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JOURNAL OF ECONOMICS AND ECONOMIC EDUCATION RESEARCH

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Dr. Larry R. Dale

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ECONOMICS EDUCATION ARTICLES

FINANCIAL ATTITUDES AND SPENDING HABITS OF UNIVERSITY FRESHMEN

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ABSTRACT

Attitudes toward, and use of, money affects relationships, family stability, and even employment success. Recently, the effect of these issues on college students has been investigated. Eighty percent of undergraduates have credit cards with an average balance of $2,226 and 10 percent have outstanding balances of more than $7,000 (Kendrick as cited in Henry, Weber & Yarbrough, 2001). A survey by VISA found 8.7 percent of those filing for bankruptcy were below twenty-five years old (McBride as cited in Jones & Roberts, 2001).

Financial management capabilities are essential to students' personal success and their academic success. Students able to manage their finances are more likely to organize their lives and manage their time in a way conducive to good academic progress (Weaver, 1992). At Idaho State University, lack of financial management is a reason students do not graduate (Eskelson, 2005).

This study will evaluate the financial attitudes and perceptions, as well as the spending habits, of university freshmen. Implications are far-reaching and will provide valuable data for university administrators in enrollment management and student affairs, high school counselors, economic educators, and parents. Assisting students with information and strategies to improve their academic success and degree completion is vital.

INTRODUCTION

A person's ability to manage his money is essential to being successful in life. Effective financial management strategies are important for all members of society, including college students. It has been hypothesized that students' financial management capability is pivotal to their overall academic success and retention.

Views toward money have changed over time and students are now being raised in a society comfortable with debt. Instead of saving for emergencies, people are now turning to credit and credit cards to cover these expenses---and even to pay normal everyday bills! Staying out of debt is no longer valued as an important social norm. In fact, the debt-free lifestyle sought after by prior generations has been replaced with simply "paying bills on time"---and in many cases "only making minimum payments" (Diamond & O'Curry, 2003).

To complicate the issue, college students are being inundated with credit card offers. University campuses have become the perfect place for credit card companies to lure students into applying for credit cards. Students are offered candy, free t-shirts, and other trinkets in exchange for their credit card application (Jones & Roberts, 2001). Four out of five universities allow on-campus solicitations from credit card companies. In return, universities charge these vendors several hundred dollars each day they are on campus soliciting students (Jones & Roberts, 2001).

Students are caught up in the rush and excitement of starting college. Because of this, they are easily seduced and overwhelmed by these offers. For many, this is also a period in which they experience financial independence for the first time. These two variables (lifestyle change and financial freedom), coupled with being raised in a society comfortable with debt, can easily become a formula for a series of poor choices with money.

The attitude of Americans toward debt has changed dramatically. This change has resulted in a generation of students desensitized to debt and not completely prepared to handle the financial stresses of higher education. College students are exposed to credit card offers and other opportunities to incur debt around their college campuses. Many high school students take courses that include personal financial education. However, the enormous amount of debt incurred by college students raises questions as to whether or not this financial education in high school is effective.

College students need to be prepared before they are faced with important and mounting financial decisions. Current research indicates they in fact may not have the necessary financial background. A lack of financial management has actually been identified as one of the key reasons students do not complete a higher education degree.

REVIEW OF LITERATURE

A person's ability to manage their money is essential to being successful. All members of society, including college students, will benefit from effective financial management. Students' financial management capabilities are pivotal to their academic and personal success.

Changing Perceptions of Money

Americans' current views on money have a significant impact on the upcoming generation of consumers. A survey by University of California Los Angeles/American Council on Education Annual found that three out of every four students surveyed said a "very important" reason for going to college was to "make more money" (Jones & Roberts, 2001). In 1971, only one out of two (twenty-five percent fewer) students had this same response. Becoming "very well-off financially" was "very important or essential" to 74 percent of college students surveyed (Jones & Roberts, 2001). In 1971, only 39 percent of students said the same (Jones & Roberts, 2001). Having money is clearly becoming increasingly important to students.

The United States has evolved from cherishing savings to revering spending (Jones & Roberts, 2001). The ways in which Americans view and use credit are indicative of this perception. A recent study provided evidence that consumers now define 'fiscal responsibility' as making payments on time, rather than being debt-free (Diamond & O'Curry, 2003). Approximately 80 percent of undergraduate college students have an average of $2,226 in credit card debt; 10 percent of them have outstanding balances of more than $7,000 (Kendrick as cited in Henry, Weber, & Yarbrough, 2001). A survey by VISA found that 8.7 percent of those filing for bankruptcy were less than twenty-five years of age (McBride as cited in Jones & Roberts, 2001). This percentage is up from 1 percent just two years earlier.

These changing attitudes concerning money, and the acceptance of debt as a part of life, are having a tremendous effect on teenagers and, in turn, college students. Boyce and Danes (as cited in Norvilitis & Santa Maria, 2002), argued that teenagers experience "premature affluence" because of their high amounts of discretionary funds with a concurrent small amount of bills. These teens are becoming accustomed to the standard of living they have while they are with their parents, and expect the same for themselves when they move out and go to college (Norvilitis & Santa Maria, 2002).

College Students and Credit Card Debt

Recent studies concerning college students and debt found the following: approximately 70 percent of college students have at least one credit card; between 6 percent and 14 percent have four or more credit cards; more than 40 percent of those with credit cards do not repay their balances in full each month; 14 to 16 percent report balances over $1000, while about 5 percent report balances over $3000; and the vast majority of these students obtain credit cards prior to college or during their freshman year (Lyons, 2004).

It is becoming increasingly easy for college students to obtain credit cards on their college campuses. Credit card vendors are invited to set up booths on campus at the beginning of the academic year. In addition, credit card applications accompany the materials given to students when they purchase their books at the bookstore (Jones & Roberts, 2001). Credit card companies also solicit university alumni offices for names and addresses of students. These companies send applications for special affinity credit cards that include the university logo or a university landmark printed on them (Hirt & Munro, 1998). Four out of five universities allow on-campus solicitations for credit cards and charge these vendors up to $400 dollars each day they are on campus soliciting students. Universities are actually benefiting financially from credit card companies being on their campuses (Jones & Roberts, 2001).

Impact of Financial Management on Student Success

The ability to manage finances impacts students both personally and academically. Students who are able to manage their money are also more likely to be able to manage their time wisely (Weaver, 1992). These same students will out-perform their peers academically because they are also the students who go to class and allow plenty of time to study. Ray Edwards, an admissions consultant and former East Carolina University Financial Aid Director stated, "As a rule, the more a freshman student has access to credit card accounts, the harder it is to get good grades" (Weaver, 1992).

According to a study released by the National Center on Public Policy and Education, tuition at public, four-year institutions rose by an average of 10 percent from 2001-02 to 2002-03 (Cavanaugh, 2003). Average student loan debt has grown to $17,000 and about 20 percent of college students work 35 or more hours a week (Cavanaugh, 2003). Some students may choose to decrease their course load to part-

time, or drop out of school completely, to pay bills. As students take fewer credits per semester, they extend the amount of time it takes them to complete their college education, resulting in an increase in total student loan debt.

Some researchers suggest that the rising costs of higher education play a key role in the increasing use of credit on college campuses (Asinof & Chaker, 2002; The Education Resources Institute and The Institute for Higher Education Policy, 1998; Lyons, 2003; Shenk, 1997; Rohrke, 2002; United States General Accounting Office as cited in Lyons, 2004). Nearly 50 percent of students receiving financial aid do not feel the aid they receive is enough to cover the costs of a college education (Lyons, 2003). These students have turned to other forms of debt, including credit card debt, to cover the balance of their college costs (Lyons, 2004).

Debt can have devastating effects on college students. John Simpson, an Indiana State administrator, was quoted, "This is a terrible thing. We lose more students to credit and debt than academic failure" (Commercial Law Bulletin, 1998, p. 6). There have been at least two cases of college students who took their lives, in part, because of their credit card debt. Sean Moyer was a 22-year old student with $10,000 of debt and Mitzi Pool was a 19-year old student with $2500 in debt. Prior to their deaths, both of these students had talked to others about feeling overwhelmed by the amount of debt they had acquired (Norvilitis & Santa Maria, 2002).

Economic Education

Many researchers believe programs that teach financial management and proper use of credit must begin in junior high and high school (Hayhoe et al., 2000; Munro & Hirt, 1998; Smith, 1999; Souccar, 1998). By the time a student is on their own in college, social pressure and advertising, combined with a lack of financial literacy, can result in disturbing outcomes. Parents and educators must be proactive and teach these young adults how to manage their personal finances before they are seduced by credit cards and then faced with increasing amounts of debt. When educated, students will then be prepared to handle the financial situations common to university student life (Jones & Roberts, 2001).

State leaders and educators are recognizing the need to have economic education in high schools. According to a study by the National Council on Economic Education (NCEE), 31 states have standards for personal finance and economic education in high schools. Of those 31 states, 16 require these standards be implemented. This same study found that only four states (Idaho, Illinois,

Kentucky, and New York) require students to complete a course in economics that includes personal finance, before they graduate from high school (NCEE Survey, April 2003).

METHODOLOGY

The purpose of this study was to evaluate the financial attitudes, perceptions, and spending habits of freshmen students at Idaho State University (ISU). The population was students enrolled in First Year Seminar (FYS), a one-credit semester orientation class taken by freshman students. The sample for this study enrolled in the course during the fall 2004 academic semester. They were asked to complete a written survey addressing financial perceptions and money management issues.

Data Collection

This study was conducted as a pilot study for further research and data collection. In cooperation with the Coordinator of FYS Program at ISU, all FYS instructors during fall 2004 were solicited for their class' participation in this research project. This was a total of 32 sections of the course. Completion of the survey was voluntary and confidential for the participants. The researcher collected the data from each section of the class utilizing a standardized procedure and set of instructions. Eight classes of FYS agreed to participate in the study. Within those classes, the number of useable surveys completed was n = 117.

The purpose of FYS is to expose freshmen to the academic resources available to them and provide these students with the tools and information essential to their success while attending Idaho State University. The instructors of FYS design their syllabus with this purpose in mind. One of the topics that is becoming a standard toward meeting these goals is "money management."

The survey was given to students in each of the 8 sections of the FYS course, prior to a money management workshop presented in that course by the field director of the Center for Economic Education (CEE). The primary function of the CEE at ISU is to improve the quality/and expand the reach of consumer and economic education to students (elementary, secondary, and university) and the general public. The CEE provides money management workshops for first year students as one of the services they provide at Idaho State University. This workshop includes a discussion and activities geared toward an introduction to financial basics.

The "Money Management and Spending Habits of University Freshmen" survey is brief and designed to be completed in five minutes. Students were read the following uniform set of instructions:

> "The Center for Economic Education is performing a study to evaluate the financial literacy of Idaho State University freshmen. This survey will be used to assess your understanding, habits, and attitudes about money management. It will take you approximately five minutes to complete this pre-workshop survey. Your participation in this study is voluntary and will in no way affect your grade in this course. There are no apparent risks to you. Thank you for your participation."

> (Disclaimer from Money Management and Spending Habits Survey, Haskell and Cummins, 2004.)

After these instructions were read, the students were asked to complete the survey.

Survey Instrument

The survey included a variety of questions concerning attitudes and perceptions related to money. It also asked questions that directly focused on how students spend and manage their money. Questions included topics regarding credit card use, personal spending habits, financial education, demographic characteristics, and other personal attitudes about finances.

The survey included 16 questions. Open-ended, select-from, and Likert scale questions were utilized. In the first three questions, participants were asked to check all statements that applied to their current situation. The next three questions were open-ended, short answer questions. The last ten questions were answered using a Likert scale. Participants were asked to mark "always," "often," "sometimes," "seldom," or "never" to answer these questions.

"Credit card usage" was measured using two questions. One question measured credit card usage using a five-point Likert scale. Participants used 1 = "always," 2 = "often," 3 = "sometimes," 4 = "seldom," or 5 = "never" to respond to the following statement: "Using credit is a mistake." The second question measuring "credit card usage" asked the participants to check whether or not the following statement described their situation: "I use a credit card(s)."

"Personal spending habits" were measured using six questions. One question determined "personal spending habits" using a five-point Likert scale. Participants used 1 = "always," 2 = "often," 3 = "sometimes," 4 = "seldom," or 5 = "never" to respond to the following statement: "I plan ahead for spending my money." Four questions analyzing "personal spending habits" asked the participants to check whether or not the following statements described their situation: "I have a savings account"; "I spend more than I earn"; and "I never have enough money." The final two questions about the participants' "personal spending habits" asked the participants to answer the following open-ended questions: "My most important purchase in the past three years has been _____" and "If I had $500 to spend any way that pleased me, I would _____."

The "financial education" of participants was determined using one question. Participants were asked to identify where they received their "financial education." Participants indicated where they learned about money management by checking all categories that applied from the following: "parents/family," "friends," "magazines/books," "clubs/organizations," "classes or workshops," and "other." If the participant checked "classes or workshops" or "other" they were asked to give a specific name.

The survey included two demographic questions. Participants were asked to give their gender and their age (using the month and year).

"Other personal attitudes about finances" were measured using 13 questions. Four questions analyzing "financial attitudes" asked the participants to check the statements that described their situation from the following: "I can buy most things I want"; "I earn most of my money"; "I have money in savings bonds, certificates, and other investments"; and "I have more money than I need." Participants were also asked to identify their source(s) of money. Participants reviewed a list and were asked to answer the question, "Where do you get your money?" by checking all categories that applied from the following list: "student loans, grants, scholarships," "parents (given as needed)," "regular allowance from parents," "regular job," "occasional job," "gifts," and "other." If the participants chose "other" they were asked to name that source.

A five-point Likert scale was used to answer the following seven questions: "I feel satisfied with how I spend my money"; "Lots of money is necessary to achieve financial security"; "Budgets take the fun out of spending"; "Parents should teach their children how to spend money"; "Saving money regularly is important"; "It is important to keep track of where money is spent"; and "Investing is an important part of financial planning."

Finally, an evaluation of participants' perceptions about money was determined using an open-ended question. Participants described their biggest money problem by answering the following question: "My biggest money problem is _____."

Research Questions

The research questions that lead this study were:

What are the attitudes of university freshmen toward spending money?
What are the attitudes of university freshmen toward saving money?
What are the attitudes of university freshmen toward debt?
How do university freshmen spend money?
How do university freshmen use credit card debt?

DATA ANALYSIS AND RESULTS

The total number of usable student surveys was n = 117. The number of male participants was n = 36, which was 30.8 percent. The number of female participants was n = 81, which was 69.2 percent. The age distribution of survey respondents is listed in Table 1. Mean age was 22, median age was 19, while the mode age was 18. The majority of the participants, 67.9 percent, were traditional age (18-19 year old) first semester college students.

Table 1: Age Distribution		
Age	Frequency	Percentage
18	44	38.3
19	34	29.6
20-29	19	16.5
30-39	11	9.6
40-49	6	5.2
50-59	0	0
60-69	1	.9
(n = 115)		

The responses to the question "I am satisfied with how I spend my money," as listed in Table 2, were as follows: n = 8 (6.8 percent) responded "always"; 62 (53.0 percent) responded "often"; 41 (35.0 percent) responded "sometimes"; 5 (4.3 percent) responded "seldom"; and 1 (.9 percent) responded "never." The mean response was that participants "often" feel "satisfied with how I spend my money."

Table 2: I am satisfied with how I spend my money.		
	Frequency	Percent
Always	8	6.8
Often	62	53.0
Sometimes	41	35.0
Seldom	5	4.3
Never	1	.9
(n = 117)		

The responses to the question "I plan ahead for spending my money," as listed in Table 3, were as follows: n = 7 (6.0 percent) responded "always"; 54 (46.2 percent) responded "often"; 42 (35.9 percent) responded "sometimes"; 8 (6.8 percent) responded "seldom"; and 6 (5.1 percent) responded "never." The mean response was that survey respondents "often" "plan ahead for spending my money."

Table 3: I plan ahead for spending my money.		
	Frequency	Percent
Always	7	6.0
Often	54	46.2
Sometimes	42	35.9
Seldom	8	6.8
Never	6	5.1
(n = 117)		

The responses to the question "Saving money regularly is important," as listed in Table 4, were as follows: n = 95 (81.2 percent) responded "always"; 12 (10.3 percent) responded "often"; 6 (5.1 percent) responded "sometimes"; 2 (1.7 percent) responded "seldom"; and 1 (.9 percent) responded "never." The mean response was that students "always" feel "saving money regularly is important."

Table 4: Saving money regularly is important.		
	Frequency	Percent
Always	95	81.2
Often	12	10.3
Sometimes	6	5.1
Seldom	2	1.7
Never	1	.9
(n = 116)		

The responses to the question "Using credit is a mistake," as listed in Table 5, were as follows: n = 5 (4.3 percent) responded "always"; 15 (12.8 percent) responded "often"; 75 (64.1 percent) responded "sometimes"; 16 (13.7 percent) responded "seldom"; and 6 (5.1 percent) responded "never." The mean response was that survey respondents "sometimes" feel "using credit is a mistake."

Table 5: Using credit is a mistake.		
	Frequency	Percent
Always	5	4.3
Often	15	12.8
Sometimes	75	64.1
Seldom	16	13.7
Never	6	5.1
(n = 117)		

The responses to the question "Investing is an important part of financial planning," as listed in Table 6, were as follows: n = 25 (21.4 percent) responded "always"; 48 (41.0 percent) responded "often"; 37 (31.6 percent) responded "sometimes"; 7 (6.0 percent) responded "seldom"; and 0 responded "never." The mean response was that survey respondents "sometimes" feel "investing is an important part of financial planning."

Table 6: Investing is an important part of financial planning.		
	Frequency	Percent
Always	25	21.4
Often	48	41.0
Sometimes	37	31.6
Seldom	7	6.0
Never	0	0
(n = 117)		

The responses to the question asking students to check all those descriptors which are true for their "current financial situation," as listed in Table 7, were as follows: n = 41 (35.0 percent) responded "I can buy most things"; n = 18 (15.4 percent) responded "I use credit cards"; n = 39 (33.3 percent) responded "I never have enough money"; n = 72 (61.5 percent) responded "I earn most of my money"; n = 84 (71.8 percent) responded "I have money in investments"; n = 21 (17.9 percent) responded "I spend more than I earn"; n = 99 (84.6 percent) responded "I have a checking account"; n = 5 (4.3 percent) responded "I have more money than I need."

Table 7: Current Financial Situation		
	Frequency	Percent
I can buy most things	41	35
I use credit cards	18	15.4
I never have enough money	39	33.3

Table 7: Current Financial Situation		
	Frequency	Percent
I earn most of my money	72	61.5
I have a savings account	84	71.8
I have money in investments	24	20.5
I spend more than I earn	21	7.9
I have a checking account	99	84.6
I have more money than I need	5	4.3
(n = 117)		

The responses to the question asking students to check all of the avenues through which they have "learned about money," as listed in Table 8, resulted in the following: n = 111 (94.9 percent) responded "parents or family"; n = 28 (23.9 percent) responded "friends"; n = 12 (10.3 percent) responded "magazines and books"; n = 11 (9.4 percent) responded "clubs and organizations"; n = 28 (23.9 percent) responded "classes or workshops"; n = 13 (11.2 percent) responded "other."

Table 8: Where students learned about money		
	Frequency	Percent
Parents or Family	111	94.9
Friends	28	23.9
Magazines and Books	12	10.3
Clubs and Organizations	11	9.4
Classes or Workshops	28	23.9
Other	13	11.2
(n = 117)		

Additional questions were included in the survey; however, to date the researcher chose to report only the data from the questions provided. Further analysis will be completed and conclusions formulated.

CONCLUSIONS AND DISCUSSION

Results of this survey revealed that college freshmen appear to have some basic financial management strategies. This may be, in part, a result of the students completing the survey during their first two months at the university. These initial data indicated only 15 percent of the students used a credit card and nearly 72 percent of them had savings accounts. Students who "planned ahead" were concurrently "satisfied with their spending." Many of these same students' "friends consider them to be good money managers." Although these students are "satisfied with their spending," interesting they also say "budgeting takes the fun out of spending their money."

Of the students surveyed, n = 111 (94.9 percent) learned how to manage their money from their "parents." A small number of them identified a "high school economics course" as the source of their financial knowledge. This was a surprise considering that a significant number of ISU freshmen come from an Idaho high school in which completion of an economics course is a requirement in order to graduate.

