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Table of Contents

Determinants of Stock Market Development- A Brief Survey of Literature

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ABSTRACT

This is a brief survey of the literature on determinants of stock market development and the role, which foreign capital plays in it. The survey focuses on macroeconomic, institutional, cultural, globalization, and microeconomic determinants. It find that stock market development is a product of multiple complex decisions.

INTRODUCTION

Similarly to globalization of trade and capital flows, securities activities worldwide have become a lot more global in the past several decades. The theoretical argument for the effects of foreign capital on stock market depth is that the additional capital would need additional banking system and stock markets financial intermediation. Foreign investors would need to finance their investment with either external capital or by selling equity. Therefore, the liquidity of stock markets will rise.

However, foreign investors have the option to list their companies not only on the local stock exchange, but also on foreign stock exchanges, including the global stock markets in New York, Tokyo etc. This process has been especially beneficial for firms, originating from emerging market economies whose stock market activities can be now moved abroad and cross-listed on the main capital market exchanges, such as New York and London (Claessens et al. 2002). Listing on the global stock market exchanges lowers costs and improves liquidly of traded shares for corporations. At the same time fully-fledged local stock exchanges become less necessary for many economies (Claessens et al. 2002).

This is a brief survey of the literature on determinants of stock market development and the role, which foreign capital plays in it. The survey focuses on macroeconomic, institutional, cultural, globalization, and microeconomic determinants, as follows.

Stock Market Development in a Macroeconomic Context.

Stock markets, as part of the financial system, are a tool for making allocation decisions when information and transaction costs are high. They help providing fund pooling, risk diversification, liquidity management, screening and monitoring (Garcia and Liu, 1999). They also help with the liquidity transformation from short-term savings to long-term investments. More recently, the financial development literature has been heavily influenced by analyses of the World Bank data set on *Financial Development and Structure* (Thorsten Beck, Aslı Demirgüç-Kunt, and Ross Levine, 1999), initially published in 1999. The *Financial Development and Structure* contains measures of the size of the banking sector and the liquidity of the stock markets. It covers a large country sample. Using the new measures of financial development, researchers have confirmed a high correlation and a causal

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relationship between them and GDP per capita growth (Beck, Demirgüç-Kunt, and Levine, 1999; Beck, Demirgüç-Kunt, and Levine 2009).shows how stock market development might boost long-run economic growth and new studies on determinants of stock market development cast light on the reverse relationship (Demirguc-Kunt and Levine, 1996; Singh, 1997; and Levine and Zervos, 1998).

A number of macroeconomic determinants of stock market development has been studied. Among them are the level of income per capita, both the investment and the saving rates, the level of private credit, stock market liquidity, interest rates and level of inflation (Garcia and Liu, 1999; Huybens and Smith, 1999; Boyd, Levine and Smith, 2001; Do and Levchenko, 2004 and Huang and Temple, 2005). In addition, several studies focus on the effects of openness on stock market capitalization and value traded. Trade openness is found to have a positive effect on stock market development (Do and Levchenko, 2004; Huang and Temple, 2005) and remittances as well (Aggarwal et.al, 2011). And in resource-rich countries, stock market capitalization has been shown to be driven by the oil price (Billmeier and Massa, 2007).

Stock Market Development in an Institutional Context.

A large share of the empirical literature on stock market development has emphasized institutional determinants. Legal systems, property rights and contract enforcement have all been proven important for capital markets in general. The seminal work by La Porta et al. (1997, 1998) shows the impact of contract enforcement in the form of protection of creditor' and shareholder' rights. Further studies show the importance of the regulatory environment in terms of judicial system, accounting standards, enforcement of the law in general, and lack of corruption (Lombardo and Pagano, 2002; Mayer and Sussman, 2001; Pistor, Raiser and Gelfer, 2000).

Stock Market Development in a Microeconomic Context.

From a microeconomic perspective the decision of where to list or cross-list a company is largely guided by shareholder protection considerations (La Porta et al., 2002, 2006; Doidge et al., 2004; Claessens and Schmukler, 2007; Smirnova, 2008). Since there is a link between firm legal origins, return distribution, and growth rate of market capitalization de-listing and cross-listing behavior of foreign firms is also of interest for the legal literature (Buchanan and English, 2007). The most often cited legal reasons are that by cross-listing shares in the U.S. is that foreign firms affiliate with a robust legal system that offers investor protection and improves reputation as well as their visibility and prestige (Coffee, 2002; Abdallah and Goergen, 2008; Fernandez and Ferreira, 2008; Lee and Valero, 2010). However, firms also cross-list to achieve greater liquidity, better capital access, increased transparency, as well as to broaden their shareholder base (Foerster and Karolyi, 1999; Miller, 1999; Doidge et al., 2009, 2004; Gozzi et al., 2008; Lel and Miller, 2008).

Stock Markets and Culture.

There is also a cultural dimension to the decision where to list a company, which resonates with the institutional economics literature. Culture could be a reason for de-listing of foreign firms, since social norms and cultural values impact economic decisions (North, 1990; Williamson, 2000; Daugherty and Georgieva, 2011). Companies have a tendency to list in countries that are culturally similar the theirs (Pagano et al., 2002; Licht, 2003) and cross-listing activities end up being clustered in geographical groupings (Sarkissian and Schill, 2003). The geographical and cultural factors often dominate the financial considerations for cross-listing behavior (Portes and Rey, 2000; Rauch, 2001).

Stock Market Convergence.

And finally, a new stream of literature has tested the hypothesis of Stock Market Convergence (Narayan et al., 2011; Brada et al.; 2005, Eun and Lee, 2010; Su et al., 2010; Fung, 2009; and Mylonidis and Kollias, 2010). Narayan et al., (2011) test specifically for stock market absolute and conditional convergence within various country groups and total data set for 120 countries. The authors find conditional convergence of stock market capitalization and value of traded stocks within the high income group, the low-income group, OECD panel, and the Sub-Saharan African group, where the speed of convergence is between 20% and 30%. Our paper confirms this result.

Stock Market Development and Foreign Capital.

One of the few studies that focus specifically on the effects of foreign capital on stock market development that we were able to find, is Claessens, Klingebiel, and Schmukler (2001). Their paper has been motivated by the migration of stock market activity to international financial centers, which occurs with globalization. First, the study finds that a relatively small number of fundamental factors that affects both domestic stock market capitalization and participation in international markets. Second, the study shows that FDI is positively correlated with stock market capitalization and value traded both at home and abroad. Claessens, Klingebiel, and Schmukler (2001) also predict that with improvement of countries' fundamentals and technology the trend towards integrate with the international financial markets, as well as migration of trading towards the international market centers will increase and domestic stock market activity will become too little to support many local markets.

Several more recent studies, supporting the result of a positive impact of FDI on stock market deepening are Soumaré and Tchana (2011), who find a causal relationship between foreign direct investment (FDI) and financial market development using panel data from emerging markets, Adam and Tweneboah, 2009), who find long-run relationship between FDI and stock market development in Ghana, using impulse responses and Variance Decomposition from Vector Error Correction Model, and Baltagi et.al. (2009), who explore the question of determinants stock market deepening by the use of country panels, comparing the impacts of trade and financial globalization of banking systems and stock markets and find a positive effect of both on stock market capitalization. The willingness to list domestically (or

cross-list with domestic exchanges) may depend on the sector of the international investor (Doytch, 2013).

Conclusion

The current survey examines the literature on determinants of stock market development and analyses the role foreign capital plays in it. It analyses the issue from the perspective of macroeconomic, institutional, microeconomic, and globalization determinants. It reveals the complexity of the decisions at the firm and the economy level that lead to stock market development.

ENDNOTE

More recently, the financial development literature has been heavily influenced by analyses of the World Bank data set on *Financial Development and Structure* (Thorsten Beck, Aslı Demirgüç-Kunt, and Ross Levine, 1999), initially published in 1999. The *Financial Development and Structure* contains measures of the size of the banking sector and the liquidity of the stock markets. It covers a large country sample. Using the new measures of financial development, researchers have confirmed a high correlation and a causal relationship between them and GDP per capita growth (Beck, Demirgüç-Kunt, and Levine, 1999; Beck, Demirgüç-Kunt, and Levine 2009).

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Relationship between Financial Intermediation and the Current Account in Egypt

Ossama Elhadary*

ABSTRACT

In this paper, the author studied the relationship between financial intermediation and the Current Account fluctuations in Egypt. The author was able to show that in Egypt, financial intermediation has both long and short run causal effects on the Current Account. On the other hand, the Current account has no long or short run causal effects on two of the financial intermediation variables (M2Y and Private) but had both long run and short run causal effect on the remaining financial intermediation variable (Privy). This latest finding comes as a surprise and will require additional research to explain it.

INTRODUCTION

In this paper, the author examined the relationship between financial intermediation and the Current Account in Egypt. The literature suggests that a lack of financial development prohibits emerging markets from successfully engaging in consumption-smoothing and thus affects the current account. Underdeveloped financial sectors are seen as an impediment for emerging economies to convert domestic savings and capital inflows into high-quality assets and thus investment, creating a shortage of assets (Caballero 2006). Thus, emerging markets with underdeveloped financial markets will—in principle—invest less than predicted by standard theory and hence will show a tendency towards current account surpluses (Hermann and Winkler, 2009).

Hermann and Winkler (2009) list three approaches that link underdeveloped financial markets with current account developments in emerging markets:

1. Financial intermediation and financial sector quality: Recent literature seems to suggest that the underdeveloped and weak financial markets hamper the ability of emerging markets to transform domestic savings into domestic investment and to engage in substantial foreign borrowing.
2. Build-up of foreign exchange reserves. Aizenman and Lee (2007) and Aizenman (2008) believe that foreign exchange reserve accumulation by emerging market economies acts as a substitute for developed financial markets in absorbing terms of trade shocks. Hermann and Winkler (2009) point out that for emerging markets to get credibility, they have to accumulate foreign assets (mainly foreign exchange reserves). This is especially true as consecutive financial crisis reveal financial sector weaknesses in emerging economies and reinforce the need to build-up foreign reserves.

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3. Financial integration. Underdeveloped financial sectors are regarded as a major obstacle for financial integration which hampers borrowing abroad and thus weakens the link between income convergence and the current account (Hermann and Winkler, 2009).

DATA

All time-series data was downloaded from the International Monetary Fund International Financial Statistics database. For all the variables (except Current Account), the data covers the period from 1960 to 2011. The Current Account data on the other hand is only available from 1977 to 2010.

The following data was downloaded:

1. Current Account (% of GDP)
2. M2 as a % of GDP
3. Domestic Credit to Private Sector (% of GDP)
4. Total Credit by Domestic Banks (% of GDP)

To calculate "private" (the ratio of credit issued to non- financial private firms to total domestic credit (excluding credit to banks), I divided the Domestic Credit to Private Sector by the Total Credit by Domestic Banks:

private= Domestic Credit to Private Sector/ Total Credit by Domestic Banks

FINANCIAL INTERMEDIATION AND THE RESEARCH VARIABLES

Hermann and Winkler (2009) believe that a higher degree of financial intermediation and a better quality of the domestic financial sector (less crisis-prone) should be associated with higher current account deficits (lower surpluses), as the financial sector is assumed to take a more active and facilitating role in fostering domestic investment.

According to Caprio and Klingebiel (2003), the ratio of private credit to GDP (Privy), and the ratio of M2 to GDP (M2Y) are variables directly capturing quantity and quality of financial intermediation in emerging Asia and emerging Europe. Besides these two variables, the author will also use "private" which is the ratio of credit issued to non- financial private firms to total domestic credit -excluding credit to banks as this variable is also believed to be a good measure of financial intermediation.

Accordingly, in this research, I will use the following variables:

- CA: is the ratio of Current Account to GDP
- M2Y: is the ratio of M2 to GDP
- Private: the ratio of credit issued to non- financial private firms to total domestic credit (excluding credit to banks)
- Privy: is the ratio of Domestic Credit to Private Sector as a percentage of GDP

The diagram below (Figure 1.) shows the variables used. Figure 2 on the other hand, shows the first difference of the variables used.

Figure 1: *Research Variables*

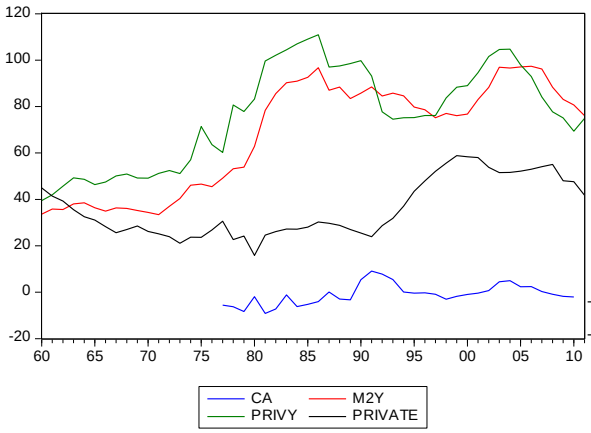
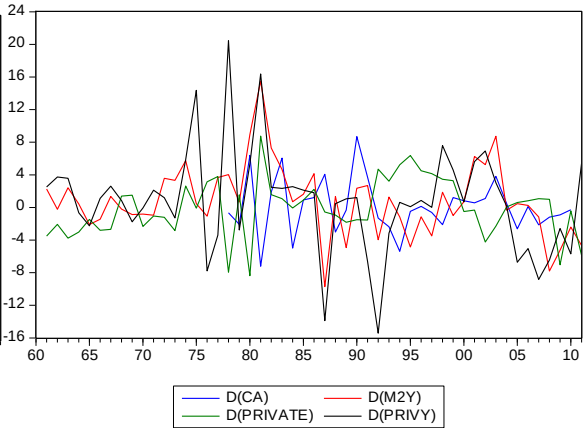


Figure 2: *First Difference of the Research Variables*



METHODOLOGY

The author will first establish the stationarity or lack of stationarity of the variables and then test for cointegration between the Current Account (CA) and the 3 financial intermediation variables (Private, M2Y, and Privy). Based on the results of the cointegration tests, the author will then construct separate VECM models with CA and the financial intermediation variables that are cointegrated with it.

To test for long run causality, the author will estimate the VECM equations using OLS and then examine the significance of the coefficient in front of the cointegrating equation. This will allow us to confirm if there is long run causality from financial integration to CA and from CA to financial integration or not.

For short run causality of financial intermediation on CA, the author will use the Wald test to confirm that the joint effect of the lags of the financial intermediation variables is significant. And to test for short term causality of CA on financial intermediation, the author will again use the Wald test to confirm that the joint effect of the lags of the CA is significant.

UNIT ROOT TEST

To confirm that the variables are I(1), the author performed the Phillips Perron unit root test which showed that all the variables have a unit root. The author then performed the same test for the difference of the variables, and the results showed that the differences do not have a unit root. This implied that the original variables (CA, M2Y, Privy, and Private) are all I(1) .

VECM SPECIFICATION

COINTEGRATION BETWEEN CURRENT ACCOUNT AND THE FINANCIAL INTERMEDIATION VARIABLES

Using Johansen's Cointegration test, the author tested for cointegration between the Current Account variable and the three financial intermediation variables (M2Y, Private, and Privy). One Cointegration relationship was found between the Current Account and each of the other variables.

LONG TERM CAUSALITY BETWEEN CA AND M2Y

To test for long term causality between CA and M2Y, we construct an Error Correction Model with CA and M2Y (Table 1.).

Table 1: VECM Model for CA and M2Y

Error Correction	D(CA)	D(M2Y)
CointEq1	-0.412	0.353
	(0.126)	(0.217)
D(CA(-1))	0.209	0.172
	(0.151)	(0.260)
D(CA(-2))	-0.156	-0.323
	(0.150)	(0.258)
D(CA(-3))	0.176	0.35
	(0.131)	(0.225)
D(CA(-4))	-0.145	-0.401
	(0.143)	(0.245)
D(M2Y(-1))	0.24	0.443
	(0.109)	(0.188)
D(M2Y(-2))	0.022	0.127
	(0.107)	(0.184)
D(M2Y(-3))	-0.368	0.077
	(0.105)	(0.180)
D(M2Y(-4))	-0.232	0.133
	(0.132)	(0.226)
c	1.02	-0.6
	(0.475)	(0.816)

The above implies the following system of equations:

- D(CA) = C(1)*(CA(-1) - 0.611991191449*M2Y(-1) + 53.256477768) + C(2)*D(CA(-1)) + C(3)*D(CA(-2)) + C(4)*D(CA(-3)) + C(5)*D(CA(-4)) + C(6)*D(M2Y(-1)) + C(7)*D(M2Y(-2)) + C(8)*D(M2Y(-3)) + C(9)*D(M2Y(-4)) + C(10)
- D(M2Y) = C(11)*(CA(-1) - 0.611991191449*M2Y(-1) + 53.256477768) + C(12)*D(CA(-1)) + C(13)*D(CA(-2)) + C(14)*D(CA(-3)) + C(15)*D(CA(-4)) + C(16)*D(M2Y(-1)) + C(17)*D(M2Y(-2)) + C(18)*D(M2Y(-3)) + C(19)*D(M2Y(-4)) + C(20)

To test for long term causality between CA and M2Y, we are especially interested in C(1) and C(11). Note that:

- C(1) is the coefficient in front of the cointegrating equation and represents the causality from M2Y to CA.
- C(11) is the coefficient in front of the cointegrating equation and represents the causality from CA to M2Y.

By estimating the above 2 equations using OLS (see table 2.), it is clear the C(1) is significant and negative at the 5% level, while C(11) is not. We can thus conclude that there is causality from M2Y to CA, but not vice versa (i.e.: there is no long run causality from CA to M2Y).

Table 2: *OLS Estimation of VECM model with CA and M2Y*

	Coefficient	Std. Error	t-statistic	Prob
C(1)	-0.412	0.126	-3.275	0.002
C(2)	0.209	0.151	1.38	0.175
C(3)	-0.156	0.15	-1.045	0.303
C(4)	0.176	0.131	1.346	0.186
C(5)	-0.145	0.143	-1.018	0.315
C(6)	0.24	0.109	2.198	0.034
C(7)	0.022	0.107	0.202	0.841
C(8)	-0.368	0.105	-3.524	0.001
C(9)	-0.231	0.131	-1.762	0.086
C(10)	1.02	0.475	2.149	0.038
C(11)	0.377	0.213	1.72	0.093
C(12)	0.154	0.255	0.602	0.551
C(13)	-0.314	0.254	-1.237	0.224
C(14)	0.352	0.222	1.583	0.122
C(15)	-0.377	0.24	-1.574	0.124
C(16)	0.432	0.185	2.337	0.025
C(17)	0.147	0.179	0.824	0.415
C(18)	0.111	0.171	0.649	0.52
C(19)	0.13	0.223	0.584	0.562
C(20)	-0.753	0.775	-0.971	0.338

SHORT TERM CAUSALITY FROM M2Y TO CA

To test for short run causality from M2Y to CA, we need to test if the joint effect of the 4 lags of M2Y are significant or not. We can do this by setting C(6)=C(7)=C(8)=C(9)=0 using the Wald Test. The results of the test are shown in table 3.

Table 3: *Wald Test for 4 Lags of M2Y*

Test Statistic	Value	df	Probability
Chi-square	23.21	4	0.0001

Because the probability is smaller than .05, it is evident that we can reject the null that C(6)=C(7)=C(8)=C(9)=0, which implies that there is a short run causality from M2Y to CA.

SHORT TERM CAUSALITY FROM CA TO M2Y

To test for short run causality from CA to M2Y, we need to test if the joint effect of the 4 lags of CA are significant or not. We can do this by setting C(12)=C(13)=C(14)=C(15)=0 using the Wald Test. The results of the test are shown in table 4.

Table 4. *Wald Test for 4 Lags of CA*

Test Statistic	Value	df	Probability
Chi-square	6.422	4	0.17

Because the probability is greater than .05, it is evident that we can not reject the null that C(12)=C(13)=C(14)=C(15)=0, which implies that there is no short run causality from CA to M2Y.

LONG TERM CAUSALITY BETWEEN CA AND PRIVATE

Similarly, to test for long run causality between CA and Private, we construct an Error Correction Model with these two variables. The results of the model imply the following system of equations:

- D(CA) = C(1)*(CA(-1) - 0.0213036413436*PRIVATE(-1) + 1.09720529618) + C(2)*D(CA(-1)) + C(3)*D(CA(-2)) + C(4)*D(CA(-3)) + C(5)*D(CA(-4)) + C(6)*D(PRIVATE(-1)) + C(7)*D(PRIVATE(-2)) + C(8)*D(PRIVATE(-3)) + C(9)*D(PRIVATE(-4)) + C(10)
- D(PRIVATE) = C(11)*(CA(-1) - 0.0213036413436*PRIVATE(-1) + 1.09720529618) + C(12)*D(CA(-1)) + C(13)*D(CA(-2)) + C(14)*D(CA(-3)) + C(15)*D(CA(-4)) + C(16)*D(PRIVATE(-1)) + C(17)*D(PRIVATE(-2)) + C(18)*D(PRIVATE(-3)) + C(19)*D(PRIVATE(-4)) + C(20)

To test for long term causality between CA and Private, we are especially interested in C(1) and C(11). Note that:

- C(1) is the coefficient in front of the cointegrating equation and represents the causality relation of Private on CA.
- C(11) is the coefficient in front of the cointegrating equation and represents the causality relation of CA on Private.

By estimating the above 2 equations using OLS, we realize that C(1) is significant at the 5% level, while C11 is not. This implies that on the long run, Private causes CA but not vice versa.

SHORT TERM CAUSALITY FROM PRIVATE TO CA

To test for short run causality from Private to CA, we need to test if the joint effect of the 4 lags of Private are significant or not. We can do this by setting C(6)=C(7)=C(8)=C(9)=0 using the Wald Test.

Because the probability is smaller than .05, it is evident that we can reject the null that C(6)=C(7)=C(8)=C(9)=0, which implies that there is a short run causality from Private to CA.

SHORT TERM CAUSALITY FROM CA TO PRIVATE

To test for short run causality from CA to Private, we need to test if the joint effect of the 4 lags of CA are significant or not. We can do this by setting C(12)=C(13)=C(14)=C(15)=0 using the Wald Test. Because the probability is greater than .05, we fail to reject the null that C(12)=C(13)=C(14)=C(15)=0, and this implies that on the short run, there is no causality from CA to Private.

LONG TERM CAUSALITY BETWEEN CA AND PRIVY

Now, to test for long run causality between CA and Privy, we construct an Error Correction Model with these two variables. The results of the model imply the following system of equations:

- D(CA) = C(1)*(CA(-1) - 1.28894606143*PRIVY(-1) + 118.838447074) + C(2)*D(CA(-1)) + C(3)*D(CA(-2)) + C(4)*D(CA(-3)) + C(5)*D(CA(-4)) + C(6)*D(PRIVY(-1)) + C(7)*D(PRIVY(-2)) + C(8)*D(PRIVY(-3)) + C(9)*D(PRIVY(-4)) + C(10)
- D(PRIVY) = C(11)*(CA(-1) - 1.28894606143*PRIVY(-1) + 118.838447074) + C(12)*D(CA(-1)) + C(13)*D(CA(-2)) + C(14)*D(CA(-3)) + C(15)*D(CA(-4)) + C(16)*D(PRIVY(-1)) + C(17)*D(PRIVY(-2)) + C(18)*D(PRIVY(-3)) + C(19)*D(PRIVY(-4)) + C(20)

To test for long term causality between CA and Private, we are especially interested in C(1) and C(11). Note that:

- C(1) is the coefficient in front of the cointegrating equation and represents the causality relation of Privy on CA.
- C(11) is the coefficient in front of the cointegrating equation and represents the causality relation of CA on Privy.

By estimating the above 2 equations using OLS we realize that that both C(1) and C(11) are significant at the 5% level. This implies that there is causality from Privy to CA and also from CA to Privy.

SHORT TERM CAUSALITY FROM PRIVATE TO CA

To test for short run causality from Privy to CA, we need to test if the joint effect of the 4 lags of Privy is significant or not. We can do this by setting C(6)=C(7)=C(8)=C(9)=0 using the Wald Test. Because the probability is smaller than .05, it is evident that we can reject the null that C(6)=C(7)=C(8)=C(9)=0, which implies that there is a short run causality from Privy to CA.

SHORT TERM CAUSALITY FROM CA TO PRIVY

To test for short run causality from CA to Privy, we need to test if the joint effect of the 4 lags of CA is significant or not. We can do this by setting C(12)=C(13)=C(14)=C(15)=0 using the Wald Test. Because

the probability is smaller than .05, it is evident that we can reject the null that C(12)=C(13)=C(14)=C(15)=0, which implies that there is a short run causality from CA to Privy.

CONCLUSION

In this paper, the author studied the relationship between financial intermediation and the Current Account fluctuations in Egypt. Three measures from the literature were used as proxies of financial intermediation: 1) the ratio of M2 to GDP (M2Y), 2) the ratio of credit issued to non- financial private firms to total domestic credit excluding credit to banks (Private), and 3) the ratio of Domestic Credit to Private Sector as a percentage of GDP (Privy).

Previous research suggests that the lack of financial development prohibits markets from successfully engaging in consumption-smoothing and thus affects the current account. In terms of financial intermediation (which is the focus of this paper), the underdeveloped and weak financial markets hamper the ability of emerging markets to transform domestic savings into domestic investment and to engage in substantial foreign borrowing (Hermann and Winkler, 2009) thus again affecting the Current Account. The author was able to show that in Egypt, financial intermediation has both long and short run causal effect on Current Account.

It is worth noting that in this paper, the long run causality from financial intermediation to the Current Account was always negative which confirms Hermann and Winkler's (2009) assertion that a higher degree of financial intermediation is associated with higher current account deficits. This implies that a weak financial sector will prohibit emerging markets from successfully engaging in consumption-smoothing and thus affects the current account.

On the short run, the above three variables also had a direct causal effect on Current Account. It is interesting to note here that Current Account had no long or short run causal effect on two of the three financial intermediation variables (M2Y and Private), but it had both long and short term causal effect on the third variable (Privy). This latest finding comes as a surprise and will require additional research to explain it.

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The Term Structure of State Bond Interest Rates

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ABSTRACT

This paper uses daily trade data from the EMMA database (Electronic Municipal Market Access) for the period 2004-2012 to examine the behavior of interest rates on state-issued bonds, particularly the influence of local employment shocks on state bond yields and premiums relative to US Treasury rates. This is a topic of important public policy relevance due to the budget woes of many of the US states since prices of fixed-income securities are influenced by changing beliefs about the riskiness of the future cash flows.

INTRODUCTION

This study uses a panel of bond data from the *Emma* online database, Electronic Municipal Market Access, provided by the Municipal Securities Rulemaking Board (MSRB). We concentrate on general obligation bonds issued by US states. Whereas some bonds might be backed by specific revenue streams (toll roads, hospitals, universities or the like), general obligation bonds are ultimately guaranteed by tax revenue, "the full faith and credit of the State." The contribution of this study is to document the ways in which the spread of state general obligation bonds from Treasuries varies with information about state economic conditions.

The muni market underwent major innovations as the 2009 US federal stimulus allocated money to states for them to issue non-tax-advantaged bonds. Although most US capital markets have become internationalized in past decades, peculiarities in tax treatment of munis has meant that these markets do not attract much foreign investment. Muni yields are low since they are tax-free so a foreign investor, which would not benefit from the tax avoidance, would be deterred by the lower yields. State borrowing is implicitly subsidized by federal taxation. The federal government instituted a new program ("Build America Bonds") that would convert these implicit subsidies into explicit payments from the federal to state level; states would benefit by selling their bonds to a deeper international market. Although this study does not address this new development (all analysis excludes the new non-tax-preferred bonds), these developments remind us how important the muni market is to questions of public finance.

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Literature Review

The most important finding from various studies of the muni market is to establish a puzzle that the different state yields are not adequately explained by marginal tax rates, so other risk characteristics of the bonds are more important to establish their prices and yields. This initial insight was formalized in Miller (1977) that bonds with different tax rates but otherwise identical risks would equalize their post-tax rate of return. Differences that are not explained by tax are therefore attributed to various risks. However data limitations of previous studies have often meant using annual or even lower-frequency data to establish rough correlations: the richness of the underlying market data was difficult to explore.

There are a few prior studies using the high-frequency trade data from EMMA rather than indexes or other second-hand data. Ang et al (2010) use EMMA data for the period 1995-2007 to compare taxed and un-taxed bond prices issued by the same entity, identifying differences due both to default and liquidity risk. They attempt to isolate the liquidity risk by partitioning bonds by quantile of number of trades. They conclude that the price reaction to taxes is too high for a rational story, but the preponderance of individual trades means that it is difficult for other participants to arbitrage this overreaction. Downing and Zhang (2004), also with EMMA data, use weekly intervals to account for the infrequency with which state bonds are often traded. Deng and McCann (2013) find some evidence that the new EMMA access to bond data has reduced markups for market makers. Wang et al (2005) construct an aggregate liquidity measure from EMMA data to assess an individual bond's 'beta' with respect to this liquidity measure, using data from 2000-2004. The liquidity differential also helps explain the finding that the tax-implied spread changes by maturities. Harris and Piwowar (2006) use MSRB data from 1999-2000 to estimate that trading costs are 1-2% of the transaction in the market for state bonds. Pirinsky and Wang (2011) provide evidence that the highly segmented markets result in higher bond returns.

Chalmers (1998) uses grid prices of various bonds including defeased bonds to show that actual prices are not well explained by tax differentials. Kadiyala (2007) uses index data from 1995-2005 to estimate a liquidity premium to explain part of the puzzle that tax rates and default rates alone are insufficient to explain the spread of municipal bonds from corporate bonds. This premium is measured following Longstaff (1995), who derives an upper bound on the discount for lowered liquidity. Other studies such as Kriz (2004) estimate the magnitude of default probabilities, although using index data for 1993-1999.

Nadler and Hong (2011) use data from a Bloomberg index of hypothetical generic bonds. They identify the spread from Treasury as the default risk, as a function of state GDP, deficit/state GDP ratio, and unemployment rate, as well as measures of political affiliation and union strength. They have annual data on budgets and concentrate their analysis on lower-frequency (annual) information. Daniels et al (2010) compare issuance of munis and corporate bonds.

Another source of information is muni bond funds; Chen et al (2011) document calendar effects at quarter ends and especially year ends, documenting the residual importance of tax avoidance. (Jones

and Stroup, 2013) use annual state data, along with Fama-French factors, to explain mispricing of closed-end funds of state bonds.

(Poterba and Ramírez, 2011) provide a range of estimates for the size of the subsidy due to the exemption of state bonds from federal income tax, using data from the Fed's Survey of Consumer Finances. Poterba and Rueben (1999) examine how state political factors such as balanced-budget requirements and spending limits, as well as state unemployment rates, can impact bond yields using data from 1973-1999, using data from a survey of bond traders.

Data

The markets for bonds of the largest state issuers are large and liquid. Table 1 shows the top ten states by average daily par amount traded in 2009-2012. There was a precipitous drop of trading after the Financial Crisis: from 2008 to 2009 the value of trades dropped 31%; from 2009 to 2010 there was only a slight drop of one-third of a percent. Most of the drop was in Auction Rate and Variable Rate securities after those auctions failed in the Crisis; these are omitted from the current analysis. The focus of uncertainty turned to the financial conditions of the issuers.

Table 1: Average Daily Par Amount of All Muni Bonds by State

	2009	**2010**	**2011**	**2012**
California	3146	2833	2320	2080
New York	1702	1742	1613	1690
Texas	1245	1261	1120	1289
Florida	911	757	530	486
Illinois	530	635	556	497
New Jersey	448	490	459	537
Pennsylvania	531	512	451	437
Massachusetts	479	486	448	413
Ohio	344	358	310	280
Georgia	371	288	229	187

Source: MSRB Factbook, 2012.

The interest rate on munis differs from the rate offered on US Treasuries for two important reasons: the tax advantages of municipal bonds that are exempt from US income taxation and the risk characteristics of the future cash flows. The changes to federal tax law are infrequent and well anticipated. The risk characteristics change at a higher frequency and are the subject of the current study.

Defaults are quite rare however; a study by Moody's in 2010 found that munis defaulted at a rate of just 0.09% over a decade whereas corporates had a default rate of just over 11% over a decade; most muni defaults (over 90%) were not general obligation bonds.

There are 1,985,343 observations for general obligation bonds of 35 different states in various series in 2004-2012 that have positive yields and were bought or sold for external customers (not inter-dealer trades). From the reported bond price, the implied yield-to-maturity is calculated for each traded security; the bonds of each state, in each time period, are fit to a zero coupon yield curve by the Nelson-Siegel method.

The time to maturity of bonds traded is shown in table 2, listing the fraction of the sample at each interval. Muni bonds are thickly traded all along the yield curve.

Table 2: Time to Maturity of State Bonds

1 year or less	0.132
2-5 years	0.237
6-10 years	0.233
10-20 years	0.287
21+ years	0.110

Source: Authors' calculations based on EMMA data.

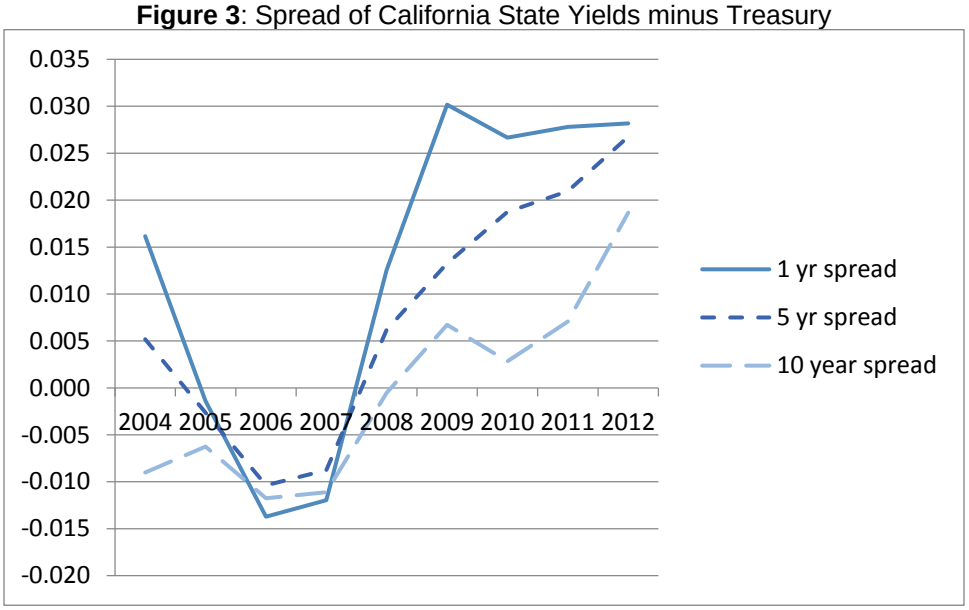
These bond trades for each state are used to construct constant-maturity yields. Perhaps the most surprising aspect of the yields is that it is nearly impossible to distinguish the years before and after the Financial Crisis, even though this means that the spreads from Treasuries inverted.

Figure 3 shows the spread, measured as state yield minus the Treasury rate so that the 'normal' value is negative. For California's ten-year bonds, before the Crisis, yields were about a percentage point less than Treasuries; after the crisis, yields were higher than Treasuries.

What models could account for this behavior? One model would assert that simply the state bond market is segmented from the Treasury market, that market participants believe that state and federal bonds are very poor substitutes. Alternately, the risks of the individual states changed from those of the federal government. If much of the change represents a huge injection of liquidity by the Federal Reserve into the Treasury market, then this can simply be considered as a relative change in liquidity risk between state and federal obligations. Nevertheless in any of these cases, we would expect to see differences among states since their economic experiences showed significant variation.

There is enormous heterogeneity in state bond yields. Using monthly 1-year maturities for 27 states with comprehensive data availability (at least 100 of the 108 months in the sample), a factor analysis shows little common movement in the state yields: the first principal component explains just 9.3% of the variance.

Figure 3: Spread of California State Yields minus Treasury



Source: Authors' calculations based on EMMA data.

Daily yields on state general revenue bonds are not well explained by contemporary movements in Treasuries. For example, table 3 shows the R-squared for regressions explaining daily yields of general obligation bonds of New York State, depending on the entire yield curve of Treasuries (from one month bills to 10-year bonds)

Table 3: R^2 for regressions of indicated dependent variable on Treasury yield curve rates

New York State:	1m yields	3m yields	6m yields	1yr yields	5yr yields	10yr yields
R^2	0.068	0.041	0.045	0.031	0.053	0.125

Source: Author calculations using data from EMMA and Fed Board of Governors

Clearly 85-90% of the variation in muni yields is not explained by Treasury movements. It would be useful to investigate other factors that influence the muni yields, particularly if these yields reflect market expectations of state solvency.

To determine how state-level economic shocks affect these yields, we use monthly state employment data from the US Bureau of Labor Statistics. These are collected based on the twelfth day of each month (except when that is a weekend or holiday, when BLS uses the working day prior). State employment data is likely to be a good proxy for state financial conditions and ability to pay, since state revenues depend on tax receipts. State employment data is also reported in a coherent standardized way by an agency external to the various states. As other sovereign entities such as Greece or Argentina have demonstrated, economic statistics collected by local agencies are susceptible to political manipulation. In

the case of the US Bureau of Labor Statistics, their collection and reporting methodology is meant to be impartial.

Estimation

First we estimate monthly bond yields affected by state employment shocks. We experiment with specifying the dependent variable as either the state bond yield or the difference between the state bond yield and US Treasuries. Notate the interest rate on τ-year maturity bonds for state j in month t as $r_{j,t}^{\tau}$; the US Treasury rate as R_t^{τ}; so the dependent is either $r_{j,t}^{\tau}$ or $\left(r_{j,t}^{\tau} - R_t^{\tau}\right)$. To the extent that state bonds are segmented from the Treasury market we would expect that the first specification would be more appropriate; if the risk is different from Treasury rates then the second specification would be more informative. Both the bond yields and employment data refer to the same time, the twelfth day of the month or, if that day is a holiday, the work day before. Bond yields are observed on that day although the employment report is published subsequent.

We begin with a basic regression where the dependent variable is the one year maturity state bond yields, while the independent variables include the level or log of state employment, $Empl_{j,t}$ fixed effects for each of the 35 issuing states, α_j, and year/month dummies, γ_t, m_t, so

$$r_{j,t}^{\tau} = \alpha_j + \gamma_t + m_t + \beta Empl_{j,t} + \varepsilon_{j,t}^{\tau}.$$

We would expect that positive employment growth would lower the state interest rate while negative employment shocks would make the state's borrowing relatively riskier, increasing the yield – so we would expect β<0. The regression results for one-year maturity are in table 4.

Table 4: State Bond Yields, 1 year maturity

	Empl	**ln(Empl)**	**Empl**	**ln(Empl)**
coefficient	-1.255e-06	-0.00692	-4.282e-07	0.000277
t-stat	-1.480	-1.582	-0.444	0.044
state fixed effects	y	y	y	y
time dummies	n	n	y	y

For 35 states with general-obligation bonds, monthly 2004-2012, dependent is state yield.

These estimates are generally insignificantly different from zero. For the next specification we use the difference of state bond yields from Treasuries, with estimation results in table 5.

$$r_{j,t}^{\tau} - R_t^{\tau} = \alpha_j + \gamma_t + m_t + \beta Empl_{j,t} + \varepsilon_{j,t}^{\tau}.$$

Table 5: State Bond Yields Difference from Treasuries, 1 year maturity

	Empl	**ln(Empl)**	**Empl**	**ln(Empl)**
coefficient	-4.88e-05	-0.378695	-2.48e-06	-0.02774
t-stat	-21.575	-35.620	-2.235	-3.793
state fixed effects	y	y	y	y
time dummies	n	n	y	y

For 35 states with general-obligation bonds, monthly 2004-2012, dependent is state yield minus Treasury yield.

In these estimates, the specifications of the difference of state yields from Treasuries, the estimated coefficients are statistically significant and with the expected sign. Next we examine the 5-year maturity, table 6.

Table 6: State Bond Yields, 5 year maturity

Dependent is State Bond Yield, 5 year maturity				
	Empl	**ln(Empl)**	**Empl**	**ln(Empl)**
coefficient	8.555e-07	0.0060919	6.261e-07	6.63e-03
t-stat	1.445	1.994	0.929	1.495
state fixed effects	y	y	y	y
time dummies	n	n	y	y
Dependent is State Bond Yield minus Treasury, 5 year maturity				
	Empl	**ln(Empl)**	**Empl**	**ln(Empl)**
coefficient	-4.67e-05	-0.366283	-1.41e-06	-0.02109
t-stat	-21.698	-36.427	-1.660	-3.771
state fixed effects	y	y	y	y
time dummies	n	n	y	y

For 35 states with general-obligation bonds, monthly 2004-2012, dependent is state yield in top panel; state yield minus Treasury in bottom panel.

The coefficient estimates are quite stable, as we move from the one-year to the five-year maturities, implying that state employment shocks are nearly a parallel shift in the state's yield curve. This is sensible if employment shocks have a long decay.

Moving to the ten-year yields, results are in Table 7.

Table 7: State Bond Yields, 10 year maturity

Dependent is State Bond Yield, 10 year maturity				
	Empl	ln(Empl)	Empl	ln(Empl)
coefficient	3.340e-08	-0.001627	1.044e-07	1.478e-03
t-stat	0.053	-0.275	0.145	0.313
state fixed effects	y	y	y	y
time dummies	n	n	y	y
Dependent is State Bond Yield minus Treasury, 10 year maturity				
	Empl	ln(Empl)	Empl	ln(Empl)
coefficient	-4.75e-05	-0.371376	-1.94e-06	-2.61e-02
t-stat	-21.713	-36.284	-2.185	-4.484
state fixed effects	y	y	y	y
time dummies	n	n	y	y

For 35 states with general-obligation bonds, monthly 2004-2012, dependent is state yield in top panel; state yield minus Treasury in bottom panel.

In each maturity specification we see the same pattern. There is generally no statistically significant relation between state yields and state employment levels; the relationship is revealed by taking the difference of state yields from Treasuries. For a range of Fed reaction functions, whether Taylor Rules or similar, Treasury yields are likely related to aggregate employment levels. This aggregate correlation swamps the individual differences that are revealed by looking at the spreads.

Adding lagged employment growth does not change the basic result: bond yields are not affected by employment while bond spreads are negatively related to employment growth. With a variety of lag specifications up to six months (although AIC and BIC indicate shorter lengths) the results are similar. Positive employment shocks cannot be shown to not Granger-cause decreases in the spread of state bond yields from Treasuries.

Splitting the sample before and after 2008 shows the same general pattern of signs; the negative impact of employment changes upon yields is statistically significant up to 2008 but without statistical significance in the later years.

Further Research

In examining the structure of state bond issuance, one question that rises to the front is, why is there a relatively limited number of capital instruments available to municipalities? (Robert Shiller,1998) has made this point in other contexts. Firms can issue debt, equity, and various combinations of those (convertibles, warrants, etc.). Would it be sensible for municipalities to issue some number of state-contingent securities, which could better span the relevant states of nature? For example, a state could issue a bond that would not make interest payments in any year when the state's employment fell. Although such bonds would have more uncertain cash flows to investors, they could help a state's fiscal position by lessening budgetary pressure at times when (due to exogenous economic shocks) the state's ability to pay is likely to be most limited. This is analogous to the state buying insurance against employment shocks.

Of course the issuance of such bonds would depend on the discount: if investors demanded a steep discount then states would be unwilling to buy insurance at such high rates. One goal of future research is to model the likely discount that current bond-pricing dynamics would imply.

Consider a sketch of such a bond. If the issuer were expected to skip a year's payment once during the twenty-year life of the bond then this would reduce the value of the bond by as much as 4% (if the skipped payment were the very first year) or as little as 1.5% (if the skipped payment were not for 20 years). The bonds would have a greater price volatility particularly as the duration lessened: a bond that matures in one year, that might skip the final year's interest payment, would not smoothly converge to a final price at maturity (as most valuation models assume) but would have a big discontinuous jump depending on whether the trigger were hit to skip a payment. Stripped coupons would be even more volatile. However this would allow investors to maintain exposure to state-specific risks and would open the range of instruments and "macro markets" that have been suggested by authors such as Robert Shiller. States would in turn receive information about market beliefs about their economic future.

In designing possible instruments, one consideration is paramount: the bonds must be structured so that the trigger is plausibly exogenous. State unemployment or job-creation rates are not only insensitive to current state policies but, in the US, are measured by an impartial federal agency. Other sovereign entities (e.g. Greece) would likely not be able to commit to similar triggers because the sovereign entity

controls the very data collection. Sovereign issuers such as Greece and Argentina have already demonstrated a willingness to falsify economic statistics to hide budget woes. To issue such trigger bonds, a sovereign entity would need to find some statistic that is plausibly beyond its government's influence.

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Examining the Influence of Microfinance on Household Conditions in Hyderabad, India

Tara Fleming*

ABSTRACT

While predicting whether or not a person will default on a loan is nigh unto impossible, modeling the probability that they will incur back-debt by the frequency of missing payments could be a reasonable proxy for this measure. This paper aims to do this by regressing the number of loans that have gone into default during any cycle on a host of measures designed to assess the individual's ability to pay back the loans. The observations have been drawn from a survey of 2,800 households in India. I am interested to see if my logical predictions of which characteristics will cause an individual to fall into default will be proven accurate. The results of this analysis could potentially help microfinance institutions make more-informed decisions regarding whom to provide loans to, in order to minimize their risk factors. Moreover, I am intrigued to analyze the theory that females make better loan candidates than males. On one hand, it does seem logical that their business revenues will be reinvested within the family, engendering more consumption in the community. But will the increase in disposable income from successful businesses affect both genders of borrowers the same?

INTRODUCTION

The aim of microfinance is to make simple financial services available to impoverished peoples who otherwise would not have access to it. Micro-loans, -savings, and –insurance are all types of microfinance offered to people living in poverty. The loans are typically small and their maturity lengths are shorter than average, usually about one year. Microloan stipulations tend to be quite strict, requiring their recipients to attend weekly meetings for installment paybacks and business or personal finance training. Across many sources, it is found that around seventy percent of those living in the most extreme situations of poverty are women. Many microfinance institutions target their loans to these women because they are believed to be more likely to invest their loaned funds in conservative business ventures and to reinvest profits in their families or children's educations, thus increasing the social wellbeing of the entire community. Does this make their ability to repay loans greater than the men? Beyond logicality, does favoritism towards women reward institutions with profits? How can one tell?[*] While predicting whether or not a person will default on a loan is nigh unto impossible, modeling the probability that they will incur back-debt by the frequency of missing payments could be a reasonable proxy for this measure. I will attempt to do this by regressing the number of loans that have gone into default for any cycle on a

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host of measures designed to assess each individual's ability to pay back the loans. I am interested to see if my logical predictions of what characteristics will cause an individual to fall into default will be proven accurate. The results of this analysis could potentially help microfinance institutions make more-informed decisions regarding who to provide loans to, in order to minimize their risk factors while still generating profit. Moreover, I am intrigued to prove or disprove the theory that females make better loan candidates than males. On one hand, it does seem logical that their business revenues will be reinvested within the family, spawning more consumption throughout the community and thus boosting incomes even more. But will the increase in disposable income stemming from successful businesses affect both genders of borrowers the same? Will this affect their comparative ability to repay loans?

DATA BACKGROUND

The data used for this analysis was pulled from a cross-sectional survey of 2,800 (randomly-chosen) impoverished households in Hyderabad, Andhra Pradesh, India. The survey was initiated by the Spandana microfinance company and was conducted in 2005. It spanned across 120 slums distributed throughout the area that were viewed as new market potential. The data was collected provisional on having an adult woman as a permanent resident in the household, making this sample a fitting choice for this regression. Although information was collected on all members of the household, I will use only the 1,891 observations aligning with the heads of each household. My rationale for this is based upon the fact that an analysis of ability to repay loans is contingent on an individual's credentials to receive loans. Thus, I have eliminated the children and those individuals in each household whose names do not appear on the loans. The original collection and analysis of this data was done by Abhijit Banerjee, Esther Duflo, Rachel Glennerster, and Cynthia Kinnan in their paper entitled: "Measuring the impact of microfinance in Hyderabad, India." (Banerjee, Duflo, Glennerster, and Kinnan, 2008)

ALTERATIONS ON THE DATA SET

Some formatting changes were made on the original data set in order to be used in this regression analysis. As mentioned, only observations concerning the characteristics of the household heads were desired. Some information concerning the remaining members of the households was still deemed necessary however, so I have reformatted the individual observations of those members so they can be accounted for as well. For instance, the remaining number of observations beyond each household head was calculated in order to include a measure of the total number of residents per household in the regression. Children were accounted for in a measure of whether or not any of the remaining individuals were of or below the age of sixteen. Additionally, some of the household heads were recorded as maintaining two jobs, and total earnings in the month preceding the survey were given for each. These were combined for simplicity purposes, adding zero to the first measure for each individual that did not work a second job. Individual loan amounts were totaled, although the actual number of loans both past and present was extracted into its own category. Finally, for every individual, the number of loans that

they had let slip into default for any one or more payment cycle(s) was quantified in addition to the existing dummy variable which simply represents whether or not that individual had ever made late payments.

INDEPENDENT VARIABLES AND DESCRIPTIONS

TABLE 1: Independent Variables

Variable Name	Variable Description
Age	Age of head of household (HH) at time of survey
BankSavingsAcco	Does HH have bank or savings account? (1=yes)
Childrenle16	Are there children 16 or under living in the household? (1=yes)
College	Is the HH's highest level of education college? (1=yes)
DeathsinthePast	Were there any major deaths in the family within the past year? (1=yes)
Employment	Is the HH employed at time of survey? (1=yes)
Gender	Gender of HH (1=male)
HHConditionPoor	Does the HH consider the household to be poor? (1=yes)
HS	Is the HH's highest level of education high school? (1=yes)
InsurancePolicy	Does the HH have some type of insurance policy? (1=yes)
LateRepayments	Have there been any late repayments for any cycle of the loan history? (1=yes)
Literacy	Is the HH literate? (1=yes)
LossofJobBusine	Has there been any loss of employment or closed businesses? (1=yes)
MaritalStatus	Is the HH married? (1=yes)
NuLateRepayment	Number of loans that went into default for any cycle
NumberinHH	Number of individuals living in the household
NumberofLoans	Number of loans (past and present)
PostGrad	Is the HH's highest level of education post-graduate studies? (1=yes)
RupeesonSickness	Any significant (500+ Rupees) expenditures on sickness? (1=yes)
TotalEarnings	Total earnings from job(s) in the past month (in Rupees)
TotalinLoans	Summation of all loans, both present and past (in Rupees)
**A dummy variable for "No education" was excluded to avoid perfect multicollinearity with the constant term*	

I have chosen to begin with these selected variables for this analysis because they will be good indicators of each individual's ability to repay loans. For instance, as the variable 'Childrenle16' increases I would also expect to see an increase the amount of loans allowed to go into default after factoring in the extra expenses, both time away from work and dollars spent, associated with caring for young children. Likewise, a household that had experienced any recent deaths or expensive sicknesses in the family would likely be facing steep and unexpected costs that might inhibit their ability to maintain a constant repayment schedule. The 'Gender' variable is especially important to this regression as it will help to explain my second hypothesis which was extracted from common thought: in the eyes of the microfinance institution, women are better borrowers than men. 'HHConditionPoor' is an interesting addition to this regression as it gives a reflective measure of the household's view of its own condition. This variable could potentially a proxy for how consumer (borrower) confidence affects repayment structure. Other variables like education which is represented by a series of dummy variables, insurance policies, literacy, marital status, and earnings all are expected to decrease the amount of loans allowed to default.

A Poisson regression will be used to model the finite number of possible outcomes for this regression. It is commonplace that a dependent variable with possible values that take on a maximum mean of [around] 10 could be subject to a Poisson distribution. In this case, it is possible to accurately model the data with a log model where it is assumed that the mean and variance of the distribution are equal. However, this occurrence does not often occur in practical situations. Instead, the variance is frequently greater than the mean of the data. This predicament violates the aforementioned assumption of the Poisson regression and is called "overdispersion." To correct this, the data can be fitted to a negative binomial regression which does not assume that the mean is equal to the variance. By observing the spreadsheet of organized data, I expect that this will be the case in this situation. The characteristics of the observations, particularly those that have experienced some amount of delayed repayments, vary greatly throughout the observations.

RESULTS

1. Model I: Poisson Regression

Poisson, using observations 1-1891
Dependent variable: NuLateRepayment

	Coefficient	*Std. Error*	*z*	*p-value*	
const	0.0408765	0.179821	0.2273	0.82018	
Gender	0.045349	0.154405	0.2937	0.76899	
Age	-0.00961331	0.00248117	-3.8745	0.00011	***
Literacy	0.0798282	0.262563	0.3040	0.76110	
HS	-0.29521	0.261664	-1.1282	0.25923	
College	-0.71704	0.329672	-2.1750	0.02963	**
PostGrad	0.193594	0.440441	0.4395	0.66027	
MaritalStatus	-0.0642675	0.152882	-0.4204	0.67421	
NumberinHH	0.00841962	0.0143421	0.5871	0.55717	
Childrenle16	-0.0632752	0.0641165	-0.9869	0.32370	
Employment	-0.186901	0.0810885	-2.3049	0.02117	**
TotalEarnings	-1.5538e-05	1.06966e-05	-1.4526	0.14633	
DeathsinthePast	0.276254	0.073006	3.7840	0.00015	***
RupeesonSicknes	-0.00815229	0.0473261	-0.1723	0.86324	
LossofJobBusine	0.0857083	0.0763755	1.1222	0.26178	
NumberofLoans	0.281673	0.0103613	27.1851	<0.00001	***
BankSavingsAcco	-0.0447815	0.0549951	-0.8143	0.41548	
InsurancePolicy	-0.0338688	0.0587639	-0.5764	0.56438	
HHConditionPoor	-0.158515	0.0592095	-2.6772	0.00742	***
TotalinLoans	8.87748e-07	2.48202e-07	3.5767	0.00035	***

Mean dependent var	0.986779	S.D. dependent var	1.496145
Sum squared resid	3301.215	S.E. of regression	1.328312
McFadden R-squared	0.137362	Adjusted R-squared	0.130410
Log-likelihood	-2482.004	Akaike criterion	5004.008
Schwarz criterion	5114.905	Hannan-Quinn	5044.842

Overdispersion test: Chi-square(1) = 49.347 [0.0000]

At first glance, many of the predicted explanatory variables discussed above appear to be significant. College education, employment, and low confidence (considering the household to be of poor status) all appear to significantly lower the occurrence of default. According to these results, both the number of current outstanding loans and a recent death in the family will have positive effects on the amount of loans allowed to enter into a defaulted state. However, the combination of these independent variables does not seem to explain much about the distribution of this data set (13.7%). The overdispersion test for this regression also fails because the chi-square test-statistic is considerably higher than the critical value at this degree of freedom. This suggests that the data could in fact be better modeled by a different distribution. As discussed, a common solution to this issue is to assume that the data follows a negative binomial distribution where the conditional mean does not necessarily equal the variance.

2. Model II: Negative Binomial Regression

Negative Binomial, using observations 1-1891
Dependent variable: NuLateRepayment
Standard errors based on Hessian

	Coefficient	*Std. Error*	*z*	*p-value*	
const	-0.342519	0.236018	-1.4512	0.14671	
Gender	0.0729121	0.187621	0.3886	0.69756	
Age	-0.00552375	0.00314481	-1.7565	0.07901	*
Literacy	0.0728526	0.337105	0.2161	0.82890	
HS	-0.255206	0.335866	-0.7598	0.44735	
College	-0.643164	0.404684	-1.5893	0.11199	
PostGrad	0.306813	0.578032	0.5308	0.59556	
MaritalStatus	-0.0381855	0.185558	-0.2058	0.83696	
NumberinHH	0.000178903	0.0185031	0.0097	0.99229	
Childrenle16	-0.0734548	0.0802718	-0.9151	0.36015	
Employment	-0.116608	0.104541	-1.1154	0.26467	
TotalEarnings	-1.75844e-05	1.30769e-05	-1.3447	0.17872	
DeathsinthePast	0.303158	0.0989369	3.0642	0.00218	***
RupeesonSicknes	0.00629255	0.0602375	0.1045	0.91680	
LossofJobBusine	0.177162	0.102753	1.7242	0.08468	*
NumberofLoans	0.335251	0.0189512	17.6902	<0.00001	***
BankSavingsAcco	-0.0248117	0.0694219	-0.3574	0.72079	
InsurancePolicy	-0.0442324	0.0747345	-0.5919	0.55394	
HHConditionPoor	-0.171867	0.0750022	-2.2915	0.02193	**
TotalinLoans	6.45799e-07	5.82453e-07	1.1088	0.26754	
alpha	0.484328	0.0599961	8.0727	<0.00001	***

Mean dependent var	0.986779	S.D. dependent var	1.496145
Log-likelihood	-2387.722	Akaike criterion	4817.444
Schwarz criterion	4933.886	Hannan-Quinn	4860.320

The Pearson Goodness-of-Fit test in this case states that if the distribution of the dependent variable is significantly different than the Poisson distribution, then the reported “alpha” in this output should also be statistically different from zero. By comparing the p-value for “alpha” with a threshold value for type I

error of 0.05, it can be concluded that the positive coefficient of "alpha" is in fact significant and different from zero. Thus, the negative binomial regression is appropriate and accurate in fitting this data set. Since this is the case, we can rely on our z-scores to be valid, consistent, unbiased, and BLUE predictors. The estimates for age and college-level education no longer appear to be significant in predicting late payments but the recent loss of employment or closure of business for a family seems to be more explanatory in this model than in the last. Further testing for misspecification of this model was performed and their results are included below. An examination of the variance inflation factors suggests that there may be multicollinearity between high-school-level education and literacy. This is both logical and noteworthy as it may be a testament to the efficiency of the school systems even in the most impoverished villages. It suggests that a high school education will almost always produce adequate literacy.

