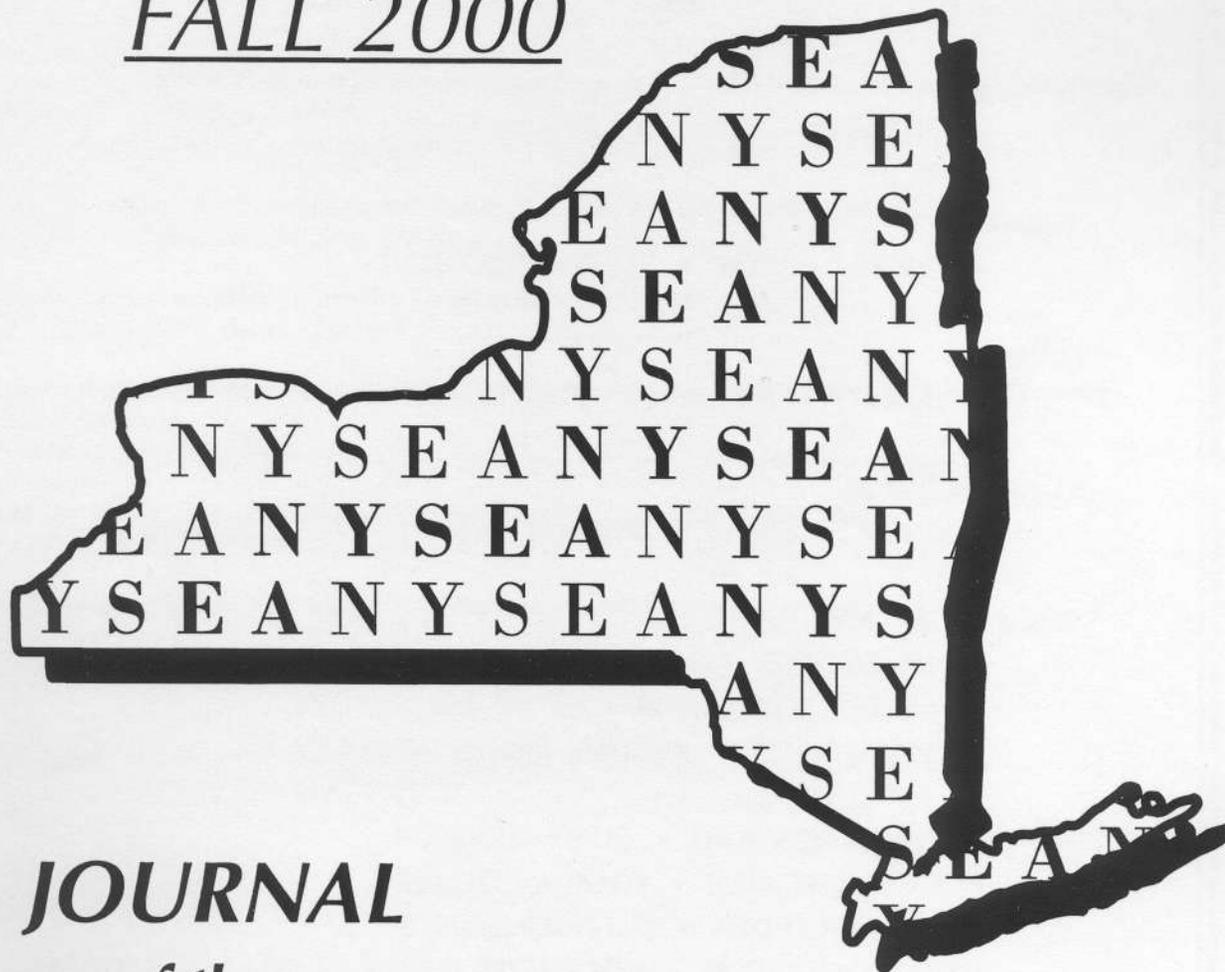


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New York Economic Review

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EDITORIAL

The *New York Economic Review* is an annual journal, published in the Fall. The *Review* publishes theoretical and empirical articles, and also interpretive reviews of the literature. We also encourage short articles. The *Review's* policy is to have less than a three month turnaround time for reviewing articles for publication.

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EFFECTS OF AN EDUCATION-ORIENTED INTERVENTION PROGRAM ON HIGH-RISK BEHAVIOR AMONG INTRAVENOUS DRUG USERS AND THEIR SEX PARTNERS

Larry Lichtenstein^{*} and George Palumbo^{}**

Previous studies (Stevens et al., 1991) and (Roberts et al., 1988) suggest that intravenous drug users (IDUs) conform to a model of rational choice when provided with accurate information about the relationship of their behavior and exposure to the human immunodeficiency virus (HIV). Stevens et al. found an impressive reduction in high-risk drug related behavior following exposure to a relatively modest set of high intensity, educationally oriented interventions. Given the economic and social cost associated with the dramatic spread of HIV, and the limited resources available for prevention and control, it is important that the most efficient means of control be chosen. If the success of the education programs reported by Stevens et al. can be replicated in other settings, it would provide support for the marshaling of resources in this direction. The National Institute of Drug Abuse (NIDA) and the U.S. Department of Housing and Urban Development (HUD) jointly sponsored a similar research project in Buffalo, New York and Tampa, Florida designed to evaluate the effectiveness of education related interventions at modifying high risk behavior with an expanded target population of IDUs and their sex partners. There was no necessary linkage between members of each group. The high-risk behavior examined included both needle use and sexual activity.

While Stevens et al. make no claims about the impact of education related interventions on seropositivity rates, they conclude that educational interventions were associated with reductions in needle usage and needle sharing of 23.5 percent and 63.9 percent, respectively. Similarly, the Buffalo-Tampa study showed post-intervention reductions in high-risk needle behavior, though substantially smaller in magnitude¹. Though not as encouraging about the impact of education programs on the level of high-risk needle use behavior, the Buffalo-Tampa study reveals substantial reductions in high-risk sexual behavior for IDUs and their sex partners. This study measures the impact of a set of educational interventions on high-risk behavior, controlling for enrollment in other formal drug treatment programs. This analysis allows for the assessment of the effectiveness of the interventions by the age, gender and educational background of the participants.

With approximately 900,000 people living with HIV in the United States, 300,000 of them with AIDS, and an annual cost of HIV care per individual estimated to be \$19,250 in 1999 (Levi and Kates, 2000), the potential impact on the health care system is enormous. HUD and NIDA embarked upon this project looking for a cost effective program to reduce the economic and social costs of the proliferation of HIV and AIDS related to the high risk behavior of IDUs and their sex partners. A number of factors have to be determined before the cost effectiveness of the program can be evaluated. The first issue to be determined is the change in high-risk behavior of the targeted population that results from the programmatic intervention. Once established, the effect the behavior modification has on the probability of an individual becoming HIV positive needs to be determined. From that information a cost-benefit

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analysis can be conducted to determine if the programmatic cost associated with the education related interventions are outweighed by the benefits associated with the reduced treatment costs due to the behavior modification. This paper addresses the issue of the impact of a set of education related interventions on the behavior of intravenous drug users and their sex partners.

The next section identifies the targeted population, the high-risk behavior of that population, as well as the pre- and post-intervention instruments that were used to assess the level of and changes in high-risk behavior. Following the methodology section the data analysis shows the level of pre- and post-intervention knowledge of HIV risk associated with an assortment of needle and sex related activities. It also presents the estimated impact of the education-related interventions on the knowledge base about high-risk behavior and the pre- and post-intervention levels of these high-risk behaviors.

The final sections present the study limitations and conclusions that can be drawn from the empirical analysis that precedes it.

METHODOLOGY

This study focuses on IDUs and the sex partners of IDUs who lived in or near public housing projects in Buffalo and Tampa between November 1989 and June 1991. Separate interventions were designed for and directed at IDUs and the sex partners of IDUs. The interventions were delivered over a six-month period with a follow-up post-intervention interview. As in Stevens et. al., subjects who voluntarily participated in pre- and post-intervention interviews were paid a nominal fee.

The intent of the interventions was to modify a number of dimensions of high-risk activity with the goals of:

- 1) eliminating intravenous drug use, measured by the absence of intravenous drug use at the end of the six-month intervention period;
- 2) reducing injection frequency for continuing IDUs, measured by the change in the frequency of injections per month over the six-month intervention period;
- 3) modifying high risk needle use behavior for continuing IDUs, needle use measures include the change in the proportion of the time the interviewee: a) rented or borrowed used needles, b) shared non-needle paraphernalia (rinse water, cooker or cotton), c) used a sterile needle, d) cleaned drug implements with bleach, and e) used drugs alone; and
- 4) reducing high-risk sexual behavior for IDUs and their sex partners, measured as the change in the number of sex partners over the six month period and the proportion of time condoms were used during sex.

The sample of 405 individuals was 56 percent male, 95 percent Black, with an average age of 36 years. Approximately 50 percent of the sample had at least 12 years of school, and 43 percent listed welfare as their primary source of income. Close to 70 percent of the sample resided in or near Buffalo public housing projects. There were 227 respondents who identified themselves as IDUs on both pre- and post-intervention interviews. An additional 176 individuals identified themselves as sex partners of IDUs, though their partners did not necessarily participate in the study.

In Buffalo, as well as Tampa, two types² of community based organizations delivered the interventions to the targeted population. Teams of outreach workers were formed based on the individual's familiarity with the targeted population. In many cases former IDUs were selected in an attempt to have interventions provided by individuals who were familiar with the environment and knowledgeable about street language. The outreach workers were instructed about issues concerning AIDS, HIV and substance abuse. These outreach workers identified and recruited IDUs and the sex partners of IDUs into various programs ranging from informal street discussions to formal small group

presentations about the transmission and prevention of AIDS. Interventions directed toward IDUs included discussions about the risks associated with needle use and needle sharing activities. Bleach kits were distributed at education sessions, which demonstrated the proper techniques for the cleaning of drug paraphernalia. Condoms were distributed at sessions where the sexual transmission of HIV and the proper use of condoms were discussed.

In a program aimed at the female sex partners of IDUs, the designed interventions provided accurate information about HIV and assisted the targeted population in the adoption of changes in behavior that were aimed at reducing the risk of contracting sexually transmitted HIV. At formal and informal educational sessions³, condoms were distributed in conjunction with presentations that demonstrated their proper use. As part of the program IDUs and the sex partners of IDUs had access to clinics for HIV antibody testing, drug treatment agencies, job training programs and food distribution services, where appropriate. The interventions were voluntary and the degree of participant exposure varied.

The interventions took the form of small group meetings, one on one contacts, posters, brochures, formal seminars, referrals to clinics, and the opportunity to be tested for HIV. The intensity and number of interactions with outreach workers were not documented, and were not discussed in post-intervention interviews. These interviews were performed by independent professionals, who conducted confidential pre- and post intervention interviews to establish the level of high-risk behavior and the changes in such behavior upon the completion of the interventions.

The Aids Initial Assessment (AIA) and Aids Follow-up Assessment (AFA) were used to collect data about drug use and sex practices at the outset and conclusion of the program. These survey instruments were constructed by the National Institute of Drug Abuse and provide the information base for a number of other studies (Brown and Beschner, 1993).

The principle methodological differences between this paper and Stevens et al. reflect the intent of the Buffalo – Tampa study to incorporate members of the community in an ongoing outreach program. Thus, the interventions are not of a standard length or intensity. In the Stevens et al. study each respondent was exposed to a one-hour information session, conducted by professionally trained health educators, in conjunction with pre- and post intervention interviews. Since The Buffalo – Tampa study used community outreach workers who provided information through a wide variety of mechanisms, the target population was exposed to numerous information delivery systems. The number of and specific types of interventions to which each participant in the pre- and post intervention interviews was exposed to were not identified. Both studies used independent professional interviewers to conduct the surveys. Additionally, the timing of the Stevens et al. interviews allowed the authors to identify the duration of the behavior modification, while this study is not able to measure the duration of the effects⁴.

ANALYSIS

The basic premise of the program was that people do not fully understand the risks associated with certain sexual and drug related behavior. By making intravenous drug users aware of the risks associated with using dirty needles, sharing needles and other drug paraphernalia, the assumption is that rational users would modify their behavior. Additionally, informing intravenous drug users and their sex partners of the risks associated with various sexual activities should lead to a reduction of those activities.

An initial assessment test (see appendix) was administered to determine the initial level of understanding about the transmission of HIV through intravenous drug use and sexual activity. The test consisted of sixteen true or false questions: five questions were about the transmission of HIV through

sexual activity; five were about intravenous drug use; and six were general knowledge questions related to HIV transmission.

From the test answers three indices were created to identify the respondents' underlying understanding of AIDS. The first index (TOTRIGHT) is the total number of questions answered correctly, taking values from 0 to 16. The second index (SEXRIGHT), taking values between 0 and 5, indicates the number of correct answers to the sexual behavior questions; and the last index (DRUGRIGHT), with values between 0 and 5, indicates the number of correct answers to the drug related questions.

Table 1 provides some understanding of the basic level of understanding of risky behavior for the participants of the interventions. Both groups appear to be fairly knowledgeable about the risks associated with intravenous drug use and having sex with intravenous drug users.

The IDUs seem to be more knowledgeable as a group than the sex partners of IDUs. These results are consistent with the findings reported by (Liebman and Mulia, 1992) as well as those reported by (Khalsa and Kowalewski, 1994) If educational interventions are to lead to the modification of behavior, they must do more than simply provide information. They must make the individual accurately perceive the risk to which he or she is being exposed when undertaking such activity. Individuals who were neither IDUs nor the sex partners of IDUs also took the initial assessment test and as a group they were generally less knowledgeable than the groups engaged in high-risk behavior.

Table 1a Intravenous Drug Users

INDEX	MEAN VALUE
TOTRIGHT	13.05
SEXRIGHT	4.38
DRUGRIGHT	4.45

Table 1b Sex Partners of Intravenous Drug Users

INDEX	MEAN VALUE
TOTRIGHT	12.58
SEXRIGHT	4.02
DRUGRIGHT	4.37

Measures of risk have been constructed from self-reported behavior. Changes in high-risk behavior were obtained by comparing post-intervention responses to identical questions concerning drug and needle use practices, as well as sexual behavior, to baseline measures derived from pre-intervention interviews. For example respondents were asked the percent of time they used dirty needles when using intravenous drugs over the preceding six months on the AIA and AFA. The average of these proportions revealed on the AIA survey instrument was 22 percent. The average response for the same question on the AFA was 14 percent. Table 2 then reports this difference as a reduction of eight percentage points. A paired t-test was performed to determine whether the difference in the response means was significant. Thus, the reported reduction in the use of dirty needles over the period of the interventions was significant at the one per cent level.

TABLE 2
HIGH RISK NEEDLE AND SEX BEHAVIOR

IDUs	PRE-INTERVENTION MEAN	POST-INTERVENTION MEAN	CHANGE
# IDUs	230	227	-3 (*)
FREQUENCY INTRAVENOUS USE PER MONTH	31.8	19.1	-12.7 (***)
% OF TIME INJECTED WITH USED NEEDLE	22%	14%	-8% (***)
% OF TIME SHARED NON-NEEDLE IMPLEMENTS	53%	41%	-12% (**)
% OF TIME INJECTED WITH STERILE NEEDLE	66%	74%	+8% (***)
% OF TIME CLEANED WITH BLEACH	65%	74%	+9% (**)
% OF TIME INJECTED ALONE	59%	64%	5%
NUMBER OF SEX PARTNERS (SIX MONTHS)	3.22	2.19	-1.03 (*)
% OF TIME USED CONDOMS	22%	32%	10% (**)
SEX PARTNERS OF IDUs ONLY: NUMBER OF SEX PARTNERS (SIX MONTHS)	4.42	2.01	-2.41 (***)
% OF TIME USED CONDOMS	33%	40%	7% (*)

* significant at the 10% level

** significant at the 5% level

*** significant at the 1% level

Table 2 reveals that only 3 of the 230 individuals who were classified as IDUs before the interventions, claimed they were no longer injecting drugs during the post-intervention survey. While the reduction in this type of risky behavior is modest, other aspects of high-risk behavior showed more appreciable declines. The monthly frequency of injected drug use fell, on average, by 12.7 injections per month, a change of 39.9 percent. There were also substantial changes in the high risk behavior associated with intravenous drug use, ranging from the 5 point increase in the percent of time IDUs were alone when they used intravenous drugs to the an 8 percentage point reduction in the number of times they used borrowed needles.

There were also reductions of IDU high-risk sexual behavior. The average number of sex partners over the six-month period was 31.9 percent lower than in the six-month period prior to the intervention. Condom use by IDUs increased on average 10 percentage points. The interventions have led to desirable reductions in high-risk behavior even among those who remain in the high-risk group of intravenous drug users.

The group of people who were the sex partners of IDUs, but not IDUs themselves, experienced similar reductions in high-risk behavior. The number of sex partners declined by 54.5 percent and average condom use increased over the six-month period. Thus, there were across the board reductions in all measured dimensions of high-risk behavior.

However, since over 25 percent of the interviewed IDUs were concurrently participating in drug treatment programs, it is possible that some of the change in behavior is attributable to these programs. A regression model was estimated to identify the relationship between the changes in behavior and enrollment in formal drug treatment programs. Table 3 presents the ordinary least squares regression estimates of this relationship⁵. In each equation the **dependent variable**, the change in high risk behavior over the intervention period, is regressed against **TREAT**, a binary variable, which takes the value of 1 if the interviewee was enrolled in a formal drug treatment program, and 0 otherwise.

The intercept coefficient can be interpreted as an estimate of the effects of the educational interventions alone, while the **TREAT** coefficient reveals the incremental impact of participation in a formal drug treatment program⁶. From Table 3 it appears that IDUs who were exposed to the educational interventions alone, without formal drug treatment, reduced their frequency of injections, on average, 7.11 times per month. Those IDUs whose educational interventions were combined with formal drug treatment reduced their frequency of injections by an additional 20.96 times.

