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The Effects of Financial Innovation on Financial Savings: Evidence From an Economy in Transition

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The general objective of this research is to establish the effects of financial innovations on financial savings in Ghana for the period 1963 to 2006. Both the perceptual index and M2/M1 that were used as proxies for financial innovation exhibited a positive long-run relationship but a negative short-run relationship. The crux of the study was that financial innovations led to a reduction in financial savings in the short run for one main reason—the prevailing innovative products in Ghana encouraged withdrawals rather than savings. Financial institutions, especially banks, are therefore encouraged to develop savings-related innovative instruments.

KEYWORDS economy in transition, financial innovation, financial institutions, financial savings, Ghana

INTRODUCTION

The rising importance of the financial sector in the economic development of developing countries and the rapid rate of innovation in that sector have generated a growing research interest in financial innovation (Bylik, 2006; Eze, 2001; Mannah-Blankson & Belnye, 2004; Shabazz, 2000; Tufano & Schneider, 2008).

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From an economic perspective, savings are important because of their direct link to a country's economic growth and prosperity. A study by Anoruo and Ahmad (2001) utilizes co-integration and the vector error-correction modeling technique (VECM) to explore the causal relationship between economic growth and the growth rate of domestic savings for Congo, Côte d'Ivoire, Ghana, Kenya, South Africa, and Zambia. The results of the co-integration tests suggest that there is a long-run relationship between economic growth and the growth rate of savings. Since the role of banks as the most important financial intermediary will persevere, studies in savings management will continue to be a topic of interest for many researchers. Of all the topics widely discussed in the savings literature, studies on savings determinants are at the top of the list (Haron, 2005). These studies, however, focus largely on economic and other financial variables and do not address financial innovation as one of the savings determinants. Beyond income, interest rates, inflation, and GDP growth as important determinants of savings, it is important to determine the extent to which financial innovation influences financial savings.

Financial innovation is defined as the introduction of new financial products and processes and expanded use of computer and communication technology in the financial system. It includes increased number and diversity of types of financial institutions that in sum produce a revolution in the delivery of financial services. In this regard, financial innovation is generally marked by the introduction of a new product or a new process in the financial system. Financial innovation may also involve modifying an existing idea, as either a product or a process. For an idea to be viable as a financial innovation, it must make markets more complete and/or more operationally efficient.

There have been many developments in the banking sector, including an increase in private banks entering the market, and the expanded use of branches by existing and new banks. Branch banking has expanded in Ghana with the development of new technologies to deliver financial services, such as automated teller machines (ATMs), electronic funds transfer at point of sale (EFTPOS), and stored-value cards. The availability of these cost-effective innovations and products have reduced the pressure on over-the-counter services to bank customers (Mannah-Blankson et al., 2004).

According to Hans-Martin (1994), Ghana has never recorded high savings rates. In fact, gross national savings never risen above 15% of GDP. After falling to under 5% in 1983, the savings rate recovered but remained below 10%. This level compares quite unfavourably with East Asian countries where savings rates of 30% are common. Similarly, recorded investment rates are far below the levels required to push Ghana into an accelerated growth mode. However, according to some surveys, private savings in Ghana are probably higher than the official data suggest. Savers hesitate to keep their assets in financial form. Instead they prefer to hold them in less risky forms

that provide a very low (and perhaps even negative) rate of return (Aryeetey, 2004). It is important to understand the cost that low intermediation, usually as a result of poor financial innovation, poses to an economy in terms of lost savings and, consequently, slower economic growth. There is a tremendous capacity for improving growth prospects by encouraging individuals to hold their savings in financial forms through the expansion of financial innovation (Mishra, 2008a).

Hans-Martin (1994) indicates that the reports on ongoing operational, economic, and sector work carried out by the World Bank and its member governments in the Africa Region identified the most prominent factors contributing to the low level of financial intermediation as low confidence in the formal financial system, macroeconomic instability, and lack of competition among financial institutions.

However, beyond these factors, other empirical studies have identified financial innovation as a factor that exerts influence on the level of intermediation and consequently savings mobilization (e.g., Mishra, 2008a; Parker, 1999; Tufano & Schneider, 2008). Notably, in Africa, especially during the last decade, the issue of financial innovations has been thoroughly investigated in relation to the demand for money (Adam, 1992; Mannah-Blankson et al., 2004; Odularu & Okunrinboye, 2008). Absent from this stream of prior research is the issue of financial innovation in connection with financial savings.

OBJECTIVE OF THE STUDY

The general objective of this research is to establish the effects of financial innovations on financial savings in Ghana for the period 1963 to 2006. Specifically, we examine empirical literature on the relationship between financial innovation and savings from the perspective of developed countries to determine that which pertains to developing countries such as Ghana. Our work is unique since it contributes to existing literature from a developing country perspective.