The researcher hypothesized that there would be a difference in the way males and females view and spend money, but the research data proved otherwise. The percentage of females who use credit cards is n = 17 (14.8 percent), while the percentage of males who use credit cards is n = 20 (16.7 percent). This was not a statistically significant difference. There were no significant differences in perceptions and spending habits of males and females, with one exception. The average response on the Likert scale of females who felt "budgeting takes the fun out of spending" was "sometimes," while the average response of the males who felt "budgeting takes the fun out of spending" was "seldom."

A large percentage of those surveyed n = 73 (62.4 percent) indicated "investing is an important part of financial planning," while only n = 24 (20.5 percent) of them "actually have money in investments." The participants were not asked whether or not they personally invested their money, but rather if they simply had money in investments. The money may have been invested by parents or grandparents and not actually by those surveyed.

The percentage of ISU freshmen surveyed who have credit cards is much lower than the 70 percent reported in other studies (Lyons, 2004). This result, however, reflects the response to the statement "Using credit is a mistake." Only 18 percent answered that question using "seldom" or "never." These young students appear very cautious of using credit as a means to purchase goods and services.

Perhaps this is indicative of a strong religious influence in southeast Idaho that discourages debt.

It is interesting that while 18 percent of the participants indicated they "spend more than they earn," and 33 percent indicated they "never have enough money," only 15 percent "use credit cards." The researcher is interested to learn more about these answers. If students do not have enough money and spend more than they earn, one would assume a subsequent increase in use of credit. The source of these extra funds remains unknown. It is possible the extra money may come from savings accounts, considering 91.5 percent responded "always" or "often" to the statement, "Saving money regularly is important."

College freshmen need to learn money management. Only 52 percent of them answered "always" or "often" on a Likert scale to the statement, "I plan ahead for spending my money." This lack of budgeting may be part of the reason that only 60 percent of respondents indicated "always" or "often" to the subsequent question, "I am satisfied with how I spend my money."

IMPLICATIONS AND RECOMMENDATIONS
FOR FURTHER RESEARCH

The study of the financial attitudes and spending habits of college students is a research topic that deserves continued time and effort. The literature strongly supports the fact that financial management is a key factor in student academic success and retention. The findings of the study suggest students may not be prepared to handle the financial situations they face while in college. For example, half of the students surveyed do not make plans ahead of time for spending their money. This lack of planning is likely setting the stage for future financial disaster.

Understanding how college students view and spend money is important in determining the type of financial education they need, not only for success in higher education and degree completion, but for success in, and quality of, life. This information is vital to educators as they are developing curriculum for financial education.

It appears that while high school students in Idaho are required to complete an economics course that includes personal finance, they are still in need of basic financial education. A study utilizing a similar survey should be conducted with high school seniors. This data would be valuable in determining the effectiveness of the high school economic courses. This research would also help university

administrators develop programs to prepare freshmen entering the university for the challenging financial decisions they will make throughout college.

More research is needed to determine the amount of credit card debt students at Idaho State University accumulate while they are in school. While only 15 percent of them were using credit cards when they completed the survey, other statistics suggest more of them will have multiple credit cards before they graduate. Research indicates that 70 percent of college students have at least one credit card. Further research will determine whether or not this same statistic is true for ISU students. This information will be beneficial to administrators as they are planning programs to help students manage their debt.

Future research is also needed to evaluate whether or not the attitudes and spending habits of university students change during the time they spend in the university setting. This same type of study should be conducted with college seniors just before graduation. Longitudinal studies, with data collection conducted at strategic points (e.g., 5-year intervals), would also be invaluable. For example, graduates who have been gone from the university for five years or more could provide valuable insights for designing freshman money management curriculum.

Additionally, university financial aid offices should conduct further research to evaluate students' financial knowledge as part of an exit interview prior to graduation. These students will soon be required to repay their student loans. If students know how to manage their finances, they will be less likely to default on their student loan debt.

Money management skills are essential for students' academic success. University officials have identified a lack of these crucial skills as one of the reasons students do not succeed in the university setting. Students with credit cards have lower grades because they have to work to pay off their debt instead of spending the time studying. Students may even choose to drop out of school in order to work full-time to pay their bills.

Students need financial training. Economic education is essential for students to be successful academically and personally. Money management should be a key part of orientation for college freshmen and all college students should take a course in basic personal finance. Providing students with strategies that will improve their academic success and degree completion is critical.

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FAMILY BACKGROUND OR CHARACTERISTICS OF THE CHILD: WHAT DETERMINES HIGH SCHOOL SUCCESS IN GERMANY?

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ABSTRACT

It is becoming more and more important to be highly skilled in order to integrate successfully into the labor market. Highly skilled workers receive higher wages and face a lower risk of becoming unemployed, compared to poorly qualified workers. We analyze the determinants of successful high school graduation in Germany. As our main database, we use the youth file of GSOEP for the period extending from 2000 to 2007. Because the decision as to which secondary school track to attend – general school (Hauptschule), intermediate school (Realschule) or high school (Gymnasium) – is made after the end of elementary school (Grundschule) at age of ten, parents are responsible for this decision. Therefore, the characteristics of the child as well as those of its parents are the main determinants of educational attainment. We also include the characteristics of grandparents in our regression framework, something which has not been done in any previous study so far. In order to disentangle the determinants of successful graduation at high school, we use the Cox proportional hazard model. We find markedly different determinants of successful graduation for males and females. Furthermore, the results indicate a strong linkage between mothers and daughters, as well as between fathers and sons.

INTRODUCTION

Globalization and skill biased technical change have increased the demand for highly skilled workers over the last few decades and led to a widening of the wage differential between high and low-skill workers (see Dustman 2007). In some industries, this leads to excess demand, which cannot be eradicated by the existing workforce in Germany. Low-skill workers are not suitable for filling the demand gap. In 2007, the unemployment rate of 18 % for low-skilled workers in the prime working age was five times higher than the rate for high-skilled workers. By contrast, the unemployment rate was three times higher for unskilled workers in 1999. Therefore, being highly skilled is becoming more and more important for successful integration into the labor market. Not only are wages higher for high-skilled workers, but also the risk of unemployment is lower than for low-skilled workers.

Thus, investment in formal education is extremely important. After completing elementary school (Grundschule), the decision as to which secondary school track to attend – general school (Hauptschule), intermediate school (Realschule) or high school (Gymnasium) – has to be made for ten year old pupils.[1] Thus, the division of pupils between the three school types takes place very early in Germany (see Soskice 1994, Winkelmann 1996 and Dustman 2004 for a detailed description of the German school system). Changes from a lower to a higher school type are very rare. After elementary school, teachers give a recommendation based on grades during elementary school and their personal view of the ability of the pupil, as to which school track is appropriate. Which school pupils will attend depends mainly on the decision of the parents, because children cannot decide on their own and the recommendations of teachers are not binding.[2]

Attending a university or other institution of higher education is possible after successful graduation from high school, which is usually at the age of 18-19. At the age of 15-16, pupils regularly graduate at intermediate school. If their grades are better than 2.5 (equivalent to B-C according to the American system) on average, pupils can choose to attend high school or a technical school. By allowing either of these, they can process to university Pupils who complete general school at the age of 15-16 have to earn an intermediate school equivalent certificate at a special technical school, before joining a program with the prospect of taking a school leaving exam which allows higher education attendance afterwards. Therefore, not only is there a lower level of educational training compared to intermediate and high school pupils at the age 10-15, but even good pupils from

general schools also have to overcome high hurdles in order to attend higher education institutions, because their education has not been so thorough. Especially for those pupils who did not start secondary school at the high school level, parental characteristics can account for the probability of graduating with a high school degree or equivalent.

Theoretically, education is an investment in human capital (see Becker 1964 and Mincer 1974). However, for pupils, the decision on how much to invest in human capital may be influenced heavily by their family background. Especially the father or/and mother set incentives for their child to make direct investments in education or other activities which are highly correlated with the level of human capital. However, we are not concerned about the precise manner in which parents influence the decisions of their children. We assume a decisive impact of parental characteristics on the educational attainments of their children. This assumption is supported by the literature which provides strong empirical evidence of such a relationship.

Recently, Dustmann (2004) shows that for Germany, the choice between one of the three school tracks after end of elementary school is influenced heavily by family background, particularly parental class. This holds also for subsequent career prospects of the pupils, which emphasizes the general relevance of the topic.[3] Dustman (2004) uses the German Socio-Economic Panel (GSOEP) data, which covers 4500 households with individuals born between 1920 and 1966. With PISA data from 2003 and GSOEP data from 2000 and 2001, Checci and Flabbi (2007) compare the German and Italian school system in order to determine the nature and level of institutional influence on childrens' choices. Besides a positive relationship between parental status and post secondary school choices, they report differences in the estimated coefficients by gender, as does Dustmann (2004). Nguyen and Taylor (2003) show that the effects of parental characteristics are also positive, but differ among ethnic groups and selected tracks for pupils' post-high school choices in the USA. Feinstein and Symons (1999) and Ermisch and Francesconi (2001) support these findings with similar evidence for the UK (see Li 2007 for China, Maani and Kalb 2007 for New Zealand). Chen and Kaplan (1999) concentrate on the relationship between family structure and educational attainment of the child. Accordingly, an intact family structure has a positive effect on the continuation of post secondary education (see also Kim 2004).

Additionally to family background, the personal characteristics of pupils can affect educational attainment either positively or negatively. A frequently considered variable is the part-time employment of pupils who are regularly in full time

education. According to Lewin-Epstein (1981), in 1980, 76 percent of senior high school pupils in the USA worked part time while in full time formal education. Moreover Schneider und Wagner (2003) report that 40 percent of 17 year old children were once employed part time in Germany, while undergoing full time formal education. However, significant negative effects of part time employment on educational attainment have only been found for American pupils whose weekly working hours exceed 15-20 hours (Lillydahl (1990)). Recently, for young males in the UK, Dustmann and van Soest (2007) report a small and negative influence of part time work on exam performance and on the decision to stay at school. For the decision of young adults to attend college, Mohanty and Finney (1997) reveal a positive quadratic impact of wages on the decision to attend college. An often hypothesized and empirically confirmed negative correlation between hours of television watching by adolescents and school performance seems not to be robust (see Zavodny 2006 and the cited literature therein). At least for preschool pupils, the ability of peers exerts a substantial positive influence on various different skill variables of young children (Henry and Rickman 2007).

To the best of our knowledge, this present study is the first to use the Cox proportional hazard model to analyze the determinants of successful graduation at high school, depending on the age of adolescents. We extend the literature by using the latest available data for Germany, which ranges from 2000 to 2007. As our main data source, we use youth-specific questions which are included in the GSOEP. This youth data set has not yet been used to analyze the determinants of successful graduation at high school. As indicated earlier, our data set contains not only information on the characteristics of adolescents and parents, but also information about grandparents.

The remainder of the paper is organized as follows. In Part 2, we describe the Cox proportional hazard model, which is used for estimation. Part 3 presents our database and summary statistics. The empirical results are presented in Part 4 and the final section concludes.

EMPIRICAL MODEL

In order to analyze the factors determining successful high school graduation, we use time-to-event analysis. This enables us to investigate the likelihood of the event occurring and the duration. Since successful graduation for high school is influenced heavily by the personal characteristics of adolescents and

family background, these characteristics have to be incorporated as covariates in order to explain the outcome.

We use the Cox proportional hazard model (see Cox 1972), which allows us to incorporate personal characteristics through the use of covariates. We select *age* as our waiting time concept. Thus, we can estimate the likelihood of graduating from high school at each possible age of the particular adolescent, depending on the personal characteristics.

The specification of the Cox proportional model is as follows (equation 1):

$$\lambda_i(t)=\lambda_0(t)e^{Xi(t)\beta}\ (1)$$

$\lambda_i(t)$ is the hazard rate of person i, $\lambda_0(t)$ is the baseline hazard rate and $Xi(t)\beta$ are the covariates and regression parameters. For the baseline hazard rate, the particular distributional form of the duration time is left unspecified. However, the estimation of the baseline hazard and the baseline survivor function is possible. The hazard rate is proportional and constitutes a fixed proportion over time. The covariates can be both time invariant and time variant. Since the proportionality assumption has to be fulfilled, covariates can only shift the hazard rate, but cannot change its shape.

We observe adolescents aged 17 up to the latest available survey wave. Ideally, we would observe adolescents from the date of birth until graduation from high school. Thus, we face the problem of truncation and censoring. Because we observe adolescents aged 17, our data is left truncated. For adolescents who are at probability of graduating and do not graduate from high school until the last observation period, we do not know whether they will graduate from high school at some point in the future. Thus, our data is right censored. Accordingly, left truncation and right censoring has to be taken into account when defining the likelihood function for estimating the Cox model. This can be done by separating the likelihood into two parts. One contains the right censored observations and the other the remaining observations. We take left truncation and right censoring into account when estimating the Cox model.[4]

DATA AND SUMMARY STATISTICS

For our analysis, we use the latest version of the GSOEP for the period ranging from 1984 to 2007. The GSOEP is a representative annual household survey (see Haisken-DeNew and Frick 2005 and Wagner et al. 2007 for a detailed

description of the GSOEP). Specifically, we use the youth questionnaire to analyze the determinants of successful graduation from high school. A yearly representative sample of adolescents aged 17 was asked initially about their relationship with their parents, leisure-time activities, past achievements at school and personal characteristics in 2000. Furthermore, they were asked about their educational plans and expectations for their career and family (see Schupp and Fruehling 2007a for a detailed description of the youth questionnaire). In subsequent years of the interview, adolescents are questioned by means of the regular GSOEP questionnaire. Thus, it is possible to follow adolescents across time. We merged the youth data set with the regular GSOEP data to obtain further personal information from the adolescents. For our analysis, we use only those adolescents who attend school during the first year they are interviewed.

Since family background is an important factor determining the school track decision of the child, personal characteristics of parents are a crucial factor for a successful high school graduation of their children. It is possible to directly identify the father as well as the mother of the adolescent. Consequently, we merged our dataset with one containing characteristics of the mother and the father in terms of their education and career training, detailed information on job biography and personal characteristics (see Schupp and Lenauweit 2007, Schupp and Fruehling 2007b, Schmidt 2007 and Frick and Schmitt 2007). We also included information about the grandparents.

Our variables determining successful graduation at high school are grouped into the following categories: residence, jobs and money, siblings, relationships, leisure time and sport, school, education and career plans, characteristics of parents and information about grandparents. Because of different characteristics, we dropped all adolescents with foreign nationality. Our constructed data set contains 1748 observations. On average, we observe 749 adolescents for 2.3 years. Because the determinants of successful graduation from high school might differ by gender, we split our sample accordingly. 372 adolescents are male and 377 female. The youngest adolescent in our data set is 17 years old and the oldest 25. The youngest male adolescent is 17 and the youngest female, 18.

In Table 1, summary statistics for the total sample and the two subsamples are displayed. On average, adolescents are 20.1 years old for the total sample, as well as for both subsamples. Slightly more than 90 percent of the adolescents living in their own room (not sharing with a sibling) in their parents' home and one quarter lives in East Germany. While in full time formal education, 47.3 percent earn an own income working part time. 3.4 percent more female than male adolescents earn

their own income. Approximately 9 percent have no siblings. For adolescents with siblings, 37.9 percent of respondents are the oldest in the family and 38.4 the youngest. 4 percent more female adolescents are the oldest child in the family compared to male adolescents. Approximately 40 percent of adolescents have no steady boy/girlfriend. For male adolescents, approximately 50 percent have no steady girlfriend (this would include same-sex couples). For female adolescents it is 15.7 percentage points less. Leisure time activities and sports yield marked differences for male and female adolescents. Approximately 18 percent of the adolescents watch TV or videos daily. 31 percent of the female adolescents read daily. For male adolescents, it is 10 percent less. Every week, roughly 12 percent of the adolescents do some voluntary work in their community. 23 percent of the female adolescents take paid music lessons. The value for male adolescents is 10 percent lower. More male adolescents than female adolescents participate in hobby/leisure time sport and club sport.

Table 1: Summary Statistics			
	Total Sample	Male	Female
Number of subjects	749	372	377
Number of observations	1748	874	874
Age	20.1	20.1	20.1
Female (percent)	50.3	-	-
Residence			
Own Room (percent)	91.7	90.8	92.6
Living in East Germany (percent)	25.5	25.1	25.8
Jobs and Money			
Own income (percent)	47.3	45.6	49.0
Siblings			
Only child (percent)	9.0	9.3	8.7
Oldest child (percent)	37.9	36.0	39.8
Youngest child (percent)	38.4	38.4	38.3
Relationships			
No steady boy/girlfriend (percent)	40.5	48.5	32.8

Table 1: Summary Statistics			
	Total Sample	Male	Female
Leisure Time and Sport			
TV, Video (percent)	17.7	16.8	18.5
Reading (percent)	25.7	20.3	30.9
Voluntary activities (percent)	12.0	12.4	11.5
Paid music lessons (percent)	18.0	12.7	23.1
Hobby/leisure time sport or club sport (percent)	29.9	36.1	24.0
School			
Attendance at a private school (percent)	5.6	3.0	8.0
Class representative (percent)	31.3	30.3	32.3
School sport (percent)	24.4	26.5	22.4
No extracurricular activities (percent)	35.3	38.8	31.9
Recommended for Gymnasium (percent)	44.5	42.4	46.5
Advanced course in German (percent)	5.8	3.5	8.0
Advanced course in mathematics (percent)	7.5	8.8	6.2
Advanced course first foreign language (percent)	7.1	4.6	9.6
Paid extra lessons (percent)	28.5	26.6	30.3
Mother helps with homework (percent)	25.3	26.2	24.4
Father helps with homework (percent)	3.7	4.6	2.8
The majority of classmates are foreign (percent)	3.7	4.3	3.2
Education and career plans			
Advanced technical college (percent)	17.4	17.9	16.8
University (percent)	31.4	30.4	32.4
Desired age for financial independence (17-25) (percent)	80.7	78.4	82.9
Already financially independent (percent)	0.7	0.5	0.8
Characteristics of parents			
Father does not work (percent)	14.4	14.8	14.0

Table 1: Summary Statistics			
	Total Sample	Male	Female
Mother does not work (percent)	23.6	22.5	24.7
Net salary, father	2004.9	1945.6	2062.8
Net salary, mother	690.0	689.0	691.0
Grades of father 1 or 2 at school (percent)	11.9	14.6	9.3
Grades of mother 1 or 2 at school (percent)	22.4	24.7	20.2
Characteristics of grandparents			
Grandparents have matriculation standard (percent)	3.0	2.2	3.8
Grandparents are deceased (percent)	6.8	7.5	6.1
Source: Own calculations using GSOEP data.			

Considering school variables, we find a higher share of female adolescents than male adolescents attending a private school. The share is 8 percent for female and 3 percent for male adolescents. With respect to school activities, being the class representative, participating in school sport and doing no extracurricular activities, are considered. Approximately 31 percent are class representatives. 27 percent of male adolescents are active at school sport and 22 percent of females. More male adolescents than female adolescents do not participate in extracurricular activities. Roughly 40 percent of male adolescents do not participate in extracurricular activities. For female adolescents, the value is 7 percent lower.

Attending high school after elementary school is recommended by teachers to approximately 45 percent of pupils. The value is slightly higher for female adolescents. More female adolescents than male adolescents choose an advanced course in German or in their first foreign language. An advanced mathematics course is chosen by more male than female adolescents. When grades at school are not sufficient from parent perspective, 29 percent of parents pay a tutor in an attempt to improve the performance of their children at school. Approximately 30 percent of females receive lessons from a private tutor. For male adolescents, this value is 4 percent lower. The share of adolescents receiving help with homework from their mother is higher than the share of adolescents receiving help from their father. 25 percent of teenagers receive help from their mother and only 4 percent from their

father. More male adolescents than female adolescents receive help with their homework from both their father and mother. Around 4 percent of adolescents are in a class in which most of the pupils are foreign.

According to their educational and career plans, about 17 percent (31 percent) of adolescents wish to attend an advanced technical college (the German Fachhochschule) after graduation. We further include a variable indicating the desired age of being financially independent, between 17 and 25 years of age. Approximately 80 percent belong to this group. 1 percent of the adolescents are already financially independent.

