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Financial development and economic fluctuations*

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Abstract

This paper provides empirical evidence on the link between financial system development and business cycles volatility. Previous studies have shown that economic fluctuations become less pronounced as the financial system of a country develops. This paper reveals that this result is not apparent when dealing with shorter horizons and when considering the behavior of other components of output, such as private investment and consumption. Using a dynamic Generalized Method of Moments technique on a cross-country panel data set, this paper shows that financial development may actually contribute to increased consumption volatility.

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1. Introduction

The importance of financial development in fostering investment and economic growth has been the focus of a vast literature (see, for example, King and Levine, 1993; Levine, 1997a; Neusser and Kugler, 1998; Beck, Levine and Loayza, 1999; and Schich and Pelgrin, 2002). More recent works have also shown that financial development contributes to reducing the volatility of the business cycles (see Denizer, İyigün and Owen, 2002; and Ferreira da Silva, 2002).

This paper shows that the link between smoother economic fluctuations and the development of the financial system is not straightforward in the short run. Using a dynamic Generalized Method of Moments (GMM) technique on a cross-country panel data set, the empirical results presented here indicate that, although financial development reduces the volatility of investment, it has no significant

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effect on output volatility, and it actually leads to increased consumption volatility.

Schumpeter (1911) pointed out that a well-functioning financial system promotes growth by allowing funds to be channeled to those entrepreneurs more capable of implementing successful projects. Economies of specialization arise as financial institutions develop expertise in directing resources of uninformed savers to borrowers, in monitoring managers and exerting corporate control. Developed financial systems also facilitate trading, hedging, diversifying, and pooling of risk in a more efficient manner (see Levine, 1997b).

From a theoretical perspective, the factors that allow financial development to promote growth should also lead to smother economic fluctuations. For example, one could argue that as financial systems become more capable of screening potential borrowers, the likelihood that projects with greater probability of failure are externally financed reduces, minimizing the fluctuations in economic activity. Alternatively, the "balance sheet view" points out that financial institutions' improved ability in gathering and processing information about debtors reduces agency and verification costs, minimizing credit markets' imperfections. Because nominal and real shocks to economic activity are magnified by credit market imperfections, reducing the degree of these imperfections should reduce the volatility of the business cycles (see Bernanke and Gertler, 1995; Hubbard, 1997; and Bernanke, Gertler and Gilchrist, 1998).

Take, for example, the case of a negative nominal shock to economic activity. According to the "balance sheet view", a contractionary monetary policy and the consequent increase in interest rates weaken the balance sheet position of firms through three channels. First, the rising interest rates increase the interest payments on the firms' debt, reducing their cash flows. Second, as interest rates rise, asset prices fall, and this causes the value of the firms' collateral to decrease. Finally, the fall in consumers' spending in response to the increase in interest rates reduces firms' revenues (since the firms' costs remain relatively fixed, the fall in revenue decreases firms' net worth and creditworthiness). All these events raise agency costs, increasing the external financing premium. The external financing premium, in turn, amplifies the shocks to economic activity by increasing the fluctuations in borrowing, spending and investment. From a cross-country perspective, financial development should reduce the size of the external financing premium by reducing agency costs, thereby reducing the impact of real and nominal shocks to economic activity.

Nevertheless, situations could arise in which financial development actually increases business cycles volatility. For instance, if markets

become more competitive as the financial system develops, then banks may tend to behave more aggressively in order to keep their market shares, and may implement more lax credit standards. Friedman (1993: 38) argues that "once even a few lenders assume dangerously aggressive postures, it becomes entirely rational indeed, competitively necessary, for others to do so as well" (see also Weinberg, 1995). Thus, it is a matter of finding empirical support to whether the effect of reduced asymmetric information outweighs any increased volatility that would occur due to greater competition among banks.

After controlling for other factors that may affect the fluctuations in economic activity, the empirical tests conducted here indicate that output, investment and consumption present different behavior as the financial system develops. Although in the long run the volatility of the business cycle component of the output, investment and consumption series is reduced in countries with more developed financial system, the short-term responses are mixed[1]. As financial systems develop, investment volatility tends to fall, but output volatility shows no significant response and consumption volatility seems to increase.