REVIEW OF EMPIRICAL LITERATURE ON FINANCIAL INNOVATIONS AND SAVINGS

Mobilization of savings involves the agglomeration of capital from disparate savers for investment purposes. Furthermore, mobilization of savings involves the creation of small denomination instruments. These instruments provide opportunities for households to hold diversified portfolios, which enhance risk diversification and liquidity. Risk is one of the greatest hindrances to savings. Therefore, if innovative financial instruments (e.g., shares, corporate bonds, treasury bills) can help provide a diversified

portfolio to households and help savers minimize their risk, then such instruments must be deemed to be significant in savings mobilization. Other recent innovations such as mutual funds have gone a long way to address the liquidity risk associated with certain types of investment.

Mobilizing the savings of many disparate savers is costly, however. It involves overcoming the transaction costs associated with collecting savings from different individuals and overcoming information asymmetries associated with making savers feel comfortable in relinquishing control of their savings. Many of the process innovations in payment systems technologies are aimed at lowering transaction costs. ATMs, smart cards, automated clearing house (ACH) technologies, and many other new businesses are legitimate financial innovations that seek to dramatically lower the costs of processing transactions.

New businesses like Instinet, Open-IPO, Enron On-Line, eBay, or the host of B-to-B exchanges are innovations aimed at lowering the transaction costs faced by buyers and sellers. These transaction costs are search or marketing costs, which can include a variety of components—the costs of identifying buyers and sellers, information costs, and transaction costs of order processing (Tufano, 2002). The cost savings function of financial innovations transcends financial considerations to include time management.

Oyelaran-Oyeyinka (1991) observed that with computerization, banks have been empowered to introduce new products and services such as ATM, and that there is now faster delivery of front office services and more efficient back-office operations. Easy access to banking services can greatly improve the number of deposits these banks can mobilize.

Mishra (2008a) studied the economic growth implications of financial innovations that emerge in more sophisticated and complete financial markets. Mishra concluded that financial innovations in the form of new financial instruments, services, institutions, technologies, and markets mobilize financial surpluses from ultimate savers and direct them into most productive investment avenues, thereby raising the rate of capital accumulation and, hence, the rate of economic growth. Implicit in this finding is the fact that innovations, in either product or process form, have a positive impact on financial savings. According to Yuan (2007), financial innovation raises the efficiency of financial intermediation by increasing the variety of financial products and services and improves the match of individual savers' need with those of firms raising funds for expanding future production. The resulting capital accumulation leads to economic growth. In the same vein, in a recent working paper, Tufano and Schneider (2008) observed that, at one extreme, families may not save because they simply do not have the financial resources after paying for necessities. In these instances, outright transfers may be necessary to create savings. Similarly, one might force families to save through government coercion. Short of coercion, innovations may make it easier to save, or harder not to save.

The financial system facilitates exchange, which, in recent times, is predominantly enhanced through the presence of innovative products such as wire transfers, ATMs, and stored-valued cards (Levine, 1997). Horan (1980) categorized the electronic fund transfer (EFT) system technology into four categories—the ACHs, POS, ATMs, and national bank card networks (NBCNs). Haron stressed that ACHs are cost effective, based on the extensive paperless transactions; reduce the margin of error; and protect customers' checks against loss or theft. With POS, Haron stressed the ease of funds transfer from cardholders' accounts to merchants' accounts and the ease with which the customer can make an immediate deposit into and withdrawal from an account directly through a POS terminal. With respect to ATM, the customer has a full range of services including checking deposits or withdrawals, funds transfer between accounts, and some installment payments into financial institutions after normal banking hours. Last, with the NBCN, the use of paper media has decreased and the interval involved in processing credit transactions has decreased.

Arguably, some empirical studies criticized this role of innovative products for their negative impact on financial savings by. For instance, Parker (1999) attributes the decline in saving rates in the United States to financial innovations. According to Parker, financial innovation relaxed liquidity constraints that many households had been facing by increasing their access to credit markets. This argument is consistent with the observed increase in consumer credit relative to GDP that has accompanied the consumption boom. In Canada, the increased availability and widespread adoption of electronic payment options have led to dramatic improvements in the ease, speed, and cost of access to liquid balances. Growth in the use of ATMs, debit and credit cards, online banking, and personal credit lines has served to reduce transactions and precautionary demand for liquidity. Easier access to funds in liquid saving accounts and easier access to bridge financing through lines of credit to meet liquidity pressures mean that households have less need to save as much for a rainy day or to keep as much on reserve to fund spending (Derek, 2005).

To conclude, it is clear from the literature examined that there is a relationship between savings and financial innovation. However, the direction of this relationship could either be positive or negative. As established by Parker (1999) and Derek (2005), a negative relationship is possible if the available innovative products are largely those that facilitate withdrawals or easy access to liquidity rather than encouraging deposits.

DATA AND METHODOLOGY

Data

The analyses in this work are based on a combination of secondary data as well as primary data from a survey of six long-established banks in Ghana.