Furthermore, we include parental characteristics. Integration into the labor market is markedly different for men and women. 14.4 percent of male parents are not employed, while this applies to 23.6 percent of the female parents. Because the share of part time workers is noticeably different for the mother and father, the average net salary of the father is roughly €1310 higher than that of the mother. This difference can be explained by a higher share of full time working fathers. 12 percent of the fathers have grades 1 or 2 (equivalent to A or B) in mathematics, German and the first foreign language at school when they were 15 years old. For male adolescents, this value is about 5 percent higher compared than for female adolescents. The share of mothers with grades of 1 or 2 (equivalent to A or B) in the main subjects at school is 22 percent. This value is 5 percent points higher for male adolescents than for female adolescents.

Finally, we include characteristics of the grandparents. 3 percent of at least one parent of the father and one parent of the mother of the adolescents have at least a high school diploma. Both grandparents of approximately 7 percent of the adolescents are deceased.

EMPIRICAL RESULTS

We use the Cox proportional hazard model specified in equation (1) to estimate the likelihood of successful graduation from high school, depending on the age of the adolescents. We conducted regressions for the total sample and subsamples of men and women. Our endogenous variable is a dummy variable that takes the value 1 in the year the pupil graduates at high school, 0 otherwise. The average age of high school graduation is 21.54 years of age in the total sample, 21.63 for males and 21.45 for females.

Our specification includes fixed and time dependent covariates. We grouped the exogenous variables according to the grouping of the summary statistics. Except

for the interaction of being employed part time or full time and the net salary of the father and mother, all variables are dummy variables.

In order to gain an first impression of the time dimension of graduation from high school, we plot the smoothed hazard function for the total sample and the two subsamples in Figure 1. The hazard indicates the instantaneous rate of high school graduation and can take values from zero (meaning no high school graduation at all) to infinity (meaning certainty of high school graduation). Thus, the hazard is the probability that graduation from high school occurs within a given interval, conditional upon pupils still being at school to the beginning of that interval, divided by the width of the interval. The hazard function of male pupils increases until the maximum at the age of 22.2. Being older than 22.2, reduces the hazard of graduating from high school for males. For female pupils the maximum of the hazard function is 21.4. Before the age of 21.4, the hazard function increases and then decreases subsequently. For males, the hazard curve is at a higher level compared to females and therefore, the probability of graduating at high school is higher for males at every age of the observation period. Since the hazard curve begins to decrease at an earlier age for females, females are less likely to graduate at a higher age, compared to males. For the total sample, the value of the maximum of the hazard curve and the age at this point are between the values of the two subsamples.

Table 2 displays the regression results. The results in the first column refer to the total sample, and the next two columns for males and females, respectively. According to equation (1), we estimate the coefficients β. Exponentiating the estimated coefficient leaves us the hazard ratio displayed in Table 2. This expoentiated individual coefficient yields the hazard ratio. For example, if the coefficient on the dummy variable *own income* is 0.352, then a change in the status of the dummy variable from 0 to 1 increases the hazard by 42.2 percent, because exp(0.352)=1.422. If the coefficient of the dummy variable indicating living in East Germany for males is -0.347, then a change in the status of the dummy variable decreases the hazard by 29, percent because exp(-0.347)=0.707. Therefore, hazard ratios lower than one indicate a negative impact of the considered variable on the hazard of graduating from high school, while hazard ratios above one indicate the opposite.

Figure 1: Smoothed hazard functions
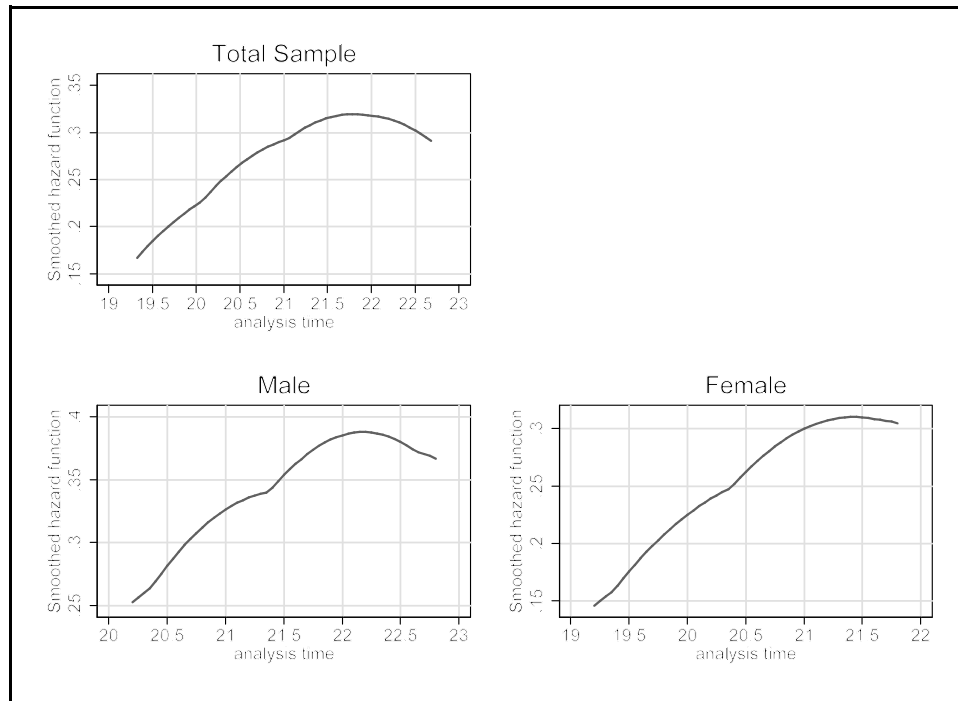
Source: Own calculations using GSOEP data.

For males and females, we did not detect a statistically significant difference. Living their own room at home raises the likelihood of graduating from high school insignificantly. Due to inferior economic standards in East Germany compared to West Germany, we assume lower probabilities of graduation for adolescents living in East Germany. However, a significant negative effect of 29 percent is only revealed for *male* adolescents.

A strong positive and highly significant effect is found for pupils who work part time in addition to their regular full time formal education. This applies especially to females, who have almost a 68 percent higher likelihood of graduating from high school than their non-working counterparts. Male adolescents who work part time also are more likely to graduate, but the effect is not significant. Since own income or part time work has no direct influence on school performance from a

theoretical point of view, the estimated effect could be an indirect measure of personal ability. Since more highly skilled adolescents are able to work part time while in full time education, it is not surprising that working adolescents more often complete their high school exam.

A look at siblings reveals ambiguous findings. Being the only child has a strong and significantly positive effect on the likelihood of graduation for male adolescents, whereas females are less likely graduate. The results indicate large differences for males and females. It seems that males my benefit substantially from increased status. On the other hand, females probably perform better at school if they have siblings. In families with more than one child, with respect to the graduation likelihood of the individual child, it does not matter whether it is the youngest or the oldest of the siblings.

Table 2: Cox Model Estimation Results						
	Total Sample		Male		Female	
	Hazard Ratio	Std. Err.	Hazard Ratio	Std. Err.	Hazard Ratio	Std. Err.
Sex	0.9786	(0.104)	-	-	-	-
Residence						
Own Room	1.273	(0.277)	1.199	(0.279)	1.558	(0.647)
Living in East Germany	0.844	(0.121)	0.707	(0.148)*	0.940	(0.201)
Jobs and Money						
Own income	1.422	(0.152)***	1.273	(0.199)	1.677	(0.273)***
Siblings						
Only child	0.987	(0.264)	1.902	(0.666)*	0.568	(0.231)
Oldest child	1.026	(0.174)	0.931	(0.221)	0.950	(0.230)
Youngest child	0.949	(0.167)	1.121	(0.275)	0.681	(0.177)
Relationships						
No steady boy/girlfriend	1.216	(0.130)	1.120	(0.165)	1.229	(0.223)
Free time and Sport						

Table 2: Cox Model Estimation Results					
	Total Sample		Male		Female	
	Hazard Ratio	Std. Err.	Hazard Ratio	Std. Err.	Hazard Ratio	Std. Err.
TV, Video	0.909	(0.121)	1.235	(0.244)	0.719	(0.149)
Reading	1.223	(0.143)*	1.073	(0.206)	1.143	(0.209)
Voluntary activities	1.223	(0.172)	1.116	(0.223)	1.132	(0.252)
Paid music lessons	1.041	(0.141)	0.877	(0.206)	1.019	(0.190)
Hobby/leisure time sport or club sport	1.056	(0.118)	0.923	(0.151)	0.989	(0.203)
School						
Attendance in a Private School	1.077	(0.220)	1.502	(0.581)	0.968	(0.276)
Class representative	1.053	(0.138)	1.601	(0.314)**	0.658	(0.121)**
School sport	1.138	(0.148)	0.985	(0.205)	1.415	(0.281)*
No extracurricular activities	1.012	(0.146)	1.361	(0.286)	0.671	(0.154)*
Recommended for Gymnasium	1.372	(0.164)***	1.596	(0.288)***	1.178	(0.193)
Advanced course in German	1.403	(0.369)	0.936	(0.403)	1.616	(0.524)
Advanced course in mathematics	1.156	(0.214)	1.648	(0.332)**	0.874	(0.354)
Advanced course first foreign language	1.035	(0.256)	1.667	(0.564)	0.966	(0.379)
Paid extra lessons	1.048	(0.130)	1.264	(0.220)	0.924	(0.172)

Table 2: Cox Model Estimation Results					
	Total Sample		Male		Female	
	Hazard Ratio	Std. Err.	Hazard Ratio	Std. Err.	Hazard Ratio	Std. Err.
Mother helps with homework	1.037	(0.122)	0.837	(0.143)	1.203	(0.206)
Father helps with homework	0.627	(0.200)	0.586	(0.183)*	0.534	(0.433)
The majority of classmates are foreign	0.975	(0.318)	0.572	(0.256)	1.309	(0.557)
Education and Career plans						
Advanced technical college	1.158	(0.154)	1.488	(0.244)**	0.924	(0.199)
University	1.105	(0.155)	1.266	(0.239)	1.208	(0.271)
Desired age for financial independence (17-25)	1.016	(0.133)	1.031	(0.210)	0.941	(0.185)
Already financially independent	5.293	(2.868)***	3.405	(1.507)***	20.266	(9.188)***
Characteristics of the parents						
Father does not work	0.698	(0.146)*	0.336	(0.111)***	1.238	(0.389)
Mother does not work	0.851	(0.136)	1.021	(0.219)	0.537	(0.141)**
Net salary, father	1.000	(0.000)**	1.000	(0.000)***	1.000	(0.000)
Net salary, mother	1.000	(0.000)	1.000	(0.000)	1.000	(0.000)

Table 2: Cox Model Estimation Results					
	Total Sample		Male		Female
	Hazard Ratio	Std. Err.	Hazard Ratio	Std. Err.	Hazard Ratio	Std. Err.
Grades of father 1 or 2 at school	1.161	(0.179)	1.478	(0.346)*	0.957	(0.233)
Grades of mother 1 or 2 at school	1.271	(0.171)*	0.949	(0.185)	1.565	(0.296)**
Characteristics of the grandparents						
Grandparents have matriculation standard	1.756	(0.512)**	1.187	(0.444)	2.775	(1.057)***
Grandparents are deceased	1.213	(0.254)	1.276	(0.366)	1.431	(0.479)
number of observations	1748		874		874	
number of subjects	749		372		377	
number of failures	281		148		133	
log likelihood	-1529.88		-685.74		-628.90	
LR Chi2	124.51 ***		202.26 ***		245.70 ***	

Note. - * significant at 10%; ** significant at 5%; * significant at 1%. In order to test the proportional hazard assumption, we performed the link test. According to the link test, the squared linear predictor is insignificant, so that the model is specified correctly. To check the proportional hazard assumptions for the global model and for each covariate we used the Schoenfeld residual test, based on a generalization by Grambsch and Therneau (1994). The global model and each covariate included in the estimation results fulfils the proportional hazard assumption. We also plotted the Nelson-Aalen cumulative hazard measure compared to the partial Cox-Snell residuals. Since the Nelson-Aalen cumulative hazard lies very close to the 45˚ line, the fit of our model is good. For the dummy variables, we plotted the –ln[-ln(survival)] curve for each category versus ln (analysis time). The curves are parallel. Therefore, the proportional hazard assumption is not violated.

Source: Own calculations using GSOEP data.

Adolescents with no steady boy/girlfriend have a significantly higher hazard ratio in the total sample. The effect is also positive, but insignificant in the subsamples for males and females. A plausible explanation for this finding could be the limited time for studying, which is reduced further when a boy/girlfriend appears on the scene.

Leisure time activities may correlate with school performance, if a particular activity directly influences human capital maturation or is an indicator of ability. A frequently mentioned variable in this context is time spent watching television. We do not find any significant effect for adolescents who watch TV every day. Interestingly, there are large differences in the hazard ratios for males and females. The effect of daily TV watching is positive for males, but negative for females. Daily reading increases the likelihood of graduating by 22 percent. Separated by gender, the effect is positive, but insignificant. Doing voluntary work in the community, taking paid music lessons or participating in hobby/leisure time sport or club sport increases the likelihood of graduating insignificantly. This also holds for both subsamples.[5]

A look at the school category does not reveal a significant influence of private school attendance. Being a class representative enhances the likelihood of graduation for males by 60 percent, whereas, surprisingly, females are 34 percent less likely graduate. It seems that male class representatives are positively selected from the pupil population and females negatively. The influence of doing school sport or doing no such activity at all is significant for females, but insignificant for males. Females doing school sport are 42 percent more likely to graduate from high school. Doing no extracurricular activities reduces the likelihood by 33 percent for females. Extracurricular activities seem to be an indicator of overall positive motivation at school. This impacts positively on school performance. After elementary school, teachers recommend a secondary school track for each pupil, based on their view about the pupil's ability. This recommendation is not binding for parents, but high schools can easily reject pupils who have been recommended for a lower school track. When a recommendation for high school truly reflects higher ability on the part of pupils, the likelihood of graduating should increase. This is confirmed by the total sample. For males, the likelihood increases by 60 percent. For females, the influence is also positive, but insignificant. We further investigate the influence of attending an advanced course in one of the main subjects – German, maths and first foreign language. Only attending an advanced math course positively affects the likelihood of graduating by 65 percent for males.[6] Paid private coaching does not enhance the likelihood of graduation. If parents helps

children to do their homework properly, and the effect is significantly negative only when a father helps his son. This could be due to opposing effects. Because of negative selection, more often pupils with low ability will need assistance in private learning. However, assistance by itself should enhance performance. The share of foreign classmates has no significant effect on the likelihood of graduating.[7]

The aim of attending an advanced technical college or university after successful high school graduation should increase the likelihood of graduating. Only males who wish to attend an advanced technical college in the future graduate more often. Pupils who with to be financially independent even at the age of 17-25, do not graduate more often. Being already financially independent before graduation increases the likelihood of graduating markedly. However, this result must be interpreted with caution, because of the small sample size.

Considering parental characteristics yields different findings for both males and females. Male adolescents tend to be influenced by their father, while the graduation likelihood of females tends to be affected more by their mother. The father unemployed has only a negative impact on the likelihood of a son graduating. Daughters graduate less often when their mother is not employed.[8] The net salaries of the parents have no or only a negligible influence on graduation. When the father performed well at school in his main subjects, his son will have a 48 percent higher likelihood of graduating. The same holds for daughters, when their mothers had been good performers at school. They have a 57 percent higher likelihood of graduating.[9]

We further analyze influence of grandparent characteristics on the likelihood of their grandchildren graduating successfully. If at least one parent of the father and one of the mother of the adolescents has at least a high school diploma, the likelihood of granddaughters graduating is increased by 176 percent. There is no significant effect for males. The death of grandparents has no significant effect on the likelihood of graduating.

CONCLUSION

Since the demand for highly skilled workers will probably continue to rise over the coming decades, due to globalization and skill-biased technical change, it is becoming more and more important to graduate successfully from high school and obtain access to tertiary education. Thus, analyzing the determinants of successful high school graduation is extremely important. That proportion of the population with educational attainments of at least high school level, is not only better

integrated into the labor market, but exerts a positive impact on societal development in a broader sense. The determinants of successful graduation are markedly different in terms of gender. According to the smoothed hazard function, the probability of successful graduation is higher for males than for females. The maximum of the hazard function is reached at the age of 21.4 for females and at 22.2 for males. Being older than 21.4 years old reduces the probability of graduating from high school for females. For males, the decrease begins at the later age of 22.2. Male adolescents are less likely graduate when they live in East Germany, when their fathers help them with their homework and when their fathers are unemployed. Having no siblings, being the class representative, being recommended for high school, attending an advanced mathematics course, wanting to attend a technical college after graduation, being already financially independent while at school and having a father who himself earned good grades at school, all increase the likelihood of graduating successfully.

Successful graduation is less likely for females when they are class representatives, do not participate in any voluntary school activities and do not have a mother who is employed. In contrast, they benefit by earning their own income, by voluntarily participating in school sport, being financially independent, having a mother who earned high grades at school and having grandparents with a matriculation standard of education.

Surprisingly, we find no effect of leisure time activities on graduation. Furthermore, the results indicate that the variables relating to the parents have the following impact: fathers' impact on sons and mothers on daughters. Especially the integration of parents into the labor market is crucial for successful graduation at high school. If the father is unemployed, the likelihood of graduating is markedly reduced for male adolescents. Surprisingly, this is not the case for female adolescents. A strong positive influence of grandparents on school graduation was only evident for females. Since this is the first study to incorporate three generations, interdependencies between generations could be studied in more detail.

ENDNOTES

[1]   In Germany, there is also the comprehensive school which combines all three types in one school, but within these schools, there is also a separation between the three main types.

2   In some federal states like Bavaria, the recommendation of the teacher is binding. In this case, parents can influence the recommendation indirectly by communicating with the teacher before he makes the decision.

3   For an overview of the literature on the returns to education in Germany, see Flossmann and Pohlmeier (2006).

4   See Klein and Moeschberger (1998) for a detailed specification of the partial likelihood function. We use the Breslow method to deal with tied failures.

5   Since leisure time variables are measured in categories, we could only use dummy variables in our estimation. Further information on free time activities could yield a significant influence on high school graduation.

6   We also have information on grades in German, maths and the first foreign language. Because grades and graduation are influenced positively by unobserved ability, we do not include grades as an exogenous variable.

7   We also included a dummy variable indicating if the pupil has repeated a school year. The effect on the likelihood to graduate was significantly negative for male and female. Because this dummy variable does not fulfil the proportionality assumption of the Cox model we dropped it.

8   Instead of the employment status we used the skill level of the parents. Being unskilled reduces the hazard ratio insignificantly. Alternatively being skilled increases the hazard ratio, but insignificantly. The results of the other variable are robust to these changes. We do not use both the skill level and the employment status, because of multicollinearity. In another specification we used a dummy variable identifying the father being a blue collar worker for employment status. This reduces the likelihood to graduate by 30 percent. An interaction of blue collar worker and being unskilled decreases the likelihood to graduate by 50 percent. These results are comparable to the findings of the OECD (2007), p. 116.

9   We also included dummy variables indicating foreign nationality of the mother and father. Neither exerts a significant or negative influence on the likelihood of graduating. The dummy variables are not included in our final specification, because they do not fulfil the proportionality assumption.

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AUTHORS' NOTES

ECONOMICS ARTICLES

THE MONETARY APPROACH TO BALANCE OF PAYMENTS: A REVIEW OF THE SEMINAL SHORT-RUN EMPIRICAL RESEARCH

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ABSTRACT

This paper provides a review of the seminal short-run empirical research on the monetary approach to the balance of payments with a comprehensive reference guide to the literature. The paper reviews the three major alternative theories of balance of payments adjustments. These theories are the elasticities and absorption approaches (associated with Keynesian theory), and the monetary approach. In the elasticities and absorption approaches the focus of attention is on the trade balance with unemployed resources. In the monetary approach, on the other hand, the focus of attention is on the balance of payments (or the money account) with full employment. The monetary approach emphasizes the role of the demand for and supply of money in the economy. The paper focuses on the monetary approach to balance of payments and reviews the seminal short-run empirical work on the monetary approach to balance of payments. Throughout, the paper provides a comprehensive set of references corresponding to each point discussed. Together, these references exhaust the existing short-run research on the monetary approach to balance of payments.