3. **Model II: Negative Binomial Regression, VIF**

Minimum possible value = 1.0	
Values > 10.0 may indicate a collinearity problem	
Gender	3.504
Age	1.313
Literacy	36.265
HS	36.708
College	5.027
PostGrad	1.472
Marital Status	3.500
NumberinHH	1.140
Childrenle16	1.141
Employment	1.355
TotalEarnings	1.266
DeathsinthePast	1.034
RupeesonSicknes	1.043
LossofJobBusine	1.037
NumbrtofLoans	1.125
BankSavingsAco	1.178
Insurance Policy	1.107
HHConditionPoor	1.124
TotalinLoans	1.205

VIF(j) = 1/(1 - R(j)^2), where R(j) is the multiple correlation coefficient between variable j and the other independent variables

4. Model II: Negative Binomial Regression, Likelihood Ratio Test

Test for omission of variables -

Null hypothesis: parameters are zero for the variables HS

Test statistic: (-2)*[(-2388.004)-(-2387.722)] = 0.564

where $\ln(L_R)$ = log likelihood from Model III *(Next page)*

X^2 Chi-Square Critical Value: 3.8414

After executing a likelihood ratio test, it can be determined that the estimated parameter for high school education is not significantly different from zero so it can safely be dropped from the model without inhibiting the efficiency of the remaining estimators. The justification for aiming to eliminate this variable is to reduce the slight but present negative effects of multicollinearity. In doing so, I have estimated a final version of the model that best predicts the effects of the listed explanatory variables on the number of loans incurring late payments. The final model fits all assumptions of the negative binomial regression and may accurately predict the theoretical answers to my hypotheses. The estimated coefficients (reported below) of the independent variables are the expected change in the log of the expected count of loans in default, given a one-unit change in each variable. They can be exponentiated in order to clarify their interpretation. This procedure allows these changes to be expressed as percentages affecting the expected count of loans with late payments.

5. Model III: Negative Binomial Regression, correcting for collinearity

Negative Binomial, using observations 1-1891
Dependent variable: NuLateRepayment
Standard errors based on Hessian

	Coefficient	*Std. Error*	*z*	*p-value*	
const	-0.339908	0.236089	-1.4397	0.14994	
Gender	0.0740328	0.18764	0.3945	0.69318	
Age	-0.0055653	0.0031456	-1.7692	0.07685	*
Literacy	-0.178708	0.0643932	-2.7753	0.00552	***
College	-0.390441	0.230878	-1.6911	0.09082	*
PostGrad	0.558965	0.47377	1.1798	0.23807	
MaritalStatus	-0.0374916	0.185579	-0.2020	0.83990	
NumberinHH	0.000490864	0.0185009	0.0265	0.97883	
Childrenle16	-0.0732942	0.0802951	-0.9128	0.36134	
Employment	-0.120099	0.104463	-1.1497	0.25028	
TotalEarnings	-1.77398e-05	1.3095e-05	-1.3547	0.17551	
DeathsinthePast	0.301192	0.0989443	3.0441	0.00233	***
RupeesonSicknes	0.00649151	0.06026	0.1077	0.91421	
LossofJobBusine	0.174638	0.102748	1.6997	0.08919	*
NumberofLoans	0.335255	0.0189653	17.6773	<0.00001	***
BankSavingsAcco	-0.0272324	0.0693727	-0.3926	0.69465	
InsurancePolicy	-0.042222	0.074713	-0.5651	0.57199	
HHConditionPoor	-0.172826	0.0750255	-2.3036	0.02125	**
TotalinLoans	6.55567e-07	5.81787e-07	1.1268	0.25982	
alpha	0.4855	0.060014	8.0898	<0.00001	***

Mean dependent var	0.986779	S.D. dependent var	1.496145
Log-likelihood	-2388.004	Akaike criterion	4816.007
Schwarz criterion	4926.905	Hannan-Quinn	4856.842

With this knowledge, it can be concluded that one-unit increases in age or literacy will decrease the expected count of loans in default by 0.55% and 16.36%, respectively. Moreover, a college-level education or low consumer confidence (reporting one's own household as poor in financial condition)

could decrease the expected count by 32.32% and 15.87%, respectively. Conversely, a recent death in the family or a loss of employment (or closure of a business) can be expected to increase the number of loans an individual will let fall into default at some point during repayment to increase by as much as 35.15% and 19.08%, respectively. Finally, with each additional outstanding loan, we can expect to observe a 39.83% increase in the total number of defaulting loans.

The implications of these results are substantial; evidence has been provided for both of my hypotheses. First, the effect of gender on the ability to repay loans is statistically insignificant here meaning that the expected count of loans in default does not vary between men and women. This suggests that the status quo of targeting women with microfinance under the assumption that they will be less risky may not reward creditors with the same magnitude of gains as commonly expected and may not be based on factual evidence. Larger data sets could be examined to confirm these results. Second, a SAS analysis of earnings based on gender proves that there is a significant difference between the two levels but that there is no difference between household financial conditions (based on the variable 'HHConditionPoor '). This implies that although incomes differ between genders (in favor of men, not women), the impact on the household does not; negating the theory that microloans benefit women more than men.

The two outputs shown below are both analyses of levels conducted with SAS. Their outcomes imply that not only should individuals be assessed for their ability to repay loans but so should the villages that they reside in. The first output is an analysis of how the total amount of loans in each individual's name, expressed in Rupees, differs between slums. The results show that there is a significant difference in total amount of loans among the villages. This is evidence that some villages may be made up of good communicators, sharing their successes with the loan programs through word of mouth. Microfinance institutions could use this information to take advantage of cheap (or near-free) advertising and marketing opportunities. The second output conveys that the number of loans that have fallen into default differs significantly by village as well. Thus, the same institutions could exploit the data presented here to better analyze which villages would be less risky (and more profitable, ceterus paribus). This evidence taken with the results presented earlier in this paper may prove this tactic to be more beneficial to the overall status of the institution than targeting women.

The hypotheses presented in this paper have thus far been proven to be correct; based on the results, loan defaults can be accurately modeled through regression analysis, women do not necessarily make less-risky borrowers than their male counterparts, and household conditions do not drastically improve under the sole stipulation that the signer on the loan is female. The inclusion of additional explanatory variables, larger samples of households under analysis, or the exploration of other possible models could further prove or disprove these results.

6. SAS Analysis of Levels: Slum

The SAS System

The ANOVA Procedure

Dependent Variable: condition

Number of Observations Used: 1891

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	0.2608350	0.2608350	1.47	0.2248
Error	1889	334.1326076	0.1768833		

The SAS System

The ANOVA Procedure

Dependent Variable: earnings

Number of Observations Used: 1891

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	441922072	441922072	40.02	<.0001
Error	1889	20858209061	11041932		

7. SAS Analysis of Levels: Gender

The SAS System

The ANOVA Procedure

Dependent Variable: Total

Number of Observations Used: 1891

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	119	968529199593	8138900836.9	1.45	0.0016
Error	1771	9.9666682E12	5627706502.1		

The SAS System

The ANOVA Procedure

Dependent Variable: NoLate

Number of Observations Used: 1891

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	119	855.168501	7.186290	3.77	<.0001
Error	1771	3375.500986	1.905986		

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The Effects of the 2007-2009 Financial Crisis on the Cointegration Relationship between Stock Markets

Julia Fremante*

ABSTRACT

This study examines the cointegration relationship between the S&P 500 and other major stock market indices before, during and after the 2007-2009 financial crisis. This paper examines the S&P 500 and its cointegration relationship with the following indices: Hang Seng, FTSE 100, DAX, Nikkei 225, CAC 40, IPC, TSX 60 and Merval Buenos Aires. The augmented Dickey-Fuller test (ADF) is used to test the cointegration between the major stock market indices. It is found that the majority of the indices were cointegrated with the S&P 500 before and during the crisis and were not cointegrated after the crisis.

INTRODUCTION

This study will look into how the U.S. financial market influenced other countries' stock market performance following the 2007-2009 financial crisis. The cointegration relationship between the U.S stock market index and the stock market indices of other countries will be examined. Financial markets around the world are interdependent with each other and every movement in one of their economies has the potential to affect another market in a different country. This paper will focus on the effect that the recent 2007-2009 U.S. financial market crash had on the stock market performance of different countries around the world and how this influenced the relationship between the countries' stock markets. This relationship is important because global financial interdependence is a strong factor in the economy and it can be very beneficial but it also can have its negative aspects.

The housing bubble burst in 2007 and led to a large decrease in the prices of securities related to U.S. real estate pricing. There were many causes of the 2007-2009 U.S. financial crisis including sub-prime borrowers having easy access to loans, the overvaluation of bundled sub-prime mortgages, banks and insurance companies having a shortage of sufficient capital holdings to back up their financial commitments, and problematic trading methods of buyers and sellers. The crisis led to credit tightening, a decline in international trade and a rise in unemployment. Unemployment started to significantly increase in September 2008 and reached its peak of ten percent in October of 2009 ("Financial Crisis of 2007-2008", 2014).

According to the National Bureau of Economic Research the recent financial crisis began in December 2007 and lasted until June 2009 ("U.S. Business Cycle Expansions and Contractions" 2013). This crisis had many negative effects on the United States. Between 2007 and 2009 American

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employment decreased by about 8.8 million people, U.S. GDP fell by more than five percent, and the Standard and Poor's 500 decreased by about 57 percent. As a result of the crisis many banks filed for bankruptcy while many other banks were bailed-out, acquired or taken over (Rodrigo, 2013).

One indicator to examine this more in depth is to look at the weekly adjusted close prices, adjusted for dividends and splits, of major stock indices around the world from January 2003 to February 2013. The stock indices studied are the S&P 500 in the U.S., the Hang Seng in Hong Kong, the FTSE 100 in England, the DAX in Germany, the Nikkei 225 in Japan, the CAC 40 in France, the IPC in Mexico, the TSX 60 in Canada and the Merval Buenos Aires in Latin America. Europe should be studied because it was so largely influenced by the crisis. The financial crisis in the United States helped contribute to the European sovereign-debt crisis; an ongoing crisis in Europe where countries had trouble repaying their government debt without assistance. The crisis also led to bank failures in Europe ("Financial Crisis of 2997-2008", 2014). The Asian region is included in the study because it contains two of the world's largest economies, The People's Republic of China and Japan. The Latin American region is of interest because of its past financial troubles in the 1980s and 1990s that made it better prepared to withstand the recent financial crisis. There was an external debt crisis in Latin America in the early 1980s. That crisis led the Latin American governments to enact reforms that helped strengthen the region's financial sector and better prepare it for future financial instability (Griffin, 2010). Mexico and Canada were chosen because of their close proximity to the U.S.

This study is different than many previous studies because it uses cointegration rather than correlation measures. Another distinction of this study is that the augmented Dickey-Fuller test will be used to measure the cointegration relationship, unlike many previous studies which use other forms of cointegration measures.

LITERATURE REVIEW

There have been many studies that have tried to measure the amount of linkage between countries following a financial crisis in one country. Some studies focus on contagion or correlation while other studies use cointegration to examine the relationship between two countries. Financial contagion occurs when shocks in one country's economy spread to other financial institutions and economies in other countries. The correlation coefficient can be used to measure the strength of the linkage between two countries (King and Wadwani, 2013). King and Wadwani (1990) studied the correlation of stock markets in different countries following the stock market crash of October 1987. They found that the impact from the contagion increases as volatility increases. Hamao, Masulis, and Ng (1991) examined stock market returns on the New York Stock Exchange, the Tokyo Stock Exchange and the London Stock exchange from 1985-1990 to study the impact of the stock market crash in October 1987. They believe there is an increased awareness of the interdependence of financial markets due to the increased volatility spillover effects originating in Japan. They found that before the crash there was weak correlation in returns

among international stock markets but during the crash there were much stronger correlations. They found that spillover effects do not occur evenly around the world.

While many researchers use correlation to measure the relationship between stock market returns some use cointegration measures instead. This study is going to use cointegration measures because cointegration attempts to measure common trends in prices over the long run while correlation is only a short term measure of interdependence. Cointegration occurs when two or more times series have a common stochastic trend. This means that they have the same trend component because over the long run the times series drift together. The concept of cointegration was first formalized by Engle and Granger (1987). Kasa (1992) studied the cointegration relationship among the stock indices of five developed countries from 1974 to 1990 using Johansen's (1991) likelihood ratio. Kasa found that among the five markets there was only one common stochastic trend (Fu and Pagani, 2010).

Forbes and Rigobon (2002) discuss how correlation coefficients have a bias because they depend on market stability. They define contagion as a considerable rise in cross-market co-movements after a shock occurs in one country. They say that interdependence occurs when a high level of market correlation implies a link between two countries, but a significant increase in co-movements does not occur. Forbes and Rigobon believe that there is a bias in the correlation coefficient due to heteroskedasticity. They manipulate the equation for the correlation coefficient to adjust for heteroskedasticity bias. Heteroskedasticity in markets can cause an upward bias of cross-market correlation coefficient estimates. The adjusted equation assumes that there are no omitted variables or endogeneity between markets. This adjustment of the equation helps solve the problem of the difference between the conditional and unconditional correlation coefficients. They examined the contagion during the 1987 U.S. stock market crash. To do this they define the turmoil period and the stable period and they focused on the ten largest stock markets. Forbes and Rigobon found that there wasn't much evidence of a significant increase in cross-market correlation coefficients during the 1987 U.S. stock market crash.

There are many factors that may contribute to the degree to which stock markets are related. Walti (2005) studied 15 countries from 1973 to 1997 and examined the co-movements between their stock market returns and how they were influenced by macroeconomic variables. He studied the process of synchronization between the markets, which is measured by a correlation coefficient. He found that synchronization of stock markets is affected by the intensity of trade relations, the degree of financial integration, and the nature of the exchange rate regime. Other factors that influence the synchronization of stock markets are: informational asymmetries, similarity of economic structure across countries, and a common language (Walti, 2005).

Countries' synchronization can be affected by a common disturbance such as a change in the world interest rate level, changes in the level of price and volatility of oil, political uncertainty or similar characteristics. These common disturbances tend to make comovements between countries stronger. Shocks that are related to specific countries that pass through economic linkages such as trade can have an effect on comovements (Walti, 2005).

Michael Dooley and Michael Hutchison (2009) examine the spreading of the U.S financial crisis to emerging markets. In their studies they examine fourteen emerging markets around the world to study how countries with emerging financial markets respond to U.S. news through the stages of a financial crisis. Fu and Pagani (2010) wanted to test if there was bias affecting Kasa's cointegration studies; to do this they use the Johansen's small sample correction factor. They find that there is still a cointegration relationship between the indices studied by Kasa by the evidence supporting this is weaker. They believe Kasa's findings are probably due to size distortion in extremely long lag vector auto regression (VAR) models.

Khan (2011) looks at the United States and twenty two other countries and studies their convergence in the long-run. He finds that by 2010 stock markets for most countries have become cointegrated. To examine the stock markets he uses the Johansen (1988) and the Gregory and Hansen (1996) tests.

Rim and Setaputra (2012) examined the impact of the U.S. financial crisis on different financial markets in Asia and Europe by using the daily return of stock market indexes between January 2005 and February 2010. Using a GARCH model to look at the U.S. financial crisis and its impact on other markets, they found that before the crisis the U.S financial market had a strong impact on markets in Hong Kong, UK and France. They also found that during the U.S financial crisis the U.S. became more integrated with Asian markets and less integrated with financial markets in Europe but the influence from the U.S remained strong in Asia and Europe throughout the crisis. They found that before the crisis the average correlation coefficient between the U.S. and Asia was 0.0884 and during the crisis it increased to 0.2437. Between U.S. and European markets, before the crisis the average correlation coefficient was 0.1128 and during the crisis it decreased to -0.0566.

Asongu (2012) studied the markets of emerging countries and their vulnerability during the 2007-2008 U.S financial crisis. They found that Asian markets were hit the worst and Latin American countries were the least affected. Latin America was probably the least affected area based on shifts in conditional correlation coefficients because it was the most prepared due to its history of financial crises.

DATA

This study will use the weekly adjusted close prices gathered from Yahoo Finance from January 2003 to February 2013 for the following indices: S&P 500, Hang Seng, FTSE 100, DAX, Nikkei 225, CAC 40, IPC, TSX 60 and Merval Buenos Aires ("Historical Prices" 2013). Each index was compared to the S&P to measure if there is cointegration with the U.S. market before, during and after the 2007-2009 financial crisis. The period before the crisis is from January 2003 to November 2007. The crisis was from December 2007 to June 2009. The period after the crisis goes from July 2009 to February 2013. For the Nikkei stock index three dates are missing from the data set due to exchange holidays in Japan; these dates are January 2, 2003, December 31st, 2007, and December 31st, 2012 ("Market Holidays," 2014).

METHODOLOGY

The augmented Dickey-Fuller test (ADF) was used to test the cointegration between the stock market indexes of different countries. This model tests for a unit root in a time series sample ("Augmented Dickey-Fuller Test" 2013). First one variable needs to be regressed on another using least squares. Then the residuals are tested for nonstationary using the Dickey-Fuller test. If the Dickey-Fuller test statistic turns out to be statistically significant then the two series are cointegrated. If the null hypothesis, that the residuals are nonstationary, is rejected then it is concluded that the residuals are stationary and that the two series are Cointegrated ("Cointegration and the ECM" 2013).

RESULTS

As table 1 shows that there are some common patterns of cointegration between the different countries before, during and after the crisis.

Table 1: Summary of cointegration Tests

	Before Crisis	During Crisis	After Crisis
S&P - DAX	Cointegrated	Cointegrated	Not Cointegrated
S&P - Hang Seng	Not Cointegrated	Cointegrated	Not Cointegrated
S&P - FTSE 100	Cointegrated	Cointegrated	Not Cointegrated
S&P - CAC 40	Cointegrated	Cointegrated	Not Cointegrated
S&P - IPC	Cointegrated	Cointegrated	Cointegrated
S&P - Merval	Cointegrated	Not Cointegrated	Not Cointegrated
S&P - Nikkei 225	Not Cointegrated	Cointegrated	Not Cointegrated
S&P- TSX 60	Cointegrated	Cointegrated	Not Cointegrated

Table 2 shows the cointegration relationship between the indices before the crisis. Table 3 shows the cointegration relationship between the indices during the crisis. Table 4 shows the cointegration relationship between the indices after the crisis. These relationships were computed through Stata: data analysis and statistical software using the augmented Dickey-Fuller test. Before the crisis, the S&P and the DAX have a Dickey-Fuller test statistic of -3.101 and a p-value of 0.0264, which causes us to reject the null hypothesis at the five percent level and conclude that they are stationary and cointegrated. During the crisis, the S&P and the DAX are found to be stationary and cointegrated because the test statistic of -2.679 and the p-value of 0.0778 cause us to reject the null hypothesis at the ten percent level. After the crisis, with a test statistic of -1.802 and a p-value of 0.3795 we fail to reject the null hypothesis and find

that the S&P and the DAX are not cointegrated. Before the crisis, the S&P and Hang Seng have a test statistic of -0.322 and a p-value of 0.9223 so we fail to reject the null hypothesis and find that they are cointegrated. During the crisis, we find that the S&P and Hang Seng are stationary and cointegrated because the null hypothesis was rejected at the five percent level with a test statistic of -3.217 and a p-value of 0.0190. After the crisis, the S&P and the Hang Seng have a test statistic of -1.490 and a p-value of 0.5385 so we fail to reject the null hypothesis and find that they are not cointegrated.

We reject the null hypothesis at the ten percent level and find that before the crisis, the S&P and FTSE 100 are stationary and cointegrated with a test statistic of -2.633 and a p-value of 0.0864. For the S&P and FTSE 100 during the crisis we reject the null hypothesis at the one percent level and find they are cointegrated and stationary with a test statistic of -3.550 and a p-value of 0.0068. After the crisis, the S&P and FTSE 100 are found not to be cointegrated because we fail to reject the null hypothesis with a test statistic of -1.503 and a p-value of 0.5321. For the S&P and CAC 40 before the crisis we reject the null hypothesis at the ten percent level and find they are stationary and cointegrated with a test statistic of -2.835 and a p-value of 0.0535. During the crisis, we reject the null hypothesis at the five percent level for the S&P and CAC 40 with a test statistic of -3.035 and a p-value of 0.0318 to find that they are stationary and cointegrated. After the crisis, the S&P and CAC 40 were found not to be cointegrated with a test statistic of -1.962 and a p-value of 0.3033 which causes us to fail to reject the null hypothesis.

Before the crisis, the S&P and IPC had a test statistic of -3.966 and a p-value of 0.0016 so we rejected the null hypothesis at the one percent level and found they were stationary and cointegrated. During the crisis, the S&P and IPC we rejected the null hypothesis at the one percent level and found they were stationary and cointegrated with a test statistic of -3.814 and a p-value of 0.0028. The S&P and IPC after the crisis were stationary and cointegrated because we rejected the null hypothesis at the one percent level with a test statistic of -5.906 and a p-value of 0. Before the crisis, S&P and the Merval Buenos Aires had a test statistic of -3.935 and a p-value of 0.0018 so we reject the null hypothesis at the one percent level and find that they are stationary and cointegrated. For S&P and Merval during the crisis we fail to reject to the null hypothesis with a test statistic of -1.738 and a p-value of 0.4117 and found they are not cointegrated. After the crisis we found that S&P and Merval were not cointegrated because we fail to reject the null hypothesis with a test statistic of -1.253 and a p-value of 0.6504.

Before the crisis, S&P and Nikkei 225 had a test statistic of -1.994 and a p-value of 0.289 so we fail to reject the null hypothesis and find they were not cointegrated. During the crisis, S&P and Nikkei 225 had a test statistic of -3.72 and a p-value of 0.0038 so we reject the null hypothesis at the one percent level and find they are cointegrated. After the crisis, for S&P and Nikkei 225 we fail to reject the null hypothesis and find they were not cointegrated with a test statistic of -1.814 and a p-value of 0.3736. Before the crisis, the S&P and TSX 60 we reject the null hypothesis at the one percent level and find that they are stationary and cointegrated with a test statistic of -4.280 and a p-value of 0.0005. For the S&P and TSX 60 during the crisis we reject the null hypothesis at the ten percent level and find they are cointegrated and stationary with a test statistic of -2.622 and a p-value of 0.0885. After the crisis, the S&P and TSX 60

are found not to be cointegrated because we fail to reject the null hypothesis with a test statistic of -1.949 and a p-value of 0.3094.

Table 2: Summary of cointegration tests before crisis

Before Crisis			
	Dicky-Fuller Test	**p-Value**	**Note**
S&P - DAX	-3.101	0.0264	Cointegrated
S&P - Hang Seng	-0.322	0.9223	Not Cointegrated
S&P - FTSE 100	-2.633	0.0864	Cointegrated
S&P - CAC 40	-2.835	0.0535	Cointegrated
S&P - IPC	-3.966	0.0016	Cointegrated
S&P - Merval	-3.935	0.0018	Cointegrated
S&P - Nikkei 225	-1.994	0.289	Not Cointegrated
S&P- TSX 60	-4.280	0.0005	Cointegrated

Table 3: Summary of cointegration tests during crisis

During Crisis			
	Dicky-Fuller Test	**p-Value**	**Note**
S&P - DAX	-2.679	0.0778	Cointegrated
S&P - Hang Seng	-3.217	0.019	Cointegrated
S&P - FTSE 100	-3.55	0.0068	Cointegrated
S&P - CAC 40	-3.035	0.0318	Cointegrated
S&P - IPC	-3.814	0.0028	Cointegrated
S&P - Merval	-1.738	0.4117	Not Cointegrated
S&P - Nikkei 225	-3.72	0.0038	Cointegrated
S&P- TSX 60	-2.622	0.0885	Cointegrated

Table 4: Summary of cointegration tests after crisis

After Crisis			
	Dicky-Fuller Test	**p-Value**	**Note**
S&P – DAX	-1.802	0.3795	Not Cointegrated
S&P – Hang Seng	-1.49	0.5385	Not Cointegrated
S&P – FTSE 100	-1.503	0.5321	Not Cointegrated
S&P – CAC 40	-1.962	0.3033	Not cointegrated
S&P – IPC	-5.906	0.0000	Cointegrated
S&P – Merval	-1.253	0.6504	Not Cointegrated
S&P – Nikkei 225	-1.814	0.3736	Not Cointegrated
S&P- TSX 60	-1.949	0.3094	Not Cointegrated

CONCLUSIONS

Based on the research a common pattern of cointegration between the stock indices and the S&P 500 were found in the before and during crisis periods but not in the after crisis period. It was found that all of the indices studied were cointegrated with the S&P 500 before the crisis except the Hang Seng and the Nikkei 225. During the crisis all indices were cointegrated with the S&P 500 except the Merval Buenos Aires. After the crisis the results show that all of the indices were not cointegrated with the S&P 500 except for IPC.

Some of the outliers in the data can be explained through the global effects discussed earlier in the paper. The Hang Seng and the Nikkei 225 are outliers in the before crisis period, this may be due to their large market power. The past financial troubles in Latin America could have caused the Merval Buenos Aires index to be an outlier since the country was better prepared for a crisis. The close proximity of the United States and Mexico could effect the IPC being an outlier in the after crisis period.

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Financing Sports in Europe: An International and Comparative Perspective

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ABSTRACT

The focus of this paper is to evaluate conceptions, perceptions, and interpretations of 'financing sport' throughout the European continent. The paper will aim to shed light on the ways that policy contexts dictate the application of sport financing as well as sport management. This paper would like to focus some attention to the involvement of central and local governments of European countries in sport financing. Moreover, in pursuing this line of interrogation this paper asserts that opportunity structure for the organization and development of sporting activities has shifted from developmental to managerial throughout the 21st century.

INTRODUCTION – FROM SPORT FOR ALL TO SPORT FOR GOOD

The concept of sport financing can be interpreted in many different ways. Allied to sport financing has often been taken to indicate a positive process of change or a mean of progression. This affirmative relationship has been associated with sport performance, sport participation, community relations, health, self-confidence, and crime reduction. It is unquestionably the case all around the world. Historians have argued that the process of formalization of sports mimicked the formalization inherent in industrialization and urbanization. It does not seem to be a coincidence that most of this development took place in an urban, industrial setting, nor that the development of most sports occurred in England, the leading industrial nation of the nineteenth century. Sports, in their evolution, have offered two faces to the world. Much of modern sports developed out of the nineteenth century military imperatives of the emerging nation-states, and as such the state has retained, until today, a significant role in the organization of sports. But sports are also entertainment and their development as such has been driven largely by liberal market-oriented economies.

"The battle of Waterloo was won on the playing fields of Eton," The Duke of Wellington was supposed to have said. The English public school movement embraced a new ideology of education based on sports, health, and discipline. However, this was a generation of players – not performers. This model of sports emerged in the free market- oriented Britain without any explicit direction by the state. Friedrich Ludwig Jahn founded the gymnastic "Turnen" movement in Prussia in the early nineteenth century. This was not sports for entertainment, nor even for the pleasure of competition. Jahn was driven by the need to improve the physical quality of Prussian youth and prospective soldiers following a humiliating defeat by Napoleon at the battle of Jena.

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The connection between war and sports in the nineteenth century ensured that the European states would play a leading role in the evolution of sports. Even when militarism was discredited, the state's role did not disappear. Instead, its apparatus was turned towards the promotion of other benefits that sports might produce for the state and society. In addition to enhancing military preparedness, Houlihan (1994) identifies five further reasons for government involvement in sports:

1. Social regulation on moral grounds (regulation of blood sports)
2. Concerns for the general level of health and fitness
3. Sports as motor of social integration
4. Sports as promoter of international prestige
5. Sports as a promoter of economic regeneration

Despite 19th century beliefs about the contribution of sport to improved health and the construction of civic cultures, central government interest in sport dates largely from 1960s. Governments' interest reflected a concern with the potentially negative effects of rapid economic, social, and cultural change. This was a reflection of a more general concern to promote public planning, provision and management for sport to cater for demands of the new 'leisure age.' This general organizational infrastructure for leisure policy was reorganized and extended in the early 70s to support the voluntary sector and encourage local authorities to provide for increasing demand in the interest of social welfare and the enjoyment of leisure among the public at large. Within this context, identified inequalities in participation in sport led to the designation of certain groups as being 'recreationally disadvantaged.' This led to the formation of policies of recreational welfare: rather than increase supply in response to what was assumed to be the inevitable rise in demand, policy became concerned to democratize areas of public leisure. The language of policy quickly shifted from a concern with expressed demand to an attempt to address the 'issues of need.' Policies of positive discriminations were developed under the slogan of "Sport for All" with the identification of target groups and promotional strategies aimed at reducing constraints and encouraging participation. It has been argued, that the apparent political neutrality and popularity of sport and its presumed ability to provide an economy of remedies made it more attractive option than addressing fundamental structural and social changes. Thus, the motive has shifted to recreation as welfare with increasing resources to what economists refer to as externalities and merit goods – i.e. that participation in sport may be an individual social right of citizenship, but such participation also leads to collective benefits such as improved health and reduced crime. (Henry, 2001) Additionally to that, governments focus on sport as a tool to achieve international prestige requested the continuity in financial commitment to elite sport. Few attempts were made to examine systematically the effectiveness of recreation as welfare policies, with monitoring usually being restricted largely to measuring participation and nature of participation. The 1990s placed sport more centrally on the broader social policy agenda. European governments started actively relying on sport and its ability to contribute to neighborhood renewal by improving communities' performance on four key indicators such as health, crime, employment, and education. Around the beginning of the 21st century a shift has occurred from

local government investing in sport and recreation *as a right of citizenship* to seeking to use *sport as a tool for economic and social regeneration*. Henry (2012) argues that local authorities' interest has shifted again from one of welfare to one of regeneration. Schimmel (2001) in her analysis even uses urban regime theory and the idea of growth coalition to argue that much sport-event-related development reflects the interests and strategies of urban elites rather than any systematic strategic consideration of a whole city benefits.

No doubt, the limited inclusivity of sport worldwide raises significant questions for the nature and extent of sport's supposed role in strategies of social and economic regeneration. But there is no doubt about the fact, that opportunity structure for the organization and development of sporting activities has shifted from developmental to managerial throughout the 21st century.

THE EUROPEAN MODEL OF SPORT

There can be little doubt that when European officials talk of a 'European model of sports,' what they mean is a model that is distinctively non-American. "*The European Model of Sport should safeguard the socio-cultural elements of sport and remain distinctive from the commercialized American sport model*" (European Sport Charter, 2002)

Of course, there are some general trends in sport developments on the European continent, of which the following can be noted:

Firstly, it is agreed, that the "share" of public funds underscoring total sport finance is in the range of 16-39%, which forms the basis of the "European model of sport" in contrast to its American counterpart. This share is the highest in France with 39% and around 50% in East European countries.

Distribution of identified sources of sport finance in Europe in % (Eurobaromater, 2004)

2004	DEN	FIN	FRA	GER	ITA	POR	SWE	IRL	UK	HUN
Central State	6.3	4.3	8.9	0.6	8.2	9.9	2.2	0.4	0.8	30.2
Local Govts	32.5	24.7	29.5	26.6	11.0	11.6	20.4	5.2	15.1	16.6
Public Funds	38.8	29.0	38.4	27.2	19.2	21.5	22.6	5.6	15.9	46.8
Enterp	5.6	4.8	4.5	3.8	7.9	42.0	17.1	2.8	5.0	5.7
Households	55.6	66.2	57.1	69.0	72.9	36.5	60.2	91.6	79.1	47.5
Private funds	61.2	71.0	61.6	72.8	80.8	78.5	77.3	94.4	84.1	53.2
Total	100	100	100	100	100	100	100	100	100	100

Secondly, the highest level of private finance is found in European countries where there is a great deal of professional sport, such as Germany, the United Kingdom, and Italy.

Thirdly, in the European context private sector financing largely means revenue flow from consumers' pockets instead of TV channels, sponsors, enterprises or other businesses. In all European countries, personal and individual expenditures form the biggest financial contribution to sport, ahead of all other financing sources. Sport development in Europe depends primarily on the financial contribution of participants and/or spectators, secondarily on local authorities.

On the other hand, it is obvious that several national variants of this model can be distinguished. The main differences between the European countries' sports systems, based on their historical and traditional differences, are rooted in the domestic organization of sport, in some specificities of the structure of financing, and in sport practices that are financed. The organizational structures of sport systems have, of course, an influence on the economy and finance of sports in each country.

This study categorizes European countries according to their sport system into the following groups[1]:

1. "Missionary model"- Here the voluntary sports movement plays a major role, both as a service provider and as a regulator. Sport in this group of countries is seen as a "private and free decision of associates." For that reason public authorities are discreet and cautious towards leaving the sport leadership to volunteers. Even the leadership for coaching belongs to the sports federations. The training for volunteers is often confused with vocational training. In some ways there is resistance towards "professionalization," volunteers being more legitimate human resources. There is no real job market but more of a process of sporting socialization. This group is represented by countries like Germany, Denmark, and Sweden.

2. "Bureaucratic model" - This group is characterized by the leading position of public authorities in sports. National and local authorities may be in charge of a sporting policy and the voluntary sports movement is only an auxiliary contributor to the decisions. Most of the time there is a sport law establishing the mutual responsibilities of the different actors. The coaching in these countries is strongly controlled by the public authorities, as for example, Ministries in charge of sports. In some cases there is even a monopoly dictated by law to public training for access to work in the sports sector. Job market needs are not really taken seriously into account. Rather, public suppliers play the key roles. There is also an important contribution given to sport by civil servants. France, Spain, Portugal, and Greece are the best examples in this group.

3. "Entrepreneurial model" - It is supposed to be led by the sports participants or consumers. The market dictates the regulation between suppliers of sports services. When public regulation exists, it is mainly dedicated toward fair competition and concurrence between suppliers. The coaching in this model is characterized by a strongly competitive situation and by the dominance of short work-oriented training programs, corresponding to immediate market needs. Private, profit-oriented programs for training of actors in the sport system take the key positions. Ireland and the U.K. form this group.

4. "Social model" - It might be seen as a variation of the previous model, but the regulation on employment and qualification is done by the social partners. One of the consequences is that such a model involved bigger numbers of actors coming with different perspectives, which makes things more complex. A high capacity of "governance" is required to lead such a system. In the context of training, one can find the same orientation towards the immediate market needs but the social partners ensure that standards of qualification and career perspectives are present as well. The training of actors in the sport system focuses as a priority on the needs of further education of the "already on job" employees. Only in the Netherlands is this particular structure in vogue.

5. "Transitional model" – This model is characteristic in East European countries that joined the EU in 2004. That means the State was the exclusive player in sport in all of these countries. It still plays an important role, and we shall see that after major reduction of its role and the near dismantling of the sports system, it retains a high level of intervention in every aspect of the industry. Even if the nations see the development or revolution that they are undergoing as a real "enterpreneurization" of their systems, the transition gives new autonomy to the sporting movement, despite a context of "relative pauperization" of voluntary sports organizations and the fast rise of the commercial sector which still remains marginal at present. The severe weakening of trade unions and the low degree of organization among voluntary, commercial or private entrepreneurs leaves few short term opportunities for the development of these countries towards a "social configuration".

These organizational features of sport systems have their influence on the structure of financing and on the goals for which the finances are used. This can be characterized in the following:

1. In the "Missionary model" countries like Denmark and Sweden have developed a model of programs giving priority to sport for all. As a result, these countries achieved high participation rates with relatively lower expenditures. In these two countries, the efficiency of sport expenditures seems to be the highest. Finland and Germany, the other two members of this group, have a slightly different picture. They show high expenditure and high participation rates.

2. In the "Bureaucratic model" the central state devotes a larger share to sport finance than the countries of the first group. In France, Spain, and Portugal the high level of financing contributed to high levels of participation.

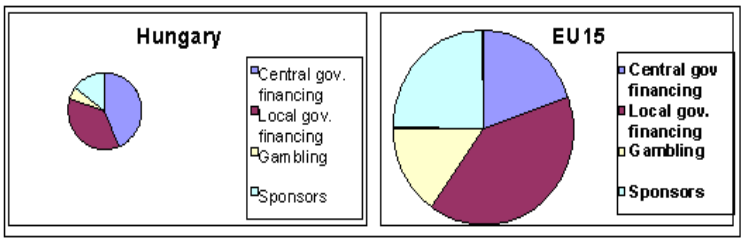
3. The "Entrepreneurial model" shows the lowest central government involvement in sport. These are the only countries in Europe where the central state's share in financing sport is less than 1%. But here one can note an interesting trend regarding the UK. In 1998, Prime Minister Major's government established the Lottery Fund to finance different aspects of leisure policy. Elite sport, as an important issue of building national pride and identity, became a beneficiary of the program. Thus, one must underscore that the UK made an interesting shift, mostly similar to

the one we see in Italy, where betting and gambling traditionally have made a considerable contribution to sport finance.

4. In the "Social model" interestingly enough, the Netherlands shows a similar case to Denmark and the Scandinavian countries. The sport expenditure is low and the efficiency of using resources is high.

5. In "Transitional model" Poland, Latvia, Lithuania, Estonia, the Czech Republic, Slovakia, Hungary, Slovenia shows a very high percentage of central and local government financing, with a low level of participation rate. Compare to France, where the share of public funds in financing sport is 39%, in these countries this number is around 46-50% while their participation rate is only about 8-10%. Interestingly, in these countries financing sport does not develop through the transformation of private-public partnerships but through the reconfiguration of central-local government relationships.

Difference in Sport Financing Structure of Hungary and the EU15 in 2004



Source: *National Sport Strategy* [*Nemzeti Sportstrategia*] (Budapest: Belugyminiszterium, 2002). p.85

The common trend in the growing importance of the commercial actors, both in organization/training and financing is seen in all countries. But interestingly, resistance against commercialization occurs again and again.

Countries of the Missionary model effectively resist commercialization because of two convergent reasons. In the countries belonging to this model, there exists a strong social demand to keep the social importance of these associations. Second, the voluntary sport movement is an adaptation to the new demands, including renewal of associations and even compromises with commercial actors to sustain control over the situation.

The Bureaucratic systems are in more danger in the context of a decrease of public funding for sports. Poor capacity to respond to economic and social needs creates gaps in which the commercial

actors develop themselves easily. This situation is very sensible in some countries, like Greece or Portugal, where the state is willing to control but has ineffective means; new laws express the maintenance of the dominant position of the state. But in some cases we see a transition towards the "social model" as an escape from a total loss of public control can be observed. This is a tendency in France and in Spain.

Comparative Analysis of Funding Sport:
Public Sector as Partner in Achieving Goals
(Ivan, 2006)

MISSIONARY MODEL

- Voluntary sector
- Focus on short-midterm outcomes
- Innovation, flexibility
- Monitoring of outcomes
- Expansion
- Adaptability!

SOCIAL MODEL

- Social sector
- Focus on long-term outcomes
- Commitment
- Multifaceted system
- Capacity building
- Cultural outcomes
- Effectiveness!

Comparative Analysis of Funding Sport:
Public Sector Is the Driver to Achieve Govt. Specified Requirements (Ivan, 2006)

BUREAUCRATIC MODEL

- State sector
- Focus on regulating the delivery process by state bodies
- Monitoring of standards and systems
- Accountability!

ENTEPRENEURIAL MODEL

- Private sector
- Focus on short term delivery
- Achievement of outcomes by contractual agreements
- Maximization of immediate outcomes
- Efficiency!

Transitional Model – Example Hungary
(Ivan, 2006)

East European countries demonstrate a new group in European sport system:

1. Only country in the EU15 with financing sport with <1% of the national budget is the UK – Hungary 0.44%
2. The central government involvement in financing is the highest in France with 39% - Hungary 48%
3. Hungarian sport governed by sport law and led by a Ministry
4. Participation rate in Hungary is 16% – EU15 is >25%
5. Ratio of No. of clubs to No. of citizens 1:330 in EU15, 1:1250 in Hungary
6. Belonging to a sport club (volunteer activity) 7% in Hungary - >30% in EU15

CONCLUSION

Traditionally, the European Sport Model has been based on a pyramid structure. Generally, this vertical structure of European sport gives the opportunity for sport federations to use the generated commercial revenue for the overall good of that particular sport. Vertical solidarity refers to support at the grassroots, where the elite clubs in effect subsidize the lower reaches of the game. Vertical solidarity depends on the exclusive jurisdiction of a single governing body – one national sport federation – that has the authority to impose this form of "taxation." The existence of vertical solidarity is important from a cultural perspective as well. Namely, the existence of local teams is crucial in the European model of sport so that fans retain a sense of local identity.

On the European continent, the increased competitive pressure of the last fifteen years has led to the restructuring of central-local government relations rather than the private-public partnerships, although the presence of foreign and domestic capital has increased dramatically. The new capacity of the European states regarding sport development lays in the new power-sharing arrangements between the different levels of government and the growing importance of local and regional policy developments.

ENDNOTES

[1] The analysis follows the European Observatoire of Sports Employment classification of different European national sport models

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A 33 Equation Econometric Model Of The U.S. Economy

John J Heim*

ABSTRACT

The model contains 22 behavioral equations and 11 identities connecting them into an integrated model of the real U.S. economy. Behavioral equations were generally estimated applying strong instrument 2SLS to 1960-2010 data. The model includes equations for 7 components of consumption, 7 components of investment, two prime interest rate determination models based on the Taylor rule or the Keynesian LM curve, 1 export function, 2 "IS" curve functions determining GDP. In addition, behavioral models for taxes, unemployment and inflation are included. Eleven identities connect the various parts. Identification issues are resolved, and model results are robust to different time periods.

1.0 INTRODUCTION

The purposes of a large scale econometric model of the macroeconomy are to explain what *science* has to say about what makes the economy tick, rather than rely on what deductive reasoning from (what are assumed to be self evident truths (philosophy) has to say about the economy.

Second, their purpose is also to do so in a theoretically integrated manner: only relationships taken from the total set of equations hypothesized to drive the economy, and the interaction of its parts, are tested.

Finally, large scale models only *structural* equations. This ensures that only economically sensible variables are used to explain variance: no "VAR" - type lags, trend variables, etc., are used, i.e., no variables that explain variance, but are devoid of economic meaning. Occasionally autocorrelation control variables are used to explain otherwise unexplainable drift of variables over time. This helps ensure the accuracy of other coefficients in the regression model. They are used only as "place markers' to highlight areas where further work is needed to develop economic theory that explains the currently unexplained variance that (statistically useful, but non-economic) autocorrelation variables explain.

2.0 Component Parts Of The Macroeconomics Model: 22 Behavioral Equations, 11 Identities

2.1. The 22 Behavioral Equations, Econometrically Estimated:

1. C_T = Consumer Goods & Services -Total Domestically Produced & Imported
2. C_D = Consumer Goods & Services -Total Domestically Produced
3. C_I = Consumer Goods & Services -Total Imported
4. C_{Dur} = Consumer Goods & Services -Total Durable Goods
5. C_{ND} = Consumer Goods & Services -Total Non-Durable Goods

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6. C_S = Consumer Goods & Services -Total Services
7. C_{BOR} = Consumer Goods & Services -Total Consumer Borrowing
8. I_T = Investment Goods & Services -Total Domestically Produced & Imported
9. I_D = Investment Goods & Services -Total Domestically Produced
10. I_M = Investment Goods & Services -Total Imported
11. $I_{P\&E}$ = Investment Goods & Services -Total Durable Goods
12. I_{RES} = Investment Goods & Services -Total Non-Durable Goods
13. I_{INV} = Investment Goods & Services -Total Services
14. I_{BOR} = Investment Goods & Services -Total Business Borrowing
15. X = Demand for Exports
16. PR_T= Taylor Rule Interest Rate Determination Model
17. PR_{LM}= Keynesian LM Theory Interest Rate Determination Model
18. $UNEM_o$ = Okun Unemployment Determination Model
19. $UNEM_T$ = Tech. Progress Unemployment Determination Model
20. INFL = Phillips Curve Model of Determinants of Inflation
21. GDP = f(Determinants of C, I, plus G, X-M)
22. GDP = f(Determinants of C_D, I_D, plus G, X)

2.2. The 11 Identity Equations

1. $Y = C_T + I_T + G_T + NX$
2. $Y = C_D + I_D + G_D + X$
3. $C_T = C_D + C_M$
4. $C_T = C_{DUR} + C_{ND} + C_S$
5. $I_T = I_D = I_M$
6. $I_T = I_{P\&E} + I_H + I_{INV}$
7. $M_T = M_C + M_I$ = Total Imports of Consumer and Capital Goods
9. M_I = Imports of Capital Equipment and Industrial Supplies and Materials
10. NX = (X-M)
11. (M2 - M1) = Savings Components of M2

3.0. LITERATURE REVIEW: PREVIOUS LARGE SCALE ECONOMETRIC MODELS

- L. Klein & M. Evans (1968) *The Wharton Econometric Forecasting Model*
- O. Eckstein (1983) *The DRI Model of the U.S. Economy*
- R. Fair (2004) *Estimating How The Macroeconomy Works*

- J. Heim – (2008-2009) Various Papers
    - "What Determines Market Demand for Investment Goods?"
    - "U.S. Demand for different Types of Imported and Domestic Investment Goods"
    - "Consumer Demand for Durable Goods, Nondurable Goods and Services".

3.1. HOW THIS MODEL IMPROVES ON PAST WORK

- No Trend Variables Used As Explanatory Variables
- No Past Values Of The Dependent Variable Used As Explanatory Variables
- Better Scientific Methods: More Up To Date Econometric Techniques Used To Ensure No
    - Stationarity Issues
    - Identification Issues (Endogeneity)
    - Minimize Multicollinearity And Serial Correlation Issues
- Once Fully Estimated, Model Should Be Reliable For Estimating Well Beyond The Sample Period
    - (Previous, But Similar Model Estimated Using 1960-2000 Data Explained 2001-2010 GDP With Average Error Of ½ Of 1%)

4.0 SUMMARY OF METHODOLOGY USED

- Data: Taken from: Economic Report of the President 2011, Flow of Funds Accounts 2011
- Spending and Borrowing Models: Same Determinants Assumed
- "Standard Models" Used: Test All Variables Commonly Cited As Determinants of Consumption or Investment.
- Lags: Chose the lags most systematically related to the dependent variable, if theory says the variable should be included.
- 2SLS: Used to eliminate simultaneous equations bias caused by identification problems arising from endogeneity.
- Tests:
    - Hausman endogeneity tests were used to determine what needed to be instumented.
    - Wald weak instrument tests were used to ensure the instrument was a reasonable proxy for the variable it replaced.
    - Sargan "Valid Instrument" tests were used to ensure the the instrument was free of any endogeneity with the dependent variable.

Data were tested in first differences, not levels to address nonstationarity, serial correlation and multicollinearity issues. All passed augmented Dickey-Fuller Unit Root tests, except 3, which were cointegrated with the dependent variables they were used with, so nonstationarity was not a problem. Multicollinearity was reduced by approximately half, and first differencing raised almost all Durbin Watson test results considerably, markedly reducing or eliminating most serial correlation problems.

Newey West standard errors were used to correct for heteroskedasticity.

IS Curve Method was used to incorporate all the relevant equations inn the model into one to explain changes in the GDP.

5.0. SUMMARY AND CONCLUSIONS: 6.0 DETAILED REGRESSION TEST FINDINGS FOR FOUR KEY EQUATIONS IN THE MODEL

5.1 FINDINGS: IS THE PRIME INTEREST RATE DETERMINED BY THE TAYLOR RULE?

ΔPR_{REAL} = .47 Δ INFL -1.22 Δ UNEM – 1.49 Δ $M1_{REAL}$ + .00 Δ TAXES +.00 Δ Govt. Spend + AR(1)

(t=) (3.9) (-3.6) (-2.1) (0.1) (0.8) (2.1) (Eq.6.1)

R^2 =.68; DW 1.8

Note: Taxes and Government spending included because government deficit traditionally has been thought to affect the economy by raising interest rates, reducing investment. Clearly they do not seem to affect the prime rate, the economy's most important rate, at all.

5.2. THE CONSUMPTION FUNCTION (TOTAL DOMESTICALLY PRODUCED AND IMPORTED CONSUMER GOODS)

OLS Standard Consumer Spending Model, With Borrowing Included as a Determinant of Consumer Spending. (No variable found endogenous, so no 2SLS Models)

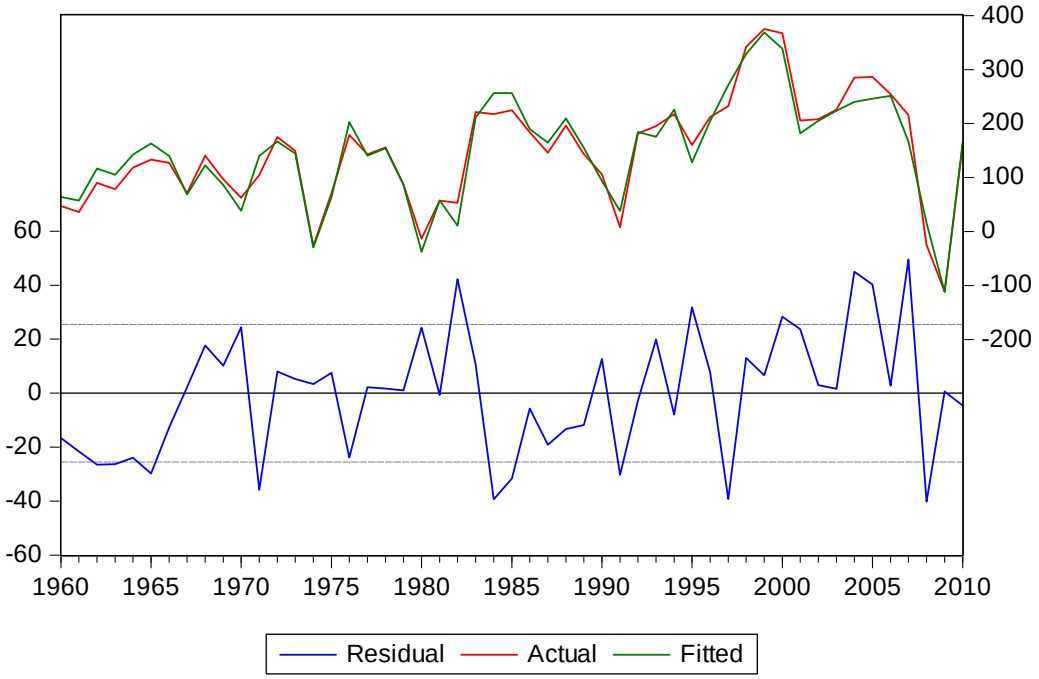
ΔC_T =.39Δ(Y-T_T) **+.51Δ(T_T) -.31Δ($G_{T\&I}$)** -10.92ΔPR +.34 ΔDJ_{-2} +3.59 ΔXR_{AV} +543.50ΔPOP_{16} -.034ΔPOP +.64ΔICC_{-1} +1.40Δ$M2_{AV}$ + **.17 ΔC_{B2}**

R^2=94.8% D.W.=1.7 MSE=25.49 (Eq. 6.2)

The explanatory power of this model is substantial. Comparisons of actual consumption 1960 -2010 and levels expected, based on the model are shown in Graph 6.2. below.

Tests for endogeneity did not find any variables endogenous with consumer spending at statistically significant levels, so no instrument development or 2SLS testing for the model was needed.

Graph 5.2.1 Actual Consumption Demand Compared To Demand Explained By The Model



5.3. DETERMINANTS OF INVESTMENT SPENDING AND BORROWING

2SLS Estimates of Determinants of Investment Spending, Using No Business Cycle Control Variable. Hausman Tests Indicate 4 Variables Endogenous With Investment Spending, So Instrumented: ACC (Wald test F= 11.5), DJ_0 (Wald F= 11.8), $PROF_0$ (Wald Test F= 6.0, but DJ_{-2} t=3.9) and POP (Wald F=13.1). Sargan Test $NR^2=4.0 < X^2_{(95,14)} = 23.7$. Hence, This is a Strong Instrument Model.

$$\Delta I_T = +.36\Delta(ACC) \mathbf{+.21\Delta(T_T) -.45\Delta(G_{T\&I})} + .86\Delta DEP + 5.91\Delta CAP_{-1} -.23\Delta PR_{-2} + .07\Delta DJ_{-0} +.26\Delta PROF_{-0} +6.95\Delta XR_{AV} +.01\Delta POP + \mathbf{.09\ \Delta(BOR_{-1})}$$

R^2=92.6% D.W.=2.1 MSE=34.51 (Eq. 6.3)

The explanatory power of this model is substantial. Comparisons of actual consumption 1960 -2010 and levels expected, based on the model are shown in Graph 6.3. below.

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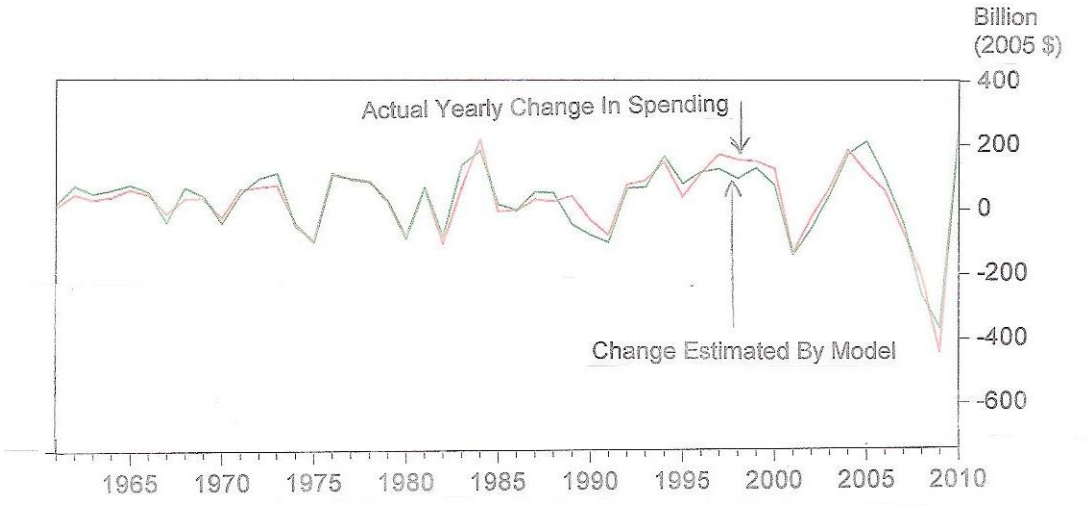
Graph 6.3.1 Actual Investment Demand Compared To Demand Explained By The Model



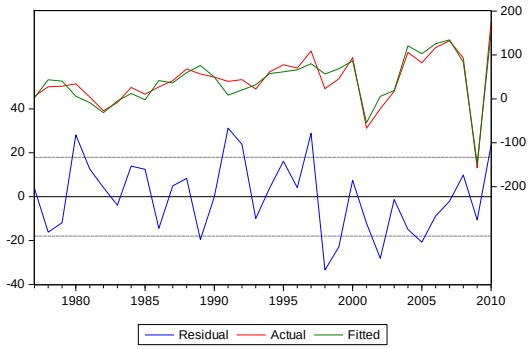
5.4. Export Demand Model

$\Delta X = 3.00E\text{-}138\ \Delta(ACC^{40}) + 2.47E\text{-}68\ \Delta(\ (TWAv_{0\ to\ -3}.For.Inc^{20})\ -7.82\ \Delta(XR_{AV0\ to\ -3}) + .59\ \Delta(M_T) + 5.14\ \Delta(PR_{RealAV\ -1\ to\ -2}) - 3.57\ \Delta INFL_{AV-1\ to\ -2})$

$R^2 = 92.6\%$; DW = 2.1 (Eq. 6.4)

The explanatory power of this model is also substantial. Comparisons of actual consumption 1960 -2010 and levels expected, based on the model are shown in Graph 6.4. below.

Graph 6.4. Actual Export Demand Compared To Demand Explained By The Model



7.0. CONCLUSIONS

Modern, large scale econometric models have what only can be described as extraordinary explanatory power. Though the 33 equation model above, estimated using 1960 -2010 data, cannot be tested (yet) to see if it explains behavior far outside the sample period, we expect it can. As noted in the introduction, the same model, re-estimated using only data up to 2000, explained yearly changes in GDP beyond 2000 with an average error of only 1/3 of 1% each year for the 10 year period 2001 - 2010. We attribute the success of the model to the huge improvements in econometric methodology made since the early models of the 1960's, and to exhaustive efforts to ensure each equation is based on good economic theory, testing contains all variables cited in the historic literature (and no others, including trend variables and lagged values of dependent variables, which explain variance, but for which there is no economic rationale).

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Does "Crowd Out" Offset The Stimulus Effect Of Government Deficits? A Large Scale Econometric Study

John J. Heim*

ABSTRACT

60 structural models of U.S. consumption, investment and the GDP were tested. Virtually all tests indicate that as deficits grow, private borrowing and spending decline. The cause appears to be a "crowd out": government borrowing undertaken to finance the deficit reduces money available for private parties to borrow and spend. Crowd out was found to dominate the stimulus effect, resulting in a net negative effect on the economy. Crowd out was found in both recessions and nonrecession periods. Results are inconsistent with hypotheses proposed by Krugman that general economic conditions are responsible for the negative relationship, not crowd out.

1.0 INTRODUCTION

Thirty years ago, the distinguished econometrician Otto Eckstein noted the crowd out problem, though much debated, was "still" unresolved:

> …Does fiscal policy work? Or does the financing of deficits "crowd out" private activity? This has been one of the more durable controversies in macroeconomic theory…
>
> (Eckstein, 1983)

One of the most important questions in macroeconomics 30 years ago remains unresolved today. This paper, through extensive testing of the crowd out problem in 60 different models of the GDP, consumption or investment, attempts to provide a satisfactory answer to that question.

"Crowd out" is the reduction in loanable funds available to private borrowers resulting from government borrowing to finance deficits. Consumers and businesses borrow to supplement their current incomes. Crowd out, if it occurs, reduces the funds available to private parties for such borrowing. If private borrowing is reduced, spending is likely to be reduced, since most borrowing is done to finance spending. This spending decline may offset some or all of the stimulus effect of a government deficit. Much borrowing is done for discrete "big ticket" items like cars, houses or machinery. Hence deficits that reduce loanable funds available may cause borrowing and spending to decline even more; if all funds needed can't be borrowed, none may be.

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Private spending may decline more than the deficit's stimulus effects increase it, causing a net negative effect. But of course, this is all theory. Whether it actually does or not is a question for the econometricians to answer. Additionally, as the state of the economy changes, income changes. This changes domestic savings, which largely determine the pool of loanable funds. In recessions, declining income evidence indicates savings decline as much or more than private demand for loans. Flow of Funds data for the 1981-83 recession period suggest savings declined far more than investment demand. If so, any borrowing done to finance government deficits, even in recessions, may still have crowd out effects.