The primary data were intended to generate an index of financial innovation based on the opinions of bank officials. Apart from their years of experience, existing industry archives could help these officials provide a highly accurate estimate of the trend of financial innovations in Ghana.

The population for this study consisted of bank experts within a managerial rank from six traditional banks in Ghana. The rationale for this category of staff was to ensure that only persons with in-depth knowledge of their respective innovative products responded to the questionnaires. The study was also initially intended to be confined to those in the headquarters of the six banks in Accra (the capital of Ghana) for a total population size of about 110. The headquarters were selected because, as indicated by Vijay and Camara (2007), they serve as collating centers to their respective banks and may exhibit the highest concentration of computer technology in their intrabank and interbank activities. However, due to a poor response rate at the various headquarters, the survey was extended to include some branch officials of these banks within the Accra metropolis to augment the sample size. Apart from time and financial constraints, the other reason for including officials in this study is because banks within this metropolis are normally the first to roll out their respective innovative products. This is probably because of their proximity to their head offices and because they have a large customer base relative to branches in other parts of the country. These officials are therefore deemed to be relatively more knowledgeable about their products and services and the general trend of financial innovation in Ghana.

A sample of 85 respondents was purposefully chosen based on their expertise and accessibility. For instance, questionnaires were only given to personnel with managerial status at the branch level and, at the headquarters, officials in the marketing and/or research and development departments. The purposive sampling technique is a type of nonprobability sampling that is most effective when one needs to study knowledgeable experts within a certain cultural domain. Purposive sampling may be used with both qualitative and quantitative research techniques. The inherent bias of the method contributes to its efficiency and the method stays robust even when tested against random probability sampling (Tongco, 2007).

The questionnaire yielded 50 usable responses, made up of 18 from Ghana Commercial Bank Limited, 15 from Agricultural Development Bank, 6 from National Investment Bank Limited, 6 from SG-SSB Bank (formerly, SSB), and 5 from Barclays Bank Ghana Limited. Officials of Standard Chartered Bank did not respond either at the head office or branch level. In view of some possible errors associated with opinion index and sampling, the proxy M2/M1 was employed as an alternative measure of financial innovations to substantiate the findings based on the perceptual index.

Model Specification

The model for this study makes use of macroeconomic data covering 44 years (1963–2006) to determine the core determinants of financial savings in Ghana. The models from Uremadu (2007) and Haron (2005) were adopted and modified to create a model for explaining the leading indicators of financial savings in Ghana.

Based on the empirical evidences on the impact of identified variables (especially, financial innovations) on financial savings, the following modified model is estimated to determine the effects of financial innovation on financial savings.

$$TFS = f[LR, DR, GDP, EX, INF, FINNOV] \quad (1)$$

Where:

TFS = total domestic savings as a percentage of GDP derived from gross national savings figures for the period 1963–2006.

LR = lending rates (%)
DR = deposit rates (%)
GDP = growth in gross domestic product (%)
INF = inflation rate (%)
EX = cedi/dollar exchange rate (GHS/$)
M2/M1 = financial deepening
FINNOV = financial innovation

Justification of Variables

The choice of variables included in the above model is limited partly by series availability and partly by the length of the sample period. In particular, the researcher would have included per capita income, life expectancy, and other demographic variables.

Lending rate (LR)

Lending rate represents the interest rate charged for bank loans and has yet to be used by other researchers as one of the determinants of savings. Changes in the rate will have a direct relationship with credit available to customers. An increase in the rate means a higher cost of borrowing to customers and also serves as an indicator of whether customers can easily obtain financing for their needs as well as their capacity to pay back the loans. When people are constrained from extensive borrowings due to a high lending rate, they are induced to save in anticipation of future consumption needs that cannot be financed through credit (Haron, 2005).

Deposit rate (DR)

Savings, according to classical economists, is a function of the rate of interest. The higher the rate of interest, the more money will be saved, since at higher interest rates people will be more willing to forgo present consumption. Based on utility maximization, the rate of interest is also at the center of modern theories of consumer behaviour, given the present value of lifetime resources. However, the results of a change in the rate of return are theoretically ambiguous because of potential offsetting substitution and income effects. For a net saver, an increase in the rate of interest will have an overall effect composed of two partial effects: an income effect leading to an increase in current consumption and a substitution effect leading to a reduction in current consumption. Since the net lender (net saver) receives more in investment income than he/she has to pay to service his/her debt, high interest rates increase net investment income, thus encouraging present consumption and lessening the need to save in order to finance future consumption. However, if the substitution effect is stronger, an increase in the rate of return tends to encourage consumers to postpone consumption and increase savings in the present period in order to achieve higher consumption levels later. This variable is used to validate the existence of smoothing consumption theory and the life-cycle model where individuals will keep their monies during working years for usage during their retirement period (Haron, 2005).

In Malaysia, a steady policy of positive inflation-adjusted interest rate led to growth in both real terms and savings deposit. In Turkey, the deregulation of interest rates in 1981 resulted in a substantial increase in time and savings deposits in real terms (Ndekwu, 1991). In this study, it is hypothesized that deposit rates will have a positive impact on savings.