INTRODUCTION

This paper provides a review of the seminal short-run empirical research on the monetary approach to the balance of payments with a comprehensive reference guide to the literature. The paper reviews the three major alternative theories of balance of payments adjustments. These theories are the elasticities and absorption approaches (associated with Keynesian theory), and the monetary approach. In the elasticities and absorption approaches the focus of attention is on the trade balance with unemployed resources. The elasticities approach emphasizes the role of the

relative prices (or exchange rate) in balance of payments adjustments by considering imports and exports as being dependent on relative prices (through the exchange rate). The absorption approach emphasizes the role of income (or expenditure) in balance of payments adjustments by considering the change in expenditure relative to income resulting from a change in exports and/or imports. In the monetary approach, on the other hand, the focus of attention is on the balance of payments (or the money account) with full employment. The monetary approach emphasizes the role of the demand for and supply of money in the economy. The paper focuses on the monetary approach to balance of payments and reviews the seminal short-run empirical work on the monetary approach to balance of payments. Due to space limitation the seminal long-run empirical work on the monetary approach to balance of payments is reviewed in another paper. Throughout, the paper provides a comprehensive set of references corresponding to each point discussed. Together, these references exhaust the existing short-run research on the monetary approach to balance of payments.

This study is organized in the following way: First, it reviews three alternative theories of balance of payments adjustments. They are the elasticities and absorption approaches (associated with Keynesian theory), and the monetary approach. Then, the seminal short-run empirical work on the monetary approach is reviewed. It notes that the literature may be divided into two classes, long run (associated with Johnson) and short run (associated with Prais). Then, the review focuses on the seminal short-run literature. The theoretical model is described first, and then the estimated results are reported. At the end of the discussion, some comments on the short-run approach are made.

DIFFERENT APPROACHES TO
THE BALANCE OF PAYMENT ANALYSIS

Three alternative theories of balance of payments adjustment are reviewed in this section. They are commonly known as the elasticities, absorption, and monetary approaches. Johnson (1958, 1972, 1973, 1976, 1977a, 1977b, 1977c) and Whitman (1975) have discussed these other approaches to balance of payments.

The elasticities approach applies the Marshallian analysis of elasticities of supply and demand for individual commodities to the analysis of exports and imports as a whole. It is spelled out by Joan Robinson (1950).

Robinson was mainly concerned with the conditions under which devaluation of a currency would lead to an improvement in the balance of trade. Suppose the trade balance equation is written as:

$$X = \text{value of exports}$$
$$IM = \text{value of imports}$$
$$BT = \text{balance of trade}$$
$$BT = X - IM \quad (1)$$

In this context, it is generally assumed that exports depend on the price of exports, and imports depend on the price of imports. These relations are then translated into elasticities, by differentiating the above equation with respect to the exchange rate. In effect, the exchange rate clears balance of payments. A criterion for a change of the balance of trade in the desired direction can be established, assuming that export and import prices adjust to equate the demand for and supply of exports and imports.

The effect of a devaluation on the trade balance depends on four elasticities: the foreign elasticity of demand for exports, and the home elasticity of supply, the foreign elasticity of supply of imports, and the home elasticity of demand for imports (Robinson, 1950, p. 87). For the special case where it is assumed that the trade balance is initially zero and that the two supply schedules are infinitely elastic, the elasticities condition for the impact of a devaluation to be an improvement in the trade balance, is that the sum of the demand elasticities exceed unity. This has been termed the "Marshall-Lerner condition."

This special case and the assumptions behind it should be viewed against the background of the time they were developed, the great depression of the 1930s. The theory adopted Keynesian assumptions of wage and price rigidity and mass unemployment and used these to extend the Keynesian analysis to the international sphere. Robinson (1950) mentions that her "main endeavor is to elaborate the hints thrown out by Mr. Keynes in his Treaties on Money, Chapter 21." p. 83.

Under Keynesian assumptions of sticky wages and prices, devaluation changes the prices of domestic goods relative to foreign goods, i.e., a change in the terms of trade, in foreign and domestic markets, and causes alterations in production and consumption (Johnson, 1972). This in turn has an impact on the balance of trade.

It is important to note the following two characteristics of the special case of elasticities approach: (i) Any impact of the devaluation on the demand for

domestic output is assumed to be met by variations in output and employment rather than relative prices, with the repercussions of variations in output on the balance of payments regarded as secondary. This is made possible by the assumption that supply elasticities are infinite. The assumption of output and employment being variable proved highly unsatisfactory in the immediate postwar period of full and over-full employment. (ii) The connections between the balance of payments and the money supply, and between the money supply and the aggregate demand, are ignored. This is made possible by the assumed existence of unemployed resources, as well as by the Keynesian skepticism regarding the influence of money. Johnson (1972) emphasizes that the monetary approach differs crucially from the elasticities approach on both these grounds.

A notable shortcoming of the elasticities analysis is its neglect of capital flows. Even though the adherents of the elasticities approach were attempting to guide the policy-maker in improving the country's balance of payments, their focus, nevertheless, was on the balance of trade (net exports of goods and services). For the special case mentioned above, this is traceable to the emphasis in Keynesian analysis (see Whitman, 1975, p. 492) given to aggregate demand (of which net exports are a component).

Before we close this section, one important point has to be mentioned. In the literature, the elasticities approach is often mistakenly referred to as being a partial equilibrium analysis. This type of argument is based on the fact that in the special case elasticities of supplies of export and imports are assumed to be infinite, the effect of changes in the quantity of goods and services exported and imported are independent of, or are not sensitive to, the happenings elsewhere in the economy; e.g., the change in income which results from the change in exports does not have an effect on imports. The important point to note is that, whereas the special case of infinitely elastic supplies of exports is a partial equilibrium analysis, the general case is not. In general, the elasticities approach considers the usual demand and supplies for imports and exports where they are obtained on the basis of the production possibilities curve of domestic economies, like any usual general equilibrium analysis, everything depends on the happenings elsewhere in the economy, i.e., general equilibrium analysis.

The absorption approach was first presented by Alexander (1952). He sought to look at the balance of trade from the point of view of national income accounting:

Y = domestic production of goods and services
E = domestic absorption of goods and services, or domestic total expenditure
BT = balance of trade

$$BT = Y - E \qquad\qquad\qquad\qquad (2)$$

The above identity is useful in pointing out that an improvement in the balance of trade calls for an increase in production relative to absorption.

When unemployed resources exist, the following mechanism is visualized: the effect of a devaluation is to increase exports and decrease imports. This in turn causes an increase in production (income) through the multiplier mechanism. If total expenditure rises by a smaller amount, there will be an improvement in the balance of trade (Alexander, 1952, pp. 262-263). Thus, the balance is set to be identical with the real hoarding of the economy, which is the difference between total production and total absorption of goods and services, and therefore equal to the accumulation of securities and/or money balances. In the absorption approach, in effect, income or expenditure clears balance of payments. The monetary approach concentrates on the accumulation of money balances only. In the presence of unemployment, therefore, devaluation not only aids the balance of payments, but also helps the economy move towards full employment and is, therefore, doubly attractive (Alexander, 1952, pp. 262-263).

Suppose, however, that the country is at full employment to begin with. It cannot hope to improve its trade balance by increasing real income. Here, it has to depend on its ability to reduce absorption. How can a devaluation achieve this? Alexander argued that the rise in the price level consequent upon the devaluation would tend to discourage consumption and investment expenditures out of a given level of income. One way this will happen is through the "real balance effect" – a reference to the public's curtailment of expenditure in order to rebuild their stock of real cash balances that was diminished by the increase in the price level. The real-balance effect plays an important role in the monetary approach as well.

However, under conditions of full employment, a devaluation cannot be expected to produce, by itself, the desired extent of change in the overall balance. The reduction in the public's expenditure in order to build their money balances will have to be supplemented by domestic deflationary policies, the so-called "expenditure-switching" and "expenditure-reducing" policies (Johnson, 1958). This, of course, is because the balance of trade cannot be improved through a rise in the output level.

The absorption approach can be said to work only in the presence of unemployed resources. The absorption approach is a significant improvement over the special case of the elasticities approach in one important sense, this is its view of the external balance via national income accounting. In this manner, the approach relates the balance to the happenings elsewhere in the economy rather than taking the partial equilibrium view of the special case of the elasticities approach in analyzing the external sector in isolation.

The "monetary approach" is so called because it considers disequilibrium in the balance of payments to be essentially, though not exclusively, a monetary phenomenon. To say that something is essentially a monetary phenomenon means that money plays a vital role, but does not imply that only money plays a role. The monetary approach takes explicit account of the influence of real variables such as levels of income and interest rates on the behavior of the balance of payments. Kreinin and Officer (1978), Magee (1976), and Whitman (1975) have reviewed the literature on the monetary approach to balance of payments. The term "monetary approach" was first used by Mundell (1968) to refer to the new theory (Mussa, 1976).

The elasticities and absorption approaches are concerned with the balance of trade while the monetary approach concerns itself with the deficit on monetary account. In principle, this balance consists of the items that affect the domestic monetary base.

In general, the approach assumes full employment and emphasizes the budget constraint imposed on the country's international spending. It views the current and capital accounts of the balance of payments as the "windows" to the outside world, through which an excess of domestic stock demand for money over domestic stock supply of money, or of excess domestic stock supply of money over domestic stock demand for money, are cleared (Frenkel and Johnson, 1976). Accordingly, surpluses in the trade account and the capital account, respectively, represent excess flow supplies of goods and of securities, and as excess domestic demand for money. Consequently, in analyzing the money account, or more familiarly, the rate of increase or decrease in the country's international reserves, the monetary approach focuses on the determinants of the excess stock demand for, or supply of, money. Dornbusch (1971, 1973a, 1973b) discusses the role of the real-balance effect.

This theory divides the country's monetary base into foreign assets and domestic assets of the monetary authorities. An increase in foreign assets of the central bank is achieved when the central bank purchases foreign exchange or gold.

Under pegged exchange rates, the central bank buys foreign exchange in order to prevent the national currency from appreciating in the foreign exchange market. The central bank's purchase of foreign assets increases its domestic monetary liabilities by the same amount.

An increase in domestic assets of the central bank is achieved when the central bank purchases bonds from the fiscal branch of the government (the treasury), or from the public. The central bank's purchases of domestic assets (e.g., bonds) increases its domestic monetary liabilities, i.e., the monetary base, by the same amount. The excess supply of money has to be matched by an equivalent excess demand for goods and/or securities. This is because the budget constraint deems that the public's flow demand for goods, securities, and money – assuming that these three encompass all that the public demands – should add up to the public's total income. Therefore, with an unchanged level of income, an excess supply of money has to be matched by an equivalent excess demand for goods and/or securities. Viewing the economy as a whole, what does the excess demand for goods and securities imply? In a closed economy, an excess demand for goods would lead to an increase in the domestic price level and a consequent fall in the real money balances the public holds. An excess demand for securities would increase their price (decrease the interest rate), increasing desired money balances. Price and interest rate changes eventually cause the existing nominal money supply to be willingly held by the public. However, in a small open economy with fixed exchange rates, the domestic price level has to maintain at parity with the price level in the rest of the world, and the domestic price of securities (and therefore the interest rate) is determined by the price of securities (and therefore the interest rate) in the world as a whole. So, in the absence of sales of domestic assets by the central bank, the desired level or real money balances is achieved by importing goods and/or securities from abroad. This creates a deficit in the money account, resulting in a fall in foreign assets of the central bank and, therefore, in the money supply.

The monetary approach is seen to have an appreciation of the inter-related nature of the various markets. The monetary approach insists that "when one market is eliminated from a general equilibrium model by Walras' law, the behavioral specifications for the included markets must not be such as to imply a specification for the excluded market that would appear unreasonable if it were made explicit." (Whitman, 1975, p. 497). The monetary approach focuses on stock and flow equilibrium, with emphasis on stock equilibrium for money. In this way it considers inter-relationships among various markets and, therefore, the inter-relationship between stock and flow equilibrium. The stock-flow consideration of the monetary

approach is in fact the essential difference between the monetary approach and the elesticities and absorption approaches, where the latter two consider the flow equilibrium only.

The monetary approach, like the absorption approach, stresses the need for reducing domestic expenditure relative to income, in order to eliminate a deficit in the balance of payments. However, whereas the absorption approach looks at the relationship between real output and expenditure on goods, the monetary approach concentrates on deficient or excess nominal demand for goods and securities, and the resulting accumulation or decumulation of money.

The monetary approach looks at the balance of payments as the change in the monetary base less the change in the domestic component:

$$H = \text{change in the quantity of money demanded}$$
$$D = \text{domestic credit creation}$$
$$BP = D\text{H} - D\text{D} \tag{3}$$

where the "italic D," i.e., D, appearing in front of a variable designates the "change" in that variable. That is, D is the first difference operator: $DX = X_{(t)} - X_{(t-1)}$.

Putting just monetary assets rather than all assets "below the line" contributes to the simplicity of the monetary approach. Other things being equal, growth in demand for money, and of factors that affect it positively should lead to a surplus in the balance of payments. Growth in domestic money, other things being equal, should worsen it. Thus, the growth of real output in a country with constant interest rates causes its residents to demand a growing stock of real and nominal cash balances. This means that the country will run a surplus in the balance of payments (Johnson, 1976, p. 283). In order to avoid a payments surplus, the increase in money must be satisfied through domestic open market operations. To produce a deficit, domestic money stock must grow faster than the growth of real income.

This analysis suggests that if a country is running a deficit, then assuming that the economy is growing at its full-employment growth rate with a given rate of technological progress, it should curtail its rate of domestic monetary expansion. Use of other measures like the imposition of tariffs, devaluation or deflation of aggregate demand by fiscal policy can succeed only in the short run (Johnson, 1976, p. 283).

The decision on which variables are exogenous and which are endogenous is made in the following manner: real income is assumed exogenous in the long run.

Also, in the long run, prices and interest rates are exogenous for small countries. Thus, the quantity of money demanded is exogenous (Magee, 1976, p. 164). The monetary approach assumes that the domestic assets component of the monetary base is unaffected by balance of payments flows. This (the domestic assets) is the variable which the monetary authorities control, and, thereby, indirectly control the balance of payments.

Under fixed exchange rates, a small country controls neither its price level nor quantity of domestic money in anything but the short run. Its money supply is endogenous, and what it controls by open market operations is simply the international component of the monetary base. In a system of flexible exchange rates, the focus of analysis shifts from determination of the balance of payments to the determination of the exchange rate (Frenkel and Johnson, 1976, p. 29).

REVIEW OF THE SEMINAL SHORT-RUN EMPIRICAL RESEARCH

Empirical work on the monetary approach to the balance of payments can be divided into two different approaches; one tests the theory in long-run equilibrium, the other considers the adjustment mechanism and the channels through which equilibrium is reached. The first approach is based on the reserve flow equation developed by H. G. Johnson (1972). Testing was undertaken by J.R. Zecher (1974) and others. For a comprehensive list of references which have estimated either the "reserve flow equation" or the "exchange market pressure equation" see appendix 1. For a comprehensive list of references which have estimated the "capital flow equation," which is a variant of the "reserve flow equation," see appendix 2. The second approach is based on theoretical work of S.J. Prais (1961), with corresponding empirical work undertaken by R.R. Rhomberg (1977) and others. For a comprehensive list of references which have estimated a short-run model in the tradition of the monetary approach to balance of payments see appendix 3. In this paper, seminal long-run approach is reviewed by representing the underlying theoretical model first, and then looking at a few well-known empirical estimations of the model.

This section reviews short-run models of the balance of payments. First, the typical theoretical formulation of the adjustment process elaborated by S.J. Prais (1961) is presented. Second, four well-known empirical studies that are based on Prais' (1961) formulation are reviewed. These four consist of one by Rudolph R. Rhomberg (1977), two by Mohsin S. Khan (1977, 1976), and the last one by Charles

Schotta (1966). Finally, some points which are overlooked in these short-run models and tests are discussed.

S.J. Prais (1961) formulated the model in terms of continuous time, which allows precise specification of the relation between stock and flow variables. Prais (1961) specifies a domestic expenditure function which emphasizes the role of deviations of actual from desired money holdings as the link between the real and monetary sectors of the economy. This particular specification has come to be widely used in the recent literature (Dornbush, 1973a, 1973b, 1975).

The model, which is in differential equation form, may be set out with a system of six equations given by equations (4) through (9):

$$LD = k.Y \tag{4}$$
$$dL/dt = X - IM \tag{5}$$
$$E = Y + a.(L - LD) \tag{6}$$
$$IM = b.Y \quad \text{or} \quad IM = b.E \tag{7}$$
$$X = X(t) \tag{8}$$
$$Y = E + X - IM \tag{9}$$

In these equations LD is the desired level of liquidity as distinguished from the actual liquidity, L. The first equation is the familiar Cambridge equation relating a desired level of liquidity, LD, to the level of income. The second equation relates the change in actual liquidity to the balance of payments, which is represented in differential form. An additive term to represent any given rate of credit creation can be introduced on the right-hand side of (5) without altering the basic mathematics. Equation (6) indicates that domestic expenditure, E, equals income plus the excess of actual over desired liquidity. Imports, equation (7), are taken as a constant fraction of income. As an alternative, imports may be taken as a fraction of expenditure, E, so as to be proportionately influenced by the liquidity situation. However, this and other variations lead to rather similar results, apart from changes in the constants. Exports are assumed exogenous and given by equation (8). Finally, national income, in equation (9), is defined as domestic expenditure plus exports less imports.

In this system, a disequilibrium – for example a deficit in the balance of payments – is corrected by a fall in the money supply via (5), followed by a fall in domestic expenditure via (6), a fall in income via (9), and a fall in imports via (7). The reduction continues until the deficit in (5) is eliminated.

Rudolf R. Rhomberg (1977) also focuses attention on the relation between money and expenditure and estimates the entire structure of the model by multiple regression technique. The basic equations of his model are given by equations (10) through (15):

$$LD(t) = k.Y(t) \tag{10}$$
$$E(t) = a_0 + a_1.Y(t) + a_2.Y(t-1) + a_3.\{[L(t-1)+L(t-2)]/2 - k.Y(t)\} \tag{11}$$
$$IM(t) = b_0 + b_1.E(t) \tag{12}$$
$$G(t) = g_0 + g_1.Y(t) \tag{13}$$
$$Y(t) = E(t) + G(t) + X(t) - IM(t) \tag{14}$$
$$L(t) = L(t-1) + X(t) + DK(t) - IM(t) + DD(t) \tag{15}$$

where DK is the net capital inflow, and D is the domestic component of the monetary base. The long-run desired demand for money, LD, is expressed by equation (10). Private expenditure is linearly dependent on current and last year's income, and on the excess of actual over desired cash balances. Since the stock of money, L(t), is measured at a moment of time (at the end of year t), while Y(t) is the flow of income during year t, Rhomberg (1977) expresses cash balances during year t as $\{[L(t) + L(t-1)]/2\}$ and the deviation of actual from desired cash balances as $\{[L(t) + L(t-1)]/2 - [k.Y(t)]\}$. His private expenditure function is thus given by equation (11) because he assumes there is a one year lag in expenditure with respect to a change in the excess of desired over actual cash balances. Additionally, Rhomberg's (1977) model contains an import function specified by equation (12). Imports are assumed to depend on expenditures. In equation (13), Rhomberg (1977) argues that government expenditures on goods and services, G, are related to income, while, recognizing the fact that they (G) depend to a considerable extent on tax revenue, which is itself a function of income. The model is completed by the two identities defining income and the money supply.

The estimated behavioral equations (11), (12), (13) and their reduced forms for five countries of Norway, Costa Rica, Ecuador, Japan, and the Netherlands and for the period 1949-60 are given in Tables 1-A, 1-B, and 1-C.

Table 1-A: Rhomberg's Model: Expenditure Function				
	Y(t)	Y(t-1)	[L(t-1) + L(t-2)]2	R-squared
Norway	0.53	0.13	0.90	0.99
	-0.1	(0.11)	(0.47)	
Costa Rica	-	0.42	2.80	0.99
		(0.24)	(1.40)	
Ecuador	0.07	0.20	5.00	0.99
	-0.54	(0.25)	(3.80)	
Japan	0.96	-0.20	0.12	0.99
	-0.14	(0.17)	(0.53)	
Netherlands	0.54	-0.22	2.70	0.99
	-0.4	(0.29)	(1.00)	
The numbers in parenthesis indicate standard errors.				