It is somewhat surprising that in four of the five needle use behavior equations, those IDUs who participated in formal drug treatment programs seem to have had more modest reductions in high risk behavior than those who were exposed to the educational interventions alone. The unanticipated deleterious effects of participation in formal drug treatment programs, in conjunction with educational interventions, could result if IDUs who received drug treatment are systematically different from those that did not. Since the participation in formal drug treatment programs was not randomized, the effects of **TREAT** could reflect the differences in the groups rather than the effects of treatment. It appears that failure to control for simultaneous enrollment in drug treatment programs distorts estimates of the effectiveness of educational programs alone⁷.

TABLE 3
OLS REGRESSION ESTIMATES TREATMENT MODEL

DEPENDENT VARIABLE:	INTERCEPT	TREAT	R ²	Observed F - value
CHANGE IN:				
FREQUENCY OF INTRAVENOUS USE PER MONTH	-7.11 (*)	-20.96 (**)	.05	6.51 (**)
% OF TIME INJECTED WITH USED NEEDLE	-.11 (***)	.12 (**)	.03	3.86 (**)
% OF TIME SHARED NON-NEEDLE IMPLEMENTS	-.18 (***)	.24 (***)	.05	7.02 (***)
% OF TIME INJECTED WITH STERILE NEEDLE	.07	.02	.01	.09
% OF TIME CLEANED WITH BLEACH	.12	-.13 (*)	.03	2.76 (*)
% OF TIME INJECTED ALONE	.06	-.05	.01	.41

* significant at the 10% level
 ** significant at the 5% level
 *** significant at the 1% level

Basic demographic characteristics such as age, gender, and education, as well as past behavioral practices, could also have an impact upon the effectiveness of the educational interventions. Table 4 presents regression estimates of the relationship between these characteristics and the changes in behavior presented in Table 3. The following binary variables were constructed from demographic characteristics:

GENDER which takes the value of 0 for female, and 1 for male respondents ;

EDUCATION which takes the value of 0 for those respondents with less than 12 years of education, and 1 for those with at least a high school degree;

AGE which takes the value of 0 for those individuals less than 35 years of age, and 1 for those 35 or older; and

LEVEL which takes the value 0 for those respondents whose pre-intervention behavior was in the lower half of the distribution of high risk behavior, and 1 for those respondents whose initial behavior

placed them in the upper half of the distribution of high risk behavior. A separate Level variable was constructed for each of the categories of needle use behavior⁸.

The estimates presented in Table 4 suggest that differences in the changes in high-risk needle use behavior are related to participation in formal drug treatment programs and the initial level of risky behavior. The demographic characteristic parameter estimates are generally statistically insignificant, suggesting that differences in the impact of educational interventions on high-risk behavior were not related to age, education or gender. In conjunction with the results reported in Table 2, it is apparent that the educational interventions were equally successful at reducing high-risk behavior regardless of age, gender or educational background. The coefficients of the level variables indicate that the greatest reduction in high-risk behavior occurred for those individuals whose pre-intervention behavior was the most risky⁹.

**TABLE 4
OLS REGRESSION ESTIMATES DEMOGRAPHICS MODEL**

DEPENDENT VARIABLE	TREAT	LEVEL	GENDER	EDUCATION	AGE	R ²	Observed F-value
CHANGE IN:							
FREQUENCY OF INTRAVENOUS USE PER MONTH	-18.72 (***)	-48.35 (***)	-2.38	-7.38	10.08	.52	28.58 (***)
% OF TIME INJECTED WITH USED NEEDLE	0.12 (**)	-0.3 (***)	-0.03	0.02	0.1	.45	21.41 (***)
% OF TIME SHARED NON-NEEDLE IMPLEMENTS	0.15 (*)	-0.54 (***)	0.07	-0.08	-0.08	.34	13.91 (***)
% OF TIME INJECTED WITH STERILE NEEDLE	0.04	0.34 (***)	-0.11 (**)	0.08 (*)	-0.07	.38	16.20 (***)
% OF TIME CLEANED WITH BLEACH	-0.07	0.45 (***)	-0.14 (**)	-0.07	0.11	.42	13.16 (***)
% OF TIME INJECTED ALONE	-0.04	0.38 (***)	0.03	0.06	-0.04	.37	15.15 (***)

* significant at the 10% level
 ** significant at the 5% level
 *** significant at the 1% level

In a similar fashion, tests for the effectiveness of the educational interventions in reducing high-risk sex behavior among individuals of different ages, educational backgrounds, gender and previous behavior patterns were performed. The statistically insignificant coefficients for the age and education binary variables in Table 5 suggest that, as in the needle use regression equations, the educational interventions were equally successful among individuals of different ages and educational backgrounds.

However, in the sex behavior questions, there are statistically significant differences in the effectiveness of the interventions by gender and patterns of previous behavior.

TABLE 5
CHANGES IN SEX HIGH RISK SEX BEHAVIOR BY CHARACTERISTICS
(OLS ESTIMATES)

DEPENDENT VARIABLE	LEVEL	GENDER	EDUCATION	AGE	R ²	Observed F-value
CHANGE IN:						
% TIME USED CONDOM (IDUs)	-0.68 (***)	0.1 (*)	-0.06	0.01	.29	11.81 (***)
NUMBER OF SEX PARTNERS (IDUs)	-0.97 (***)	1.21 (*)	-0.09	0.16	.77	165.86 (***)
% TIME USED CONDOM (IDU SEX PARTNER)	-0.67 (***)	0.04	0.03	-0.01	0.27	7.48 (***)
NUMBER OF SEX PARTNERS (IDU SEX PARTNER)	-0.95 (***)	0.79 (**)	-0.37	-0.44	0.93	529.77 (***)

* significant at the 10% level

** significant at the 5% level

*** significant at the 1% level

In both groups, IDUs and sex partners of IDUs, the reduction in the number of sex partners was greater for women than men. Additionally, condom use appeared to increase slightly more for men than for women. The greater the number of sex partners before the intervention, the greater was the reduction in the number of sex partners after exposure to the interventions. Similarly, condom use increased most for those individuals who used condoms the least frequently prior to the study. This indicates a greater degree of success among individuals with the riskiest pre-intervention behavior.

STUDY LIMITATIONS

A limitation of the analysis is its reliance on self-reported behavior. However, with the exception of the validity of self-reported HIV sero-positivity status (Latkin and Vlahov, 1998), the literature provides favorable evidence on the reliability of self-reported high-risk behavior for IDUs. (Stevens, 1972), (Maddox and Desmond, 1975) and (Amsel et al., 1976). Measurements of the change in behavior would be unaffected by a respondent bias if the degree of systematic bias was the same on both the pre- and post-intervention interview¹⁰.

Potentially more disturbing is the existence of self-selection bias. There were 787 individuals who completed the pre-intervention interview, and 405 of them completed the post-intervention interview. The high-risk behavior of the individuals who completed the first, but not second interview, was greater than the revealed risk behavior of those who completed both interviews. This was true for behavior associated

with virtually all dimensions of drug use, as well as high-risk sexual patterns. Since those who did not complete the program were the individuals who were most at risk, the changes in reported behavior may be an overstatement of the effects of the program on the at-risk population at large.

Finally, since there was no control for the number or intensity of the interventions, it is difficult to evaluate the effectiveness of the specific interventions.

CONCLUSIONS

When information about the consequences of their behavior was presented to intravenous drug users and the sex partners of drug users, they reduced their high-risk behavior. Although there was a minimal reduction in the number of intravenous drug users, there were substantial reductions in the frequency of injections, sharing of paraphernalia and improvements in the observance of proper cleaning techniques.

There were also substantial reductions in high-risk sexual behavior for both IDUs and their sex partners, in the form of decreases in the number of sex partners and increases in condom use. The educationally oriented interventions were effective regardless of the age, sex or educational background of the participants. Thus a program of educational interventions could be a cost-effective mechanism for reducing high-risk behavior. We estimate the cost of the presence of three outreach workers and a project director to provide information to the residents of a public housing project and its surrounding community to be less than \$200,000 per year. At approximately \$20,000 per year in health care costs, with a life expectancy of ten years, if only one person per year is saved from contracting HIV as a result of the program it might justify the expense.

These conclusions should be tempered by the limitations inherent in the nature of the interventions performed and the data generated. Since the participants of the program were self-selected, they may differ systematically from those who refused to participate in the program, making inferences about the general population problematic. Additionally, further study is required to determine the linkage between the change in high-risk behavior and the probability of contracting HIV.

ENDNOTES

1. The study, jointly sponsored by HUD and NIDA interviewed 787 IDUs and sex partners of IDUs. From this group 405 completed the post-intervention interview. All constructed risk measures reported here reflect the complete information supplied by the 405 respondents.
2. Alternative models were developed in each city. One approach, derived from the precept that community based organizations, working in conjunction with residents, can implement an effective AIDS prevention and intervention program. The second was based on the belief that with minimum financial and technical aid public housing tenant associations could provide effective AIDS outreach and education programs.
3. The formal presentations were comprised of four 90-minute sessions. These sessions focused on: 1) modes of HIV transmission, high risk behaviors and the importance of antibody testing; 2) high risk sexual behavior; 3) male-female relationships as they relate to the risk of contracting HIV; 4) self-esteem and self-confidence for self-protection.
4. Steven's et al. analyzed a sample of post intervention interviews that spanned a period of 1 to 15 months after exposure to the intervention.
5. Formal drug treatment programs include drug detoxification, residential therapeutic communities, prison programs, methadone maintenance and outpatient drug-free programs.

6. The effect of drug treatment is a measure of the impact of treatment added to educational interventions. There is no measure here of the effect of drug treatment alone.
7. Failure to control for concurrent enrollment in formal drug treatment programs may have affected the estimated impacts found by Stevens et al. and Robertson et al.
8. Binary variables were constructed for ease of interpretation. Many of the variables were reported in sub-groups during the interviewing process.
9. While only individuals with high levels of risky activity could have high reductions in behavior, there was no guarantee of any reduction due to educational interventions.
10. Direct statements of behavior changes were compared to indirect measures of behavior changes taken from the pre- and post-intervention interviews. The measures showed high positive correlations.

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APPENDIX AIDS QUESTIONNAIRE

Possible responses are: true, false, unsure or refused to answer.

Drug Related:

1. A person cannot gets the AIDS virus from works/rigs bought on the street in a sealed wrapper.
2. Cleaning works/rigs with just water is enough to kill the AIDS virus.
3. Cleaning works/rigs with bleach is thought to be an effective way of killing the AIDS virus
4. A person can get the AIDS virus from sharing dirty works/rigs with someone who has AIDS.
5. A person can get the AIDS virus from sharing works/rigs with someone who has shared them with others.

Sex Related:

1. Anyone having sex with only one other person cannot get the AIDS virus.
2. Using a latex condom is thought to be an effective way to keep from getting the AIDS virus during sex.
3. A person can avoid getting the AIDS virus by just having oral sex.
4. A person can get the AIDS virus from having sex with a man who has had sex with other men.
5. A person can get the AIDS virus from having unprotected sex with someone who has AIDS.

General:

If a person is positive on the blood test for the HIV virus that means the person has AIDS.

1. A person cannot get the AIDS virus by shaking hands or touching someone who has AIDS.
2. A person can get the AIDS virus from donating blood and plasma.
3. A woman with AIDS virus can give her unborn child AIDS.
4. A person can get the AIDS virus from eating in a restaurant where the cook has AIDS.
5. A person can get the AIDS virus by using public toilets.

CAUSALITY BETWEEN TAXES AND EXPENDITURES IN THE U. S.: A MULTIVARIATE APPROACH

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ABSTRACT

Applying Hsiao's version of the Granger causality method, this paper reexamines the causality between nominal expenditures and revenues in the United States for the 1946-96 period in a multivariate framework. Both the Engle-Granger two-step and Johansen canonical cointegration tests are performed. This study finds that taxes, spending, and GDP are cointegrated. While this study detects no evidence of causality between revenues and expenditures, it is found that income causes both revenues and expenditures in the Granger sense in the United States.

I. INTRODUCTION

Whether changes in tax revenues affect government expenditures (or vice versa) has been an issue of heated debate among economists as well as public policy makers. In the literature there are four models of public finance that characterize the relationship between taxes and expenditures.

First, in the spend-and-tax hypothesis, the political system somehow determines how much to spend and then looks for revenue sources to finance the spending (Barro, 1974; Peacock and Wiseman, 1979; Anderson et al., 1986). Second, there is the tax-and-spend proposition championed by Friedman (1978) and Buchanan and Wagner (1977). Friedman (1978) argues that increasing taxes results in more spending, thus causing a larger deficit. However, Buchanan and Wagner (1977) contend that politicians often choose debt financing over tax financing, thereby distorting the tax-and-spend prediction. Thus, to Friedman, lower taxes may lead to lower expenditures while to Buchanan and Wagner, lower taxes do not necessarily always suggest smaller spending because the government can borrow and spend (see Lee and Vedder, 1992). Third, in the tax-and-spend and spend-and-tax scenario, Musgrave (1966) and Meltzer and Richard (1981) argued that government may change expenditures and taxes simultaneously. The fourth model is the argument that because of the institutional separation of the allocation and taxation functions of government what happens to one can not affect the behavior of the other.

In the empirical literature, the relationship between taxes and expenditures is as controversial as in the theoretical literature. In their studies for the U.S., Von Furstenberg, et al. (1985) and Anderson et al. (1986), Provopoulos and Zambaras (1991) and Hondroyiannis and Papapetrou (1996) found that expenditures cause taxes. On the other hand, Manage and Marlow (1986) found a bidirectional causality for the U.S. Ram (1988) reexamined this issue and found that revenues cause expenditures at the federal level, whereas expenditures cause revenues at state and local levels in the United States. Joulfaian and Mookerjee (1990) and Hasan and Lincoln (1997) found support for both the tax-and-spend and the spend-and-tax hypotheses at the federal level.

Using the recently developed technique of cointegration with the aid of error-correction modeling, Miller and Russek (1990), Bohn (1991), and Jones and Joulfaian (1991) found causality running unidirectionally from expenditures to revenues in the short run, but discerned feedback between the two

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in the long run. Most recently, Owoye (1995) reexamined data for the G7 countries and found feedback causality in the U.S., Germany, the UK, France, and Canada, but identified causality from taxes to expenditures in Japan and Italy. Thus, the literature review reveals mixed and inconclusive evidence concerning the relationship between government expenditures and tax revenues. Given this lack of unequivocal evidence and the profound policy implications of this issue, it is necessary to investigate the direction of causality between the two variables using more advanced methods.

The purpose of this paper therefore is to reexamine the causality between revenues and expenditures in a multivariate framework by applying the techniques of cointegration and Hsiao's version of the Granger causality method to U.S. postwar data for the period 1946-96, as explained below. Section II presents the methodology and model. The third and fourth sections report the empirical results and conclusions, respectively.

II. METHODOLOGY AND MODELS

According to Granger (1969 and 1980), if a series x_t contains information in past terms that helps in the prediction of y_t and if this information is contained in no other series used in the prediction, then x_t is said to cause y_t . Thus, a variable x_t is said to Granger-cause y_t if the prediction of the current value of y_t is improved by using past values of x_t .

As noted, in contrast to earlier U.S. studies, a multivariate, rather than a bivariate model is used in this study. Bivariate casualty tests have fallen out of favor in macroeconomics because it has become quite clear that the results of the causality tests are extremely sensitive to omitted variables. Darrat and Suliman (1994) have argued that in the bivariate model, if x_t is found not to cause y_t , it does not necessarily imply that such an inference holds in the context of a larger economic model which includes other relevant variables. Lutkepohl (1982) has also noted that a low dimensional subprocess contains little information about the structure of a higher dimensional system and that Granger casualty is severely affected by bias caused by the omission of relevant variables. Granger (1969), Sims (1980), and Serletis (1988) have also argued that Granger casualty is severely affected when using the restrictive bivariate model.

Following earlier studies, government expenditures (G) are modeled as a function of revenues (T). However, standard macroeconomic theory suggests the potential importance of the rate of growth of GDP, because changes in the GDP growth rate also change government expenditures and tax revenues. Therefore, GDP is added to the expenditure/revenue equation. Note all variables are expressed in logs.

$$\text{Log } G = f(\text{log } T, \text{Log } \text{GDP}). \quad (1)$$

The model can then be transformed into one causality equation and rewritten by specifying a causality:

$$(1-L) \begin{bmatrix} \text{log } y_t \\ \text{log } x_t \end{bmatrix} = \begin{bmatrix} \alpha_1 & \delta_1 \\ \alpha_2 & \delta_2 \end{bmatrix} \begin{bmatrix} 1 \\ e_{t-1} \end{bmatrix}$$

$$+ \sum_{i=1}^p (1-L) \begin{bmatrix} \beta_{11i} & \beta_{12i} & \beta_{13i} \\ \beta_{21i} & \beta_{22i} & \beta_{23i} \end{bmatrix} \begin{bmatrix} \text{log } y_{t-i} \\ \text{log } x_{t-i} \\ \text{log } z_{t-i} \end{bmatrix} + \begin{bmatrix} v_{1t} \\ v_{2t} \end{bmatrix}, \quad (2)$$

$$L \quad \quad \quad \Delta L \quad \quad \quad \Delta \quad L \quad \Delta$$

where: y = government expenditures (G) in current dollars,
 x = tax revenues (T) in current dollars,
 z = GDP in current dollars,
 L = the lag operator and $(1-L)\Delta$ is the difference operator such that $(1-L)y_t = y_t - y_{t-1}$ represents the first difference.
 v_{it} = the white noise disturbance terms,
 e_{t-1} = the error-correction term (ECM) which is the one period lag of e_t which in turn is the stationary residuals from the multi-cointegration equation:

$$y_t = \alpha_0 + \alpha_1 x_t + \alpha_2 z_t + e_t. \quad (3)$$

We follow Miller's (1991) approach to error-correction modeling and choose the conditioning (left-hand-side) variable which maximizes the adjusted R-squared.