Growth in gross domestic product (GDP)

A study by Anoruo and Ahmad (2001) utilizes co-integration and the VECM to explore the causal relationship between economic growth and growth rate of domestic savings for Congo, Côte d'Ivoire, Ghana, Kenya, South Africa, and Zambia. The results of the co-integration tests suggest that there is a long-run relationship between economic growth and the growth rate of savings. Mavrotas and Santillana (1999) support the view that higher savings raise the growth of GDP by increasing capital accumulation. They note that the investment-growth link has been challenged by a number of studies that argue that the co-movement of investment ratios and growth rates may be mainly the result of a third crucial factor, namely technological innovation, which drives both output expansion and capital accumulation. More precisely, they indicate that recent empirical studies cast serious doubts on the hypothesized positive impact of investment on growth. Mavrotas and Santillana provide robust empirical evidence to suggest that, even though a

causal link seems to be apparent, the direction of causation runs from growth to investment and not vice versa, as pointed out by King and Levine (1994) and Benhabib and Jovanovic (1991) and much later by Blomstrom, Lipsey, and Zejan (1996). According to Haron (2005), the simple permanent-income theory postulates that higher growth reduces current savings because of higher anticipated future income, thus urging people to dissave against future earnings. But in the life-cycle model, growth has an ambiguous effect on savings, depending on which age cohorts benefit the most from the growth, how steep their earning profiles are, and the extent to which borrowing constraints apply. In this study, GDP growth is expected to have a positive relationship with savings.

Inflation rate (INF)

INF is defined as a macroeconomic instability represented by the annual rate of inflation. Inflation may influence savings through several channels. First, theory postulates that greater uncertainty should raise savings since risk-averse consumers set resources aside as a precaution against possible adverse changes in income and other factors. Hence, inflation may increase precautionary savings by individuals. Second, inflation can influence saving through its impact on real wealth. If consumers attempt to maintain a target level of wealth or liquid assets relative to income, saving will rise with inflation. Finally, savings may rise in inflationary periods if consumers mistake an increase in the general price level for an increase in some relative prices and refrain from buying (Deaton, 1977). According to Uremadu (2007), inflation impacts negatively on private savings mobilization. It should be noted as well that inflationary expectations play an important role in the supply of and demand for loanable funds. It is expected that inflation will have a negative effect on savings.

Exchange rate (EX)

According to Montiel & Luis (2008), while there is no consensus on the precise channels through which this effect is generated, an increasingly common view in policy circles points to saving as the channel of transmission, with the claim that a depreciated real exchange rate raises the domestic saving rate, which in turn stimulates growth by increasing the rate of capital accumulation.

Due to the fact that the Ghana cedi consistently depreciated over the study period against its major trading foreign currency, the US dollar, exchange rate is expected to have a positive correlation with savings.

Financial innovation (FINNOV)

Mishra (2008a) studied the economic growth implications of financial innovations that emerge in more sophisticated and complete financial markets

and concluded that financial innovations in the form of new financial instruments, services, institutions, technologies, and markets mobilize financial surpluses from ultimate savers. Such surpluses are directed to the most productive investment avenues, thereby raising the rate of capital accumulation, and hence, the rate of economic growth. Implicit within this findings is the fact that innovations either in product or process form have a positive impact on financial savings.

Similarly, Mishra's (2008b) study on the benefits and risks associated with financial innovations at the macroeconomic level indicates that financial innovations enlarge the menu/list of assets available to savers and borrowers. By designing savings vehicles/instruments in a more attractive way and extending the reach of financial intermediation, saving is encouraged, and the utility of a given volume of savings to the holders of financial assets is enhanced.

On the contrary, in Canada, the proliferation in the availability and widespread adoption of electronic payment options have led to dramatic improvements in the ease, speed, and cost of access to liquid balances. Growths in ATMs, debit and credit cards, online banking, and personal credit lines have all served to reduce the transactional and precautionary demand for liquidity. Easier access to funds in liquid saving accounts and easier access to bridge financing through lines of credit to meet liquidity pressures mean that households have less need to save as much for a rainy day or to keep as much on reserve to fund spending (Derek, 2005).

From Equation 1 and the hypothesized relationship, an explicit function for the core determinants of savings in Ghana is as follows:

$$TFS = \alpha_0 + \beta_1 LR + \beta_2 DR + \beta_3 GDP + \beta_4 EX - \beta_5 INF + \beta_6 FINNOV + \ell \quad (2)$$

Where:

TFS is the dependent variable; β_1, $\beta_2, \ldots,$ β_6, are the estimated linear coefficients of the independent variables; α o is the autonomous estimate of the savings function, and ℓ is the random error term. According to Enders (1995), most macroeconomic time series data are usually nonstationary and hence do not meet the criteria for ordinary least squares (OLS) estimation. A series is nonstationary when their mean, variance, and covariance vary with time. Time-series data typically contain a trend, which must be removed prior to undertaking any estimation. In view of this fact, the co-integration test and vector error correction model will be used to establish any long-run and short-run relationship.