Table 1-B: Rhomberg's Model: Import Function and Government Expenditures					
	Import Function			Government Expenditures	
	E(t)	E(t) + G(t)	R-Squared	Y(t)	R-Squared
Norway	0.59	-	0.98	0.21	0.96
	-0.02			(0.01)	
Costa Rica	-	0.23	0.93	0.20	0.89
		(0.02)		(0.02)	
Ecuador	0.25	-	0.97	0.18	0.96
	-0.01			(0.01)	
Japan	0.16	-	0.93	0.19	0.95
	-0.01			(0.01)	
Netherlands	0.69	-	0.99	0.20	0.92
	-0.02			(0.02)	
The numbers in parenthesis indicate standard errors.					

Table 1-C: Rhomberg's Model: The Reduced Forms for Income and Imports					
		Y(t-1)	X(t)	[L(t-1) + L(t-2)]/2	
Income (Y)	Norway	0.09	1.76	0.66	
	Costa Rica	0.38	1.18	2.47	
	Ecuador	0.23	2.03	2.42	
	Japan	0.2	3.86	1.5	
	Netherlands	-0.28	1.81	2.38	
Imports (IM)	Norway	0.1	0.54	0.73	
	Costa Rica	0.12	0.06	0.76	
	Ecuador	0.07	0.13	1.43	
	Japan	-0.03	0.59	0.24	
	Netherlands	-0.06	0.59	2.54	

Results show that for Norway and Japan, a change in the money supply appears to affect expenditure appreciably. The statistical significance of the coefficient of the money variable, however, is at a lower level than that of the other coefficients of the model.

Although the high values of coefficients of determination suggest a strong relationship, the results are not dependable because estimation is done in levels of the variables (Granger and Newbold, 1974). Since time series analysis is used, where variables like income, expenditure, and imports are highly auto-correlated, regression analysis in levels may have generated spurious correlation. In this respect, the knowledge of D-W statistic is of some help in the inference from the results obtained, but the author has not published the D-W statistic and interpretations of the coefficients should be treated with caution.

Like Prais (1961), Mohsin S. Khan (1977) expresses the model in continuous time. This allows him to estimate the time pattern of adjustment to the final equilibrium values via a system of linear differential equations. Khan (1977) specifies six equations containing three behavioral relationships – for imports, exports, and aggregate expenditure – and three identities – for nominal income, the balance of payments, and the money supply.

a. Imports: Khan (1977) relates imports to aggregate domestic expenditure. In order to take account of quantitative restrictions and controls on imports, he also

introduces the level of net foreign assets, R, of the country. His assumption behind the use of such a variable is the implied existence of a government policy reaction function in which controls are inversely related to reserves. The authorities are assumed to ease or tighten restrictions on imports as their international reserves increase or decrease. The import demand function is thus specified as:

$$IM^d(t) = a_0 + a_1.R(t) + a_2.E(t) + u_1(t) \quad a_1>0, a_2>0 \tag{16}$$

where IM^d is demand for nominal imports, and u_1 is a random error term with "white noise" properties. Actual imports in period t are assumed to adjust to the excess demand for imports:

$$D[IM(t)] = A.[IM^d(t) - IM^s(t)] \quad A>0 \tag{17}$$

where $D(x)$ is the time derivative of x, i.e., $D(x) = dx/dt$. A further assumption is that import supply is equal to actual imports:

$$IM(t) = IM^s(t) \tag{18}$$

Substituting (16) into (17), the estimating equation becomes:

$$D[IM(t)] = A.a_0 + A.a_1.R(t) + A.a_2.E(t) - A.IM(t) + A.u_1(t) \tag{19}$$

   b. Exports: Small countries are generally price takers in the world market and can sell whatever they produce. The volume of exports is therefore determined by domestic supply conditions. An increase in the capacity to produce in the export sector should lead to an increase in exports. Capacity to produce in the export sector is related directly to the capacity to produce in the entire economy. Khan (1977) considers permanent income to be a suitable indicator of capacity to produce, and specifies exports as a positive function of the permanent domestic income:

$$X(t) = b_0 + b_1.Y_P(t) + u_2(t) \quad b_1>0 \tag{20}$$

where X is the nominal value of exports, and Y_P is the permanent nominal income in time period t; u_2 is a random error term. Permanent income is generated in the following way:

$$D[Y_P(t)] = B.[Y_P(t) - Y(t)] \quad B<0 \qquad (21)$$

Permanent income in time period t adjusts to the difference between permanent income and actual income, Y, in period t. Equation (21) is re-written as:

$$Y_P(t) = [- B/(D-B)].Y(t) \qquad (22)$$

Substituting (22) into (20):

$$X(t) = b_0 + [(- B.b_1)/(D-B)].Y(t) + u_2(t) \qquad (23)$$

and solving for D[X(t)], equation (24) is obtained:

$$D[X(t)] = b_0.(D-B) - B.b_1.Y(t) + B.X(t) + u_3(t) \qquad (24)$$

where $u_2(t) = (D-B).u_3(t)$. Relation (24) is Khan's export estimating equation.

   c. Aggregate Expenditure: Khan's (1977) equation for desired expenditure is specified as follows:

$$ED(t) = c_0 + c_1.M^s(t) + c_2.Y(t) + u_4(t) \quad c_1>0, c_2>0 \qquad (25)$$

where ED is desired aggregate nominal expenditure, and Y is nominal income, and u_4 is a random error term. The stock of money, M^s, is included because, given the stock of money that the public desires to hold, an increase in the money supply raises actual money balances above the desired level. This increases the demand for goods and services as the public attempts to reduce its excess cash balances. Moreover, the actual value of expenditure is assumed to adjust to the difference between desired expenditure and actual expenditure:

$$D[E(t)] = C.[ED(t) - E(t)] \quad C>0 \qquad (26)$$

By substituting (25) into (26), the differential equation in D[E(t)] is obtained:

$$D[E(t)] = C.c_0 + C.c_1.M^s(t) + C.c_2.Y(t) - C.E(t) + C.u_4(t) \qquad (27)$$

this is the equation that is estimated.

d. Nominal Income: The ex-post nominal income identity is:

$$Y(t) = E(t) + X(t) - IM(t) \tag{28}$$

e. The Balance of Payments (BP): It is specified as:

$$BP(t) = D[R(t)] = X(t) - IM(t) + SK(t) \tag{29}$$

where SK represents the non-trade variable that contains services, short-term and long-term capital flows, and all types of foreign aid receipts or repayments. For the purposes of the model, this item (SK) is assumed to be determined outside the system.

f. The Supply of Money: It equals the international, R, and domestic, D, assets held by the central bank:

$$M^s(t) = R(t) + D(t) \tag{30}$$

Khan (1977) estimates the monetary model for ten developing countries for the period 1952-70. Results are reported in Tables 2-A, 2-B, and 2-C. Certain common results emerge from the estimates. Despite some obvious dissimilarities between countries, most of the estimated coefficients in this study appear to be of the same order of magnitude. In the import equations, the coefficients for net foreign assets range from approximately 0.3 to 0.9 and the coefficients of aggregate expenditure from 0.02 to 0.10, with most of the figures at the lower end. The lag in adjustment of imports to a desired level varies from 1.340 to 6.098 years. The current income coefficients in the export equation lie between 0.02 and 0.1 and the expenditure coefficients between 0.1 and 0.7, with most between 0.3 and 0.5. With the exception of the results for one of the countries, the stock of money has a proportionally greater effect on nominal expenditure, with the estimated coefficients ranging from 1.4 to 2.2. Differences among countries as to the estimated income coefficient in the nominal expenditure equation are much greater. The lag in the adjustment of expenditure to a desired level is generally similar among countries, varying from four to six quarters; with the exception of one country, where the lag varies from one to two years.

Table 2-A: Khan's First Model: Import Function				
	Constant	B(t)	E(t)	IM(t)
Argentina	0.105	0.419	0.018	-0.194
		(3.34)	(4.16)	-2.47
Columbia	0.37	0.962	0.035	-0.355
		(4.19)	(2.34)	-2.17
Dominican Republic	0.019	0.607	0.093	-0.623
		(4.36)	(6.58)	-7.04
India	3.077	-0.327	0.045	-0.746
		(0.90)	(3.70)	-4.12
Mexico	0.003	0.841	0.013	-0.368
		(5.94)	(3.30)	-5.15
Pakistan	0.3	0.798	0.015	-0.269
		(4.88)	(2.18)	-3.42
Peru	0.353	0.98	0.037	-0.164
		(7.32)	(2.86)	-1.76
Philippines	-1.136	0.789	0.107	-0.536
		(2.44)	(5.45)	-4.35
Thailand	0.001	0.263	0.069	-0.419
		(4.07)	(3.02)	-3.53
Turkey	0.001	0.259	0.019	-0.296
		(2.04)	(2.37)	-3.23
The numbers in parenthesis are t-statistics				

Table 2-B: Khan's First Model: Export Function			
	Constant	Y(t)	X(t)
Argentina	0.147	0.087	-0.569
		(4.77)	-3.92
Columbia	0.202	0.061	-0.31
		(2.05)	-1.32
Dominican Republic	0.069	0.054	-0.385
		(2.03)	-3.22
India	0.068	0.028	-0.258
		(5.64)	-3.52
Mexico	0.003	0.019	-0.27
		(2.73)	-2.64
Pakistan	0.483	0.035	-0.418
		(6.51)	-5.6
Peru	0.198	0.136	-0.333
		(4.16)	-3.06
Philippines	0.775	0.209	-0.712
		(5.81)	-4.82
Thailand	0.001	0.029	-0.126
		(0.87)	-0.82
Turkey	0.001	0.043	-0.37
		(5.15)	-4.31
The numbers in parenthesis are t-statistics.			

Table 2-C: Khan's First Model: Expenditure Function				
	Constant	$M^s(t)$	Y(t)	E(t)
Argentina	0.305	1.697	0.031	-0.842
		(41.18)	(0.36)	-29.33
Columbia	0.177	1.387	0.816	-0.748
		(6.34)	(3.18)	-7.13
Dominican Republic	0.054	1.232	1.364	-0.764
		(5.21)	(2.72)	-8.87
India	3.262	1.915	0.292	-0.991
		(17.53)	(2.43)	-21.17
Mexico	0.001	2.025	0.072	-0.983
		(9.46)	(0.27)	-10.14
Pakistan	1.397	0.897	0.698	-0.519
		(3.02)	(2.42)	-4.01
Peru	1.182	1.505	1.993	-0.927
		(3.19)	(7.10)	-3.64
Philippines	0.021	1.492	0.328	-0.742
		(10.67)	(1.57)	-9.48
Thailand	0.004	1.359	0.269	-0.629
		(9.20)	(1.75)	-9.19
Turkey	0.002	2.155	-0.196	-1.013
		(13.63)	(1.29)	-18.62
The numbers in parenthesis are t-statistics.				

Simulations show that Khan's (1977) first model is able to explain the behavior of the balance of payments and income in a satisfactory manner for a wide variety of countries.

The second model developed by Khan (1976), which is applied to Venezuela, is also concerned with the short-run implications of the monetary approach. The results are very encouraging for the monetary approach, as the model

is able to explain a great deal of the quarterly fluctuations in the balance of payments for Venezuela during the period 1968-73.

The model is concerned with the short-run implications of the monetary approach. In this framework, an excess supply of real money balances leads to an excess demand for goods and financial assets, which in turn changes domestic prices and interest rates; this leads to disequilibrium in the foreign exchange market and the balance of payments. The model decomposes the balance of payments into the trade and capital accounts, which permits a simultaneous study of the behavior of the individual accounts rather than simply the trade account or the overall balance of payments.

The model contains seven stochastic equations determining the following variables: real imports, real expenditures, the rate of inflation, the currency to deposit ratio, the domestic rate of interest, short-term capital flows, and the excess reserves to deposits ratio of the commercial banks. There are also four identities defining real income, the change in international reserves, the stock of money, and the stock of high-powered money. Each of these equations is discussed below.

a. Real Imports: The real value of imports is specified as a linear function of the level of real expenditures on all goods, E, and the ratio of import prices, PIM, to domestic prices, P:

$$[IM(t)/PIM(t)] = a_0 + a_1.[PIM(t)/P(t)] + a_2.[E(t)/P(t)] + u_1(t) \quad a_1<0, a_2>0 \quad (31)$$

The variable u_1 is a random error term and has the classic properties. Khan (1976) introduces real expenditures as an explanatory variable rather than the more commonly used demand variable, real income. His reasoning behind this formulation is that demand for foreign goods (imports) should properly be related to domestic demand for all goods rather than to domestic demand for domestic goods plus foreign demand for domestic goods (exports). The use of real income would involve the latter. Import prices are treated as exogenous to the model, since Venezuela is a small country with a fixed exchange rate.

b. Real Expenditures: Real expenditures are defined as equal to real income less the level of the flow demand for real money balances, F:

$$[E(t)/P(t)] = [Y(t)/P(t)] – F(t) \quad (32)$$

where Y is the level of nominal income. The flow demand for money is assumed to be a proportional function of the stock excess demand for real money balances:

$$F(t) = a.\{[M^d(t)/P(t)] - [M(t)/P(t)]\} \qquad 0<a<1 \qquad (33)$$

where M is the stock of nominal broad money balances and M^d refers to nominal money demand. The stock demand for real money balances is specified as a linear function of real income and rate of interest:

$$[M^d(t)/P(t)] = a_3 + a_4.[Y(t)/P(t)] + a_5.i_{vz}(t) \qquad a_4>0, a_5<0 \qquad (34)$$

where i_{vz} is the short-term rate of interest in Venezuela. Substituting equations (33) and (34) into (32), yields the following equation:

$$[E(t)/P(t)] = -a.a_3 + (1-a.a_4).[Y(t)/P(t)] - a.a_5.i_{vz}(t) + a.[M(t)/P(t)] + u_2(t)$$
$$(1-a.a_4)>0, a.a_5<0, a>0 \qquad (35)$$

where u_2 is a stochastic random error term.

    c. Rate of Inflation: The rate of inflation is assumed to be equal to the "expected" rate of inflation plus a function of the general level of excess demand in the economy and the proportionate rate of change of import prices. Khan (1976) represents this general level of excess demand by the difference between expected, or "permanent" real income and actual real income:

$$[DP(t)/P(t)] = a_6 + a_7.\{Y_P(t) - [Y(t)/P(t)]\} + a_8.EIP(t) + a_9.[DPIM(t)/PIM(t)] + u_3(t) \qquad (36)$$

where Y_P is the level of permanent real income and EIP is the expected rate of inflation, and u_3 is a random error term. The estimated parameters are expected to carry the following signs:

$$a_7<0, a_8=1, a_9>0$$

    Permanent real income and the expected rate of inflation are generated by an adaptive expectation model and then used in estimation.

d. Currency to Deposit Ratio: The ratio of currency to the deposit liabilities of commercial banks is specified as a negative function of the opportunity cost of holding currency, as measured by the domestic interest rate, and as a negative function of the level of income, since individuals and corporations tend to become more efficient in their management of cash balances as their income rises:

$$CDR(t) = a_{10} + a_{11}.i_{vz}(t) + a_{12}.Y(t) + u_4(t) \quad a_{11}<0, a_{12}<0 \quad (37)$$

where CDR is the ratio of currency to total private deposits at commercial banks, and u_4 is the error term.

e. Rate of Interest: Khan's (1976) equation for the determination of the rate of interest is obtained simply by solving the equation for the demand for real money balances, equation (34), for i_{vz}:

$$i_{vz}(t) = a_{13} + a_{14}.[Y(t)/P(t)] + a_{15}.[M(t)/P(t)] + u_5(t) \quad (38)$$

where $a_{13} = a_3/a_5$, $a_{14} = a_4/a_5$, $a_{15} = 1/a_5$. Since $a_4>0$ and $a_5>0$, then $a_{14}>0$, and $a_{15}<0$.

f. Short-Term Capital Flows: Khan (1976) assumes private short-term capital flows, *D*K, are a linear function of the change in the rate of interest in Venezuela and the change in the foreign interest rate. He argues that since most capital flows take place between Venezuela and the United States, the foreign rate is taken to be the U.S. rate, i_{us}. As there were substantial speculative inflows to Venezuela in December 1971, there is a dummy variable, DU, for the fourth quarter of 1971:

$$DK(t) = a_{16} + a_{17}.Di_{vz}(t) + a_{18}.Di_{us}(t) + a_{19}.DU + u_6(t) \quad a_{18}<0, a_{19}>0 \quad (39)$$

where u_6 is a random error term.

g. Ratio of Excess Reserves to Deposits: The ratio of excess reserves of commercial banks to their total deposits liabilities, ER, is specified as a linear function of the rate of interest. As the rate of interest rises, the opportunity cost of holding reserves in the form of non-income yielding assets rises, and commercial banks can be expected to lower their demand:

$$DER(t) = a_{20} + a_{21}.i_{vz}(t) + u_7(t) \qquad a_{21}<0 \qquad\qquad (40)$$

where u_7 is a random error term. As the commercial banks may adjust this ratio to the desired level, DER, with a lag, an adjustment function is assumed:

$$DER(t) = F.[DER(t) - ER(t-1)] \qquad 0<F<1 \qquad\qquad (41)$$

Substituting (40) into (41) and solving for ER, the estimating equation is obtained:

$$ER(t) = F.a_{20} + F.a_{21}.i_{vz}(t) + (1-F).ER(t-1) + F.u_7(t) \qquad\qquad (42)$$

h. Real Income: The level of real income is equal to real private expenditure plus the real value of exports less the real value of imports:

$$[Y(t)/P(t)] = [E(t)/P(t)] + [X(t)/PX(t)] - [IM(t)/PIM(t)] \qquad\qquad (43)$$

where PX is the price of exports, and both X and PX are assumed to be exogenous to the model.

i. Balance of Payments: The balance of payments, BP, is equal to the current account balance of the non-petroleum sector plus that of the petroleum sector, plus short-term capital flows, plus a residual item, COB, which includes long-term capital flows, government capital flows, etc.:

$$BP(t) = DR(t) = X(t) - IM(t) + [XOIL(t) - IMOIL(t)] + DK(t) + COB(t) \qquad\qquad (44)$$

where (XOIL – IMOIL) is the current account balance of the petroleum sector. The variables (XOIL – IMOIL) and COB are assumed to be exogenously determined.

j. Money Supply: The nominal stock of money is determined by the following non-linear identity:

$$M(t) = [(1 + CDR)/(CDR + ER + RRR)].H(t) \qquad\qquad (45)$$

The expression within the brackets is the money multiplier and H is the stock of high-powered money. RRR is the proportion of total required reserves to total deposit liabilities of commercial banks, and this ratio is assumed to be under the

influence of the monetary authorities as it can be altered by manipulating various legal reserve ratios.

k. High-Powered Money: The stock of high-powered money is equal to the stock of international reserves and the domestic asset holdings of the central bank:

$$H(t) = R(t) + D(t) \tag{46}$$

D, along with RRR, represent monetary policy variables.

l. Results: Since the data are not seasonally adjusted, seasonal dummies (S1, S2, and S3) for the first three quarters are introduced into each equation. The method of estimation is two-stage least squares. Table 3 shows the estimated values of the parameters for each of the seven equations with "t-values" in parenthesis.

Table 3: Khan's Second Model: Structural Equation Estimates

(IM/PIM) = 2.046 – 2.287 (PIM/P) + 0.062 (E/P) + 0.011 S_1 – 0.165 S_2 + 0.0283 S_3
  (0.97) (2.05)   (10.74)   (0.17)   (2.51)   (0.42)
  adjusted R-squared = 0.871   D-W = 2.14

(E/P) = 0.069 + 0.027 i_{vz} + 0.849 (Y/P) + 0.744 (M/P) + 0.187 S_1 – 0.366 S_2 – 0.481S_3
  (0.06)   (0.98)   (9.07)   (2.06)   (0.76)   (2.20) (2.72)
  adjusted R-squared = 0.996   D-W = 2.51

(DP/P) = 0.001 – 0.004 [Y_P - (Y/P)] + 1.062 EIP – 0.70 (DPIM/PIM) – 0.001 S_1 – 0.001 S_2 – 0.001 S_3
  (2.92)   (4.37)   (10.42)   (1.12)   (0.70)   (2.85)   (2.78)
  adjusted R-squared = 0.998   D-W = 1.71

CDR = 0.397 – 0.009 i_{vz} – 0.003 Y + 0.021 S_1 + 0.005 S_2 – 0.003 S_3
  (21.45) (3.95)   (15.17) (7.15)   (1.77)   (0.97)
  adjusted R-squared = 0.962   D-W = 1.56

i_{vz} = 3.982 – 1.410 (M/P) + 0.295 (Y/P) + 0.473 S_1 + 0.196 S_2 + 0.547 S_3
  (2.22)   (1.98)   (2.21)   (1.10)   (0.60)   (1.38)
  adjusted R-squared = 0.585   D-W = 1.83

DK = -0.025 + 0.005 i_{vz} – 0.016 i_{us} – 0.096 DU + 0.044 S_1 – 0.031 S_2 + 0.028 S_3
  (1.35)   (2.08)   (1.91)   (1.97)   (1.62)   (1.18)   (1.20)
  adjusted R-squared = 0.256   D-W = 2.52

ER(t) = 0.019 – 0.001 i_{vz} + 0.582 EB(t-1) + 0.001 S_1 + 0.013 S_2 + 0.003 S_3
  (1.65)   (2.16)   (3.10)   (0.09)   (2.57)   (0.70)
  adjusted R-squared = 0.681   D-W = 1.91

The numbers in parenthesis are t-statistics.