This study uses annual data that cover the period 1946-96 for the U.S. The data for GDP, government expenditures and tax revenues are compiled from the Economic Report of the President (various years). Current dollars are used because budgetary decisions for the most part are made in nominal terms and nominal variables determine debt accumulation.

III. UNIT ROOT AND COINTEGRATION TESTS

Hsiao's (1981) version of the Granger causality test requires that all variables be stationary¹. Hence, our first step after presenting the models is to test for the properties of unit roots/stationarity of all three variables in the model. The Phillips-Perron (Phillips and Perron, 1988) tests (PP test) therefore are performed and the results, shown in table 1, indicate the tax, expenditure and GDP series are each I(1). However, the PP tests reveal that all three I(1) series become stationary or I(0) after first differencing.

Table 1 Results of the Phillips-Perron (PP) Unit Root Tests Before and After Differencing the Data

Variable	The PP value	The Critical Value
A. The Levels		
Expenditures (G)	-0.7132	-3.13
Tax Revenues (T)	-0.9653	-3.13
GDP	-2.9234	-3.13
B. First Differences		
Expenditures (dG)	-7.1167*	-3.13
Tax Revenues (dT)	-6.0537*	-3.13
GDP (dGDP)	-5.5760*	-3.13

* denote non-stationarity (see Fuller, 1976).

Table 2 Johansen's Cointegration Test Statistics

Null H	Maximal Eigenvalue Test			Trace Test		
	Alterna- tive H	Eigen- value	C.V. 99%	Alterna- tive H	LR Ratio	C.V. 99%
r=0	r=1	30.31**	26.41	r \geq 1	56.26**	40.20
r \leq 1	r=2	21.63**	19.83	r \geq 2	25.95**	24.99
r \leq 2	r=3	4.32	12.74	r \geq 3	4.32	12.74

Notes: C. V.=critical value; H=hypotheses and PP=Phillips-Perron.

**denotes two cointegration ranks.

Subsequently, the cointegration test is performed to check whether the simple Granger causality test is appropriate. Note that cointegration is the statistical approach which tests for the existence of long-run equilibrium relationships among non-stationary variables which are integrated to the same order. In testing for cointegration, we employ the Johansen test (Johansen and Juselius, 1990) because this test is a more powerful cointegration test, particularly when a multivariate model is used. Moreover, Johansen's test is robust to various departures from normality in that it allows any of the three variables in the model to be used as the dependent variable while maintaining the same cointegration results. The results of the Johansen test, as reported in table 2, reveal the existence of more than one cointegrating vector, indicating that the three variable are cointegrated². The existence of more than one cointegrating vector may indicate that the system under examination is stationary in more than one direction and hence more stable (Dickey et al., 1994; Lee, 1997; Vamvoukas, 1997).

It is worth noting that the differencing process tends to filter out low-frequency lagged regressors which may contain valuable information concerning the long-run equilibrium properties of the data. Incorporating the error-correction terms into the models reintroduces the lost information (Granger, 1988; Miller, 1991).

According to Engle and Granger (1987), cointegrated variables must have an ECM representation. Furthermore, including the error-correction term, e_{t-1} , in the equations (3) throughout (5) below, introduces an additional channel through which Granger causality can be detected. Take equation (3) as an example. Granger (1988) noted that in the error-correction model there are two possible sources of causation of y_t by x_{t-i} , either through the e_{t-1} term, if $\delta_i \neq 0$, or through β_j . Thus, the error-correction terms in the two equations can be used to gauge the long-run causal relationship between taxes and spending.

IV. Hsiao's Version of the Granger Causality Tests

While Granger's method discussed above is widely used in applied research, its application is restricted to models with identical lag lengths. In traditional vector autoregression models, a fixed lag length is imposed on all variables and across all observation periods. However, Lee (1997) argued, this practice can result in potential model misspecification. More specifically, underparameterization due to a too short lag length results in estimation bias, while overparameterization due to a too long lag length causes a loss of degrees of freedom and thus estimation efficiency. The final prediction error (FPE) criterion that we use in this paper is appealing because, as Hsiao (1981) points out, it balances the risk of selecting a higher lag against the risk of a lower lag. When an additional lag is included, the first term in

FPE is increased, but simultaneously the second term is decreased. When their product (FPE) reaches a minimum, the two opposing forces are balanced.

Hsiao's method works well for a bivariate model. For a multivariate equation model, however, it does not ensure that the results of the autoregression (AR) equation will remain the same when the order in which regressors are introduced is changed. In this study, the specific gravity criterion (SGC) proposed by Caines, Keng, and Sethi (1981) is used to determine the sequence in which the regressors are added at each stage. For instance, if a process y_t has n multiple causal variables, $x_1, x_2, x_3, x_4, \dots, x_n$, we first rank them according to the decreasing order of their specific gravities or the increasing order of their smallest FPE value. Accordingly, the variable with the minimum FPE among the bivariate equations is first added while each remaining variables is added one at a time.

Notice that equation (1) can be broken down into two equations: an expenditure equation and a revenue equation. The expenditure equation in turn can be broken down into three causality equations: a univariate equation, a bivariate equation and a trivariate equation as follows:

$$(1-L)y_t = \alpha_0 + \delta_1 e_{t-1} + \sum_{i=1}^M \alpha_i (1-L)y_{t-i} + v_{1t}, \quad (4)$$

$$(1-L)y_t = \alpha_0 + \delta_1 e_{t-1} + \sum_{i=1}^M \alpha_i (1-L)y_{t-i} + \sum_{j=1}^N \beta_j (1-L)x_{t-j} + v_{2t}, \quad (5)$$

$$(1-L)y_t = \alpha_0 + \delta_1 e_{t-1} + \sum_{i=1}^M \alpha_i (1-L)y_{t-i} + \sum_{j=1}^N \beta_j (1-L)x_{t-j} + \sum_{k=1}^P \varphi_k (1-L)z_{t-k} + v_{3t}. \quad (6)$$

Finally, after transforming the original data, we proceed to perform the causality tests employing Hsiao's version of the Granger causality method. For details of Hsiao's procedure, see the appendix.

For the purpose of comparison, we first perform tests using a bivariate model. The results, as shown in table 3, indicate that for the expenditure equation, taxes do not Granger-cause expenditures since $0.2440035E-02 > 0.236116E-02$. By the same token, for the revenue equation, we conclude that

expenditures Granger-cause revenues since $0.3302899E-02 < 0.3350230E-02$. Thus, the bivariate model results show that causality runs unidirectionally from expenditures to revenues in the short run.

Subsequently, the trivariate causality tests are performed and the results are strikingly different. As shown in Table 3, for the expenditure equation, GDP is added to the equation first and since $0.17332166E-02 < 0.2341116E-02$, we conclude that GDP Granger-causes expenditures. Next, revenues are entered into the equation and since $0.1989555E-02 > 0.17332166E-02$, we conclude that revenues do not Granger-cause expenditures. In sum, GDP is found to Granger-cause expenditures, whereas revenues are found to Granger-cause expenditures. Conversely, for the revenue equation, as indicated in the same table, GDP is entered into the equation first and we conclude that GDP Granger-causes revenues since $0.1910552E-02 < 0.3350230E-02$. Finally, expenditures are added to the equation and we conclude that expenditures do not Granger-cause revenues since $0.1977002E-02 > 0.1910552E-02$. In sum, GDP is the only variable that is found to cause tax revenues in the United States. Interestingly, the results from the bivariate and trivariate models are completely different. While the bivariate tests indicate that expenditures Granger-cause revenues without feedback, the trivariate tests reveal that neither revenues nor expenditures cause each other. It is GDP that is found to cause both government expenditures and tax revenues. This strongly demonstrates that specification does matter a great deal for the causality test. In addition to the direction of causality, the sign of the causal relation between taxes and expenditures is also of great importance. The t- and Wald-tests therefore are performed and the results (table 4) fully corroborate the causality tests³.

Table 3 Results of the Hsiao's Version Causality Tests

Controlled Variable	First Manipulated Variable	Second Manipulated Variable	FPE	Causality Inferences
The Bivariate Models				
(a) Expenditure Equation:				
G(i=5)			0.2341116E-02	
G(i=5)	T(j=1)		0.2440035E-02	T \neq >G
(b) Revenue Equation:				
T(i=6)			0.3350230E-02	
T(i=6)	G(j=1)		0.3302899E-02	G \Rightarrow T
The Trivariate Models				
G(i=5)			0.2341116E-02	
G(i=5)	GDP(j=4)		0.1733216E-02	GDP \Rightarrow G
G(i=5)	GDP(j=4)	T(m=1)	0.1989555E-02	T \neq >G
T(i=6)			0.3350230E-02	
T(i=6)	GDP(j=2)		0.1910552E-02	GDP \Rightarrow T
T(i=6)	GDP(j=2)	G(m=1)	0.1917002E-02	G \neq >T

Notes: G=expenditures and T=tax revenues. The figures in parentheses behind the variables are the optimal lag length.

Table 4 The t- and Wald Chi-Squared Statistics of the Trivariate Models₂

(a) The Expenditure Equation:

$$(1-L)G_t = \alpha_0 + \delta_1 e_t - \sum_{i=1}^5 \alpha_i (1-L)G_{t-i} + \sum_{j=1}^4 \beta_j (1-L)GDP_{t-j}$$

(0.00452)	(5.27847)	(7.14087)
0.95	0.00*	0.00*

$$- \sum_{m=1}^1 \varphi_m (1-L)T_{t-m} + v_{1t}$$

(0.10394)
0.75

(b) The Revenue Equation:

$$(1-L)T_t = \alpha_0 + \delta_2 e_t - \sum_{i=1}^6 \alpha_i (1-L)T_{t-i} + \sum_{j=1}^2 \beta_j (1-L)GDP_{t-j}$$

(2.10845)	(2.10914)	(13.83980)
0.15	0.08**	0.00*

$$+ \sum_{m=1}^1 \varphi_m (1-L)G_{t-m} + v_{2t}$$

(0.62615)
0.54

Note: The statistics of the joint significance of the coefficients are reported in parentheses and the number beneath each corresponding parenthesis represents the p-value (the significant level).

* significant at the 1% level.

** significant at the 10% level.

The finding that expenditures do not Granger-cause taxes runs counter to Barro's views that higher government spending drives up taxes (Barro, 1974). This result is also at odds with Friedman's belief (Friedman, 1978) that increasing taxes only results in more spending. Our results indicate that neither revenues nor expenditures respond to a short run budgetary disequilibrium. Taxes and spending each adjust to a disequilibrium independently. Changes in expenditure levels respond to economic growth, rather than changes in taxes. Government expenditures often increase due to a rising demand for government services that are caused by higher income, population growth, and other domestic and international events rather than increased revenues. Likewise, tax revenue increases are caused by increased GDP rather than government expenditures. In other words, in the United States, where spending goes, taxes do not necessarily follow.

Caution should be exercised in interpreting the above causality results. Buchanan and Wagner (1977) have pointed out that sources of financing for public expenditures other than taxation are available and thus may distort the tax-expenditure causal relationship, particularly when politicians have a tendency

to increase debt financing rather than tax financing during an election year. In fact, government spending is often financed by some combination of direct taxation and borrowing (including monetizing the debt). In financing the budget deficit, politicians, through borrowing, deliberately lower the perceived tax price of public goods and services to gain public support and secure re-election (Hasan and Lincoln, 1997). Consequently, people increase their demand for such goods and services and thus the government grows larger.

Based on our observation of the federal budgetary process over the past two decades in the U.S., government spending has grown through deficit financing since the late 1970s and especially after the early 1980s. An inspection of the data reveals that during the Reagan years (1981-88), government spending grew from \$698.4 billion to \$1,035.6 while tax revenue only rose from \$622.3 billion to \$925.7 billion. Consequently, the budget deficit climbed from \$76.1 billion to \$140.5 billion. This increase was totally financed by public borrowing. Thus, increased government expenditures more often are financed by an increase in the public debt rather than by an increase in tax revenues. This seems to reflect Buchanan and Wagner's (1977) argument that politicians most often chose debt-financing over tax-financing because the latter is less popular politically and not likely to win Congressional approval. Increasing taxes may not only be economically unsound, but also politically undesirable especially if elected officials wish to get reelected. Obviously, continuous economic growth since April 1991 and the end of the cold war have lead to the current Federal budget surplus.

Moreover, while our results from the bivariate model are consistent with the bivariate studies by von Furstenberg et al (1985) and Anderson et al (1985) which did not use error-correction models but concluded that spending Granger-causes taxes in the short run, our trivariate study do not support these studies. However, our results from the trivariate study do not agree with the bivariate studies of Bohn (1991), Jones and Joulfaiian (1991), and Miller and Russek (1990), Owoye (1995) and Hasan and Lincoln (1997) who found bidirectional causality between the two variables in the short run. This strongly indicates that omitting any relevant variable may generate biased or spurious causality results.

V. CONCLUSIONS

The paper seeks to extend and advance earlier empirical research on the relation between taxes and spending. First, by testing cointegration, we ascertain that error-correction modeling must be incorporated in analyzing the relationship between government expenditures and tax revenues. Second, by employing Hsiao's version of the Granger's causality method, we use the FPE criterion to estimate the optimum lag length, which improves the statistical estimation between taxes and spending. Third, by adding the third variable, GDP, we avoid biases caused by omitting relevant variables. Finally, we conduct the t- and Wald-tests to estimate the sign of causality between expenditures, revenues and GDP.

Contrary to earlier bivariate studies, this study finds no evidence of causality between expenditures and revenues. Instead, we find that GDP causes both revenues and expenditures. This strongly demonstrates that the omission of any relevant variables may generate spurious causality results. This result is due to the institutional separation of the allocation (expenditure) and tax collection functions of government.

The policy implication of this is that changes in taxes and expenditures that are intended to reduce the budget deficit do not necessarily offer a permanent solution to underlying fiscal problems in the U.S. While our tests do not provide the final answer to the deficit issue, they imply that policy makers will find it difficult to balance the budget or reduce budget deficits because taxes in the US do not affect and are not affected by expenditures. However, it implies that maintaining steady, continual, non-inflationary economic growth coupled with selective spending reduction and tax increase may be a more

effective way to reduce budget deficits or even increase budget surpluses in the U.S. What we have observed in the last two years in the U.S. budget that has turned from deficits to surpluses is a testimony to this conclusion.

ENDNOTES

1. A process is stationary if the mean, the variance, and the covariances of the error term do not change over time. If economic data are stationary, they can be thought of as "nicely behaved." For instance, in table 1, since the PP value of expenditures, 0.7132 is less than 3.13 it is not stationary. Because most economic data are trending, that is, the mean changes over time, they clearly cannot be stationary. One difficulty that arises when employing regression with clearly non-stationary series is the spurious problem, that is, the conventional t-test will tend to indicate a relationship between the variables when none is present. This is particularly likely when the adjusted coefficient of determination (R^2) exceeds the D-W statistic. High R^2 s may indicate correlated trends and not true economic relationships while low D-W statistics may reflect nonstationary residuals. In such situations, the usual ordinary least squares significance tests can be quite misleading. Therefore, it is important to test for stationarity before proceeding with the causality estimation. See D. N. Gujarati (1996) and Granger and Newbold (1974).
2. As shown in table 2, the trace test statistic for at most one cointegrating vector (null $H_0: r=0$; alternative $H: r \geq 1$) is 56.26 and the 99% critical value given in Johansen table is 40.20 so that the null hypothesis is rejected and thus there is evidence for cointegrating relations in the data.
3. Neither F-test nor Wald-test can show the direction of causality. The direction of causality is estimated by using the Granger causality method. Nevertheless, we find that it is necessary to gauge the nature of causal relationship because if x_t is found to cause y_t , it could mean that (a) x_t positively causes y_t or (b) x_t negatively causes y_t . To obtain the complete information therefore, we performed the t- and Wald-tests to estimate the joint significance levels of causality between the two variables as well as the nature (negative or positive) of this relationship.

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APPENDIX

Hsiao's (1981) method essentially follows a two-step procedure to simultaneously determine the optimum lag lengths (using Akaike's (1969) FPE criterion and the directions of causality. The procedure used to implement Hsiao's version of the Granger-causality tests is given as follows:

- (i) Using Equation (4) for illustration, in step one we treat the dependent variable, y_t , as a one-dimensional autoregressive process and compute its Final Prediction Error (FPE) using the equation with the maximum order of lags varying from 1 to M. The corresponding FPE is calculated using the following equation:

$$FPE(m) = \frac{(T + M + 1)}{(T - M - 1)} \bullet \frac{SSE}{T}, \tag{7}$$

where T = total number of observations,
M = the order of lags varying from 1 to M, and
SSE = the sum the squared errors.

- (ii) In step 2, we choose the order which yields the smallest FPE, m^* . Focusing on Equation (5), we then treat y_t as a controlled variable, with the order of lags set at m^* , and x_t as a manipulated variable. Using Equation (5) we again compute the FPE of y_t by varying the order of lags of x_t from 1 to N and determine the order which yields the smallest FPE, n^* . The corresponding two-dimensional FPE is

$$FPE(m^*,n) = \frac{(T + m^* + n + 1)}{(T - m^* - n - 1)} \bullet \frac{SSE(m^*,n)}{T}, \tag{8}$$

where n = the order of lags on $x(t)$ varying from 1 to N, and
 m^* = the optimum number of lags computed from (7).

If $FPE(m^*, n^*)$ is less than $FPE(m^*)$, we then conclude that tax revenues (x_t) Granger-cause expenditures (y_t). Subsequently, by using the same procedure, $FPE(m^*, n^*)$ and $FPE(m^*, n^*, p^*)$ can be obtained and compared with each other. By repeating the same procedure for the tax revenue equations, causality from expenditures and income to revenues may also be estimated.