Measuring Financial Innovation

As a result of the difficulty associated in finding an appropriate measure for financial innovation, an index of financial innovations was constructed

similar to the one developed by Bylik (2006), who studied the impact of financial innovation on money demand in Ukraine. Also, Mannah-Blankson et al. (2004) applied error-correction modeling by using two proxies for financial innovations when researching financial innovation and the demand for money in Ghana: the volume of cash cards transactions in the economy and the ratio of broad money to narrow money. The ratio of broad money to narrow money (M2/M1) was rationalized on the grounds that a greater array of money substitutes will be reflected in broad money (M2) than in narrow money (M1). In view of some possible errors associated with our opinion index and sampling, the proxy M2/M1 was employed as an alternative measure of financial innovations to substantiate the findings from the perceptual index.

An annual time frame of 1987 to 2006 was chosen for constructing the index. Respondents were also to assess the overall development of financial innovation for the period 1963 to 1986 using the rankings for the index. The rationale for timing the index from 1987 instead of 1963 is a result of the findings of Sowa (1997). According to Sowa, for a long time the only tradable financial instruments have been government of Ghana bills. In the face of these financial system inadequacies, the government of Ghana in 1986 instituted a program of reforms that involved liberalizing the financial system using market-based instruments in monetary management. This implies that most of the innovative products currently available occurred after 1986.

The index is by its nature qualitative and aims to get answers on the level of development of financial products according to the following criteria:

- 0 means that the certain financial product or instrument is absent.
- 1 means that the certain financial product or instrument has extremely poor development.
- 2 means that the certain financial product or instrument has poor development.
- 3 means that the certain financial product or instrument has average development.
- 4 means that the certain financial product or instrument has good development.
- 5 means that the certain financial product or instrument is highly developed.

The index of financial innovations has been calculated as follows:

$$FINNOV_t = \frac{1}{\alpha\beta}\sum_{t=1987}^{2006}(CB_t + TB_t + ATM_t + CD_t + CM_t + FB_t + ACH_t + WT_t + Tb_t + EB_t) \quad (6)$$

Where:

- α is the number of received questionnaires on Ghanaian Banking sector for the period of 1987–2006.
- β is the number of financial products/instruments constituting the questionnaire.
- CB is the level of development of corporate bonds in Ghana in period t.
- TB is the level of the development of treasury bills in Ghana in period t.
- ATM is the level of the development of automated teller machines in Ghana in period t.
- CD is the level of the development of credit/debit cards in Ghana in period t.
- CM is the level of the development of collateralized mortgages in Ghana in period t.
- FB is the level of the development of forward contracts in Ghana in period t.
- ACH is the level of the development of automated clearing houses in Ghana in period t.
- WT is the level of the development of wire transfers in Ghana in period t.

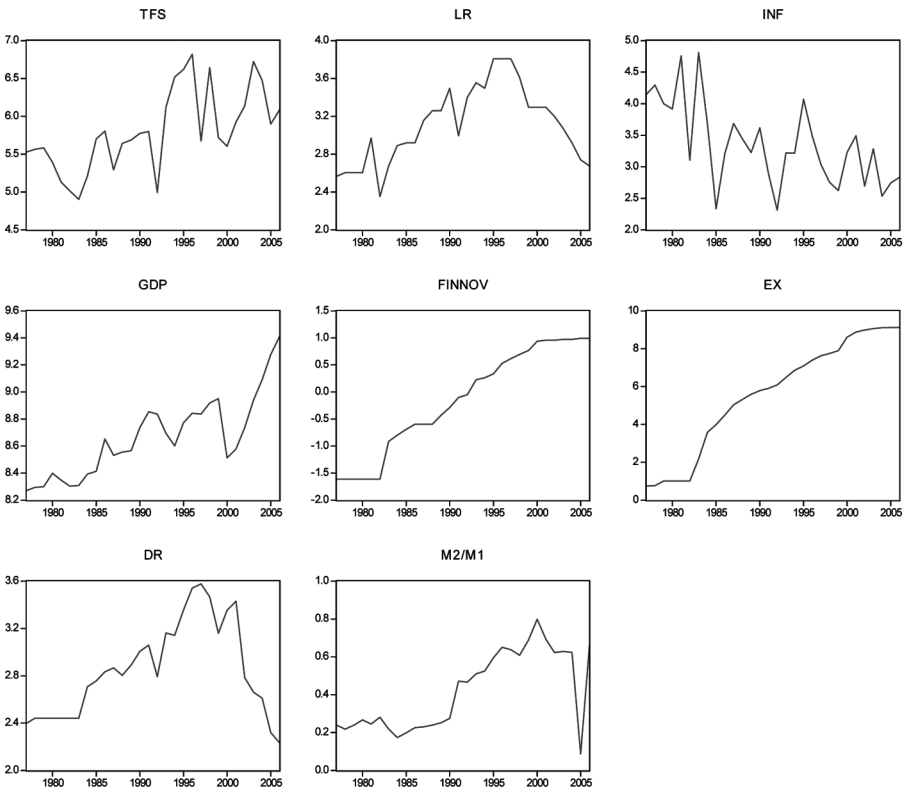

FIGURE 1 Graphical representation of the variables used.