In the import function, both explanatory variables have coefficients with the expected sign, and these coefficients are significantly different from zero at the 5 percent level. The equation appears to be well specified, with a fairly high coefficient of determination and no significant auto-correlation. There is the possibility, of course, that the good fit of the equation is due in part to real imports and real expenditures following a common time trend. For this reason Khan (1976) estimated the equation in first difference form as well. Its results are reported by equation (47):

$$D[IM(t)/PIM(t)] = -0.781 + 2.446 \ D[PIM(t)/P(t)] + 0.019 \ D[E(t)/P(t)]$$
$$(1.30) \qquad (0.64) \qquad\qquad (2.64)$$
$$+ 0.009 \ S_1 + 0.099 \ S_2 + 0.013 \ S_3$$
$$(0.31) \qquad (1.31) \quad (0.41)$$

$$\text{adjusted R-squared} = 0.179, \ \text{D-W} = 3.11 \qquad\qquad (47)$$

The fit of the import function is substantially reduced when the variables are transformed into first-difference form. The coefficient of relative prices has an incorrect positive sign and is not significantly different from zero. The coefficient of real expenditures, though significant, is much reduced in size. On the face of it, the estimates in equation (47) would tend to support the hypothesis that real imports and real expenditures are only spuriously correlated. However, there is another plausible explanation for the relatively poor results obtained in (47) compared to the import equation estimated in terms of levels as reported in Table 3. If the original errors are independent, first differencing introduces negative auto-correlation into the model, and this biases both the estimated standard errors of the coefficients and the coefficient of determination (Granger and Newbold, 1974). Judging by the value of the D-W statistic, the errors in equation (47) do have significant negative auto-correlation in them. Although negative serial correlation probably is not as serious as positive serial correlation (Granger and Newbold, 1974).

All three estimated coefficients in the equation for real expenditure (in Table 3) have the expected signs. However, the estimated coefficient of the interest rate is not significantly different from zero at the 5 percent level. This could be a result of the fairly high degree of correlation between the interest rate and the stock of real money balances. Both real income and real money balances have a positive impact on real expenditures, and the coefficients are significantly different from zero at the 5 percent level.

Summarizing these structural equation results, it can be observed that all but two of the economically meaningful parameters have the correct signs and are significantly different from zero at the 10 percent level. Most of the structural equations appear with a general absence of auto-correlation and a high coefficient of determination.

Khan (1976) conducts simulation experiments in order to determine the tracking ability of the model, and to see what the response of the model is to shocks. The overall performance is good, but the results have to be viewed with some caution due to the deficiencies mentioned above.

Charles Schotta's (1966) study, "sketches two extreme variants of a short-run model for the prediction of changes in money national income in Mexico." (Schotta, 1966). The monetary and Keynesian models are compared. This type of analysis is followed by others (Baker and Falero, 1971, and LeRoy Taylor, 1972).

In building his monetary model, Schotta (1966) starts with a short-run theoretical model as suggested by Prais (1961), but he reasons that, "Since the data used for estimation are annual data, it has been assumed that the equilibrium in the money markets exists at all times." (Schotta, 1966).The model is specified with four definitional equations, three structural equations, and one that defines equilibrium in the money market. They are described by equations (48) through (55):

$$DM^d = a_1 + k.DY + u_1 \tag{48}$$
$$DM^s = a_2 + a_3.BT + a_4.DLK + a_5.GD + u_2 \tag{49}$$
$$DM^d = DM^s \tag{50}$$
$$BT = X - IM \tag{51}$$
$$IM = a_6 + a_7.Y + u_3 \tag{52}$$
$$X = X(t) \tag{53}$$
$$DLK = DLK(t) \tag{54}$$
$$GD = GD(t) \tag{55}$$

where LK is long-term liabilities to foreigners, and GD is the government cash deficit. The explanation of equations are as follows: Equation (48) is a money demand equation in which the demand for money (or the change in the demand for money) is some constant fraction of money national income (or the change in money national income). Equation (49) is a money supply equation, stating that the change in the money supply is some fraction of the current account, BT, the long-term capital inflow, DLK, and the federal government cash deficit, GD. Equation (50) defines equilibrium in the money market and is assumed to hold continuously.

Equation (51) defines the current account balance, while equation (52) states that imports are a simple function of money income. Equations (53), (54), and (55) define exports, the change in long-term liabilities to foreigners, and the cash deficit as exogenous.

Schotta (1966) estimates the model for Mexico using the ordinary least squares technique for the 1937-63 period. The results are reported below, and the numbers in parenthesis are the standard errors of the estimated coefficients.

$$DM^d = 0.40 + 0.80 \, DY \tag{56}$$
$$(0.003)$$
R-squared = 0.31, D-W = 1.37
$$DM = 0.50 + 0.32 \, BT + 0.47 \, DLK - 0.82 \, GD \tag{57}$$
$$(0.13) \quad (0.12) \quad\quad (0.32)$$
R-squared = 0.60, D-W = 1.65
$$IM = -1.06 + 0.19 \, Y \tag{58}$$
$$(0.005)$$
R-squared = 0.98, D-W = 1.68

All the coefficients are significantly different from zero at the 5 percent level, except for the government cash deficit. The values of D-W statistic lie above the upper bound for the critical value at the 1 percent level; hence, the hypothesis of positive auto-correlation may be rejected for the three structural equations.

Schotta (1966) combines equations (48) and (49) to form the money multiplier of the external variables on the money national income. When the resultant equation was estimated, equation (59) was obtained. He also combines equation (56) and (57) to obtain equation (60):

$$DY = 3.32 + 2.45 \, BT + 4.96 \, DLK \tag{59}$$
$$(0.77) \quad\quad (0.81)$$
R-squared = 0.70, D-W = 1.72
$$DY = 1.3 + 4.0 \, BT + 5.09 \, DLK \tag{60}$$

He then tests the hypothesis of equality of the regression coefficients of equation (59) with corresponding parameters in equation (60), at the 5 percent level. The null hypothesis of a significant difference is rejected in each case.

Schotta's (1966) Keynesian model is:

$$Y = C + I + G + X - IM \tag{61}$$
$$C = c.Y_d \tag{62}$$
$$Y_d = Y - T \tag{63}$$
$$T = g.Y \tag{64}$$
$$IM = m.Y \tag{65}$$
$$I = I(t) \tag{66}$$
$$G = G(t) \tag{67}$$
$$X = X(t) \tag{68}$$

where Y_d is disposable income. Equation (61) defines income. Equation (62) gives consumption as a function of disposable income. Equation (63) defines disposable income as the income left after taxes are paid. Equation (64) gives the tax structure. Equation (65) shows that the value of imports is determined by the level of nominal income. The last three equations show that investment, government expenditure, and exports are exogenous.

He solves the above system for income to yield:

$$DY = \{1/[1-c(1-g) + m]\}.(DI + DX + DG) \tag{69}$$

and this multiplier formulation is then estimated to test the explanatory power of the Keynesian model.

In order to test the explanatory power of the model, Schotta (1966) estimates structural equations (62), (64), and (65), so that the values for the parameters for the multiplier equation (69) may be determined.

$$C = 1.69 + 0.87 \, Y_d \tag{70}$$
$$(0.05)$$
R-squared = 0.99, D-W = 1.07
$$T = 0.17 + 0.07 \, Y \tag{71}$$
$$(0.002)$$
R-squared = 0.98, D-W = 0.80

Positive auto-correlation may be present in equation (70), since the value for D-W statistic lies between the upper and lower bounds for the critical value at the 1 percent level; the hypothesis of positive auto-correlation cannot be rejected for equation (71) at the same level. He uses the marginal propensity to import which

was estimated in equation (58), together with other parameters from equation (70) and (71), to form the multiplier for changes in money national income:

$$DY = 2.63 \ (DI + DG + DX) \tag{72}$$

When the exogenous variables are regressed against income, all in first difference form, one should expect that the regression coefficients would each be equal to the value of the multiplier and to each other.

$$DY = 2.55 + 0.72 \ DI + 3.37 \ DG + 0.96 \ DX \tag{73}$$
$$(1.55) \quad (2.48) \quad (0.97)$$
R-squared = 0.50, D-W = 2.09

The hypothesis of the investment multiplier being different from zero cannot be rejected at the 5 percent level of significance. Multi-collinearity is present, and when correlation between variables was checked, it was confirmed. When DY is regressed on DI, the results are:

$$DY = 2.98 + 2.73 \ DI \tag{74}$$
$$(0.74)$$
R-squared = 0.44, D-W = 2.04

When the null hypothesis that the regression coefficient in equation (74) is not equal to 2.63 is tested, it is rejected at the 5 percent level. Positive auto-correlation is not present when the D-W statistic is tested at the 1 percent level.

Statistically, the multiplier theory explains between 44 and 50 percent of the variance of money national income in Mexico, in contrast to the 70 percent of the variance explained by the monetary model. The comparison suggests that the monetary model is likely to be a better predictor of changes in income and prices in Mexico than the income level. The final conclusion is that a composite model is probably the most fruitful approach.

At this point a few comments on the short-run approach are in order. These comments are divided into two categories – the specification and the estimation of the model.

 a. Specification of the Model: Short-run monetary models are based on an adjustment process in which an excess supply of real money balances results in increased expenditures on goods and services in general, and imports in particular. There are a few points that are overlooked in these short-run models. In order to demonstrate these points, let us start with the simpler case where only commodity and money markets are considered. In this case, an excess supply of real money balances spills over to the commodity market and results in excess demand for commodities. If so, then presumably both exports and imports are affected so that imports increase and exports decrease. In the specification of the existing empirical short-run models, this point is usually ignored, and exports are assumed to be either exogenous or determined by factors other than the excess supply of real money balances. It may be argued that if countries specialize in the production and export of one or, at most, a few commodities, their exports are not substantially affected by disequilibrium in their domestic money market. This explanation, of course, applies to those countries where domestic demand for exportables is not elastic; it is not, however, applicable to other countries where domestic consumption of exportables is significant.

 In the more general case, where the model includes commodities, money, and bonds, the excess supply of real money balances also spills over into the bond market. On this basis, one should expect capital flows to be affected by the excess supply of real money balances. In the specification of the short-run empirical models, capital flows are either not considered, or when considered they are determined by levels or changes in rates of interest. The models of Rhomberg (1977) and Schotta (1966), and Khan's (1977) first model are examples of the first case. Their reasoning may be defended on the grounds that there is no developed capital market in the countries under consideration, which are mostly under-developed countries. Khan's (1976) second model is an example of the second case.

 In the specification of some of the models that are made for short-run analysis, and therefore for consideration of disequilibrium and the adjustment process, one encounters the assumption of equilibrium in the money market. Some models make this assumption at the estimation stage of the analysis, i.e., a short-run disequilibrium model is set up, but a long-run equilibrium model is actually estimated. Others keep the assumption of monetary equilibrium at both the model-building and estimation stages of the analysis. Charles Schotta's (1966) model is an example of keeping the assumption of monetary equilibrium throughout the analysis. The second model presented and estimated by M.S. Khan (1976), is an example of dropping monetary disequilibrium just before estimation. If the model

is carefully analyzed, the adjustment process in Khan's (1976) second model is assumed to take place through disequilibrium in the money market, as summarized in the expenditure equation, equation (37), and yet, at the same time, the interest rate is determined through equilibrium in the money market, as specified by equation (40).

b. Estimation of the Model: Estimation of the models is mostly done in levels. In economic time series analysis, where variables are often highly correlated, regression analysis undertaken in terms of levels may generate spurious correlation. Also, the high degree of collinearity between explanatory variables makes statistical inference difficult. In such a case it is advisable to filter the data so that the variables approximate "white noise." In most cases, first differences are adequate (Granger and Newbold, 1974).

The positive relationship between expenditures and imports in the expenditure function is consistent with other behavioral relationships. For convenience, expenditure equations of previous empirical studies are repeated here. Rhomberg (1977) specifies the following expenditure function, which is equation (11), mentioned earlier.

$$E(t) = a_0 + a_1.Y(t) + a_2.Y(t-1) + a_3.\{[L(t-1) + L(t-2)]/2 - k.Y(t)\}$$

Khan (1977), in his first model, uses the following two expenditure functions, where the second one is the transformed version of the first one. These were previously denoted as equations (25) and (27) in Khan's (1977) Model:

$$ED(t) = c_0 + c_1.M^s(t) + c_2.Y(t) + u_4(t) \qquad c_1>0, c_2>0$$
$$D[E(t)] = C.c_0 + C.c_1.M^s(t) + C.c_2.Y(t) - C.E(t) + C.u_4(t)$$

Khan (1976), in his second model, uses the following real expenditure function, denoted as equation (35) previously.

$$[E(t)/P(t)] = -a.a_3 + (1-a.a_4).[Y(t)/P(t)] - a.a_5.i_{vz}(t) + a.[M(t)/P(t)] + u_2(t)$$
$$(1-a.a_4)>0, a.a_5<0, a>0$$

The positive relationship between expenditures and money is also consistent with the demand for real money balances. It is known that level of expenditure is one of the determinants of the real money balances, i.e., the transaction demand for money. On this basis a positive relationship between money demand and expenditure is

implied, which is consistent with the expenditure equations listed above. So, a significant positive relationship between expenditure and money may be due to other behavioral relationships.

The positive relationship between expenditure and income is quite predictable on a purely accounting basis. If variations in net exports are relatively low, then expenditure constitutes a good proxy for income through the national income accounting identity. In this respect a positive relationship between income and expenditures is expected. So, it may be argued that a significant positive coefficient for income in the above expenditure functions may give undue support to the specification of the expenditure equations. If the variance of the excess of exports over imports is small relative to the variance of real expenditures, a strong relationship between (real) income and (real) expenditure exists because expenditure is the main component of income, through the income identity, $Y = E + X - IM$.

This paper provided a review of the seminal short-run empirical research on the monetary approach to the balance of payments with a comprehensive reference guide to the literature. The paper reviewed the three major alternative theories of balance of payments adjustments. These theories were the elasticities and absorption approaches (associated with Keynesian theory), and the monetary approach. In the elasticities and absorption approaches the focus of attention was on the trade balance with unemployed resources. The elasticities approach emphasized the role of the relative prices (or exchange rate) in balance of payments adjustments by considering imports and exports as being dependent on relative prices (through the exchange rate). The absorption approach emphasized the role of income (or expenditure) in balance of payments adjustments by considering the change in expenditure relative to income resulting from a change in exports and/or imports. In the monetary approach, on the other hand, the focus of attention was on the balance of payments (or the money account) with full employment. The monetary approach emphasized the role of the demand for and supply of money in the economy. The paper focused on the monetary approach to balance of payments and reviewed the seminal short-run empirical work on the monetary approach to balance of payments. Throughout, the paper provided a comprehensive set of references corresponding to each point discussed. Together, these references would exhaust the existing short-run research on the monetary approach to balance of payments.

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APPENDIX 1

This is a comprehensive list of references which have estimated either the "reserve flow equation" or the "exchange market pressure equation."

Aghevli and Khan (1977), Akhtar (1986), Akhtar, Putnam, and Wilford (1979), Arize, Grivoyannis, Kallianiotis, and Melindretos (2000), Asheghian (1985), Bean (1976), Beladi, Biswas, and Tribedy (1986), Bhatia (1982), Bilquees (1989), Blejer (1979), Bourne (1989), Boyer (1979), Brissimis and Leventakis (1984), Burdekin and Burkett (1990), Burkett, Ramirez, and Wohar (1987), Burkett and Richards (1993), Civcir and Parikh (1992), Cobham (1983), Connolly (1985), Connolly and Da Silveira (1979), Connolly and Taylor (1976, 1979), Coppin (1994), Costa Fernandes (1990), Courchene and Singh (1976), Cox (1978), Cox and Wilford (1976), Farhadian and Dunn, Jr. (1986), Feige and Johannes (1981), Fontana (1998), Frenkel, Gylfason, and Helliwell (1980), Genberg (1976), Girton and Roper (1977), Grubel and Ryan (1979), Guitian (1976), Gupta (1984), Hacche and Townend (1981), Hodgson and Schneck (1981), Ibrahim and Williams (1978), Jager (1978), Jayaraman (1993), Jimoh (1990), Johannes (1981), Joyce and Kamas (1985), Kamas (1986), Kemp and Wilford (1979), Kenneally and Finn (1985), Kenneally and Nhan (1986), Khan (1973, 1990), Killick and Mwega (1993), Kim (1985), Laney (1979), Lee and Wohar (1991), Leiderman (1980), Leon (1988), Looney (1991), Luan and Miller (1979), Mah (1991), McCloskey and Zecher (1976), McNown and Wallace (1977), Miller (1978), Modeste (1981), Pentecost, Van Mooydonk, and Van Poeck (2001), Phaup and Kusinitz (1977), Putnam and Wilford (1986), Rasulo and Wilford (1980), Roper and Turnovsky (1980), Sargen (1975, 1977), Sheehey (1980), Sohrab-Uddin (1985), Sommariva and Tullio (1988), Spanos and Taylor (1984), Taylor, M.P. (1987a, 1987b), Thornton (1995), Tullio (1979, 1981), Watson (1988, 1990), Weymark (1995), Wilford (1977), Wilford and Wilford (1977, 1978), Wilford and Zecher (1979), Wohar and Burkett (1989), Wohar and Lee (1992), and Zecher (1974).

APPENDIX 2

This is a comprehensive list of references which have estimated the "capital flow equation."

Argy and Kouri (1974), Artus (1976), Brunner (1973), Darby (1980), De Grauwe (1975), Fratiani (1976), Herring and Marston (1977), Hodjera (1976), Kouri (1975), Kouri and Porter (1972, 1974), Kulkarni (1985), Laskar (1981, 1982), Luan and Miller (1979), Murray (1978), Neuman (1978), Obstfeld (1980, 1982), Porter (1972, 1974), and Stockman (1979).

APPENDIX 3

This is a comprehensive list of references which have estimated a short-run model in the tradition of the monetary approach to balance of payments.

Agenor (1990), Aghevli (1975, 1977), Aghevli and Khan (1980), Aghelvi and Sassanpour (1982), Akhtar (1986), Ardito Barletta, Blejer, and Landau (1983), Argy (1969), Baker and Falero (1971), Bergstrom and Wymer (1976), Blejer (1977, 1983), Blejer and Fernandez (1975, 1978, 1980), Blejer, Khan, and Masson (1995), Blejer and Leiderman (1981), Bonitsis and Malindretos (2000), Borts and Hanson (1977), Brissimis and Leventakis (1984), Cheng and Sargen (1975), De Silva (1977), Dornbusch (1973a), Fleming and Boissonneault (1961), Franco (1979), Guitian (1973), Horne (1979, 1981), International Monetary Fund (1977, 1987, 1996), Jonson (1976), Jonson and Kierzkowski (1975), Kanesathasan (1961), Khan (1974, 1976, 1977), Khan and Knight (1981), Kieran (1970), Knight and Mathieson (1979, 1983), Knight and Wymer (1976, 1978), Knoester and Van Sinderen (1985), Lachman (1975), Laidler (1975), Laidler, Bentley, Johnson, and Johnson (1981), Laidler and O'Shea (1980), Leon and Molana (1987), Leventakis (1984), Levy (1981), Miller (1980), Miller and Askin (1976), Mussa (1974), Myhrman (1976), Otani and Park (1976), Parikh (1993), Parkin (1974a, 1974b), Polak (1957, 1998), Polak and Argy (1971), Polak and Boissonneault (1960), Prais (1961), Rhomberg (1977), Rodriguez (1976), Sassanpour and Sheen (1984), Schotta (1966), Spinelli (1983), Taylor, L. (1972), Taylor, M.P. (1986), Teal and Giwa (1985), Vaez-Zadeh (1989), Wallich (1950), Wilford (1977), and Yusoff (1988).