THE IMPACT OF SEASON MATURITY ON THE FOOTBALL-BETTING MARKET

Ladd Kochman* and Randy Goodwin**

ABSTRACT

Efficiency in the football-betting market was examined on a month-by-month basis over a 19-year period. Prompted by the mispricing of IPOs in the securities market, we anticipated less-efficient pointspreads in the first month of the National Football League's season (September) than in the three succeeding months. While more wins-to-bets ratios for the 28 NFL teams competing during the 1980-98 seasons were nonrandom in September than in October or November, W/B ratios in December were most conspicuously out-of-line. Possible explanations for a mature market behaving immaturely include an environment in which streaks occur as teams either chase post-season rewards or collapse when no longer contending and the substitution of lesser-known players for injured teammates.

INTRODUCTION

The vulnerability of stock prices to systematic trading has long intrigued investors and researchers. *Beating the market* has an inescapable appeal. Even the overwhelming evidence that superior returns are available only to those with *inside information* has not slowed efforts to uncover exploitable trends and biases. One reason for the ongoing inquiry may be the belief that closure is impossible owing to the limitless variety of trading rules. Perhaps another is that past studies, however thorough, lacked an unambiguous cutoff date for measuring results.

Fortunately, the second obstacle to resolving the question of market efficiency can be removed by redefining market opinion as football pointspreads rather than security prices. Recognizing that bettors are no less numerous, knowledgeable, competitive or profit-maximizing than investors, Pankoff (1968) argued that the outcomes of bets on National Football League (NFL) games provided valuable insights into the efficiency of people's average economic judgments. Also subscribing to the investing-betting analogy, Avery and Chevalier (1999) suggested that bets are actually superior to assets for gauging market efficiency since only the former have a well-defined *settling-up point* that facilitates performance evaluation.

Unfortunately, the football-betting market can neither solve nor escape the problem of limitless strategies. Home teams, favorites, *hot* teams, home underdogs, visiting favorites, teams off a loss and dozens of other angles have all served as the basis for attempts to uncover inefficient pointspreads. Where rules were found that produced above-average returns such as *Bet against the favorite if, as the favorite in its previous game, it beat the spread by 10+ points* (Gandar et al., 1988), they were almost always exposed as being sample-specific.

Another characteristic common to previous investigations is that betting strategies bear little or no resemblance to those contemplated by investors. It is clear from Sauer's (1998) exhaustive review of sports-betting studies that writers seem content to simply demonstrate that market consensus is or is not fallible. If "the pointspread betting market is a fruitful place to conduct research about behavioral theories

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that could apply in conventional market settings” (Gandar et al., 1988: 1007), researchers should strive to test strategies that have greater meaning for the markets to which Gandar et al. were alluding. Two exceptions are studies which examined the *neglect effect* (Kochman and Waples, 1998) and the *overreaction hypothesis* (Kochman, 1998).

In the former study, neglected (or overlooked) stocks [p1][p2]—often cited as an anomaly to the *efficient market hypothesis* (EMH)—were represented by college football teams that attracted only minimal, or regional, attention from fans and bettors. The *size effect* which tends to obscure the neglect-return relationship in conventional studies was absent in Kochman and Waples because each college is permitted a uniform number of football scholarships. When the twenty *most neglected teams* (e.g., Rutgers, Tulsa and Memphis) failed to achieve a combined wins-to-bets ratio (W/B) superior to that produced by the twenty *least neglected clubs* (e.g., Notre Dame, Nebraska and Florida State), Kochman and Waples concluded that neglect had no predictive value.

The hypothesis that overreaction by investors creates opportunities for abnormal returns was applied by Kochman to the market for bets on NFL games. Specifically, a series of events was hypothesized in which (1) bettors overestimate the chances that the reigning Super Bowl (SB) champions will beat the pointspread; (2) oddsmakers, in turn, adjust pointspreads upward in games involving the previous year’s SB winner in order to balance wagers; and (3) the inflated pointspreads lead to above-average returns from bets on the opponents of the SB winners. A wins-to-bets ratio of nearly 68 percent compelled Kochman to conclude that overreaction in a competitive market is both a real and exploitable phenomenon.

METHODOLOGY

The purpose of this study is to examine the efficiency of the football market from a time-of-the-season, or maturity, perspective. Our hypothesis—namely that pointspreads at the start of the NFL season are less efficient than spreads later in the year—is intended to mimic the proposition that the prices of initial public offerings (IPOs) are inefficient and represent an exception to the EMH. To accomplish our objective, we divided the NFL season into four months (September, October, November and December) and compiled the pointwise records of the 28 NFL teams that competed during the 10 consecutive years ending in December 1998 for each of those months. Two current NFL clubs (Charlotte and Jacksonville) began playing in 1995 and were therefore excluded from this study.

To determine the nonrandomness and profitability of each team’s W/B ratio for a particular month, we relied on tests developed by Vergin and Scriabin (1978) and Tryfos et al. (1984), respectively. Vergin and Scriabin (V&S) focused on the probability of a team beating the pointspread ($Z_{V\&S}$) and therefore ignored any transaction expense in their equation. Tryfos et al. were interested in the probability of beating the bookie (Z_{Try}) and incorporated the typical commission of 10 percent in their model.

$$(1) \quad Z_{V\&S} = [W - 0.5(B)] \times [B(p)(1-p)]^{-1/2}$$

where: W = number of winning bets

B = number of total bets

P = probability of winning a bet (=0.5)

$$(2) \quad Z_{\text{Try}} = \frac{W/B - (1.1)L/B}{\{1/B[(W/B + (1.21)L/B) - (W/B - (1.1)L/B)^2]\}^{1/2}}$$

where: L = number of losing bets

Ranges of 1.0 percent (e.g., 50.1-51 percent) were established for the wins-to-bets ratios achieved by the 28 NFL teams during the 1980-98 period. If, for example, the Atlanta Falcons beat the pointspread in 37 of 76 games played in September, their W/B ratio of 48.7 percent would be recorded in the 48.1-49 percent range. Ranges above 59.0 percent and below 41.1 percent were equated with nonrandom behavior in the V&S sense inasmuch as $Z_{V\&S}$ is significant at $p < 0.10$ where wins represent either more than 59.4 percent or fewer than 40.6 percent of 76 bets—or 19 seasons *times* 4 games per month. Ranges above 61.0 percent were regarded as profitable in the Tryfos et al. sense since Z_{Try} is significant at $p < 0.05$ where wins account for more than 61.5 percent of 76 wagers. The source for Las Vegas pointspreads and final scores was Lawrence (1999).

RESULTS

The pointwise success of NFL teams over the 1980-98 seasons resulted in W/B ranges from a high of 62.1-63 percent to a low of 36.1-37 percent. It is apparent from Table 1 that W/B ratios for the 28 NFL teams clustered around 50 percent and that few deviated by more than 10 percent. Another insight from Table 1 is that W/B ratios are more disperse in the season-beginning and season-ending months of September and December than in the middle months of October and November. The hypothesis that pointspreads are less efficient in the early part of the football year would seem to enjoy some support from our results inasmuch as five of the 28 teams (or roughly 18 percent) produced W/B ratios in September that were nonrandom in the Vergin and Scriabin sense—including one that was profitable per Tryfos et al. By contrast, only one W/B ratio was nonrandom in October while two were nonrandom in November—or approximately 3 ½ and 7 percent, respectively. The unexpected finding from our data was the erratic behavior of W/B ratios in December where eight teams (nearly 30 percent of the total) had nonrandom results—one of which was profitable as well. Confirming December's disperse results is its standard deviation of W/B ratios (7.3 percent) relative to 6.5 percent for September and 5.3 percent for both October and November.

Table 2 identifies the NFL teams with random and profitable W/B ratios. While four teams appear twice (Cincinnati, Denver, Indianapolis and Oakland), it is clear that one or two teams do not explain the nonrandom behavior of wins-to-bets ratios. It is also fair to say that our nonrandom ratios were not dominated either by those above the 58.1-59 percent range or by those below the 41.1-42 percent range. Eight of the 16 nonrandom W/B ratios exceeded 59.0 percent while the other half was less than 41.1 percent.

CONCLUSIONS

We had hoped to find early-season W/B ratios that reflected the kind of mispricing that many market observers connect with IPOs, and to some extent we did. Relative to the pointwise records of NFL teams in October and November, September's W/B ratios did reflect a slightly less-efficient market. Ratio ranges in September spanned 62.1-63 percent to 37.1-38 percent while—with the exception of one W/B ratio—ranges in October and November stretched only from 59.1-60 percent to 41.1-42 percent.

TABLE 1

Wins-to-bets ratios for NFL teams by months (1980-98)				
W/B Range	September	October	November	December
62.1-63%*	●			●
61.1-62%*				
60.1-61%**				●●
59.1-60%**	●	●	●	●
58.1-59%		●	●	●
57.1-58%	●	●		●
56.1-57%	●●	●●●		
55.1-56%	●	●	●●	●
54.1-55%	●●●●		●●	●
53.1-54%	●	●	●●●	●
52.1-53%		●●	●●	●
51.1-52%		●	●●●	
50.1-51%	●●	●	●●	●●
49.1-50%	●●	●●●	●●●●	●●●●●
48.1-49%	●	●	●●●	●
47.1-48%		●●		●
46.1-47%	●	●●		●●
45.1-46%	●●	●●●		●
44.1-45%		●	●	
43.1-44%	●●●	●●	●●	●
42.1-43%		●		●
41.1-42%	●	●	●●	●
40.1-41%**	●			
39.1-40%**				●●
38.1-39%**	●			
37.1-38%**	●			●
36.1-37%**			●	●
σW/B ratios	6.5%	5.3%	5.3%	7.3%

● represents a single NFL team

* profitable at $p < 0.05$

**nonrandom at $p < 0.10$

TABLE 2
NFL teams with nonrandom* and profitable** W/B ratios (1980-98)

September	October	November	December
Cincinnati**	Oakland*	Cincinnati*	Denver**
Denver**		Indianapolis**	Kansas City*
Indianapolis*			NY Giants*
Miami*			NY Jets**
New England*			Oakland*
			St. Louis*
			San Fran.**
			Seattle*

September also produced five nonrandom W/B ratios vis-a-vis three for October and November combined. The curious month is December when a mature market in which participants (both oddsmakers and bettors) should fully know competing clubs was plagued by the greatest incidence of nonrandom W/B ratios. Instead of extending or improving the efficiency in October and November, December emerged as less mature than September. That eight of 28 W/B ratios were nonrandom and one was profitable in December suggests that important information existed or developed which was not discounted by the points spread. W/B ratios in December covered the entire spectrum of ranges in Table 1.

In sum, it is gratifying to discover that efficiency in the football market appears related to time-of-the-season—albeit in a curvilinear manner. While it is disappointing that the betting-investing analogy fails to offer any insights into how a mature market can behave immaturely, explanations are still possible. What might be occurring in a season's final few weeks is the *streaking teams phenomenon*—the tendency of some teams to run *hot* or *cold*. Although researchers such as Camerer (1989) and Brown and Sauer (1993) have studied the phenomenon and found no predictive value, no one has limited it to a segment of a season. Intuitively, streaks would be more likely to occur at the end of a sports year as certain clubs have extra motivation to play well and make the playoffs while other teams lose motivation as they fall out of contention. The incentive to succeed may be one of those variables which points spreads fail to capture. Another explanation for our season-ending anomaly could be that cumulative physical exertion and injuries result in the substitution of better-known players by lesser-known ones. The changes create a new market in which participants are more likely to commit mistakes. Of course, a third explanation for the somewhat counterintuitive results is that they are simply specific to our sample and should be added to the long list of short-lived anomalies to the EMH.

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A MODEL OF BALANCE OF PAYMENTS CRISIS: MONETARY INDEPENDENCE AS A DETERMINANT OF EXCHANGE RATE DISEQUILIBRIA

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ABSTRACT

What factors determine a government's decision to abandon a currency peg or to continue to use a fixed exchange rate? This question may be logical when one recognizes that governments can borrow international reserves and exercise other policy options to defend fixed exchange rates during currency crises. When the government initiates purposeful actions, the possibility of self-fulfilling crises and multiple equilibria become important. Speculative responses depend on anticipated government responses, which in turn, depend on how price changes affect the government's economic and political positions. This circular flow pattern implies the potential for crises that need not occur, but occur because market participants expect them to occur. This paper presents a model in which crisis and realignment result from the domestic government's fiscal, monetary and economic policies. If these policies are not consistent with the exchange rate regime and based on sound macroeconomic fundamentals, the currency peg can become untenable.

INTRODUCTION

In first generation crisis models, Krugman (1979) and Floyd and Garber (1984) assumed that a government with a persistent balance of payment deficit would use a limited stock of reserves to defend its exchange rate. This policy, of course, would ultimately be unsustainable. When reserves fall to some critical level, attempts by investors to anticipate the inevitable collapse would generate a speculative attack on the currency.

In second generation models (Obstfeld 1995, 1996), a government in choosing whether to defend a pegged exchange rate considers the tradeoff between short-run macroeconomic flexibility and longer-term credibility. The crisis arises because defending a fixed exchange rate is more expensive (i.e., requires higher interest rates) if the market believes that defense of the exchange rate will ultimately fail. As a result, a speculative attack on a currency can develop either as a result of a predicted future deterioration in fundamentals, or purely through a self-fulfilling prophecy. Krugman (1996) extended the self-fulfilling prophecy theory to the Asian crisis. Eichengreen, Rose and Wyplosz (1996) examine a large number of attack episodes, including those in which the exchange rate's defense succeeded and those in which the result was realignment. They found that speculative attack episodes exhibit significant pre-crisis changes in such variables as competitiveness, fiscal deficits, and unemployment which suggests it may be hard to explain crises without postulating that at least some involve self-fulfilling elements and multiple equilibria. Rose and Svensson (1994) concluded that the European Exchange Rate Mechanism's (ERM) credibility did not deteriorate markedly until August 1992 which suggests that most of the system's

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exchange rates were not viewed as unsustainable by markets until the 1992 crisis actually erupted. Jeanne (1996) developed a structural estimation strategy whose results indicate that France's 1992-93 exchange rate crisis had a self-fulfilling aspect. The currency crises of the 1990's can be viewed as three regional crises consisting of the ERM crisis in Europe from 1992 to 1993, the Latin American crises of 1994-95, and the Asian crises of 1997. Financial markets did not anticipate the ERM crisis. Rose and Svensson (1994) argued that interest rate differentials against the target currencies did not begin to widen until August 1992, which was a month before the crisis.

Calvo and Mendoza (1996) argued that the roots of Mexico's balance of payments crisis were in the prevailing high degree of capital mobility and financial globalization. Under these circumstances, shifts of foreign capital flows and anticipation of a banking-system bailout produced large imbalances between stocks of financial assets and foreign reserves, threatening the sustainability of the currency peg. Chang and Velasco (1998) argued that a country's financial system is internationally illiquid if its potential short-term foreign currency obligations exceed the amount of foreign currency available on short notice. They argue that the 1997-98 crisis in Asia was in fact a consequence of international illiquidity. They trace the emergence of illiquidity to financial liberalization, the shortening of the foreign debt structure, and the currency denomination of assets versus liabilities. Kaminsky and Reinhart (1999) argue that problems in the banking sector typically precede a currency crisis. The currency crisis deepens the banking crisis, activating a vicious spiral; financial liberalization often precedes the banking crisis.

Lindert and Pugel (1996) argue that one of the main objectives of government policy is to reduce the variability in exchange rates. However, they also argue that governments have other reasons for adopting a fixed exchange rate such as keeping the exchange rate low to protect certain groups in the country. Or a government may want to do the opposite: keep the exchange rate value of the currency high to benefit groups such as import buyers and to reduce domestic inflation by using the competitive pressure of low import prices. Lindert and Plugel also argue that government policy may reflect other noneconomic goals. The government may believe that it is defending national honor by maintaining a steady exchange rate or a strong currency. Devaluation or depreciation would be viewed as a confirmation of government ineptitude.

While this paper is directed toward the Asian crisis, it must be emphasized that many of the circumstances and factors that were present in the ERM and the Latin crises were also present in the Asian crisis. One of the main factors was the emergence of very large current account deficits. Several of the Asian countries had developed financial weaknesses such as heavy investment in highly speculative real estate ventures financed by borrowing from under-regulated domestic financial institutions. During 1996 the IMF and the World Bank warned the governments of Thailand, Malaysia, and other countries of the risks imposed by their financial situation, and urged corrective policies. However, these warnings were rejected.

The Asian currency crisis of 1997 opened up a new perspective on theories or models that attempt to explain why currency crises occur. Economists attempted to analyze the Asian crisis using conventional currency crisis theories. While these models had been useful in the past, it became increasingly evident that they were missing important aspects of the crisis in Asia. While every crisis is different, the Asian crisis differed from the standard currency crisis in several fundamental ways.

1. When the crisis began, all of the governments were more or less in fiscal balance, and were not engaged in irresponsible credit creation or runaway monetary expansion policies. Their inflation rates, in particular, were quite low.
2. Although there had been some slowdown in growth in 1996, the Asian economies did not have substantial unemployment when the crisis began. Therefore, this would not have been an

incentive to abandon a fixed exchange rate in order to pursue a more expansionary monetary policy, (this was held to be one of the causes of the 1992 ERM crises in Europe).

3. In all of the Asian countries there had been a boom-bust cycle in the asset markets before the currency crisis in which stock and land prices soared, and then plunged, (they plunged even further after the crisis).
4. In all of the Asian countries, financial intermediaries played a central role whether it was the domestic country's commercial banks or foreign commercial banks.

What all of this suggests is that the Asian crisis should not be viewed as a problem caused by fiscal deficits, as in first generation models. Nor should it be viewed as one brought on by short-run macroeconomic policies, as in second-generation models.