The observed negative relationship between deficits and private spending may also be caused by changing economic conditions. In recessions, deficits rise due to declining tax collections, and private spending falls due to rising unemployment. For crowd out to be the culprit requires that reduced private borrowing, caused by government borrowing to pay for deficits, be the mechanism, and that testing show this to be the case, controlling for the state of the economy. This study tests for crowd out that way.

Sixty tests of structural models of the U. S. economy's components 1960-2010 were undertaken. Fair (1984), Orszag (2005), Eckstein (1968), and others have found structural models are better at explaining the long run behavior of the economy than VAR and DSGE alternatives (see literature review), though the latter are currently more popular. Mankiw (2006) and Solow (2010) appear to share that perspective. Exhaustive endogeneity testing was undertaken to ensure identification issues were fully addressed. Extensive testing was done to ensure instrument strength, stationarity, homoscedasticity, and robustness over time. Results were also robust to model specification, different regression techniques used, and different strong 2SLS instruments used. Testing was done in 1st differences, eliminating most nonstationarity and reducing multicollinearity, and explained 92 -95% of the yearly changes of consumption and investment. Models were found to fit the data equally well for any specific decade examined.

2.0 THEORY OF CROWD OUT

2.1. Traditional Stimulus Models (No Crowd Out)

A typical demand - driven structural model of the macroeconomy, like the Wharton school model of the 1960s and '70s, did not include variables for crowd out in its consumption and investment equations. In such models, the impact of taxes and government spending are shown, but are derived from the GDP identity:

$$GDP = Y = C + I + G + (X-M) \qquad \text{(Eq. 2.1.1)}$$

where a simplified consumption function might be given as a linear function of disposable income (Y-T), and crowd out was assumed not to be a determinant

$$C = \beta(Y-T) \qquad \text{(Eq. 2.1.2)}$$

which, when substituted into (2.1) gives

$$Y = \left(\frac{1}{1-\beta}\right)(- \beta T + I + G + (X-M)) \qquad \text{(Eq. 2.1.3)}$$

The clear expectation of standard model demand theory is that tax changes in are expected to be negatively related to the GDP, with a multiplier effect -β /(1-β). Changes in government spending and net exports are related to GDP in the positive direction, with a multiplier effect 1/(1-β) and should when tested, have the same coefficients if the theory holds. The coefficient on changes in taxes should have a negative sign, indicating a positive effect on GDP. All expected effects of deficits are effects that stimulate the economy. Testing these expected relationships is necessary to see if actual findings match these predictions.

2.2. Empirical Problems With The Theory

The problem is, in econometric tests, it is nearly impossible to get a negative sign on the tax variable, even in the simplest stimulus model, the so-called "Keynesian Cross":

$$Y = f\ (T, G, Investment,\ X - M) \qquad \text{(Eq. 2.2.1)}$$

If we increase the sophistication of the model by replacing investment with two of its most commonly cited determinants, the accelerator (ACC) and interest rates, we get a simple "IS" curve model:

$$Y = f\ (T, G, ACC,\ Int\ Rate,\ X - M) \qquad \text{(Eq. 2.2.2)}$$

Tests show the tax variable's sign to be both positive and statistically significant for this model In more sophisticated IS models, which include representatives of most variables commonly thought to affect consumption or investment, results are the same Table 2.1 shows examples taken from 2SLS regression tests of the Eq. 2.3 – 2.5 models.

All models tested in Table 2.2.1 use strong instruments for Hausman - endogenous variables, Wald tests to avoid weak instruments, and Sargan tests to ensure elimination of endogeneity in the instrumented models. First differences are used to reduce stationarity and multicollinearity, etc. Time trend variables were used to control serial correlation if needed. U.S. data was used for 1960 – 2010.

In sophisticated models, the sign of the government spending variable is also opposite what standard stimulus theory predicts. When tested for other sample periods (1960-00, 1970-00 and 1970 -10) these models generally provided the same contra – theoretical results. Even the simplest tests of standard

deficit - driven stimulus variables consistently show them to have the wrong sign. This raises serious questions about the theoretical underpinnings of traditional government stimulus policy.

Table 2.2.1. Tests of Structural Models for the Stimulus Effects of Tax Cuts

Model	Tax coefficient (t-statistic)
Keynesian Cross:	
$Y = f\ (T, G, Investment,\ X - M)$	+.17 (2.2)
Simple IS Curve Model:	
$Y = f\ (T, G, ACC,\ Int\ Rate,\ X - M)$	+.72 (3.4)
Sophisticated IS Curve Model:	
Y = f(T, G, ACC, Int Rates, Dow Jones, Average Exch. Rate, Pop. Growth Rate, Prior Period M2 Growth, Consumer Confidence, Depreciation Allowances, Profits, X)	+.49 (2.7)

2.3 A Stimulus Model With Crowd Out

Borrowing to finance government deficits may reduce loanable funds available to finance consumer spending. If so, the consumption function used in the no-crowd out model must be modified to add the government deficit, taxes minus government spending (T-G):

$$C = \beta (Y-T) + \lambda_1(T-G) \qquad \text{(Eq. 2.3.1)}$$

Or, if taxes and government spending have different crowd out effects,

$$C = \beta (Y-T) + \lambda_{1T}T - \lambda_{1G}G \qquad \text{(Eq. 2.3.2)}$$

Lambda (λ_1) represents the marginal effect of the government deficit on consumer demand (spending). With this function, the simplest model, modified, becomes

We can expand this model to include effects of crowd out on investment spending. Assume a simple investment model in which investment is determined by only three variables: the accelerator (ACC), real interest rates (r), and access to credit, which varies with the government deficit (T-G).

$I = - \theta_1 r + \theta_2 ACC + \lambda_2 (T-G)$ (Eq. 2.3.3)

Or, if tax and spending deficits have different crowd out effects

$I = - \theta_1 r + \theta_2 ACC + \lambda_{2T} T - \lambda_{2G} G$ (Eq. 2.3.4)

where gamma (γ_{2T} and γ_{2G}) indicates the marginal effect of crowd out (the government deficit) on investment and (θ_1, θ_2) represent the marginal effects of real interest rates and the accelerator. Replacing investment and consumption in the GDP identity with their hypothesized determinants, we obtain a typical equation for determining GDP in structural models:

$GDP = Y = \left(\frac{1}{1-\beta}\right) [(-\beta + \lambda_{1T} + \lambda_{2T}) T + (1 - \lambda_{1G} - \lambda_{2G}) G - \theta_1 r + \theta_2 ACC + (X-M)]$ (Eq. 2.3.5)

Table 2.3.1 below compares the net effects on the GDP of tax or spending deficits are presented below for the traditional Keynesian model (stimulus, but no crowd out effects), and the crowd out model (stimulus effects net of crowd out effects).

Table 2.3.1 Simple Structural Model Mechanics With And Without Crowd Out

	Without Crowd Out	With Crowd Out		Without Crowd Out	With Crowd Out
Tax coefficient	$(-\beta)$	$(-\beta + \lambda_{1T} + \lambda_{2T})$	Gov't Spending Coef.	(1)	$(1 - \lambda_{1G} - \lambda_{2G})$
Tax Multiplier	$\frac{(-\beta)}{(1-\beta)}$	$\frac{(-\beta + \lambda_{1T} + \lambda_{2T})}{(1-\beta)}$	Gov't Spending Mult.	$\frac{(1)}{(1-\beta)}$	$\frac{(1 - \lambda_{1G} - \lambda_{2G})}{(1-\beta)}$

3.0 LITERATURE REVIEW

When stimulus programs are proposed, they generate much discussion of possible crowd out effects in the popular press. Rarely is data introduced to support theories about whether crowd out does or does work. Examples include:

1. *Chan, S.* (*NY Times,* 2/7/10, p. A16): the I.M.F. warned on Jan. 26, 2010 that rising sovereign debt "could crowd out private sector credit growth, gradually raising interest rates for private borrowers and putting a drag on the economic recovery."

2. *Barley, R.* (*Wall Street Journal*, 2/24/10 p. C14): "any government-bond buying by banks is another form of crowding out, potentially reducing supply of consumer and corporate lending"

3. Krugman (*New York Times*, 9/28/09) notes that in recessions, the accelerator effect on investment is likely to dominate crowd out effects, leaving a net stimulus effect of government spending increases/tax cuts. Alternatively, private borrowing may have declined so much that money is available for government to borrow without causing crowd out. (New York Times, 4/28/13)

4.0 METHODOLOGY

4.1. DATA USED

1960 - 2010 data from the *Economic Report of the President* (2011 and 2002) and the *Flow of Funds Accounts* of the Federal Reserve (2011) were used to estimate the effects of 11 -12 variables on consumption and 12 variables on investment spending and borrowing. A substantial review of the economic literature found these variables, or variants of them, cited as the major determinants of consumer or investment demand. Specific variables used in consumption and investment models are described in detail in sections 5 and 6. They are summarized in Table 4.1.1

Table 4.1.1 Determinants Of Consumption And Investment

Consumption	Investment
Disposable Income ($Y-T_T$)	Samuelson's Accelerator (ACC)
Deficit Variables ($T_T - G_{T\&I}$)	Deficit Variables ($T_T - G_{T\&I}$)
Wealth (DJAV)	Depreciation Allowances (DEP)
Interest rates (PR or r)	Interest Rates
Exchange rates (XR_{AV})	Tobin's q (DJAV
Consumer Confidence (ICC_{-1})	Profits (PROF)
Population Size (POP)	Exchange rates (XR_{AV})
Population Age Composition (POP_{16})	Population Size (POP)
Money supply (M2 - M1, $M2_{AV}$))	
Consumer borrowing ($C_{B\ or\ B2}$)	Business Borrowing ($I_{B(-1)}$)

4.2. Specific Methods Used

Key aspects of the methodology are summarized n the Introductory section of this paper. (Section 1).

5.0 TEST RESULTS: CONSUMER SPENDING AND BORROWING MODELS

Table 5.0.1 summarizes all 39 consumption spending and borrowing test results.

Table 5.0.1 Summary Of All Consumption OLS And 2SLS Spending And Borrowing Results

A.) 2SLS Borrowing Model Findings Summarized:

Model#	$\Delta(T_T\text{-}G_{T\&I})$ β (t-stat.)	Bus. Cycle Control
Average (All)	.74 (2.2)	
Av. (Str. Inst.)	.81 (2.2)	

OLS Borrowing Model Findings Summarized:

Model#	$\Delta(T_T\text{-}G_{T\&I})$ β (t-stat.)	Bus. Cycle Control
Average	.61 (2.4)	

B.) 2SLS Spending Model Findings Summarized:

Model#	$\Delta(T_T\text{-}G_{T\&I})$ β (t-stat.)	Δ(Bor) β (t-stat.)	Bus. Cycle Control
Average (All):	.45 (6.2)	.12(2.3)	
Av.(Str.Inst.Only)	.46 (5.5)	.12(2.4)	

OLS Spending Findings Summarized:

Model#	$\Delta(T_T\text{-}G_{T\&I})$ β (t-stat.)	Δ(Bor) β (t-stat.)
Average:	.46(7.4)	.12 (3.2)

Mean results of OLS and 2SLS tests were virtually identical for spending models, and reasonably close for borrowing. In the borrowing models, 2SLS results show a larger crowd out effect than the OLS results. Within each group, the results for different models tested generally cluster closely around the group mean

Statistically significant negative relationships between deficits and consumer spending (and borrowing) hold even controlling for state of the economy. This is contrary to the Krugman hypothesis that normal business cycle effects that cause the observed negative relationship between deficits and consumer spending.

6. INVESTMENT SPENDING AND BORROWING RESULTS

In this section, we test the relationship between government deficits and both business borrowing (I_B) and spending (I_T) in 40 models. 35 spending models are tested, 12 OLS and 23 2SLS. In addition, Four OLS borrowing models and one 2SLS borrowing model are tested. Only one 2SLS model was tested because most borrowing models showed no statistically significant Hausman endogeneity. Crowd out findings will be examined, controlling for a wide range of other variables beside the government deficit) that may affect investment. The variables hypothesized as determinants of Investment spending

6.1. SUMMARY OF ALL OLS AND 2SLS INVESTMENT SPENDING AND BORROWING FINDINGS

Table 6. 1.1 below summarizes of all 40 investment spending and borrowing model test findings

Table 6.1.1 Summary Of All Investment OLS And 2SLS Spending And Borrowing Findings

2SLS Spending Model#	Deficit Var. $\Delta(T_T-G_{T\&I})$ β (t-stat.)	Specific Method	OLS Spending Model#	Deficit Var. $\Delta(T_T-G_{T\&I})$ β (t-stat.)	Specific Method
Spending Models:					
Average	.34 (5.6)	2SLS weak instr.	Average	.33 (5.5)	(w/o "a")
Average	.35 (5.5)	2SLS str. instr.(Alt)			
Average	.30 (3.4)	2SLS str.Instr (Alt.a)	Average	.30 (3.6)	("a"only)
Average	.34 (3.9)	2SLS str.Instr (Alt.a2)			
Borrowing Models:					
Average	1.11 (3.3)		Averaqe	.96 (3.4)	

All 35 OLS and 2SLS spending tests show a very strong negative, statistically significant relationship between the government deficit and investment spending, even controlling for the level of the economy. The same tests also showed some evidence that borrowing is a separate factor affecting investment spending, and not just a financial manifestation of the desire to invest due to other investment determinants. However the statistical significance of this finding was marginal, apparently because of multicollinearity with the deficit variable. Remove the deficit variable and borrowing becomes highly statistically significant.

The similarity of findings for different 2SLS instruments suggests model results are robust to moderate changes in the components of the instruments. Whichever set of 2SLS models are used, results are nearly identical to the OLS results.

Dropping the business cycle control made no significant difference in the results. Investment spending was estimated to decline $0.33 per dollar of deficit incurred (Strong Instrument 2SLS results). ($0.32 for OLS results)

As was the case with spending models, in all 5 OLS and 2SLS borrowing models, the evidence indicates a systematic, highly statistically significant, negative relationship between government deficits and business borrowing, and that this relationship is nearly a one to one relationship, where business borrowing declines approximately $1.00 for every $1.00 increase in the deficit.

As was the case for consumer spending and borrowing, estimates of crowd out effects remain about the same whether the state of the economy is controlled for or not. Results show little support for the

Krugman hypothesis that it is just normal business cycle effects, not deficits themselves that cause the observed negative relationship between deficits and investment spending or borrowing.

7.0 SUMMARY OF FINDINGS AND CONCLUSIONS

The models within which crowd out was tested seem to comprehensively control for most if not all the key factors thought to affect consumption or investment. These models, which expand the standard structural stimulus models traditionally used to include the deficit variable, explain virtually all of the variation in consumer and investment spending that has occurred the past 50 years. They also explain consumer or investment behavior about equally as well in one decade as another of the fifty years studied, as shown in graphs 5.13.a and 6.13.Alt presented earlier.

The 60 models tested indicate the crowd out effects of government deficits overwhelms their stimulus effects, resulting in (so called) stimulus programs having a net negative effect on the GDP and raising the unemployment rate. Both econometric and accounting data from the Flow of Funds Accounts suggest this is true in both recession and nonrecession periods. At least for consumption, the crowd out effect occurred regardless of type of tax cut or spending stimulus. These results provide a factual basis for understanding why results of past stimulus programs have failed to convince many, though not all, economists that they are worthwhile.

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Macroeconomic Policies And Their Impact On Health In Sierra Leone: An Analysis Of The Prevalence Of Malaria, Malnutrition And Maternal Morality

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ABSTRACT

This study attempts to examine how changes in macroeconomic policies have shaped health outcomes in Sierra Leone, particularly with regard to malaria, malnutrition and maternal mortality in the post-war era. The study also examines how these health outcomes vary by income and geographical location.

Macroeconomic policies In Sierra Leone have tended to shape health outcomes and they have had an Impact on trends in household income levels and access to health facilities. The introduction of structural adjustment programs (SAPs) in the 1980s, which later were renamed poverty reduction strategy papers (PRSPs) has witnessed a major shift in macroeconomic policies. And these policy changes have tended to affect the health sector in a negative manner. In particular, the rollback on government expenditure on social services, health included, has led to a reduction in the population able to access health facilities.

INTRODUCTION

Health is extremely important to any society. While it brings the capacity for personal development and future economic security to the individual and families, it also forms the basis for productivity for a society as a whole.

The purpose of this study is to examine how changes in macroeconomic policies have shaped health outcomes particularly with regard to malaria, malnutrition and maternal mortality in post-war Sierra Leone. The study will also examine how these health outcomes vary by income and geographical location.

Recent studies have shown some direct relationship between malaria, malnutrition and maternal mortality on the one hand and income levels or poverty status, and geographical location on the other. However, in the absence of national studies verifying such relationships, this study deduces general trends in health in Sierra Leone, using national surveys conducted in 2008 and 2010. Accordingly, this study argues that a direct relationship exists between the prevalence of malaria, malnutrition and maternal mortality on the one hand, and such independent variables as income levels, and rural or urban location.

Studies have established that general health is affected by income levels. Accordingly, the poor are more likely than the non-poor to be ill. Moreover, income levels determine one's dietary patterns and living conditions both of which seem to have an impact on health outcomes. In the context of Sierra

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Leone, this would mean that while illness is experienced both by the rural and urban populations, slightly higher percentages of low-income groups become ill than the higher income urban population.

Sierra Leone's health care system has for a long time been characterized by user fees. But in 2010, the government removed these fees for pregnant and lactating mothers and children under the age of five. This initiative has led to a tripling of the number of women giving birth in hospitals and the number of children being treated for malaria. It has also dramatically reduced the fatality rate for malaria in hospitals.

However, the introduction of economic reform programs popularly known as the Poverty Reduction Strategy Papers (PRSPs) has witnessed a massive shift in macroeconomic policies in Sierra Leone. And these policy changes have tended to affect the health sector in a negative manner. In particular, the rollback on government expenditure on social sectors, health included, has led to a reduction in the population able to access health facilities.

Studies have shown that in developing countries women are more likely than their male counterparts to be ill. A number of factors have been attributed to this trend, preeminent among them being the reproductive role of females. This puts them at greater risk of being ill than males. In Sierra Leone, the greater division of labor at the household level and the nutritional intake differences between men and women cause women to be in worse health than men.

For Sierra Leone, the prevalence of malaria and other diseases is affected by income levels, with people in high-income groups being less likely to have malaria than those in low-income groups. Moreover, overall, the prevalence of malaria is greater in rural than urban locations.

Compared with other regions of the world, the percentage of Africans living under $1 a day is the highest by WHO region. 42.6 percent of Africans survive on less than a dollar day. In South-East Asia, it is 38.4 percent, while in Western Pacific it is 16.0 percent. In Eastern Mediterranean, 11.0 percent of the population lives on less than $1 a day while in the Americas only 4.8 percent of the population lives on less than $1 a day (WHO, 2012).

Also, lower income groups in Africa and in Sierra Leone are more likely than higher income groups to have children less than 5 years who are malnourished. And malnutrition also varies by geographical location, with a higher prevalence in rural than urban areas.

Sierra Leone gained independence from Britain in 1961. However, the post-colonial trajectory of development has been characterized by dramatic economic decline and political instability. Since independence, Sierra Leone has had five military coups d'état and a brutal civil war that lasted almost eleven years. This war, which started in March 1991 and ended in January 2002 resulted in over 20,000 deaths.

In the 1960s, annual growth averaged 4 percent but this dropped to 3.5 percent in the 1970s. In the 1980s this figure further plummeted to 1.5 percent. This dismal economic picture was largely the result of misguided economic policies and economic mismanagement by successive national governments.

Like other developing countries striving for economic growth, Sierra Leone introduced a series of macroeconomic and structural reforms in the late 1980s. This was done in consultation with the country's

development partners, chiefly, the World Bank and the International Monetary Fund (IMF). These reforms, which were called structural adjustment programs (SAPs) advocated a neoliberal economic agenda that aimed at stabilizing the economy and restoring growth through the reduction of the budget deficit, liberalizing the exchange rate, and abolishing price controls. However, the programs were derailed when war broke out in 1991. The war led to economic collapse and between 1991 and 2000, Sierra Leone experienced negative growth rates.

With the economy in shambles, poverty increased thereby becoming more pervasive as warring factions refused to lay down their arms. The outcome of this was Sierra Leone slipping down to the bottom rungs of the UNDP Human Development Index. With pervasive poverty came a higher incidence of diseases, particularly HIV/AIDs, typhoid, malaria, tuberculosis and other communicable diseases.

The war ended in 2002. And the post-conflict era has been characterized by economic, social and political rebuilding, resulting from decades of economic mismanagement, wide-spread corruption and inefficient state control over economic and political activity. Although significant progress has been made especially in stabilizing the economy and removing many of the structural impediments to growth, overall, the implementation of macroeconomic reforms in the form of the PRSPs framework has not brought to sierra Leone the expected benefits of sustainable growth and human development.

The rest of this study will be divided as follows: Section II will present the study's objectives and methodology. Section III will review the literature on the impact of macroeconomic policies on health while section IV will analyze the poverty reduction strategy papers as they affect Sierra Leone. Section V will discuss the findings of the 2008 Sierra Leone demographic household survey and the 2010 nutritional situation in Sierra Leone as they relate to the health sector. Finally, Section VI will draw a conclusion.

II. OBJECTIVES AND METHODOLOGY

This study attempts to examine how changes in macroeconomic policies have shaped health outcomes in Sierra Leone in the post-war era. To achieve this objective, health literature covering the specific areas in health being investigated is reviewed. Additionally, to understand the impact of the PRSPs on health, the study utilizes selected data from two national surveys - the 2008 Sierra Leone Demographic and Health Survey (SLDHS) and the 2010 Report on the Nutritional Situation of Sierra Leone. The two national surveys, conducted at more or less the same time, investigated nearly the same issues (health, poverty status, geographical location, gender and other social aspects).

The SLDHS conducted in 2008 contains detailed information on the demographic, health, and social indicators that enables a measurement of progress in Sierra Leone. Data were generated from a nationally representative sample of 7,374 women aged 15-49 and 3,280 men aged 15-59.

The second data source, the Report on the Nutritional Situation in Sierra Leone, was conducted from June 16 to August 10, 2010. Data were collected from 8, 801 households and 14,027 children less than 5 years of age and 13,636 women of reproductive age from 9,228 households. The two datasets investigated the theme of poverty and a number of social issues of which health was one. They were

timely since they were conducted after the introduction of second PRSPs and as such contain information relative to the implementation of macroeconomic policies in the health sector. This study deduces general trends in health in Sierra Leone, using the surveys mentioned above.

III. LITERATURE REVIEW

Every country on the face of the earth needs a strong health care system. While it balances prevention and intervention strategies, a strong health care system also provides a good health care education to citizens and at the same time ensures that an active workforce of health care providers is maintained. Moreover, a good health care system ensures that there are sufficient resources to confront illness and/or disease. On the contrary, a weak health care system cannot ensure that there are sufficient resources to confront illness and/or disease.

In Africa, weak health care systems are associated with poverty. And extreme poverty, on the other hand, is classified as a disease in itself. Therefore, reducing poverty has become an international priority for quite some time.

For quite a long time, Africa's chief development partners have included the World Bank and the International Monetary Fund (IMF). Since these two institutions are deeply involved in global development, they provide technical, operational, and financial assistance to member countries. In recent years, Poverty Reduction Strategy Papers (PRSPs) have represented the initiative that the World Bank and the IMF have used for reducing the plight of the poor in developing countries.

PRSPs in health are important due to the many roles that they perform. According to Walford (2002), these roles include:

First, PRSPs bring poverty up the national agenda.

Second, a health sector with developed policies and strategies that are pro poor can benefit from the PRSP process in that it can open an opportunity for such a health sector to communicate these policies to central ministries and politicians in order to have them reflected in budget allocations.

Third, where there is no pro poor strategy in place in the health sector, the PRSP process can provide an opportunity to reopen such initiatives in health policy or budget allocations. This means that the PRSP process can provide a context for discussions relative to the allocation of funds for preventable diseases suffered by the poor.

Fourth, the PRSP process can provide the opportunity to discuss such vital issues to the health sector as low civil service salaries, the need for measures to attract qualified staff to work in poor rural areas or the case for allocating budget to such needy areas as sanitation.

Fifth, the PRSP process serves as a link between external development partners and national governments. This means that through the PRSP process and external development partners can coordinate their efforts while focusing and monitoring their support.

Finally, the PRSP process offers all interested parties the opportunity to agree on some key milestones and indicators relative to sector progress and priorities.

PRSPs in developing countries have their roots in structural adjustment programs (SAPs) that emerged from the World Bank and the International Monetary Fund (IMF). Concerned with the debt crisis of the 1980s, the World Bank and the IMF intervened to ensure that developing countries continued paying their debt by offering new loans to these countries with certain conditions.

Built on neoliberal economic theory, SAPs wanted to increase the efficiency of developing nations in global markets by advocating for deregulation, privatization, and withdrawal of the state from many areas of social services. It was argued at the time that privatization and deregulation will spur competition thereby eliminating bureaucratic red tape (Brunelli, 2007).

Moreover, proponents of SAPs argued that structurally adjusting economies would increase efficiency and productivity, reduce costs and thereby provide cheaper goods and services for consumers. According to them, as productivity continues to increase, citizens will start to experience higher standards of living. Consequently, the expansion of unhindered free markets will eventually eliminate poverty through the acceleration of growth and the elimination of waste.

But SAPs in many developing countries, especially in Africa brought macroeconomic changes that had immediate consequences that were negative. While the gap between the rich and the poor increased dramatically, unemployment levels rose in many African countries in the 1980s. As far as the health sector was concerned, there were fewer subsidies for health and health centers. This meant that individuals must purchase health care from the private sector (Brunelli, 2007).

The minimization of subsidies to health, led to drastic staff reductions in public health facilities. Additionally, there were less equipment, inadequate supplies and lower quality services. And the reduction in government health expenditure coupled with the bringing in of private provision and payments for services even gave birth to inequalities in the provision of health services. In many African countries, the rise in private practices created a two-tier system. There were those patients who could pay more and as a result, got better services and attended special clinics in hospitals. On the other hand, there were those who could not afford the charges and as a result, had limited access or no access at all to good health care service.

The drastic budget cuts to health care also decreased incomes, limited employment opportunities and eliminated food subsidies. Infrastructural development also suffered, thereby making it difficult to locate and afford treatment in many African countries. Consequently, the likelihood of contracting diseases increased.

It is also important to mention that SAPs ushered in the policy of ‘exports at all costs’ since developing countries could only earn foreign exchange earnings to pay off their debts through exports. This left little or no foreign exchange to purchase drugs and other imported medical supplies. Thus, across much of Africa, there were severe shortages of imported drugs thereby contributing immensely to the migration of skilled health workers.

Sierra Leone’s SAPs resembled other African government-creditor agreements. But with the economy worsening, Sierra Leone’s creditors emphasized that loans would be contingent on government

commitment to dismantle the public sector. To the creditors, the bloated public sector was seen as the main reason for inefficiency and unproductive spending. According to Reno (1996), revenue collections had fallen from 30 per cent of GNP in 1982 to about 20 per cent of a smaller 1992 GNP. Yet the austerity measures that accompanied SAPs led to mass dismissals, which destroyed state-owned enterprises.

In 1991, Sierra Leone's creditors supported the arrival of a German firm, Specialist Services International (SSI) to operate the country's ports. The introduction of foreign firms with virtually no political connections was deemed by creditors as the best prospect for Sierra Leone to eventually clear its debt arrears, restore fiscal solvency and eliminate corruption. However, war broke out in 1991 and with it brought mass destruction of property and lives.

Today, Sierra Leone ranks among the lowest in the world in health care. Compounding the problem is a lack of qualified staff and hospital funds. These problems have had dire outcomes. According to UNICEF, one in five children die before age five and one in eight women die from pregnancy-related complications. According to the IMF Country Report on Sierra Leone, "while 49 percent of the "food poor" and 37 percent of the "other poor" go to a nurse, only 26 percent of the non-poor also go to a nurse."

The poor in Sierra Leone have considerable problems with affording health service. While physical distance to health care facilities may be a constraint to some, with others, even if there is health service available, they simply cannot afford it.

Additionally, Sierra Leone has about three doctors per 100,000 people and there exists a concentration of doctors and other health personnel per capita in the Western Area where the capital, Freetown, is located. There is also a plurality of health service providers with the government accounting for 70 percent. However, a major problem confronting the health sector continues to be the exodus of health professionals out of the country.

Emigration can have a considerable impact especially when the workforce is already small. Sierra Leone with a relatively small workforce and inflows (training and immigration) can be disproportionately affected by outward flows. Added to emigration and the shortage of health professionals is the fact that many hospitals in the country lack running water and electricity. There are also insufficient generators, inadequate beds and inadequate medical equipment.

Although there is little or no evidence to establish a relationship between staffing levels, other human resources issues, access to services, quality of maternal health care and maternal health outcomes, studies have found that doctor, nurse and midwife densities were significantly related to maternal mortality rates, when per capita income, female literacy and absolute poverty were controlled for (Gerain, et al 2006).

Sierra Leone has the highest rate of child deaths in the world. The table below shows the ten African countries with the highest under five mortality rate.

Table 1. Top ten African countries with the highest under five mortality rate

COUNTRY	U5 MORTALITY RATE	HEALTH WORKERS PER 1000	% GOVT. HEALTH EXP.	# OF UNDER FIVE DEATHS
SIERRA LEONE	270	0.5	8	71,000
ANGOLA	260	1.4	4	206,000
NIGER	253	0.3	10	173,000
MALI	217	0.7	13	126,000
CHAD	209	0.5	10	101,000
EQ. GUINEA	206	0.8	7	4,000
DR CONGO	205	0.6	7	620,000
BURKINA FASO	204	0.5	15	131,000
GUINEA BISSAU	200	0.8	4	16,000
NIGERIA	191	2	4	1,129,000
TOTAL				**2,577,000**

SOURCE: World Vision: Africa facts and statistics.

Although Sierra Leone has the highest rate of child deaths, Nigeria accounts for the highest under-five children deaths in Africa. That number stands at 1,129,000 compared with Sierra Leone's 71,000. Additionally, Sierra Leone has the highest maternal mortality rate in Africa and in the world. The table below shows health and economic indicators for African countries with the highest maternal mortality rates.

Table 2. Health and economic indicators for African countries with highest mmr

COUNTRY	MMR	HW PER 1000	HEALTH AS A % GOV. EXP.
SIERRA LEONE	2100	0.5	8%
NIGER	1800	0.3	10%
CHAD	1500	0.5	10%
ANGOLA	1400	1.4	4%
SOMALIA	1400	0.2	-
RWANDA	1300	0.5	17%
LIBERIA	1200	0.3	20%
BURUNDI	1100	0.2	29%
DR CONGO	1100	0.6	7%
GUINEA BISSAU	1100	0.8	4%
MALAWI	1100	0.6	29%
NIGERIA	1100	2	4%

SOURCE: Compiled from World Vision: Africa facts and statistics.

Maternal deaths in Africa are directly caused mainly by hemorrhage, sepsis, eclampsia, and obstructed labor. In the face of these problems and taking into account the effects of poverty on access to health care in Sierra Leone, the government of Sierra Leone launched a free health care scheme in 2010 for some 1.5 million women and children. Under this scheme, health facilities were to provide free care to under- five children and pregnant and lactating women. However, reports from state hospitals and health clinics across the country intimate that there are severe shortages of drugs that should be supplied under the free health care program. This is due to practitioners diverting these drugs for private use. But despite these complex problems, UNICEF states that the free health care scheme is producing

positive results as the number of malaria consultations for under-fives has doubled since the scheme's initiation.

IV. THE POVERTY REDUCTION STRATEGY PAPERS

This section analyzes the adoption and implementation of the interim poverty reduction strategy papers (I-PRSP) of 2001 and the poverty reduction strategy papers (PRSPs) 2005 for Sierra Leone. The PRSP programs were to be financed with loans from the World Bank and the International Monetary Fund (IMF). Additionally, external donors were also expected to make funds available to the government.

The government of Sierra Leone prepared the interim poverty reduction strategy paper (I-PRSP) and submitted it to the World Bank and the IMF on June 2001. This document outlined the government's objectives, strategies, and programs for poverty reduction both in the transition period from the civil war and the medium term. In it was a vivid description of the pervasive extent of poverty in Sierra Leone and the role of the civil war in its intensification. While government reiterated its commitment to poverty reduction, it also outlined a monitoring and evaluation strategy.

Since the civil war was now winding down in 2001, the government did not only outline its commitment to ending the war but also to creating a peaceful environment that would allow people and goods to move freely.

In analyzing the transition from war to peace, the I-PRSP emphasized national security and good governance, relaunching the economy, and providing the most vulnerable groups with basic social services. While national security and good governance would call for the implementation of the disarmament, Demobilization and Reintegration (DDR) program, the relaunching and revival of the economy would recognize the maintenance of macroeconomic stability as a prerequisite for the attainment of sustainable and higher economic growth.

The I-PRSP allocated a significant amount of budgetary resources to fund poverty reduction activities especially in the social sector comprising of health, education, water and sanitation. The budgetary allocation to health was aimed at expanding maternal and child health care, the school health and immunization programs and for the purchase of drugs and medical equipment. In the education sector, government aimed at implementing the universal primary education program.

According to the IMF Country Report on Sierra Leone, as a result of the I-PRSP, there was a sustained recovery of the economy between 2001 and 2004. Real gross domestic product expanded by 5.4 percent in 2001 from 3.8 percent in 2000. RGDP further expanded by 6.3 percent in 2002. Also, a National Zero-prevalence Survey conducted by the Sierra Leone Statistics Office (SSL) and the US Centers for Disease Prevention and Control (CDC) in April 2002, showed that HIV prevalence nationally was 0.9 percent.

Following the end of the war in 2002 was a countrywide reconstruction and rehabilitation work. This spurred economic growth which resulted in an increase of real GDP by 27.5 percent in 2002 and 9.4 percent in 2003 (IMF Country Report, Sierra Leone, 2005). There was also broad recovery in agriculture,

mining, manufacturing, and construction and services sectors. Further, diamond exports grew as well as imports. The growth in imports led to a current account deficit.

The government adopted the full PRSP in 2005. This document was constructed around three pillars: Good Governance, Peace and Security; Food Security, Job Creation and Growth; and Human Development. These pillars were supported by a framework for implementation that included the following:

1. Mainstreaming poverty reduction efforts.
2. An inclusive participatory process that emphasized the active involvement of civil society, private and public sectors, and representatives of vulnerable groups.
3. Achieving transparency through a well-defined planning process that included more efficient coordination and prioritization.
4. The participation and cooperation of representatives of local governments, the NGOs and private sectors and donors.
5. Building partnerships during the course of the PRS implementation for the purpose of improving coordination and information sharing.

In addition to the foregoing, the 2005 PRSP contained a monitoring and evaluation component that established a monitoring and evaluation unit. This unit was staffed by a Monitoring and Evaluation Officer, poverty Data analyst and Two program Officers. In addition to its many functions, this unit also coordinated the collection and collation of all poverty related data and facilitated the analysis of such data.

In the health sector, the objective of government in the medium term was to reduce under five and maternal mortality rates by expanding access and quality to healthcare services. Under this initiative, government would construct and rehabilitate health facilities nationwide, train health workers and traditional birth attendants, expand immunization coverage, provide Insecticide Treated Bed Nets (ITNs) and address HIV/AIDS.

The interventions on the part of government led to significant reductions in infant under-five and maternal mortality rates. Additionally, access to healthcare increased from 40% to 70% between 2004 and 2005 (IMF Country Report, Sierra Leone, 2005). Access to ITNs among pregnant women rose by 8% while among children less than five years age it increased by 6%.

V. FINDINGS AND DISCUSSION BASED ON THE 2008 SIERRA LEONE DEMOGRAPHIC AND HEALTH SURVEY AND THE 2010 REPORT ON THE NUTRITIONAL SITUATION IN SIERRA LEONE.

Two national surveys that provided the much-needed national data that can be used to evaluate the general impact of PRSPs on health in Sierra Leone are the 2008 Sierra Leone Demographic and Health Survey and the 2010 Report on the Nutritional Situation in Sierra Leone.

HEALTH STATUS IN GENERAL

Based on the demographic and health survey, infant and under-five mortality rates have dropped by 26%. However infant and under-five mortality rates in Sierra Leone remain one of the highest in the world. One in every seven Sierra Leonean children dies before reaching the age of five.

Table 3

WEALTH QUINTILES							
Percent distribution of the jure population by wealth quintiles according to residence and region, Sierra Leone 2008							
	Wealth quintile						
Residence/region	Lowest	Second	Middle	Fourth	Highest	Total	Number of population
Residence							
Urban	2.0	4.4	9.2	28.4	56.0	100.0	14.104
Rural	28.8	27.6	25.3	15.9	2.3	100.0	28.701
Region							
Eastern	24.1	21.9	23.8	20.0	10.2	100.0	7,878
Northern	19.4	25.2	26.3	21.9	7.2	100.0	18,730
Southern	34.9	24.0	17.1	16.3	7.7	100.0	8,531
Western	0.7	0.9	3.9	19.5	75.0	100.0	7,667
Total	20.0	20.0	20.0	20.0	20.0	100.0	42,805

Source: SLDHS

The results of the SLDHS show a positive relationship between poverty status or income levels and the occurrence of illness. What this means is that there is higher incidence of illness among the poorest people. More than half of urban residents (56%) live in households that are in the highest quintile while only 2% of the rural population is in the highest quintile. Moreover, based on the above table, three out of four residents of the Western Region, where Freetown, the capital is located are in the highest quintile, while three in four residents of the other regions are in the three lowest quintiles.

In a country where rural areas have far less healthcare facilities than urban areas and with more urban dwellers belonging to the highest wealth quintile, poverty status or income levels determines the health outcomes of people. It follows that the income status of the population determines many of their socio-economic and environmental conditions.

Also, in a country where access to health care is still a problem, more mothers are now receiving antenatal care from a health professional (doctor, nurse, and midwife) than they are from a traditional midwife or a community health worker. Almost 87% of Sierra Leonean mothers have consultations with a doctor, nurse or midwife while only 5% receive antenatal care from a traditional midwife or a community health worker. 9% of the country's mothers receive no antenatal care.

Table 4. PROBLEMS IN ACCESSING HEALTH CARE

Percentage of women age 15-49 who reported that they have serious problems in accessing health care for themselves when they are sick, by type of problem, according to background characteristics, Sierra Leone 2008

	Problems in accessing health care		
Background characteristic	Getting permission to go for treatment	Getting money for treatment	Distance to health facility
Age			
15-19	11.9	76.8	49.2
20-34	7.9	80.0	54.0
35-49	5.9	81.8	53.1

Source: Compiled from SLDHS

Table 2 shows that a major problem of more than half (80%) of Sierra Leonean women in accessing health care for themselves is getting money for treatment. And about half of women (49 to 53%) have problems accessing health care due to the distance to the health facility.

Nor is the statistics for postnatal care is not encouraging. Only 38% of Sierra Leonean mothers receive such care within four hours of delivery. 20% receive postnatal care within two days of delivery, 5% within 3-41 days after delivery and 33% receive no such care at all. For the seven-year period preceding the SLDHS, there were 857 deaths per 100,000 births.

Life expectancy in Sierra Leone estimated at 47.5 years is one of the lowest in the world. Although this rate is associated with a heavy disease burden and high child and maternal morbidity and mortality, the underlying factors are preeminently pervasive poverty, high illiteracy rate and limited access to safe drinking water.

Sierra Leone has consistently ranked at the bottom of the Human Development Index and is still considered one of the poorest countries in the world. Poverty is pervasive and 60% of the population lives on less than $1.25 a day. Also, unemployment and illiteracy levels especially among youth are high.

At the level of the household, there are variations in poverty between urban and rural areas. The SLDHS shows that in rural settings, households in which the heads are primarily engaged in agriculture are more likely to be poor. But households in rural areas where the head has at least some secondary or post-secondary education are less likely to be poor. In urban areas, education has a strong impact on poverty as the increasing levels of education of the head of the household reduces the household's probability of being poor considerably.

Malaria is on a rise accounting for about 48% of outpatient attendances. According to the World Health Organization, malaria accounts for about 25% of mortality in children and under-fives.

Awareness of HIV/AIDS is relatively high among adults in Sierra Leone. In the 15-49 age category, 69% of women and 835 percent of men admitted to having some knowledge about HIV/AIDS. Also, within this age category, 1.5% of Sierra Leoneans are HIV positive while 1.7% of women are HIV positive.

MALARIA

For quite a long time, malaria has posed one of the most serious problems in Sierra Leone. According to the SLDHS, malaria accounts for over 40% of outpatient morbidity, with the most vulnerable groups being children under five years, pregnant women, refugees, and returnees.

Malaria also poses a serious problem in other West African countries. It is a leading cause of child death in Nigeria, accounting for roughly 250,000 child deaths. In Ghana, approximately 20,000 children die each year of malaria.

With civil war, the incidence of malaria only exacerbated as a substantial fraction of the population was displaced and much damage was done to the health care system.

The primary health intervention for reducing malaria transmission and morbidity in communities is ownership and use of mosquito nets.

According to the SLDHS, more than 37% of households in Sierra Leone own at least one insecticide-treated net (ITN), with households in the Southern Region recording the highest percentage of ownership – 45%. There is a higher concentration of ownership among wealthier households while poorer households owned less.

Pregnant women are more susceptible to malaria infection and low birth weights are often reported among children whose mothers are infected with malaria during pregnancy. This is because malaria can interfere with the maternal-foetus exchange. Government has adopted a strategy called Intermittent Preventive Treatment (IPT) whereby pregnant women are treated with sulphadoxine pyrimethamine (SP) also known as Fansidar. It is recommended that pregnant women receive two doses of IPT in the second and third trimesters, to reduce the risk of malaria infection. The survey results show that urban women (41%) are more likely to use anti-malarial drugs during pregnancy than rural women (31%)

Malaria manifests itself with fever and most of the fevers occur at home. Fever is most common among younger children. However, the proportion of children with fever differs little by urban-rural residence.

The results of the survey also show that there is higher prevalence of fever among children of more educated women and women in the higher wealth quintiles. This may be attributed to educated women more likely recognizing and reporting fever in their young children than women with less education and women in lower wealth quintiles.

MALNUTRITION

Malnutrition is a pressing major development challenge in Sierra Leone. According to the Report on the Nutritional Situation in Sierra Leone, all forms of malnutrition are high in the first two years of age. On the national level, 6.9% of children aged 6-59 months have Global Acute Malnutrition (GAM) and 0.9% suffers from Severe Acute Malnutrition (SAM).

There is a high rate of stunting among children, reflecting the existence of chronic malnutrition. Stunting or chronic malnutrition exists in 34.1% of children 6-59 months of age. And severe stunting exists in 9.5% of children countrywide. Moreover, 18.7% of children 6-59 months of age are underweight.

At the national level, 4.5% of women 15-49 years of age are obese, 13.4% are overweight and 9.2% are underweight. Malnutrition is associated with poverty levels with children of higher income groups suffering less from malnutrition than children of poor parents.

MATERNAL MORTALITY

Maternal mortality reveals women's overall access to health care and the responsiveness of the health care system to meet their needs. Knowledge of maternal mortality does not only help to identify the risks associated with pregnancy and childbearing but it also reveals, albeit indirectly, women's economic and social status.

According to the SLHDS, one in eight Sierra Leonean women risk dying during pregnancy or childbirth. This means that maternal mortality in Sierra Leone is one of the highest in the world. Many Sierra Leonean women even bleed to death after giving birth.

In Ghana, it is estimated that between 250,000 and 343,000 die each from complications related with pregnancy and childbirth. In Nigeria, one in 13 women die in childbirth.

In Sierra Leone, while many pregnant women die in their homes, some die on the way to hospital in taxis, on motorbikes or on foot. Moreover, a great number of the deliveries in Sierra Leone are not attended by a skilled birth attendant. Also, many deliveries are not carried out in health facilities.

VI. CONCLUSION

Macroeconomic policies in Sierra Leone have tended to shape health outcomes. They have also had an impact on trends in household income thereby influencing access to health facilities.

Sierra Leone introduced structural adjustment programs in the 1980s and twenty years later these programs became known as poverty reduction strategy programs. These programs have tended to affect the health sector directly since they precipitated a reduction in government expenditure on social programs which includes health.

Results of the Sierra Leone demographic household survey of 2008, and the report on the nutritional situation in Sierra Leone show that the impact of the PRSPs on Sierra Leone has been negative. They also show that a positive relationship exists between the prevalence of malaria, malnutrition and maternal mortality and poverty levels. In other words, lower income groups as opposed to higher income groups are more likely to become ill or have problems accessing health care facilities. Also, the prevalence of malaria, malnutrition and maternal mortality is influenced by rural and urban locations. Correspondingly, there is a higher incidence of malaria, malnutrition and maternal mortality in rural other than urban areas.

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Too Many Cliffs

Kent A. Klitgaard*

ABSTRACT

The U.S. economy is currently been mired in stagnation. Different schools of economic thought have different visions of the economy, different explanations for the crisis, and different policies to rectify the problems. The result is policy impasse, sometimes referred to as "The Fiscal Cliff." What are missing are theories of the limits to growth. This paper looks beyond the "Fiscal Cliff" to economic problems that will occur as the age of economic growth ends: specifically a "Net Energy Cliff" and a "Climate Cliff." Solutions to the fiscal and energy cliffs could make the climate cliff far more difficult to transcend.

INTRODUCTION

As one looks at the economy of the United States in the second decade of the twenty-first century two phenomena appear: economic stagnation and political impasse. Annual percentage growth rates in real gross domestic product, which averaged 5.9% in the decade of the 1940s, driven by the stimulus of World War II spending, averaged 4.4% per year during the vibrant decade of the 1960s. By the first decade of the 21st century this figure had declined to 2.6% and to only 1.67% per year during the second decade (Foster and Magdoff 2009, Bureau of Economic Analysis 2014).The World Bank estimates real growth to be only 1.0% for the world in 2012 (World Bank 2014). Behind these immediately apparent issues lay others of crucial importance, such as rising levels of debt and inequality, along with environmental constraints like peak oil, declining energy returns on investment, impending planetary boundaries, such as the rise in atmospheric concentrations of carbon dioxide. Recent political manifestations include concerns over the fiscal cliff of unpaid debt and debates over the passage of continuing resolutions to raise the debt ceiling. While political processes have their own dynamics revolving around issues such as the beneficence or malignancy of big government itself, as well as the intricacies of personality and coalition building, I assert that underlying these political intransigencies are profound differences in economic philosophies as to the nature of the economy and economic growth. Period of impasse, defined as periods when no political party or coalition has the power to implement its own agenda, yet does possess the power to block the policies of its rival, have occurred before in the history of the United States (Wolfe 1981). The most recent example was the period at the end of the 1970s.

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While there were many proximate causes, such as Watergate, the seizure of the American Embassy in Tehran, and President Carter's "Life is not Fair" speech, the ultimate causes lie in the breakdown of the post-World War II "golden age" of American capitalism and the subsequent failure of Keynesian-based policies to produce the goals enumerated in the Employment Act of 1946: reasonably full employment; stable prices;and economic growth. Instead the era was characterized by falling rates of productivity growth; two oil rises, stagflation, and the collapse of the Bretton Woods Accords. The impasse was not resolved until the election of Ronald Reagan in 1980, who was able to implement a more market-oriented set of policies in the wake of the devastating recession of 1981-1982. Since that time conservative politics and neoclassical economics have dominated the ideological landscape. Indeed, energy and economic analysts Daniel Yergin and Joseph Stanislaw considered Richard Nixon to be the "last liberal president" of the United States (Yergin and Stanislaw 1997). Nobel Prize-winning economist Robert Lucas summed up the transformation of the economics profession when he stated: "One cannot find good under-forty economists who identify themselves or their work as 'keynesian.' Indeed, people even take offense if referred to as Keynesians. At research seminars, people don't take Keynesian theorizing seriously anymore; the audience starts to whisper and giggle at one another" (Lucas 1980, quoted in Perelman 2007: 183).

However, in the wake of the financial collapse of 2007-2008 and subsequent "Great Recession," Keynesian economics has made somewhat of a comeback, at least in policy circles. Spokespeople such as Nobel Laureates Paul Krugman and Joseph Stiglitz, along with former Labor Secretary Robert Reich have responded to the persistent sluggish growth and high rates of unemployment with calls for more government stimulus to boost aggregate demand and for the redistribution of income. Liberal and conservative economists have subsequently advanced programs to rekindle economic growth that are fundamentally in opposition to one another.

However the mainstream debate does not take sufficiently seriously the idea of limits to economic growth. In this paper I will develop the idea that there exist two sets of profound limits to growth. One set is internal and manifests itself as a tendency toward stagnation, or slow growth. These limits are found in an economy characterized by globalization, large-scale concentrated oligopolies, and the dominance of finance over industry. In other words, the decades-long tendency towards stagnation we have witnessed is not the result of bad policy choices, but can be found embedded in the very institutional structure of the economy itself. A second set of limits is imposed by nature. Many scientific measures such as ecological footprinting, analysis of carrying capacity, energy return on investment, and the effects of increasing atmospheric carbon dioxide indicate that the present level of economic activity has already overshot at least three of eleven "Planetary Boundaries" and is critically close to another three (Rockstrom 2009). Since energy has long been a driver of economic growth, a world of less-available, and increasingly expensive, energy will serve as a limit to future economic growth (Cleveland 1984, Hall and Klitgaard 2011, Campbell and Laharèrre 1998). Moreover, the destabilization of the Earth's climate from the increased loading of carbon dioxide in the atmosphere will likely destabilize the economy as

well. Consequently the discussion of future economic policy should include an analysis of the interaction of internal and biophysical limits, as beyond the fiscal cliff lie steeper and more precarious precipices such as a net energy cliff, a biodiversity cliff, and a climate cliff. Any supposed solution to the fiscal cliff arrived at by increasing growth, especially growth in material throughput, new sources of energy, and expanded consumption is likely to exacerbate problems associated with being close to, or exceeding, our planetary boundaries. Attempts to live within nature's limits by reducing the size of the economy will make problems such as debt management and the maintenance of employment exceedingly difficult, if not impossible. Economists need to consider the restructuring of social institutions in a manner that can accommodate a smaller impact upon nature's systems while simultaneously allowing human beings to live decent and meaningful lives.

THE CONSERVATIVE ARGUMENT

Conservative political thought is based upon the idea that a competitive economy will produce allocatively efficient results if left to its own devices. Hayek, for example, believed that the Great Depression would have ended in the absence of increased governmental activity if enough time elapsed. Many conservative politicians, especially the Tea Party wing of the Republican Party, exhibit a profound distrust of government and argue that it should be kept to the basic principles consistent with *laissez-faire* such as protecting property rights and providing for the common defense. Conservative economists over the years have advanced the theories that economies can thrive and grow without inflation and serious unemployment if the government will simply exhibit responsible fiscal policy, provide a stable monetary policy, keep taxes and regulations to a minimum, and allow people to pursue their own self-interest (Skousen 1994). Economist David Kotz enunciated a somewhat more ambitious agenda for conservative (or neoliberal) policy including: 1) the removal of institutional barriers to the free movement of commodities and capital; 2) the withdrawal of the state from regulatory activity; 3) privatization of state enterprise and public services; 4) a shift to regressive taxation; 5) the end of the capital-labor accord (whereby increases in productivity were translated into increases in wages by means of negotiations between unions and management); 6) the replacement of co-respective oligopoly pricing behavior by renewed competition; and 7) a faith in entrepreneurial activity and free-market ideology (Kotz 2009). In a financialized economy the market will serve as an essentially perfect carrier of information, such that no individual can successfully "beat the market," thereby rendering financial regulations unneeded, and, indeed, counterproductive.

Conservatives identify uncertainty as a major problem. Fixed investment grew by only 5.4% over the course of the first decade of the 21st century, fluctuating significantly in the process. Conservative politicians tend to blame government for creating uncertainty by means of its expansionary monetary and fiscal policies. Debt only adds to the uncertainty problem. Consumer debt as a percentage of disposable income increased from 62% in 1975 to 127% in 2005. By the same year total debt stood at

330% of the economy (Foster and Magdoff 2009). Conservative doctrine contends that since a government must fund its expenditures by selling bonds any increase in government spending must be met by a decrease in private sector funding, or by an increase in interest rates. The economy cannot simply live on expanding debt. A period of austerity will create the fiscal discipline needed for the private sector of the economy to grow in the long run by means of fostering an atmosphere in which individual enterprise can thrive (Ahiakpor 2012).

The combination of the financial collapse of 2007-2008 and subsequent recession, and an increase in severe weather driven by increased carbon emissions has made more economists take a skeptical attitude towards free market ideology than at any time in the course of two decades. A liberal resurgence and an increased credibility for the lessons of Keynesian economics, has appeared recently.

THE LIBERAL APPROACH

In the 1920s and 1930s John Maynard Keynes broke with his "Classical" predecessors, primarily over "Say's Law" and the derivation of the labor supply curve. He argued that an economy can reach equilibrium at any level of employment, and less than full employment levels of equilibrium output can be traced to a lack of effective demand. Keynes' analysis was also linked to uncertainty, but the uncertainty was to be found in the private sector in the process of investment, especially investment in long-lived fixed capital assets. No one can predict accurately business conditions, even in the intermediate term, and capital investment necessitates calculating market values far into the future. This necessitated the development of financial markets, and these markets were prone to both speculation and the miscalculations involved with "animal spirits." It is impossible to reduce this uncertainty to calculable risk (Keynes 1937). What is now termed "irrational exuberance" can create bubbles subject to collapse in a positive feedback situation. "Speculators may do no harm as bubbles on a steady stream of enterprise. But the situation is serious when enterprise becomes a bubble on a whirlpool of speculation" (Keynes 1964: 159). Moreover the classical policy prescription of reducing wages to expand employment and reduce business costs was counterproductive in that the decline of wage income further reduced effective demand. Keynes also believed in direct governmental action. While most economists recognize Keynes' dictum that "in the long run we are all dead," few can cite the source or the context of the quote. Arguing against a policy of benign neglect towards economic downturns following the recession of 1921 Keynes stated: "But this long run is a misguided guide to current affairs. In the long run we are all dead. Economists set themselves too easy a task if in the tempestuous seasons they can only say that when the storm is long past the ocean is flat again" (Keynes 1923: 80).

Most students of today who study liberal macroeconomics learn not the economics of Keynes, but the "New Economics" of the American "Keynesians" of the 1950s and 1960s. Correct use of monetary and fiscal policy can keep the economy at full-employment equilibrium and produce economic growth by matching the level of aggregate demand to the productive capacity of the economy. The

government is a vital component of a modern economy, providing sufficient demand and liquidity when the private sector is unable to, and "cooling down" an "overheated" economy when needed, without producing large-scale unemployment. As previously mention, these policies were rendered ineffective by the global economic conditions of the early 1970s, falling largely into disrepute. However in the years following the "Great Recession" of the late 2000s strong advocates of governmental action to stimulate the economy in the wake of prolonged stagnation have re-emerged.

One prominent liberal Keynesian of today is Nobel Laureate Paul Krugman. His primary arguments are that the government has not exhibited fiscal irresponsibility by increasing levels of deficit spending. On the contrary, the stimulus has been inadequate. It was too short lived and of insufficient magnitude to solve the most important problem of persistent unemployment. He points to the to the higher European rates of unemployment rates and lower rates of economic growth as proof that austerity plans, or the cutting of public spending in order to balance the budget, are effective as methods of spurring economic growth. More fundamentally, Krugman advocates an expansionary fiscal policy, in the form of spending rather than tax cuts, because monetary policy has reached its limits. Once the Federal Reserve has pushed the Federal Funds Rate essentially to zero we are once again living in the Keynesian world of the liquidity trap, when further monetary policy is ineffective. Even though the Federal Reserve has come up with innovative policy instruments such as quantitative easing, the increased liquidity is not resulting in the expansion of the real economy, as the unemployment rate remained stubbornly high 7% three years into the recovery. Moreover capacity utilization stood at 79.1% in December 2013, below the 1972-2012 average of 80.2 (FRB 2014). In contrast stock market prices grew by more than 25% over the course of 2013. He considers the deficit to be a lower priority problem that employment. According to Krugman if markets are excellent conduits of information the bond market should be responding to fears of inflation and potential crowding out by increasing interest rates. However this has not occurred and interest rates remain low, possibly due not only to the easy money policy of the Fed, but also to debt deflation (Krugman 2013).

Another point of Krugman's is that moral hazard was exacerbated by the loosening for financial regulations in the 1980s and 1990s. Unregulated "shadow banking" combined with a growing gap between the growth of productivity and stagnant wages to produce the conditions for the crisis. The way out is for the government to spend where the private sector will not. Conservative policy choices such as reducing the progressivity of taxes, slashing social programs, and cutting education expenditures all served to increase inequality and potentially reduce the consumption of "the bottom 80%" (Krugman 2013).

The liberal economist most associated with the perils of rising income inequality is Robert Reich. Reich remains an avowed underconsumptionist, arguing that the growing income inequality since the 1980s, attributed to soaring stock values and stagnant wages, technological change and globalization, serves to reduce potential consumption spending, and thereby aggregate demand through a multiplier effect. Gini Coefficients have risen considerably from .401 in 1972 to .477 in 2012 (U.S. Bureau of the

Census 2014). According to a much-quoted 2013 study by Picketty and Saez wages have remained flat since 1970 while productivity has more than doubled. The income share captured by the top decile exceeds 50% while the top 0.01% of income earners has more than quintupled since 1970. Moreover the top 1% of income earners captured more than 95% of income gains since the trough of the "Great Recession" (Picketty and Saez 2013). Reich calls for a return to the Basic Bargain negotiated in the late 1940s whereby increases in productivity were translated into increasing wages, and the increase in working class consumption served as the basis to justify increased investment. This provided the basis for a prolonged period of sustained economic growth (Reich 2011).