GOLDILOCKS REBATES: COMPLYING WITH GOVERNMENT WISHES ONLY WHEN REBATE AMOUNT IS "JUST RIGHT"

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ABSTRACT

While tax rate policy decisions are sometimes made to affect the economy in some specific way, the empirical evidence surrounding whether federal income tax refunds predominantly stimulate consumer spending or saving remains contradictory. This study attempts to combine income tax research findings with research on mental accounting, to determine if an explicit statement of how the government would prefer a refund to be used is effective in influencing taxpayers' intended use of their refunds, controlling for the refund's timing. The authors developed and administered an experiment, using college students as subjects, to test whether tax refunds with a stated government preference for spending or saving will be used. The study also explores the types of saving, consuming and investing (including the payment of credit cards vs. investments in securities, and the amount spent on durable goods vs. monthly expenditures) that result from refunds of different sizes under both a lump sum and a monthly distribution pattern, given different government preferences. A within subjects experiment of spending decisions was used, and ANOVA results confirm that government direction has only a very limited but significant effect on taxpayer spending and saving choices. Conformance with government preference appeared only in a "sweet spot" of rebate levels that is not too high in amount and not too low. This pattern would make sense where the friction costs of conforming with government preferences is viewed as relatively high for low rebate amounts - outweighing the benefits, as in the case of all (smaller) monthly rebated amounts and in this case, the $300/year amount.

In 2008, the President and Congress enacted rebate legislation for the purpose of stimulating the economy with instructions for taxpayers to spend those refunds. To

validate our initial findings, a second instrument was disseminated to test how taxpayers spent their actual lump-sum rebate checks. The same pattern was observed in the spending the actual rebates as predicted by the experimental study, supporting those experimental findings.

INTRODUCTION

Tax refunds and rate reductions are a political mainstay, and are often justified as a means to increase savings or stimulate the economy (increase spending). Consequently, it is important to know whether and how the stated government intent affects spending versus saving, if at all. The evidence of whether tax refunds predominantly stimulate consumer spending or investment/saving in general is contradictory per Slemrod (2004), and may be affected by whether the refund is delivered as a lump sum or pro-rated monthly through e.g., reduced withholding tables (Chambers and Spencer, 2007 and 2008). This paper examines how closely taxpayers follow the government's stated objective of increasing savings or stimulating the economy through additional spending at four levels of tax rebates: $300, $600 $1,500 and $3,000. Additionally, this study explores the types of investment/saving and spending that result from refunds under both sets of government directions, controlling for the timing of the distribution.

LITERATURE REVIEW

In making tax cuts, presidents have predicted how those cuts would affect the economy. For example, George W. Bush (2001) defended his tax cut proposal, saying "In the short-term, the American consumer needs a hand… (with) credit card debt." Yet, there are few studies to determine whether government direction actually affects taxpayers use or timing of tax cuts and refunds. Slemrod and Bakija (2004) posited that "the degree to which people spend any increase in their after-tax incomes depends heavily on their perceptions of the state of the economy (and) cast doubt on the effectiveness of even persistent tax cuts as recession-fighting measures" (pp. 102-103).

Timing of tax distributions might also affect the amount spent vs. saved. Per Shapiro and Slemrod (1995), almost half the taxpayers receiving the George H. W. Bush 1992 decrease in tax withholding tables expected to spend most of the extra money immediately. This particular rebate changed the amount of federal individual income taxes withheld from paychecks, but the total yearly tax liability was unaffected. Hence, the extra money taken home was later due or reduced the year-end refund when

the tax return was filed. Economic theory leads us to expect that no change in consumption should have resulted. However, when the 2001 tax cut came as a lump sum of about $300 - $600, only about one quarter of the taxpayers expected to spend the refunds (Shapiro and Slemrod, 2003a, 2003b*)*. Parker (1999) found that taxpayers whose salaries exceed the Social Security limit spend a significant amount of the excess when it is received rather than averaging the excess over an entire fiscal year; whereas Souleles (2002) found that taxpayers responded to the 1981 gradual tax cuts by gradually increasing their consumption. Chambers and Spencer (2007) found that those receiving a yearly refund of either $300 or $600 in a lump sum saved more of that refund than if that same yearly amount were spread out in smaller, monthly installments.

Thaler's (1999) work sheds light on this behavior by asserting that individuals use a system of "mental accounting," informally labeling funds depending on whether they result from a regular income flow or from an irregular, lump-sum windfall. O'Curry (1997) finds that people match the flow with the use to which it is put. These accounts are evaluated by what Read, Loewenstein and Rabin (1998) label "choice bracketing," which include time periods within which accounts are mentally reconciled. The relative amount of the refund might also be a factor, with poorer households tending to have shorter reconciliation periods than wealthier households. Camerer et al. (1997) find that New York taxi cab drivers have daily earnings targets, while Heath and Soll (1996) find that MBA students have a weekly meals and entertainment budget, but a monthly clothing budget. (Wealthier) physicians reconcile their budgets yearly (Rizzo and Zeckhauser 1998).

Fogel (2009, p. 12-15) tested money from various frivolous and serious sources (e.g. raffle winnings v. job earnings) and found an interaction effect between amount and source of money. At smaller amounts, the source of income did not affect spending patterns. At moderate amounts of money, frivolous sources of income led to frivolous uses (and serious sources led to serious uses). And, at the largest amounts of money those differences disappeared. When comparing the effect of the explicitness of income source labels, Fogel (2009, p. 26) found that where source labels were explicit, the means of obtaining income determined the spending. Conversely, where the source of labels were ambiguous, the amount of the income dominated spending choices, adding that "[a]mount was also important at extremely high or low values, consistent with prior evidence that large windfalls are treated differently than other income."

As for corporations, Rice (1992) found that higher profit companies had worse tax compliance than less profitable companies. If corporations, especially wealthier ones, do not obey the government laws, the author(s) posit that individuals will be lax

in adhering to the government's intended use of a tax refund. Chambers (2005) found that the self-employed or those actively seeking to be self-employed often will elect to pay required quarterly estimated taxes in smaller, more frequent amounts if given the explicit option despite foregone interest and facing the same total tax liability. The documentation of this phenomenon is impressive. However, few practical tax policy uses have been developed to capitalize on this knowledge.

In February 2008, new tax rebates were approved, with some rebates significantly larger than in past years. President Bush urged consumers to spend the funds to stimulate the economy. According to the subsequent CCH tax briefing concerning the economic stimulus package:

> Recovery rebates (technically known as "advance credit payments"), reaching as high as $600 for individuals and $1,200 for married couples, will soon be deposited or mailed to an estimated 130 million Americans…. According to Ways and Means Chair, Charles Rangel, D-NY, "This stimulus package will send critical relief to millions of lower- and middle-income families whose economic situation dictates that they have no choice but to spend the rebate check and purchase goods and services to spur our economy."

This study developed and administered a survey instrument in an attempt to determine whether an explicit statement of how the government would prefer a refund to be used is an effective method for influencing taxpayers' intended use of their refunds, controlling for demographic differences, the size of the refund and the refund's timing.

HYPOTHESIS AND RESEARCH QUESTIONS

The author(s) hypothesize that explicit government direction for the uses for the refund will not make a significant difference (the null hypothesis), at four lump-sum rates of refunds - $300, $600, $1,500 and $3,000, controlling for the timing of the distribution:

Hypothesis: *Respondents receiving a lump sum hypothetical tax refund of $300 (or $600, $1,500 or $3,000) which the government expressly wishes them to spend will not spend significantly more of the refund than those*

receiving the same lump sum amount where the government expressly wishes that the taxpayer save it.

Saving is defined as either increasing assets and/or decreasing liabilities to increase net worth, consistent with Shapiro and Slemrod (1995). Short-term saving is included as spending, because while the amount is not spent immediately, it is expected to be spent before a 12-month period has elapsed, and thus is expected to stimulate the economy at the expense of net worth. A separate analysis is run to test whether including short-term saving as saving significantly changes the results for this hypothesis. A third analysis controls for the annual amount of the refund if distributed over 12 equal monthly installments. The results of these analyses for the hypothesis are expected to be insignificant (even if positive), with the results diminishing as the size of the refund increases, consistent with Rice (1992).

Respondents in Shapiro and Slemrod's (1995) study were asked if they intended to do one of three things with their 1992 rebates: "(A) spend, (B) save, (or) (C) repay debt," without considering whether the savings will last longer than, or less than, one year. The time horizon for saving might have a broad economic effect: affecting, e.g. the supply and demand curves for the price of marketable securities. Similarly, on the spending side, a one-time purchase of durable goods is different from an increase in regular monthly purchases. Consistent with Chambers and Spencer (2007 and 2008) such differences in spending and saving decisions are studied by asking 12 research questions. Specifically, research questions 1 -12 examine the percentages of refunds applied on a yearly, and monthly, basis respectively as: (1) & (7) investing in long-term savings vehicles like certificates of deposit and debt/equity securities; (6) & (12) saving for short-term goals like a vacation; (3) & (9) paying down long-term notes payable; (2) & (8) paying down credit card debt; (4) & (10) spending for monthly bills; or (5) & (11) spending on durable goods.

METHODOLOGY

Within-subjects experimental questionnaires concerning either the $300 or $600 rebate amount were distributed to 376 university students. (See Appendix A.) An additional 88 students were given the same instrument at the $1,500 yearly level; and 96 at the $3,000 level. However, since this was materially greater than historical tax cut amounts for most taxpayers, the $1,500 and $3,000 amounts are limited in this paper to a discussion of the sensitivity of the findings of this study. Students completing the instrument received extra credit equal to about 1% of their final grade. Initially, the

instrument was distributed during the 2006-2007 academic school year. In 2007-2008, the instrument was re-distributed, and those 2007-08 data are the focus of this paper, with a comparison to the 2006-07 results when they differ significantly.

The instrument provides for not only a hypothetical refund amount (either $300 or $600) but also a statement of how the government would like the taxpayer to use that sum – to either spend or save. Roughly half of the instruments first asked how much of the lump sum refund would be: (1) invested (in stocks, bonds, savings account, etc.), (2) used to pay off credit card debt, (3) used to pay off notes (e.g. mortgage, car note), (4) used up for regular monthly expenses, (5) used to buy a durable asset (e.g. car, boat, washing machine, furniture), and (6) used to save for an infrequent yearly expense (e.g. vacation, bigger holiday gifts). Next, the respondent was asked the same six questions, but changing the timing of a refund from lump sum to a smaller *monthly* amount equal to 1/12 of the lump sum amount. The other half of the instruments reversed the order – first asking about the use of a monthly amount and then a yearly lump-sum. Reversing the order allowed for testing whether order mattered. Finally, each of the instruments controlled for demographics and perceived business experience.

ANOVA was used to analyze the hypothesis, where items 1 through 3 are saving, and items 4 through 6 are spending, and then again with short-term saving included as saving rather than spending. Research items 1 – 12 were analyzed for frequency of payment at each refund level in percentage terms and with descriptive statistics. The descriptive statistics by refund level are available on request. Then, to refine the amount of the materiality limit, a subsequent instrument using numbers between $300 and $600 was administered and analyzed.

Subsequently, the 2008 rebate was announced and distributed. A second study was then performed to survey members of the Corpus Christi community, from September through November 2008, who actually received the 2008 economic stimulus rebate, with questionnaires distributed to 203 participants. Approximately half of the respondents were university students in business, education and social science classes; most of them completed the survey in order to receive extra credit equal to about 1% of the final course grade. The other half of the respondents filled out the survey in various community venues: on their way into Sam's Club, after church services at churches in different parts of town, before and after a meeting of the local American Association of University Women branch, or at a Rotary Club meeting. Most participants were given small, token gifts for the use of their time or were offered small financial gifts for non-profit organizations of their choosing.

This second instrument (see Appendix B) asked each respondent to indicate the size of the economic stimulus rebate and the month they received it. Then they were

asked how they allocated the funds, among the same six categories used in the first questionnaire. The instrument also asked for responses to questions on their demographics and financial status. The dollar amount for each of the primary six categories was converted to a percentage of the refund, as well as aggregated into the saving and spending categories. As with the experimental group, investing and paying off credit card debt and/or notes is considered as savings (items 1 through 3), and monthly spending and purchasing durable assets as spending (items 4 and 5). In the first analysis, saving for an infrequent expense (item 6) is added to savings. However, because it is only short-term savings, stimulating the economy by the end of the year, the analysis is run a second time to include it as spending instead of saving; in that second analysis "savings" indicates "long-term savings."

RESULTS AND DISCUSSION

The instrument was administered to 376 experimental respondents (after 13 invalid responses). These respondents averaged 3.4 years of business experience and some college education. Students perceived themselves to have moderate business experience. The amount of Adjusted Gross Income (AGI) was a significant factor when focusing on those with a non-zero AGI, but not significant when including those with zero AGI. The size of the effect for income earners only was very small (0.0003). No other control variables were found to be significant.

Surprisingly, the null hypothesis was rejected (we had predicted it would be accepted at all levels of refund), but only at one level of hypothetical lump sum refund amount, $600. To validate these findings, a second instrument was disseminated to test how taxpayers spent their actual 2008 economic stimulus lump-sum rebate checks. The same pattern was observed in the spending the actual rebates as predicted by the experimental study, supporting those experimental findings. These results are consistent with Fogel (2009), whose research indicated a spending pattern of windfall funds at moderate amounts that differed from spending at extremely high or low amounts.

When this instrument was first administered during the 2006-2007 academic year, similar, significant results were shown, but at the $300/year level *only* (Chambers & Spencer, 2007). That is, the experimental results appear to have been stable over both administrations of the instrument; however the *amount* at which significant compliance occurred shifted. Two major economic events occurred between the first and second administrations of the instrument that may make the consolidation of the results unwise: a significant jump in inflation - and in particular energy prices and food - was occurring, and an actual lump-sum tax rebate of similar amounts was declared, adding immediate

external validity to this instrument. Perhaps the inflation, and/or the looming reality of the rebate, accounts for this shift, but this is a matter for further study.

As with Shapiro and Slemrod's (2003a) study, most of a lump sum refund of $300 or $600 would have been saved, not spent. Specifically, $173 (58%) of the $300 and $374 (62%) of the $600 would be saved for longer than one year when the government requested the refund be *saved.* When the government requested the refund be *spent*, the amounts were $159 (53%) and $256 (43%), respectively. Of those instructed to spend the money, 13 (27%) saved all of a $300 lump sum refund compared to 14 (27%) of those instructed to save the money. Of those who received a $600 lump sum, 2 (5%) of those told to *spend* the refund saved it all, versus 13 (32%) of those instructed to *save* the refund, who would save it all. See Table 1 for ANOVA results at the $300 level for a lump-sum distribution, which indicates no significant difference. When the amounts of the tax rebates are distributed in smaller, monthly amounts, none of the differences are significant, consistent with the timing of a tax distribution changing the spending pattern of that distribution (Chambers and Spencer, 2008). When short-term saving is considered as saving, the p-value for difference between groups is not significant. Thus, the hypothesis is sustained at the $300 level.

The results for a $600 refund are presented in Table 2 below, and the hypothesis is rejected, with robust, significant results. The change in significance comes almost entirely from the group instructed to spend. Those instructed to save at the $300 and $600 levels save most of the refund: 57.8% and 62.4%, respectively, consistent with instructions. However, those instructed to spend the refund move from saving 53.0% at the $300 level to saving only 42.7% at the $600 level. This behavior at the $600 level reverts to largely disregarding the government's intended use when the refund level increases to $1,500. Where short-term saving is considered as saving at the $600 level, the p-value falls to .07. Paired with the findings at the $300 level, it seems taxpayers view short-term saving as spending, or else intend to save, but not for long.

Conformance with government preference appears only in a "sweet spot" of rebate levels that is not too high in amount and not too low. This pattern would make sense where the friction costs of conforming with government preferences is viewed as relatively high for low rebate amounts - outweighing the benefits, as in the case of all (smaller) monthly rebated amounts and in this case, the $300/year amount. At the higher end, somewhere above $600, taxpayers may value higher personal utility and/or responsibility for the disposition of *their* tax rebates over government direction as to how those rebates should be spent. To try to pinpoint the amount of the sweet spot, the

authors analyzed amounts between $300 and $600 but found no hypothetical breaking point *between* those two numbers.

Table 1. Amount Saved When $300 Hypothetical Refund Is Received Yearly						
Groups	Count	Sum	Average	Variance	% of Refund	
Instructed to Spend	48	7635	159.0625	12792.19	53.00%	
Instructed to Invest	52	9020	173.4615	9478.959	57.80%	
ANOVA						
Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	5175.014	1	5175.014	0.467567	0.495722	3.938112
Within Groups	1084660	98	11067.96			
Total	1089835	99				

Table 2. Amount Saved When $600 Hypothetical Refund Is Received Yearly						
Groups	Count	Sum	Average	Variance	% of Refund	
Instructed to Spend	40	10250	256.25	34321.47	42.70%	
Instructed to Invest	40	14965	374.125	42329.34	62.40%	
ANOVA						
Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	277890.3	1	277890.3	7.250811	0.008671	3.963464
Within Groups	2989382	78	38325.41			
Total	3267272	79				

As shown in Tables 3 and 4, and consistent with Chambers and Spencer (2007), if individuals invest more when asked to invest rather than spend, that effect is not significant and remains insignificant at the $3,000 level, sustaining the hypothesis at these levels of refund.

Table 3. Amount Saved When $1,500 Hypothetical Refund Is Received Yearly						
Groups	Count	Sum	Average	Variance	% of Refund	
Instructed to Spend	42	34110	812.143	220046.5	54.10%	
Instructed to Invest	46	41520	902.6087	214104.2	60.20%	
ANOVA						
Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	179677.5	1	179677.5	0.828247	0.365324	3.951882
Within Groups	18656594	86	216937.1			
Total	18836272	87				

Table 4. Amount Saved When $3,000 Hypothetical Refund Is Received Yearly						
Groups	Count	Sum	Average	Variance	% of Refund	
Instructed to Spend	45	74520	1656	1176370	55.20%	
Instructed to Invest	51	89610	1757.059	911581.2	58.60%	
ANOVA						
Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	244151.8	1	244151.8	0.235776	0.628404	3.942304
Within Groups	97339339	94	1035525			
Total	97583491	95				

Refunds of $1,500 and $3,000, which have the potential to soundly affect the standard of living of respondents, were used to test the sensitivity of these findings. Similar to Rice (1992), as the amount of money to the taxpayer increases, the wishes of the government are heeded less. Even if these same yearly amounts are distributed to taxpayers in smaller, monthly payments, no significant differences are found. The results of spending for research questions 1-12 are presented in Table 5.

Table 5. How Hypothetical Refunds Will Be Used (rounded to nearest whole percent)								
Yearly Lump Sum of	$300		$600		$1,500		$3,000	
Government Instruction	Spend	Save	Spend	Save	Spend	Save	Spend	Save
n=	48	52	43	43	45	49	45	51
Investments in debt/equity	26%	25%	19%	24%	26%	27%	22%	30%
Pay Credit Cards	17%	16%	15%	23%	14%	21%	22%	17%
Pay Long-term Notes	10%	17%	11%	14%	15%	12%	11%	12%
Spend Mon. Expenditures	11%	13%	18%	13%	17%	10%	11%	14%
Spend on Durable Goods	14%	11%	15%	9%	12%	13%	17%	13%
Short-term Savings	22%	18%	22%	17%	16%	18%	17%	14%
Percent Saved/Pay Off Debt	53%	58%	45%	61%	55%	60%	55%	59%
Percent to Be Spent	47%	42%	55%	39%	45%	40%	45%	41%
Monthly Amount of	$25		$50		$125		$250	
n=	48	52	43	43	45	49	45	51
Investments in debt/equity	23%	25%	21%	21%	22%	21%	20%	30%
Pay Credit Cards	11%	12%	14%	20%	18%	19%	18%	18%
Pay Long-term Notes	10%	7%	5%	6%	16%	8%	15%	12%
Spend Mon. Expenditures	40%	35%	38%	43%	28%	35%	32%	22%
Spend on Durable Goods	4%	4%	10%	4%	11%	8%	8%	9%
Short-term Savings	12%	17%	12%	6%	5%	9%	7%	9%
Percent Saved/Pay Off Debt	44%	44%	40%	47%	56%	48%	53%	60%
Percent to Be Spent	56%	56%	60%	53%	44%	52%	47%	40%

At the $600 per year level, the greatest increase in spending - when taxpayers were encouraged to spend - was for durable goods. When encouraged to save, the greatest increase in saving was in the form of credit card debt reduction. This is arguably the most financially sound place to save, given the credit card interest rates in 2007-2008 compared to market returns. This choice reduces interest expense of future purchases, as opposed to investments in debt/equity which increase net worth without changing future spending patterns.