TABLE 1 Descriptive Statistics

	TFS	LR	INF	GDP	FINNOV	EX	DR	M2/M1
Mean	5.8	3.1	3.4	8.7	−0.2	5.6	2.9	0.42
Median	5.7	3.1	3.2	8.6	−0.1	6.0	2.8	0.37
Std. Dev.	0.5	0.4	0.7	0.3	1.0	3.0	0.4	0.21
Skewness	0.3	0.1	0.5	0.6	−0.3	−0.5	0.3	0.17
Jarque-Bera	1.0	1.2	1.3	2.0	2.5	2.6	1.9	3.05
Probability	.6	.6	.5	.4	.3	.3	.4	.22
Sum	174.0	93.2	100.6	259.9	−4.5	167.5	85.6	12.58
Sum Sq. Dev.	8.1	4.8	12.4	2.6	26.7	253.6	4.6	1.26

- Tb is the level of the development of telephone banking in Ghana in period t.
- EB is the level of the development of electronic banking in Ghana in period t.

Data Description and Statistics

Figure 1 and Table 1 report graphical and descriptive statistics of the data used in the study. The Jarque-Bera statistics from Table 1 indicate that the null hypothesis of normality cannot be accepted at a 5% significant level. With the exception of financial innovation and exchange rate, the rest of the variables are positively skewed. The standard deviation gives varying variation in the spread of the variables over the period of study (Figure 1). The lending and deposit rates seem to follow the same trend. Both have continuously decreased since 2000 while financial innovations and exchange rate were trending upward. The plot of inflation rate in Figure 1 exhibits high volatility between 1980 and 2000.

RESULTS AND DISCUSSION

Time Series Characteristics of Annual Data

According to Enders (1995), most macroeconomic time series data are usually nonstationary and hence do not meet the criteria for ordinary least squares (OLS) estimation. A series is nonstationary when their mean, variance, and covariance vary with time. Time-series data typically contain a trend, which must be removed prior to undertaking any estimation. VECMs were estimated to model short-run dynamics of the model. A Dickey and Fuller (1979) unit root test was carried out to establish whether the properties of the data were stationary at the log-levels. As shown in Table 2, they were not stationary. However, these variables became stationary after the first differencing.

Based on the differencing, a Johansen co-integration test was performed for the series to determine the absence or presence of any long-run

TABLE 2 ADF Unit Root Test

Variable	ADF Model	Test Statistic For ADF in Levels	Test Statistic For ADF in First Difference
LTOTSAV	Intercept	1.733	−6.088
LEXRATE	Intercept	−0.264	−10.973
LGDP	Intercept	1.049	−4.122
LDEPRATE	Intercept	−1.805	−6.096
FINNOV	Intercept	0.970	−7.901
LINF	Intercept	−2.551	−9.065
LLENDRATE	Intercept	−1.305	−4.764

Critical: 1% = −3.59; 5% = −2.95; 10% = −2.60.

relationship among the variables. Utkulu (n.d.) posits that co-integration analysis allows nonstationary data to be used to avoid spurious results. It also provides applied econometricians an effective framework for testing and estimating long-run models from actual time-series data. The Max-eigenvalue test indicates one co-integrating equation at the .05 level which, when normalized on DLTOTSAV, yields the result (Table 3).

Table 3 measures the long-run relationship between the explanatory variables and total financial savings (the dependent variable). As hypothesized, due to the fact that the Ghana cedi consistently depreciated against the U.S. dollar, its major trading foreign currency, the exchange rate had a positive correlation with savings. This is consistent with the findings of Montiel & Luis (2008), who claimed that a depreciated real exchange rate raises the domestic saving rate, which in turn stimulates growth by increasing the rate of capital accumulation.

Contrary to most research findings, however, is the negative relationship of deposit rates with savings. This reverse sign could be due to an obvious reason in that nominal deposit rates were generally low while inflation kept rising. This meant that real deposit rates were largely negative. With such rates of interest, there is no incentive to save with banks. This is consistent with the findings of Brownbridge, Gockel & Harrington (2000). They attributed the low savings mobilization prior to 1986 to low interest rates, credit controls, reserve requirements, unorthodox monetary policies, and bad legislation.