RADICAL PERSPECTIVES

From the more radical social structure of accumulation (SSA) perspective, Reich's Basic Bargain did not happen in an institutional vacuum. Rather it was the result of a historically specific set of conditions that followed World War II, including not only the capital-labor accord of which Reich speaks, but also a capital-citizen accord based on economic growth, world economic hegemony in production and finance, especially as regards the Bretton Woods Accords, and the containment of price competition (Bowles 1990). From a biophysical perspective it was also the age of cheap oil and rising productivity growth (Hall and Klitgaard 2011). Historically it is the consolidation of an SSA that produces a prolonged period of economic growth. When these conditions evaporated in the early 1970s the capitalist class could no longer afford the Basic Bargain, given declining productivity growth and rising input prices. Although much of the conservative agenda was implemented during the last two decades of the 20th century a new, neoliberal, SSA was never fully consolidated and vibrant economic growth henceforth was replaced by stagnation (Kotz 2009).

Another radical perspective has been advanced by the Monthly Review School since the 1940s. The American economy is characterized by large-scale oligopolies not tiny competitive enterprises, and these corporations avoid price competition. Rather they compete on the basis of the extension of market share and cost reduction. This pricing behavior coupled with the increases in productivity, facilitated by the application of fossil fuel, allow the economic surplus, or the difference between the value of output and the sum of subsistence consumption and replacement investment, to rise. Ways of absorbing, or spending this surplus included consumption, investment, and flat out waste. Unabsorbed surplus is the primary cause of stagnation. Normally sufficient outlets are not found, as even increasing mass consumption, foreign trade, and government spending cannot offset the increases in productivity in a context of the excess capacity that develops as a consequence of co-respective oligopoly behavior (Baran and Sweezy 1966). This raises a fundamental theoretical difference between radical and neoclassical economics. For the neoclassical theorist the market economy is built upon efficiency. For the radical economist it is built upon waste, and even our normally wasteful economy cannot transcend the tendency towards slow growth often called the "Sweezy Normal State."

In *Monopoly Capital* Baran and Sweezy explained the periods of historically vibrant growth as the result of epoch-making innovations that absorb tremendous amounts of investment capital and surplus, such as the steam engine, the railroad, and the automobile. These innovations also create entire new industries, and provide for the expansion of employment and the creation of new markets. War and its aftermath are also ways of counteracting the stagnation tendency of monopoly capital. In 1939 the unemployment rate was 17.9%. Five years later it had fallen to 1.2% (Baran and Sweezy 1966). As the SSA theorists state, the new postwar social structure that produced the golden age was constructed largely upon the aftermath of the war. In the 1980s Sweezy and Harry Magdoff turned their attention to the increasing financialization of the economy. In distinction to the mainstream business press who saw the expansion of finance at the expense of industry as a drag upon the economy, Magdoff and Sweezy analyzed that the financial sector expanded because of the underlying stagnation in the real economy. The expansion of debt was a major, along with military spending, factor in propping up the economy and producing what growth was forthcoming in the 1980s and 1990s (Magdoff and Sweezy 1987). This debt expansion was driven by the creation of exotic new financial instruments in the context of a deregulated banking system. While conservatives tend to focus their ire on the expansion of the budget deficit, the expansion of government debt was relatively small when compared to the expansion of financial sector debt. Government debt, including state and local debt expanded a little more than eighteen-fold in the period from 1970 to 2007. Financial firm debt expanded by a factor of 160. When the expansion debt exceeded the ability to repay the underlying weakness in the real economy was exposed. The economy suffered not a financial collapse of historic magnitude and a deep recession as well, as the underlying stagnationist tendencies of the real economy manifested themselves (Foster and Magdoff 2009).

BIOPHYSICAL ECONOMICS

Economic development and economic value, since ancient times, have depended largely upon the appropriation and adaptation of energy. It is not surprising that the Physiocrats developed a value theory whereby all value was based in agricultural production. At that point, before the era of fossil fuels, land was the primary way of accessing energy—primarily through photosynthetic capacity. The tremendous expansion of output in the industrial revolution depended not only upon the reorganization of the labor process, but upon the application of fossil-based energy, first in the form of coal and later in the form of natural gas. Historically, lower quality, less dense, forms of energy were replaced by higher quality, more dense forms of energy. Draft animals replaced human muscle power and increased labor productivity in the process, once agricultural productivity increased enough to produce fodder for the draft animals. Coal replaced biomass and heralded the industrial revolution. In the early 20th century oil replaced coal, especially in transportation, and electricity replaced steam. Electricity was not only a more flexible source of power, but allowed for the revolutionary transformation of the workplace, as electric motors could be placed on individual machines, according to power needs, and the multi-story factory, dependent upon a central power source, could be replaced by the expansive, single story production facility (DuBoff 1967).

For example, without electricity Ford's innovations in automobile assembly would scarcely have been possible (Hall and Klitgaard 2011).

The most fruitful method of assessing the economic dimensions of energy quality is by calculating the Energy Return on Investment (EROI).

$$\text{EROI} = \frac{\text{Energy Returned to Society}}{\text{Energy Required to Get that Energy}}$$

A great number of studies (Campbell, Campbell and Laharèrre) have indicated that the production of conventional crude oil has already peaked in the first decade of the 20th century. The problem is not one of "running out of oil," but one of a declining geophysical supply relative to an increasing demand. When the U.S. supply of conventional oil peaked in 1970, the nation became increasingly vulnerable to variations in the world market. Most analysts attribute at least a portion of the causes of stagflation to high oil prices. Much of the success of the Reagan era programs, not to mention the collapse of the Soviet Union, have a great deal to do with the collapse of world oil prices from over $100 per barrel to $10 per barrel. Oil producers behaved historically as Ricardo predicted they would. They exploited the cheapest, highest quality resources first. Consequently as conventional oil is depleted a greater amount of oil comes from "unconventional" sources such as deepwater drilling, natural gas liquids (such as propane and butane), tight oil (made possible by the combination of hydraulic fracturing and horizontal drilling), and oil sands. The EROIs of unconventional sources of hydrocarbons, along with alternatives such as wind and solar, today are much lower than were the EROIs of conventional oil at the beginning of the oil age. EROIs exceeded 100:1 when the big finds occurred in Texas and Oklahoma in the 1930s. By the peak year of 1970 the EROI of domestic oil had fallen to 30:1. Oil and gas production in 2005 had an EROI that ranged between 11:1 and 8:1. Even imported oil carried a 2007 EROI of only 12:1. Wind turbines have an EROI in the 18:1 range and photovoltaics range from 6:1 to 8:1. Nuclear power has an EROI of approximately 5:1.The EROI for corn ethanol has been estimated to be as low as 0.8:1. It actually takes more energy to manufacture the ethanol than the ethanol returns! (Hall and Klitgaard 2011).

Much of our existing infrastructure was built upon cheap oil. Many analysts count on a rebounding housing sector to drive economic growth. Yet the present configuration of suburban housing was built upon 25 cent per gallon gasoline. Whether or not it can exist at $5.00 or $10.00 per gallon gasoline, especially in the context of stagnant wage income is highly suspect. The question arises: what level of EROI do we need to support a civilized society? If energy returns on investment were as low as 1.1:1 all we could do would be to pump the oil out of the ground and look at it. If we wanted to transport and refine it we would need higher EROIs. If society wanted to support education, especially female literacy in developing nations, health care and the arts we would need EROIs of around 10:1 (Lambert *et al.* 2013).Energy sources with lower EROIs are literally leading society off a net energy cliff more precarious than the fiscal cliff of political impasse. Murphy and Hall estimate that without high EROI energy sources economic growth will stagnate because of biophysical causes (Murphy and Hall 2011). While new techniques for getting oil out of the ground have been developed in recent years and have increased the

available supply, the newly discovered oil is not cheap oil. The energy inputs into deepwater and tight oil assure us that we will not return to $10 per barrel oil that drove economic development as recently as the 1980s and 1990s.

However finding higher EROI fuels would not, in and of itself, be a panacea for economic growth, for there are dire consequences of using the fossil fuels. Atmospheric concentrations of carbon dioxide exceeding 400 parts per million have already been observed at Mauna Loa. James Hansen has estimated that climatic "tipping points" can occur at concentrations of $C0_2$ of 350 ppm, a figure that would result in 1 watt of radiative forcing, but 350 ppm is a figure we have not seen in decades. Current 400 ppm CO_2 concentrations have resulted in a radiative forcing of 1.5 watts. If concentrations exceed 450 parts per million the probabilities of keeping global temperature increases to less than 2 degrees Celsius, as agreed to at the Copenhagen Climate Convention are virtually nil. Hansen asserts that if we exploit fully all the hydrocarbons already discovered that it is essentially "game over" for climate stability. While the relation between carbon dioxide and temperature is settled science, some controversy remains, especially as regards the climate forcing of atmospheric aerosols. These aerosols increase the albedo (reflectivity) of the atmosphere. If the aerosol forcing is two watts rather than one, we are masking even greater climate change potential by the release of criterion pollutants (Hansen 2009, Rockstrom 2009). Journalist Bill McKibben puts is simply: the planet at an average temperature of 2 degrees or higher will be unlike the planet upon which human life evolved, and which produced the Holocene stability in which agriculture and an economic surplus itself developed (McKibben 2011). The costs of adapting to climate change will be staggering, raising questions of who will pay in the current period of political impasse. The consequences of reversing the process are even more challenging.

CONCLUSION

Neither liberals nor conservatives possess the answers to our current economic dilemmas. Conservatives have a point in that there is a limit to how much debt can be contracted and still remain sustainable over the long run. Yet I believe the conservative position is ultimately incorrect because the economy is not competitive, and price competition is essential to allocative efficiency. The liberal position seem to reflect the Keynesian roots of "spending one's way out of a recession," either by direct government stimulus, continued easy money policy, or by a return of the Basic Bargain of wage growth commensurate with productivity growth, administered by mature collective bargaining, including strong unions. But from a biophysical point of view the increase in consumption needed to drive growth, the expansion of the housing sector into even more distant patches of farmland requiring even more fossil fuels in commuting and house maintenance seems counterproductive. If the historical engine of economic growth has been cheap fossil fuels, what will be the engine when the era of cheap fossil fuels ends? Moreover, we have already exceeded the first tipping point of climate change, and it is not a problem for our grandchildren, it is a problem for us.

If the economic stagnation is embedded in the very structure of the economy, in the form of inadequate surplus absorption, then there is simply no fixing the economy first and dealing with the environment later. Economic stagnation pervades the planet from the developed world (European and Japanese stagnation are far worse than that which is occurring in the United States) to emerging economies like China. Chinese growth has been driven by investment rather than consumption and has resulted in large degrees of excess capacity and the status of the world's largest emitter of carbon dioxide. The fundamental dilemma of a mature market economy is that the same growth that is needed to produce employment is the basic cause of pressure upon the earth's fragile biophysical systems. What we need is an institutional structure that divorces meaningful work and meaningful lives from the need to grow perpetually.

AKNOWLEDGEMENTS

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Dancing with the Bees: Follow-the-Leader Market Dynamics with Robot Firms

William Kolberg*

ABSTRACT

This paper reviews a market experiments designed to capture an information feedback process, and test its effectiveness in leading a market to a profit maximizing market equilibrium when agents do not engage in explicit profit-maximizing decision-making. Instead robot firms adapt to the performance of the top firm in the market, and also to market conditions, in updating their decisions on price and production. We find that the simple information feed-back process leads to profit maximizing market equilibrium in a competitive market with no profit maximization built into the firm-level decision process.

INTRODUCTION

This paper reviews a market experiments designed to capture an information feedback process, and test its effectiveness in leading a market to a profit maximizing market equilibrium when agents do not engage in explicit profit-maximizing decision-making. Instead robot firms adapt to the performance of the top firm in the market, and also to market conditions, in updating their decisions on price and production.

The particular information feedback process tested here has attributes of the foraging process in which a hive of bees can locate a specific and critical source of food as described by Thomas Seeley in *The Wisdom of the Hive*. In this process there is no discussion among the individual bees about where to look. Instead a host of scout bees is sent out in every direction. Upon their return, those that discover any food engage in a special "waggle" dance. The better the source, the better the dance. Others are attracted to a variety of the best dancers and follow the leaders to their sources. After a few iterations "disciples" switch to the best dancers and eventually the single best food source is selected by the hive. This process requires a variety of mutually independent observations, and an information feedback process in which hive members follow those who have chanced upon the best food source. These are some of the characteristics of group decision making discussed by James Surowieki in *The Wisdom of Crowds*.

In the information feedback process tested in this study, in Period 1 we apply a normally distributed random variable on the common decisions of Period 0. This generates a wide array of possible decisions on the part of firms in each market. Clearly some of these decision sets fail miserably, but some work very well. As the market process progresses, there is a continual tuning process that improves upon the previous period's results as long as there continues to be variation in decisions offered across firms.

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The success of this process requires a sufficient array of possibilities generated in Period 1, and in subsequent periods and also an efficient information feedback process to bring others along. We find that the simple information feed-back process leads to Market Equilibrium in a competitive market. These results are interesting. Economists often face critiques about the role profit maximization plays in our economic models. Business firms rarely use marginal revenue or marginal cost in their actual decision-making. Results of experiments reported here suggest that even when that is true, a simple follow-the leader information feed-back process can lead market participants to results that look as if they were based on profit maximizing behavior when in fact they were not.

The Market Process

The market period corresponds to a business quarter. decisions are made each period by each firm in the market. The marketing decision is price per unit, and the production decision is labor hours for the quarter to be used with a specified (fixed) plant size. The market process entails a beginning "trial" period in which all decisions are identical across participating firms. This is followed by Period 1, in which firms choose their own price and labor hours without much direction of any kind. This involves adding a normally distributed random component across firms to the Period 0 decisions. In Periods 2 onward, firms review the results of the previous period and adapt according to a logistic process that includes a normally distributed random component and information on decisions of top firms, market conditions and individual firm's inventory. There is no maximizing behavior built into this process of any kind. Production is Cobb-Douglas in form:

$$(1) \qquad TP_i = GL_i^a K^b$$

Where: TP_i is firm *i*'s total production in the current period; *G* is a constant; L_i is firm *i*'s labor hours in the current period; K is units of Capital (fixed at 4), and *a* and *b* are parameters.

G = 6100, K =4, a = 0.25, and b = 1.04.

This gives rise to total, average and marginal costs as follows:

$$(2) \quad TC_i = W\left(\frac{1}{GK^b}\right)^{\frac{1}{a}} TP_i^{\frac{1}{a}} + RK$$

$$(3) \quad ATC_i = W\left(\frac{1}{GK^b}\right)^{\frac{1}{a}} TP_i^{\left(\frac{1}{a}-1\right)} + \frac{RK}{TP_i}$$

$$(4) \quad MC_i = \tfrac{1}{a} W\left(\frac{1}{GK^b}\right)^{\frac{1}{a}} TP_i^{\left(\frac{1}{a}-1\right)}$$

Where: TP_i is total production in the current period by firm *I;* TC_i is total cost for firm *i* in producing TP_i; ATC_i is average total cost for firm *i* in producing TP_i; MC_i is marginal cost for firm *i* in producing TP_i; W is the wage per hour; and *R* is the implicit rental rate of capital.

In this market, W = $52.00, and R = $252,000. There are 36 firms in the market. The market supply function from (4) is:

(5) $$Q_S = N\left(\frac{P}{\frac{1}{a}W\left(\frac{1}{GK^b}\right)^{\frac{1}{a}}}\right)^{\left(\frac{1}{\frac{1}{a}-1}\right)}$$

Where: Q_s is market quantity supplied; *N* is the number of firms in the market; and *P* is market average price.

Market demand is Cobb-Douglas/log linear:

(6) $$Q_D = CP^{e_p}$$

Where: Q_D is Market Quantity Demanded; *P* is the market average price; *C* is a constant; and e_P is market price elasticity of demand.

In this market, *C* = 81,823,500, and e_P is -1.1

Period 0

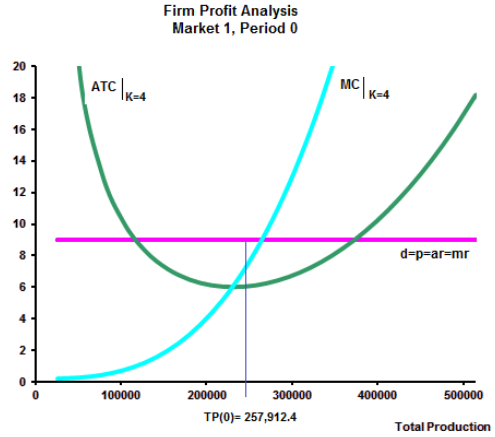
In Period 0, firm decisions are set as follows:

$p_{i,0} = \$9.00$ and $l_{i,0} = 10000$ for all *i*.

Where: $p_{i,0}$ is the price of firm *i* in period 0; and $l_{i,0}$ is the labor hours of firm *i* in period 0.

Using (1) and l_i = 10,000, each firm produces TP_i = 257,912.4 units. Unconstrained profit analysis for a firm in Period 0 with model assumptions and Period 0 decisions is illustrated in Figure 1.

Figure 1



Market goods available for sale in Period 0 is 9,284,846.4. Market demand using (6) and p_i = \$9.00 is 7,298,124.91. In the competitive market, the good sold is perfectly homogeneous, so with a common price, this demand is split evenly across firms so that in Period 0, each firm's quantity demanded is 202,725.7 and its sales are therefore restricted to this figure. (See Appendix 1, Period 0). This means each firm has 55,186.71 in unsold goods at the end of the period. Since inventory is assumed perishable, this is lost before commencing with Period 1.

Period 1

In Period 1, the "hive" sends the "bees" out to scout for a new "food source".

Firm decisions are as follows:

(7) $p_{i,1} = p_{i,0} + \varepsilon_1$

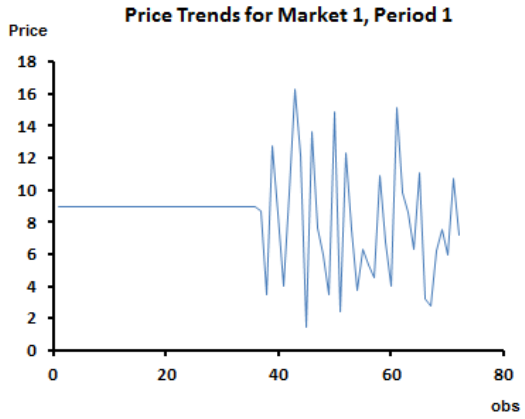
(8) $l_{i,1} = l_{i,0} + \varepsilon_2$

Where: ε_1 is a random normal disturbance on price; ε_2 is a random normal disturbance on hours; and

$p_{i,0}$ = \$9.00, and $l_{i,0}$ = 10,000.

The resulting price time series for Period 1, are shown in Figure 2:

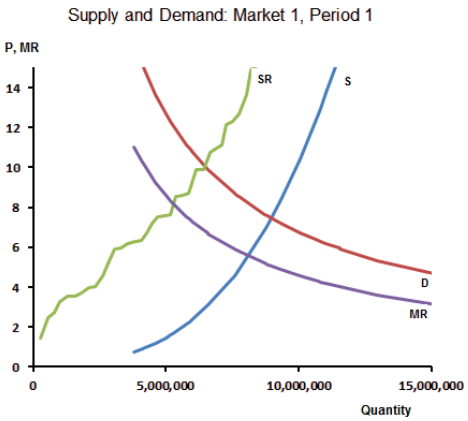
Figure 2



In the competitive market, the good sold is perfectly homogeneous. Buyers always purchase the cheapest offerings first. Firms' prices are therefore sorted from lowest to highest along with quantities offered for sale. This is illustrated in Figure 2 as the Supply Response (SR).

Market demand from (6) is also plotted in Figure 3 and labeled (D). Firms offering goods to the northeast of the intersection between SR and D do not sell. In Period 1 the highest price that sold was $10.00. Firms offering goods for prices higher than $10 did not sell in Period 1. With perishable inventory these goods are lost prior to Period 2. This process implies that an individual firm in the competitive market will face a perfectly elastic demand at is chosen price as long as it can sell P <= $10 in Period 1. Otherwise its demand vanishes. With this setup, firms with a price closest to the highest price that sells and also with production closest to the level where the firm's price equals its marginal cost will be the firms with highest profits.

Figure 3



In Period 1 it is clear that firms are generally not profit maximizing and are generally over-pricing their goods.

Period 2 and Beyond

In periods 2 and beyond "bees" return to the "hive" and "dance". Those with the most "flashy" dances attract other "deciple bees". In Periods 2 and onward, therefore, robot firms adjust their prices and labor hours. These adjustments respond to information feedback from the previous period, and focus on three factors:

a) the prices and output of the top ranked firm,
b) the firm's goods available in comparison with its share of market demand, and
c) Market Goods available compared with Market demand.

The specific form of these three information feed-back relations is a logistic process in each case as follows:

(9a) $$\left(p_{top}\right)_{i,t} = p_{i,t-1} + p_{i,t-1}\left(1 - \frac{p_{i,t-1}}{p_{top,t-1}}\right)\varepsilon_3$$

Where:

$(p_{top})_{i,t}$ is firm *i*'s price adjustment tied to the top firm's previous period price; $p_{i,t\text{-}1}$ is firm *i*'s price in the previous period; $p_{top,t}$ is the top firm's price in the previous period; and ε_3 is a normally distributed random variable, with a mean of 1.

So if a firm's price was less than the top firm's price in the previous period, $(p_{top})_{i,t}$ is adjusted upward. If it was higher, it is adjusted downward. Since this is a logistic form, the adjustment asymptotically diminishes the closer a firm's price was to the top firms' price last period. Note that this also diminishes the impact of ε_3, the normally distributed random variable.

(9b) $$\left(p_{fg}\right)_{i,t} = p_{i,t-1} + p_{i,t-1}\left(1 - \frac{fg_{i,t-1}}{qd_{i,t-1}}\right)\varepsilon_4$$

Where:

$(p_{fg})_{i,t}$ is firm *i*'s price adjustment tied to firm *i*'s inventory in the previous period; $p_{i,t\text{-}1}$ is firm *i*'s price in the previous period; $fg_{i,t\text{-}1}$ is firm *i*'s finished goods available for sale in the previous period; $qd_{i,t\text{-}1}$ is firm i's share of quantity demanded in the previous period; and ε_4 is a normally distributed random variable, with a mean of 1.

So if a firm's goods available was less than its share of market demand in the previous period, $(p_{fg})_{i,t}$ is adjusted upward. If its goods available was greater, it is adjusted downward. Since this is a logistic form, the adjustment asymptotically diminishes the closer a firm's share of demand approached its goods available last period. Again, this diminishes the impact of ε_4, the normally distributed random variable.

(9c) $$(p_{MG})_{i,t} = p_{i,t-1} + p_{i,t-1}\left(1 - \frac{MG_{t-1}}{Qd_{t-1}}\right)\varepsilon_5$$

Where:

$(p_{MG})_{i,t}$ is firm *i*'s price adjustment tied to market conditions in the previous period; $p_{i,t\text{-}1}$ is firm *i*'s price in the previous period; $MG_{,t\text{-}1}$ is market finished goods available for sale in the previous period; $QD_{i,t\text{-}1}$ is market quantity demanded in the previous period, and ε_5 is a normally distributed random variable, with a mean of 1.

So if there was a surplus of goods available compared with market quantity demanded in the previous period, $(p_{MG})_{i,t}$ is adjusted upward. If there was a shortage, it is adjusted downward. Since this is a logistic form, the adjustment asymptotically diminishes as surpluses or shortages diminish. Again, this diminishes the impact of ε_5, the normally distributed random variable.

These are each considered by the robot firms using a weighting scheme as follows:

(10) $$p_{i,t} = w^p_{top}(p_{top})_{i,t} + w^p_{fg}(p_{fg})_{i,t} + w^p_{MG}(p_{MG})_{i,t}$$

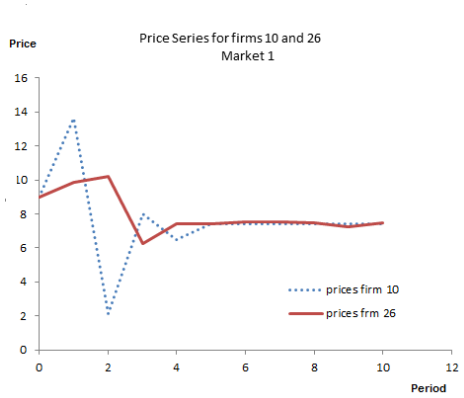
(11) $$w^p_{top} + w^p_{fg} + w^p_{MG} = 1$$

For the competitive market run, weights are set as follows:

$w^p_{top} = 0.7$, $w^p_{fg} = 0$, and $w^p_{MG} = 0.3$

According to this weighting scheme, firms mostly focus on the top firms previous price and output decisions, along with some consideration of market quantity demanded as compared with the amount of goods actually offered for sale in the previous period. In the competitive case, buyers always choose the lowest price that has not sold out. As they go from the current best price to the next best, firms sell out and the effective quantity demanded at each firm will equal the firm's goods available for sale, unless the firm has priced itself out of the market. For this reason, in the competitive case we set $w^p_{fg} = 0$, but adjust $p_{i,t}$ from (10) by -.05$p_{i,t\text{-}1}$. Figure 4 illustrates this price adjustment process for Firms 10 and 26 in the competitive market experiment over the market process, Periods 0-10:

Figure 4



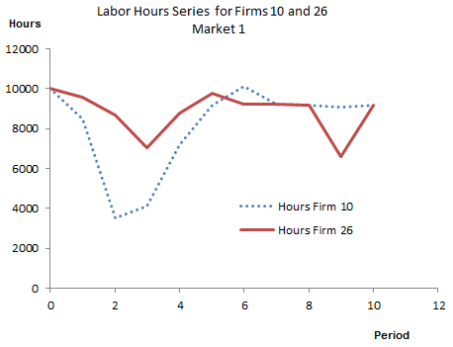
A similar process is used for generating the labor hours decisions in periods 2 and onward in the competitive market experiment.

(12a) $$(l)_{i,t} = l_{i,t-1} + l_{i,t-1}\left(1 - \frac{l_{i,t-1}}{l_{top,t-1}}\right)\varepsilon_6$$

Where: $(l)_{i,t}$ is firm *i*'s labor hours in period *t*; $l_{i,t-1}$ is firm *i*'s labor hours in the previous period; $l_{top,t}$ is the top firm's labor hours in the previous period; and ε_6 is a normally distributed random variable, with a mean of 1.

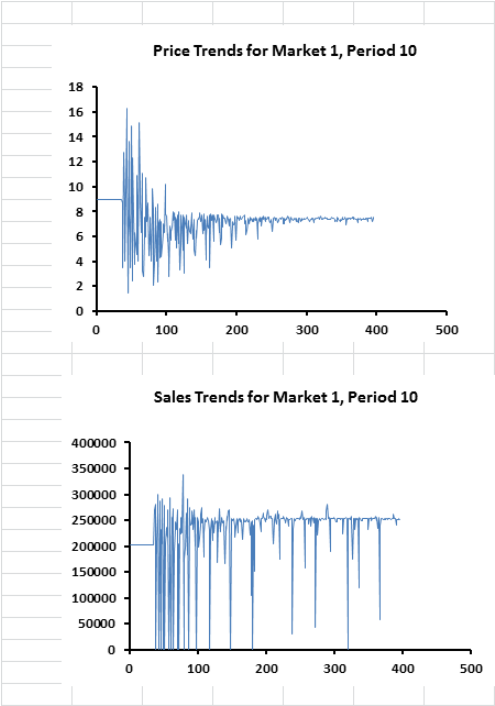
So if a firm's hours were less than the top firm's hours in the previous period, they are adjusted upward. If they were higher, they are adjusted downward. Since this is a logistic form, the adjustment asymptotically diminishes the closer a firm's hours were to the top firms' hours last period. Note that this also diminishes the impact of ε_6, the normally distributed random variable. Firms only consider the top firm's production decision in adjusting their labor hours each period, so a weighting function for labor ours like () for price is not used. The process is illustrated for firms 10 and 26 in Figure 5.

Figure 5



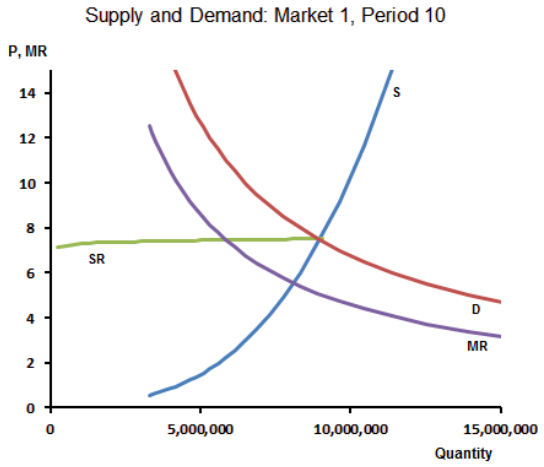
The time series of prices and output for the entire competitive market run are shown in Figure 6.

Figure 6



These results suggest the market is moving toward equilibrium by Period 10.

Figure 7



The process of adjustment that takes place in Market 1 from Period 2-10 results in a dramatic change in the character of the supply response, (SR) in Figure 6 as compared with Figure 2. Note that by Period 10, nearly all firms are charging the equilibrium market price and as a group they are offering the market equilibrium quantity for sale. Buyers are in turn purchasing this quantity. So as a group, sellers have adjusted their decisions so that the profit maximizing market equilibrium is achieved. This is especially

interesting because sellers have no information on marginal cost or market supply. They simply make adjustments tied to basic information on top firm production and pricing, along with information on market conditions and inventories, and price adjustment process is not explicitly connected to the labor hours adjustment process.

Conclusions

We find that the simple information feed-back process leads to Market Equilibrium in a competitive market and Nash equilibria in imperfectly competitive markets. Clearly, this process is capable of leading to sub-optimal equilibria traps, but testing up to this writing appears to indicate that these usually are surprisingly close to the optimal equilibrium solution.

These results are interesting. Economists often face critiques about the role profit maximization plays in our economic models. Business firms rarely use marginal revenue or marginal cost in their actual decision-making. Results of experiments reported here suggest that even when that is true, a simple follow-the leader information feed-back process can lead market participants to results that look as if they were based on profit maximizing behavior when in fact they were not.

Appendix 1: Model Parameters

Distribution of Weights for Price and Labor Hour Adjustments

	competition	mon. comp.	oligopoly	monopoly
w^p_{top}	0.7	0.7	0.7	0.7
w^p_{fg}	0	0.15	0.15	0.3
w^p_{MG}	0.3	0.15	0.15	0
w^l_{top}	1	1	1	1
w^l_{fg}	0	0	0	0
w^l_{MG}	0	0	0	0

Parameters

		competition	mon. comp.	oligopoly	monopoly
Production:	G	6100	6100	6100	6100
	K	4	4	4	4
	a	0.25	0.25	0.25	0.25
	b	1.04	1.04	1.04	1.04
Cost:	W	52	52	52	52
	R	252000	252000	252000	252000
Firms:		36	36	5	36
Market Demand:	C	81823500	81823500	11364375	81823500
	e_p	-1.1	-1.1	-1.1	-1.1
Firm Demand:	c		2272875	2272875	2272875
	α		-3.1	-3.1	-1.1
	β		2	2	0

Extreme Dependence across East Asian Financial Markets: Evidence in equity and currency markets

Fangxia Lin**

ABSTRACT

Using unconditional and conditional copulas, this paper investigates pair-wise extreme dependence across equity markets and currency markets by directly modeling the tail dependence behavior. Empirically, we find significant asymmetric tail dependence in equity markets, with a large lower tail dependence coefficient than upper tail dependence coefficient, implying that international diversification is limited since the equity pairs tend to crash together when diversification is most needed. Mixed results are found for currency co-movements. Co-movements in the currency markets are much weaker, in several cases, with larger upper tail coefficients. This study has important implications in portfolio selection and risk management strategies in international diversification.

INTRODUCTION

In this paper, we focus on five East Asian countries: Hong Kong, Indonesia, South Korea, Singapore, and Taiwan. We examine the tail dependence behavior across the equity markets as well as across the currency markets. We endeavor to answer the following questions: 1) is there extreme dependence across the equity market? 2) is there extreme dependence across the currency market? 3) are the tail dependence behavior similar? By answering these questions we hope to better understand the extreme co-movements across these two important markets and provide some insight on risk management strategies involving hedging and potential diversification benefits.

Co-movement across international financial markets of the same or different types has been widely studied in the finance community, as it has very important implications in portfolio selection and risk management. Earlier research is conducted along the line of correlations and conditional correlations. Kaplanis (1988) examines the stability of the co-movements among monthly stock index returns for ten industrial countries between 1967 and 1982 and finds stability in correlations but not in covariances. Using a dynamic simultaneous equations model, Koch and Koch (1991) study co-movements of daily returns in six developed and two developing countries over three different years: 1972, 1980, and 1987. They find growing market interdependence within the same geographical region over time. Chung and Liu (1994) find that the US and five East Asian countries have co-integrated stock prices.

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Using bivariate GARCH model on data over the period 1960−1990 for seven OECD countries, Longin and Solnik (1995) conclude that both covariances and correlations are unstable and they also find that the correlation rises in periods of high volatility. Karolyi and Stulz (1996) investigate daily return co-movements between Japanese and U.S. stocks. They find strong evidence that covariances are higher when there are large contemporaneous return shocks in the national markets. Forbes and Rigobon (2002) conclude that there was virtually no increase in unconditional correlation coefficients during the 1997 Asian crisis, 1994 Mexican devaluation, and 1987 U.S. stock market crash and they argue that increased correlation during more volatile periods could be an artifact. They term the high level of market co-movement as interdependence, instead of financial contagion.

Some other works attempt to examine the co-movements between financial markets using extreme value theory. Examples include Longin and Solnik (2001) and Hartmann et al. (2004), among others. Longin and Solnik (2001) explicitly model the multivariate distribution of large returns and estimate the correlation for increasing threshold values. They find that correlation increases in bear markets but not in bull markets. Hartmann et al. (2004) also use extreme-value analysis to capture the dependence structure between stock and bond returns for pairs of G5 countries. They find that extreme dependence between stocks and bonds is much lower than extreme dependence between stock markets or bond markets.

Discussions of the limitations of correlation measures in risk management by Embrechts et al. (1999, 2001) turn more and more researchers and practitioners to apply copula framework in modeling dependence structure and co-movements between financial variables. Applications of copula methods in finance can be found in Cherubini et al. (2004), and Patton (2009) gives an excellent survey within time series framework. Other references include Li (2000), Hu (2006), Rodriguez (2007), Ning (2009, 2010) among others. Using likelihood ratio-based methods, Mashal and Zeevi (2002) investigate the potential for extreme co-movements between financial assets (equities, currencies, and commodities markets) and find the presence of extreme co-movements is statistically significant in the three markets.More recent works allow some dynamics in dependence using conditional copula. Using conditional copula, Patton (2004) examines dependence between small and large cap US stocks. He documents evidence of asymmetric dependence in the stock returns and indicates that knowledge of this asymmetry can lead to significant gains for investors who do not face short sales constraints. Patton (2006) investigates the dependence structure between Deutsche mark and Japanese yen. He finds evidence that the mark-dollar and yen-dollar have asymmetric dependence structure in the tail area.Jondeau and Rockinger (2006) capture the time-varying volatilities of univariate returns by a GARCH model and introduce Markov-switching Student t-copula for pairwise dependence in international financial returns. Chollete et al. (2009) propose a model of multivariate regime-switching copulas to capture asymmetric dependence in international financial markets.

One of our major findings is that, across stock markets, there is an obvious asymmetry between the dependencies in bear markets and bull markets, consistent with previous research results. An important

implication of this finding for practice work is the warning against using bivariate normality or correlation coefficients as a guide for risk management and international asset allocation. Given a constant correlation, the underlying dependence structure could be very different. We also find that co-movements across the currency markets of the countries are quite different from stock market co-movements. In many cases, the upper tail dependent coefficient is higher than the lower tail dependence coefficient.

The layout of this paper is as follows. In section 2, we introduce some conventional measures of dependence and copula measures of dependence. In section 3, the models are specified for the marginal distributions and for the joint distributions. We describe the data used in the study and discuss our empirical results in section 4. Section 5 concludes.

DEPENDENCE MEASURES AND COPULA CONCEPTS

In finance, the most popular measure of dependence is linear correlation. Under the assumption of multivariate normal distribution, the linear correlation is the canonical measure of dependence. However, empirical evidence in finance has proved the inadequacy of the multivariate normal distribution. Therefore, linear correlation as a measure of dependence can often lead to misleading results. Over the past decade, copulas have experienced a surging popularity in modeling dependency between financial variables and risk factors. Copula functions represent a methodology to handle the co-movement between financial markets and other variables relevant in financial economics, independent of the underlying marginal distributions.

Classical measures of dependence

Linear correlation

Linear correlation is the most popular measure of dependence, and it is also known as Pearson's product moment correlation.

Definition1 Let $(X, Y)^T$ be a vector of random variables with nonzero finite variance. The linear correlation coefficient for $(X, Y)^T$ is

$$\rho(X,Y) = \frac{Cov(X,Y)}{\sqrt{Var(X)}\sqrt{Var(Y)}} \quad (1)$$

where $Cov(X,Y) = E(XY) - E(X)E(Y)$is the covariance of $(X, Y)^T$, $Var(X)$ and $Var(Y)$ are the variances of X and Y, respectively, and $-1 \leq \rho(X,Y) \leq 1$. In the case $\rho(X,Y) = 1$, we say that X and Y are perfectly positively correlated, in the case of $\rho(X,Y) = -1$, X and Y are perfectly negatively correlated. The value of 0 indicates that there is no linear correlation between X and Y. As explained by Embrechts et al. (1999), the linear correlation is a dependence measure only in the case of multivariate normal distributions.

Kendall's tau

The Kendall's tau rank correlation coefficient, developed by Maurice Kendall in 1938, is a non-parametric statistic used to measure the degree of correspondence between two rankings.

Definition 2 Let F be a continuous bivariate cdf and let $(X_1, X_2), (X_1', X_2')$be independent random pairs with distribution F. Then Kendall's tau is

$$\tau = \Pr\left((X_1 - X_1')(X_2 - X_2') > 0\right) - \Pr\left((X_1 - X_1')(X_2 - X_2') < 0\right)$$
$$= 2\Pr\left((X_1 - X_1')(X_2 - X_2') > 0\right) - 1 = 4\int\int F\, dF - 1 \qquad (2)$$

Kendall's tau is a bivariate measure of dependence for continuous variables that are invariant with respect to strictly increasing transformations.

Spearman's rho

Spearman's rho, named after Charles Spearman and denoted by the Greek letter ρ_s (rho), is also a non-parametric measure of correlation. As with Kendall's tau, Spearman's rho is also a bivariate measure of dependence. Both Kendall's tau and Spearman's rho provide distribution free measure of dependence between two variables, and known as concordance measures of dependence.

Definition 3 Let F be a continuous bivariate cdf with univariate margins F_1 , F_2 and let (X_1 , X_2) ~*F*; then Spearman's rho is the correlation of $F_1(X_1)$ and $F_2(X_2)$. Since $F_1(X_1)$ and $F_2(X_2)$ are U(0,1) random variables, their expectations are 1/2, their variances are 1/12, and Spearman's rho is

$$\rho_s = 12\int\int F_1(X_1)F_2(X_2)\, dF(F_1, X_2) - 3 = 12\int\int F\, dF_1 dF_2 - 3 \qquad (3)$$

For bivariate data, ρ_s is the rank correlation and the rank transformation is like the probability transform of a random variable to U(0, 1).

Kendall's tau and Spearman's rho coefficient lie inside the interval $[-1, 1]$. The value of -1 indicates the disagreement between the two rankings is perfect, and one ranking is the reverse of the other. The value of 0 indicates the rankings are completely independent, and if the agreement between the two rankings is perfect, the rank correlation coefficient is +1. Concordance correlation measures like Kendall's tau and Spearman's rho are independent of the univariate marginal distributions. They provide the best alternatives to the linear correlation coefficient as a measure of dependence for non-elliptical distributions. The advantage of rank correlations over linear correlation is that they are invariant under monotonic transformations.

Copula measures of dependence

Dependence between random variables can also be modeled by copula (coined by Sklar (1959)) method, an ever increasingly popular way to model the dependency between financial risk factors. As described in Joe (1997), a copulais a multivariate distribution function that is used to bind each marginal distribution function to form the joint distribution function. Copulas parameterize the dependence between the margins, while the parameters of each marginal distribution function can be estimated separately. The advantages of copula method presents over the traditional methods to measure dependence are as follows. One is that copulas allow modeling nonlinear dependence structure; secondly, no assumption required regarding the marginal distribution, which is particularly suitable for financial returns data, as there is no known exact distribution; lastly, we can use copulas to model tail events, which can never be over-emphasized in financial risk management practice.

The Gaussian copula

The Gaussian copula is derived from the bivariate normal distribution. With Φ_ρ being the standard bivariate normal cumulative distribution function with correlation ρ, The Gaussian copula is

$$C_\rho^{Ga}(u,v) = \Phi_\rho\left(\Phi^{-1}(u), \Phi^{-1}(v)\right) \quad (4)$$

where the variables u and v are the CDFs of the standardized residuals from the marginal models, with $0 \le u, v \le 1$, Φ_ρ is the joint distribution function of a 2-dimensional standard normal vector, with linear correlation coefficient ρ, Φ is the standard normal distribution function. The density function of a Gaussian copula can be represented by the following

$$c_\rho(u,v) = \frac{\varphi_{X,Y,\rho}(\Phi^{-1}(u),\Phi^{-1}(v))}{\varphi\left(\Phi^{-1}(u)\right)\varphi(\Phi^{-1}(v))} \quad (5)$$

where

$$\varphi_{X,Y,\rho}(x,y) = \frac{1}{2\pi\sqrt{1-\rho^2}} exp\left(-\frac{1}{2(1-\rho^2)}[x^2+y^2-2\rho xy]\right)$$

is the density function for the standard bivariate Gaussian distribution with Pearson's product moment correlation ρ and φ is the standard normal density. If two return series have a bivariate normal copula, then both upper and lower tail dependence coefficients are zero, implying that there is no tail dependence.

Gumbel copula

Gumbel copula is another member of the Archimedean copula family and can be used to describe upper tail dependence. The bivariate Gumbel copula is given by the following

$$C_\theta^{Gu}(u,v) = exp\{-\left[(-lnu)^\theta + (-lnv)^\theta\right]^{1/\theta}\} \quad (6)$$

where $0 < \theta \le 1$ is a parameter controlling the dependence, $\theta \to 0^+$ implies perfect dependence, and $\theta = 1$ implies dependence. Gumbel copula has upper tail dependence and has no lower tail dependence.

To avoid repetition, the copulas we use in this study are introduced in section 3. The functional forms for the three static copula models will be given in subsection and the conditional copula function is introduced in subsections. We use three Archimedean copula models (static and conditional Symmetrized Joe-Clayton (SJC) and Clayton) and one elliptical copula (Student's t-copula), each with a different tail dependence behavior.

MODEL SPECIFICATION AND ESTIMATION

Our estimation procedure include the following steps: first, we filter the original returns series with a GARCH model, secondly, we check to make sure that the marginal models are correctly specified before we transform the standardized residuals into i.i.d. Uniform (0,1). In the final step, we plug the probability integral transforms of the standardized residuals from the marginal models to the choice copulas. In the literature, this estimation method is referred to as the inference functions for the margins (IFM) method

proposed by Joe and Xu (1996). The marginal distributions can be estimated either parametrically or non-parametrically. Joe (1997) points out that the IFM is a highly efficient method, and he proves that the IFM estimator is consistent and asymptotically normal under standard conditions. Because of its computational tractability, IFM method, either parametrically or semi-parametrically, has been widely used for multivariate copula applications.

The procedure we apply in stock markets is the same as in foreign exchange markets. We compare the performance of the copula models by examining the Akaike's information criterion and/or Bayesian information criterion.

Marginal models

We model the marginal distributions parametrically using GARCH type models. In the finance literature, a very common approach to model time series is the generalized autoregressive conditional heteroskedasticity (GARCH) model. In particular, we filter the raw returns data with a AR(*k*)-GARCH(*p*, *q*)or AR(*k*)-*t*-GARCH(*p*, *q*) type models. This type of models has been used in Bollerslev (1987), Patton (2006), and Ning (2010) among others. The marginal model is specified as follows:

$$r_{i,t} = C_i + \sum_k AR_{i,k} \times r_{i,t-k} + \varepsilon_{i,t} \tag{7}$$

$$\sigma_{i,t}^2 = Arch0_i + \sum_p Garch(p)_i \times \sigma_{t-p}^2 + \sum_q Arch(q)_i \times \varepsilon_{i,t-q}^2 \tag{8}$$

where $r_{i,t}$ is the returns for country *i* at time *t*, $\sigma_{i,t}^2$ is the variance of $\varepsilon_{i,t}$term in the mean equation (equation (7)). Estimation results of the marginal models are discussed in section 4.

Static copula models

Symmetrized Joe-Clayton copula (SJC)

Symmetrized Joe-Clayton (SJC) copula allows both upper and lower tail dependence and symmetric dependence as a special case. The SJC copula is a modified version of the Joe-Clayton copula (Joe 1997), as proposed by Patton (2006) and it is defined as follows.

$$\begin{aligned} &C_{SJC}(u, v|\lambda_r, \lambda_l) \\ &= 0.5 \cdot (C_{JC}(u, v|\lambda_r, \lambda_l) + C_{JC}(1-u, 1-v|\lambda_r, \lambda_l) + u + v - 1) \end{aligned} \tag{9}$$

where $C_{JC}(u, v|\lambda_r, \lambda_l)$ is the Joe-Clayton copula defined as follows:

$$\begin{aligned} &C_{JC}(u, v|\lambda_r, \lambda_l) \\ &= 1 - \left(1 - \{[1-(1-u)^k]^{-\gamma} + [1-(1-v)^k]^{-\gamma} - 1\}^{-1/\gamma}\right)^{1/k} \end{aligned} \tag{10}$$

where $k = 1/\log_2(2 - \lambda_r)$, $\gamma = -1/\log_2(\lambda_l)$, and $\lambda_r \in (0,1)$, $\lambda_l \in (0,1)$. The drawback of the Joe-Clayton copula is discussed in Patton (2006).

SJC copula belongs to the Archimedean family of copulas and is very flexible since it allows for both asymmetric upper and lower tail dependence and symmetric tail dependence as a special case.

Clayton copula

Clayton copula belongs to the Archimedean Copula family and is known to have tail dependence. The bivariate Clayton copula can be written as the following

$$C_{\theta}^{Cl}(u,v) = (u^{-\theta} + v^{-\theta} - 1)^{-1/\theta} \quad (11)$$

where $0 < \theta < \infty$ is a parameter controlling the dependence, $\theta \to 0^{+}$ implies independence, and $\theta \to \infty$ implies perfect dependence. Clayton copula can be used to describe lower (left) tail dependence and no upper (right) tail dependence. Like SJC copula, Clayton copula also belongs to Archimedean copula family.

Student's t-copula

The Student's t- copula is based on the multivariate t distribution, in the same way as the Gaussian copula is derived from the multivariate normal distribution. The copula of the bivariate Student's t-distribution with a degree of freedom of v and correlation ρ is

$$C_{v,\rho}^{t}(u,v) = \int_{-\infty}^{t_v^{-1}(u)} \int_{-\infty}^{t_v^{-1}(v)} \frac{1}{2\pi\sqrt{1-\rho^2}} \left\{1 + \frac{(s^2+t^2-2\rho st)}{v(1-\rho^2)}\right\}^{-(v+2)/2} dsdt \quad (12)$$

As the value of *v* increases, say *v* = 100, it approximates a Gaussian distribution. The bivariate Student's t-copula exhibits symmetric tail dependence and has the tail independent Gaussian copula as a special case. Student's t-copula belongs to the elliptical copula family, as does the Gaussian copula.

Dynamic copula model

To examine time-varying tail dependence in the returns series, we use the time-varying SJC copula, as proposed in Patton (2006).

$$\lambda t = \Lambda(\omega + \beta\lambda_{t-1} + \alpha \cdot \frac{1}{10}\sum_{i=1}^{10}|u_{t-i} - v_{t-i}|), \quad (13)$$

where Λ denotes the logistic transformation to keep the tail dependency parameter of the SJC copula in [0,1] and it is defined as $\Lambda(x) = (1 + e^{-x})^{-1}$.

The dynamic copula model contains an autoregressive term designed to capture persistence in dependence and a forcing variable which is the mean absolute difference between *u* and *v*. The forcing variable is positive when the two probability integral transforms are on the same side of the extremes of the joint distribution and close to zero when they are on the same side of the extremes.

DATA AND EMPIRICAL RESULTS

Data

The dataset used consists of daily closing stock index returns and foreign exchange rate movements for five East Asian economies: Hong Kong, Indonesia, South Korea, Singapore and Taiwan. The stock indices are the Hang Seng Index of Hong Kong, the Jakarta SE Composite Index of Indonesia, the Korea Stock Exchange Stock Price Index (KOSPI), the Strait Times Stock Exchange of Singapore, and the Taiwan Stock Exchange Capitalization Weighted Index. The corresponding exchange rates are Hong Kong dollar (USD/HKD), Indonesia Rupiah (USD/IDR), Korean Won (USD/KRW), Singapore dollar

(USD/SGD), and Taiwanese dollar (USD/TWD). The returns datastart on 7/3/1997, and end on June 4, 2010. There are a total of 2772 observations for stock index returns and 3227 observations for the exchange rate returns. The bilateral spot exchange rates for the selected countries are expressed as units of U.S. dollar per unit of local currency. The stock index return is computed as:

$$r_t = \ln\left(\frac{P_t}{P_{t-1}}\right) \quad (14)$$

where P_t is the stock index level at time *t*, and P_{t-1} is the stock index level at time t-1. The currency movement is computed as

$$e_t = \ln\left(\frac{S_t}{S_{t-1}}\right) \quad (15)$$

where S_t is the spot exchange rate at time *t* expressed as units of USD per unit of local currency, and $S_{t-1}$is the spot exchange rate at time t-1.The stock index returns from each country should represent the stock market performance of the country. We discuss the summary statistics and some properties of the returns distribution below.

TABLE 1 presents summary statistics of the log differences of stock index levels and exchange rate movements for each country. Panel A of the table presents the summary statistics of the stock index returns and Panel B reports those of the exchange rate returns. The high risk in the stock markets can be manifested from the table, ranging from 1.65% (Singapore) to 2.27% (South Korea), compared with much smaller mean returns for the sample period. Generally, the standard deviation of stock index returns is higher than that of exchange rate returns. All countries experienced positive average returns in the equity market except Taiwan. But the skewness measures all point to the fact that more negative returns are observed. The returns distribution in the currency market is more peaked than the stock market, as judged by the kurtosis measure for the returns series. In the table we also report the Jarque-Bera and Ljung-Box statistics. For all the cases, the Jarque-Bera test statistic strongly rejects the hypothesis of normally distributed stock index returns and currency movements at 5% significance level. The Ljung-Box statistic for raw returns, LB(20) is significant for all cases, implying serial dependencies in these returns. For squared returns, $LB^2(20)$ is significant for all cases, showing significant evidence in support of GARCH effects. All these test statistics further confirm non-normality in our returns series and volatility clustering observed in most financial markets. We employ GARCH models to the return series to capture this property.

The unconditional linear correlation matrix and Kendall's tau for the stock index returns and foreign exchange rate returns are presented in Panel A and Panel B of TABLE2, respectively. The linear correlation coefficients observed for the stock index returns, ranging from 0.3435 (Indonesia and Taiwan) to 0.6953 (Hong Kong and Singapore), indicating that a rather large dependency between the stock markets is expected. For the exchange rate returns, the correlation is the smallest between Hong Kong dollar and Indonesian Rupiah (0.0340), and the largest between the Singapore dollar and Taiwanese dollar (0.3583).

Results of the marginal models

Given the stylized fact that financial market returns exhibit volatility clustering and are non-normally distributed, it is a crucial step to model the marginal distributions correctly to make sure that we have non-serially correlated probability integral transforms as copula model inputs. For all the stock index returns, in the mean model we set k = 10, and in the variance model, we set p = 1, and q = 1. TABLE 3 presents the GARCH model estimates for the stock index returns. Numbers in parentheses are standard errors. Serial correlation in the raw returns can be captured with up to an AR4 term for Hong Kong, Singapore and Taiwan, but higher terms are required for Indonesia (with significant AR6, AR9, and AR10 terms) and South Korea (AR7 is significant). GARCH(1,1) is sufficient to model the conditional heteroskedasticity for all the stock index returns series. Since the intercept term in the variance model is less than 0.0001 for all cases, and therefore not reported in the table.

The marginal models for the exchange rate returns are presented in TABLE 4. For the mean model of exchange rate returns, AR term is set to equal 10 for all cases except Indonesia (k = 5) to deal with serial correlation, and in the variance model, higher order of p and q terms are generally required to model the conditional variance. Hong Kong dollar returns series has significant Arch terms up to Arch10, but only the first three are reported in the table. For Indonesian Rupiah series, not only are the Arch1, Arch2, and Arch3 terms significant, but also is Garch8 term. The intercept term of both the mean and variance models are less than 0.0001 and thus not reported in the table. Only the highly significant autoregressive terms and GARCH terms (with a t-stat greater than 2.0) are reported in the tables.

For each marginal model, we perform goodness-of-fit test to test for serial independence of the standardized residuals and of the probability integral transforms. Ljung-Box Q-statistic is employed in conducting the tests and the test results on the first four moments of the probability integral transforms are reported in TABLE 5. For the stock index returns, the p-values range from 0.0796 to 0.9947 on the first four moments, indicating that the copula models will not be mis-specified. For the currency returns, most series past the test with p-value ranging from 0.1064 to 0.9268 except Hong Kong (p-value is 0.0004 for the fourth moment). We discuss the copula models in the following subsection.

Results of static copula models

Parameter estimates for the copula models, along with the log-likelihood values and the AIC (Akaike's information criterion) and BIC (Schwarz's Bayesian information criterion) are presented in tables from TABLE 6 to TABLE 9. We discuss the empirical results across the two financial markets separately.

Co-movements in stock markets

Why international stock markets move together? As put by Karolyi and Stulz (1996, pp.953), one possibility is "market contagion". Contagion effects occur when enthusiasm for stocks in one country brings about enthusiasm for stocks in other countries, regardless of the evolution of market fundamentals. Co-movements across international stock markets can also be explained using information hypothesis. The changes of stock prices in one market may reveal information on the fundamentals underlying the

worldwide equity market and these price movements serve as signals to investors in other markets. It has been found that the co-movements during market downturns are different from market upward movements.

Our study covers five national stock markets and thus we have in total ten pairs. We report results for all ten pairs. The estimated tail dependence coefficients and degree of freedom parameters and the respective standard errors are presented in TABLE 6a, top panels of TABLE 7, TABLE 8, and TABLE 9. From the tables, we observe that in all ten pairs, there is obvious asymmetry between the dependencies in bear markets and bull markets. For example, our SJC copula results suggest that, the limiting probability of the Singapore stock market and Hong Kong stock market crashes together is about 34% greater than for the two stock markets booming together. The average tail coefficients range from 0.1628 (Indonesia-Taiwan pair) to 0.4428 (Hong Kong-Singapore pair), implying that the diversification benefits, if any, are much smaller by investing in the two more advanced markets (i.e. Hong Kong and Singapore) than two emerging markets (i.e. Indonesia and Taiwan).To explain this asymmetry, one possible reason is that investors are more sensitive to bad news than good news in other markets. Investors are loss aversion,and when a stock market crash occurs in a foreign country, they tend to take cautious action in domestic market as well. The estimated degrees of freedom from Student's t-copula range from 4.41 (Hong Kong-Indonesia pair) to 7.18 (Taiwan-Indonesia pair) are small, indicating that bivariate distribution is far from normal.

Co-movements in foreign exchange markets

Empirical studies of co-movements in foreign exchange markets usually focus on currency crisis, such as the 1997-1998 Asian currency crisis originated in Thailand (Corsetti et al. (1998)). There are multiple channels that currency crisis can be transmitted from one country to others. Two main channels are discussed in Eichengreen et al. (1996): trade links and similarity in macroeconomic and political situations. Countries having strong trade links are likely to transmit currency crises. Regarding the second point, it may be explained by the confidence of currency traders. Currency traders in one country may become skeptical if another country with similar economic and political situations suffers from crises.

Co-movements across the currency markets of the countries are quite different from stock market co-movements, as manifested from our empirical estimates. Copula results are reported in TABLE 6b, bottom panels of TABLE 7, TABLE 8, and TABLE 9. In the currency case, Hong Kong currency pairs stand out. We only detect weak lower tail dependency between US$/HKD and US$/SGD. There is not enough evidence to support extreme co-movements in the Hong Kong currency pairs. The estimated degrees of freedom parameter in the Student's t-copula also suggest a much thinner bivariate distribution tails than corresponding stock markets. The bivariate pairs for South Korea, Singapore and Taiwan exhibit strongest tail dependency with greater upper tail coefficients than lower tail coefficients. For Indonesia pairs, only the extreme co-movements between US$/IDR and US$/SGD are significant, with higher probability depreciating than appreciating together against U.S. dollar.

Dynamic tail dependence – time-varying SJC copula

TABLE 10 reports the result for the time-varying SJC copula models for the equity pairs and some selected currency pairs. For the equity pairs, most dynamic parameters are significant, indicating significant changes in the degree of tail dependence across pairwise stock markets. These results serve as evidence that the degree of tail dependence in these stock markets changes over time. We find insignificant change in the lower tail dependence of Hong Kong−South Korea pair and the upper tail dependence of Singapore−Taiwan pair. To illustrate how the degree of tail dependence evolves over time, we plot the lower and upper tail dependence coefficients, along with the estimated parameter value using static SJC copula, in Figures 1−10. The bottom plot in each figure shows the difference between lower and upper tail coefficients over time. The percentage of time that lower tail coefficient is greater than upper tail coefficient ranges from 62 percent (Hong Kong – Korea pair) to 90 percent (Hong Kong – Singapore pair), showing asymmetry of tail dependence with greater lower tail dependency than upper tail dependency overall. We observe the increasing degree of dependence in the upper tail (e.g. Hong Kong−Indonesia pair, Singapore−Indonesia pair) and/or lower tail (e.g. most Taiwan pairs) for some equity pairs since 2007, suggesting that these stock markets are in the process of becoming more integrated.