The Asian currency crisis should be viewed from an entirely different perspective. When a country (the domestic country) pegs to a currency, it is effectively relinquishing monetary policy to the central bank of the country of that currency. (In this study we refer to the US dollar but the domestic country could peg its currency to any strong currency). We postulate that the domestic country's fiscal policies are influenced by the monetary policy of this country, which in turn has economic and political implications for the domestic country.

The three strongest currencies in world financial markets are the US dollar, the Japanese yen, and the German mark (now the euro) . Most world trade is conducted in US dollars. A country whose currency is pegged to the US dollar gives up its monetary control for the benefits of a stable currency. This position places the domestic country under the influence of the monetary policy of the Federal Reserve and exposes it to the volatility of the US dollar. This study presents a model in which a balance of payment crisis and realignment result from the interaction of the US government's monetary policy and a domestic government that pursues well defined policy goals. A fixed exchange rate regime must maintain the link between the domestic currency and the US dollar. One of the problems for the Asian countries was that the US dollar was stable in terms of commodity prices, but appreciated in value relative to the Asian currencies (value being determined by the US dollar as the monetary standard). This indicated a deflationary policy by the Federal Reserve. The dilemma facing Asian countries was whether to depreciate relative to the US dollar or to maintain the peg. The Federal Reserve chairman, Alan Greenspan (1997), alluded to this problem in a speech given at Stanford University on September 9, 1997 noting that, "As long as individuals make contractual arrangements for future payments valued in dollars and other currencies, there must be a presumption on the part of those involved in the transaction about the future purchasing power of money....There will always be some general sense of purchasing power of money both across time and across goods and services. Hence we must assume that embodied in all products is some unit of output, and hence of price, that is recognizable to producers and consumers and upon which they will base their decision".

If we accept the premise that the US dollar has established itself as one of the dominant and controlling currencies (and the monetary standard) in the world's financial markets, we can postulate that its volatility is a determinant of the domestic country's exchange rate disequilibrium. We consider a simple discrete time model of exchange rate determination containing stochastic market fundamentals, which cause the regime to collapse.

A SIMPLE MODEL OF EXCHANGE RATE DETERMINATION

To present a simple model of exchange rate determination we consider a small, one-sector, open economy. In order to focus on the monetary side of the economy, we assume that its real side is characterized by full employment and that factor endowment and technology are constant. The following equilibrium conditions describe the monetary side of the economy:

$$M(t)/P(t) = a-bi(t) \quad (1)$$

$$M(t) = S(t)R(t)+D(t) \quad (2)$$

$$P(t) = P^*(t) \cdot S(t) \quad (3)$$

$$i(t) = i^*(t)+S'(t)/S(t) \quad (4)$$

where:

$M(t)$ = quantity of high powered money

$S(t)$ = spot exchange rate

$P(t)$ = general price level

$D(t)$ = domestic credit

$i(t)$ = interest rate

$i^*(t)$ = foreign interest rate.

Equation (1) is the real money demand equation, since the output level is fixed. The coefficients, a and b , are positive numbers. Equation (2) gives the money supply, which consists of the foreign currency reserves held by the government (central bank) $R(t)$, plus domestic credit, $D(t)$. The spot exchange rate $S(t)$ is used to express foreign currency holdings in terms of the domestic currency. Equation (3) is the purchasing power parity condition, where the asterisk represents a foreign variable. Equation (4) is the interest parity condition, where a (') attached to a variable represents the rate of change of that variable with respect to time. Assuming perfect foresight, the expected rate of depreciation is equal to the actual rate of depreciation. Since we are considering a small economy, foreign variables are treated as given exogenously. This allows us to normalize $P^*(t)=1$ and $i^*(t)=0$.

We assume that the spot exchange rate always adjusts to its equilibrium level instantaneously and costlessly. With no government intervention, foreign reserves are fixed at R_0 . Domestic credit is assumed to be increasing at the exogenously given rate of $\mu(>0)$, i.e. $D'(t)=\mu$. The increase in domestic credit is the main feature of most currency crisis models when the government runs a deficit and finances the deficit by increasing domestic credit (printing money).

Because $D(t)$ is changing at rate of μ , using a linear Taylor approximation, we can represent the domestic credit $D(t)$ at time t as:

$$D(t) = D_0 + \mu(t-t_0), \quad (5)$$

where D_0 is the initial domestic credit at time t_0 . The change of foreign reserves over time t may be approximated by the following linear expression:

$$R(t) = R_0 - \mu(t-t_0),$$

where R_0 is the initial value of foreign reserves. This has been arbitrarily chosen as schedule ABC in Fig. 1.

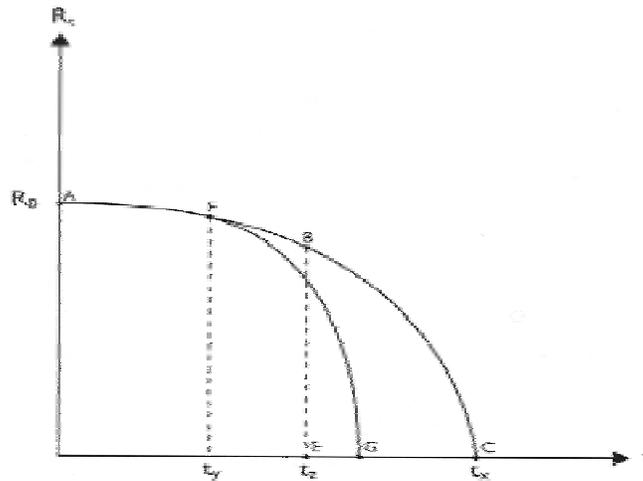


Figure 1

Combining (1), (3) and (4), we have the following equation for the money supply:

$$M(t) = a S(t) - b S'(t). \quad (6)$$

Assuming that S' is constant, we can differentiate both sides of equation (6) to obtain:

$$M'(t) = a S'(t).$$

If we assume that reserves are fixed, then the rate of growth of the money supply $M(t)$ equals the rate of growth of domestic credit (μ)

$$S'(t) = \mu/a$$

We can then use this expression to substitute for S' in equation (6). The solution to equation (6) is then given by :

$$S(t) = \alpha + \beta M(t), \quad (7)$$

with $\alpha = b\mu/a^2$, $\beta = 1/a$.

Recalling that high-powered money consists of foreign reserves and domestic credit, (2) can be substituted into (7) to obtain:

$$S(t) = \alpha\delta + \beta\delta D(t), \quad (8)$$

where $\delta = 1 / (1 - \beta R_0)$.

Factoring the common δ in equation (8), we have

$$S(t) = \delta [\alpha + \beta D(t)]. \quad (9)$$

Equation (9) is represented by line ABCE in Figure 2. Suppose that at time $t=t_0$, the quantity of domestic credit is D_0 . This is represented by point B. As domestic credit increases, the currency is devalued and the exchange rate moves up the line BCE. Because of the constant rate of increase in $D(t)$, figure 1 can also be interpreted as showing the change in $S(t)$ with respect to time, with t represented by the horizontal axis.

Using equations (5) and (9), it is easy to write the exchange rate $S(t)$ as follows,

$$S(t) = \delta [\alpha + \beta D_0 + \beta(t-t_0)] \tag{10}$$

The exchange rate in (10) depends on the initial value of foreign reserves. If reserves are zero, then $\delta=1$ and equation (10) becomes:

$$S(t) = \alpha + \beta D_0 + \beta(t-t_0). \tag{10a}$$

This exchange rate is represented by line GHJ in figure 2.

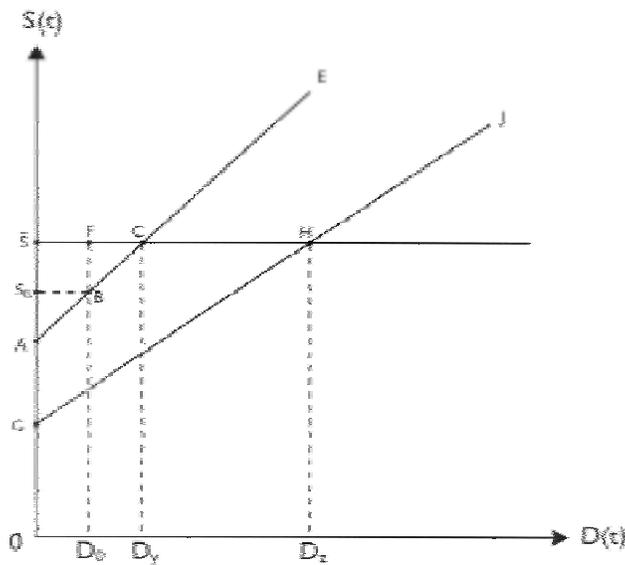


Figure 2

When the exchange rate $S(t) = S_1$ is fixed, (i.e. $S'(t)=0$), equation (6) implies that

$$M(t) = a S_1 \tag{11}$$

Thus, the equilibrium stock of money is proportional to the given exchange rate. Therefore, when the government pegs the exchange rate, the economy accumulates foreign reserves and thus money by

running a balance of payment surplus, or the economy loses foreign reserves and thus money by running a balance of payment deficit.

Mexico, Argentina, Brazil, and Peru have experienced currency crises of varying severity. These countries chose to peg their currencies. At some point, each of these countries experienced capital flight and a speculative attack on its currencies.

Continuous government deficits have been identified as one of the major causes of these currency crises. These deficits were financed mainly by printing money, i.e., through an increase in domestic credit held by the central banks. As Salant and Henderson (1978), Krugman (1979), and Flood and Garber (1984) have pointed out, there is an inconsistency between this deficit financing policy and a fixed exchange rate. In the model described above, the money supply is exogenous. An increase in the central bank's domestic credit will be matched by a drop in foreign reserves. Because the foreign reserves held by the central bank are finite, the government cannot maintain a fixed exchange rate regime indefinitely. Krugman (1979) argued that a crisis occurs when the central bank's foreign reserves reach a minimum level. At this point, the government has to devalue its currency or give up its fixed exchange rate policy. The change in foreign reserve follows the arbitrarily chosen schedule ABC in Figure 1. Assuming that the minimum level of reserves is zero, this implies that the crisis occurs at $t=t_x$.

Flood and Garber (1984), however, argue that if people anticipate the devaluation, speculation will occur which could force the devaluation to happen earlier. For example, shortly before t_x , speculators can purchase the central bank's remaining foreign reserves, R' with an amount of domestic currency equal to SR' . When the exchange rate depreciates to S' , the speculators can sell the foreign reserves back to the central bank, and earn a profit of $(S' - S)R'$. This profit may not be much if R' is small, but the profit rate is very high considering the short duration of time. As a result, whenever the anticipated exchange rate is higher than the pegged rate, one can argue that devaluation will occur before t_x . This means that the crisis will occur when $t=t_z$ and the change in the central bank's foreign reserves is described by ABE in Figure 1.

However, the path ABE assumes costless exchange transactions, that speculators have unlimited resources and know when the fixed exchange rate will be changed. Between t_y and t_z the currency is overvalued (relative to the existing stock of foreign reserves held by the central bank). Therefore, if the government's determination to defend the pegged exchange rate is unknown and speculators do not know at what point a decrease in foreign reserves will lead the government to give up the exchange rate regime, then it is possible that the investors who are most pessimistic about the economy or the resolve of the government may start moving money out of the country at or shortly after t_y . This loss of foreign reserves makes devaluation more likely by causing more people to take similar action. Finally, the capital flight and speculation become so overwhelming that the government cannot defend the exchange rate anymore. The result is a possible adjustment path of foreign reserves as described by schedule AFG in Figure 1.

THE SELF-FULFILLING CURRENCY CRISIS

Krugman (1996) supposes that a fixed exchange rate could be costly to defend, if people expect that it will be depreciated in the future. The use of higher interest rates to defend the currency could either worsen the cash flow of the government (or indebted enterprises) or depress output and employment.

The earlier model can be used to explain the feature of a self-fulfilling currency crisis. Suppose that the central bank currently owns foreign reserves ($R_0 > 0$), and that the government keeps domestic credit constant ($\mu = 0$). From (8) with $\alpha = 0$, the flexible exchange rate corresponding to foreign reserves R_0 is given by

$$S(t) = \delta\beta D(t). \tag{12}$$

Equation (12) is illustrated by line OAB in Figure 3. Line OAB assumes a positive level of reserve holdings.

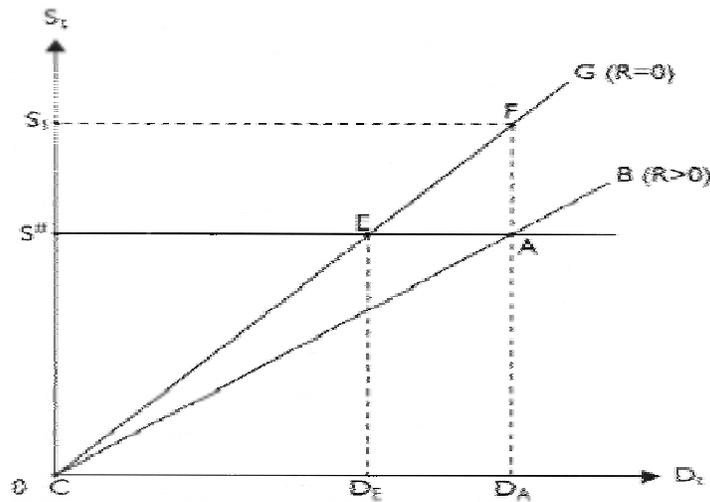


Figure 3

If $R_0 = 0$, then $\delta = 1$. Equation (12) becomes $S(t) = \beta M(t)$

Since $\beta = 1/a$, we obtain:

$$M(t) = aS(t) \tag{13}$$

The equilibrium stock of money is proportional to the exchange rate. This is similar to (11). In this case there is no deficit and when the government pegs the exchange rate, the economy accumulates foreign reserves and thus money by running a balance of payment surplus.

Let the current domestic credit be D_A and let the exchange rate be pegged at $S^\#$. This is depicted by point A in the diagram. Since domestic credit is fixed, the economy can avoid the type of crisis as described above, and can stay at point A indefinitely.

Suppose now that currency speculators believe that there is a positive probability that the government will devalue the currency in the near future. Specifically, if the foreign reserves fall below a minimum level, such as zero, the shadow exchange rate will then be equal to the flexible rate. Floyd and Garber (1984) describe a shadow exchange rate as the exchange rate under the condition $R_0 = 0$. Prior to

the collapse at t_2 , money remains constant, but its components vary. $D(t)$ rises at the rate μ and reserves decline at the same rate. Since reserves fall to zero, money equals domestic credit (after t_2). It is also assumed that the value of the floating exchange rate depends only on market fundamentals. In figure 3, line OEFG shows the shadow flexible rate and is based on the premise that reserves are zero.

If the speculators have the resources and choose to purchase all of the foreign reserves held by the central bank, the government will give up its fixed exchange rate policy and the exchange rate will jump up to $S_1 > S^\#$, as represented by point F in Figure 3. This devaluation occurs despite the fact that the economy is fundamentally solid, with no domestic credit creation due to deficit financing.

In terms of the resources held by the speculators, Obstfeld (1996) distinguishes among three different cases: (a) when the resources of the speculators are less than R_0 ; (b) when the resources of each speculator are greater than R_0 ; (c) when none of the speculators has resources greater than R_0 , but when two or more have combined resources greater than R_0 . In case (a), devaluation will not occur. In case (b), devaluation will occur when any one of the speculators purchases R_0 from the central bank, causing devaluation. In fact, all of them will try to be the first to do so. In case (c), if a sufficient number of speculators believe that devaluation will occur and purchase foreign reserves, devaluation will definitely occur, even though without speculation, the fixed exchange rate regime could have survived indefinitely. If the currency is devalued, the total profit of the speculators is $(S_1 - S^\#)R_0$.

The crisis that occurs is case (c) has two features: (1) there are multiple equilibria; (2) it is self-fulfilling in the sense that it will not occur if none of the speculators act, but will occur if a sufficient number of them act.

Figure 3 also shows that a self-fulfilling crisis can occur when domestic credit is in between D_A and D_E . As explained before, if the central bank loses all its foreign reserves, the exchange rate becomes flexible, jumping up to a point in between E and F on OEFG. If the initial value of domestic credit is equal to D_E , the speculators will earn no profit.

If the initial domestic credit is less than D_E , no speculation will occur because if the fixed exchange rate breaks down, appreciation of the currency will occur and the speculators lose money. If domestic credit is greater than D_A , the currency is overvalued and speculators will have a bigger incentive to attack the exchange rate.

SUMMARY

This study presents a model that focuses on the relationship of the money supply to the exchange rate of the domestic government. When the government pegs the exchange rate, the economy accumulates foreign reserves and thus money by running a balance of payment surplus, or the economy loses foreign reserves and thus money by running a payment deficit. If, the exchange rate is fixed, the domestic country trades its monetary independence for the advantages of a stable currency. Without a discretionary monetary policy, the money supply will remain constant.

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OPTIMAL MONETARY STRATEGIES FOR CENTRAL AND EAST EUROPEAN EU CANDIDATES

Miron J. Wolnicki**

ABSTRACT

The author argues that the high real interest rate policy pursued in the Central and Eastern European Countries (CEEC) carries a risk of currency devaluation and recession when they join the European Monetary Union. Fear of demand-pull inflation has led the monetary authorities in the fast-growing CEEC to reduce the demand for credit by raising real interest rates, exceeding the interest parity relation with major EU markets. This policy has caused speculative capital inflows, distortion of capital allocation, real currency appreciation and trade deficits. Currency overvaluation will require a corrective devaluation vis-à-vis the Euro during the final stages of accession to the EMU. Such a "last minute" correction is likely to destabilize CEEC banks and businesses by upsetting the balance between short-term foreign currency liabilities and long-term domestic assets. The author proposes that the CEEC EMU candidates adopt flexible inflation targeting instead of focusing on interest rates as a main disinflationary tool. This would assure accumulation of the proper amount of foreign currency reserves, reduce the current account deficit and ensure a smooth transition to the EMU. The new policy should be focused on defining and adopting a band of acceptable inflation rate targets and a "step down" path to alignment with the Euro.