However, deposit rates still have a significant impact on savings mobilization in Ghana. A reduced inflation rate and proper sensitization of

TABLE 3 Max-eigenvalue Co-integration Equation Results

Variables	DLEX-RATE	DLGDP	DLINF	DLLEND-RATE	DLDEP-RATE	FINNOV
Coefficients	.1101	.735	.388	.3688	−.1784	.555
Std. errors	.02908	.11784	.04645	.13395	.11631	.18442

financial intermediaries on the vital role deposit rates play on savings mobilization may persuade them to establish appropriate deposit rates that can encourage savers or investors to make deposits. An alternative solution to this could be to reduce the interest rate spread.

In the case of lending rate, any increase in the variable should result in an increase in the amount of savings. An increased lending rate means a higher cost of borrowing to customers and also serves to indicate whether they can easily obtain financing for their needs, as well as their capacity to pay back the loans. When people are constrained from extensive borrowings due to a high lending rate, they are induced to save in anticipation of future consumption needs that cannot be financed through credit. Therefore, lending rate had the expected positive relationship with savings. This finding is consistent with Haron's (2005) findings on the effects of lending rates on conventional bank deposits. He postulated that lending rate represents the interest rate charged for bank loans. Changes in the rate will have a direct relationship with credit available to customers.

Surprisingly, our study found a positive relationship between savings and inflation. According to Deaton (1977), some possible reasons are as follows. First, theory postulates that greater uncertainty should raise savings since risk-averse consumers set resources aside as a precaution against possible adverse changes in income and other factors. Hence, inflation may increase an individual's precautionary savings. Second, inflation can influence savings through its impact on real wealth. If consumers attempt to maintain a target level of wealth or liquid assets relative to income, saving will rise with inflation. Finally, savings may rise in inflationary periods if consumers mistake an increase in general price level for an increase in some relative prices and so refrain from buying.

As predicted, higher growth (GDP) led to increase in savings. A study by Anoruo and Ahmad (2001) utilized co-integration and the VECM to explore the causal relationship between economic growth and growth rate of domestic savings for Congo, Côte d'Ivoire, Ghana, Kenya, South Africa, and Zambia. The results of the co-integration tests suggest that there is a long-run relationship between economic growth and the growth rate of savings. The finding of our research is therefore consistent with their finding.

With regard to financial innovation, which is the variable of interest for this work, there was a positive relationship with savings as conjectured in the long-run but a negative relationship in the short-run (see Tables 2 and 3). The negative relationship between savings and financial innovation in the short-run is realistic due to the kind of products that are presently dominant in Ghana. For example, the most popular innovative product according to the opinion index is ATMs, which obviously facilitates withdrawals far more than deposits. This is consistent with the findings of Derek (2005), who found that in Canada, the proliferation in the availability and the more widespread adoption of electronic payment options have led to dramatic

improvements in the ease, speed, and cost of access to liquid balances. Growths in ATMs, debit and credit cards, online banking, and personal credit lines have all served to reduce transactions and precautionary demand for liquidity. Easier access to funds in liquid saving accounts and easier access to bridge financing through lines of credit to meet liquidity pressures mean that households have less need to save as much for a rainy day or to keep as much on reserve to fund spending. However, in Ghana, entrepreneurs and other businesspeople do not have easy access to funds, and as a result, the only possible reason for this relationship is the easier access to liquid savings accounts.

As consumers become aware of the negative effects of these products on their savings, some may reduce or even abandon the usage of these instruments. The results will be improved savings. Mishra (2008a) studied the economic growth implications of financial innovations that emerge in more sophisticated and complete financial markets and concluded that financial innovations in the form of new financial instruments, services, institutions, technologies, and markets mobilize financial surpluses from ultimate savers and direct them into the most productive investment avenues. This action raises the rate of capital accumulation and, hence, the rate of economic growth.

Results of the Vector Error Correction Model

Since the financial saving function and its corresponding explanatory variables exhibit co-integrating (long-run) relationships, the VECM was estimated to model short-run dynamics of the system. The size and statistical significance of the error correction term (ECT) measure the extent to which each dependent variable has the tendency to return to its long-run equilibrium. Results from the VECM test are shown in Table 4. The results reveal that the ECT is negative and statistically significant at a 10% level for the saving function. This implies that most of the dependent variables have the

TABLE 4 Estimation of Error Correction

Variable	Coefficient	Standard Error	T-statistic
D(DLLENDRATE(−1))	.642427	.14543	4.41742
D(DLDEPRATE(−1))	−.660499	.12765	−5.17422
D(DLEXRATE(−1))	−.082438	.03360	−2.45355
D(DLGDP(−1))	−.626578	.37656	−1.66394
ECT(−1)	−.263266	.13681	−1.92428
FINNOV(−1)	−.227518	.25581	−0.88939

Note. R^2 0.831311 Log likelihood 37.63796.
Adjusted R^2 .736845 Mean dependent 0.006921.
SE of regression 0.139520 SD dependent 0.232846.
F statistic 8.800127 Sum sq resids 0.356687.