By examining the time path of the tail dependence coefficients for the selected currency pairs, we find no significant change in the lower and upper tail dependence of Korea−Taiwan pair and in the lower tail dependence of Singapore−Taiwan pair, as shown in Figure 12 and Figure 13. The conditional tail coefficients fluctuate around their respective mean value (the horizontal dashed line). The time path in the difference further confirms our earlier conclusion of asymmetry in the tail as 98 percent of the time that the upper tail coefficient is greater than the lower tail coefficient. In terms of asymmetry, this is also the case for Singapore−Taiwan currency pair. It is more likely that Taiwanese dollar tends to appreciate together with Korea Won and Singapore dollar than they depreciate together against USD. For the Singapore pairs (vs. Korea and Indonesia), there is not enough evidence to support asymmetry in the tail dependencies, even though there is significant change in the dynamics of tail coefficients (see Figure 11 and Figure 14).

Comparing the static and time-varying SJC models, we find the latter perform better than the former, as judged by the decreased Akaike's information criterion. By the same token, the dynamic SJC model performs slightly better than the static SJC model in modeling the currency co-movements. These two models produced very similar results regarding the degree of tail dependence.

CONCLUSION

In this paper we model the tail dependence structure across international financial markets. Specifically we use copula functions to model the pairwise extreme co-movements across the equity markets as well as across the currency markets of five East Asian economies over the period 1997−2010.

An important property of the copula function is that it is defined over i.i.d. uniform marginals. To ensure that we have the required inputs for the copula functions, we first filter the raw returns series using GARCH-type models and then we get the standardized residuals from this first step. Copula models inputs are the probability integral transforms of the i.i.d. standardized residuals from the marginal models. Comparisons of model performance are based on the Akaike information criterion and/or Bayesian information criterion.

The extreme co-movement across the five East Asian stock markets is found to be significant in both tails, with a larger lower tail dependence coefficient than an upper tail dependence coefficient. This is not the case in the currency markets. Our findings have important implications in international finance, especially for those investors who seek international diversification to improve asset allocation and overall portfolio returns.

ENDNOTES

1. The tables and figures are available from the author upon request.

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How Effective Was the Home Affordable Modification Program in Modifying the Loans of at Risk Homeowners? An Examination of Eight Metropolitan Areas: 2009 - 2012

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ABSTRACT

This paper examines the relative effectiveness of the primary federal mortgage loan modification program – the Home Affordable Modification Program (HAMP) from early 2009 through year-end 2012. It evaluates U.S. Treasury Department and other data sources, and reviews the recent literature on the relative success of the program. The data analysis suggests that HAMP's success rates in a cross-section of metropolitan areas are closely tied to differences in labor market conditions, home price recovery, rates of negative equity, share of borrowers receiving a permanent modification, and the type of modification received. The analysis finds strong evidence that markets most severely impacted by the housing market collapse experienced a comparatively lower rate of permanent modifications.

INTRODUCTION AND PROPOSED RESEARCH

Despite recent indicators of emerging recovery in the housing market nationally toward year end 2012, the problem of default and foreclosure remained a significant drag on the economic recovery and job growth through 2012. This was particularly the case in the most distressed markets nearly six years after the nation's foreclosure crisis began following the unraveling of the subprime mortgage market and the housing market collapse. Numerous efforts at stemming the rapid growth in foreclosure actions were introduced and undertaken at both federal and state levels starting in late 2008 – early 2009.

This discussion is focused on a critical evaluation of the relative success rates of the principal federal loan modification program – The Home Affordable Modification Program (HAMP) from 2009 through 2012. Based upon an analysis of key variables, a central conclusion is that this modification program largely fell short of its potential.

To obtain further insight into which factors may have accounted for the program's relatively uneven impact (success rates), this inquiry examines several variables that are often employed as indicators of the extent of housing market strength across a sample of eight metropolitan areas. These include the share of homes in negative equity, the share of borrowers receiving a permanent modification of either a first or second lien loan relative to total trial modifications, the type of loan modification received, trends in the Case-Shiller home price index, and average unemployment rates as of fourth quarter 2012. While data on rates of successful modification by major lender at the MSA level are uneven and incomplete the national data for the largest lenders is reviewed and discussed here.

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To determine which of these variables may have had a greater effect on the relative success rates of loan modification and where, the sample of metropolitan areas selected seeks to include housing markets that were characterized by different market trends just prior to and following the housing market peak. It is hoped that this inquiry will help to identify the factors that may have contributed to differences in the pace and strength of housing market recovery through 2012.

Thus, the MSAs studied here include a mix of former "bubble" markets, as well as MSAs whose economies were comparatively weak going into the housing market downturn, and one whose market experienced comparatively less of a 'bubble' effect. These include the Miami, Las Vegas, Los Angeles, San Bernardino, Detroit, Chicago, New York and Phoenix metropolitan areas. Data for the nation overall is included for comparison. Five of these MSAs were in markets where the housing bubble was comparatively greater than in the nation as a whole, while two represent areas that had significantly more depressed economies going into the downturn in 2008 and whose housing markets have nonetheless remained weak relative to the nation. Finally, one MSA experienced relatively less housing market inflation prior to the crisis.

Analysis of the available data suggests that these indicators are significantly linked to HAMP's uneven rates of success across these MSAs. Several measures point to evidence of continued economic and housing market weakness through year-end 2012, with the data on rates of permanent loan modification viewed as evidence of much of that continued weakness. Comparatively high rates of unemployment in many of the housing markets most affected by the crisis have been correlated with disproportionately higher rates of delinquency and lower modification success rates over the four-year period. As of year-end 2012, the data suggests that many of the variables examined here continued to constrain the pace of recovery in some housing markets more than in others

OVERVEW OF FEDERAL MODIFICATION PROGRAMS INTRODUCED SINCE 2008

The initial program introduced in late 2008 in the final months of the Bush Administration, known as Hope for Homeowners (H4H), enabled underwater borrowers to refinance into an FHA guaranteed mortgage. H4H relied upon the voluntary participation of lenders and servicers. Prior to 2008, as the first signs of soaring foreclosure rates began to appear principally in the subprime market, efforts which encouraged lenders and servicers to work primarily with subprime borrowers to modify their high interest rate loans into fixed rate loans, also relied upon voluntary participation in such efforts by lenders and loan servicers. Not only did these proposals rely upon lenders' voluntary participation, there was also the obstacle posed by the fact that many of these loans had been securitized. Thus, "In most cases, servicers are restricted from modifying mortgages without investor approval, and obtaining investor approval can be a challenge for the servicer" (Consumer Compliance Outlook, 2009). Reports on such modification efforts by the Subprime Foreclosure Prevention Working Group, discussed later in this paper, reveal mixed outcomes.

In early 2009, in an effort to reach more troubled borrowers, a number of new foreclosure prevention measures began to be introduced, including the Home Affordable Modification Program (HAMP), the Home Affordable Refinance Program (HARP), and 2MP, a program that offered either modification of or extinguishment of second liens for homeowners who had already refinanced their primary loan under HAMP. In February 2009, the U.S. Treasury Department allocated $50 M in TARP funds to help homeowners struggling with their mortgages.

The first of these programs, HAMP and HARP, were created in February 2009 as part of the Homeowner Affordability and Stability Plan in an effort to help homeowners avoid foreclosure either by modifying or refinancing their first mortgages. While these programs, unlike earlier initiatives that relied entirely upon the voluntary participation of lenders and servicers (i.e., Hope for Homeowners enacted in October 2008), HAMP required that all banks and lending institutions that received government assistance under the Troubled Asset Relief Program to "implement loan modifications for eligible loans under HAMP's guidelines" (Consumer Compliance Outlook, 2009).

In October 2011, the Federal Housing Finance Agency (FHFA), Fannie Mae, and Freddie Mac improved upon the existing Home Affordable Refinance Program making it easier for lenders to refinance HARP-eligible mortgages by making refinancing possible for borrowers who owed more on their mortgages than their homes were worth (Fannie Mae, 2012).

However, the same mandate did not apply to non-TARP banks. Nevertheless, this requirement was short-lived. In April of 2009, the Treasury Department announced changes to this mandate, stipulating that Help for Homeowners (H4H) should be the primary source for homeowners seeking a modification before applying under HAMP (Consumer Compliance Outlook, 2009). In essence, the mandate to lender participation was further weakened and the process for homeowners became more bureaucratic.

Another change made to the original HAMP program by the Treasury Department added a second lien modification program, known as 2MP. This program would be available only to borrowers who obtained a second lien on or before January 1, 2009 and who had already attained a first lien modification under HAMP.

Under 2MP, a second lien that met these qualifications would be eligible for either a modification or extinguishment (Consumer Compliance Outlook). However, 2MP appeared to have had limited success in attracting lender participation, with just over 103,000 second lien modifications from the program's inception through December 2012 (U.S. Treasury Dept., December 2012). The principal obstacle was that a second lien modification was not possible unless the borrower had first obtained a first lien modification. The significant numbers of homeowners in negative equity and their concentration within those markets with slower home price appreciation since having reached bottom continued to pose obstacles to gaining access to the second lien modification program.

RESEARCH SUMMARY

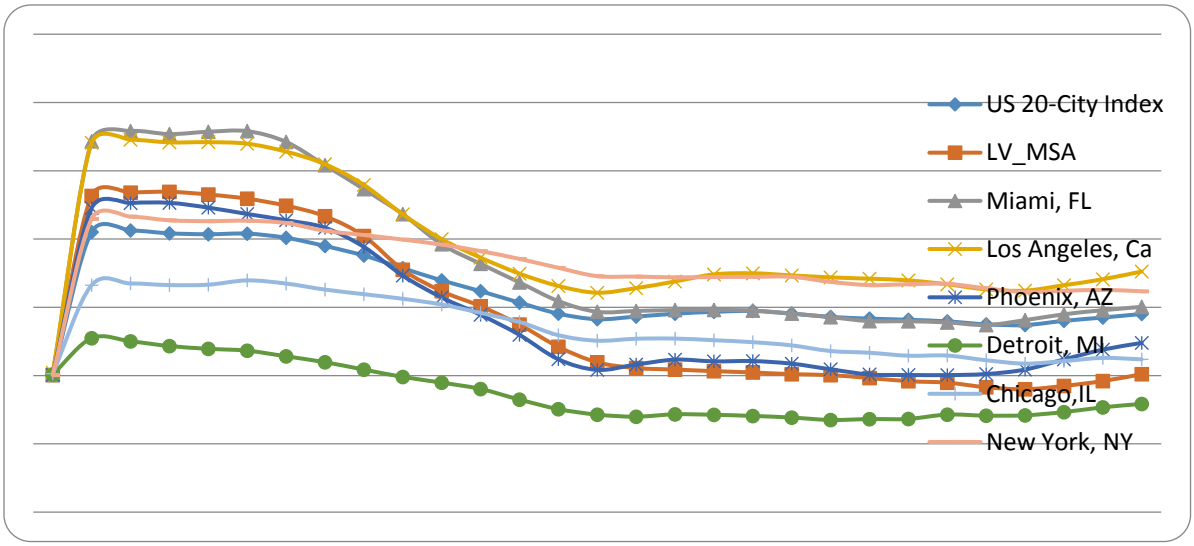
The following discussion considers the relative strength of the previously identified variables in explaining the outcomes of actual loan modifications. Employing data sets on the proportion of successful modifications to total trials, first lien modifications under HAMP from the U.S. Treasury Department, modification type, unemployment data, historical Case-Shiller home price index data, and rates of negative equity, the data analysis here seeks to identify not only which of these variables appears to exert the greatest explanatory power, but which have had the strongest impact over time. Rates of lender participation in modification efforts nationally will be measured in terms of the proportion of successful modifications relative to trials.

Data on the types of modifications undertaken, including principal balance reductions, refinancing into lower interest rate loans and other types are examined here briefly as well. An overview of total successful modifications under 2MP is also discussed. While data on loan modification type does not appear to be available at the MSA level from the Treasury Department data, U.S. level data will be used. The correlation analysis which will be included in a follow-up paper will examine the four year period from January 2009 through December 2012. The picture that emerges suggests that all of the variables examined are potentially significant in explaining the wide variation in the rates of recovery in each of the metropolitan areas.

DATA: Home Price Trends

Since the second half of 2012, several indicators began to point to the beginnings of recovery in the U.S. housing market. Nationally, housing starts on new privately owned units, which peaked in 2005 at 2,068.3 thousand, rose to an annual rate of 780.0 thousand after plummeting to 554.0 thousand in 2009. New single family home sales, which also peaked in 2005 at 1,283.0 thousand have only recently shown evidence of a turnaround since bottoming out in 2011 at 306,000. The number of new home sales in 2012 reflected a small increase to 367.0 thousand, still the lowest annual rate on record since 1982. Existing home sales began to see a modest turnaround from their post-recession low in 2010 to 4,650.0 thousand in 2012 (U.S. Department of Housing and Urban Development, 2012), and the Case-Shiller national composite home price index showed some modest improvement, rising to 135.11 in fourth quarter 2012 after hitting bottom in first quarter 2012 at 124.06 (2012).

Figure 1: Case-Shiller Home Price Index: U.S. 20-City and Metropolitan Areas



Data for the Riverside-San Bernardino CA MSA is not available.

However, despite signs of an emerging housing market in 2012, the turnaround in many of the nation's hardest hit markets continued to lag that of the U.S. overall, and to a significant degree, their recoveries have been measurably weaker.

The seasonally adjusted peak in the national composite home price index based on an analysis of Case-Shiller quarterly data shows that the national market bottomed out in 3rd quarter 2011 after peaking in 1st quarter 2007. Overall, U.S. home prices lost an average of 32.9 percent of their value over this period. Based upon the 20-city composite index, home values lost 33.8 percent of their value from their peak in April 2006 to the trough in January 2012. (Case Shiller, Dec. 2012).The two measures are comparable.

A comparison with peak to trough indices for the eight MSAs relative to the nation reveals comparatively sharper declines in home values from housing market peaks to troughs. In five of these MSAs, the peak to trough decline was noticeably greater than for the nation as a whole. At the same time, the recoveries in four of these same markets significantly lagged the nation based upon the 20-City composite index. Two areas – Los Angeles and New York – began to stabilize.

While Detroit and Chicago experienced considerably less of a bubble market, these MSAs started from relatively more depressed economies relative to the nation and the other markets and they have continued to markedly lag the nation overall. Despite these differences, their housing markets, as well as those of the others and the U.S., had not recovered to their pre-bubble price levels as of December 2012.

Table 1: Market Peak to Trough Percent Changes in Home Price Index

20-City Composite Index	Las Vegas NV	Miami FL	Los Angeles CA	New York NY	Phoenix AZ	Detroit MI	Chicago IL
-33.8%	-61.6%	50.9%	-40.4%	-34.9%	-55.7%	-44.6%	-35.0%

(based on analysis of Case-Shiller home price index data; Case-Shiller data for the Riverside-San Bernardino MSA not available)

Negative Equity

Based upon another critical measure of housing market health – negative equity - most of these markets still demonstrated comparatively weaker recoveries. First, the weakness in permanent modifications appears to be strongly linked to the share of mortgaged housing units still in negative equity.

The problem of negative equity continued to exert a significant impact in the bubble markets – the Las Vegas, Miami, Los Angeles, Phoenix and San Bernardino MSAs. At the end of fourth quarter 2012, an estimated 10.4 million, or 21.5 million residential properties with a mortgage were still in negative equity. (CoreLogic, March 2013). In the U.S. overall, an estimated 21.5 percent of owner occupied homes with a mortgage were in negative equity, while another 23.2 percent were considered "under-equitied," - having less than 20 percent equity at the end of fourth quarter 2012. (Core Logic March 2013). In three of these five markets, the percent of homes in negative equity remained significantly above the U.S. average at year-end 2012. For just two MSAs – Los Angeles and New York – the negative equity percentages were below the national average. Los Angeles fared somewhat better than the national average at 19.6 percent, while the New York market showed considerable strength with just 11.9 percent of mortgaged homes in negative equity. The percent share for the Chicago MSA at 33.3 percent was also measurably greater than the U.S. average although it experienced a comparatively flat market during the housing bubble.

While data for the Detroit and Las Vegas MSAs was not available, statewide data revealed an especially high rate of negative equity for Nevada overall at 52.4 percent. In Michigan overall, the rate was at 31.9 percent.

Table 2: Negative Equity Status as of 4 Quarter 2012.

U.S. and Six Metropolitan Areas	Percent of Mortgaged Owner Occupied Homes in Negative Equity
U.S.	21.5
Miami, FL	40.7
Phoenix, AZ	36.6
Los Angeles, CA	19.6
Riverside-San Bernardino CA	35.7
New York NY	11.9
Las Vegas NV*	**52.4
Chicago IL	33.3
Detroit MI*	31.9

Core Logic, "Core Logic Reports Equity Improves in Fourth Quarter 2012," March 19, 2013. *Data for Las Vegas, NV and Detroit MI MSAs was not available. **Figures represent statewide data; MSA-level data not available.

Rates of Permanent Modification by MSA

Nationally, 851,135 homeowners out of 1,975,649 who had entered a trial modification from the program's inception through December 2012 received a permanent modification of their home mortgage through the Making Home Affordable Modification (U.S. Department of the Treasury, Dec. 2012, Jan. 2013). This number represents a national success rate of 43.1 percent. When compared to the total of 2.2 million applications made through lenders for a HAMP modification, the national success rate falls to 38.7 percent.

A further comparison with total foreclosure data indicates an even smaller successful modification rate. A total of 4.2 million foreclosures nationally were completed from September 2008 through January 2013 (Core Logic, Feb. 2013), suggesting a successful modification rate of just 20.3 percent of all distressed mortgages over this four year period. In these same eight housing markets, permanent modifications through December 2012 averaged 44.4 percent of all trials.

While there is data on completed foreclosures from U.S. Treasury Department reports, the dates for which this data is available are not consistent across the eight MSAs and thus, is not included here.

Table 3: HAMP Activity through December 2012

MSA	Active Permanent Modifications	Rank: Permanent Modification:15 MSAs with highest HAMP Activity	Mod. Rate: % active perm. Mod. To total trials	% of Total U.S. HAMP Activity
U.S Los Angeles Long Beach	**851,135**		**43.1**	**100.0**
Santa Ana CA		**1**	**53.0**	**8.2**
New York White Plains	**56,452**	**2**	**45.5**	**6.8**
Miami, Ft Lauderdale FL	**41,865**	**3**	**45.8**	**5.3**
Chicago IL	**42,292**	**4**	**43.6**	**5.0**
Riverside-San Bernardino CA	**42, 910**	**5**	**47.9**	**5.0**
AZ	**26,951**	**7**	**39.4**	**3.1**
Las Vegas NV	**15,549**	**11**	**39.6**	**1.8**
Detroit MI	**15,521**	**12**	**41.5**	**1.8**
TOTALS	**310,114**	**12**	**44.4 (Avg)**	**37.0**

Sources: U.S. Treasury Department, Making Home Affordable Program Performance Report Through December 2012.

While all eight MSA's were among the top fifteen with the highest HAMP activity through December 2012, and five were in states with the highest levels of HAMP activity – (California, Nevada, Illinois and Florida) – the data overall reveal comparatively week modification success rates. Permanent modifications for these MSAs taken together, averaged 44.4 percent of total trials in these markets, while at 37.0 percent, they accounted for well over one-third of total HAMP activity nationwide over the four-year period.

Despite the challenges in comparing the number of active permanent modifications to total completed foreclosures as a result of the inconsistencies in the dates for reported foreclosure data, a look at the outcome for a couple of these markets with data that is relatively consistent with the four-year period studied here provides some measure of modification success rates relative to total distressed properties. In the Miami MSA, with total foreclosures of 101,900 reported through 2Q 2012, the ratio of active permanent modifications to completed foreclosures was 41 percent. In Detroit, with 131,400 completed foreclosures through 1Q 2013, active permanent modifications totaled just 11.8 percent.

In the New York MSA, the ratio of permanent modifications to completed foreclosures through January 2013 (27,520) was more than two-to-one. In part, this may be due to policies of early intervention

to assist distressed (delinquent) homeowners before the formal foreclosure process began, the enactment of a mandatory 90-day pre-foreclosure filing notice to all delinquent homeowners, which gave struggling homeowners more time to enter into and complete a successful modification and the opportunity to start the process comparatively earlier.

Modification Type

In many cases, some of the nation's largest lenders had relatively low rates of successful permanent modifications while others achieved higher rates of success. Through December 2012, successful second lien modification activity represented a relatively small proportion of total modifications nationally. A total of 103, 272 second liens had entered the 2MP modification program as of year-end 2012. Just 25,573 of these resulted in a full extinguishment of the second lien, while another 6,552 received a partial lien extinguishment. The balance of 69,078 were in active modification status. A total of 2,697 that had entered into a 2MP modification were paid off. The median amount of a fully extinguished second lien was $61,734, while the median amount of a partial second lien extinguishment was $9,347 (Treasury, 2012). In total, just 16 servicers were participating in 2MP modifications through December 2012, representing a fraction of total servicers nationwide.

There is evidence that modification type has also been a factor in the relative success rate of loan modifications (The State Foreclosure Prevention Working Group[1] (Aug. 2010; Querci and Ding (2009). Specifically, there is strong evidence that modifications that feature a principal balance reduction have had relatively higher rates of success. The sum of such modifications at 89, 217 nationally as of year-end 2012was small in comparison with the total number of distressed property owners seeking a HAMP modification. Based on a reading of the U.S. Treasury HAMP reports, one of the principal reasons has had much to do with policy guidelines and limitations under HAMP that were still in effect through year-end 2012. Those guidelines stated that while both GSE and non-GSE loans (i.e. many subprime loans) were eligible to participate in a HAMP modification, GSE policy (Fannie Mae and Freddie Mac) stipulated that servicers can only offer a principal balance reduction – a PRA (or Principal Reduction Alternative) on non-GSE modifications under HAMP (2012). As a share of total active permanent modifications through December 2012, modifications featuring a principal balance alternative constituted just 10.5 percent.

Such successes appear to be reflected in the Treasury Department's own statistics on modifications by servicers. Under the terms of the HAMP Principal Reduction Alternative, servicers of non-GSE loans are required under the terms of the program to evaluate borrowers for a principal reduction (although they are *not required* to do so). The program applies to mortgages with a loan to value (LTV) that is greater than 115 percent. Servicers that do participate are eligible under the program to receive an incentive depending upon the amount of the principal reduced (U.S. Treasury, Dec. 2012 MHA Final Report). According to the December Treasury report, "The terms of the $25 billion settlement of mortgage servicing deficiencies between the five largest mortgage servicers, the Federal government, and 49 state attorneys general[2], have caused servicers to increase use of non-PRA principal reductions".

In fact, modifications that included a principal balance reduction feature began to be offered to a greater extent following the $25 billion mortgage settlement between the 49 state attorneys general, the Federal Government and the five largest mortgage servicers (National Mortgage Settlement, 2012). In addition to the Principal Reduction Alternative offered under the terms of the HAMP program (a HAMP PRA), in which servicers receive a financial incentive to reduce a borrower's principal balance, more servicers began offering this option following the national settlement even though they received no financial incentive to do so. The December 2012 HAMP Servicer Report noted that among the non-GSE loans eligible for a principal reduction and that had begun a trial modification in December 2012, 71 percent included a principal reduction, with 54 percent of these being offered through the HAMP PRA program (2012).

Among all non-GSE loans eligible for a principal reduction under the HAMP program and that entered into a trial modification in December 2012, 71% included a principal reduction feature, including 54% through the HAMP PRA program. (U.S. Treasury, 2012). However, as a percentage of all active permanent loan modifications, these particular modifications constituted 89,217 or 10.5 percent of permanent trial modifications and just 4.5 percent of all HAMP trials initiated through year-end 2012 (U.S. Treasury Department, 2012).

Despite the low rate of principal balance reductions offered over this four-year period, studies such as those by the State Foreclosure Prevention Working Group, which looked at a longitudinal dataset of nine large loan servicers in New York State in 2007, concluded that modifications that included significant reductions in principal balances tended to have lower re-default rates than modifications that did not (August 2010).

Labor Market and Unemployment Rates

Unemployment rates in all but one of these same eight MSAs clearly trended above that for the nation overall through December 2012. Phoenix Arizona is the exception. Peak unemployment rates at the height of the downturn have fallen in all of these markets, but remained considerably higher than the national average at year-end 2012. Continued high rates of unemployment since the official start of the recession in December 2007 have clearly been a significant drag on housing market recovery. In all cases, unemployment did not decline below double digits until December 2012, and in three of these MSAs rates still remained in double digits.

Table 4: Metropolitan Statistical Area and U.S. Unemployment Rates: December 2007 - December 2012

Year	U.S.	LA_CA	Riverside-San San Bern. CA	Phoeniz AZ	Chicago IL	Las Vegas NV	Detroit MI	Miami Fl	NY
Dec-07	5.2	6.3	3.7	5.1	5.3	7.4	4.4	4.8	5.0
Dec-08	8.8	10.2	7.3	7.3	9.3	10.9	7.8	6.9	7.3
Dec-09	11.3	13.8	9.9	10.9	13.4	14.5	10.9	9.9	9.9
Dec-10	11.5	13.7	9.0	9.2	14.3	11.7	11.0	8.8	9.3
Dec-11	10.7	12.4	7.7	9.1	12.6	9.9	9.0	9.1	8.5
Dec-12	9.4	11.0	6.8	8.6	10.0	10.2	8.0	8.8	7.8

Source: U.S. Department of Labor, Bureau of Labor Statistics; New York State Department of Labor

A Note on Lender and Servicer Participation in Modification Efforts

Rates of lender and servicer participation in the various loan modification programs are also linked to the percentage of permanent modifications. While this data does not provide detail at the MSA level, the data on servicer performance for the nation overall is quite detailed in monthly Treasury Department reports. The percentages of successful permanent modifications as a share of total trials for the top five loan servicers since through December 2012 reveals quite mixed outcomes. There is evidence that modification type has also been a factor in the relative success rate of loan modifications.

Table 5: Servicer Loan Modification Activity through December 2012

Lender/Servicer	All HAMP Trials Started	Active Permanent Modifications	Permanent first lien modifications as a share of lender's total trials started	Second lien modifications started (2MP)	Principal Reduction Alternative[1]
Bank of America	342,841	118,446	34.5%	33,599	11,377
Citi Mortgage	141,865	52,741	37.2%	12,895	2,004
J.P. Morgan Chase	330,545	141,928	42.9%	29,218	22,843
Wells Fargo	284,594	121,259	42.6%	15,241	17,524
GMAC Mortgage	76,962	42,594	55.3%	4,548	2,256
Ocwen Loan Serv	112,905	71,331	63.2%	N/A	22,366
One West Bank	65,666	35,323	53.8%	3,334	5,448
Select Portfolio .	64,230	25,311	39.4%	N/A	2,345
Homeward Resid.	51,117	31,579	61.8%	N/A	0
Total-all servicers	**1,1975,649**	**851,135**	**43.1%**	**103,272**	**89,217**

Source: U.S. Treasury Department, December 2012 MHA Report; permanent modifications started.

Review of the Literature: Obstacles to Loan Modification

A number of factors have been identified in the literature regarding the limited impact of loan modification programs. The assessment in much of the literature is that the forces that led to the foreclosure crisis continued to reinforce its effects, most notably posing barriers to successful loan

modification. This lends support for the view that to a significant extent, continued high unemployment, particularly in the hardest hit markets, the negative equity position of many borrowers, and stagnant and/or continued weak recovery in home values continued to weigh on housing market recovery through 2012, preventing higher rates of successful modification. Also noted is the difficulty posed to refinancing of mortgages with second liens.

The large number of mortgages with second liens is identified as posing one of the greatest impediments to refinancing (Been, et. al., 2011, Lee, et. al. 2012, LaCour-Little, 2009). It is estimated that between 40 and 45 percent of new mortgage loans originated at the height of the housing boom (2005-2007) included a second lien or piggyback mortgage which enabled borrowers with less than a 20 percent down payment to purchase a home, particularly in high cost coastal markets and in 'bubble locations.' (Lee, et. al. 2012). Their research documents that both the number of and value of closed end second liens (as opposed to HELOCs) represented a relatively small percentage of originations in 1999 compared with their peak in 2006.

Been, et. al. (2011) point out that HAMP's success was to a significant degree constrained by the presence of a second mortgage. "Second liens significantly complicate modifications because first lien holders may lose their senior status upon modification," and thus first lien holders are reluctant to agree to participate in a modification unless second lien holders agree to subordinate their liens to the newly modified mortgage. As the authors point out, few have chosen to do so. Examining a sample of zip code-level and state data, LaCour-Little et. al.(2009) found that the percentage of piggyback originations from 2001 – 2008 was positively correlated with higher foreclosure rates in subsequent years. Their findings confirm that second liens rose rapidly during the housing boom and are a major contributing factor to underwater mortgages in the face of the sharp decline of home prices after the peak. They specifically looked at whether states and zip codes with a higher proportion of piggyback loans originated during the 2001 - 2006 period were associated with increased rates of delinquency and foreclosure. Their findings pointed to evidence that second liens originated to subprime borrowers were significantly related to higher rates of foreclosure after 2006. The finding did not especially hold for prime second-lien borrowers (LaCour-Little, et. al., 2009). Nevertheless, given the time of their study, it may have been too early to have seen the full effects of declining home equity, which affected large swaths of the home-owning population nationwide, as home prices continued their decline throughout 2010 and 2011.

A broad cross-section of the literature is largely consistent in pinpointing the crisis in the subprime mortgage market beginning in 2006 as the catalyst for much of the larger housing market collapse that followed (Gerardi, et. al. 2008 and 2011, Been, et. al., 2011, Rugh and Massey, 2010, Bromley, 2008, Gerardi and Willen, 2008). Other analyses identify a number of other important factors that coincided with the build-up to the collapse that were at work as well. These include deteriorating loan quality and poor underwriting standards particularly in the subprime market (Been, et. al., 2011), smaller down payments and a run-up in borrowing against home equity while home prices were still rising, coupled with declines in home price appreciation that began well before the crisis (Gerardi, et. al., 2011). At the same time, the

work of the State Foreclosure Prevention Working Group, (which began analyzing a longitudinal dataset of nine large loan servicers in New York State in 2007 - long before the crisis reached its peak) and Quercia and Ding (2009) find a significant relationship between re-default risk and the failure to reduce principal balances in loan modification efforts (SFPWG, Aug. 2010).

Much of the literature also addresses the shortcomings of the various loan modification programs introduced in the wake of the foreclosure crisis. It is noted that the Home Affordable Modification Program (HAMP) in particular, had mixed results, as the available data examined here clearly demonstrates.

In the years immediately prior to the housing market collapse, increasing numbers of borrowers, particularly in the subprime market, were making very small down payments at the time of purchase, and in many cases, putting zero money down. At the same time, many borrowers who had purchased years before the onset of the crisis, had been withdrawing extraordinary amounts of equity while home prices were still rising, (Gerardi et. al. 2011). This created heightened risk – especially in the 'bubble' markets - once home prices stalled and began their steep decline. These two conditions alone would clearly pose challenges to refinancing in a down market. After the market peaked, large numbers of homeowners – both subprime and prime - found themselves in a negative equity position. Until HARP 2.0's recent allowance of refinancing of up to 125 percent of a home's original mortgage (2011), this problem was clearly unaddressed.

Some inquiries, relatively early in the course of the rapid rise in distressed properties, found strong evidence that principal balance reductions were associated with the strongest modification success rates. The State Foreclosure Prevention Working Group (Aug. 2010), analyzing a longitudinal dataset of nine loan servicers, found that modifications that included significant reductions in principal balance tended to have lower re-default rates than their counterparts. This finding led the group to recommend reducing principal balances on loans in areas impacted by significant home price declines (Aug. 2010).

In fact, the changes made to the Treasury Department's guidelines under the terms of the HAMP Principal Reduction Alternative, servicers of non-GSE loans were required to evaluate borrowers for a principal reduction (although they are *not required* to provide such a modification) under the terms of the national mortgage settlement (U.S. Treasury, Dec. 2012 MHA Final Report) with the nation's five largest servicers. As a result, many began to increase the use of non-PRA principal reductions.

Similarly, Querci and Ding (2009) found that borrowers were less likely to re-default on their home mortgage when their monthly payments were reduced through a balance-reducing loan modification. Using data from a large sample of recently modified subprime loans, the authors looked at the question of why some loan modifications were more likely to re-default than others. At the same time, they examined the characteristics of modifications that were more likely to re-default within a short term period. Their findings confirmed that modifications that involved a significant reduction in mortgage payments tended to result in more sustainable short-term modifications, and that re-default rates are further reduced when payment reductions also include a reduction in principal balances.

As noted in the previous discussion however, such modifications have often been the exception. Modifications with a significant reduction in principal balance represented just 20 percent of the loan modifications that the SFPWG studied. In most modifications, the loan amount increased as service charges and late payments were rolled into the loan.

With the onset of the financial crisis in late 2008, the SFPWG concluded that a comprehensive approach to loan modification was necessary. At the time the organization issued its fourth report in January 2010, it was estimated that just four out of ten seriously delinquent borrowers were on track for any kind of loan modification. The authors also concluded that while the HAMP program increased the percentage of borrowers participating in some form of loan modification, the rapidly rising number of such delinquent borrowers meant that HAMP had merely been able to slow the foreclosure crisis, and that its efforts have not been able to keep pace with the rising scale of delinquencies (SFPWG, Jan. 2010).

Conclusions

Based upon this preliminary analysis of eight metropolitan areas and the U.S., available data suggests that in the MSAs examined here, the sharp rise in, and continued high rates of unemployment, continued high negative equity rates, weak rates of housing price recovery, inconsistent and often poor rates of successful loan modification, were all clearly tied to the mixed success rates of the HAMP loan modification program from 2009 through year-end 2012. In some cases, the outcome was reflected in higher rates of completed foreclosures relative to successful permanent loan modifications. At the same time, many MSAs with the highest rates of negative equity at the end of 2012 appear to be significantly correlated with comparatively lower rates of permanent modification relative to trial modifications.

While many modification programs aimed initially at getting borrowers out of ‘high cost’ or subprime loans, many subsequent efforts have fallen short of large scale remediation of loans at high risk of default as a result of the sharp economic downturn, precisely because of the prolonged and slow pace of economic recovery that continued to keep large numbers of properties in negative equity through year end 2012. While the government modification programs have clearly had a degree of success over the past four years, the results have largely been mixed, with significant percentages of modified loans (particularly under HAMP) going back into default.

The other issue concerns the reliance upon the voluntary participation of lenders and servicers in modification efforts from the outset, a factor that is reflected in the mixed outcomes of lender/servicer participation in modification efforts. HAMP relied heavily on the employment of various incentives to encourage lenders to modify the loans of homeowners at risk of default and foreclosure.

The next step will undertake a correlation analysis aimed at more precisely gauging the significance of the variables discussed here to the success rates of government loan modification programs over the 2009 – 2012 period as measured by the rate of permanent modification in each MSA.

The proposed model will examine permanent modification rates as of year-end 2012 as a function of the Case-Shiller home price index (HPI), percent of mortgaged owner-occupied homes in negative equity

(NEGEQ), the annual average unemployment rate (UNEMPL), The share of permanent modifications that featured a principal balance reduction as a share of total permanent HAMP modifications nationally (PRINCRED).

ENDNOTES

1. The Subprime Foreclosure Prevention Working Group consisted of several state attorneys general and state bank supervisors.
2. As part of the nationwide mortgage settlement reached between the U.S. government and the major lenders in 2012, the nation's five largest banks agreed to pay a total of $25 billion to borrowers who lost their homes to foreclosure, and to the states and the federal government to settle investigations linking the country's five largest mortgage servicers to the practice of routinely signing foreclosure related documents without the presence of a notary public and without confirming whether the facts contained in the documents were correct.

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A Look at Pay and Performance for the American Association's Cincinnati Club during the 1880s

Michael McAvoy*

ABSTRACT

Using a new salary data series, we correlate characteristics and performance measures with salary differentials. The new salary data are obtained for the American Association's Cincinnati Reds between the years 1882-1884, and 1886-1888. We find evidence that current season real salaries are significantly explained by performance: prior season batting averages for fielders and prior season wins for pitchers. In addition, fielders receive higher pay for experience but reduced pay as they age.

SALARIES OF PROFESSIONAL BASEBALL PLAYERS IN CINCINNATI DURING THE 1880S

Cincinnati, Ohio has had a long presence in professional and major league baseball, organizing the first recognized all-professional nine in 1869, and the city later obtained a franchise in the newly formed National League for the inaugural 1876 season. Expelled after the 1880 season for permitting alcohol in its park as well as renting it for the playing of Sunday baseball, baseball interests in the city sought other means to obtain major league baseball. The Cincinnati Base Ball Club organized and obtained a franchise in the American Association for that major league's inaugural 1882 season (Ellard, 2004).

We build a salary list for the Cincinnati AA club. Many of its business records, including accounting books, correspondence, and player contracts, for portions of the 1880s, are preserved in the archives at the Cincinnati Museum Center. In total, we record a fairly complete list of Reds players' salaries during the years 1882-1884, and 1886-1888. Salaries are unavailable for 1885 and post-1889. Where the contract is present, we record that salary, and rely upon the accounting records if no contract is present. This era covers a nationwide boom in professional baseball following 1884 (Roberts and Cunningham, 2012, pp. 17-18).

The Appendix shows the salary list for salaries recorded by player name, season, and nominal amount. In general, the salary is paid over a period of time as defined in the contract, commonly specified by the National Agreement, and usually began April 1 and ended November 1 (seven months). Players were typically paid every two weeks. Beginning with the 1883 season, the National Agreement specified the minimum salary for players in the major leagues as $1,000. Prior to 1886, several salaries below $1000 are apparent. Perhaps the Reds purchased a minor league player's contract while trying out the player at the major league level; however, we do not know why several salaries below $1000 are observed for the 1883 and 1884 seasons. The nominal amounts shown are based upon the salary rates

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across the seven month season and do not include incentives, bonuses, or deductions from the nominal pay. The standard contract specified the player was to purchase his uniform and equipment and maintain them at his expense, and allowed 50 cents per diem when the club travelled. Bonuses were not specified in the standard contract nor were fines. The standard contract demanded performance from the player, and permitted the club to release the player without further payments at any time during the term of the contract (Gelzheiser, 1997, pp. 47-50).

Table 1**:** Summary measures of 105 Cincinnati baseball salaries

Year	Sample size	Mean	Median	Maximum	Minimum	Standard Deviation
1882	13	780.77	750	1400	500	250.45
1883	14	1382.14	1400	2500	600	469.70
1884	23	1370.87	1400	2500	525	553.18
1886	17	1606.27	1800	2000	605	452.20
1887	20	1635.00	1725	2000	600	344.16
1888	18	1986.11	2000	3000	900	468.04
All	105	1493.21	1500	3000	500	552.15

Source: Cincinnati Base Ball Club Records, boxes 1, 6, 7

The salary list is summarized by season in Table 1. The list reveals large jumps in salaries between 1882, when NL rosters were largely filled and the AA respected the NL reserve list, and 1883 when the AA determined its business model was successful and adopted its own reserve lists. An increase in the number of players is apparent in 1884, and salary increases are evident in 1886 and 1888.

Table 2: Summary measures of 77 Cincinnati baseball salaries in estimation sample

Season	Sample Size	Mean	Median	Maximum	Minimum	Standard Deviation
1882	10	725.00	725	1200	500	191.85
1883	12	1445.83	1450	2500	850	447.95
1884	13	1682.69	1600	2500	875	414.50
1886	16	1612.92	1800	2000	605	466.17
1887	13	1765.38	1800	2000	1200	230.38
1888	14	1967.86	2000	2500	1500	305.47
All	77	1575.09	1700	2500	500	512.16

Source: Cincinnati Base Ball Club Records, boxes 1, 6, 7

Position and experience, and prior season performance are factors used to explain player salaries. 77 salaries show major league experience during a prior season. Table 2 summarizes these salaries. Similar to the Appendix, salaries increased for 1883, 1884 and 1888, and are stable in 1886 and 1887. Players with major league playing experience show increases for 1884 due to an increase in demand for players when the AA expanded from eight to 12 clubs, and the Union Association (UA) entered major league baseball with eight clubs.

POSITION, EXPERIENCE, AND PERFORMANCE

Different positions in the field require different competencies. Traditionally, the battery – pitcher and catcher – were the most desirable and difficult to fill. The pitcher in this era worked the entire game, took his place in the batting order, and often pitched on no rest. The catcher was often rested and a change catcher employed, because the position was very physical in performance, demanding on the arms, hands and legs, and dangerous, for the body was exposed to wild pitches, fast moving hard hit foul tip balls and runners, in an era of equipment and skill development. Often, pitcher and catcher moved together through baseball, as they knew each other's playing style. As the game developed, the infield positions required agility, intuition, speed, accuracy, and teamwork in play. Finally, the outfield positions were considered least skilled (*Beadle's*, 1860; Rader, 1995, p. xviii). In the 1880s, the club rosters began to increase in size, growing from 11 or 12 players at the beginning of the decade and approaching 15 or more by the end of the decade. Most clubs were staffed with their starting nine, an extra battery, placing catchers at a premium, and one or more other position players. Primary positions are recorded from baseball-reference.com.

Human capital is reflected in age and experience. The adult body continues to develop, peaks in physical condition, then begins to decline. On the other hand, as the player practices and works more championship games, and watches the play of opponents, he gains knowledge of how to more effectively apply his skills to his position. The statistics are obtained from baseball-reference.com. For each player, his age during each season is recorded as is the number of previous seasons' experience.

Table 3: Summary measures, all players and seasons, 1882-1884, 1886-1888

Variable	Mean	Median	Maximum	Minimum	Standard Deviation
Salary rate (nominal)	1575.09	1700.00	2500.00	500.00	512.16
Age	27.1429	27.0000	35.0000	19.0000	3.3901
Career # Seasons	4.2468	4.0000	12.0000	1.0000	2.7823
Pitcher	0.2208	0.0000	1.0000	0.0000	0.4175
Catcher	0.1948	0.0000	1.0000	0.0000	0.3986
Infielder	0.3377	0.0000	1.0000	0.0000	0.4760
Season batting average	0.2345	0.2523	0.3419	0.0667	0.0618
Season runs average	0.5139	0.5161	1.0000	0.0909	0.1583
Season fielding percentage	0.8874	0.8902	1.0000	0.6667	0.0648

For each season, fielding ability is measured as fielding percentage, the ratio of errors to chances, from the prior season. Table 3 shows summary measure for all players in the estimation sample. The hitting skill is measured through batting average, the ratio of hits to at bats. Once on base, the player was expected to score. The running skill is measured in the ratio of runs to (hits + walks).

The pitching skill is measured for pitchers. The vast majority of pitchers in the 1880s were starters who generally completed the games they started throughout the decade. Most clubs carried one starter at the start of the decade, employed two starters a few years later as the number of scheduled championship games increased, and employed more pitchers, both regular and spot starters, towards the later-1880s as the number of championship games increased again as well as recognition of the need to rest starters who were by then throwing overhand from greater distances due to changes in the rules.

Table 4: Summary measures, 60 fielders, 1882-1884, 1886-1888

Variable	Mean	Median	Maximum	Minimum	Standard Deviation
Salary rate (nominal)	1554.03	1725.00	2350.00	500.00	473.27
Age	27.5167	28.0000	35.0000	20.0000	3.2390
Career # Seasons	4.5167	4.0000	12.0000	1.0000	2.9198
Catcher	0.2500	0.0000	1.0000	0.0000	0.4367
Infielder	0.4333	0.0000	1.0000	0.0000	0.4997
Season batting average	0.2419	0.2535	0.3419	0.0667	0.0610
Season runs average	0.5198	0.5200	1.0000	0.1667	0.1514
Season fielding percentage	0.8941	0.8963	1.0000	0.7059	0.0593

Table 5: Summary measures, 17 pitchers, 1882-1884, 1886-1888

Variable	Mean	Median	Maximum	Minimum	Standard Deviation
Salary rate (nominal)	1649.41	1600.00	2500.00	600.00	623.07
Age	25.8235	26.0000	33.0000	19.0000	3.5684
Career seasons	3.2941	3.0000	7.0000	1.0000	1.9633
Season fielding percentage	0.8634	0.8571	0.9833	0.6667	0.0764
Season strikeouts per 9 innings	3.0748	3.0303	5.2388	0.8067	1.3826
Season earned runs per 9 innings	2.9754	3.2444	4.1062	1.5192	0.8152
Season hits per 9 innings	8.8551	8.5204	11.9348	7.1053	1.3633
Season walks per 9 innings	2.4072	2.3108	5.4848	1.2761	1.0296
Season wins	18.5294	14.0000	43.0000	1.0000	13.9879

Tables 4 and 5 show the Cincinnati pitchers were on average almost two years younger and had almost 1.5 fewer seasons than the fielders. That they were more scarce is shown in average earnings almost $100 more per season. The pitching skill is measured in strikeouts per 9 innings, walks per nine innings, hits per nine innings, and earned runs per nine innings. Pitchers also field, and fielding percentage is measured. Ultimately, effective pitchers are winners, and the ratio of wins per games started is recorded to measure winning competitiveness. While pitchers in the 1880s took their place in the batting order, hitting skill is not measured here. Pitchers were expected to pitch, and a weak hitter was acceptable if the pitching skills were effective. Also, the sample size is small for use in estimation.

VALUATION OF SKILLS

At the margin, in competitive markets, an additional unit of labor effort is compensated up to the value of its marginal revenue product (Fort, 1992, p. 137). In sports, the player is compensated by the expenditures from additional attendance directly due to his efforts. Players contract for their payments with management prior to the season, obtaining a fixed salary rate. A player might consider his opportunity costs, how much money his team mates earn, how much money players on other clubs earn in his position, as well as how much is his value to the club. Management estimates an expected marginal impact on revenues from engaging a player as well as his expected replacement cost.

In the sports compensation literature, where information may not be readily available to determine marginal revenue product, compensation is related to productivity. If attendance increases as a result of winning, and winning depends upon competitive play, attendance is related to performance, or player productivity (Hakes and Sauer, 2006). Baseball is a multi-skill game requiring effectiveness in hitting,

running, fielding, and throwing (Roberts and Cunningham, 2012, pp. 29-33). The more tools a player has, the more valuable he will be to his club.

We follow the approach of Fort, in which the player's salary for time period *t* depends upon his performance during time period *t-1*. Like Fort, we use the natural logarithms of pay and performance variables to reduce effects from any nonlinearities (1992, pp. 137-138).

Table 6: Real season salary rate on prior-season performance, 1882-1884, 1886-1888

Variable	77 players (A)	60 Fielders (B)	17 Pitchers (C)
Constant	9.6144***	8.5259***	11.9361***
	(1.3929)	(1.4161)	(1.4532)
1882	-1.0040***	-0.8089***	-1.1770**
	(0.1208)	(0.0932)	(0.3284)
1883	-0.3194***	-0.2743***	-1.2402***
	(0.0990)	(0.0755)	(0.2521)
1886	-0.1395	0.0326	0.1237
	(0.0927)	(0.0769)	(0.2514)
1887	-0.0018	0.1153	1.2750**
	(0.0992)	(0.0799)	(0.3331)
1888	0.0613	0.1475*	0.8448**
	(0.0975)	(0.0758)	(0.2793)
Age	0.0424	0.1491	
	(0.1091)	(0.1103)	
Age^2	-0.0014	-0.0033	
	(0.0021)	(0.0020)	
Number of seasons	0.0976**	0.0440	
	(0.0415)	(0.0326)	
Number of $seasons^2$	-0.0031	0.0007	
	(0.0036)	(0.0028)	
Pitcher	-0.0405		
	(0.0875)		
Catcher	-0.1125	-0.0173	
	(0.0945)	(0.0700)	
Infielder	0.0262	0.0064	
	(0.0746)	(0.0539)	
Batting average	-0.3388	0.9355*	
	(0.0036)	(0.5137)	
Runs average	-0.5854***	-0.3450*	
	(0.1929)	(0.1718)	
Fielding percentage	1.1498**	0.2359	4.7013**
	(0.4728)	(0.4108)	(1.2560)
Wins per game started			-1.8526*
			(0.7993)
Strikeouts per 9 innings			-0.1687*
			(0.0723)
Walks per 9 innings			0.0276
			(0.0888)
Hits per 9 innings			-0.2458**
			(0.0717)
Earned runs average			-0.7522***
			(0.1728)
R^2	0.7617	0.8766	0.9717
Adjusted R^2	0.7031	0.8382	0.9095
F	12.9975***	22.8298***	15.6172***

Standard errors in parentheses; *** significant at 1 percent, ** at 5 percent, and * at 10 percent

For the first set of estimations of salaries on performance, ordinary least squares is used to estimate the value of skills. Real season salary rate is measured as a function of year, age, number of seasons experience, position, batting average, runs average, and fielding percentage, for the seasons of 1882-1884, and 1886-1888. The real salary rate is adjusted by the consumer price index, 2010 the base year, using the deflator given by Williamson (2013), and explained by Officer and Williamson (2012). The real salaries are logged. For the year dummy variables, 1884 is excluded, the year when the UA entered the market for major league baseball. To capture impacts of nonlinearities in experience, such as learning by doing, the square of age and completed seasons are included. For the position dummy variables, the relatively lower skilled outfield position dummy is excluded.

Table 6 explains players' salaries with prior season performance measurements, year, position, and experience. For the entire sample, shown in panel A, the model is significant at 1 percent significance, and the variables taken together explain approximately 76 percent of the variation in salary. The number of seasons is significant at 5 percent, an additional career season increasing salary an estimated 0.098 percent. The runs average is significant at 1 percent. An increase of one percentage point in prior season runs average decreases salary an estimated expected 0.006 percent. Fielding percentage is significant at 5 percent. An increase of one percentage point in prior season fielding percentage increases salary an estimated expected 0.011 percent.

Excluding the 17 pitchers, column B in Table 6 shows the estimated model for non-pitchers is significant at 1 percent. The explanatory variables taken together explain 88 percent of the variation in salary. Prior season batting average and runs average are significant at 10 percent. While the model has high estimated explanatory power, little inference is possible from the estimated coefficients.

For the pitchers, Table 6, column C shows the estimated model significant at 1 percent, and the variables taken together explain 97 percent of the variation in pitchers' salaries. Significant at 5 percent, a one percentage point increase in prior season fielding percentage increases the pitchers salary an estimated 0.047 percent. At 10 percent significance, a one percentage point improvement in prior season wins per game started decreases salary an estimated 0.019 percent. Significance shown at 10 percent, an increase of one prior season strikeout per nine innings decreases salary an estimated 0.169 percent. At 5 percent significance, an increase of one prior season hit per nine innings decreases salary 0.246 percent. Finally, significant at 1 percent, a decrease of one prior season earned run per nine innings increases salary 0.752 percent. As expected, a pitcher who puts fewer runners on base or who allows fewer runs scored enjoys higher estimated compensation.

ENTRY AND COMPETITION FOR LABOR

As production increases and firms require additional resources, the resources for which competition is relatively greatest will tend to increase in price. In baseball, clubs used fixed capital inputs, a park and a club house, and labor inputs: a manager and players. Players provided the service that generated the revenues and were able to change their employers. The clubs held a franchise with territorial rights and

located their consumable in parks that seated thousands of customers. Clubs could not relocate their capital nor easily alter their territory (Haupert, 2007). Any entrant into major league baseball would require at least nine players. All else equal, entry increases demand for labor and raises salaries while exit will have the opposite effect. Prior to 1882, the NL began seasons with between six and eight franchises. In 1882, the AA entered major league baseball with six clubs, expanded to eight clubs in 1883, increased to 12 clubs in 1884 when the UA entered with eight clubs, then thereafter reduced the number of franchises to eight for 1885. Major league clubs increased from 16 in 1883 to 28 in 1884, then were reduced to 16 in 1885 for the remainder of the 1880s.

Kahn observes nominal increases in average nominal Major League salaries during the 1880s, when players were presented with opportunities to change teams across two leagues (2000, pp. 76-77). Table 6 shows that player salaries were significantly lower in 1882 and 1883 relative to 1884 when the UA entered. For all players, a player's salary was an estimated approximately 1 percent lower in 1882 compared to 1884, and approximately 0.3 percent lower in 1883 compared to 1884. When controlling for prior season performance, the Cincinnati club increased salaries in 1887 over 1884 by an estimated 1.28 percent, and by 0.84 percent in 1888.

For fielders, table 6 shows that except for 1888, salaries were unchanged relative to 1884. Even though there were 12 fewer major league clubs after 1884, player salaries in the Cincinnati club did not decline. Players might have refused to accept cuts in compensation. Alternatively, player productivity improvements might have increased sufficiently to overcome any reduction in the size of the market for player services. The 1880s witnessed introduction of and improvements to equipment and numerous rule changes, which affected player performance. Or customer interest may have improved, with its corresponding increases in club revenues, and enabled management to increase player compensation.

CONCLUDING REMARKS

We build a salary list and determine that players' skills affect player salaries. In addition, UA entry into major league baseball in 1884 permanently increased salaries which did not decrease in years following the entrants exit following its single season.

Pay and performance studies estimate the marginal revenue product and the degree of exploitation (Scully, 1989). Although the reserve clause was included in the 1887 standard contract printed, the reserve lists for the AA were recognized within organized baseball beginning with the 1883 season. Using a smaller data set of 29 1880s stars, Ashcraft and Depken (2007) estimate the reserve clause significantly reduced salaries of stars by an expected $3,000 to $5,000, in year 2004 dollars. With additional information, a similar approach may identify whether the reserve lists impacted player salaries.

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APPENDIX

Nominal Salary Rates

Season	Player	Salary ($)	Season	Player	Salary ($)
1886	Baldwin	1500	1887	Nicol	1700
1887	Baldwin	1650	1888	Nicol	2000
1888	Baldwin	2000	1888	O'Connor	1650
1882	Carpenter	700	1882	Powers	750
1883	Carpenter	1100	1883	Powers	1500
1884	Carpenter	1600	1884	Powers	2000
1886	Carpenter	1800	1883	Reilly	1800
1887	Carpenter	1800	1884	Reilly	1800
1888	Carpenter	1800	1886	Reilly	1800
1884	Corkhill	1500	1887	Reilly	2000
1886	Corkhill	1800	1888	Reilly	2350
1887	Corkhill	2000	1882	Snyder	1200
1888	Corkhill	2200	1883	Snyder	1700
1886	Fennelly	1800	1884	Snyder	2000
1887	Fennelly	1800	1886	Snyder	2000
1888	Fennelly	2000	1882	Sommers	600
1882	Fulmer	800	1883	Sommers	1200
1883	Fulmer	1600	1882	Stearns	500
1884	Fulmer	2000	1888	Tebeau	2000
1883	Jones	1400	1883	Traffley	1100
1884	Jones	1450	1882	Wheeler	750
1886	Jones	1800	1884	Deagles	1300
1887	Jones	1800	1882	McCormick	600
1888	Kappel	1750	1883	McCormick	2500
1886	Keenan	2000	1887	McGinnis	1800
1887	Keenan	1700	1886	McKeon	2000
1888	Keenan	2000	1886	Mullane	2000
1886	Lewis	1800	1887	Mullane	2000
1882	Luff	750	1888	Mullane	2500
1882	Maculler	600	1886	Pechinery	1500
1883	Maculler	850	1886	Powell	605
1884	Mansell	1950	1886	Richmond	635
1886	Maskrey	966.67	1887	Serad	1500
1883	McPhee	1000	1888	Serad	1500
1884	McPhee	1400	1887	Smith	1200
1886	McPhee	1800	1888	Smith	2300
1887	McPhee	2000	1883	White	1600
1888	McPhee	1500	1884	White	2500
1884	Miller	875			

Source: Cincinnati Base Ball Club Records, boxes 1, 6,

Immigrants and Natives Homeownership Gap in the State of New York:

Abeba Mussa*

ABSTRACT

This paper analyzes the determinants of homeownership gap between the immigrant and native population in the State of New York. Using the data from 2010 – 2012 American Community Survey, the paper provides empirical evidence that the homeownership gap between the immigrant and native households persist during the recent housing boom/bust recovery periods. There is a 30 – 31 percentage homeownership gap between the immigrant and natives households. The homeownership gap between the two groups of population becomes smaller among those who have 100% or total ownership on their dwellings. On the other hand, the gap is bigger among those who partially own their house and still purchasing their house by paying mortgage.

INTRODUCTION

International migration is projected to surpass natural increase (births minus deaths) as the principal driver of U.S. population growth by 2060 (Census Bureau Report, 2012). The Census Bureau in December 2012 projected that U.S. resident population will become majority-minority by 2041. This means minority population — all people except for those that are non-Hispanic, single-race white — would climb from 37 percent of the total in 2012 to 58.8 percent in 2060. Much of the analysis on the effects of immigration on the U.S. economy has focused on the economic differences between immigrant and native workers on wages and earnings. While the wage or earning gap is important, we relatively know little about the long term implications of consistently lower earnings on immigrants' ultimate residential decisions. The paper provides Coherent framework for measuring the homeownership gap between immigrant and native population in one of the gateway state, New York.

Immigrants have been an important and growing source of demand for the housing market in the last decades. In the aftermath of the 2007 collapse and subsequent stagnation of the housing market in most states, immigrants have a substantial contribution to the recovery of the demand for housing and homeownership. A recent student report by Research Institute for Housing America found that immigrant buyers filled a "big hole" and played a key role in boosting home demand over the past decade. The study also projected that about 36% of homeownership will be generated by the immigrant population in the coming decades. The report also indicated that from year 2000 to 2010, the immigrants accounted about 65.1% and 82% of homeownership growth in the two established gateway states of New York and California respectively.

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In spite of an upward trend in homeownership for immigrants, the immigrant-native homeownership gap rose from 12 percentage points in 1980 to 20 percentage points in 2000 (Borjas 2002). According to the 2010 State of nation's Housing Outlook report, during 1995 – 2009 the homeownership rates for Hispanics and for blacks increased by 6.7 and 7.5 percentage points, respectively. The report also indicated that the homeownership gap between whites and Hispanics have fallen from 28.8 to 26.9 percentage points, while the gap between white and black has stayed the same, around 28 percentage points. A more significant gap in homeownership is expected in the major gateway states like New York.