In the early 1990s the Czech Republic, Poland, Hungary and the Slovak Republic established the basic institutions needed for monetary policy implementation: full-function central banks, capital and money markets. The objectives of the monetary authorities in these countries were to reduce double-digit inflation, introduce currency convertibility and provide financial services to a growing private sector and consumer market. In 1993 all four countries (the Visegrad group) signed "Europe Agreements" which laid out the framework of association with the European Union (EU). Joining the EU early in the next century requires a credible commitment to meet the Maastricht criteria of the European Monetary Union (EMU). EMU membership is not required of new EU entrants; nevertheless, eligibility to enter the Euro zone is a useful benchmark in assessing the monetary policy of potential new Union members. The Maastricht criteria are:

- a) The candidates must have inflation rates no more than 1.5 percent above the average of the three countries with the lowest inflation rates in the Community;
- b) Long-term interest rates should be no more than 2 percent above the average of the three lowest inflation countries;
- c) The exchange rate of the country should remain within the "normal" band of the Exchange Rate Mechanism (ERM) for two years. At the time of the Maastricht Treaty, the "normal" band was +/- 2.25 percent;
- d) The public debt of the country must be less than 60 percent of GDP;
- e) The national budget deficit must be less than 3 percent of GDP.

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Formally, all Visegrad countries are obliged to follow a "pre-accession strategy", which is to help them attain EU and later EMU membership. During the first phase of the negotiations, which started on April 1, 1998 it became apparent that the Central European candidate countries had very different monetary and exchange rate policies. In such a situation proposing a uniform monetary strategy to arrive at a target Euro exchange rate became practically impossible (see table 1).

This paper is an attempt to analyze monetary policy in EMU candidate countries which were centrally planned only a decade ago. Since the phenomenon of economic transition has no precedent this author does not attempt to build formal models to test alternative monetary policies but wants to show the opportunities and perils of such policies in countries where true central banks have just begun to apply market-based monetary tools and academic economists hired by the government year-by-year acquire better monetary management experience. This paper is a critique of the CEEC preference for a high interest rate policy as the main anti-inflationary tool. The author wants to prove that while high interest rates had some justification in the early 1990s they became quite dysfunctional in the late 1990s when the CEEC became the candidates to EU and EMS II. The critique presented here is based both on contemporary research and empirical studies of rules-based vs. discretionary monetary policies as well as examples of recent successful and unsuccessful monetary policies in transforming economies. The author hopes to make some contribution to a better understanding of the difficult task of finding a suitable monetary policy for economies making the transition from centrally planned to market systems.

Table 1. Exchange Rate Regimes in Selected CEEC (1998)

Country	Currency	Exchange Rate Regime	Description
Czech Republic	Czech koruna	Managed Floating	The Czech National Bank manages the rate of koruna, which is pegged to the German mark. The band of fluctuation was widened from +/-0.5 percent to +/- 7.5 in 1996. Since May 1997 the koruna is under a managed floating regime.
Hungary	Forint	Crawling Band	The National Bank of Hungary adjusts the official exchange rate in accordance with a desired crawl against a basket consisting of German mark (70 percent) and the U.S. dollar (30 percent), within margins +/- 2.25 percent.
Poland	Zloty	Crawling Band	The Polish National Bank devalues the Zloty at a preannounced devaluation rate. The crawling band margin is +/- 10 percent around the central rate. The zloty is pegged to a basket of the US dollar (45 percent), the German mark (35 percent), the British pound (10 percent), the Swiss franc (5 percent) and the French franc (5 percent).
Slovakia	Slovak koruna	Managed Floating	The Slovak koruna is pegged to a basket consisting of the German mark (60 percent) and the US dollar (40 percent) within margins of +/- 7 percent.

THE MONETARY STRATEGY OF CEEC CENTRAL BANKS

The Czech Republic

Between 1991 and 1997, Czech policymakers chose to maintain an overvalued exchange rate supported by foreign exchange controls. After the division of the country in 1993, a newly introduced Slovak koruna was devalued and pegged to the German mark. With a fixed exchange rate the increase in Czech inflation caused the Czech koruna to appreciate in real terms. By the beginning of the 1997 maintaining an unrealistically high value of the Czech currency was no longer defensible. In May 1997, the Czech National Bank (CNB) abandoned the fixed exchange rate regime after which the Czech koruna depreciated by 12 percent against the German mark. In order to defend the koruna, the CNB decreased the money supply and raised the real interest rate. The lombard rate¹ was raised from 14 to 50 percent and the interbank short-term borrowing rate peaked at above 400 percent after which koruna regained some of its value. The intermediate operating target for the Czech CNB was the one-week Prague Interbank Offer Rate (PRIBOR).

By adopting a managed float for the koruna and maintaining a high real interest rate, the Czech National Bank succeeded in reducing inflation in 1997. However, it again lost control over prices in late 1998 and 1999. The Czech economy paid a steep price for setting an unrealistic exchange rate for the koruna. After strong 6.4 and 3.9 percent real GDP growth rates in 1995 and 1996 respectively, the growth rate fell to 1.0 percent in 1997 and was negative in 1998 (- 0.5 percent). Expected real GDP growth in 1999 is 2.0 percent².

Hungary

Until 1995 Hungary was troubled by a large external debt, fiscal deficits, high inflation, declining domestic investment, and a steady erosion of the current account. The situation began to improve in 1996 when the fiscal deficit and inflation began to fall. Despite wage increases between 1996 and 1998, inflation fell from almost 24 percent to 14 percent. The National Bank of Hungary (NBH) committed itself to maintaining the exchange rate within the plus-minus 2.5 percent band and countered inflationary expectations with frequent adjustments of the base (discount) rate. For example between January 1996 and November 15, 1999 the rate was changed 19 times. The NBH's operational target is to keep a positive interest differential vis-`a-vis EU financial markets. The NBH claims that it is able to monitor short-term capital inflows more effectively as a result of this policy.

Poland

Between 1991 and 1997 the Polish central bank - Narodowy Bank Polski (NBP) - devalued the zloty at the rate of 1 percent per month in relation to a basket of five currencies (see table 1). At the beginning of 1998, the devaluation rate was reduced to 0.8 percent per month. The NBP's policy of maintaining a positive interest differential with the EU resulted in a rapid increase in banks' dollar reserves (see table 2) and the erosion of the country's current account (see tables 3, 4).

To keep the money supply and inflation under control, the NBP raised the real interest rate from 6.3 percent in 1997 to 10.5 percent in 1999 (see table 5). The NBP used short-term interest rates as an operational target in the first half of 1996. When the current account deficit started to deteriorate rapidly in 1997 the bank formally selected the monetary base as its target. In 1998, it switched to targeting interest rates again. The NBP's intermediate target is to maintain the exchange rate within the plus-minus 10 percent band. The NBP directives state that the spread between the one-month Warsaw Interbank Offer Rate (WIBOR) and the lombard rate is their operational target.

Table 2. Foreign Official Reserves (billions of US\$)

Year	Czech Rep.	Hungary	Poland	Slovakia
1995	13.9	11.9	14.7	3.4
1996	12.3	9.7	18.0	3.5
1997	9.7	8.4	20.7	3.0
1998	12.6	9.4	27.4	2.9
1999	12.9	11.4	25.5	3.4

Source: CESTAT Statistical Bulletin, GUS, Warsaw 1999, BSE 1999 (<http://www.czso.cz/eng/figures/select/select.htm>)

Table 3. Current Account (billions of US\$)

Year	Czech Republic	Hungary	Poland	Slovakia
1995	- 1.4	- 2.5	5.5	0.4
1996	- 4.3	- 1.7	- 1.4	- 2.1
1997	- 3.2	- 1.0	- 4.3	-1.9
1998	- 1.0	- 2.3	- 6.9	- 2.1
1999	-0.8	-2.1	- 11.7	-1.0

Source: CESTAT Statistical Bulletin, GUS, and Warsaw 1999

Table 4. Trade Balance (billions of US\$)

Year	Czech Republic	Hungary	Poland	Slovakia
1995	-3.7	-2.5	-6.1	-0.2
1996	-5.8	-3.1	-12.7	-2.3
1997	-4.2	-2.7	-16.5	-2.0
1998	-2.5	-2.7	-18.9	-2.3
1999	-2.0	-2.9	-18.0	-2.0

Source: CESTAT Statistical Bulletin, GUS, Warsaw 1999, BSE 1999 (<http://www.czso.cz/eng/figures/select/select.htm>)

The targeting practices of the Central European monetary authorities indicate that **all of them use interest rate based discretionary policy as a main disinflationary tool**. Their central banks want to exercise a high degree of influence over financial markets and institutions through high real interest rates. Between 1998 -1999 the real interest rate rose in the Czech Republic by 3.8 percentage points, in Hungary by 6.3 percentage points, in Poland by 5.4 percentage points and in Slovakia by 2.6 percentage points. The CEEC's monetary authorities argue that this approach is an effective way to control inflation given the current conditions of rising foreign direct investment (FDI), especially in Poland, high demand for credit, and large capital inflows and fiscal deficits (Orlowski, 1998). (See tables 5 and 6).

Table 5. NOMINAL INTEREST RATE, INFLATION, REAL INTEREST RATE

Year	Czech Republic			Hungary			Poland			Slovakia		
	IR*	INF	RIR	IR	INF	RIR	IR	INF	RIR	IR	INF	RIR
1995	12.8	9.1	+3.7	32.2	28.2	+4.9	25.0	27.8	+2.8	13.3	9.9	+3.4
1996	12.5	8.8	+3.7	24.0	23.6	+0.4	22.0	19.9	+2.1	13.4	5.8	+7.6
1997	13.2	8.5	+4.7	20.8	18.3	+2.5	24.5	14.9	+9.4	18.4	6.1	+12.3
1998	12.8	10.7	+2.8	17.3	14.3	+3.0	18.1	11.8	+6.3	19.4	6.7	+5.7
1999	8.7	2.1	+6.6	19.3	10.0	+9.3	19.0	7.3	+11.7	18.8	10.5	+8.3

Source: CESTAT Statistical Bulletin, GUS, and Warsaw 1998

*IR = interest rate = refinancing rate or average bank lending rate

INF = annual inflation rate

RIR = IR – INF = real interest rate:

Table 6. Foreign Direct Investment to CEEC (billion US \$)

Year	Czech Rep	Hungary	Poland	Slovakia
1995	2.7	4.9	1.1	0.3
1996	1.1	2.8	2.8	0.3
1997	1.3	1.4	3.0	0.2
1998	1.4	1.9	7.5	0.3
1990-99*	13	15	41	3

Source: CESTAT Statistical Bulletin, GUS, Warsaw 1999

The National Bank of Poland, 1999, <http://www.nbp.pl/en/statistics/index.html>

* Estimate, various resources.

Heller (1997) and Laurens and de la Piedra (1998) have discussed the proper policy response to capital inflows and inflation. The essence of their argument is that the central bank can only successfully pursue a disinflationary monetary policy when the policy is well understood and accepted by the government and the public. Therefore if discretion dominates rules in monetary policy and if the government does not support a deflationary monetary policy with appropriate fiscal policy, its effectiveness is going to be very low.

The evidence from Latin America in the early 1990s, the Czech Republic in 1996, and Poland in 1997-1998 clearly shows that restrictive monetary policy alone cannot cope successfully with large capital inflows, inflation, and maintenance of a stable currency value. Also, while the economic conditions are not quite similar, this author believes that there exists a real danger of triggering in the CEECs a crisis similar to those in Malaysia and Indonesia. In those countries, high real interest rates and overvalued domestic currencies led to current account deficits of crisis proportions and subsequent currency devaluations. In addition, high real interest rates raised the cost of public debt servicing causing a public finance crisis³.

If real interest rates in the CEEC continue to rise in as they did in 1999 (see table 5), the anti-inflation policy may fail and fiscal deficits might start growing again. The CEEC countries might then have a fundamental problem in qualifying for EMU membership, which is expected sometimes between 2004-2005.

The unique characteristics of the CEEC economies are the costly legacy of the "socialist welfare state" (a large state sector payroll combined with farm, social security and health care subsidies) and a weak tax base (Heller, 1997). While in the first half of the 1990s all four of the countries experienced inflationary pressures of mostly fiscal origins, in the second half of the decade they succeeded in controlling spending, increasing privatization revenues and, finally, lowering their budget deficits and inflation (see table 7). However, this progress could be lost due to the increased cost of debt financing, and fall of tax revenues due to a very restrictive monetary policy. Given this situation a proper response to inflation should be a policy of lowering real interest rates, tightening government spending, accelerating privatization of state-funded services and a gradual easing of monetary policy. Tightening government spending would decrease the pressure on the current account and create some fiscal space for tax cuts and job-creation while eased monetary policy would result in lower interest rates. Lower interest rates, in turn, could ease the pressure on the domestic currency and prices.

THE CONSEQUENCES OF TARGETING SHORT-TERM INTEREST RATES AS A MAIN DISINFLATIONARY TOOL

One could ask: what is wrong with controlling inflation with high real interest rates, which create an incentive for foreign investors to bring in capital. This policy has a number of adverse effects which in the long run may impede the transition process.

A) Inadequate control of money supply

While interest rate targeting does allow the central banks to hit short-term targets relatively precisely, it makes it practically impossible to control the money supply in the long-run.

The problem is that currently the CEEC's real interest rates exceed the interest parity condition with EU money markets and stimulate an additional inflow of capital which raises banks' reserves⁴. A common practice among the CEEC commercial banks has been to swap dollar and EU currency deposits for bonds with the central bank. These interbank transactions increased banks' reserves and thus their ability to create money. In such a situation, neither the velocity of money nor the supply of loanable funds can be adequately controlled by the CEEC central banks.

It has been observed that in both transition and mature market economies central banks which have attempted to sterilize the foreign currency inflow by buying it back from the commercial banks have actually ended up losing control over the money supply (Dornbusch, et.al, 1998).

B) The disruption of rational capital allocation and interest rate dualism

Generally, in a high interest rates environment, those who need loans cannot afford to borrow. Therefore, the use of credit decreases and the banks lose customers. Recently many foreign-owned

banks operating in the CEEC started offering dollar or Euro denominated loans at lower interest rates, comparable to those in EU loan markets. Attractive as they are, such loans shift all risk to the borrowers whose accounts receivables are in local currency.

In mature market economies, an inflow of foreign capital generally reduces interest rates. However, this is not the case in transition CEECs where monetary authorities use high interest rates to control inflation. If this monetary policy is applied on a more or less permanent basis, job-creating small businesses are denied access to low cost capital and the current account deficit goes out of control as happened in Poland in 1998 and 1999.

Some parallels can be made between the conduct of the Russian and Polish economic transitions. The August 1998 default on Russian short-term government bonds (GKOs) and the devaluation of the ruble may serve as a good illustration of the consequences of an ill-conceived monetary policy. In anticipation of the ruble devaluation, the country's private banks decided to export capital to avoid overexposure. At the same time, foreign opportunity-seeking investors continued to buy short-term Russian government bonds which offered annual yields of 80 to 150 percent. After the commercial money rate skyrocketed to 70 percent, many Russian businesses, both state and private, were unable to borrow and thus stopped paying taxes and wages. Finally, the budget deficit deepened and the federal government was no longer able to service its short-term debt. On August 17, 1998 the government suspended payments on GKOs and devalued the ruble.

Today, in some CEECs one can already observe the adverse effects of crowding-out. In Poland and the Czech Republic, the bulk of new capital is directed to high-risk office and luxury apartment construction, rather than small businesses, utilities, power generation, or the highway system⁵. The high interest rates put pressure on the emerging business sector, erode support for liberal, pro-market political parties and provide arguments to the advocates of subsidies and price control⁶. The monetary authorities in transition economies should be aware of all the political consequences which are associated with a highly restrictive monetary policy.

At this stage, the key to a successful economic transition is to generate public support for more privatization, tax and subsidy cuts and market-based funding solutions for health care and retirement systems. To stimulate private saving and investment monetary authorities must put a top priority on creating a low inflation - low interest rate environment. Given this macroeconomic goal, the governments and the central banks should control inflation using all available fiscal and monetary tools among which high real interest rates could be one tool but definitely not the main one.

C) Excessive reserve accumulation due to exporters' hedging practices

A higher real interest rate in the CEECs than in the EU may contribute to the accumulation of excessive foreign currency reserves and overvaluation of the domestic currency.

To better understand this type of hedging strategy let's use an example of a Polish exporter who signed a contract to sell 1 million German marks (DM) worth of goods to a German buyer. The goods are scheduled for delivery in November 1999 and payment is to be made in March 2000. Since the November 1999 spot rate (R) was 2.02 Polish zloty (PLN) per German mark (DM). The Polish exporter could immediately borrow DM 1,000,000 from a German bank at a 7 percent (annual rate) and repay the loan with receivables expected in March 2000. The loan could be converted in November 1999 to Polish zloty and invested for four-months in a Polish bank deposit paying an annual rate of 21 percent. The money market hedge yields PLN 2,112,186 in March 2000. Unhedged receivables would yield only PLN 1,880,000 at the available March 2000 spot rate of R (PLN/DM) = 1.88⁷.

Exporters' hedging practices were responsible for an inflow of \$2.7 billion (1.9 percent of the GDP) in January and February of 1998 alone. Since 1997, when the Polish National Bank raised the real

interest rate, there have been strong capital and FDI inflows which have continued through 1999 (see table 6). As a result the current account deficit was \$16.5 billion in 1997 and almost \$19 billion in 1998.⁸ Despite the current account deficit the Polish zloty continued to appreciate and in March of 2000 hit its 14 - month high vis a vis the dollar and the Euro proving beyond doubt that its value is primarily defined by interest rates and the demand for local assets.