Actual rebates spent in the $300 to $600 range indicated that same pattern, with taxpayers ending compliance with government wishes for spending at $600. Recall that all actual rebates received came with the government encouragement to spend. At the $300 level, many split their rebates between two, or more, categories. At about $600,

people began to shift gradually via allocations towards their final rebate allocation/position. Although some never had a pattern that indicated taking direction from the government, some appeared to do so in that range above $300 (therefore material) but ending in self-determination at $600. Note in Table 6, showing the percentage of taxpayers who spent, shows that 40% of the time, the entire $300 was spent. The percentage for the $301 - $599 range is similar, but then at $600, the percentage of the rebate spent drops to 24% (a drop of 40%). It seems as if, at least for actual rebates, the sweet spot is not between $300 and $600, but, in aggregate on average *is* $600 (validating our lack of pinpointing an amount of hypothetical rebates between $300 and $600). Splitting between two categories remains the same. – Perhaps these respondents are "planner/sorters" (highly organized people who make lists, organize their closets, etc.), but that is left for further study. Those who spent none of the rebate made up the difference; that is, savings went up by approximately 40%.

Table 6. Number and Percent of Actual Rebate Allocations, $300 to $600 Range			
# of observations	$300	Mid	$600
100% spent	14	8	12
Split	8	5	11
0% spent	13	9	26
% observations			
100% spent	40	36.36	24.49
Split	22.86	22.73	22.45
0% spent	37.14	40.91	53.06

The actual rebate mean for the $300 to $600 range was $465. For actual rebates in a $300 range (+/- 20%, an *a priori* grouping) around the $1,500 rebates, the rebate mean was $1,355. The pay-down of credit cards was almost twice the expected rate, with less spending on monthly expenses and durables. However, a limitation in the actual rebate spending is likely; while the authors used the same categories to test the hypothetical and actual allocation of rebates for internal validity, the actual rebate distribution was different than the hypothetical scenario: in the hypothetical scenario, the announcement of the rebate was simultaneous with its hypothetical receipt. In the actual scenario, there was much public discussion and notice of the forthcoming rebate. Some may have spent the rebate by charging either a durable or monthly expense in anticipation of receiving the check, and now were merely "paying it back." Therefore,

could be, given that the hypothetical results are generally validated by the actual results, that the hypothetical is more reliable than the actual, at least given the wording of the survey. (See Table 7.)

Table 7. Hypothetical v. Actual Rebate Allocations (rounded to nearest whole percent)			
Rebate Type	Hypothetical	Actual	
Yearly Lump Sum of	$300	$600	$300-$600
Government Instruction	Spend	Spend	Spend
n=	48	43	106
Investments in debt/equity	26%	19%	18%
Pay Credit Cards	17%	15%	28%
Pay Long-term Notes	10%	11%	11%
Spend on Monthly Expenditures	11%	18%	9%
Spend on Durable Goods	14%	15%	11%
Short-term Savings	22%	22%	22%
Percent to Be Saved/Pay Off Debt	53%	45%	57%
Percent to Be Spent	47%	55%	43%

In that $1,200 to $1,800 range, investments are somewhat lower and payment of notes payable is somewhat higher, which would be expected where the investment market had soured (as it did between the time of the hypothetical questionnaire and the actual one). Paying off notes did yield a better return than investment than the market. Short-term savings is also higher, which may indicate a pent up demand to get back into the market once the taxpayer perceives that the market has bottomed out. Only two respondents received tax rebates of more than $2,500, so the comparison of savings patterns between the hypothetical and actual rebates for the $3,000 was not feasible.

CONCLUSIONS

ANOVA results confirm that government direction has only a limited effect on taxpayer spending and saving choices, only significant over some range around $600, given that this study examined the proposed spending from refunds of $300, $600, $1,500 and $3,000. Individuals significantly followed the government's stated

desire for the use of the money – spending or saving - *only* when the dollar amount is perceived as small, but not so small as to be perceived as not worth the effort. But, whatever the reason, the implication for federal tax policy is to *not* rely on governmental requests to have the desired effect on taxpayer behavior. It appears that the taxpayers' inclination is to not be dissuaded by governmental requests from making consumption, investment or saving choices they would perceive as being in their own self-interest once the rebate reaches the $600 level.

FUTURE DIRECTIONS

Given the quasi-experiment provided by the 2008 stimulus rebates, further analysis of how people actually did use their rebate funds will provide even better answers to the question of the effect of government wishes on consumer choices. These rebates – for those with positive AGI and also for those receiving Social Security - ranged from $300 to well above the $1,500 amount considered in this paper.

Another area for study is to examine in more depth the sensitivity of an individual's responses to the size of the refund, especially when examined relative to the household's assets and debts. A within-subject's study of responses to different rebate levels may yield a pattern of behavior that could shed more light on why no significance was found at the $300 level but that individuals did respond significantly to the government's request at the $600 level. It may be that economic theory of consumption behavior needs to be questioned for not being robust enough, especially if what is currently considered to be rational behavior is not the behavior actually observed. We may need to learn more about consumption decisions by studying current brain research and mental accounting theory.

President Obama recently signed another economic stimulus bill. Included was a tax rebate that is just now being distributed as small amounts in payroll checks, starting in spring 2009. This new quasi-experiment will provide an additional opportunity for researchers, to measure the impact of a tax rebate delivered in yet another way.

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APPENDIX A – EXPERIMENTAL INSTRUMENT

The first eight instruments were constructed as follows: Four instruments, including the one shown below, had the same wording but used yearly (followed by monthly) amounts of $300 ($25), $1,500 ($125), and $3,000 ($250) respectively. Using the same four amounts, another four instruments were administered changing only the instructions to indicate that "It is the government's hope that you will use this money to stimulate the economy (spend it)." The remaining eight instruments asked about a monthly rebate first and the lump-sum rebate second, to be able to test for order effects. Otherwise they were the same as the first eight instruments.

"What would you do if . . .?" (Fill in the amounts): One hypothetical proposed tax bill would result in *you* receiving $600.00 tax credit which for 2006 will automatically be mailed to you as a check from the IRS this November. *It is the government's hope that you will invest this money.*

APPENDIX A 1st Table	
If enacted, how much of this refund would you plan to:	
Invest (in stocks, bonds, savings account, etc)?	$
Use to pay off credit card debt?	$
Use to pay off notes (e.g. mortgage, car note, etc.)?	$
Use up about evenly every month for expenses? _____/mo. x 12 mo.=	$
Use to buy a durable asset (e.g. car, boat, washing machine, furniture)?	$
Use to save for an infrequent expense (e.g. vacation, bigger holiday gifts)?	$
Amount must total $600.00-------------à	$

Another hypothetical tax proposal would result in *you* receiving $50.00/month after taxes; that is, your paychecks would go up $50.00/month with no additional tax due at the end of the year. *It is the government's hope that you will invest this money.*

APPENDIX A 2nd Table	
If enacted, how much of this monthly increase would you plan to:	
Invest (in stocks, bonds, savings account, etc.)?	$
Use to pay off credit card debt?	$
Use to pay off notes (e.g. mortgage, car note, etc.)?	$
Use up for regular monthly expenses?	$
Use to buy a durable asset (e.g. car, boat, washing machine, furniture)?	$
Use to save for an infrequent yearly expense (e.g. vacation, bigger holiday gifts)?	$
Amount must total $50.00-------------à	$

APPENDIX A 3rd Table

Please list your: _____ Zip Code ____ Years of Business Experience

Highest education level:
    ___ High School ___ Undergraduate ___ Graduate or above

Occupation: _____ Gender: ___ Female ___ Male

\# Hours College-level Accounting _____
Industry where you work _____
You would classify your business experience level as:
___ High ___ Fairly high ___ Moderate ___ Fairly low ___ Low

THANK YOU FOR YOUR PARTICIPATION!!

APPENDIX B:
INSTRUMENT FOR ACTUAL 2008 STIMULUS RECIPIENTS

"What did you do . . .?"
(Fill in the amounts): In order to stimulate the economy, y*ou* received a payment from the government this year. This payment was automatically sent to you from the IRS.
In which month did you receive the funds:
May ___ June ___ July ___ August ___ September ___ October ___ November ___
Size of refund: $_____

APPENDIX B 1st Table	
How much of this refund have you used for each of these purposes (approximately)?:	
Invest (in stocks, bonds, savings account, etc.)?	$
Use to pay off credit card debt?	$
Use to pay off notes (e.g. mortgage, car note, etc.)?	$
Use up about evenly every month for expenses? _____/mo. x 12 mo.=	$
Use to buy a durable asset (e.g. car, boat, washing machine, furniture)?	$
Use to save for an infrequent expense (e.g. vacation, bigger holiday gifts)?	$
Amount must total $600.00------------à	$

APPENDIX B 2nd Table

Please list your: _____ Zip Code _____ Years of Business Experience
Highest education level: ___ Less than high school ___ High School
                         ___ Undergraduate   ___ Graduate or above
Occupation: _____   Retired? ___ yes ___ no
Gender: ___ Female   ___ Male

Hours College-level Accounting _____

Industry where you work _____

You would classify your business experience level as:

___ High   ___ Fairly high   ___ Moderate   ___ Fairly low   ___ Low

Hours College-level Accounting _____

Industry where you work/worked_____

Yearly household income (AGI) _____   Age _____

You would classify your business experience level as:
___ High   ___ Fairly high   ___ Moderate   ___ Fairly low   ___ Low

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THANK YOU FOR YOUR PARTICIPATION!!

THE EMERGENCE OF COMMODITY MONEY ALONGSIDE A FUNCTIONING FIAT MONEY

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ABSTRACT

This study describes an actual situation where local pharmacies buy and sell prescription drugs to each other using one drug, Prevacid™, as the "money" to fund the transaction. The advantages of using Prevacid instead of the readily accepted fiat money (US dollars) in these transactions are noted. In addition, the emergence of Prevacid™ as money is compared and contrasted to Radford's commonly used example of cigarettes as money in prisoner of war camps during World War II. This study should serve as a useful example of the functions of money in introductory economics classes, as well as to describe how and why commodity money comes into being.

INTRODUCTION

Do you ever wonder how your pharmacy always (or nearly always) has the prescription medication you need when you need it? Grocery stores often find themselves short of bread, or milk, or some item that is on your shopping list. Everyone has experienced the frustration of going to the shoe store and finding the perfect shoe, only to discover that they do not have it in your size. How is it that pharmacies, with hundreds of drugs behind the counter, successfully manage to maintain an inventory that supports a nearly perfect on time delivery record, when other businesses frequently find themselves short of a particular item?

Pharmacies in a small community in southeast Georgia (USA) enhance their chances of delivering the requested prescription drug by cooperating with one another in an exceptional manner. If one pharmacy finds itself short of a particular medicine, it calls a local competitor and asks if they have that particular item. If the requested pharmacy finds itself short of another drug, a barter exchange is negotiated, enabling both pharmacies deliver the product to their customers with unerring efficiency. Given the size of the community, all of the pharmacists know one another. They may have

previously worked together in the local location of a national chain, such as CVS, but now may work for different pharmacies, or may have even opened their own pharmacy. Speaking with local pharmacists, none could recall a time when they did not exchange pharmaceutical products with each other.

However, the most common inter-pharmacy exchange involves neither cash nor a direct barter exchange. Rather, a system has evolved where drugs that are commonly exchanged are priced in terms of one specific drug, Prevacid™. Prevacid™ (generic name: Lansoprazole) is manufactured by TAP Pharmaceuticals to treat gastrointestinal disorders. It is commonly prescribed for those who have acid reflux disorder. Its sales make this drug one of the top 20 pharmaceutical products, with revenues in excess of $3 billion per year.

PREVACID™ AS A MEDIUM OF EXCHANGE

The exchange of a particular drug for Prevacid™ is an exchange of equivalent dollar values of the drugs. For instance, if Lipitor™ (a cholesterol medication from Pfizer) costs $10 per tablet and TAP Pharmaceuticals charges $2 per Prevacid tablet, then 100 Lipitor™ (worth $1000) would cost 500 Prevacid™ (also worth $1000). Likewise, if Singulair™ (asthma medication from Merck) is $6 per tablet, then 100 Singulair™ would cost 300 Prevacid™ in this $600 transaction. Since these exchanges are for equivalent dollar amounts, Prevacid™ can be used to "buy" liquid medications as well.

Prices from the major drug manufacturers are relatively stable. There are no "seasons" associated with hypertension medication as there would be with "back to school" supplies in the fall or jewelry at Christmas and Valentine's Day. However, on those rare occasions when a drug price does change, then the pharmacies continue to exchange an equivalent dollar amount of Prevacid™ for the other drug.

Thus, Prevacid™ serves as money in these transactions, much like gold, salt or cigarettes have done in the past. Money is generally acknowledged as having three functions: the medium of exchange; the unit of account; and a store of value. (See any introductory economics text, such as Mankiw (2009), Baumol and Blinder (2009) or Bade and Parkin (2007).) For this particular inter-pharmacy market, Prevacid™ takes on the medium of exchange function of money. While the specific drug that serves as the medium of exchange has changed over time, the primary requirement, that the drug is a fast mover, has remained constant. The dollar continues to be the unit of account, as the dollar establishes equivalent values, and also a store of value.

While most of our purchases use the dollar as the medium of exchange and unit of account, it is not a requirement that these two functions be performed by the same asset. Indeed, while the medium of exchange needs to exist, the unit of account need not exist. For instance, in 19th century England, many services were priced in guineas. A guinea was a pound and a shilling, or twenty-one shillings (since twenty shillings equaled a pound sterling). There was no single note or coin that equaled a guinea. In the United States, the well-known saying, "shave and a haircut, two bits" implied the shave and a haircut would cost 25¢. While a two bit, or 25¢, coin existed, there was never a 12 ½¢ coin that equaled a single bit. However, the absence of a coin equal to a guinea or a bit did not make those measures any less effective or less efficient as the unit of account.

The efficiencies that result from this "monied" exchange over barter are many. The "buying" pharmacy is able to acquire a product needed to fill a prescription locally much faster and less expensively than from the manufacturer. Acquiring the product locally merely means driving to the competing pharmacy and swapping the Prevacid™ for the desired product. This transaction need not be completed by a registered pharmacist, but can be handled by a less expensive employee, such as a pharmacy technician. While Prevacid™ is dispensed only by prescription, it is not a controlled substance, such as Ritalin™ or Oxycontin™. With little or no street value, there is little threat the pharmacy technician would be tempted to steal the Prevacid™ in order to sell it illegally on the street. In addition, with little or no street value, there is no need to provide the significant security (at a significant cost) that would be required if controlled substances or cash were being transported. The "buying" pharmacy may find itself temporarily with an excess inventory of Prevacid™. However, this excess supply is easily ameliorated by reducing the amount of Prevacid™ on the next order.

OTHER EXAMPLES OF COMMODITY MONEY

The classic example of a commodity evolving into a medium of exchange is the use of cigarettes in prisoner of war (POW) camps in Germany during World War II, as described by Radford (1945). Prisoners traded items from Red Cross packages, such as canned milk, chocolate, canned meat and cigarettes. Rather than engage in barter to exchange unwanted items for those items they preferred, POWs began accepting cigarettes in exchange. Cigarettes, once accepted, met the minimal criteria for a medium of exchange. They were of small enough value individually that further divisibility was not required. Cigarettes also "maintained their value," which is to say, they did not spoil. While the multiple exchanges from buyer to seller would certainly

have reduced the value of a traded cigarette as a smoke, Gresham's Law insured that only the cigarettes that were least desirable as a smoke were used as a medium of exchange. Since the lower quality cigarettes were used as money, the cigarettes' loss of value as an intrinsic commodity was minimized.

Senn (1951) describes how cigarettes also served as money in post-war Germany, specifically from 1946 through 1948. Currency conversion between the dollar and Reichmarks (as well as between the English pound and the Reichmark) was arbitrarily established at a non-equilibrium exchange rate. The occupation army, mainly American and British soldiers, had no incentive to lose purchasing power by converting their pay into local currency. They used their cigarette ration to acquire cigarettes, which they then traded with locals. Because of the small value of cigarettes, cognac also emerged as money, but with a much higher denomination than cigarettes (Friedman, 1992).

COMPARISON OF PREVACID AND OTHER COMMODITY MONIES

Gresham's Law states that bad money drives out good money. For instance, the introduction of the silver-copper sandwich dimes and quarters in the United States caused the pure silver coins to be pulled from circulation. The pure silver coins were worth more than their face value. Likewise, as POWs received cigarettes of various quality, with the cigarettes that were used in exchange (acted as money) were those cigarettes least desirable to enjoy as a smoke. Thus, you had two classes of cigarettes, those that were smoked and those that were used as money in exchange. However, the value of cigarettes in exchange was all the same. The Prevacid™ tablets are all of equal quality, having all been manufactured under strict controls, so there is no quality difference between those dispensed in a prescription and those that are used as money. Thus, there is no display of Gresham's Law in action with this commodity money.

CONCLUSION

In the situations described above, a commodity emerged as money to facilitate transactions. Barter was always an option, but a medium of exchange removed the requirement of simultaneous reciprocal wants. The use of "money" (either dollars, cigarettes or Prevacid™) increased the efficiency of the transaction.

There are numerous examples of barter in today's economy. The internet makes it easier to find a partner to complete a trade. They are particularly helpful in facilitating transactions among multiple participants. Assume seller 1 wants to

exchange product A for product B, and seller 2 wants to exchange product B for product C. The internet barter sites can find seller 3 that wants product A in exchange for product C. If necessary, the sites will find the fourth, or fifth, or sixth, etc., trader required to complete the transaction. The more convoluted the barter arrangement, the more you appreciate some item (or commodity) serving as money.

For a single good to evolve into money, as Prevacid™ has done among the pharmacists, the market must have several characteristics. First, the more generic the goods are that are bought and sold, the more likely a single item will emerge as money. The generic nature of the traded goods makes pricing more straight forward. The money good itself must also be commonly used by the market members. For instance, big-box building supply companies (such as Home Depot and Lowes) could use 2x4s as the medium of exchange, since the boards are commonly sold by both companies and are indistinguishable. Shirts, on the other hand, would not serve well as money for clothing stores because the different sizes and styles. Other desired characteristics of a medium of exchange include value and portability, which is why a currency based on 2x4s probably will not emerge. If Lowes needed a particular refrigerator from Home Depot, it would require a considerable quantity of 2x4s to have an equivalent value. The exchange would be quite labor intensive, and thus, quite expensive with regard to transaction costs. Diamonds are a high value to weight item that could serve as money for jewelers. However, the value of individual diamonds depends on cut, color, clarity and carat weight, which makes them less generic. Also, the item sold in jewelry stores vary greatly, with many necklaces or rings being quite unique. In addition, the high street value of diamonds suggests the courier could be tempted to steal the diamonds and/or risk being robbed. The pharmacy setting seems to be rather unique in that it seems to satisfy all of these criteria, which would explain why an alternative money has evolved in this market and not others.

Another factor that makes the emergence of Prevacid™ money note worthy is that it emerged in a market that had a functioning fiat money. (Post-war Germany's Reichmark was a fiat money, but the non-market mandated exchange rate between the Reichmark and the dollar or pound prevented the Reichmark from functioning efficiently.) In addition, while cigarettes in the POW camp or post-war Germany were accepted in numerous markets for many items, Prevacid™ is exchanged only for other prescription pharmaceuticals and only in a specific geographic market. However, in this specific market, Prevacid™ is *more* efficient than fiat money in funding these inter-pharmacy exchanges, and as such, replaces the dollar as money for these transactions.

ACKNOWEDGMENT

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