A small and growing literature has begun to assess the differences between native and immigrant homeownership rates. A lot of these studies showed a significance difference in homeownership rates for immigrants and natives (Borjas 1992, 2002; Coulson, 1999; Painter et al. 2001; krivo 2004; Diaz McConnel and Enrico 2007). For example, Coulson (1999) finds the rates of homeownership declined for immigrants of different ethnic groups by 10 to 16 percentage points. Borjas (2002) also indicated that the homeownership gap has been increasing since 1980. Why the homeownership rate is considerably different between the two groups of population in the U.S? While discrimination in housing markets often sits in the middle of the explanation, questions about immigrants' familiarity with the U.S. financial institutions and credit constraints often arise when immigrants are studied. Bocian et al. (2008) find that the African-American and Latino borrowers are more likely to receive higher priced subprime home loan than white borrowers. Borjas (2002), on the other hand, claimed that the lower home ownership rates stem from wage discrimination between immigrant and native population.

In spite of the evidence that the immigrants have experienced a lower home ownership rates, it is not clear whether the recent housing boom increased first time homeownership significantly for the immigrants compared to that of the natives. Using a Public Use Microdata Sample (PUMS) of 2010 – 2012 3-years American Community Survey (ACS), the paper mainly explore whether the widely documented homeownership gap for immigrants persists or improved in the state of New York. There is increasing evidence that the recent housing bust and high foreclosure rates have been disproportionally titled towards minorities. Although it is estimated that about 56% of families who lost homes during 2007-2009 were non-Hispanic and white, but African-American and Latino families were disproportionately affected relative to their share of mortgage originations (Bocian et al., 2010). Recently Wells Fargo settled to pay $175 million in damages on charges that its independent brokers discriminated against black and Hispanic borrowers during the recent housing boom (New York Times July 12, 2012).

Despite the homeownership rate has been increasing among the immigrant population since 2009, this paper finds that the homeownership gap still persists during the last three years, 2009 -2012. There has been a 30 – 31 percentage home ownership gap between the immigrant population and the natives in the state of New York. Interestingly, the homeownership gap is smaller for naturalized immigrants, i.e. 11 percentage points, as compared to the natives. I also find that the homeownership gap is smaller among households who have total ownership on their dwellings. The gap, however, is bigger on partial ownership of housing. The other findings supported by this paper are consistent with the previous

literature. The probability of homeownership is lower for Hispanics, Hispanic and Black, Lain and African Origin households. The probability of ownership is higher for immigrants who earn higher income compared to the natives in the same income group. The ownership rate is also higher for households who have Asian and European origin.

1. Data Description

The empirical analysis uses the 3 year 2010 – 2012 PUMS American Community Survey (ACS) on State of New York, collected by U.S. Census Bureau. The ACS provides detail information on physical and demographic characteristics of each individual unit as well as households. My analysis is based on characteristics of the reference person, who is considered as the head of the household. A household is classified as an immigrant household if the head of the household was born outside the U.S. and is either an alien or a naturalized citizen; all other households are classified as "native" households. People who born in the U.S territories (Puerto Rico, Guam, American Samoa, etc), and those born in foreign country from U.S. citizen parents are considered to be natives as well. The study is also restricted to households that do not reside in any sort of group quarters. The household head must be at least 18 years old to be included in the analysis.

Table 1 summarizes the data used in the analysis. The dependent variable, homeownership, is the binary variable which takes the value of one if the household heads owns his or her place of residence and zero otherwise. Of 365, 141 household heads in the sample, 63 percent own their dwelling of residence. The remaining 47 percent are either renting or have some sort of occupation without renting. Since the real homeownership or wealth is contingent on how much of the home is owned, we also distinguish between those still buying their home by paying mortgage (partial ownership) and those who have no mortgage on their homes or owns outright (i.e. 100% or total ownership). The majority of homeowners, 62% of the sample, have mortgage on their dwellings. The other important variable in this study is immigrant, which is measured by a dummy taking 1 if the head of the household is an immigrant and 0 otherwise. About 21 percents of the sample are immigrant households, from which about 67 percent are naturalized citizens and the remaining 33 percent are non citizens.

The homeownership decisions of households are influenced by the number of socio-economic and demographic characteristic of the households. Household income and education level of the household are the two major socioeconomic variables considered in the literature. Households with higher level of education and income will expect to have a higher probability of achieving homeownership. As indicted in Table 2, on average, natives earn 79,000 while immigrants earn 72,000 a year. The household income is also interacted with the immigrant dummy to ascertain whether there are differences in behavior by immigrants and natives at the same income levels, allowing for the possibility that immigrants choose to spend and invest their income differently than natives. Three education groups are included in the regression: those with high school and some college diploma, with BA degree and those with Graduate degree. About 43 – 45% of the immigrant as well as the native population have BA degree and some

sort of graduate degree. The majority, about 55%, of both the immigrant and native community have high school and some college diploma.

Table 1: Means and Standard Deviation of the Whole Sample, Immigrants and Natives

Variables	All Sample		Immigrants		Natives	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Home Ownership	0.63	0.48	0.46	0.50	0.68	0.47
100% ownership	0.38	0.49	0.34	0.47	0.39	0.49
With Mortgage	0.62	0.49	0.66	0.47	0.61	0.49
Immigrant Household	0.21	0.41	1.00	0.00		
Naturalized Immigrant	0.14	0.35	0.67	0.47		
Non Citizens	0.07	0.25	0.33	0.47		
Household Size	3.09	1.33	3.43	1.50	2.98	1.25
Number of own child	0.49	0.97	0.59	1.00	0.47	0.95
log(Household Income)	77440.72	90582.80	72152.13	85441.43	78836.06	91840.73
Household with children age under 6 years	0.06	0.25	0.08	0.27	0.06	0.24
Household with children age 6 to 17 years	0.18	0.38	0.08	0.27	0.05	0.22
Marital status of the head	0.51	0.50	0.56	0.50	0.49	0.50
Married and Spouse Present	0.48	0.50	0.51	0.50	0.48	0.50
Age of the head	53.68	16.83	52.33	16.04	54.04	17.01
Education BA degree	0.19	0.39	0.18	0.39	0.19	0.39
Education Graduate Degree	0.16	0.37	0.15	0.36	0.16	0.37
Education High school and some college diploma	0.52	0.50	0.42	0.49	0.55	0.50
Gender (=1 for male)	0.51	0.50	0.52	0.50	0.50	0.50
Hispanic Origin	0.10	0.30	0.25	0.43	0.07	0.25
Black and Hispanic	0.11	0.31	0.19	0.39	0.09	0.29
White and Hispanic	0.72	0.45	0.32	0.47	0.82	0.38
Entry after the year 2000			0.17	0.37		
Entry before the year 2000			0.83	0.37		
Europe Origin	0.47	0.49	0.19	0.39	0.54	0.50
Latin Origin	0.10	0.29	0.29	0.45	0.05	0.22
African Origin	0.01	0.08	0.02	0.15	0.002	0.05
Asian Origin	0.04	0.20	0.18	0.38	0.007	0.08
Number of Observation	365141		76227		288914	

A number of characteristics such as age, marital status, gender, household size, and presence of children are included to control for the major demographic factors. Age and age square are included to account for the life cycle aspects of homeownership. The decision to purchase home often depends on the family structure. Four variables are included to control family structure: household/family size, the

number of own children, and two dummy variables which take 1 if the household have children below age 6 or between 6 and 17 years old, 0 otherwise. The marital status of the head of the household and the presence of the spouse in the house often has important influences in homeownership decision. As indicated in Table 1, in both immigrant as well as native groups, about half of the household head is married, and in about 50% households the spouse are present in the house.

Most of the literature on homeownership indicated the importance of nationality and ethnicity of immigrants to capture the degree of assimilation and integration in the country that they are living. The probability of homeownership is higher for those immigrants who assimilated or integrated well. The degree of assimilation and integration is highly influenced by cultural norms towards asset accumulation or home ownership and the attitude towards risk. The norm or culture that the natives have grown is also important for the native's decision as well. This paper acknowledges the cultural issues associated with nationality that may be present for natives of the same ethnicity. The homeownership gaps are consistently raised for people of varying race, background and cultural norms. As a result I also consider not only the race and ethnicity of the head of the household, but also origin of the head of the household. As indicated in Table 1, the majority of the native population, about 54%, have European origin. On the other hand, the majority of the immigrant communities, 29%, have Latin origin. About 18% of the immigrant population has some sort of Asian origin, while only 0.7% of the natives have Asian origin. The African decedents are 8% and 0.2% of the immigrants and natives, respectively.

2. Estimation and Analysis

A voluminous literature documents that many socioeconomic and demographic characteristics are important determinants of homeownership rates. I adopt the basic model used in this literature to examine the determinants of homeownership gap between immigrants and natives in the state of New York. In particular, I consider estimating the following linear probability model:

$$H_i = X_i\beta + \alpha M_i + \varepsilon_i$$

where H_i indicates the homeownership status of household i, which takes 1 if the household owns the residence, and zero otherwise. X is a vector that includes the socio-economic and demographic characteristics of the household; and M is a dummy that set to 1 if the household head is an immigrant and zero otherwise. The linear probability specification implies that the coefficient of M gives the difference or gaps in homeownership rates between immigrants and natives after taken into account for differences in the characteristics in X between the two groups.

Table 2 below reports the results of the estimation from logistic specifications. The first raw reports the coefficient α after controlling for vector of socioeconomic and demographic variables, including age, sex, and educational attainment of the household head; the household's income; the number of persons in the household, the number of own children; dummy variable capturing the presence of children below age 16; dummy variable indicating if the head is married and the spouse is present in the household. The

results revels that homeownership gap between immigrant and native is about 30 percentage point. As indicated in column 2 and 3 of Table 2, the gap between the two group is about 31 percentage points after controlling for other important variables such as dummy that capture whether the immigrant is a naturalized citizen, the ethnic origin and the ancestry of the head of the household. The result also shows that the probability of homeownership is 11 percent higher for naturalized immigrants than non-citizen immigrants. Income and home ownership are consistently positively related. The household income is also interacted with the immigrant dummy to ascertain whether there are differences in behavior by immigrants and natives at the same income levels, allowing for the possibility that immigrants choose to spend and invest their income differently than natives. The result evidenced that immigrants invest 2 percent more on homeownership than the corresponding natives.

Table 2: Estimation Results – Probability of homeownership by households

Variables	Marginal Effects		
	1	2	3
Immigrant Household	-0.299**	-0.306**	-0.312**
Naturalized Immigrants		0.111**	0.111**
log(Household Income)*Immigrant	0.019**	0.020**	0.020**
log(Household Income)	0.111**	0.102**	0.101**
Hispanic Origin		-0.145**	-0.156**
Hispanic Black		-0.104**	-0.101**
Hispanic White		0.067**	0.056**
Europe Ancestry			0.034**
Latin Ancestry			-0.032**
Africa Ancestry			-0.008
Asia Ancestry			0.016**
Number of Observation	239887	239887	239887
Pseudo-R2	0.27	0.31	0.31
Goodness of Fit Test (Pearson chi2)	305071.76 (0.000)	304839.4 (0.000)	304686.59 (0.000)

** Significant at 5% level of significance.

Note: In addition to the variables in the table above, the following variables are included in the estimation: household size, the number of own child, dummy for having children below 16 years age, age and gender of the head of the household, dummy captures whether the spouse present in the household, three education attainment variables (BA degree, Graduate Degree, High school Graduate and some college diploma), dummy that indicates weather the household enters to the U.S before the year 2000 or after the year 2000.

A large number of studies have shown that ethnicity and nationality of immigrants is highly correlated with home ownership in the United States, but it has been difficult to ascertain why some ethnic or nationality groups are less likely to own homes than others. In this paper, not only the ethnicity or race of the households are controlled , but also the origin of the households is controlled to see if they have any systematic or unsystematic impact on homeownership. Consistent with the available evidences in the literature, Hispanic origin households have 15 - 16 % lower probability of home ownership compared to the other corresponding immigrants. The white Hispanic households, though, have 6 – 7% higher

probability of home ownership, while the black Hispanic households have 10% lower probability of home ownership than the other households. In addition to ethnicity, the origin or ancestry of the households are found to be important in home ownership decisions. Households with European and Asian ancestry have a higher probability of owning their dwellings, while Latin ancestry households have a lower probability of purchasing their home.

Table 3: Homeownership gap between immigrants and natives by type of ownership (Marginal Effects)

Variables	Total Ownership		Partial Ownership	
	1	2	1	2
Immigrant Household	-0.161**	-0.178**	-0.352**	0.357**
Naturalized Immigrants	0.013**	0.014**	0.124**	0.129**
log(Household Income)*Immigrant log(Household Income)	-0.019** 0.088**	-0.020** 0.087**	-0.027** 0.054**	-0.026** 0.053**
Hispanic Origin	-0.192**	-0.183**	0.168**	0.156**
Hispanic Black	-0.226**	-0.224**	-0.156**	-0.138**
Hispanic White	0.051**	0.053**	0.031**	0.034**
Europe Origin		0.047**		0.015**
Latin Origin		0.028**		-0.063
Africa Origin		-0.032		-0.047**
Asia Origin		0.107		0.115
Number of Observation	239887	239887	239887	239887
Pseudo-R2	0.261	0.267	0.0.261	0.267

** Significant at 5% level of significance.

Multinomial regression categories: total ownership (1), Partial ownership (2), No ownership (3) and category 3 is the base citatory.

Note: In addition to the variables in the table above, the following variables are included in the estimation: household size, the number of own child, dummy for having children below 16 years age, age and gender of the head of the household, dummy captures whether the spouse present in the household, three education attainment variables (BA degree, Graduate Degree, High school Graduate and some college diploma), dummy that indicates weather the household enters to the U.S before the year 2000 or after the year 2000.

As indicated above that there are substantial differences in homeownership rates between immigrants and natives; and even between naturalized immigrants and non-citizen immigrants. The level of the gap could be different depending on the type of ownership. Using Multinomial logistic specification the paper further examines home ownership gap between immigrants and natives for those who own their dwellings 100% (total ownership), and for those who still purchasing their dwellings through mortgage (partial ownership). Table 3 report the result of the estimation from the two groups. Among those who own their houses 100%, there is about 16% - 18% homeownership gap between natives and immigrants. It is also interesting to find out that the gap becomes bigger, 35% – 36%, among partial owners or mortgage backed owners. The home ownership gap is also getting bigger between naturalized immigrants and non citizen immigrants. This is mainly due to the fact that the natives as well as the naturalized immigrants have more access, information and approval on getting bank loans to purchase

houses. The 100% ownership rate is lower among households who have some sort of Hispanic origin, while they have a higher probability of ownership of mortgage backed purchases.

3. Conclusions

This paper analyzed the determinants of homeownership gap between immigrant and the native population in the major gateway state New York. The empirical analysis used data drawn from 2008 – 2012, 5-years, American Community Survey (ACS). The study yields a number of interesting empirical findings. Immigrant households have lower homeownership rates than native's households and this homeownership gap persists during the housing market recovery time. The homeownership gap is relatively smaller for naturalized immigrants as compared to non-citizen immigrants. Consistent with the literature, a relatively small part of the homeownership gap between immigrants and natives can be attributed to differences in other socioeconomic and demographic variables such as age, household size, the number of children, income, education level and ethnicity.

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What Were They Thinking: Can Student Responses to Teaching Evaluation Instruments Reveal the Qualities of an Effective Instructor?

William P. O'Dea*

OBJECTIVE

The object is to develop a set of simple metrics that department chairs can use to evaluate the data generated by the student evaluation of instruction (SEI) instruments used by their departments. I am operating on the premise that department chairs typically inherit an SEI instrument they had no hand in designing. The instrument may in fact be poorly designed. Even if the instrument is not statistically reliable, the faculty may still resist replacing it with a better alternative. At my institution, the Committee on Instruction spent several years and engaged in two pilot studies to produce a more reliable SEI instrument. Union opposition prevented the adoption of the new instrument. Department chairs are thus in the unenviable position of having to extract the maximum possible meaning from data generated by what could be viewed as a haphazardly designed research project.

RESULTS FROM THE FIRST PHASE OF THE PROJECT

The results of the student evaluations are not noisy. The ranking of instructors from most to least effective are very stable from semester to semester. In any given semester, the difference in the student responses to the "overall evaluation of teaching effectiveness" question [the summative question on my department's SEI instrument] between the most highly rated and lowest rated instructors is large and ranges from two to three standard deviations. For the most part, the results do not appear to be influenced by factors beyond the control of the faculty such as their gender, their ethnicity, enrollment in the course section, and the time of day at which the course was taught. What does seem to make a difference is the level of the course. The average response to the "overall evaluation" question is about .5 point higher, which with our scoring scale would be worse, in 100 level courses than it is the higher level course sections. The results are not influenced by factors under the instructor's control such grading policy and the response rate to the SEI instrument. [Since instructors control when the SEI is administered, the possibility exists that instructors can pick a day in which they expect the students in attendance to rate them highly.] In my department, assigning high grades is not a winning strategy to receiving favorable student evaluations. The results appear to be driven by what is going in the classroom. The questions remains: what are the qualities that differentiate more effective from less effective instructors?

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A POSSIBLE APPROACH

Our SEI instrument has 13 items. The first 12 items deal with the qualities that my department thinks (or thought at the time it designed the instrument) that a good instructor should possess. The thirteenth item is the summative "overall evaluation of teaching effectiveness" item. Our scoring scale ranges from 1 (excellent or the equivalent) to 5 (poor or the equivalent). Our hope is that the students in completing the questionnaire will carefully answer the first twelve questions and then make a bottom line assessment. I have access to SEI data from 277 course sections taught in the Department of Economics Finance and Accounting (EFA) between the fall of 2008 and the spring of 2012. I used OLS to determine which of the 12 qualities have the greatest impact on the "overall effectiveness." The results are shown in table 1. I tested for the presence of heteroskedasticity using the Koenker-Bassett test and found none. As a variation on this theme, I eliminated very highly ranked course sections (overall rating of 1.5 or less) and very poorly rated course sections (overall rating of 4 or higher). The change in the estimated coefficient was negligible.

Table 1: OLS Regression Results

Variable	**Estimated Coefficient**	**Standard Error**	**t-Statistic**
Constant	-.021	.062	-.337
Rigor of the Course	-.013	.032	-.433
Organization	.132	.047	2.783**
Teaching Skill	.361	.056	6.475**
Coordination of Materials	.142	.052	2.744**
Poise	-.01388	.036	-.384
Planning and Clarity of Exam Questions	.084	.034	2.469*
Ability to Answer Questions	.22	.039	5.537**
Tolerance	.043	.033	1.294
Maintain Control	-.069	.026	-2.606**
Availability for Consultation	.032	.0333	.956
Demanding grading	-.041	.043	-.955
Fairness of Grading	.158	.033	4.799**

Number of Observations=277; R^2=.9821; adjusted R^2=.9629; F=599.48
**significant at the 99 percent confidence level *significant at the 95 percent confidence level

Overall, the twelve items account for 96 percent of the variation in the "overall effectiveness" ratings. This suggests that the student ratings are not much influenced by factors that our instrument does not

address such as sense of humor, wardrobe choices, or physical attractiveness. The most highly valued qualities are teaching skill by which we mean the instructor's ability to deliver a coherent presentation and the ability to answer questions. These findings are consistent with the SEI literature and match up well with our intuition. Also important are the organization of the course, the coordination of instructional materials with the lecture, and fairness of grading practices. Again, there are no surprises here. What might be surprising is that delivering a rigorous and demanding course and maintaining demanding grading practices have a negligible impact on the overall SEI ratings. It could be that our students expect economics, finance and accounting courses to be hard and are not overly surprised when this expectation is met.

BUT

Given the results shown in table 1, it would seem that I as a chair can declare victory and tell my faculty that as long as they are well-organized, can deliver an effective lecture and make sure that they answer questions to the students' satisfaction they should be fine. [I would also encourage them to use good examples to illustrate their theoretical points and involve the students in their presentations.] The problem can be found in table 2 which shows a portion of the correlation matrix between the items in the SEI questionnaire. The first column shows that "overall evaluation of teaching effectiveness" is highly correlated with most of our qualities of good teaching. This is not a problem. The problem can be seen in examining the "organization" and "teaching skills" columns. It is readily apparent our qualities of effective instruction items are not only highly correlated with the 'overall evaluation question", which is a good thing, but they are also highly correlated with each. The correlation between some of the items, for example between organization and teaching skills, are well above the levels which would indicate the presence of multicollinearity. In fact, a regression of "overall effectiveness" on teaching skill alone produces an adjusted R^2 of .92.

The high correlations suggest that highly rated instructors perform well on most of the constituent items in the SEI and conversely for poorly rated instructors. It could be that highly rated instructors being aware of the criteria on which their teaching will be evaluated adjust their teaching methods accordingly and poorly rated instructors are uninterested in conforming to the SEI. There is another angle from which to approach the high correlations. We hope that the students are evaluating each of the attributes of effective instruction carefully before they make their bottom line evaluation. Is this true?

Table 2: Correlation between SEI Questions

	Overall	**Rigor**	**Organization**	**Teaching Skill**	**Coordination of Materials**	**Poise**
Overall	1					
Rigor	.05	1				
Organization	.94	.14	1			
Skill	.96	.12	.94	1		
Coordination of Materials	.95	.11	.94	.96	1	
Poise	.86	.17	.84	.88	.83	1
Exam Questions	.91	.06	.89	.9	.91	.83
Ability to Answer Questions	.94	.07	.9	.94	.89	.89
Tolerance	.79	-.12	.74	.74	.74	.66
Control	.79	.03	.82	.79	.81	.71
Availability for Consultation	.79	.07	.72	.75	.77	.68
Demanding Grading	.16	.85	.21	.26	.23	.31
Fairness	.76	-.04	.7	.66	.7	.6

WHAT ARE THEY THINKING

One hypothesis that has been advanced in the SEI literature is that student responses can be manipulated through “priming.” The story is that students are asked a series of questions about behaviors that even ineffective instructors can exhibit. For example, did the class meet every day or were examinations given on the day specified in the syllabus. In answering a series of softball questions, the student falls into a fugue state and when they get to the summative question they have been “primed” to bubble in the excellent answer. This hypothesis has not been tested empirically. I don’t think that our instrument biases our students to give students an excellent rating to the “overall evaluation” question, because our last two questions deal with grading policy, which is a an issue likely to capture the attention of our students.

A second possibility is that the students don't consider any of the individual items particularly carefully. Rather, they start by making an overall assessment ("Professor A is wonderful" or "Professor Z" is a waste of oxygen"). Having made this assessment, the student then bubbles in the rest of the responses accordingly. That is, if the student's gut level assessment is that the instructor is excellent (1 on our scale) the student simply fills in 1 for the other 12 items. Encouraging this type of behavior is that if the evaluation is given at the end of the period, filling out the SEI form is all that stands between the student and freedom. Bubbling in a series of 1s takes about 15 seconds which gains the student about 4 minutes to check text messages or play "Angry Birds." If either of these stories is correct (or approximately correct), we would expect to find student SEI sheets with runs of the same response. Of course if every student filled out the SEI forms in this manner then in an analysis that uses course section level data the result would be perfect multicollinearity. In order to have a statistical estimation problem at least some of the students have to vary their answers.

WHAT I DO

To get a sense of how the students fill in the questionnaires, as a one-off exercise I decided to examine the individual SEI forms from all course sections taught in EFA during the fall of 2012. The students filled out a total of 957 questionnaires. The only piece of information that we ask the students to provide is their cumulative GPA for all courses taken at SUNY-Oneonta. The students are offered six ranges (e.g. 3.5-4) and asked to select one. First semester students who don't have a SUNY-Oneonta GPA would bubble in the "no GPA" option. The students are also offered the opportunity to make a written assessment on the back of the SEI form. I have no information about the identity of the students who completed the SEI sheets. Indeed, even to attempt to match the sheets to the students who wrote them would be ethically dubious since we tell the students that their responses will be anonymous.

From the individual sheets, I then pulled out the following pieces of information: the respondent's GPA; whether the student made a written response; whether the response was positive; whether the response offered a substantive comment on the instructor's performance; the response to the "overall effectiveness "; the number of answers that were identical to the bottom line score; the spread between the high and the low response; and the spread between the high and low responses to the organization, teaching skills and coordination of instruction materials questions. I'm interested in whether the student made a written response because if a student is willing to take the time to make a written response it suggests that the student might have given some thought to filling out the questionnaire. Following this train of thought, I also identify those responses that made at least some attempt to identify the qualities of instruction that the student liked or disliked. I collect data on the number of answers that are the same as the bottom line assessment to establish whether the students are filling out the questionnaires in a rote manner. The spread between the high and the low responses measures the extent to which the students attempts to differentiate between the instructor's performance in each of the areas addressed by the 12

questions. The reason for looking at the spread between the high and low response to the subset of questions is that these are the questions where the correlations between the responses are especially high as shown in table two. For future work, I also identified the level of the course in which the SEI form was completed. I distinguished between 100 level courses, 200 level required courses, 200 level courses taken by majors, and 300 level courses. My thought is that students in these courses have different levels of interest in the subject and different expectations. For example, students in the 100 level courses night be taking the course to satisfy a related work requirement for their major and thus might want to take the easiest possible course. In future work, I will record the number of item responses that were higher than the "overall evaluation" and the number that were lower. Table 3 provides the summary statistics.

Table 3: Summary Statistics of Individual Student Responses to the SEI Questionnaire

Variable	**Mean (proportion)**	**Standard Deviation**
GPA*	2.93	.39
Written	.495(474/957)	
Written Favorable	.323(310/957)	
Written Substantive	.789(370/474)	
"Overall Effectiveness"	2.39	1.2
Number of Responses the Same as "Overall Effectiveness Response"	5.93	3.12
Spread between High and Low Response	2.21	.98
Spread between High and Low Response to Three Items	.69	.76
Responses from 100 level sections	467	
Responses from 200 level required courses	309	
Responses from 200 level major courses	84	
Responses from 300 level courses	97	

*Based on the 863 questionnaires that reported a GPA.

The response to the "overall effectiveness" questions indicates that on our rating scale our students consider the quality of instruction in EFA to be a little less than very good. When the students take the trouble to make a written response, they generally offer some concrete reason(s) why they like or dislike the course. On the typical SEI sheet, six answers are the same as the bottom line evaluation. This

response suggests that neither the "priming" or "student as robot" hypotheses are correct. The spread between the high and low responses indicates that the students means that the students make at least some attempt to differentiate an instructor's performance in the areas addressed by the individual questions. The spread between the high and low responses to the three highly correlated questions is much lower, which suggests that in any statistical analysis two of these questions are redundant (but which two?).

WHAT THE DATA TELL US

A good place to begin is by considering whether a relation exists between the reported GPA and the response to the "overall effectiveness" question. Do self-reported high performing students give higher ratings than lower performing students? The answer is they do not. The correlation between GPA and the "overall evaluation" is a miniscule -.068.

To determine, the relation between the willingness of students to discriminate on the SEI questions (i.e. to not bubble in the same answer all the way down the form), I split the overall population into three groups: students who gave the same response to nine or more questions that they did to the overall evaluation (more than one standard deviation above the mean), students who gave the same response to between three and nine of the questions as they did to the overall evaluation (the mean plus or minus one standard deviation) and students to who gave the same answer to two or fewer questions as they did to the overall evaluation question (more than one standard deviation below the mean). I then calculated the mean response to the overall evaluation question for the students in each group. The results are shown in table 4.

Table 4: Relation between Answer to "Overall Evaluation" Questions and Students' Discrimination

Number of Answers the same as "Overall Evaluation"	**Number of Students in Group**	**Mean Answer to "Overall Evaluation" Question**	**Standard Deviation**
9 or more	254	1.52	.8559
8 to 3	554	2.57	1.107
2 or less	149	3.32	1.1854

The striking thing to note in table 4 is that the students who discriminate the least in answering the SEI give their instructors the lowest (best) evaluations. Conversely, students who discriminate the most give their instructors the highest (worst) evaluations. The differences are large and statistically significant. The question is what to make of these differences. It is possible that students who are pleased with the quality of the instruction that they receive are not inclined to give much thought to the specific qualities that an effective instructor possesses. It could also be that effective instructors really do possess all (or

most of the qualities) that we think that a good instructor possesses. It also appears that once students start thinking carefully about the individual questions the "overall effectiveness" scores start to do down. The results in table 4 do suggest that when students give an instructor a high (unfavorable) "overall effectiveness score" they seldom give the same high score to the constituent items; i.e. they follow my mother's advice and think of something nice to say (or to be more accurate bubble in). The results also suggest that to the extent that there is variation in the explanatory variables it comes from students giving the least favorable evaluations.

As a variation to this exercise, I also broke the overall population into three subgroups based on the spread between the lowest and the highest scores: students with a spread between the lowest and highest answer of one or less (more than one standard deviation below the mean), students with a spread between the lowest and highest answer of between two and three (the mean plus or minus one standard deviation) and students with the maximum spread between the lowest and highest answers of four (more than one standard deviation above the mean). The results are shown in table 5.

Table 5: Relation between Answer to "Overall Evaluation" Questions and Spread

Spread between the lowest and highest responses	Number of Students in Group	Mean Answer to "Overall Evaluation" Question	Standard Deviation
1 or less	212	1.76	.8534
2 or 3	651	2.38	1.1266
4	94	3.9	1.038

The data in the table tell the same story. The responses of students who give instructors the best ratings tend to be the most tightly bunched. The responses of students who give the least favorable ratings are the most dispersed

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Revisiting the Corporate Income Tax in the United States: Philosophical and Structural Issues

Anthony Pappas*

ABSTRACT

As corporate profits soar and cash reserves increase, while the government that facilitates the business environment that these businesses operate in, there is increasing discussion concerning the corporate tax burden and whether it is sufficient or "fair."

DISCUSSION

Recently, as many Americans debate ways the federal government can raise revenue, a closer look has been given to corporations and the taxes they pay. In these debates, attention is turned towards the 35% statutory tax rate that the United States levies on taxable corporate income of corporations whose revenues exceed $18,333,333 for the tax year (IRS); other times attention is given to various loopholes that corporations exploit to lessen their tax burden. There have been many studies trying to tease out where the burden of corporate income taxes fall, but it seems that shareholders bear the greater part. The Citizens for Tax Justice cynically point out that corporations do not lobby for a reduction in payroll taxes as they are borne by workers (2003). Thus, the prominence of their lobbying for corporate tax reductions seems to bolster studies that show that shareholders are most affected by changes in the corporate tax.

However, in the United States, effectively taxing corporations is hampered by the very nature of the corporate entity and also by the structural problems associated with the peculiarities of federalism. To address corporate tax reform, one has to wrestle with these underlying problems.

To begin with, there is no single corpus of federal law that handles the corporate entity; rather, corporate law is governed by each of the 50 states that comprise the Union. In taxing corporations, the Internal Revenue Service (IRS) attempts to reconcile the need to tax corporate entities on the federal level without any unifying legal structure to underpin the recognition and classification of corporations. Preeminent among the various frameworks available in America are the American Bar Association's Model Business Corporation Act (MDCA) and Delaware's General Corporation Law. The prominence of the State of Delaware may seem strange to the layman. Indeed, to the layman, when Facebook made its Iinitial Public Offering (IPO) there was great fanfare and video from Facebook's Menlo Park, California, headquarters.

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The fact that Facebook launched its IPO as a legal entity of the State of Delaware is the kind of fact that many would, perhaps, find odd. But Facebook is far from odd. The 2012 Annual Report From the Delaware Division of Corporations states that 90% of all U.S. IPOs were incorporated in Delaware and, out of the 50 U.S. states, 64% of the Fortune 500 were incorporated in Delaware (2012).

As a single legal entity it seems that a corporation is unique in its ability to be in many places at once. The statement from the MDCA that, once incorporated,

> "every corporation has perpetual duration and succession in its corporate name and has the same powers as an individual to do all things necessary or convenient to carry out its business and affairs."

is somewhat laughable for equating a corporation to anything like an "individual". To wit, with the advent of globalization, corporations can be in many countries at once; they chose where they want to be incorporated, whose laws they want to be subject too, and, most importantly, have many ways of choosing where they declare income.

The super-individual powers of corporations also extend to lifetimes: corporations have a theoretical unlimited lifetime. As such, they have avenues to tax deferral not available to individual persons. This "immortality" is one of the main reasons to have a corporate income tax. Many critics would seek to abolish the corporate income tax, arguing that corporate profits are taxed twice: first under the corporate income tax and, when corporate profits are distributed as dividends to individuals, under the individual income tax. But, without a corporate income tax, the owners of a corporation could defer their tax liability and reinvest the profits indefinitely; theoretically, a corporation could go ten or twenty years without paying the government any taxes. This is obviously unsatisfactory. It would constitute an enormous tax loophole for corporate owners and would deny the government compensation for the various services it provides that makes the carrying out of the business in the first place.

As individuals, corporations are enormous beneficiaries to an environment composed of strong, stable governments. However, the ability of the government to provide such services is underwritten by tax receipts; thus, it is well within the prerogatives of the government to tax corporations. Since the 1980s, the GAO reports corporate tax receipts accounted for 6 to 15 percent of U.S. federal revenues (2013). It is my guess that, as it currently stands, if one could put a dollar amount to the benefit that U.S. corporations receive from the government, the 6 to 15 percent companies pay is vastly disproportionate compared to the resources of the federal government that they utilize to their benefit.

To get some sort of idea of the nature of a corporation and its dependence on government, one could imagine a society without a government. In such a society, corporations would emerge to do some functions of government, but many functions are best done by governments in that, without a government, corporations would have to band together into groups of corporations to hash out the liability of each corporation for such things as roads, airports, bridges, security, etc. It is my assumption that governments are a necessarily self-organized entity among human species. In order for disparate groups to coexist, some kind of bureaucracy will form to fill the need of organizer. If in some alternate universe a government does not form as a result of individual living organisms coexisting and corporations somehow

existed without a government, one could easily see how a government of some kind would eventually form; various trade organizations would not be as efficient as a centralized government in charge of dealing with facilitating individual interactions of either individual people or individual corporations.

In considering the details of corporate tax policy and the corporate tax burden, Peter Harris nicely sums up the situation in his book *Corporate Tax Law: Structure, Policy and Practice*:

> The artificial nature of the corporation is the overpowering consideration in formulating corporate tax policy. That nature often means that there is no clear policy path, only points in a spectrum. The distinction (or lack thereof) between widely held and closely held corporations and between debt and equity capital are examples of the spectrum problem. There are many others. Tax laws draw lines in these spectrums, and every time they do, corporations are structured to manipulate the line drawing.

Many critics focus on the statutory 35% top tax rate that the most profitable companies are subject to. But, to properly measure the corporate tax burden one must look at the average effective tax rates (AETR) that corporations pay. The average effective tax rate can be defined as:

> the ratio of taxes paid or tax liabilities accrued in a given year over the net income the corporation earned that year.

While not the subject of this general discussion, it should be noted that defining and calculating the components of this general formula for AETRs is not black and white and subject to wide interpretation. Additionally, obtaining the information can prove to be equally difficult. However, in May 2013 the Government Accountability Office (GAO) calculated an AETR for profitable U.S. corporations that filed a Schedule M-3 for Form 1120 as about 13 percent. Adding state, local, and foreign income taxes, the GAO found an AETR of 17 percent. This is far below the statutory rate. Including unprofitable companies, which decrease the denominator while not affecting or decreasing the numerator (as negative taxes paid), the GAO calculated an AETR of 22.7 percent. Again, far below the statutory rate trumpeted by critics of current tax rates.

While the AETR calculations are not directly comparable to those of the GAO, according to a Congressional Research Service (CRS) Report for Congress by Steven Maguire, from 1959 to 2005, taking into account that the highest federal statutory corporate tax rate has changed over this period, the AETR paid by domestic non-financial corporations has always been less than the AETR. While some of this discrepancy can be attributed to various factors such that one would never expect the statutory rate to ever be equal to the AETR, the average discrepancy over all years was about 13% with a standard deviation of about 5.5%. The year for the maximum difference between the statutory rates and AETRs was 1985 (25.8%) and the minimum difference occurred in 2000 (1.2%). The statistics regarding the discrepancies were calculated based on Maguire's data. The following table summarizes Maguire's calculations of the AETR paid by domestic non-financial corporations by decade calculations of statistics of the discrepancy between the federal AETR and the statutory federal corporate tax rate by decade based on Maguire's data:

Table 1: Federal Average Effective Tax Rate (AETR) Analysis

Decade	Federal AETR	Mean difference between Federal Statutory Rates	Standard Deviation
1960s	35.57% 2.67%	12.43%	2.67%
1970s	33.93% 3.73%	13.60%	3.73%
1980s	23.61% 7.01%	18.58%	7.01%
1990s	24.45% 1.04%	9.44%	1.04%
2000 to 2005	25.48%	8.27%	4.51%

Thus, it is difficult to draw conclusions between economic performance and a specific statutory tax rate because the difference between the statutory tax rate and the AETR of corporations has always been significant.

However, one can certainly conclude that the current tax brackets are in need of reconsideration. For income in the United States, the rates on taxable income for 2012 are listed in the instruction to IRS Form 1120, line 30 can be consulted to see the absurdity of the brackets.

As previously reported in this paper, the statutory tax rate is hardly ever paid and one can surmise that the corporations with profits over $18,333,333 are the ones with the greatest means to lower their effective tax rate, not least of which is the fact that these large corporations are more likely to be the multinational corporations that can take advantage of transfer pricing among the different countries they "operate" in. The rate structure above has been in place without major changes since 1993, twenty years.

As it stands, while appearing to be progressive, time has rendered the progressive tax rates for the tax brackets as meaningless or regressive. Using the Consumer Price Index (CPI) inflation calculator provided by the Bureau of Labor Statistics (BLS), in today's dollar terms the brackets would be.

As can be seen, twenty years has totally distorted whatever reasoning was used when the brackets were created in 1993. The upper limit for the 1st bracket value adjusted with the CPI is $80,926 in 2013 and, thus, effectively places businesses in the 1st bracket in 1993 into the 3rd bracket in 2013. Some corporation who was in the 6th bracket in 1993 now finds itself paying the top tax rate.

Table 2: Statutory Tax Rates Established in 1993 in 2013 Dollars Using CPI Inflation Calculator

Bracket	Over	But not over	Difference between brackets	Over	But not over	Difference between brackets
1	**$0**	**$50,000**	**$50,000**	**$0**	**$80,926**	**$80,926**
2	**$50,000**	**$75.000**	**$25,000**	**$80,926**	**$121,389**	**$40,463**
3	**$75,000**	**$100,000**	**$25,000**	**$121,389**	**$161,853**	**$40,464**
4	**$100,000**	**$335,000**	**$25,000**	**$161,853**	**$542,206**	**$380,353**
5	**$335,000**	**$10,000,000**	**$235,000**	**$542,206**	**$16,185,260**	**$15,643,054**
6	**$10,000,000**	**$15,000,000**	**$9,665,000**	**$16,185,260**	**$24,277,890**	**$8,092,630**
7	**$15,000,000**	**$18,333,333**	**$5,000,000**	**$24,277,890**	**$29,672,976**	**$5,395,086**
Top	**$18,333,333**	**----------**	**$3,333,333**	**$29,672,976**	**----------**	

Historically, the tax code has been updated on a more frequent basis. While the current tax brackets were effected twenty years ago, there is no hint that Congress would be able to reach an agreement on revising the tax code in the near future. Again, Steve Maguire's short report for the CRS furnishes instructive information. According to Maguire, the corporate tax highest rate brackets were:

Table 3: Highest Tax Rate Brackets

Period	Effective on taxable income above	Years in effect
1959 to 1974	**$25,000**	**15**
1975 to 1978	**$50,000**	**3**
1979 to 1986	**$100,000**	**7**
1987	**1987 averaged the 1986 and 1988 brackets**	**----------**
1988 to 1992	**$335,000**	**4**
1993 to 2013	**$10,00,00**	**20**

The explicit calculation of years between an adjustment in the top bracket for the top rate of corporate taxable income is my addition and not in Maguire's table.

It is clear from examining the tax brackets and changes to them that as the years pass the tax code becomes more and more anomalous in its total indifference to inflation.

Furthermore, something must be done with regard to multinational corporations. Purely domestic corporations do not have the same opportunities for profit shifting and access to markets that multinational corporations have. Historically, foreign-controlled domestic corporations have reported less tax liability to the U.S. than U.S.-controlled corporations. One can only hypothesize as to the reasons for such differences and whether transfer pricing is an explanation. The tax regime should recognize the distinction between a company's operating area(s) so that purely domestic corporations are not compared

to large multinationals and so that the different revenue streams from different countries of multinational corporations are more fairly taxed. Ideally multinational corporations would function under some international framework for taxation agreed upon through treaties. Having each country trying to solve the problem of taxing multinational corporations creates opportunities for corporations to manipulate corrupt nations and also to exploit the different regimes countries adopt if they advantage the corporation. As it stands, no major developed country has adopted either a fully "worldwide" approach, where all of a corporations income worldwide is taxable and the company receives foreign tax credits against domestic taxes, or a "territorial" approach, where only the income earned within a country's borders are taxed (CBO, 2013)

In conclusion, transparent and fair taxes are to everybody's benefit, the corporations themselves. For example, Dupont and Monsanto are in the same industry; however, over the 2008-2010 period Monsanto paid 22 percent of its profits in U.S. corporate taxes while DuPont paid a rate of -3.4 percent (McIntyre, et al, 2011). It behooves Monsanto and economists to support fair and transparent tax policies, rather than try to join DuPont in a race to exploit tax loopholes to mitigate its advantage. There are many other examples of such disparity among companies in equal industries. A corporation benefits society when it innovates in producing goods and services; however, innovation in exploiting tax loopholes is nothing other than corporations and accountants collecting "rents." Both political parties in the U.S. Congress should strive to make the tax law relatively impervious to companies exploiting loopholes. Additionally, there are many reasons to push for an international agreement on handling multinational corporations; while anathema to many people, it is actually a more economically sound approach; like the example of DuPont and Monsanto, a company can then allocate resources according to economically productive endeavors without directing resources towards tax avoidance.

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Loan Flows and Monetary Policy

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ABSTRACT

Various Statements by Federal Reserve Governors have indicated considerable degrees of pessimism with respect to the power of monetary policy to control economic conditions. The unconventional tools utilized by the Fed during the 2008-09 crisis were aimed at and effective in maintaining (stimulating) loan flows in particular markets. These new tools demonstrated considerable potency for achieving immediate results, although they were abandoned after the peak of the crisis. In this paper, long-term-historical and recent evidence shows that loan flows provide a more efficacious monetary policy target than the Federal-funds rate utilized since 1954.
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INTRODUCTION

In recent reviews of the history of Federal Reserve monetary policy, Reinhart and Rogoff (2013) point out the inconsistency of the monetary authority's targeting interest-rates with its announced coincident policies of also controlling consumer credit. Also, Romer and Romer (2013) review the history of various statements by Federal Reserve Governors that indicated their considerable degree of pessimism with respect to the power of monetary policy to control economic conditions particularly during several critical periods: the 1930's depression, the inflation of the 1970s, and the credit collapse of the post-2007 crisis and following stagnation. The 2008-09 crisis, however, manifested considerable development of "unconventional tools" that included, among other actions, direct interference in the commercial paper market in early 2009 so as to maintain its functioning, and also the direct purchases of mortgage-backed securities (MBS) - which started in 2009, but continues to the current date (January, 2014).

Since the post WWII period, the Fed has targeted interest rates (Federal Funds rate after 1954) as its primary indicator of monetary policy, and does so through open-market purchases of securities (currently through Treasuries and MBS). Targeting interest rates is, however, akin to observing only a price to reach a conclusion about the quantity traded rather than measuring the quantity directly. Interest rates fluctuate as both the demand and supply of credit fluctuates: interest rates can increase either because the

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demand for credit has increased, or the supply of credit has tightened; interest rates can decrease either because the credit demand has collapsed, or because the supply has increased.

The resulting quandary for monetary policy is that if interest rates rise as a result of increased credit demand, and the monetary authority targets interest rates, then a response of monetary ease will follow, and loan flows will further increase. The Fed, as it did in the 1970s, could end up unintentionally feeding inflationary conditions. Similarly, a collapse in the demand for credit would result in lower interest rates, but this does not indicate easy credit conditions. Countercyclical policy requires offsetting stimulation or dampening of loan markets accordingly. This is partially the Fed's response to the financial crisis of 2008-2009 when it created unconventional tools to reestablish credit flows in several loan markets.

It may well be that the debate concerning whether monetary policy should target interest rates or loan flows actually has its roots in the late 1930's controversy of *loanable funds versus liquidity preference models of interest rate determination*. (See Cardim de Carvalho, 1996, for a review of this debate between J.M. Keynes, D. Robertson and B. Ohlin which took place through a series of published articles in the *Economic Journal* in 1937.) Liquidity preference theory envisions interest rates as being the price charged for becoming illiquid, and is therefore a key indicator of economic sentiment. Following Hicksian IS – LM analysis, the interest-rate defined as liquidity premium is determined in a general equilibrium model. Any changes are viewed as resulting from differing comparative static equilibriums. There is no real time dimension to these changes since we envision the equilibrium in one period to flow seamlessly to the next period's equilibrium. The time length between equilibriums is not measured. There is no time derivative, or rate of change, revealed in this macro-static model.

The loanable funds model, however, measures the flow of credit, and this flow-measure has a natural time dimension. This approach is not one of general, but rather one of partial equilibrium, i.e. only in the loan market. As either demand or supply of credit change over the time-period, the measure of loan-flow per-period also changes, as well as the interest-rate price. Envisioning the macro model used as being built upon loanable funds rather naturally changes the target of the monetary policy to loan flows, perhaps combined with interest rate targets, but not just the singular price of illiquidity.

For practical purposes, however, one must note the ease of actually conducting open-market operations as based upon targeting an interest rate such as the federal-funds rate, which is a simple target for the central bank's trading desk to observe and control. In today's electronic information age, however, estimates of daily, weekly, and monthly loan-flow are obtainable and perhaps fairly accurate. (Note that weekly flows are reported on *Table H.8* by the Board of Governors at *www.federalreserve.gov*.) As a result, any task assigned to the trading desk to meet some loan-flow targets, which are certainly more difficult to measure than the Federal Funds rate, is more problematic than meeting the single interest rate target. Nonetheless, for purposes of macro-economic control (the ultimate challenge for monetary policy), the loan-flow targets might be more worthy of pursuit as compared to the simple federal-funds target. This worthiness might exist because of the loan-flow's greater macro effects.

The *unconventional tools* utilized by the Fed during the 2008-09 crisis were directly aimed at maintaining (stimulating) loan flows in particular markets. In this paper we examine using total loans as a target of monetary policy rather than solely using the simple interest-rate target (Federal Funds rate).

VIEWS OF MONETARY TRANSMISSION

The current conventional view of the monetary transmission process deemphasizes the loan-flow channel. Mishkin (2007, p. 60-71) for example, provides the conventional view that monetary transmission relies on relative prices and wealth effects. The asset price effects are envisioned to work through (1) debt instruments, (2) equity securities, (3) real estate, and (4) foreign exchange. The first two of these affect business demand for investment via the cost of capital. The fourth impacts the values of domestically owned foreign assets, as well as the foreign demand for domestically produced goods, and the domestic costs of foreign produced supplies to the production process. The wealth effects of monetary policy on asset prices primarily impact household aggregate expenditures indirectly. Much of the relative price effects must work through loan flows, i.e. (i) through business raising capital from debt and equity markets, and (ii) through households obtaining loans for real estate or consumer durables.

It is clear that not all of these monetary transmissions have their primary impacts on aggregate demand through credit markets, but much do. As an illuminating illustration, consider a Fed open-market purchase of Treasury bonds from either households or financial institutions. As we know, immediately after the purchase, the Fed's check is deposited into bank accounts, and abstracting from small currency and coin amounts that might be held by the public, total reserves held at the Fed increase by the amount of the check. These reserves (deposits at the Fed plus vault cash) can either (1) remain in excess reserves, (2) be loaned to households or businesses, or (3) be used by the financial institutions to purchase other securities from secondary markets. If in general, banking institutions pursue the second option, then total loans increase by a multiple of the Fed's OMO purchase. If in general, banking institutions pursue the third option, then the demand for secondary security-market purchases also increase by a multiple of the Fed's OMO purchase.

To further elaborate, allow P to be the amount of the OMO purchase. Also allow r to be the banking sector's fraction of deposits kept in the form of both legally required and excess reserves, and allow ΔL to be the change in loans made from the banking sector. If banks decide to loan rather than purchase other secondary market securities, then equation (1) presents the loan expansion assuming $0 < r < 1$. Note that the loan-expansion process of (1) is similar to (the *flip side* of) the deposit-expansion process of the money multiplier mechanics.

$$\Delta L = (1\text{-}r)P + (1\text{-}r)^2P + (1\text{-}r)^3P + \cdots \quad (1)$$
$$= \left[\frac{1-r}{r}\right]P$$

If, on the other hand, banks decide to spend all of the excess reserves on secondary market purchases, then allow ΔS to be this total increase in secondary market purchases as given by (2).

$$\Delta S = (1\text{-}r)P + (1\text{-}r)^2P + (1\text{-}r)^3P + \cdots \quad (2)$$
$$= [\tfrac{1-r}{r}]P$$

If we further allow α to be the fraction of the Fed's OMO purchase that is dedicated by the banking sector to loans, and therefore (1-α) to be the fraction used to purchase other secondary market securities, then equations (3) and (4) present ΔL and ΔS.

$$\Delta L = [\tfrac{1-r}{r}]P\alpha \quad (3)$$

$$\Delta S = [\tfrac{1-r}{r}]P(1\text{-}\alpha) \quad (4)$$

Of course, loans and secondary security-market purchases can be made by the non-banking sectors. Since these variables do not originate in the banking sector, they are not in the aggregate directly controlled by monetary policy. Therefore, ΔL and ΔS measure only the levels stimulated by the Fed's open-market operations. Note that if r = 1, then ΔL = ΔS = 0. Also note that if $0 < r < 1\text{-}r < 1$, then $[\tfrac{1-r}{r}] > 1$, and there is a multiplier impact on the aggregate of ΔL + ΔS. We can term this combination of loan flows and secondary market expenditures *the primary effect of open-market operations*. It is, of course, recognized that *subsequent effects* on wealth and relative prices also impact aggregate demand.

For the most direct impact on aggregate demand, the Fed would desire its OMO actions to entirely impact ΔL, the loan flow measure. Impacting secondary market value by ΔS, however, indirectly stimulates aggregate demand through wealth and relative price effects. In a latter section, we argue that the Fed should monitor the total loan/GDP ratio as an indicator of monetary policy, but this total loan measure is impacted by the fraction α. We argue that when this ratio collapses to excessively low levels, subsequent economic growth suffers. Also, when the ratio reaches very high levels, speculative bubbles might occur. Prior to this analysis, however, we review the Fed's view of its unprecedented but temporary interventions in loan markets during the financial crisis.

THE EFFICACY OF THE UNCONVENTIONAL TOOLS

Romer and Romer (2013) document a significant degree of pessimism with respect to the effectiveness of monetary policy, a pessimism that pervaded the Fed during critical times in its history, especially during periods of financial crisis: the 1930s, the 1970s, and post 2008. Recently, Governors Janet Yellen (Associate Chair and incoming Chair) and Ben Benanke (current Chair) indicated (1) in general the power of monetary tools is limited for stimulating the economy into a more robust growth period, and (2) the new nonconventional monetary tools all have economic costs. Bernanke (August, 2012) specified 4 potential costs associated with these unconventional tools:

i) These new tools are likely to impair the efficiency of the conventional securities markets.
ii) The new tools might reduce confidence in the Fed's ability to smoothly exit from its crisis management positions, i.e. the drawdown in excess reserves if and when the economy becomes overheated.

iii) The new tools develop risks of developing new speculative bubbles, and hence they risk financial stability.

iv) The Fed could incur financial balance-sheet loses due to these new positions.

In particular, Bernanke (October, 2012) indicated that the Fed has developed a rather high hurdle for future adoption or expansion of nonconventional tools. This indication followed the Fed's September, 2012, more aggressive policy of expanded purchases of MBS (up to $45 billion per month through 2013). Gagnon (2009) also documents Bernanke's and Yellen's public requests for a more aggressive fiscal policy to stimulate an enhanced robust economic growth, and associated statements of pessimism as to monetary policy's ability to accomplish the same. This theory is that since loan demand collapsed during the crisis, and stayed low during the subsequent period of stagnation, the economy needed further fiscal stimulus for loan demand to recover. Any further central bank purchase of private loans from the secondary markets – say commercial and industrial loans – would not stimulate investment.

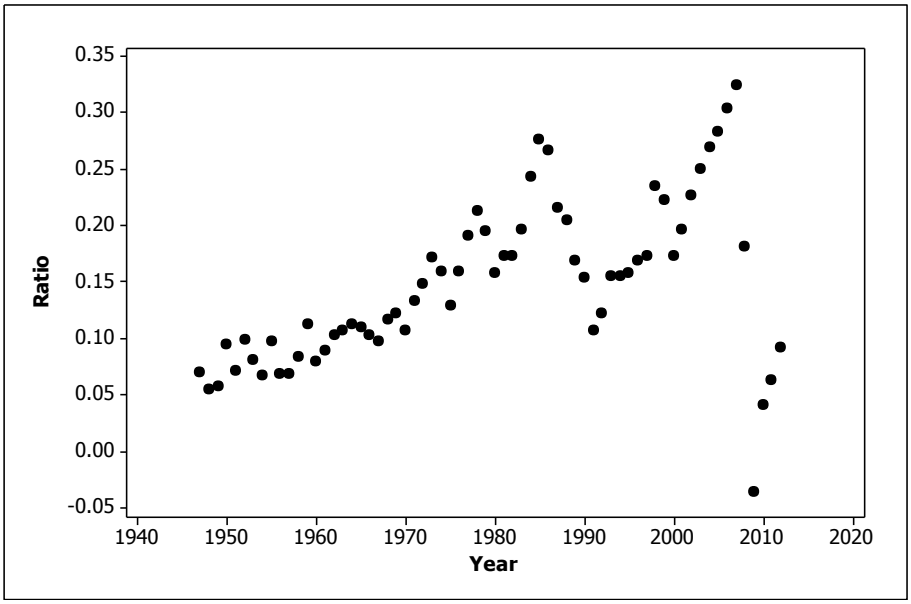
One might consider this pessimism to be warranted, but one must also ponder whether the root cause stems from the vision that conventional policy should work through control of interest rates rather than credit flows. After all, the nonconventional tools all worked directly through the transmission mechanism of loan flows, i.e. they were designed to stimulate credit flows, and the historical analysis reviewed indicates that they were effective in restoring credit flows in commercial paper, security dealer credit, and more recently in mortgage credit flows. In fact, all of the markets targeted by the Fed during the crisis (the dealer liquidity, commercial paper, money-market mutual funds, and MBS markets) maintained their functioning despite being severely threatened with collapse. The business and consumer loan markets, which were supported under TALF, along with the mortgage markets, suffered sustained decreases, but still maintained substantial credit flows. One must wonder if the Fed sustained its broad credit easing policies, would the stimulus to loan flows have helped to avoid the stagnation of 2010-12.

Figure 1 presents a time graph of *US total non-financial borrowings per GDP* during the post WWII era, 1947 - 2012. This ratio shows a gradual rise from approximately 5 percent to a bit less than 15 percent in 1970. Thereafter, the ratio shows a more rapid rise to exceed 25 percent in the mid 1980s just before the S&L home mortgage crisis. By 1990, the ratio had decreased to approximately 10 percent, and it began an even more rapid rise to exceed 30 percent by 2007 with its sub-prime mortgage crisis. During 2009, the ratio was actually negative as non-financial debt was liquidated while financial sector debt was rapidly expanding, and by 2012 the ratio rose again to its pre 2008 level.

This documents the impact of easy monetary policy as leading to the very high ratios of the early 1980s and the years prior to 2007. For the decade ending in 2008, the monetary base increased by a geometric average growth rate of 4.66 percent per year. Loans initiated by commercial banks increased by a geometric rate of 7.48 percent per year; and securities held by commercial banks increased at 7.26 percent per year. (The monetary base was $854.3 billion in 2008, and $542.0 billion in 1999. Loans by commercial banks were $6,841.7 billion in 2008, and $3,327.0 billion in 1999. See Table 2 for these figures.) The ratios depicted by Figure 1 show the increases prior to these crises because these high

rates of growth in the base and in loans exceed any possible sustained growth rates for the macro economy. The loan ratios therefore rise. It is therefore evident that measuring both the total of loan flows, and the compositions of these flows, would have indicated monetary policy was feeding the speculative booms of these periods. Monitoring these flows should therefore be a practical task of monetary policy. They are measurable in close to real time, although not as easily monitored in actual real time as the Fed Funds rate. It is clear that these flows are more directly and closely related to real economic activity than the Fed Funds rate.

Figure 1: Ratio of Total Borrowing to GDP by Year



The FOMC does not currently systematically utilize any quantitative measures of loan flows, either in the aggregate or in any particular credit market, for its considerations of monetary policy. The *Minutes of the FOMC's* periodic meetings do occasionally refer qualitatively to conditions in some particular credit market, as in the minutes of its January, 2013 meeting. As rationale for its bond buying program, at this January meeting, the FOMC cited tight credit conditions in housing, but it also cited an expansion in *commercial and industrial loans*, which during the crisis and its after-period had either dropped or were stagnant in growth, and it also cited an expansion of consumer credit. It cited no measures of credit flows, however, nor did the record of economic predictions contain any such measures.[2] Indeed, even during the height of the Fed's interference in credit markets with unconventional tools, i.e. January, 2009, the Fed cited yield spreads as rationale for its interference. It did not cite any credit-flow data to document the collapse of credit markets such as the commercial paper market. Citing such measures would seem a rather natural way to explain the need for this interference.

POST WW II CREDIT AND MONETRAY BASE MOVEMENTS

Reinhart and Rogoff (2013) cite that during the last three decades, little attention has been paid to the effects of credit on aggregate demand. They also characterize monetary policy during the Fed's 100 year history, and resulting credit conditions as measured by the volume of consumer credit. They show that during NBER classified recessions, interest rates generally rose while credit volume declined. For one-quarter of the years of its 100-year history, interest rates rose, but household credit was either stable or increasing. Also, for one-quarter of these years, interest rates declined, but credit also decreased. In fact, only during one-quarter of the years of the Fed's existence were rates and consumer credit movements consistent.