D) Currency appreciation and corrective devaluations.

According to the advice given by the European Commission, EMU candidates should avoid excessive foreign exchange accumulation. Large reserves would be unnecessary since the Euro reserves would have to be surrendered to the European Central Bank (ECB) upon accession to the EMU. Moreover, in accordance with the framework specified by the Maastricht Treaty if a candidate's currency is overvalued in real terms, it has to undergo a **corrective devaluation** no later two years prior to its entry to the EMU.

Although it is not certain that large devaluations would be necessary for all CEEC currencies, the possibility is quite high. There are two basic reasons why currencies of the CEEC countries tend to be overvalued: a political one and an economic one. The political argument is that NATO membership and progress in the EU accession negotiations (and eventually accession itself) will trigger much larger capital inflows and subsequently increase the demand for CEEC currencies early in the next decade. The economic argument is that productivity growth in the CEEC countries in their initial years of EU membership will be significantly higher than in the "older" EU countries while their ability to devalue their currencies would be limited by the ERM II⁹.

Even if the economic situation did not warrant devaluation, the rational expectations of financial institutions and the foreign trade sector could force the monetary authorities to actually devalue the domestic currency¹⁰. This phenomenon has been described as "the last minute devaluation syndrome". For instance, exporters are likely to lobby for currency devaluation to help their cause. That scenario is likely to occur since the exporters' lobby is strong everywhere in Central Europe.

Acting on the assumption of unavailability of last minute devaluation, financial institutions are likely to start lowering their holdings of domestic currency assets and buying foreign currencies, thus creating a pressure for devaluation of the domestic currency. Today, many CEEC banks are encouraged to borrow short-term in foreign currency and offer a longer-term maturity loans in the domestic currency¹¹ (Mishkin, 1997). After a corrective "last minute devaluation", many banks would be seriously exposed since the domestic currency cash flows might not cover the costs of their short-term foreign currency liabilities. For example, after the 1998 ruble devaluation massive bank defaults in Russia were attributed to a gap between banks' short-term dollar liabilities and their medium-to-long term ruble assets. In case of the CEEC, it may cause a serious deterioration of the balance sheets of the CEEC firms.

In sum, the "last minute devaluation" may be caused by rational expectations and thus became practically non-discretionary for the monetary authorities. Therefore, the Central European monetary authorities would be well advised to change the monetary policy objective from interest rate and exchange control to floating exchange rates and flexible inflation targeting while at the same time applying fiscal restraint (see table 7).

Table 7. BUDGET BALANCE (percentage of GDP)

Year	1991	1992	1993	1994	1995	1996	1997	1998	1999
Czech Republic	-1.9	-3.1	0.5	0.9	0.5	-0.1	-0.9	-1.6	-1.6
Hungary	-2.9	-6.8	-5.5	-8.1	-5.5	-1.9	-4	-3.6	-2.9
Poland	-6.7	-6.7	-3.1	-2.7	-2.4	-2.4	-1.3	-2.4	-2
Slovakia	na	na	-7	-5.2	-1.6	-4.4	-2.6	-2.7	-1.9

Source: Business Central Europe: <http://www.bcemag.com/>

This policy mix would ensure a better balance between domestic and foreign interest rates reducing the incentive for uncontrollable capital inflows and current account deficits.

ALTERNATIVE MONETARY POLICY: DIRECT INFLATION TARGETING

In order to enhance policy credibility and to pursue disinflation more effectively, the central banks of the CEEC transition economies should abandon a high interest rate policy and adopt a system of **direct inflation targeting**. That would better prepare them for monetary convergence and stabilize their domestic currencies in terms of the Euro, if they opt to join the new Exchange Rate Mechanism II (ERM II)¹². The literature supporting direct inflation targeting systems has been both extensive and forceful in its arguments (Spaventa, 1996; Wyplosz, 1997; Orłowski, Krzak and Schubert, 1997; Orłowski, 1997, Fischer, 1997, Halpern, Laszlo and Wyplosz 1996; Klein, 1997, Mishkin and Posen, 1997; Cechetti, 1996; Svensson, 1997; DeGrauwe, 1996; Bernanke and Mishkin, 1997). What are the main advantages for the fast growing transition economies in switching to direct inflation targeting?

A) It is a rules-based, non-discretionary policy¹³

Direct inflation targeting is a rules-based policy, meaning that the central bank may reduce inflation through diminished volatility of money balances and the reduction of inflationary expectations.

Rules-based policy making involves implementation in each period (or in each case) of a formula for a monetary policy or fiscal policy, whereas discretionary policy treats each situation as a new case which requires the application of a newly conceived plan.

The empirical and theoretical evidence has been that these two policies lead to different money growth rates. The rules – based policy usually leads to lower money growth than the discretionary policy. If the policy focus is on the avoidance of inflation and unemployment, a rules-based policy has a clear advantage over discretionary policy (McCallum, 1996).

Direct inflation targeting can be pursued in two different ways. On the one hand, central banks can adopt a narrow band and strict inflation targeting. However, strict inflation targeting is seldom used in practice. It requires frequent intervention in the foreign exchange market, crawling devaluation, or adjusting the spread between the required reserves ratios on domestic and foreign currency deposits.

The empirical literature proves that strict inflation targeting may lead to considerable fluctuations of exchange rates and interest rates generating instability in the money market (Bowen, 1997, Svensson, 1997).

Poland, Hungary and the Czech Republic may consider applying a reasonably wide band of + / - 4.5 percent with a midpoint level of 5 percent over a three year period, until inflation is lowered to a “safe”, more sustainable level. Such a band would be sufficiently wide to allow for recognition and decision lags, yet, it would be narrow enough to permit more efficient control of interest rates and exchange rate volatility.

Flexible inflation targeting is likely to enhance the policy credibility of the banks, extend firms' investment horizons, and increase the maturity of forward contracts. Under such conditions, real interest rates would become more predictable and would help ensure consistency between assets and liabilities in the banking sector. Flexible inflation targeting permits the exchange rate to fluctuate over a wider range, allows more time for policy decisions and enables central banks to better focus on the long-term goal of disinflation. The literature on inflation targeting and the empirical experiences of central banks applying this system are very helpful for designing a path of monetary system adjustments that would bring the CEEC closer to the EU and, eventually, to EMU accession (Mishkin and Posen, 1997).

B) *The Inflation targeting will avoid last minute corrective devaluations*

As argued, it is very likely that the CEEC central banks will have to conduct last minute corrective devaluations of their currencies. The causes of such real overvaluation of the CEEC currencies could be: high interest rates policies, high inflation rates, productivity growth rates higher than those in the EU countries, as well as rising FDI.

In the final stage of preparations for accession to the EMU, financial institutions and exporters following their rational expectations are likely to exchange domestic currency assets for foreign currencies causing both real and nominal currency depreciation. This scenario can be avoided if the monetary authorities shift their focus from strict adherence to predetermined exchange and interest rates to a disinflationary policy.

Expectations of devaluation may be reduced if the candidates exercise a considerable degree of exchange rate flexibility prior to the entry to the EMU. Even if the macroeconomic fundamentals are met and the exchange rate is in equilibrium with respect to the purchasing power parity criterion, financial markets may still expect a candidate for accession to the EMU to devalue. Alternatively, flexible inflation targeting would allow for a linear depreciation of the domestic currency and for a smooth convergence to the equilibrium exchange rate. However, it is advisable that the fluctuation band be wide enough to avoid one-side betting¹⁴. If flexibility is restrained, for instance, by a narrow band of permitted fluctuations or frequent interventions, foreign exchange markets will likely develop expectations of a one-time devaluation.

C) *The inflation targeting allows a smooth approach to the Euro*

According to ERMII rules, new members are not required to fix their exchange rates to the Euro as soon as they join the Union or even participate in ERMII at all. However, joining the ERMII, say in two years after the admission to the full EU membership, would be very advisable because of its flexibility. Its relatively wide (plus/minus 15 percent) standard fluctuation margins against the Euro provide a perfect opportunity to apply direct inflation targeting.

At present the CEEC monetary authorities should set two goals: first, design and adopt a tolerance band for inflation targeting which would be "narrowed" over time and second, apply a "step down" path for their currencies to meet the target Euro exchange rate. Those two objectives can be combined into set of monetary policy thresholds to be achieved by certain clearly stated dates and announced to all market participants.

The main disadvantage of direct inflation targeting is higher exchange rate volatility (Rosati, 1996, Sachs, 1996). However, such costs would be offset by the lower fiscal cost of sterilization and a decreased risk of speculative capital flows relying on the expectation that the central bank will intervene every time the exchange rate approaches either side of the band. The currency crises of Thailand and Indonesia provide a convincing argument against pegging the exchange rate in high growth emerging markets. On the other hand a semi-fixed exchange rate and high inflation could lead to a gap between the real and the nominal exchange rates and massive speculation. Floating exchange rates would enable

the CEEC central banks to conduct an effective monetary policy and allow the countries to benefit from the disinflationary effects of growing productivity which would be lost under a regime of fixed interest rate targeting and fixed exchange rates.

CONCLUSIONS

This analysis has emphasized that the governments of the CEEC candidate countries should not delay the preparation of specific plans outlining their intentions and policies for approaching integration with the EMU. This would help accession negotiators for both the EU and the CEEC candidates ensure the consistency of their preparations.

The legacy of the CEEC monetary authorities is a tendency to overemphasize the need to maintain high real interest rates to control inflation, exchange rate stability and currency reserves. They must acknowledge that as the economies are getting more open the use of high real interest rates to control inflation can be highly destabilizing and that exchange rates are no longer direct instruments of central planning (or arbitrary government accounting tools) but important market variables that provide crucial information on external balances for fiscal and monetary authorities. Therefore, the inflationary and exchange rate policy in preparation for accession to the EU and the EMU must be defined within a framework of nondiscretionary monetary policy and fiscal restraint.

The CEEC candidates to the EU should follow a flexible inflation targeting monetary policy system rather than strict interest rate and exchange rate targeting. The exchange rate cannot be mandated or fixed arbitrarily by the central bank but must reflect general consistency with the macroeconomic criteria defined by the Maastricht Treaty. The candidate countries will be able to enter the ERM II when their inflation rates fall to a sustainable level and their interest rates are within an acceptable range of the EU interest rates. The time has come for them to abandon a high interest rate policy and expose their economies to a more flexible disinflationary policy which would put the exchange rate in a desirable range of the Euro at the time of the EMU accession. Joining the ERM II framework would bring a number of advantages to their stabilization efforts, including enhanced policy credibility, expanded access to Euro-zone credit markets, and increased fiscal and monetary discipline.

END NOTES

1. The CEEC central banks use the discount rate, the lombard rate and the refinance rate to control the money supply and the commercial rate. The lombard rate is applied to short-term loans (up to 6 months) issued against collateral of government bonds. The refinance rate is used for government projects and refinancing of the indebted banks.
2. Source: The World in Figures, Economist Intelligence Unit 1999.
3. Assuming that the increase in cost of servicing domestic debt is higher than the saving on reduced external debt servicing costs due to appreciation of the currency.
4. This situation occurs when portfolio return in a home market (CEEC) is higher than the return in the foreign market (EU). Full sterilization should result in nominal devaluation of the domestic currency ($R < F$). The concept is based on the interest rate parity condition (simplified): $i_d - i_f = (F - R)/R$, where i_d = home interest rate, i_f = foreign interest rate, F = forward rate, R = spot rate. The underlying logic of this condition is that in an open economy the government cannot effectively control both interest rates and exchange rates without falling into either real currency appreciation (interest rates are too high for the desired exchange rate) or real currency depreciation (interest rates are too low for the

- desired exchange rate). Interest rate parity condition suggests that monetary policy should target either interest rates or the exchange rate but not both variables at the same time.
5. The 1999 McKinsey report on Poland observed that land prices in Warsaw are 2 times higher than in Stockholm and 2.5 times higher than in Berlin. See: The McKinsey Quarterly, 2000 Number 2: Europe, pp. 88–97.
 6. In Poland 26 percent of the population still works on farms. Understandably, the cost of farm loans cannot be ignored by any government in that country.
 7. The amount borrowed immediately is DM 1,000,000 \times 1/1.0233 = DM 977,230.53. It is swapped to the PLN 977,230.53 \times 2.02 = PLN 1,974,005.67 and invested at a Polish bank for four months which yields: PLN 1,974,005.67 \times 1.07 = PLN 2,112,186.07. An alternative is to sell DM 1,000,000 in the forward market which could only generate PLN 2,080,000 since the four months forward DM selling rate available in November was R (PLN/DM) = 2.08.
 8. The Polish government attributes much of the 1999 current account deficit to the decline of exports to Russia which followed the August 1998 economic crises in that country. Data: Statistical Bulletin, GUS, Warsaw and The World in 1999, The Economist Publications.
 9. According to the law of one price, a productivity increase leads to currency appreciation over the long run (Gerber, 1999). As noted, the EMU admission guidelines rule out currency devaluation during two years prior to joining the EMU.
 10. The Greek admission to EMU represents a good example for CEECs. Knowing that Greece will not meet the Maastricht convergence criteria upon its inception in January of 1999, the Government of Greece announced in mid-March 1998 a two-year program of accession to EMS. A date for the accession was set, the Greek Drachma was devalued by 14 percent against the ECU, and wage discipline reaffirmed to lower the inflation rate to 2 percent by 2001.
 11. Some authors use the term: “return-to-peg”.
 12. After January 1999, ERM became ERMII.
 13. The distinction between the rules-based and discretionary policy was first clearly developed in a paper by Kydland and Prescott (1977) and later refined by Barro and Gordon (1983).
 14. Typically, this situation occurs when the speculators enter the market expecting the central bank to defend the currency value every time the exchange rate approaches either side of the fluctuation band. In the case of the CEEC, the market participants would act on the premise that the currency would be devalued.

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CONSOLIDATION IN THE BANKING INDUSTRY: A HOMEWORK ASSIGNMENT

Kent T. Saunders*

ABSTRACT

This paper introduces ideas on how to incorporate the internet and spreadsheets as research tools in the study of the effects of consolidation, specifically the effects of consolidation in the banking industry. A homework assignment is described that can be used in any course dealing with consolidation (e.g. managerial economics or money and banking). The homework assignment outlines procedures that can be used to: access insured commercial bank data for a specific state, create a chart to plot return on assets by the natural log of total assets, and run a regression of return on assets as a function of the natural log of total assets using Microsoft Excel.

INTRODUCTION

This paper describes a homework assignment aimed at introducing the internet as a source of information and spreadsheets as a tool of analysis for undergraduate students. This homework assignment can serve as a stand alone analysis or can be used as a starting point for further discussion and analysis. This paper provides an example of how to go about answering the following questions: is there a trend toward consolidation of banks in your state of interest, and do larger banks have a higher return on assets in your state of interest?

THE HOMEWORK ASSIGNMENT

The instructor should hand out the assignment and then demonstrate each of the procedures in class. The assignment should be due at least two class sessions after distribution so that there would be an opportunity to address any questions related to the assignment at the next class session. When class size is less than 50 each student can have a different state. Students who are particularly interested in the assignment may choose to analyze more than one state. The homework assignment is provided in the appendix.

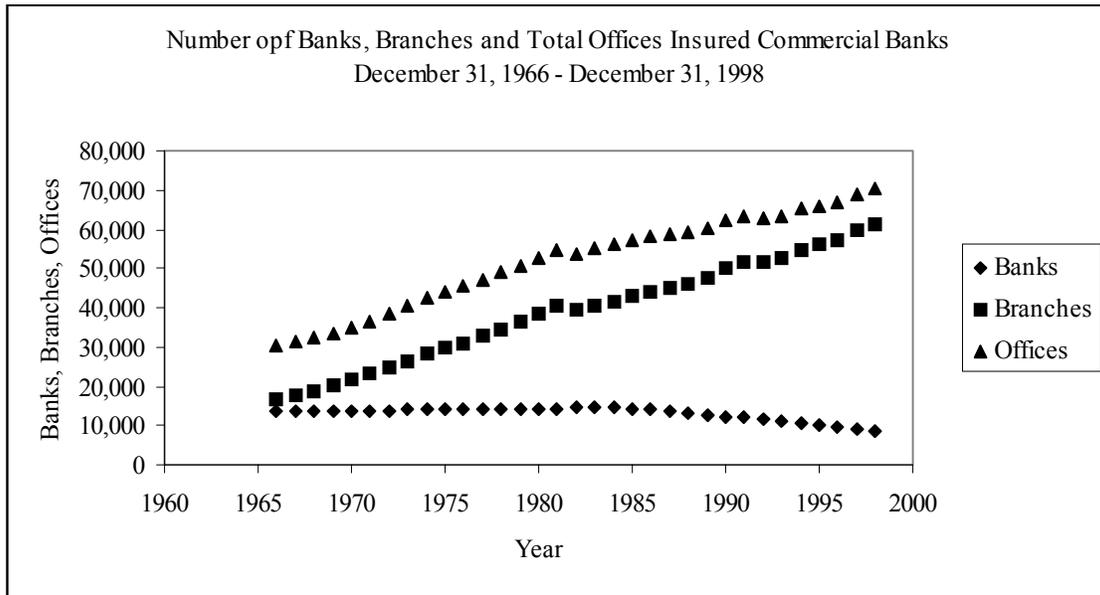
Question 1: Consolidation

In recent years it would be hard not to notice the trend of consolidation in the banking industry. Banks are getting bigger. The FDIC provides numerical data that allows one to quantify this trend for the United States or for any state within the United States. The procedure described in the homework assignment will produce data on the number of banks, branches and total offices of insured commercial banks. Chart 1 displays two trends for the United States as a whole. First, the number of branches and offices has been growing over time and particularly since 1983. Second, the number of banks has been

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falling over time and particularly since 1985. An examination of Chart 1 can easily lead to a discussion of deregulation during the 1980s. It will be up to the students to determine if these national trends also prevail in their state of interest.