TABLE 5 Max-eigenvalue Co-integration Equation Results (M2/M1 as a Proxy for Financial Innovation)

Variables	DLEX-RATE	DLGDP	DLINF	DLLEND-RATE	DLDEP-RATE	FINNOV
Coefficients	.181069	1.1284	.60045	−.3282	−.178	.19824
Std. errors	.04629	.18979	.0753	.2063	.11631	.1343

tendency to adjust to any deviations in the long-run equilibrium. The significance of this ECT provides further evidence for a co-integration relationship among the variables in the saving function.

The estimated coefficient of the ECT indicates that the saving function corrects about 26% of the system disequilibrium in a single year. The estimated coefficients of the lagged first different variable capture short-run effects (Engle & Granger, 1987). The results reveal that in the short-run, all of the variables (except lending rate) show negative effects on the saving function. In a similar vein, all the variables (except financial innovation) are significant. This indicates that for lending rates, about 64% of the deviations from the long-run relationship are corrected in the next quarter. With regard to deposit rate, 66% of the deviations from the long-run relationship are corrected in the next quarter, while 8.2% of the deviations from the long-run relationship with respect to exchange rate are corrected in the next quarter. Finally, about 63% of GDP deviations from the long-run relationship are corrected in the first quarter.

Results Using M2/M1 as a Proxy for Financial Innovation

The co-integration equation results (Table 5) indeed corroborated the findings based on the perceptual index. Financial innovation had a positive long-run relationship with financial savings. However, the error correction model (Table 6) was not robust even though the short-run relationship was once again negative.

TABLE 6 Estimation of Error Correction (M2/M1 as a Proxy for Financial Innovation)

Variable	Coefficient	Standard error	T Statistic
D(DLLENDRATE(−1))	.132230	.16871	0.78375
D(DLDEPRATE(−1))	−.247974	.14206	−1.74561
D(DLEXRATE(−1))	−.026147	−.026147	−.026147
D(DLGDP(−1))	−.773958	0.37999	−2.03679
ECT(−1)	−.008786	.02942	.29861
FINNOV(−1)	−.050107	.27197	−.18424

Note. R^2 .464677 Log likelihood 15.41108.
Adjusted R^2 .330846 Mean dependent 0.006775.
SE of regression 0.188078 SD dependent 0.229919.
F statistic 3.472123 Sum sq resids 1.131942.

CONCLUSIONS

The main goal of this study was to find the effects of financial innovation on financial savings. The theoretical basis is that financial sector development induces savings mobilization. The conceptual framework therefore sought to highlight the role financial innovations play within financial sector development to achieve this important objective. Empirical results have been mixed. Both the perceptual index and M2/M1 as a proxy for financial innovation exhibited a positive long-run relationship but a negative short-run relationship. It is also clear, from the study that macroeconomic variables (e.g., GDP, inflation, lending and deposit rates, exchange rates) have a significant effect on savings.

Financial innovation has attracted much attention in the financial literature in developed and developing countries due to its implications for economic growth. The crux of this study was that the growth of financial innovation led to a reduction in financial savings in the short-run for one principal reason: the present innovative products in Ghana encourage withdrawals rather than savings. The new savings-related products are yet to be given the publicity they deserve. This conforms with some empirical studies that proposed that easier access to funds in liquid saving accounts and easier access to bridge financing through lines of credit to meet liquidity pressures mean that households have less need to save as much for a rainy day or to keep as much on reserve to fund spending (Derek, 2005; Parker, 1999). In the long-run, however, as consumers become aware of the negative effects that these products have on their savings, some may reduce or even abandon the use of these instruments. This, thus, results in an improvement in savings.

Policy Implications

On the basis of the above findings, this study suggests some key issues for policy consideration. First, policy makers should encourage financial institutions to channel investment in financial innovation toward products that will attract deposits rather than the current emphasis on electronic cards that simply edge depositors to spend their money due to easy access. Closely connected to this, commercial banks in Ghana should promote their savings and deposit products that reward customers. The researchers' observation is that even though most commercial banks have developed products other than traditional savings and current deposit accounts that could induce savings, many such products have not been brought to the public's attention.

Second, a precondition for efficient savings mobilization is a stable macroeconomic environment. Thus, in order to ensure effective savings mobilization, the government of Ghana should endeavor to stabilize the macroeconomic environment through implementing sound policies, specifically the margin between lending and deposit rates. Higher inflation rates

also render deposit rates unattractive. It is therefore recommended that efforts should be geared toward reducing the domestic inflation rate to arrest its negative impact on both real rates and spread. As well, the central bank in collaboration with the financial institutions should ensure that those who hold savings accounts receive realistic deposit rates.

Finally, the volatile nature of the exchange rate market in Ghana also means that firms and individuals dealing in international business need to make use of forward contracts in order to hedge their payables and receivables. This will enable them to lock in and avoid the problem of exchange rate volatility. It is therefore recommended that financial institutions endeavor to introduce forward contracts in the range of their products and services.

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