Proper indicators of the directions of monetary policy are the movements in the monetary base since these are directly impacted through open-market operations. In 32 of the 65 years between 1948 and 2012 inclusive the changes in the monetary base and changes in total US borrowing were in the same direction, i.e. consistent movements.[3] For 51 of these 65 years, the base changes and the changes in total borrowing were consistent. For 39 of the 65 years, changes in the base and changes in household loans were consistent. In only 8 of the 65 years were changes in the monetary base inconsistent with either changes in total borrowing or household credit. Excluding the financial crisis years of 1988-91, and 2007-12 from the sample, the rank-correlation coefficients for these variables are presented by Table 1. The correlations have the expected signs, and are significantly different from zero at higher significant levels than 95 percent. The years of 1988-91 and 2007-12 were not included since the Fed's responses to the crises were to expand the base rapidly but only after the demand for loans had collapsed. Figure 1 also shows that these crisis years had substantial drops in borrowing ratios.

Table 1: Rank Correlation Coefficients: 1948-2013

Variable	Coefficient	p-value
% Change in Base with % Change in Total Borrowing	.292	.029
% Change in Base with % Change in Household Borrowing	.286	.032

Data from *Flow-of-Funds* accounts but without the financial crisis years of 1988-91 and 2007-12.

How do we explain the data presented by Table 1? As indicated by the correlation coefficients, there is a definite positive connection between monetary stimulus and total borrowing, or for that matter between the stimulus and household credit. The magnitudes of these correlation coefficients are, however, relatively low since credit generation can originate outside the banking sector, perhaps in household savings being loaned directly to business or government. Stimulation of credit markets occurs through both monetary stimulus and other sources. To further explore the complexity of this phenomena, we develop a simple loanable funds model that utilizes the analytical equations of (1) – (4).

AN EXTENSION OF THE CLASSIC LOANABLE-FUNDS MODEL

The classic loanable funds model specifies an equilibrium interest rate and flow of loans that equates demand with supply of loans. Interest rates and loans can then be subdivided into a vector of rates and quantities that serve various sectors, maturities, or risk classifications. The demand for loans is composed of household demand (HD), business demand (BD), government demand (GD), and foreign demand (FD). The supply of loanable funds stems from household savings (HS), business savings (nonfinancial intermediary savings – BS), government savings (GS),[4] foreign savings invested in US markets (FS), and changes in the money supply (ΔM). For a simple initial analysis, the latter variable is envisioned to occur entirely through loan expansion, a vision that is corrected below. The equilibrium is the quantity of loans and corresponding interest rate that sets total supply equal to demand as specified by equation (5). Equation (5) reduces to the simple loanable funds model of (6) to contain only net figures where H = HD – HS, B = BD – BS, G = GD – GS, and F = FD – FS. The vision here is that monetary policy directly impacts the net quantities loaned and interest rates over the time period of these measurements.

$$HD + BD + GD + FD = HS + BS + GS + FS + \Delta M \quad (5)$$

$$H + B + G + F = \Delta M \quad (6)$$

Given our above analysis, however, we recognize that only a portion of the monetary stimulus feeds the loan market. We therefore can modify model (6) to derive (7). We therefore perceive that only the portion α (0 ≤ α ≤ 1) of OMO purchases impacts the loan market, and even then, this portion is further modified or enhanced by the multiplier $[\frac{1-r}{r}]$ where r is the reserve to deposit ratio. This explains the loose connection between monetary stimulus (changes in the monetary base – P) and changes in the quantity of credit. Note that the left side of (7) was used for the metrics examined on Tables 1 and 2. Note further that for conditions of r = 1 (the approximate condition of the financial crisis when nearly all OMO purchases merely fed excess reserves), there is no stimulus to the loan markets since the multiplier becomes 0. Note also that no additional loan stimulation occurs if α = 0, i.e. if all monetary stimulus is channeled into secondary-market security purchases and not new loan origination.

$$H + B + G + F = [\frac{1-r}{r}]P\alpha \quad (7)$$

LOANS AND SECURITIES HELD BY THE BANKING SECTOR

Table 2 presents the loans and financial securities held by commercial banks, 1996 – 2013 as measured in January of each year. Between 1996 and 2006, the monetary base increased by approximately $400 billion; the securities held in commercial bank portfolios increased by approximately $1.5 trillion; but loans made by these institutions increased by over $4 trillion. Equation (8) gives the overall multiplier for expansion of the monetary base by P (and as derived above). When we add the increase in loans (ΔL) and the increase in securities held (ΔS) and divide by the base expansion (P), we obtain an overall multiplier $[\frac{1-r}{r}]$ of approximately 13.5 for the 1996-2006 period. For the period 2006-13, however, the monetary base increased by approximately $1.9 trillion; securities held by commercial

banks increased by approximately $.44 trillion; but loans held by commercial banks increased by only $2.5 trillion. The overall multiplier is only approximately .13. The unprecedented increase in excess reserves, as documented above, accounts for this anemic commercial bank activity. Furthermore, the financial crisis period of 2008-2009 evidences the most extreme of this lagging activity: the base increased by almost $1 trillion but loans and securities held by commercial banks decreased by $372 billion. In attempts to remedy this, the Fed initiated its direct non-conventional instruments as documented above.

A relevant question remains, "What about the anemic era of 2010-11? Should the Fed have continued its non-conventional interference in loan markets?" During these two years, the Fed increased the monetary base by $262.8 billion. Loans by commercial banks increased by only $138.8 billion, and securities held increased by only $169.8 billion. This presents an overall multiplier of 1.17 which certainly does not approximate the 13.5 multiplier for the decade prior to the crisis. If the Fed had monitored commercial-bank loan creation with the importance and emphasis it placed on maintaining low interest rates, would it have withdrawn its nonconventional stimulus of loan markets so early, i.e., 2009-10?

$$\Delta L + \Delta S = [\frac{1-r}{r}]\text{P} \quad (8)$$

To further explore this issue, consider the ratios formulated by equations (9), (10) and (11). The computations of these ratios for years 1996-2013 (January of each year) are also presented by Table 2. The years leading up to the 2008-09 financial crisis indicate that β_{L+S} rose from 8 to approximately 11. Most of this increase was due to β_L which rose from approximately 6 to over 8 for the 2007-08 years. Securities, as measured by β_S was relatively stable at between 2.1 and 2.9 over this period. With the onset of the crisis in late 2008 and early 2009, β_{L+S} dropped by more than one-half. Both β_L and β_S dropped by approximately one-half. This was largely due to the Fed's dramatic increase in the monetary base ($.8 trillion to $2.7 trillion) while loans and securities held remained stable as shown by Table 2.

$$\beta_L = \frac{Loans}{Base} \quad (9)$$

$$\beta_S = \frac{Securities}{Base} \quad (10)$$

$$\beta_{L+S} = \frac{Loans+Securities}{Base} \quad (11)$$

The Federal Reserve's monetary policy leading up to the financial crisis clearly facilitated substantial increases in commercial bank loans. Post the crisis, the dramatic base increase did not lead to similar loan growth but rather stagnation. The imaginative nonconventional tools developed during 2009 saved various loan markets from complete collapse, but this very salvation begs the question, "What imaginative nonconventional policies could have been utilized to stimulate loans post the crisis?"

Table 2: Monetary Base, Loans and Securities Held by Commercial Banks, 2006-2013 ($ billions)

Year	Monetary Base	Loans	Securities	β_L	β_S	β_{L+S}
2013	$2,741.7	$7,280.9	$2,725.8	2.66	0.99	3.65
2012	2,640.9	6,979.0	2,534.5	2.64	0.96	3.60
2011	2,034.8	6,792.9	2,424.6	3.34	1.19	4.53
2010	1,971.4	6,693.8	2,336.8	3.40	1.18	4.58
2009	1,772.0	6,557.1	2,254.8	3.70	1.27	4.97
2008	854.3	6,841.7	2,473.9	8.00	2.90	10.90
2007	839.8	6,829.7	2,455.2	8.13	2.92	11.06
2006	818.3	6,161.5	2,232.8	7.53	2.73	10.26
2005	785.1	4,863.2	1,937.5	6.19	2.47	8.66
2004	752.6	4,444.0	1,852.5	5.91	2.46	8.37
2003	713.9	4,168.1	1,752.4	5.84	2.45	8.29
2002	669.0	3,931.4	1,385.4	5.88	2.22	8.10
2001	613.6	3,965.4	1,480.4	6.46	2.41	8.87
2000	630.5	3,913.9	1,339.1	6.21	2.12	8.33
1999	542.0	3,327.0	1,227.4	6.14	2.26	8.40
1998	510.9	3,334.4	1,231.4	6.53	2.41	8.94
1997	479.0	3,027.6	1,077.0	6.32	2.25	8.57
1996	456.7	2,813.3	972.5	6.16	2.13	8.29

ENDNOTES

1. Note that both of these simple models envision single homogeneous markets. For purposes of operationalizing the targets, the liquidity preference model must specify various degrees of illiquidity so that term-structures and risk-structures of rates are included. Note the versions of operation twist of the 1960s and of recent years. Similarly, the loanable funds model also needs to explain the rationing of credit flows among various markets of differing risks and maturities.
2. The minutes of the FOMC contains attached appendices which list various economic predictions for real growth of GDP, inflation, federal-funds rate, and unemployment, but not of credit flows.
3. *US borrowing* is defined for this purpose as loans to business, households, both federal and state and local governments, and the rest of the world as borrowed from the US, but excluding the financial-intermediary sector. The data set is from the *Flow-of-Funds* accounts.
4. Savings channeled through various agencies such as Small-Business Administration loans.

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Improving Economics and Financial Literacy and Education: An Overview from a Teacher's Perspective

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ABSTRACT

The goal of and need for improving economic and financial literacy in the United States is widely documented. Government and educational systems support such initiatives as state curriculum standards and teacher continuing education. This paper considers the availability and usefulness of economics and financial resources from a teacher's perspective. Three main questions are addressed. What are the main sources of pedagogy for K – 12th grade teachers? How are resources structured and connected to standards and curriculum, and how do they lead to cumulative and consistent learning? How do resources help teachers lacking a background in economics and/or finance?

INTRODUCTION

The goal of and need for improving economic and financial literacy in the United States is widely documented. Although a broad range of educational resources are available to both adults and children, the path to economic and financial literacy includes, and can even begin with, classroom instruction. This paper examines the accessibility, organization and effectiveness of resources available to educators in the delivery of economics and personal finance education at the primary, intermediate and secondary levels in the United States. Since the delivery of course content is mainly the responsibility of the classroom teacher, this paper evaluates these issues from a classroom teacher's perspective. That approach allows for a greater understanding of how educational content is delivered, which methods have the most potential to result in effective outcomes, and how literacy outcomes for students might be improved.

Both federal and state education departments include programs and curriculum standards in economics and personal finance at the primary, intermediate and secondary levels. This suggests an awareness of the benefit of a population educated in economics and personal finance and the need to begin that education at an early age. State-mandated core curricula as well as state and federal incentives offer the necessary structure, but there is little evidence that economic and financial literacy is improved merely by having that structure in place. The Council on Economic Education's most recent summary report, the *Survey of the States,* shows that in 2011 all 50 states included education standards in economics and 46 states included personal finance standards at the high school level.

In some states, economics and personal finance standards are included at every grade level. Based on cumulative learning standards, an identified set of core concepts is introduced each year, which allows for teaching and learning to develop over time.Standard core concepts comprise the structural base used

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by teachers to develop curriculum and course content. The means by which teachers find and access resources used to develop classroom pedagogy is an essential link between the state mandates and student literacy. Hence, the key to economic and financial literacy may lie in the hands of grade level teachers and their ability to access effective teaching resources and methodology.

This paper presents an analysis of the availability, access, and use of educational materials delivered by a representative group of institutional resource centers to K – 12th grade teachers. It discusses how using these resources might lead to cumulative and consistent learning. The basic format and structure of available resources and how these materials help teachers connect pedagogy to curriculum development and state standards is also considered. In addition, closing teacher literacy gaps is a critical and necessary step leading to economic and personal financial literacy for students.

Background

Research in the areas of economic and financial literacy generally stems from three main sources: academic, government, and nonprofit. Substantial interest in this area is found prior to 1980, but awareness of the critical nature and need for improved literacy showed a marked increase since the mid-1990s. In 1994, the National Council for the Social Studies, NCSS, published the first set of national standards which was, and continues to be, the framework for "professional deliberation and planning about what should occur in a social studies program in grades pre-K – 12".[2.] The Council on Economic Education, CEE, first published the *Voluntary National Content Standards in Economics* in 1997, which was revised in 2010. Both versions included twenty standards with benchmarks and grade level recommendations. The NCSS and the CEE standards were meant to present fundamental and essential principles that all students should learn. As stated by the CEE, "Each standard is an essential principle of economics that an economically literate student should know and a statement of what the student should be able to do with that knowledge at grades 4, 8, and upon graduating from high school." [3.]

Research shows the individual and social benefits of a financially literate population to include improved savings rates, higher wealth accumulation, and more long-term financial security. Further research supports education as a key to these benefits. Bernheim, Garrett, and Maki (2001) showed that individuals who were exposed to financial education in high school had higher savings later in life. [4.] Danes, Huddleston-Casas, and Boyce (1999)[5.] and Gutter, Copur, and Garrison (2010)[6.] supported the view that financial literacy and education can improve savings behavior, reduce maximum credit card debt and debt payment.

Attention is also paid to financial education through government and consumer advocacy initiatives. The Fair and Accurate Credit Transactions Act of 2003 established a Financial Literacy and Education Commission, FLEC, which was charged with the establishment of a national financial education website and hotline, and a national strategy on financial education. Among the key priorities of the *Starting Early* initiative in 2012 were "Preparing youth to have a basic understanding of financial transactions, and to make informed decisions about paying for post-secondary education "The intent was to develop a

comprehensive database that might be used "to evaluate the relative effectiveness of the various components of these programs for improving understanding of key personal finance concepts." and "This data could then be used to examine how financial literacy and financial education relate to future financial behavior and financial well-being."[7.] This suggests that there is awareness of the need for improvements in both research and data collection regarding successful educational methods and pedagogy.

The National Center for Education Statistics, NCES, housed within the U.S. Department of Education and the Institute of Education Sciences, published a national assessment of economic literacy, which it updated in 2012. Among the key findings was that "Economics scores increased for some lower performing student groups, even though the overall average score for twelfth-graders did not change significantly." [8.] In addition, the results of the 2012 National Assessment of Educational Progress, NAEP, showed no significant change in comparison with the 2006 NAEP. Although low performing students showed some progress, only 42 percent of students performed at or above the proficiency level. [9.]

The correlation between teacher education and student literacy outcomes is also a critical component. Teachers are the direct link to students and their educational experience. Research supports that positive influence of teacher education on student outcomes. Formative research by Allgood and Walstad (1999) studying the longitudinal effects of economic education on teachers and their students found that economic competency was improved by 22 percent for the teachers who participated in the program and was positively correlated with an increase in their students' economics scores of TEL.[10.]

Methods and Discussion

The evidence presented above supports the need for and benefits of improvements in economics and financial literacy. In addition, the inclusion of core academic standards in all 50 states for economics and in 46 states for personal finance suggests a strong belief that early educational intervention is needed to achieve these goals. Therefore, it is imperative to understand how teachers identify, access, and use educational resources in curriculum development. This paper explores the source, type, and structure of educational materials and resources that K – 12th grade teachers have readily available to them. From a teacher's perspective, being able to identify the principle components needed to teach economics and personal finance would increase the likelihood that this material would actually be incorporated into lessons plans. It would not only satisfy the state mandates but offer a greater chance of cumulative learning throughout an individual student's career.

In order to identify teaching materials used to develop curriculum and pedagogy, we need to discuss how educators initially identify and access the resource centers that deliver them. Educational resources are delivered by a wide range of primary sources including government offices/departments, nonprofit organizations and proprietary institutions/corporations. Teachers identify resource centers using such mechanisms as continuing education, direct communication with other educators, department meetings, conferences, and educational web resources.

Resource Centers

To assess the effectiveness of methods used by teachers, this paper focuses on five widely accepted resource centers. All five are considered substantial, if not essential, in the delivery of educational resources for either economics education, finance education or both. In addition, all five have comprehensive websites that can be used by teachers for curriculum development. It should be noted that a wide variety and number of institutions/organizations are accessible, reliable, and useful to educators. The resource centers discussed here indicate relative size in the field but this choice set does not imply that others centers are less useful or significant.

The five resource centers are the U.S. Department of the Treasury (www.treasury.gov), the Federal Reserve System (www.federalreserveeducation.org), the Council on Economic Education (www.councilforeconed.org), Jump$tart (www.jumpstart.org), and TheMint (www.themint.org).[11] The first two are government based, the third and fourth are nonprofit organizations and the last is an affiliate of a private corporation. The choice to include these five resource centers was based on size, influence in the educational community, and to offer a sample of the full range of resource categories (i.e., government, nonprofit, private).

The following assumptions apply:

1. Two browsers were used: Internet Explorer and Mozilla Firefox
2. Two search engines were used: Google (Explorer) and Yahoo (Mozilla Firefox)
3. A lesson plan was considered complete if it included a lesson objective, explanation of terms, description of lesson flow and related class materials
4. A format was consistent if the structure of the lesson plan followed a set pattern

Based on these assumptions, the following three tables show the comparison between the five resource centers for each of the three criteria.

Table1: Ease of Access

Institution/ Indicator	**Navigating primary website**	**Resource Type _____ Online**	**Resource Type _____ Hardcopy Text/Book/ Materials**	**Resource Type _____ CD/DVD**	**Online support services for educational resources**	**Finding Source in Search Engine[12.]**
U.S. Treasury	Moderate	Yes	Yes	Yes	No	No
Federal Reserve	Moderate	Yes	Yes	Yes	No	Yes
Council for Economic Education	Moderate	Yes	Yes	Yes	Yes	Yes
Jump$tart	Moderate	Yes	Yes	Yes	Yes	Yes
TheMint	Easy	Yes	No	No	No	No

Table 2: Organization and Consistency

Institution/ Indicator	Complete lesson plans	Links to State (S) and/or National (N) Standards	Consistent Format	Economics (E) and/or Financial Resources (F)	Resources directed toward user groups[13.]
U.S. Treasury	No	No	No	F	No
Federal Reserve	Yes	No	Yes	E, F	Yes
Council for Economic Education	Yes	No-State Yes- National	Yes	E,F	Yes
Jump$tart	Yes	No-State Yes- National	Yes	F	Yes
The Mint	Yes	No	No	E, F	Yes

Table 3: Academic Support for Teachers

Institution/ Indicator	Educational Settings Online courses, Classes, Workshops	Educational Settings On-site courses, Classes, Workshops, Conferences	Educational Settings Other continuing education	Frequency of Offerings	Clear Grade Level Differentiation
U.S. Treasury	No	No	No	NA	No
Federal Reserve	No	Yes (Tours)	No	Frequent	Yes
Council for Economic Education	Yes	Yes	Yes	Frequent	Yes
Jump$tart	Yes	Yes	No	Frequent	Yes
The Mint	No	No	No	NA	No

Summary of Results

The range of resources available to K – 12th grade teachers in the areas of economics and personal finance education is large and varied. The question remains, are these resources delivered and/or received in such a way as to establish effective connections with educators that will lead to curriculum development and improvements in economics and financial literacy?

We believe that our results show that the basic educational tools available to K – 12th grade teachers are sufficient to achieve these goals as they apply to accessibility, range, variety, and reliability. There are substantial amounts of web resources that are available, downloadable, grade-level, and linked to identified concept areas and national standards. However, only two variables in which all five resource centers showed complete compliance. Both variables were *Ease of Access* measures. All five centers offered substantive online resources and were easy to navigate. It suggests that, once identified, teachers might learn to depend on these centers more than others.

With regard to source type identification, we see that the two nonprofit centers and the Federal Reserve were consistently identified in the keyword search. The U.S. Treasury and the TheMint were not.

A general keyword search might not lead educators toward their sites and useful resources from less prominent institutions or organizations might be neglected.

The government and nonprofit resource centers offer a number of educational resources in a wide variety of formats including webpages, links, and hardcopy materials (i.e. books, printed materials, CDs and DVDs). In addition to web access, some of the materials may be bulk ordered for the classroom. For example, the U.S. Treasury offers a number of posters and publications that can used in conjunction with the lesson plans posted on the site.

Table 2 shows that there is little uniformity in the organizational structure of educational materials offered by each resource center. Generally, we would expect sources taking a serious view toward education to necessarily offer complete lesson plans to the educators. In all but one, that is the case. The lesson plans that are presented on the Treasury site are not complete, offer inconsistent formatting, have no links to either state or national standards, and are not differentiated by grade level. Just the opposite is true for the Federal Reserve system. Every Federal Reserve district offers a set of educational resources and the Fed system as a whole maintains a very useful and coordinated site linking the resources of each district bank. It also offers links to other resource centers such as the Council for Economic Education.

The nonprofit resource centers offer the most consistently organized set of resources. One main difference between the Council for Economic Education and Jump$tart is that the former includes both economics and financial education and the later focuses on financial education. Beyond that, both do a good job of organizing and presenting a full range of materials for teachers of all grade levels. TheMint, supported by private sources, also delivers a solid set of resources but does not include standards links. In addition, the educational resources are presented in a variety of formats, which might make it more difficult for teachers to use in curriculum development. It does offer materials in both economics and personal finance.

Table 3 offers the most significant results related to establishing a long-term educational path toward economic and financial literacy. Learning and retention of the material will improve when students are exposed to the core principles early, with more consistency, and with cumulative reinforcement. The results show that there is only one resource center, the Council for Economic Education, offering a full range of academic resources for teachers. In addition, returning to the results presented in Table 1, only the CEE and Jump$start (both the nonprofit centers) offer teachers online support.

Some critical questions need to be raised in the context of these results. If a teacher is not literate, is it likely that s/he will seek out additional academic support in order to satisfy the state standards? Rather than teach an unfamiliar subject area, will teachers choose to minimize or avoid core concepts in the curriculum? If we perceive a need for more support, where might teachers get the knowledge base that they need?

Concluding Remarks

The need for improved literacy in economics and personal finance is clear and the benefits are essential to the individual, the community and the nation. Our results show that there are a number of substantive and reliable resources available to the educational community as a whole. A large number of sources offer a wide variety of materials to the classroom teacher at all levels and access to these materials is easy to locate and use. Complete lesson plans for topics in both economics and personal finance are available, reliable, and grade-level identified.

Improvements in a number of key areas can be made. In particular, communication and support for educators is lacking. There are a plethora of online and hard copy resources, but few sources offer help lines, help-desk services or direct contact. Teachers without answers to critical questions that arise as they develop lesson plans might consider dropping the lesson from the curriculum entirely or may teach the principles incompletely or incorrectly.

As important, there is little academic support for the teachers themselves. Although the nonprofit resource centers offer continuing education options to the teaching community, there is little consistency in access statewide or nationally. This could result in gaps in delivery and literacy outcomes.

Teaching classroom teachers is quite different from teaching college students working toward education degrees. Mandating a college level economics and/or personal finance course for all education majors would help, but adding this requirement is neither realistic nor practical in the current educational environment. Therefore, programs that serve as outreach to the teachers themselves might be the best way to reinforce this material and, as an extension, increase the likelihood of successful improvements in literacy.

This study identifies the need for more academic support services for teachers, especially for teachers at the lower grade levels. We recommend that the state education departments develop connections between higher education institutions and school districts to facilitate teacher education and outreach.

Further, although the vast majority of states include standards in both economics and finance, they have not developed workable and/or coordinated evaluation or assessment plans for the lower grade levels. Evaluation methods are generally applied at the high school level and mostly in 12th grade. Only 16 states required some evaluation of literacy in economics and 5 states required evaluation in personal finance for the lower grades. A well-defined evaluation and/or assessment plan for lower grade levels would help to ensure that students achieve a stated degree of competency at an earlier age and this would allow secondary teachers to move forward with more advanced concepts and skills.

The evidence indicates that a full range of resources are available to K – 12th grade teachers in the areas of economics and personal finance education. However, the tools needed to help teachers link those resources to the course curriculum using consistent and cumulative methodology is not yet evident. We believe the next step is to strengthen those mechanisms by improving communication and teacher-

education. We all see the benefits of economics and financial literacy. Strengthening the links that "teach the teachers" is the necessary next step on the path.

ENDNOTES

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3. Voluntary National Content Standards in Economics, 2nd Edition. Council for Economic Education http://www.councilforeconed.org/wp/wp-content/uploads/2012/03/voluntary-national-content-standards-2010.pdf
4. See Bernheim, Garrett, and Maki, "Education and saving:: The long-term effects of high school financial curriculum mandates", 2001
5. See Danes, Huddleston-Casas, and Boyce, "Financial planning curriculum for teens: Impact evaluation",(1999)
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9. National Center for Education Statistics, The Nation's Report Card: 2012, http://nces.ed.gov/nationsreportcard/subject/publications/main2012/pdf/2013453.pdf
10. Allgood and Walstad, "The longitudinal effects of economic education on teachers and their students", 1999.
11. TheMint, www.themint.org, is an online web resource that is "committed to guiding young people and their families to be money smart and financially fit. ". It is affiliated with Northwestern Mutual Life Insurance Company.
12. "Finding Source in the Search Engine" means the listing was in the first two pages when the keywords "financial and economic education for teachers" was used.
13. The three user groups were parents, students and teachers &/or administrators.

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Economies of Scale and Scope in Increasingly Competitive New York Local Telecommunications Markets

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ABSTRACT

The rapid increase in inter-modal competition in telecommunications markets has resulted in traditional local exchange telephone companies facing significant financial pressures. The increasing acceptance of wireless as a substitute for traditional voice services, combined with the more recent roll out of digital phone service by cable companies operating in rural areas has brought the need to deal with these financial pressures to the forefront. This paper examines the cost structures of New York State's incumbent local exchange telephone companies and in doing so, sheds light on possible operational improvements which could aid the incumbent companies in managing the competitive transition.

BACKGROUND

The cost structure and operating environment of traditional local exchange telephone companies provide important information to managers and regulators regarding these companies' ability to thrive in increasingly competitive markets. Prior studies of incumbent telephone system costs were focused on whether the incumbent local exchange companies were natural monopolies. If not, the incumbents' networks could arguably be broken up without a loss of efficiency. Competition was envisioned over portions of the incumbent telephone companies' network (e.g., 1980s competition only in long distance, late 1990s/early 2000s competition for switching and inter-office elements but not so much for the local loop). With end to end facilities based competition from cable providers, economies of scope between services (e.g., economies of scope in providing residence and business services) might be increasingly important. Only a limited few of the earlier cost studies focused on the distinction between residence and business service outputs. Finally, economies of scale may remain important, and critical to the success of smaller rural companies who are facing significant inroads from larger regional cable phone providers.

Smaller rural companies were generally spared from the unbundled network element based competition that occurred immediately after the 1996 Telecom Act. The more recent competition now faced by the traditional incumbent local exchange telephone companies comes from large, end to end facilities based cable phone providers, and from increasingly ubiquitous cellular providers. The increasing acceptance of wireless as a stand-alone substitute for traditional voice services, combined with the more recent roll out of digital phone service by cable companies has quickly brought the need for all

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traditional phone providers to deal with these financial pressures associated with technological change induced competition.

New York State Telecommunications Landscape

New York's forty incumbent local telephone companies will form the basis of this analysis. New York provides a rich sample in that it contains a broad mix of large, small, urban, and rural local exchange companies. Very few states have a similar degree of geographic and demographic diversity as does New York State. Also, the New York State sample is predictive of the impact of cable telephone competition in other states. The number of homes passed by cable TV in New York is unusually high given New York's somewhat unique and foresighted polices encouraging CATV build outs in the 1970s.Thus, the New York experience could be viewed as predictive of what may likely happen in other states as broad band facilities capable of providing competitive phone service are more ubiquitously deployed throughout the nation.

As shown in the table below, the forty incumbents' loss in customer access lines since 2004 has been more dramatic with respect to residential customers than it has been for business customers. None of the companies have been able to sustain market share since 2003. The table also indicates that this decline in customers has been coupled with a dramatic increase in unit costs. Cost per access line (CPAL) is a traditional metric for comparison of incumbent local exchange company costs.

Year	Real Average Monthly Cost per Access Line	Residence Access Line Customers	Business Access Line Customers
2004	85.96	7,739,313	3,437,229
2005	85.68	6,988,971	3,264,113
2006	89.63	6,093,607	3,072,150
2007	94.64	5,297,207	2,870,705
2008	105.41	4,583,299	2,666,855
2009	114.48	3,950,710	2,463,047
2010	119.76	3,533,822	2,158,220
2011	123.29	3,074,995	1,990,559
2012	126.90	2,509,699	1,944,020

It is not surprising that these dramatic increases in per customer costs have had a significant impact on the incumbent local exchange telephone companies' financial situations. Some incumbent local exchange company residential market shares have now dropped below 50%, with no end in sight. The incumbents have argued that it is necessary for them to retain and maintain plant, regardless of customer migration to competition, given the incumbents' obligation to serve and carrier of last resort obligations. However, remaining financially solvent as unit costs are going up has become increasingly difficult as monthly competitor prices for residential and business phone service packages in New York have dipped below $50 for many residence and business customers. Although the smaller incumbent exchange

company retail rates have traditionally been below competitor levels, recent regulatory rate proceedings have resulted in the smaller incumbent company rates increasing closer to the competitive benchmark levels. A large portion of some of the more rural incumbents' supra competitive level cost recovery has come via high long distance company access charges and from inter-company funding mechanisms. The smaller incumbent local exchange companies have indicated their likely need to draw more heavily from these funds. Regulators are currently addressing how to best reformulate these funding mechanisms.

In setting new competition and funding policies, regulators should be cognizant of the following cost structure related issues. Are smaller telecommunications firms inefficient? The competing cable companies are generally much larger than the traditional incumbent local exchange companies. Should the smaller incumbents be subsidized to stay in business if their financial losses are the result of market share losses to cable (as opposed to financial difficulties in serving a very high cost rural area with no competitive cable or wireless provider)? Cable phone providers are now taking advantage of the economies of scope in serving residence and business services. Are economies of scope greater than the economies of scale? Regarding claims that incumbents are unfairly losing their position in the residential markets, do current policies impact the level playing field with respect to cost? Residential cable phone companies do not have the same degree of provider of last resort and low income obligations. Cable phone rates are subject to much less taxation/subsidy obligations. How do differences in telephone and cable construction permitting and franchise renewals processes impact costs?

In order to shed light on how responsive strategies by the incumbent local telephone companies might impact upon the incumbents' financial losses, those actions will be evaluated using a cost function estimated for the incumbent telecommunications industry.

Modeling ILEC Cost Structures

Central to this analysis is the estimation of the cost structure for local exchange telephone companies. According to economic theory, costs are a function of both the outputs produced, and the prices of inputs purchased. The cost model below specifies telephone company costs to be a function of two outputs and three inputs. Companies' costs should vary with the number of residence access lines served and the number of business access lines served. The number of residential access lines is chosen as an explanatory variable since the number of customers to be served directly affects the total costs of service. Business access lines were used as a second explanatory variable since business lines are correlated with more complicated high capacity and feature-rich services that business customers subscribe to. The input prices reflect each company's relative economic cost of capital deployment, labor compensation rates, and costs of purchasing materials & services.

Data Used in Cost Model

The cost model was estimated using output and input price data for each of the 40 New York State incumbent local exchange carriers. The data covered the nine year period from 2004 through 2012.

Outputs: The residential lines output variable was taken directly from the access line schedule in the companies' New York Public Service Commission (NYPSC) Annual Reports. The business access line output measure is the total access line figure from the annual reports minus the residential access line figure. Total cost for each company is defined as capital expenditures plus total non-capital related operating expenses.

Costs: Total company operating expenses are measured by Total Operating Expenses Subject to Separations (including depreciation) from Schedule 9, Column E, Line 18 of the PSC annual reports. An economic measure of the cost of capital is substituted for the depreciation and amortization expenditures reported annually to the PSC on Schedule 9, Column E, Line 17.

Input Prices: The capital input price reflects the annual economic cost of capital. Creation of this variable begin with the Telephone Plant in Service - Subject to Separations figures from the NYPSC-Annual Reports Schedule 9. In order to determine a real measure of capital stock, the TPIS amounts are deflated by the Bureau of Economic Analysis' communications equipment price index. This real measure of capital stock is multiplied by a factor of 0.0625 in order to calculate the annual economic cost of depreciation (using the annuity form of depreciation and assuming constant productivity of each asset over its useful life). A property tax rate of 1% is also applied to this measure of capital stock. Finally, the real capital stock is multiplied by an annual NYPSC allowed rate of return factor in order to estimate the cost associated with return on investment. The annual economic capital cost for each company reflects the sum of these three cost items. These capital costs are divided by the total access lines for each company in order to create the capital input price. The price of the labor input is determined by dividing the wages and benefits figures reported on the PSC 5 Year Books, Table E, Line 3 by the number of company employees reported on the PSC annual reports, schedule 65a. The catch-all materials price calculation begins with what remains in the NYPSC Annual Report's Total Operating Expenses Subject to Separations figure after depreciation and wages & benefits expenses are subtracted out. These remaining "material" expenses are divided by the total access lines for each company in order to create a materials input price.

Finally, dummy indicator variables are added for each year to capture the effects of technological change and the adoption of alternative technologies by consumers.

Cost Model Specification

Costs are specified to be a function of both outputs (y_r and y_b) and input prices (p_k, p_l and p_m).

$$Cost = f(Y_r, Y_b, P_k, P_l, P_m, year)$$

r = output of residence access line customers
b = output of business access line customers
k = capital input
l = labor input
m = materials input (everything else)
year = dummy indicator variable for each year

The translog cost function is specified as follows:
(i's and j's subscript the inputs, m's and n's subscript the outputs)

$$\ln C = \alpha_0 + \sum_i \alpha_i \ln p_i + \sum_m \beta_m \ln y_m + \tfrac{1}{2}\sum_{ij} \alpha_{ij} \ln p_i \ln p_j + \tfrac{1}{2}\sum_{mn} \beta_{mn} \ln y_m \ln y_n + \sum_{im} \gamma_{im} \ln p_i \ln y_m + \tau\ year + \varepsilon$$

Assuming that the local exchange telephone companies are attempting to minimize costs in the face of competitive entry, estimation efficiency can be improved by estimating the translog cost function along with the cost minimizing input share equations. Shephard's Lemma (i.e., the derivative of the cost function with respect to factor input prices produces input share equations which sum to one) can be used to obtain the following capital, labor, and materials expense share equations. (S_i 's signify the input shares of capital, labor, and materials, respectively.)

$$S_i = \alpha_i + \sum_j \alpha_{ij} \ln p_{ij} + \sum_m \gamma_{im} \ln y_m + \varepsilon$$

Before taking logs and estimating the model, all cost model variables were scaled by their respective sample means. Also, the input prices in the share equations have been normalized by the materials price, and the materials price share equation has been dropped to avoid estimation difficulties associated with a non-singular covariance matrix. The cost function and two share equations were simultaneously estimated using non-linear least squares and the TSP econometrics software package. Heteroscedastic-consistent standard errors were computed. Before estimation, the usual symmetry and homogeneity restrictions were imposed [i.e., $\alpha_{lk}=\alpha_{kl}$, $\alpha_{mk}=\alpha_{km}$, $\alpha_{ml}=\alpha_{lm}$, $\beta_{br}=\beta_{rb}$, $\alpha_m=1-(\alpha_k+\alpha_l)$,$\alpha_{kk}=0-(\alpha_{kl}+\alpha_{km})$, $\alpha_{ll}=0-(\alpha_{lm}+\alpha_{kl})$, $\alpha_{mm}=0-(\alpha_{km}+\alpha_{lm})$, $\gamma_{kr}=0-(\gamma_{lr}+\gamma_{mr})$, $\gamma_{kb}=0-(\gamma_{lb}+\gamma_{mb})$]. Thus, 23 parameters were estimated with restrictions instead of 33 without restrictions. As shown in the Appendix, 21of the 33 parameter coefficients have t-statistics that are significant at the 5% level. The question regarding the reasonableness of the assumption that regulated companies minimize costs with respect to factor inputs often arises with any analysis of regulated utility company cost functions. Thus, to assess the impact of

this assumption, the cost function for these regulated local exchange telephone companies is also estimated without the share equations. See the Appendix (*This is available from Author) for the results of the cost function estimation without the share equations. Finally, it was suggested that a fixed effects model specification might be more appropriate. Coefficient estimates associated with a fixed effects estimation are also shown in the Appendix.

Elasticities of Substitution

The predicted input shares and coefficient estimates for the system of equations are used to estimate elasticities of substitution. In responding to the significant competitive inroads by the cable and wireless providers, the firms have on average increased their relative use of capital and reduced their shares of labor and materials. In 2004 the shares of capital labor and materials were 44%, 28% and 28%, respectively. By 2012 these input shares had changed to 52%, 25% and 23%. Increased reliance upon capital might be a risky proposition since any increases in the level of fixed costs must be recovered from an increasingly smaller base of customers.

Elasticities of substitution and input price elasticities indicate how readily one factor input is substituted for others in the production process.

Elasticities of Substitution (estimated at 2004-2012 sample means)

Parameter	Estimate	Standard Error	T-Statistic	P-Value
SEKL	.232972	.052181	4.46466	[.000]
SEKM	.113871	.038060	2.99190	[.003]
SELM	.089146	.058777	1.51669	[.129]
SELK	.232972	.052181	4.46466	[.000]
SEMK	.113871	.038060	2.99190	[.003]
SEML	.089146	.058777	1.51669	[.129]
SEKK	-.140831	.031893	-4.41574	[.000]
SELL	-.794216	.161642	-4.91343	[.000]
SEMM	-.280459	.044521	-6.29942	[.000]

The average substitution elasticities over the entire sample period are not in line with expectations. The traditional view is that, given the high degree of technological change, a cost minimizing telecommunications firm should substitute capital for labor. Also, the amount of materials is often viewed as a complement to the amount of labor. However, the annual substitution elasticities which underlie these averages have changed dramatically over time, from positive to negative, as the local exchange telecommunications companies have been dealing with the impact of substantial market share losses.

Returns to Scale Analysis

The partial derivatives of the total cost function with respect to the two outputs are taken in order to evaluate economies of scale.

Evaluated at sample means

Parameter	Estimate	Standard Error	t-statistic	P-value
$\partial C/\partial Y_r$	.739724	.018991	38.9503	[.000]
$\partial C/\partial Y_b$	.231016	.018625	12.4033	[.000]

The overall output elasticity is the sum of the individual output cost elasticities.

$\partial C/\partial Y_r + \partial C/\partial Y_b = 0.9707$

This implies returns to scale (RTS) of $1/(\partial C/\partial Y_r + \partial C/\partial Y_b) = 1.030$

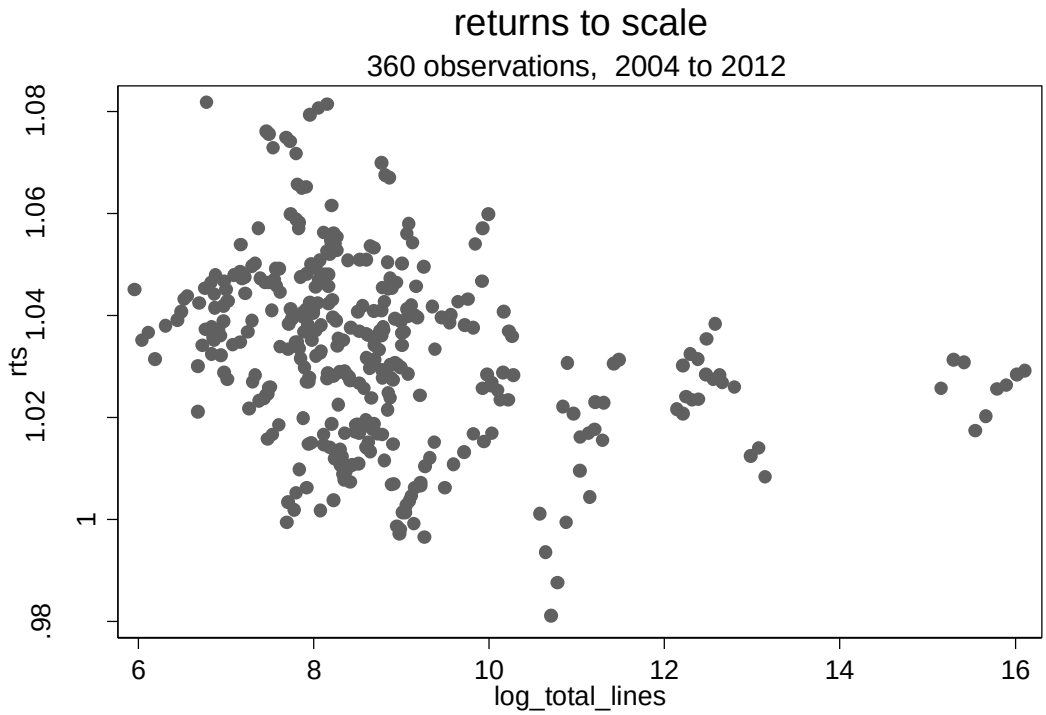
Evaluated at sample means

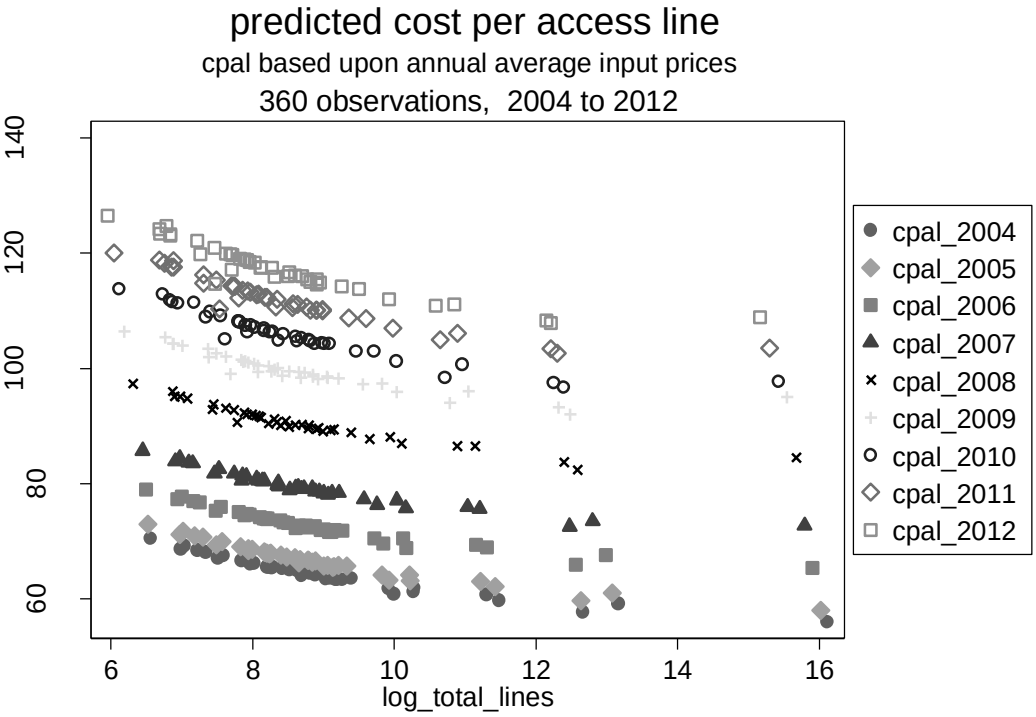
Parameter	Estimate	Standard Error	t-statistic	P-value
Output Elasticity	.970739	.446588E-02	217.368	[.000]
Returns to Scale	1.03014	.473916E-02	217.368	[.000]

Returns to scale can also be calculated at each of the 360 sample observations using the outputs and prices for each observation and the trans log model parameter estimates. The table below presents a summary of the 360 combined output elasticity and returns to scale calculations. The 360 returns to scale estimates are plotted against the log of total access lines (sum of residential and business access lines). The degree of scale economies falls as the number of access lines served increases. However, the scale economies rarely fall below the constant returns to scale level. Returns to scale would be decreasing if RTS<1.

The overall scale economies appear to be fairly slight for the larger companies in the sample. However, larger economies of scale appear to exist for the smaller companies. Thus, losses in overall customer levels might be problematic for the smallest incumbent telephone companies.

The figure below shows predicted cost per access line assuming each of the forty local exchange companies face the same input prices for capital labor and materials. The upward shift in cost per access line over time appears to have a much larger impact on unit costs than movement along the unit cost curves. This may relate to the local exchange companies' inability to quickly manage down input costs in the face of rapidly decreasing market shares.


returns to scale
360 observations, 2004 to 2012
rts
.98
1
1.02
1.04
1.06
1.08
6
8
10
12
14
16
log_total_lines


predicted cost per access line
cpal based upon annual average input prices
360 observations, 2004 to 2012
60
80
100
120
140
6
8
10
12
14
16
log_total_lines
cpal_2004
cpal_2005
cpal_2006
cpal_2007
cpal_2008
cpal_2009
cpal_2010
cpal_2011
cpal_2012

Impact of Losses in Business vs. Residence Customers

At first blush, the increases in overall cost per access line appear to be inconsistent with constant returns to scale. However, the estimated coefficient for the business to residence cross term βBRB is -0.108693 and highly significant, indicating the possibility of trans-ray convexity in the cost function, meaning that costs would decrease with the joint provision of residential and business services. As shown below, the proportion of business customers to total customers has increased as competitive wireless and cable companies have been more successful in attracting away residence customers than business customers. Unit costs might be higher than they otherwise would be if residence customers are competed away disproportionately. On average, the percentage of business customer lines of total residence and business customer lines has increased from 21% in 2004 to 26% in 2012.

Cable TV operators traditionally focused on providing service to residential customers. Those residential customers then became the cable companies' first targets when rolling out their newer cable phone offerings. In contrast, regulators found that cable companies had an initially limited role in providing phone service to larger business customers. Cable TV facilities had not been built out to many office parks and industrial locations. However, indications are that the cable companies have recently expanded their efforts provide service in the business market. The cable companies appear to be taking advantage of the significant economies of scope which are available via the addition of business service customers. According to Bailey and Friedlaender, "economies of scope become the substitute for the economies of scale which firms cannot achieve given the market conditions they face."Unit costs would increase substantially if the incumbent local exchange companies were left with only residence or only business customers.

Analysis of Customer Density

There are a couple of ways that firms can expand or contract. The returns to scale analysis in the previous section analyzed how the telecommunications firms would fare as they either added or lost customers. However, the assumption is that the size of the service territory remains constant. This section will focus on whether firms can improve by expanding the square mileage of their service areas, or conversely how they will fare if they exit portions of their existing service territories. One way that firms can expand the size of their service areas is to merge with other with other firms. Another way is to "edge out" and compete with firms in adjacent service territories. In order to analyze the impact of customer density, two output variables were added to the cost model. The first additional output variable measures the square mileage of each of the incumbent telephone companies' service territories. Square mileage is chosen as an explanatory variable since it is highly correlated with the amount of outside facilities that must be constructed and maintained to provide landline telephone service to far reaching customers. Outside plant distances have also traditionally impacted the number and location of telephone companies' central office switching facilities. The service territory area output variable is measured in square miles and was obtained from NYPSC's Graphical Information Systems section. The

second additional output variable reflects the total number of residential and business customer locations within each service territory. The incumbent telephone companies built out their networks as a result of their traditional common carriage and provider of last resort obligations. The incumbents have argued that it is necessary for them to retain and maintain plant, regardless of customer migration to competition, given the incumbent firms' obligation to serve and carrier of last resort obligations. However, it is unclear to what extent those obligations still remain. The number of customer lines served at the height of their monopolistic service provision at the turn of the century was used as a proxy for the maximum number of customers required to be served by each company. This could be viewed as describing each company's carrier of last resort obligation. Thus the cost model was expanded as follows.

$$Cost = f(Y_r, Y_b, Y_a, Y_d, P_k, P_l, P_m, year)$$

r = output of residence access line customers
b = output of business access line customers
a = output area of service territory size in square miles
d = output of total servable residential and business customer locations within service territory
k = capital input
l = labor input
m = materials input (everything else)
year = dummy indicator variable for each year

The estimated coefficient results and their significance levels for this four output cost function are shown in the Appendix. The estimated cost elasticities associated with the two additional output variables are relatively slight.

Evaluated at sample means.

Parameter	Estimate	Standard Error	t-statistic	P-value
$\partial C/\partial Y_r$	.702940	.046579	15.0913	[.000]
$\partial C/\partial Y_b$	.247303	.039942	6.19161	[.000]
$\partial C/\partial Y_a$	.011631	.011907	.976828	[.329]
$\partial C/\partial Y_d$	.677526E-02	.064076	.105738	[.916]

The marginal costs associated with the two added output variables are extremely small. Thus, the estimated model predicts that there will be little change in cost as the area of service territory size in square miles changes, or as the number of total servable residential and business customer locations within service territory changes. Also, over the 2004 to 2012 sample period, the cost elasticity associated with business line customers has increased while the cost elasticity associated with the change in residence customers has decreased. This might be reflective of the relatively greater importance of business customers to costs as the proportion of residence customers has decreased over the estimation time period.

However, given the extremely small cost elasticities for the two added variable representing the square mileage of the service territory and population of customer locations in the service territory, it is the number of business and residential customers served within that population that most greatly impacts upon the incumbent telephone company costs. The model results suggest that attempts to become more cost efficient by expanding service territory will not be very effective. The results also indicate that maintaining density of residential and business customers is important for maintaining overall cost efficiency.

Conclusion

The incumbent local exchange telephone companies appear to be facing increased difficulty as competition from cable and wireless phone providers continues to erode their market shares. This is apparent in their rising unit costs over time. The cost model estimated herein provides a number of insights regarding how the incumbent telephone companies can best respond to the increasing level of competition. The substitution of capital for labor and/or materials is a two edge sword —increasing cost efficiency, but also potentially stranding fixed costs. Incumbent telephone companies should be vigilant in retaining both residence and business customers so as to take advantage of significant economies of scope. Responsive strategies associated with mergers and competitive entry into adjacent service areas are not expected to result in a large degree of marginal efficiency improvements. Finally, maintaining customer density is essential in keeping unit costs in check.

ENDNOTE

*****The analyses and conclusions in this paper are the author's and do not necessarily reflect the position of the New York State Department of Public Service. The author is grateful for a number of very helpful comments and suggestions from his colleagues at the NYSDPS and from fellow participants of Session D43 of the October 2013 NYSEA conference.

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Interaction Effect between Price And Time Preference On Smoking Behavior Of Pregnant Women

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ABSTRACT

In this paper, I explore the smoking behavior of pregnant women in NLSY79 (National Longitudinal Surveys 79). A key aspect of this research is the availability of smoking participation before and during pregnancy. Thus, I consider the probabilities of quitting while pregnant and re-starting after giving birth as outcomes. Individuals who are more present-oriented are more likely to smoke and to consume larger amounts of cigarettes given that they do smoke than those who are more future-oriented. Moreover, those who discount the future more heavily will be more sensitive to the money price of cigarettes than those who are more future- oriented. The reason is that a one percent change in the money price of cigarettes represents a larger percentage change in the full price for the former group. I focus on the role of time preference and the interaction between time preference and price in determining these outcomes.

INTRODUCTION

Attributable risk is widely used to represent the relationship between smoking and its health risks. It is defined as the maximum proportion of a disease that is attributed by certain characteristic factor, holding other factors being equal level for all people. (Lilienfeld). Attributable risks are distinguished between the smoking and nonsmoking group. In tobacco prevalent countries, smoking related circulation and respiratory diseases remarkably account for chronic illness. Especially, pregnant women who are smoking face more risk than that of the general public. For example, fertilization ability tends to be lower and the risk of osteoporosis is accelerated. Women smoking during pregnancy have a greater risk of natural miscarriage than other women. Smoking during pregnancy can be a risk factor for low birth weight.

Apparently, by the wide health education and recent research, the harmful consequences due to smoking are well known among smokers. Because of addiction, it is difficult for people who would be willing to give up smoking to quit tobacco. A Finnish survey shows that (N=752) 58 percent of smokers who attempted to stop smoking face a failure of quitting (Sosiaal,1988). Whereas pregnancy is one of the good opportunities for people, especially for young women to stop smoking. Compared to the general population, pregnant women are a future oriented group who are more caring about their future children's health. In this paper I am going to focus on how the probability of pregnancy women quitting smoking changes if the price and discount factor change. According to the hypothesis, the money price elasticity is smaller for individual who are more future-oriented.

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The concept of the full price of cigarettes is the sum of the money price and the monetary value of the expected future harm due to smoking. To determine the monetary value of risky outcomes, the discount rate is used to account for the value of risk behaviors (Markku P). The future risky outcomes can be discounted today by a discount factor DF=1/(1+r), where r is the discount rate. The higher the discount rate, the lower the discount factor and the less value is assigned for the future outcome. As the discount rate rises, people are more likely to prefer instant gratification, which would result in less monetary value of the risky consequence. The point here is that a one percent change in cigarette price is a bigger percentage change in the full price the smaller is the discount factor. In spite of the case of time consistent preference, the same person may also face time inconsistent preference. People likely delay their actions in the short run (Harris, 2000). People are more likely to act on instant rewards and less to act to the future rewards (Laibson,1997; Cohen,2004). The risk outcomes are evaluated by individual preference, although the income level is another important concept for evaluating health risk.

This paper places a high focus on the cause-effect analysis in both health and economics meaning. First, because drug using restricts the reproductive ability of the offspring, I want to examine how much pregnant women individually or collectively reduce their smoking behavior responding to the price and personal preference. People would like to sacrifice some present happiness to achieve a reduction in the probability of future harmful outcomes (Laibson,1997; Cohen,2004). Second, same harmful consequences caused by smoking can be interpreted differently by the people who have various future discount rate. Interacting the price with discount factor can be more precise in interpreting the price effect through individual time preference.

Except for health risks caused by a smoking mother, economic consequences of smoking during pregnancy also are big costs for government healthcare. This paper can also examine how government cigarette tax policy influences the smoking behavior in pregnant women, and thereby results in a reduction of healthcare expenditure on the pregnant medical benefit.

I will use NLSY quasi-hypothetical reward question to measure personal preference. Referring to the paper of (Johnson, 2002) and (Madden, 2003), quasi-hypothetical questions have similar results as empirical experiments. I will use the measure of time preference rate in NLSY79 by following (Courtemanche, 2011), which is available only in 2006.

2. Empirical Work

2.1 Model

To test my hypothesis, I assume the individual lives for two periods. The lifetime utility function is

$$V = U(H_o, X, C) + \beta U(H, X_1, C_1) \qquad (1)$$

Here H_0 is initial health and is exogenous. X is consumption of a good other than cigarettes in period 0. C is consumption of cigarettes in period 0. The price of X is \$1, and the price of cigarettes is p. The

variables H , C_1 and X_1 are health, cigarette consumption, and the other good in period 1. β is the time discount factor. For simplicity, I assume that lending and borrowing are not possible and ignore the selection of X_1 and C_1. Hence the relevant budget constraint is:

$$I = X + PC \tag{2}$$

Finally, an increase in C lowers health in period 1 ($\partial H/\partial C \equiv H_C < C$)

The Lagrange function is:

$$L = U(H_0, X, C) + \beta U(H, X_1, C_1) + \lambda(I - X - pC)$$

where λ is the marginal utility of income.

The first order condition for C is

$$U_C + \beta U_H H_C = \lambda p$$

The second term on the right-hand side of the last equation is negative since $U_H > 0$ and $H_C < 0$. Rewrite the last equation as

$$U_C = \lambda(p - \beta \frac{U_H H_C}{\lambda})$$

Note that $f \equiv -\beta \frac{U_H H_C}{\lambda}$ defines the discounted monetary value of the loss in utility in period 1 due to smoking in period 0. Hence the full price of cigarettes (π) is

$$\pi \equiv p + f$$

Clearly, the full price is higher the larger is the value of β.

One way to proceed is to specify a general demand function without assuming anything about the form of the utility function:

$$C \equiv C(I, \pi)$$

Now differentiate C with respect to p, with f and I held constant

$$C_p \equiv C_\pi$$

So

$$-C_p \frac{p}{C} \equiv -C_\pi \frac{\pi}{C} \frac{p}{\pi}$$

Define ϵ as $-C_\pi \frac{\pi}{C}$, and note that ϵ is the elasticity of C with respect to full price π. Hence

$$e = (p/\pi)\varepsilon$$

Clearly, if ϵ is constant, e rises as β falls because p/π rises as β falls. In words, people who discount the future heavily have a more elastic demand function than those who do not because as one percent change in money price is a larger percentage change in full price for the former group.

2.2 Probit Estimation

According to the paper (Ai and Norton, 2003), assuming a probit model as

$$E[y \mid x_1, x_2, X] = \Phi(\beta_1 x_1 + \beta_2 x_2 + \beta_{12} x_1 x_2 + X\beta)$$

where X is a k x 1 vector of independent variables, including control variables, year dummy and state dummy depending on the different model. To derive the interaction effect, respect to x_1

$$\frac{\partial \Phi(\cdot)}{\partial x_1} = \Phi'(\beta_1 + \beta_{12} x_2)$$

then respect to x_2

$$\frac{\partial^2 \Phi(\cdot)}{\partial x_1 \partial x_2} = \beta_{12}\Phi'(\cdot) + (\beta_1 + \beta_{12} x_2)(\beta_2 + \beta_{12} x_1)\Phi''(\cdot) \quad (5)$$

The expected y can be represented as Cumulative Distribution Function $E[y \mid x] = F(x, \beta)$. The interaction effect $\frac{\partial^2 \Phi(\cdot)}{\partial x_1 \partial x_2}$ could be written as $\frac{\Delta^2 F(x,\beta)}{\Delta x_1 \Delta x_2}$.