CHART 1



Students will need to enter the data from the FDIC web site into a spreadsheet program in order to create a chart similar to Chart 1. One way to place the data into an Excel 97 spreadsheet when using the internet Explorer browser would be to highlight and copy the table from the web site and then paste the table into the columns of an Excel 97 spreadsheet.

Question 2: Do Larger Banks Have Higher Return On Assets

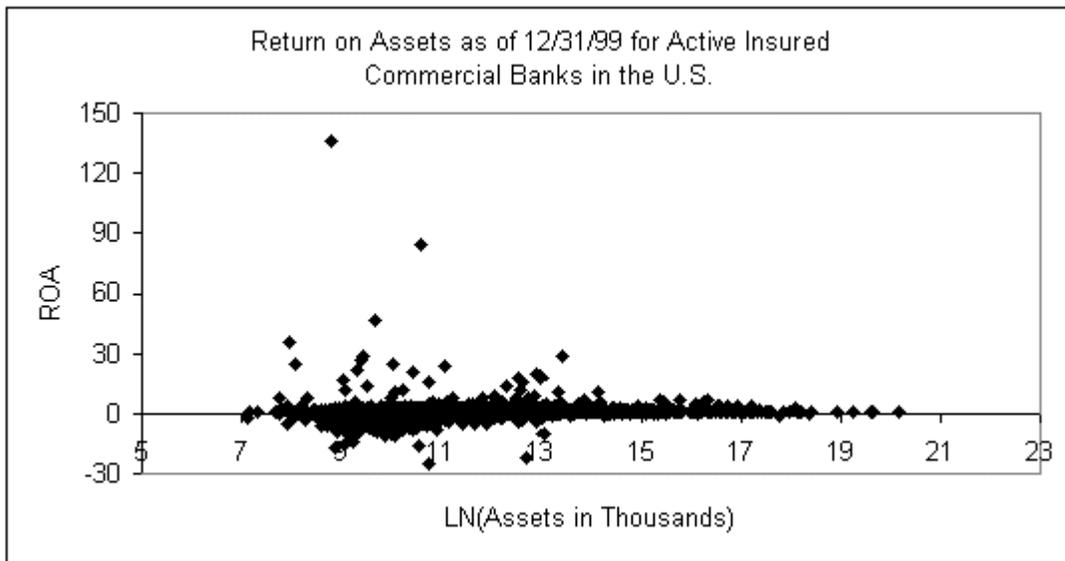
Students are asked to determine if larger banks have a higher return on assets for their state. If larger banks do have a higher return on assets one possible explanation is that there are economies of scale in the banking industry. An alternative explanation is that larger banks have more market power which leads to the increase in return on assets. The FDIC web site allows the download of numerous interesting data on an individual bank basis. There are plenty of questions that could be asked and analyzed with this data. The focus of this assignment is on the relationship between the size of assets and the return on assets. A procedure to access return on assets data is described in the homework assignment. It should be noted that the step-by-step procedure to access this data may change from time-to-time due to web site reorganization. However, the data should always be at the FDIC web site somewhere.

Once students have data on assets and return on assets they will need a tool to analyze this data. The tool described in the homework assignment is Microsoft Excel 97. Excel spreadsheets enable students to plot the data in charts and perform basic regression analysis. The text file with return on assets data can be opened directly into an Excel spreadsheet. It will be necessary to follow the steps for

the Text Import Wizard (the data is delimited by commas with a general format) to get the data into the appropriate columns.

Sometimes a graph will more easily illustrate a point or relationship that is not visible from looking at a table of data. Sometimes the reverse is true. Chart 2 displays a plot of return on assets against the natural logarithm of total assets for insured commercial banks in the United States in 1999. The natural log of total assets is selected rather than total assets due to a very wide distribution of bank size. Chart 2 displays a faint positive relationship between return on assets and bank size. Based solely on Chart 2 it would be hard to argue convincingly that larger banks had higher return on assets.

CHART 2



Two additional procedures may need class demonstration before students create their own versions of Chart 2. First, demonstrate how to create a column of the natural log of assets. To take the natural log of the contents of cell C1 you would type “=ln(C1)” in a empty column cell. Copying this formula down for the entire column would create a column of the natural log of column C. Second, the horizontal and vertical axis in the chart may need adjustment to illustrate a point or to ignore extreme values. To change the scale of a axis, double click on the axis and change the MIN and MAX from automatic to a defined value.

Excel allows a variety of statistical data analyses to be conducted. The procedure to conduct a simple linear regression is described in the homework assignment. Table 1 confirms statistically that there is a positive relationship between bank size and return on assets. The coefficient estimate of 0.158 has a t-test statistic of 5.36 and is significant at less than a one percent level. It should be noted that the overall measure of fit measured by the R^2 is very low. The regression results taken together with Chart 2 show that larger banks do have higher return on assets. However, this is not a perfect relationship and there is a lot of variance in terms of return on assets and bank size.

TABLE 1

SUMMARY OUTPUT: Active Insured Commercial Banks in the U.S 12/31/1999				
<i>Regression Statistics</i>				
Multiple R		0.0581		
R Square		0.0034		
Adjusted R Square		0.0033		
Standard Error		3.5367		
Observations		8472		
ANOVA				
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>
Regression	1	359.1267	359.1267	28.7115
Residual	8470	105943.5762	12.5081	
Total	8471	106302.7029		
	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>
Intercept	-0.7368	0.3373	-2.1845	0.0290
LN(Assets in Thousands)	0.1580	0.0295	5.3583	0.0000

DISCUSSION AND EXTENSIONS

At the completion of this assignment students are better prepared to discuss and measure the causes and consequences of consolidation in the banking industry. Consolidation in the pursuit of economies of scale is socially desirable. Consolidation in the pursuit of increased market power is not necessarily socially desirable. It might be useful to introduce students to some recent academic research in this field. Prager (1998) examines the price effects resulting from bank mergers that substantially increase local market concentration and concludes that mergers do lead to increased market power. Berger and Hannan (1998) find that the reduction in cost efficiency from lack of competition is much larger than the social loss to society due to mispricing from the exercise of market power. The results of these two papers indicate that higher return on assets from consolidation is more likely caused by the exercise of market power than from economies of scale.

The data set accessed for this assignment is not ideal for isolating whether the positive relationship between bank size and return on assets is due to economies of scale or market power. A variable from this data set that can be used as a proxy for market power is the number of offices or the number of offices as a percentage of total state or total national offices. The number of offices variable was not significant for regressions using data from 1999. When controlling for bank size and market power in a multiple regression model, it will be important to discuss the possible effects of multicollinearity because bank size is likely to be highly correlated with other variables measuring market power. An additional concern that needs to be addressed when using the number of offices as a proxy for market power is the effect of technological advancement. The internet allows banks from all over the country to compete without necessarily having a nearby office. Moore (1998) argues that technological advancement will reduce the importance of geographic distance as a barrier to competition in the banking industry.

One final recent article that would aid further discussion of consolidation in the banking industry is the survey article by Berger, Demsetz and Strahan (1999) which details the causes, consequences and future implications of consolidation in the financial services industry.

CONCLUSION

This paper introduced a homework assignment that incorporates the internet and spreadsheets as research tools in the study of the effects of consolidation. The homework assignment can be used wherever a discussion of consolidation is relevant (e.g. managerial economics or money and banking). At a minimum this assignment allows students to gather data, analyze data, and answer questions based on their analysis. Handouts of recent newspaper and magazine articles along with the academic articles cited previously allow the instructor to build this assignment into a very exiting and up-to-date discussion of the possible causes and consequences of consolidation.

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APPENDIX

HOMEWORK ASSIGNMENT

You have been assigned the state of _____. Your assignment is to use the procedures below to address the following two questions.

Question 1) Is There A Trend Toward Consolidation

- a) Create and turn in a chart illustrating the trends in terms of the number of banks, branches, and total offices for insured commercial banks in your state. For an example see the Chart 1 attachment.
- b) Is there a trend toward consolidation of banks in your state? Explain.

Question 2) Do Larger Banks Have Higher Return On Assets

- a) Create and turn in a chart plotting return on assets on the vertical axis and $\ln(\text{assets})$ on the horizontal axis for your state. For an example, see the Chart 2 attachment.
- b) Create and turn in a regression summary output for a regression where return on assets is the dependent (y) variable and $\ln(\text{assets})$ is the independent (x) variable. For an example, see the Table attachment.
- c) Do larger banks have higher return on assets in your state? Explain.

Procedure for getting data on the number of banks, branches and total offices for insured commercial banks

- 1) Start at the web address <http://www.fdic.gov/index.html>
- 2) From the Bank Data category, select "Historical" (<http://www.fdic.gov/bank/historical/index.html>)
- 3) Under the Banking History: Historical section, select "Historical Statistics on Banking" (<http://www2.fdic.gov/hsob/>)
- 3) Under the Select your historical data category, select "Commercial Banks"
- 4) In the Select Report Type box, select "Number of Banks, Branches and Total Offices of Insured Commercial Banks"
- 5) In the Select State box, select the state of interest (e.g. United States)
- 6) Click on Produce Report

Procedure for getting data on the return on assets data for insured commercial banks

- 1) Start at the web address <http://www.fdic.gov/index.html>
- 2) From the Bank Data category, select "Individual Banks" (<http://www.fdic.gov/bank/individual/index.html>)
- 3) Under the Find a Bank, Savings Association or Bank Holding Company category, select Institution Directory
- 4) Under the Use the FDIC Institution Directory to: category, select Find an Institution
- 5) Next to the Find Options, Click on Advanced
- 6) In the State box, select the state of interest (e.g. Anywhere in U.S.)
- 7) In the Charter Type box, select Insured Commercial Banks
- 8) Click on Find
- 9) To download the entire list, click on Download and save it to a disk as a text (csv) file. Do not try and open the file directly from the web site. Save the file first and then open it up with Excel.

** Before beginning a procedure to create a chart or run a regression it is necessary to make sure that missing data are removed from the spreadsheet. The data can be sorted by assets and then the rows with missing assets can be deleted.

Procedure for creating a chart in Excel 97

- 1) Select Insert from the toolbar
- 2) Select Chart
- 4) Follow the 4 step Chart Wizard to select the Chart Type (XY Scatter Plot), Chart Source Data, Chart Options and Chart Location.

Procedure for performing a regression in Excel 97

- 1) Select Tools from the toolbar
- 2) Select Data Analysis: If Data Analysis is not an option, Select Add-Ins, Check Analysis Tool Pack, Click OK and go back to step 1)
- 3) Select regression
- 4) Input the data: Y-Range (e.g. ROA in AP1:AP8806), X-Range (e.g. $\ln(\text{assets})$ in D1:D8806), Check labels if included in range
- 5) Check OK

REFEREES

1. Ilan Alon
2. Joseph Cheng
3. Joseph Eisenhauer
4. Jason Hecht
5. Barbara Howard
6. Elia Kacapyr
7. J. Austin Murphy
8. Wade Thomas
9. Mark Zaporowski

NEW YORK STATE ECONOMICS ASSOCIATION (NYSEA)

52nd ANNUAL CONVENTION

FINAL PROGRAM

Fulton-Montgomery Community College
Johnstown, New York
October 1-2, 1999

Friday, October 1

8:00-10:00 PM

NYSEA Convention Opening Reception

Holiday Inn, 308 N. Comrie Ave.

Wine and Cheese Reception

Compliments of Prentice Hall.

Introduction: Peter Pasqualino, President, NYSEA

**Welcome: Dr. Priscilla Bell, President
Fulton-Montgomery Community College**

Saturday, October 2

8:30-10:30 AM

Convention Registration & Continental Breakfast

(Classroom Bldg., Room 108, FMCC)

Compliments of the Dryden Press,

Harcourt Brace College Publishers

Pick up final program, receipt/register, location directions, name tags.

8:30 am-2:30 PM

Textbook Display/Exhibits

(Classroom Bldg., Room 108)

8:45 AM

Sessions Begin

10:45-11:00 AM

Break

12:00-1:30 PM

Luncheon (Student Union)

Speaker: Alain Gagnon, Political Economist, McGill University,
"Quebec's Place in the New Economy"

Afternoon refreshments (Classroom Bldg., Room 108)

Compliments of ITP Southwestern Publishing

3:15-4:15 PM

NYSEA Business Meeting (Classroom Bldg., Room 106)

SESSION

8:45-10:45 AM

ECONOMIC EDUCATION (Room 107)

Chair: Barbara Howard, SUNY Geneseo

"What are the Principles of Economics?," by John E. Page,
Dominican College

"Laptop Computers for All in the Economics Classroom,"
by Wade L. Thomas, SUNY Oneonta

"The Determinants of Success in a Managerial Economics Course"
by Charles Callahan, III, SUNY Brockport

"Percent Change in Capital Gain Yield Equals Current Yield,"
by Ronald R. Reiber, Canisius College

Discussants:

Barbara Howard, SUNY Geneseo

Charles Callahan, III, SUNY Brockport

John E. Page, Dominican College

Susanne Polley, SUNY College at Cortland

SESSION

8:45-10:45 AM

Urban, Rural, and Regional Economics

Chair: Richard Dietz, Federal Reserve Bank of New York

"The Upstate New York Economy: Current Conditions and Problems,"
by Richard Dietz, Federal Reserve Bank of New York

*"A Geospatial Analysis of Income and Employment in the Cayuga Lake
Watershed: 1980-1990,"* by Kent Klitgaard, Wells College

"An Economic Analysis of Construction Bottlenecks," by
William P. O'Dea, SUNY Oneonta

Discussants:

Robert Withington, SUNY Plattsburgh

Larry Lichtenstein, Canisius College

Robert Christopherson, SUNY Plattsburgh

SESSION

8:45-10:45 AM

Health and Welfare

Chair: James F. Booker, Alfred University

"The Economic Burden of Alzheimer's Disease," by Russell Holmes, Alfred University

"What is the Impact of the Initial Length of Stay on Re-entry into the Foster Care System?," by Kelly Noonon, SUNY Stony Brook

Discussants:

A. Dale Tussing, Syracuse University
James F. Booker, Alfred University

SESSION

11:00-12:00 PM

Addiction and Rationality

Chair: Martha Wojtowycz, SUNY Institute for Maternal and Child Health

"Effects of an Education-Oriented Intervention Program on Modifying the Behavior of Those at High Risk for AIDS," by Larry Lichtenstein and George Palumbo, Canisius College

"Cigarette Consumption: A Rational Choice?," by Kimberly Mazor, Rensselaer Polytechnic Institute

Discussants:

Martha A. Wojtowycz, SUNY Institute for Maternal & Child Health
Wade L. Thomas, SUNY Oneonta

SESSION

11:00-12:00 PM

Macroeconomic Issues

Chair: David Ring, SUNY Oneonta

"Fiscal Policy for Dummies," by Susanne Polley, SUNY College at Cortland

"Remembering Richard Nixon Thirty Years Later: The Economics, Not the Politics," by Joseph W. Ford and Charles F. O'Donnell, Iona College

Discussants:

D. Donald Kent, Jr., SUNY Brockport
John E. Page, Dominican College

SESSION

11:00-12:00 PM

Regional Economics in New York State

Chair: Robert Christopherson, SUNY Plattsburgh

"Evaluating the Economic Impact of Deer Hunting in New York State," by Aaron Alsheimer, Alfred University

"The North Country Stock Index: A Tool for Assessing the Impact of Publicly Traded Corporations on Our Regional Economy," by Crystal Dermody, SUNY Plattsburgh

Discussants:

Les Shiell, Skidmore College

Richard Dietz, Federal Reserve Bank of New York

SESSION

1:45-3:15 pm

International and Environmental Economics

Chair: Kent Klitgaard, Wells College

"Population Growth, Intergenerational Equity, and Climate Change," by Les Shiell, Skidmore College

"A New Model of the Balance of Payments Crisis: The Target Currency as a Determinant of Exchange Rate Stability," by Ordean Olson and Matthew He, Nova Southeastern University

"Growth and Development: Two Complementary Concepts, Not Substitutes," by Behrouz Tabrizi, St. Francis College

Discussants:

Kent Klitgaard, Wells College

Alfred M. Lubell, SUNY Oneonta

SESSION

1:45-3:15 pm

Medicaid, Medicare, and Managed Care

Chair: A. Dale Tussing, Syracuse University

"Marketing the Medicare HMO," by Zach Balser and Heather Eckert, Alfred University

"Medicaid Managed Care vs. Fee-For-Service Medicaid: Effects on Birth Outcomes," by A. Dale Tussing, Syracuse University; Richard H. Aubry and Martha A. Wojtowycz, SUNY Institute for Maternal and Child Health

Discussants:

David Ring, SUNY Oneonta

James F. Booker, Alfred University

SESSION

1:45-3:15 PM

Risk and Insurance

Chair: William P. O'Dea, SUNY Oneonta

"Demography of Risk Aversion," by Martin Halek,
University of Pennsylvania, and Joseph G. Eisenhauer, Canisius College

"The Uninsured: The Role of Rising Technology Coverage," by
Benjamin Farnsworth, Alfred University

Discussant:

William P. O'Dea, SUNY Oneonta
Joseph G. Eisenhauer, Canisius College

SESSION

1:45-3:15 PM

Human Capital

Chair: Charles Callahan, III, SUNY Brockport

"Graduate Degree Earnings Premiums 1991-1997," by
Sara Chamberlain, National Economic Research Associates, and
Robert Jones, Skidmore College

"Structured Judgements in New York State," by Ronald R. Reiber,
Canisius College

"Problems in the CPA Profession: A Local Practitioner Perspective," by
D. Donald Kent, Jr., SUNY Brockport

Discussants:

Charles Callahan, III, SUNY Brockport
Wade L. Thomas, SUNY Oneonta
Susanne Polley, SUNY College at Cortland

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