In order to get the correct standard error, the paper of Ai and Norton (2003) suggests to use the Delta method for the variance calculation, which is derived from Taylor expansion (Xu and long, 2005). The normal distribution of interaction effect is shown as

$$\hat{\mu}_{12} \sim \mathrm{N}(\mu_{12}, \frac{\partial}{\partial \beta'}[\frac{\Delta^2 F(x,\beta)}{\Delta x_1 \Delta x_2}]\hat{\Omega}_\beta \frac{\partial}{\partial \beta}[\frac{\Delta^2 F(x,\beta)}{\Delta x_1 \Delta x_2}] \quad (6)$$

And estimated variance is

$$\hat{\sigma}_{12} = \frac{\partial}{\partial \beta'}[\frac{\Delta^2 F(x,\beta)}{\Delta x_1 \Delta x_2}]\hat{\Omega}_\beta \frac{\partial}{\partial \beta}[\frac{\Delta^2 F(x,\beta)}{\Delta x_1 \Delta x_2}]$$

The t statistic is t= $\hat{\mu}_{12}/\hat{\sigma}_{12}$. It is easy to test the hypothesis by using the t statistics.

3. Data

The data is from NLSY79 except the cigarette price. Data is available from 1979 to 2010. The dependent variable is pregnant women smoking participation, which is available in 1983, 1984, 1985, 1986, 1988, 1990, 1992, 1994, 1996, 1998, 2000, 2002, 2004, 2006, 2008 (15 year periods). (there is 2010 data, but I only have cigarette price data until 2009 so I use data until 2008). Dependent variable will be the quitting indicator. The pregnant women smoking status is available in the questionnaire, whereas for before pregnancy, smoking status can only be obtained from general drug use answers, which is only

available in 1984,1992,1994,1998,2008. Participation data in 1984 is structured differently from 1992, 1994, 1998, 2008. There is no question on 100 cigarettes smoked in entire life time for the 1984 participation. But since a lot of women have born baby in 1984, so I estimate the model with 1984 data in order to keep a larger of pregnant women information. All the independent variables are from time series data, except AFQT from 1988 and discount factor from 2006.

I am mainly interested in the smoking behavior change. Quit refers to the women who smoke before pregnancy and stop smoking after pregnancy. The total data sample is the women who are smoking before pregnancy and either continuously smoking or stop smoking after pregnancy. The quit percentage is 56/205=0.27, which is consistent with the finding as Colman (2003}. I consider both one time pregnant case (31/124=0.25) and two time continuous pregnancy (25/81=0.31). In the latter case, the women who stop smoking during either pregnancy are categorized as stop smoking. The available observation year of before pregnancy is 1984 (17/73=0.23), 1992 (20/63=0.32), 1994 (14/49=0.29), 1998 (5/20=0.25). In the quit sample, I did not consider about the after smoking status.

Data for prices and taxes come from Tax Burden on Tobacco (Volume 44, 2009). Data is at county level for the period from 1984 to 2009. Both price and tax are in the real term. The base period of CPI is 1967=100. Real tax is equal to (Federal + state+ county) tax.

I use monthly data (cigarette interview date) in NLSY79 to merge with cigarette prices to more precisely match with the state and county tax.

Time preference variables (DF1) are calculated from NLSY79 reward question in 2006 wave. "Suppose you have won a prize of $1000, which you can claim immediately. However, you have the alternative of waiting one year to claim the prize. If you do wait, you will receive more than $1000. What is the smallest amount of money in addition to the $1000 you would have to receive one year from now to convince you to wait rather than claim the prize now?"

Discount factor 1 (DF1) is calculated from the answers (amount1) by following formula:

$$DF1 = \frac{1000}{1000 + amount1}$$

DF1 (β) is the annually discount factor. DF1 is a measure of future orientation in the sense that the larger is DF1 the more future oriented is the person or the smaller is DF1the more present oriented is the person.

In addition to the price and discount factor, I also include demographic variables: Age, Gender, Race, Marital status; human capital: Armed Forces Qualification Test (AFQT) (1988) and schooling dummies as independent variable. For example, college is equal to 1 if highest grade completed is 16th or over 16th. Labor includes work hours and occupation. I classify the occupation as white collar, blue collar and service referring to Courtemanche (2011). Finally I add income, income squared, net worth as financial variables into the independent variables.

4. Empirical analysis

4.1 Time consistent discount factor model

I use a general linear probability model for cigarette consumption to examine how discount factor affects consumption. This panel data permits the slope coefficients to vary over both individual and time except for the discount factor. The estimating regression equation is

$$Q_{it} = \alpha_0 + \alpha_1 DF1_i + \alpha_2 DEMO_{it} + \alpha_3 HC_{it} + \alpha_4 LABOR_{it} + \alpha_5 FIN_{it} + \alpha_6 P_{ct} + \alpha_7 DF1_i P_{ct} + \varepsilon_{it} \quad (7)$$

where Q is smoking quit probabilities during pregnancy. i represents individuals. DF1 is the annual discount factor. DEMO includes age, gender, race and marital status. HC (Human Capital) includes AFQT score and schooling dummies. LABOR includes work hours and occupation (For example, workers' blue collar, white collar and service indicators). FIN (Financial) has income and income squared and net worth. P_{ct} is the cigarette price varying in the county level and the time. Discount factor is defined as DF1 = 1/(1+r) , where r is the rate of time preference. Suppose r is bigger than 0 for the future benefit, then DF1 is always less than 1. I want to examine how the discount factor influences the cigarette consumption through prices

4.2. Quitting Probability

Table 1 shows that in order to obtain correct partial interaction coefficient of Probit and its standard error , it is important to use cross derivative of the expected value of smoking participation, instead of considering marginal effect computed by Stata software packages as interaction effect.(Ai and Norton, 2003). Additionally, standard error of interaction effect is calculated by Delta Method. My results do support the hypothesis that cigarette price increase quit probability, and the bigger the discount factor (smaller discount rate, patient people), the smaller the price effect is. When discount factor coefficient interacts with the positive price coefficient, the sign of interaction term is positive.

The results shown in table 1 prove the hypothesis of quit probabilities. First, for Probit model, The interaction effect of Probit is calculated from cross derivative of the expected value of smoking participation. And its standard error is the result from delta method, the hypothesis here is that price increases the quitting probability of smoking. The price effect will be smaller for the people who have higher discount factor. That results the negative sign for interact effect. In table 1 column (3) and column (4), I find positive price participation elasticity and negative coefficient for interaction term which confirm the hypothesis. Second, in linear probability model, in table 1 column (1) and column (2), the price elasticity is correctly positive, and interaction effect is negative which is consistent with that I expected.

Table 1. Results for quitting smoking.

	(1) quit	(2) quit	(3) quit	(4) quit
DF1	1.226	0.412	4.555	1.417
	(0.97)	(0.29)	(1.08)	(0.24)
Price	0.015	0.012	0.053	0.056
	(1.79)	(0.93)	(1.77)	(1.13)
DF1*price	-0.012	-0.004	-0.046	-0.016
	(0.014)	(0.016)	(0.046)	(0.065)
Price elasticity	2.67	3.21	3.50	5.73
	(1.60)	(2.94)	(2.10)	(4.65)
Interact effect			-0.019	-0.006
(for Probit)			(0.04)	(0.025)
Control Vars.	Yes	Yes	Yes	Yes
Year fix effect	Yes	Yes	Yes	Yes
State fix effect	No	Yes	No	Yes
Regression	OLS	OLS	Probit	Probit
N	205	205	205	176
R^2	0.144	0.316		
pseudo R^2			0.134	0.264

Standard Eorror in parentheses * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ DF1 = Discount factor 1

Conclusion

This paper studies the effect of cigarette prices on the probability of pregnancy women quitting smoking varies if the time preference changes. I find that people who discount the future consequences of their current actions heavily are likely to be more sensitive to price than those who do not. The reason is that people define the full price of cigarettes as the sum of the money price and the monetary value of the expected future harm due to smoking. A one percent increase in the money price results in a larger percentage increase in the full price for those who discount the future heavily than for other individuals.

All results show that the coefficient of discount factor is positively related to the quitting probability of smoking. Price elasticity is positive. The positive effect becomes smaller if pregnancy women's discount factor is bigger. So interaction effect is negative. I could conclude that among the pregnant women, the person who are present oriented, i.e., do not value the future highly, are more likely to smoke and more sensitive to price than those who do not.

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Household Shocks And Transition Into Marriage: Evidence From Rural Ethiopia

Boyd Tembo*

ABSTRACT

Using panel data modeling this study examines the effect of non-agricultural and agricultural household shocks on a child's transition into marriage. The general expectation is that a shock to the economic status of a household could lead to children transitioning to marriage earlier than usual. The data was collected from 15 villages during the Ethiopia Rural Household Survey (ERHS). The sample for this study comprises a cohort of children (aged between 5 and 20 years) followed over a 10-year period starting in 1999. The findings of this study may be important in influencing public policy on early child marriage, social safety nets and education in Ethiopia.

1 INTRODUCTION

Household shocks such as death of a parent(s), prolonged illness of a parent(s) or loss of assets from an agriculture disaster can among other things cause a financial and psychological imbalance in a home. The household shocks can lead to: (i) a child prematurely leaving school, (ii) failure to be enrolled in school, (iii) to disturbance of the child's way of life by relocating (Yamano and Jayne, 2004) to a poorer household, (iv) facing psychological trauma (Deb and Cosic, 2008) or (v) even suffering poor health (Kadiyala et al., 2009). In other cases, a family may due to either economic or social pressures opt to arrange for their child an early marriage as a means of survival. The latter is particularly plausible in the case of a girl child. In situations, where maternal mortality has a greater impact on a child's welfare it may be the case that a male child may opt to start a family earlier as a way of seeking extra labour for the family (Jensen and Nielsen, 1997), or could lead to a delay as they seek to re-establish themselves economically (Fafchamps and Quisumbing, 2005).

Other things remaining the same the situations presented above could lead to an increase in the proportion of early marriages in a community. However, the plausibility of this argument is premised on the assumption that early marriage is an exception rather than the norm in the villages in the sample. There is also debate on whether the marriages are forced (Alemu, 2008) or voluntary (Oleke et al., 2006). Incidences of early marriage have been a source of concern in developing countries including Ethiopia. For example, Bongaarts (2007) reported that, "at national level 62% of Ethiopian women aged 20-49 get married before the age of 18 (p.1)". While economic factors may partially explain this trend, societal pressures have had a role to play as well (Alemu, 2008).

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In this era of high HIV prevalence in some developing countries increased premature prime-age mortality or prolonged morbidity could worsen the situation. This study has been influenced by an earlier one (Beegle and Krutikova, 2008). Unlike the latter study, we attempt to measure the influence of other household shocks such as parental morbidity and agriculture shocks in addition to parental mortality. Marital status in 2009 is used as the dependent variable. Either year-of-first marriage or age-at-first marriage would have been a better variable to use but the structure of the data forbids such an analysis. Most of the previous studies have mainly focused on parental mortality and its impact on school outcomes, child health and child labour. The studies on early marriage have generally focused on its impact and causes. There is so far not many studies on parental mortality and a child's transition into marriage.

The purpose of this study is to establish a statistical correlation between household shocks and a child's transition into marriage using data from 15 villages in Ethiopia. Early marriage has implications on health and education of the concerned children and possibly their offspring.

Then, this may negatively affect a country's human capital development. More so, in the case of a poor country like Ethiopia. This paper will push the theses that:

1. Household shocks impact children in different ways according to gender and age.

2. Agriculture shocks may impact a child's transition into marriage less significantly.

3. Village fixed-effects and not household shocks may have more influence on child early marriage decisions.

One of the limitations of this study is the absence in the data of information on timing of first-marriage. The latter would have been helpful in refining the link between the occurrence of a significant household shock and a family's decision on a child's marriage. This is one of the benefits of using DHS data.

The paper is organised as follows: In Section 2, the paper describes the model and methodology used to arrive at the results that are presented and analysed in Section 3. Lastly but not the least, the conclusion is presented in Section 4.

2.METHODOLOGY

2.1 The Theory

The longitudinal nature of the data available for this study means that Ordinary Least Squares (OLS) regression may not be an appropriate econometric model to use. This is because the study focused on measuring the probability of marriage rather than the percentage by which a regressor increases the regressand. A suitable methodology for this study would have been use of survival analysis with a time-to-event dependent variable (Kleinbaum and Klein, 2012).

Survival analysis also has the benefit of properly accounting for sample attrition owing to censoring. However, this has not been possible owing to incomplete information on time of event for the cohort of interest. The function that determines the value of the dependent variable is based on a limited likelihood.

The logit methodology is based on a cumulative density function of the form:

$$\psi(X'\beta) = e^{X'\beta} / 1 + e^{X'\beta}$$

2.2 The Model

The basic logit model presented in this study is univariate of the nature:

$$M_{ijt} = S_{ijt}\theta + \upsilon_{it}$$

However, it is important to control for the possibility of other variables having influence on the outcome. This thus calls for a multivariate analysis of the nature:

$$M_{ijt} = S_{ijt}\theta + X_{ijt}\beta + \upsilon_{it}$$

where M = Marriage outcome, S = Matrix of shock events (either death, illness or agricultural) and X = Matrix of other covariates and subscripts i = Child, j = Household and t = Time.

The 15 villages in the study are situated in different regions of the country therefore, raising the possibility that the model may suffer from Omitted Variable Bias (OVB). The latter may be caused by regional factors such as cultural norms (Stock and Watson, 2003). In addition, the panel is being tracked over two cycles. Therefore, it will be appropriate to use fixed effects regression. The basic model (1) specified above is modified to include a matrix comprising dummy variables that shall capture village-specific effects.

$$M_{ijt} = S_{ijt}\beta + X_{ijt}\theta + Z_i\psi + \upsilon_{it}$$

where, Z = Matrix of village-specific effects / Regional-specific effects.

The model measured the probability of a child entering into marriage after having experienced either a household shock or combination of shocks as defined in this study. The dependent variable measures the probability of a child being married within the 10 years given the existence of a shock or combination thereof.

3. RESULTS

3.1 The Basic Model

To recap, the basic model measures the impact of the three household shocks on the probability of marriage. Table 2 shows that households that reported a severe impact of an agricultural shock were more likely to have married children compared to those that were not severely impacted by such shock. In addition, death of a parent is found to increase the probability of marriage. Both agricultural and death shocks are statistically significant at 5% level of significant. Prolonged parent illness reduced the probability of marriage other things held constant but was statistically insignificant.

The results are in line with expectations in as far as the resultant exogenous shock that the events may bring to the household economic position. However, in the case of an agricultural shock it could be

argued that the wide spread nature of such an event would imply that families may not be very keen to take on extra headcount as the basic needs would tend to be in short supply. But critical in furthering this argument would be availability of data on the timing of marriage in the proximity of the calamity.

3.2 Inclusion of the Time-Invariant Variables

In this model, time-invariant variables representing gender and location are analysed. In the first of the two models considered in this section of the study location is represented by Peasant Association (PA) dummies Table 3. The latter represent the smallest unit of community grouping and are the same as villages. Each household in the study is located in a PA.

The results of the panel data logit reveal that all the household shock variables and the gender variable have positive signs although the illness and gender variables are statistically insignificant. It will be noted that agric remains very significant at 5% level of significance.

The results also show that orphans compared to non-orphans had a higher likelihood of being married by 2009 other things held constant. In the absence of data on time-to-marriage caution is advisable in the interpretation of the impact of orphan-hood on the probability of marriage.

According to the results, the location variable shows a mixture of positive and negative influences. Suffice to say, children from four of the villages in the study had a high and significant probability (at 5% of level of significance) of being married by 2009. The finding indicates the possible influence of cultural, religious and generally village level factors that may have been captured in the error term in the basic model. From a policy perspective, this finding could help in implementation of targeted initiatives aimed at discouraging possible trends of early child marriages in the concerned villages.

In the second model under consideration, the study used a regional dummy in the place of the one for village. Reasons for this type of modeling are explained in the methodology section above. As Table 4 shows, that compared to the respective base categories the agric and death variables have a positive and significant influence on the probability of marriage other things held constant. Being located in regions 3 (Amhara) and 4 (Oromya) compared to region 1 (Tigray) increases the probability of marriage all else remaining constant. This result is in line with the presentation in (Muthengi and Erulkar, 2009), which reports a high incidence of early child marriages in Amhara region of Ethiopia. It is also imperative to mention here that close scrutiny of the data shows that the 4 villages with significant statistics alluded to above are all located in Oromya region of Ethiopia. This finding all else held constant also has implications for targeted programs aimed at reducing possible cases of early child marriage.

Notwithstanding, it should be noted that the result may be influenced by the fact that 40% of the children in the sample were from the Oromya region.

3.3 Impact of Time-Variant Regressors

Table 5 shows that for the subjects, who were in the age group 15-20 years old at the end of the survey increase in a child's age reduces the probability of marriage. The statistic is significant at 10%.

The results also show that although increasing the highest school grade achieved has a negative impact on the probability of a child entering marriage at a tender age the influence seems to be stronger for those over the age of 21. This could be attributed to the ability for such child to be old enough to insist on remaining in school if pressured into marriage by parents.

Notwithstanding the argument, it can be seen too that female children have a higher and significant likelihood of being married. This result supports earlier expectations.

In this model too, the region variables have positive and significant signs implying that regional factors may have more impact on marriage decisions that the household shocks do. In addition, the bigger the household size the more likely the probability of a child being married and more so when they are in the older age group.

4. CONCLUSION

Using panel data modeling and analysis, the study finds that death of a parent and prolonged illness generally do not have statistically significant impacts on the probability of a child being married. Interestingly, it can be seen from the results that agricultural shocks on the other hand have a positive and highly significant impact on the probability of marriage. This finding raises the need for concerted efforts in educational and social safety net programs during times of calamity. The result does not, however, imply that the agricultural shock cause early marriage but that based on the data children from households that were severely impacted by agricultural shocks were more likely to be married.

A significant finding of this study is the result that regional factors seem to have more influence on marriage decisions in the households covered in this study. The results presented in this study are not at all conclusive and would benefit from more refined data and modeling probably of the nature of survival analysis.

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APPENDICES

Table 1: Summary Statistics

Variable	Mean	Std.Dev.	N
region	4.295	1.971	1832
pa	10.947	6.653	1832
year	2004	5.001	1832
age	16.21	5.348	1832
grade	2.974	12.621	1797
female	0.406	0.491	1832
married	0.053	0.224	1832
death	0.075	0.264	1832
agric	0.45	0.498	1832
ill	0.166	0.372	1832
age_sq	291.359	183.567	1832
hhs	0.457	0.498	1832
ln_nfe	6.717	1.215	1832
N		1832	

Table 2: Basic Model

Variable	(1) Age 15-20	(2) Age 21-30	(3) Age 15-30
married			
i.agric	0.421	0.362	2.960**
	(0.40)	(0.81)	(5.78)
i.death	-0.891	0.472	1.163**
	(-0.86)	(1.44)	(2.13)
i.ill	-0.511	-0.091	-0.059
	(-0.88)	(-0.31)	(-0.13)
cons	-3.716**	-1.731**	-8.488**
	(-3.32)	(-3.95)	(-12.05)
lnsig2u			
cons	-2.890	-6.051	2.611**
	(-0.16)	(-0.27)	(14.21)
N	593	323	1832

t-statistics in parentheses * p < 0.1, ** p < 0.05

Table 3: Time-Invariant Model

Variable	(1) Age 15-20	(2) Age 21-30	(3) Age 15-30
married			
i.agric	0.465	0.993	3.016**
	(0.42)	(0.80)	(5.18)
i.death	-0.916	0.284	0.835
	(-0.84)	(0.41)	(1.45)
i.ill	-0.358	-0.703	0.008
	(-0.59)	(-0.78)	(0.02)
i.female	-0.118	0.279	0.289
	(-0.22)	(0.43)	(0.63)
2.pa	-20.459	-1.435	-1.524
	(-0.00)	(-0.64)	(-0.80)
3.pa	-20.386	0.738	1.718
	(-0.00)	(0.42)	(1.10)
5.pa	1.911*	-1.395	1.009
	(1.67)	(-0.64)	(0.88)
6.pa	0.774	2.027	2.699**
	(0.53)	(0.93)	(2.29)
8.pa	1.359	4.382	3.339**
	(1.14)	(1.05)	(2.95)
9.pa	0.375	2.706	2.967**
	(0.26)	(1.00)	(2.60)
10.pa	0.553	-0.022	1.169
	(0.38)	(-0.02)	(0.96)
12.pa	-20.249	-39.191	-36.642
	(-0.00)	(-0.00)	(-0.00)
13.pa	-20.243	-0.428	-0.834
	(-0.00)	(-0.30)	(-0.62)
14.pa	0.268	1.534	1.413
	(0.18)	(0.74)	(1.14)
15.pa	0.213	2.820	1.207
	(0.15)	(0.97)	(1.01)
16.pa	-20.402	0.631	-0.730
	(-0.00)	(0.29)	(-0.38)
22.pa	-20.395	-0.061	-0.645
	(-0.00)	(-0.04)	(-0.51)
23.pa	1.553	1.819	2.503**
	(1.22)	(0.86)	(2.05)
cons	-4.298**	-4.501	-9.274**
	(-2.28)	(-1.06)	(-6.06)
lnsig2u	-1.502	1.771	2.326**
cons	(-0.14)	(0.65)	(6.63)
N	593	323	1832

t statistics in parentheses * $p < 0.1$, ** $p < 0.05$

Table 4: Time-Invariant Model

Variable	(1) Age 15-20	(2) Age 21-30	(3) Age 15-30
married			
i.agric	0.796	0.428	2.887**
	(0.71)	(0.93)	(5.47)
i.death	-0.812	0.330	1.062*
	(-0.72)	(0.98)	(1.96)
i.ill	-0.529	-0.165	-0.174
	(-0.83)	(-0.55)	(-0.40)
i.female	-0.099	-0.007	-0.044
	(-0.18)	(-0.02)	(-0.10)
3.region	2.106*	0.784	2.250**
	(1.73)	(1.24)	(2.33)
4.region	1.065	1.363**	2.376**
	(0.94)	(2.37)	(2.63)
7.region	-0.063	0.588	0.591
	(-0.05)	(0.94)	(0.64)
cons	-5.628**	-2.672**	-9.480**
	(-2.51)	(-3.75)	(-6.98)
lnsig2u	0.366	-9.234	2.355**
cons	(0.15)	(-0.03)	(8.46)
N	593	323	1832

t-statistics in parentheses * $p < 0.1$, ** $p < 0.05$

Table 5: Time Variant Model

Variable	(1) Age 15-20	(2) Age 21-30	(3) Age 15-30
married			
age	-13.770∗	1.997∗	4.778∗∗
	(-1.71)	(1.70)	(2.36)
age_sq	0.407∗	-0.037	-0.086∗∗
	(1.76)	(-1.61)	(-2.22)
grade	-0.020	-0.056∗∗	-0.046
	(-0.84)	(-2.50)	(-1.46)
female	3.171	2.145∗∗	7.018∗∗
	(1.11)	(2.00)	(2.16)
1.agric	1.264	0.890∗	2.760∗
	(0.70)	(1.83)	(1.89)
1.death	-4.272	0.233	0.556
	(-1.05)	(0.53)	(0.45)
1.ill	0.804	-0.003	0.644
	(0.52)	(-0.01)	(0.60)
1.hhs	0.846	0.726∗∗	1.982∗∗
	(0.79)	(2.00)	(2.10)
1.poor	-1.328	0.191	0.111
	(-1.08)	(0.53)	(0.13)
3.region	3.646	2.000∗∗	6.188∗∗
	(1.47)	(2.28)	(2.16)
4.region	2.540	2.930∗∗	8.187∗∗
	(0.95)	(3.20)	(2.51)
7.region	1.525	2.072∗∗	5.260∗
	(0.52)	(2.06)	(1.82)
fdea	3.978	-0.222	-2.259
	(1.03)	(-0.30)	(-1.07)
fill	-3.848	-1.215	-5.966∗∗
	(-1.33)	(-1.35)	(-2.12)
freg	-0.561	-0.468∗	-0.985
	(-0.88)	(-1.85)	(-1.64)
cons	104.425	-31.138∗∗	-77.637∗∗
	(1.52)	(-2.07)	(-2.70)
lnsig2u	2.325∗∗	-11.465	3.614∗∗
cons	(3.27)	(-0.04)	(6.54)
N	483	276	1485

t statistics in parentheses ∗ p < 0.1, ∗∗ p < 0.05

Literature vs. Reality: Bank Valuation Methods Used by Equity Analysts

José Luis Velasco and K. Matthew Wong*

ABSTRACT

The idiosyncratic attributes of banks call for the use of valuation methods that are adapted specifically for the peculiar characteristics of the banking business and the special roles played by its leverage and capital constrains. This paper discusses the common valuation methods advocated in the academic literature and compare them against the "real world" methodologies. The study reviews 171 research reports on the valuation of some of the largest European banks in 2011. The results of the research indicate, for the scope of the sample, that there is a disconnect between the financial literature and the real world. Equity analyst, in general, use valuation models that are more closely adapted to the specific characteristics of banks and not always follow what the financial literature proposes as the core methods for bank valuation. This finding suggests that there is ample room for further research to re-evaluate the banking valuation methodology in the literature.

INTRODUCTION

A central characteristic of modern capital markets is the constant need to value assets. Asset valuation may be needed either in connection with securities traded in the stock market, as required by a corporate transaction, for value management purposes, or as a result of corporate restructuring. Although financial analysts may choose different valuation models to estimate current values, most of the models are somewhat similar in that they involve discounting the available cash flow to securities' owners to the present time (Diamond & Rajan, 2000, p. 11).

The preference for one valuation method over another is determined by the stage of life cycle of the company (new venture, stable growth, or mature), whether the cash flows are positive or negative, whether or not the company pays dividends, the degree of uncertainty of the estimates, or the specific industry, amongst many other factors.

In the case of financial institutions, the valuation process can deviate significantly from the generic valuation approach. There are three main features of the banking business that support this more custom approach in banking: the use of financing as a raw material, the high degree of leverage, and the heavy influence of government regulations on the business.

This paper studies bank valuation methods from a practitioner's perspective. It reviews how stock analysts determine absolute or relative valuation of European bank securities and examines how aligned they are with the valuation models proposed in the financial literature. This analysis looks at the bank as

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an ongoing business, and does not address valuation in the context of corporate restructuring, M&A transaction, or other special situations.

To provide a general framework for the analysis, the paper starts with a review of the main valuation techniques in the literature, continues with a discussion of the differences between a bank and an industrial company from a valuation perspective, and analyzes how the financial literature deals with bank valuation.

The sample used for the research consists of 171 reports from 18 different research houses covering euro based European bank stocks. The study summarizes the valuation models employed by different analysts and identifies the preferred methods of valuation. The results of the study show that there are differences in how banks are actually valued and what the literature advocates. There is room for further research to develop a more general valuation framework for banks to reconcile the theoretical models and what practitioners are doing.

COMPANY VALUATION METHODS

There are obvious differences in how an industrial company organizes its business and the way a financial institution is run. In contrast to industrial companies, the financial structure of a bank is influenced not only by the desire to seek an optimal capital structure, but also by how the business is actually conduct. For a manufacturing company, financing is separated from its operations. In contrast, for a bank financing is part of its operations (Gross, 2007, p. 22). Clients' deposits are a production factor of the intermediation function carried out by the bank. This characteristic of banks makes it difficult, or close to impossible, to determine what part of the liabilities is structural financing and what relates to operations (i.e. what is long-term debt and what is working capital).

Additionally, the high level of leverage of banks compared with non-financial companies compounds the impact of the problem. Non-equity financing carries a much larger weight than equity financing on the balance sheet and the cost of capital of non-interest bearing deposits is difficult to determine (Copeland et al., 2000, pp. 434-435).

These two issues led some to favor equity oriented valuations when dealing with banks, because the company's weighted cost of capital (WACC) calculation is simplified as there is no need to disentangle the liability structure of the bank. The enterprise valuation approach presents an additional problem that in situations where the spread between loans and the cost of capital is low, small estimation errors may produce significant changes in the valuation (Copeland et al., 2000, p. 435).

A second area of concern is the core banking process of transforming deposits into credits and loans. First, interest rate spreads are subject to asset and liability repricing which is also a function of the degree of mismatch between asset and liability. Given the high degree of leverage of banks, small changes in these variables can have an exponential effect in future earnings and cash flows. Second, loan related losses are an intrinsic element of the lending activity and are highly correlated with the business cycle.

Again, small changes in the percentage of bad debts in respect of total loans may have a dramatic impact in bank's profitability and even in its long-term viability.

Third, a bank's profitability is closely related to economic activity. This relationship is often reinforced by the fact that in times of general economic weakness, the regulatory measures tend to be more pro-cyclical than counter-cyclical; as well as by the more stringent financing requirements that banks impose on clients. Chen (2001, p. 416) posits that ``the initial effect of a shock to bank capital propagates into subsequent periods through the interaction of credit constrains on the banks as well as on entrepreneurs, which together cause a spiral fall in bank lending and investment''.

Fourth, in large international banks, the business is not limited to the intermediation process between lenders and borrowers. Much to the contrary, it comprises many different activities such as investment banking, payment services and other commission based products, private banking, asset management, securities services, and the provision of capital markets products. The existence of so many activities within a bank, together with the use of bundle pricing in many instances, makes it difficult to determine what is actually driving the results of the bank. As Copeland et al. (2000, p. 438) point out: ``it is hard ... to understand which business units are creating or destroying value.''

Finally, banking is also heavily regulated such that legislation has a material impact on both the business structure and the profitability level. From this perspective, the amount of capital stands out as the key variable monitored by banks. The level of total and core capital determines the level of activity and the potential growth of the bank's various business lines. For example, under the Basel II capital accord (Basel Committee on Banking Supervision, 2006), minimum capital is calculated as a function of credit risk (based on risk weighted asset calculation), operational risk, and market risk.

Most works that deal with bank valuation start with a similar tenet that banks are difficult to value and very different from other companies (see, for example, Copeland et al., 2000, p. 433, or Damodaran, 2002, p. 575). Even if both premises may be considered valid, it can also be argued that they are just as different as a manufacturing company from a utility, or no more difficult than valuing a technology driven company where a breakthrough discovery can make the difference between failure or outstanding profits.

In general, the literature treats banks as a special case for the application of the generic methods and no unique tools are developed to value financial institutions. Additionally, few papers cover the adjustments that may be required when valuing banks (Gross, 2007, p. 12).

Copeland et al. (2000, pp. 434-435) advocate the use of the FCFE model as the main valuation methodology for banks. Under this approach the free cash flow to shareholders is defined as net income plus non-cash charges less cash flow needed to grow the balance sheet. This figure is calculated as net income plus depreciation, plus sources and minus uses of cash flows that are derived from the balance sheet analysis (including the repayment of loans net of provisions, and the cash consumption resulting from new loans). The main hurdle in this approach is to determine what part of the equity cash flow has to be retained in the business to support growth and to comply with the capital ratio requirements.

Damodaran (2002, pp. 579-600) recommends a wider range of valuation methods for banks, favoring those models that focus on equity rather than on the whole firm.

Under the assumption that firms will pay eventually as dividends all available cash flow to equity, the DDM is presented as an alternative formulation to the FCFE approach. Alternatively, the free cash flow to equity can be determined by estimating the reinvestment needs of the bank on the basis of the minimum capital ratios. The fact that banks tend to pay out more in dividends than other companies makes the use of the DDM especially appropriate. In this situation, dividends can be a reasonable proxy for free cash flow to equity.

The FCFE and the DDM yield the same result when dividends are equal to the free cash flow available to shareholders, and also when excess cash above dividends is reinvested in projects with zero net present value (Damodaran, 2002, p. 374). In the more general case, FCFE valuation tends to be higher than the value derived from the DDM. This difference in value can be seen as a firm controlling premium.

Regarding the growth estimates, the general growth model in which g is equal to the retention ratio times ROE is particularly well suited for banks. Since financial assets are marked to market, ROE is a more dependable metric. And the link between retention ratio and the minimum capital ratios helps to reasonably forecast future growth (Damodaran, 2002, p. 584).

The residual income valuation model (RIV) can also be adapted to bank valuation. Most bank's assets and liabilities are marked to market. As a result, the accounting value of equity for a bank is much closer to the market value than that of a manufacturing firm. The limited impact of depreciation in banks also makes it reasonable to use equity value as the starting point for this valuation approach (Damodaran, 2002, p. 592).

Given the nature of the banking business, asset-based valuation is considered appropriate for banks only in those instances in which there is limited or no growth. Assets and liabilities can be assessed using expected transaction prices in the market. And the expected cash flows of each asset are then discounted at the applicable cost of capital.

Finally, relative valuation focusing on the measures of price to earnings (P/E) and price to book (P/B) is also a valid methodology for bank valuation. The strong relationship between P/B and ROE for financial services firms suggests the convenience of looking at both ratios simultaneously Nevertheless, different business lines within a diversified banking institution may command different P/Es (e.g. retail and investment banking divisions within a bank exhibit different risk, return, and growth profiles). To deal with such diversity, it is possible to value each business independently at the appropriate multiples and then arrive at the combined total value of equity. This approach is known amongst practitioners as the sum of the parts model (SOTP).

The sum of the parts valuation method (SOTP) is extensively used by practitioners but it is not that well covered in the literature. For a discussion of how to apply this methodology and the main issues it has to overcome (amongst others, valuation of the corporate center, assessment of the transfer pricing

quality, and allocation of equity amongst divisions), Fernández & Pérez (2008) and Morales & Martínez (2006) treat the subject with some degree of depth.

Gross (2007) discusses the applicability of four valuation approaches to banks: market based, asset oriented, cash-flow, and residual income. The author notes that the DCF method is the one favored in the bank valuation literature, despite the fact that the bank's specific attributes actually support the use of the residual income approach. She further argues that both DCF and residual income models (both using the equity approach) are preferable to multiples or net asset values approaches, which should only play a secondary role.

In addition, asset based and relative valuation methods can play a supplementary role as well. Liquidation price of a bank's assets serves as a floor for its value. Market-oriented valuations also play a role as "early indicators, control methodology and negotiation tool". Amongst them, P/E multiples have a limited explanatory power, especially in the case of diversified banks in which P/E vary markedly from one business activity to another. P/B provides a summarized view of market's expectations about future performance relative to the invested capital, which according to Gross (2007), is a better indicator to use in valuing banks.

This paper focuses on ongoing bank valuations in a stock market context and does not deal with bank analysis in connection with a corporate transaction. However, it is reasonable to assume that transactions in which at least the bidder's stock is quoted in a market, M&A analysts will also need to look at similar valuation measures used by equity analysts.

BANK VALUATION IN PRACTICE

This study reviews 171 research reports on European banks produced by 18 different research houses (international and domestic). We seek to identify the principal valuation methodologies used by sell side analysts and examine how aligned these methodologies are with the current literature.

Out of the 171 reports, 155 were available in Bloomberg and another 14 were obtained from other sources. With the exception of two reports that were written in 2010, all of them were dated 2011. The type of documents that were analyzed included full bank research reports, comprehensive analysis of the European banking sector, and research updates linked to new earnings figures or some other kind of emerging information in the market.

The sample used was limited by the authors' ability to access the actual reports, a methodological issue that can limit the ability to generalize the findings of this research (see Trochim, 2005, pp. 27-29). However, this limitation is ameliorated by several factors: 1) banking today is a global activity from a business and regulatory perspective; 2) most of the research houses are global institutions that are more likely than not to use a standardize approach to valuation; and 3) although the featured banks are European based, many of them have a substantial proportion of their business in other parts of the world.

A more serious restriction is that the sample only covers sell side research. It cannot be ruled out that buy side research or investment banking related analysis could put the accent in different valuation methodologies or variables to meet their specific needs.

The information contained in the following tables summarizes what research approaches are used in different reports. It is possible that some research houses use some other valuation techniques in other analysis that are not part of our sample.

Table 8: *Valuation Multiples*

Research House	P/E	P/PPP	Price GOP	Div. Yield	P/Book	P/NAV P/TBV	ROE	Implied ROE
Iberian Equities	*	*		*	*			
Goldman Sachs	*			*	*	*	*	
Cheuvreux-Crédit Agricole	*	*		*		*	*	
BBVA Research	*			*	*	*	*	
Bersntein Research	*			*	*	*	*	*
Morgan Stanley	*			*	*	*	*	
Société Générale	*			*	*	*	*	
J. P. Morgan Cazenove	*			*	*	*	*	
Deutsche Bank	*			*	*	*	*	
Natixis	*		*	*	*		*	
Credit Suisse	*	*		*		*	*	
Santander	*			*	*	*	*	
Royal Bank of Scotland	*			*	*		*	
Macquaire	*			*	*	*	*	
HSBC	*	*		*		*	*	
Commerzbank	*			*	*		*	
Mediobanca Securities	*			*	*			
N+1 Equities	*			*		*		
#18 Houses	18	4	1	18	14	13	15	1

Source: 171 research reports from different equity research houses downloaded from Bloomberg (155) and from other sources (14) covering the 6 banking groups included in Eurostoxx 50 and some other European banks. All reports are dated in 2011 with the exceptions of Bernstein Research and Iberian Equities which are dated in 2010.
Column headings descriptions: P/E (price to earnings), P/PPP (price to pre-provisions profit), Price/GOP (price to gross operating profit), Div. Yield (dividend yield), P/Book (price to book), P/TBV (price to tangible book value, ROE (return on equity), Implied ROE (implied return on equity).

Table 1 tabulates the valuation multiples used in different reports, whereas Table 2 shows the principal valuation models applied by the different research houses. The information contained in these tables together with the analysis of previous sections provides sufficient insights to understand how sell side analysts evaluate banks. The following itemized list summarizes the differences and similarities between what is advocated in the literature and what is used by practitioners. It also highlights in which cases some research houses may stray from the more generic approach:

- Table 1 above shows that only two multiples are present in all reports: P/E and dividend yield, reflecting the fact that despite all the limitations, markets continue to use earnings based valuation as a baseline, and that dividends play a significant role in the market assessment of banks. The use of earnings based multiples though, is consistent with some of the academic positions mentioned above.
- The results in Table 1 also indicate that some research houses also rely on the ratio of P/PPP to isolate the performance of the bank from the quality of the loan portfolio. This ratio is seldom mentioned in research of bank valuation.
- As supported in the literature, the P/B ratio is a key multiple in banking valuation. Analysts also refine this analysis by adjusting intangible assets and goodwill from book value to produce more comparable and conservative figures.
- P/B, ROE, Implied ROE, and P/B Intrinsic valuations are used by a significant number of analysts to support both their relative and absolute valuations. This approach is consistent with our discussion above and with the relative good quality of book estimates in banks and with the relevant role of capital in shaping the structure of the business.
- Regarding the use of discounted cash flow method, Table 2 below shows that none of the reports use the FCFE methodology straightly. Only two research teams apply a variant of the FCFE method and limit themselves to the use of DDM of different degrees of complexity. There are probably two notions that support this approach. First, calculating free cash flow to shareholders from outside the bank is quite difficult, and second, in cases where banks are running very tight capital ratios it can be safely assumed that dividends are a good proxy of the maximum amount of free cash flow to equity.
- Despite the fact that both the literature and on the field valuation models seek to value equity and not the whole firm, there are still examples of analyst that include company based metrics such as EV/EBITDA and P/E.
- It should also be noted that none of the research houses listed in Table 2 use the RIV methodology, despite that this metric can be calculated for banks in a rather straight forward manner and its theoretical support discussed previously.
- The SOTP is a fundamental instrument in the bank analyst's toolbox. However, it has been very scarcely discussed in the financial literature. A bank analyst may break down its analysis of the bank by its various geographical locations or business lines, or both. Each unit can be valued using any of the other methodologies, including implicit P/E, comparable P/E, or the relationship defined in equation (7). Other businesses such as asset management can be valued used different metrics such as a multiple based on assets under management.

Table 9: Principal *Valuation Models*

Research House	DDM	Sum OTP	SOTP Implicit P/E	SOTP Comparable P/E	P/Book Intrinsic Value (GGM)	EV/ EBITDA
Iberian Equities		*				
Goldman Sachs					*	
Cheuvreux-Crédit Agricole		*	*			
BBVA Research						
Bersntein Research		*				
Morgan Stanley		*			*	
Société Générale	*	*		*	*	
J. P. Morgan Cazenove		*		*	*	
Deutsche Bank		*		*		
Natixis	*	*			*	
Credit Suisse		*		*		
Santander		*			*	
Royal Bank of Scotland						*
Macquaire					*	*
HSBC						
Commerzbank						
Mediobanca Securities		*			*	
N+1 Equities						
#18 Houses	2	11	1	4	8	2

Source: 171 research reports from different equity research houses downloaded from Bloomberg (155) and from other sources (14) covering the 6 banking groups included in Eurostoxx 50 and some other European banks. All reports are dated in 2011 with the exceptions of Bernstein Research and Iberian Equities which are dated in 2010.
Column headings descriptions: DDM (dividend discount model), Sum OTP (sum of the parts), Implicit P/E (implicit price to earnings), Comparable P/E (comparable price to earnings), P/Book Intrinsic Value [GGM] (price to book intrinsic valuation based on the Gordon growth model), EV/EBITDA (enterprise value to earnings before interest, taxes, depreciation and amortization).

In summary, we observe that in some cases practitioners use models that are proposed and supported in the literature, but in other cases there seems to be a relative disconnect between the literature and reality. As a result, there is room to strengthen the theoretical foundation of bank valuation methodologies used in the field.

CONCLUSIONS

Bank valuation methods are based on the same assumptions as those applied to manufacturing companies. However, special attributes of the banking business such as leverage, role of capital, and bad debt provisions, limit the applicable techniques to a subset of the generic methods. The finance literature provides support for those methods that use some kind of discounted flow to equity (FCFE, DDM, RIV) as well as those methods that are based on market comparables (P/E or P/B).

The general practice of marking assets to market in banking provides relevance to those ratios that are related to equity, such as ROE or the P/B ratio. The equation that relates P/B with ROE, expected growth, and cost of equity through the Gordon growth model is one of the cornerstones of bank valuation due to the significance of capital in shaping the banking business and to the fact that in banks book value closely reflects asset market prices.

The sample reports in this study show that sell side analysts use, as it cannot be otherwise, similar tools proposed in the literature. However, there are some clear deviations from the general literature in their approaches. First, there is no use of the general FCFE model, probably because of the difficulty in estimating free cash flows beyond the dividend figure. Discounted cash flows valuations are limited to the use of the DDM approach. Second, they not only examine book value in respect of market price, but also estimate adjusted book value (net asset value or tangible asset value) to take into account the existence of intangible assets in some banks. Third, the dividend yield ratio is evaluated by all research houses with no exception, and this metric is hardly mentioned in the literature. Also, the SOTP method is used extensively by the vast majority of research houses, especially in the case of large and geographically diversified banks with multiple business lines.

There are at least two potential areas with theoretical and applied appeals to advance this line of research. On the one hand, it would be of interest to produce an integrated theoretical framework of the different valuation methodologies used in the banking industry, including those techniques used by practitioners and less covered in the literature. On the other hand, the research that has been carried out in this paper could be extended to include a larger sample, perhaps including research from different locales and different businesses (mainly sell side, buy side, and investment banking), in order to ascertain the validity of the findings and generalize the results. Given the proliferation of global banks in recent years, the findings here should be robust. Nevertheless, cultural differences and industry practice in a local area can exhibit marked different patterns.

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Gender and Job Location Choices: Evidence from Rural Migrants in China

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ABSTRACT

Labor mobility is a strategy that used by workers to seek for higher rent for their human capital. In rural China, with economic growth in large urban areas and coastal regions, many rural workers choose to migrate to urban areas for wage employment in order to supplement their local income. While factors such as disparity of income between home village and destination, educational attainment, reduction of risk at home have been suggested to determine where to migrate, men and women tend to respond differently in the decision of job location. Plus, shortage of farmer workers in coastal areas of China in recent years demonstrates "reverse-flow" of rural migrants, which challenges the hypothesis that income is the driving force behind migration from rural to urban areas. This paper contributes to the existing literature by investigating the gender differences in job location choices in rural China. A generalized ordered logit model is employed to investigate data Rural-Urban Migration in China and find migrants with higher educational level tend to stay within the home province, while more educated male migrants tend to seek employment out of home province.

1. INTRODUCTION

Along with its tremendous economic growth and social transitions since the reforms and opening up policies were implemented, China has experienced significant increase in the number of rural-urban migrants, who left their home villages and stayed in a different destination for a minimum of 6 months. According to sample census from National Bureau of Statistics of China, the total number of rural-urban migrants has reached 158 million in 2011, a 3.4% increase from that in 2010, more than five times as in 1989 (30 million).

There has been many studies on rural migration issues in China in the last two decades. The well-accepted understanding of China's rural-urban migration is based upon developmentalist theory in which individual migration decision is made as a part of family strategies aiming to increase total household income and insure against risk (Cai, 2000). For years, rural-urban migrants flushed into capital cities of other provinces, especially more industrialized coastal areas in East China. Yet, in light of migration distance, the pattern seems to be changing in recent years. The number of interprovincial rural-urban migrants has been outweighed that of intraprovincial migrants before 2011. In 2011, 52.9% of rural-urban migrants chose to work in a destination within home province while 47.1% rural-urban migrants worked out of their home provinces, which tips the phenomenon that interprovincial migrants dominate for years.

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While factors such as disparity of income between home village and destination, educational attainment, reduction of risk at home have been suggested to determine whether to migrate, little has been done to explain migrants whether to migrate in or out of home provinces. In addition, female rural-urban who account for at least one third of the total migrants in recent years, may behave differently in the decision of job location.

This paper contributes to the line of research on rural-urban migration in China by investigating the characteristics which increase the likelihood of interprovincial migration. Moreover, gender differences on the distance of migration are also examined. The rest of the paper is organized as follows. Section two introduces the data and empirical methods and results are presented in section three; the last section draws the conclusions and discusses the future work.

2. DATA AND EMPIRICAL METHODS

The data set used in this paper is Rural Urban Migration in China (RUMiC). The Longitudinal Survey on Rural Urban Migration in China consists of three parts: the Urban Household Survey, the Rural Household Survey and the Migrant Household Survey. It was initiated by a group of researchers at the Australian National University, the University of Queensland and the Beijing Normal University and was supported by the Institute for the Study of Labor (IZA), which provides the Scientific Use Files. The financial support for RUMiC was obtained from the Australian Research Council, the Australian Agency for International Development (AusAID), the Ford Foundation, IZA and the Chinese Foundation of Social Sciences.

One advantage of using this micro data set on migration research is it is the most recent data on migration which collects not only individual migrant's demographic information but also the socioeconomic statistics. Moreover, the data also provide the background profiles of the migrant households in rural hometown which helps to investigate the decision of migration from household perspective. In the migrant household survey, migrant workers were surveyed on questions such as "how many months did you live away from local township in the last 12 months". The survey also collected information on respondents' current work status and *hukou* (the Chinese household registration system) status. Through the information of *hukou*, we are able to track approximately the distance a migrant worker travels.

Similar to China census data, there are some limitations of using RUMic data. It does not include information on wage rate, although migrants' self-report monthly income was recorded. With little information on hours of work during migration, researchers will not be able to compute the wage rate for each respondent in the survey. Plus, when it comes to information related with income, assets, the data also suffers from missing information.

In this study, all the observations are extracted from rural-urban migrant survey data. The sample includes rural-urban migrants who left local hometown for more than 6 months, aged between 16 and 45, holding non-local rural *hukou* and currently working for wage and extracted them from rural-urban migrant data. The reasons for focusing on age group 16 - 45 are two folds: 16 years old is the minimum age to

work legally in China and 45 years old is the upper bound for primary working age for laborers by convention. In order to match individual migrant data with household information, household profile was merged with individual migrant data by unique household ID. To measure migration distance on map, ideally, information on individual migrants' *hukou* where it was registered and current destination city and province are needed. Unfortunately, in order not to identify respondents through *hukou* information, only original provinces of *hukou* registered are released on request, which makes it difficult to measure the migration distance between hometown and destination city. Therefore, migrants in this study, who travel from rural home villages to urban cities, are classified as three groups: migrants who migrate from rural areas to urban areas within the boundary of local city where the registered *hukou* belongs, migrants who migrate to other cities within the same province of *hukou*, migrants who migrate out of original province of *hukou*. A dummy variable is created to gauge different migration choice (0 = a migrant works in a local city where his/her *hukou* belongs; 1 = a migrant who migrates to other cities within the same province; 2 = a migrant who migrates out of the original province). Nine destination provinces in the sample are Henan, Jiangsu, Sichuan, Hubei, Anhui, Shanghai, Zhejiang, Guangdong and Chongqing, each of which account for 8% - 13% of the sample. Since the dependent variable is a dummy variable on migration distance, a standard logistic regression technique is employed.

In line with standard literature, where migration is a strategy to supplement family income, information on educational attainment, working experience, purchasing power of hometown property are included as explanatory variables. My study also include other independent variables on demographic background such as marriage status, per capita farmland owned in the family, number of family members living together in destination cities. To account for gender difference on migration distance, a dummy variable on gender is also included. Table 1 provides the definition and summary statistics of each variables in this analysis.

Table 1. Summary statistics of variables.

Variable	Description	No. of Obs.	Mean	S.D
Dummy_migration	=0, to local city; =1, to other city within province; =2, out of province	6513	1.254	0.749
Age	in years	6513	31.279	9.962
Edu	Educational level in years	6400	9.074	2.388
EXP	Potential experience in years	6393	14.895	10.608
Male	=1, male; =0, female	6513	0.608	0.488
Married	=1, currently married;	6390	0.633	0.482

	=0, otherwise			
Hometown Property	Value of hometown property / daily rate of part-time worker in hometown	5294	1412.601	2217.726
No_members	Number of household members who was living with migrant workers at survey	6513	1.977	1.104
Farmland	=1, if has farmland at hometown =0, otherwise	6513	0.885	0.032
Per capita Farmland	In your family, how much land does each person own on average? (1 Mu=666.6m^2)	6381	1.87	2.25

In standard migration theory, migration is costly. The opportunity costs of migration vary for individuals with various educational attainments, working experience, financial assets. Therefore, for individuals from different demographic groups, the decision on the distance of migration depends not only on individual endowment factors such as educational level, but also on financial endowments/constraints such as physical capital in hometown. In addition, the factors which impact the migrants to migrate within short distance (rural area to local urban city) may be fall in line with the forces which stimulate migrants to leave original provinces for urban cities in other provinces.

Two sets of statistical models are examined in this article. In the first logistic regression, all the observations are blended assuming explanatory variables will affect the decision on migration distance equally across the three categories, that is, migration within local city, migration within home province but different cities, migration out of home province. A generalized ordered logit regression is implemented in the second model to account for the uneven impacts of independent variables on each category of dependent variable. The results from the latter regression model will give valuable insights on why there is a pattern of “reverse-flow” of migrants, i.e., interprovincial migration may not be preferred as much as before; some migrants may choose to stay within home province despite the fact that the economy in provinces along east coast are far more advanced than home province.

3. EMPIRICAL RESULTS

The empirical study on factors which affect the migration decisions consist of two steps. Firstly, to examine who migrate with a greater distance, an ordered logistic regression model was estimated to predict the propensity of migration further away from original hometown. To capture human capital endowment effect on the decision of migration, educational attainment, years of experience and nonlinear term of years of experience are included in the regression. In addition, how much a migrant is tied to the hometown will affect the migration decision as well. If there is a greater size of per capita farmland at

home, sending out migrants will cause farm labor constraint at home, which decreases the incentive to migrate out of home province. Therefore, some other "home tie" factors are also included in the regression, such as marriage status, number of family members living in the urban city. Besides, migrants travel with greater distance to seek for higher return to migration, which may result in more remittance to build up home assets in hometown. Thus, hometown property is also included in the estimation. The result of simple ordered logistic regression is shown at the second and third columns in Table 2. It shows migrants with more years of education tend to migrate with shorter distance, while migrants with more experience tend to travel further away from home. The result also indicates migrants with more hometown property and per capita farmland are more likely to migrate further away. In order to examine the gender effect on migration distance, a dummy variable of male migrant is added, which demonstrates male migrants are more likely to migrate further away from hometown. What also interest me are if the impact of educational attainment vary by gender or if the contribution of marriage status on the propensity of migration away from home differ by gender. To study how self-employed migrants react to migration distance, a dummy variable for self-employment is included. Therefore, I run a separate ordered logistic regression (the second model) with a few interaction terms including educational level and gender, marriage status and gender. The estimation results of the second model, shown on the fourth and the fifth columns in Table 2, indicate migrants with more years of education tend to migrate with shorter distance; migrants with more years of experience tend to travel further away from home; migrants with more hometown property and per capita farmland are more likely to travel with greater distance; After controlling for marriage status, males with more years of education tend to migrate with further distance while married males tend to stay closer to hometown; self-employed migrants tend to stay within the home province which may be due to the availability of social network and resource closer to hometown

In order to check if each explanatory variables impact the three categories of dependent variable proportionally, I did a LR test for both of ordered logistic regression models, which reject the hypothesis of proportionality of odds across response categories. Therefore, a more appropriate model is generalized logistic regression model.

The second step of this empirical study is to estimate a generalized ordered logit model to capture the uneven contribution to the three response categories from each explanatory variable. As the results shown in Table 3 indicate, when considering whether to migrate to the local city or other cities within home province, the human capital endowment effect becomes insignificant; migrants with more hometown property or per capita farmland are more likely to travel to other cities within home province; while married migrants in general tend to stay closer to hometown, married male migrants and male migrants with more educational attainment are more likely to travel to other cities within home province; it also indicates self-employed migrants do not behave differently from other migrants in term of whether to migrate out of the local city. When it comes to whether to migrate out of home province, human capital endowment effect are significant and both educational attainment and working experience tend to negatively impact the odds of migration out of home province, which means migrants with more years of

education or working experience tend to stay within home province. Similarly, migrants with more hometown property or per capita farmland, who are currently married, tend to migrate out of home province.

Table 2. Ordered Logistic Regression Estimation results (dependent variable: dummy_migration).

	Coefficient	S.E.	Coefficient	S.E.
Educational	-0.032**	0.013	-0.056***	0.014
EXP	0.008	0.011	0.007	0.011
EXP squared	-0.0005**	0.0002	-0.0005**	0.0002
Hometown property	0.00005***	0.00001	0.00005***	0.00001
Number of living members	-0.038	0.027	-0.004	0.029
Currently Married	0.146	0.09	0.365***	0.111
Per capita Farmland	0.08***	0.013	0.08***	0.013
Male	0.158***	0.055	0.234	0.258
Edu X Male			0.039***	0.009
Married X Male			-0.315***	0.101
D_self employment			-0.248***	0.069
Log likelyhood	-5209.7896		-5185.2731	
Obs.	5014		5001	
LR test of Proportionality of Odds across response categories	Chi2(7)=26.52 Prob>Chi2(7)=0.0004		Chi2(11)=76.38 Prob>Chi2(11)=0.0000	

*,**,*** represent significance level at 10%, 5% and 1%, respectively.

Male migrants with more years of education are more likely to travel outside of home province while male married migrants tend to stay within home province. Somewhat interesting finding is about the self-employed migrants. As the result indicates, self-employed migrants are more likely to stay within home province for business than the rest of the migrants. To summarize, factors about assets at home, such as hometown property, per capita farmland tend to increase the odds to migrate far away from home for all three response categories, while the size of impact may not be the same. Married migrants in general tend to move away from home town, especially males with more educational attainment. Married males are more likely to stay closer to home. A surprising finding is human capital endowment effects only significantly impact the decision whether to migrate out of province, which may be because migrants with

more years of schooling or working experience are more able to obtain information and opportunity in local area, which help them to seek higher return to human capital locally. By the same token, while self-employed migrants do not behave differently from the rest of the migrants when considering whether to travel to other cities within home province, self-employed migrants are more likely to stay within home province, as the available local resources and social network are the musts to start one's own business.

Table 3. Generalized Ordered Logit Estimation Results.

Dummy_migration	**0**		**1**	
	Coefficient	S.E.	Coefficient	S.E.
Educational level	-0.015	0.020	-0.074***	0.016
EXP	-0.003	0.015	0.015	0.012
EXP squared	-0.00008	0.0003	-0.0008***	0.0003
Hometown property	0.00009***	0.00002	0.00004***	0.00001
Number of living members	-0.005	0.04	-0.003	0.03
Currently Married	0.297**	0.15	0.4***	0.12
Per capita Farmland	0.0059***	0.019	0.085***	0.014
Male	0.285	0.352	0.207	0.282
Edu_X Male	0.037***	0.012	0.042***	0.010
Married X Male	-0.33**	0.136	-0.313***	0.111
D_self employment	0.081	0.096	-0.412***	0.078
constant	1.2***	0.23	-0.126	0.185
Log likelyhood	-5146.8915			
LR chi2(14)	190.08 Prob>Chi2(7)=0.0000			

*, **, *** represent significance level at 10%, 5% and 1%, respectively.

4. CONCLUSION AND DISCUSSIONS

The rapid economic development in China, since the "open-up" state policy began to implement in 1978, has accompanied with a rarely-seen migration process from rural areas to urban cities, either within or out of home province. Labor mobility is a strategy that used by workers to seek for higher rent for their human capital. In rural China, with economic growth in large urban areas and coastal regions, many rural workers choose to migrate to urban areas for wage employment in order to supplement their local income. While factors such as disparity of income between home village and destination, educational attainment, reduction of risk at home have been suggested to determine where to migrate, men and women tend to respond differently in the decision of job location. Plus, shortage of farmer workers in coastal areas of China in recent years demonstrates "reverse-flow" of rural migrants, which challenges the hypothesis that income is the driving force behind migration from rural to urban areas. This paper contributes to the existing literature by investigating the gender differences in job location choices in rural China. A generalized ordered logit model is estimated to investigate data Rural-Urban Migration in China and find migrants with higher educational level and working experience tend to stay within the home province, while male migrants with more educational attainment are more likely to seek employment out of home province. My study also indicates that self-employed migrants tend to migrate within home province in order to take advantage of existing social network and local resources

Some limitations exist for future study. First, originally I intend to collect the geographical distance between hometown and destination city for the migrants as the dependent variable. Due to the concern of confidentiality, the information on destination city is not released. Instead, I take the household registration information to predict whether a migrant travel within/out of local city or within/out of home province and use that as a proxy for the migration distance. However, the shortcoming of this practice is for neighboring provinces, migration distance between two provinces might be smaller than that between two cities within the same province. Second, the cost of living has not been fully taken into consideration although some variables such as hometown property value have been deflated in term of local part-time worker's wage rate. Third, there is more room to study migrants and gender effect across different occupational choices.

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