The finding that consumption volatility increases with financial development is puzzling, as one would expect financial development to lead to greater consumption smoothing. One possible explanation for this result is that, contrary to the life-cycle/permanent income hypothesis, individuals do not attempt to use borrowing and saving to smooth the path of consumption. Shea (1995), for example, has shown that, contrary to the predictions of the life-cycle/permanent income hypothesis, consumption is sensitive to predictable changes in income, and this finding is not due to the presence of liquidity constraints. Alternatively, one could argue that, as the financial system develops, liquidity constraints become less binding not only in the present, but also in the future. As a result, people need to be less concerned about consumption smoothing and need to save less for precautionary reasons, causing consumption more responsive to short-term fluctuations in income (see Blanchard and Mankiw, 1988; and Zeldes, 1989).

So far, most studies on business cycles have overlooked the link between cycles' volatility and financial development (see Watson, 1994; Ramey and Ramey, 1994; and Basu and Taylor, 1999). This paper builds on my previous work (see Ferreira da Silva, 2002) with the difference that the referred study focused on the impact of financial development on the volatility of the business cycles from a long-term perspective. Here,

[1] Henceforth, the volatility of the business cycle component of the output, investment and consumption series and the terms "volatility of output, of investment and of consumption" will be used interchangeably.

the focus is shifted to the short run, and the surprising results outlined above emerge.

The present paper also differs from the existing empirical literature in terms of the econometric methodology used, and the control variables included in the tests. Denizer, İyigün and Owen (2002) have conducted a similar analysis as the one undertaken here, and found that financial development leads to reduced volatility of output, consumption and investment in the short-run. This paper has reached different outcomes mainly because of three reasons: first, Denizer, İyigün and Owen (2002) rely on a simple fixed effects model, while here a dynamic GMM method is used; second, their measure of volatility of the output, consumption and investment series did not rely on the use of band-pass filters, a standard approach of the new business cycles literature; finally, they fail to include the Solow residual as a control variable (the Solow residual has proven to be significant in explaining the fluctuations in economic activity).

The second section of this paper describes the data used, while the third section briefly explains the methodology applied. The fourth section analyzes the empirical results and the fourth section concludes.

2. Data

The data set includes forty countries' time-series data for the period ranging from 1960 and 1997[2]. The selection of the countries included in each test and the sample period was determined so that it would match with that of other recently published work on the link between business cycles volatility and financial development (see Denizer, İyigün and Owen, 2002; and Ferreira da Silva, 2002). Country specific information was obtained from the International Finance Statistics Yearbook (several editions) and from the OECD Statistical Compendium (1998). Whenever data inconsistency was found among different editions of the International Finance Statistics Yearbook, the data was spliced retaining the values of the most recent edition (2000).

The tests are run using the volatility of the business cycle component of the output, investment and consumption series as dependent variables. Consumption and Investment are calculated by multiplying real GDP by the ratio of nominal consumption over nominal GDP and by the ratio of nominal investment to nominal GDP, respectively.

[2] The countries included are Argentina, Australia, Austria, Belgium, Canada, Chile, Colombia, Denmark, Ecuador, Egypt, Finland, France, Germany, Greece, India, Indonesia, Ireland, Israel, Italy, Japan, Malaysia, Netherlands, New Zealand, Nigeria, Norway, Pakistan, Philippines, Portugal, South Korea, Spain, Sweden, Switzerland, Turkey, United Kingdom, United States and Uruguay. See Appendix 1 for the list of all the variables included in the tests.

2.1 Indicators of financial system development

An ideal indicator of "financial system development" would account for the efficiency of financial institutions in processing information, monitoring and managing risk. The indicators used in the present study were first developed by King and Levine (1993), and since then have been used by several empirical works related to financial development (among others, see Beck, Levine and Loayza, 1999; and Schich and Pelgrin, 2002). These indicators constitute only proxies of the financial markets' ability to overcome asymmetric information problems, since it is practically impossible to obtain accurate measures of financial development, especially on a cross-country basis.

Four variables are used as indicators of financial system development. The variable *LLY* measures the size of the formal financial intermediary sector. Larger financial systems are likely more efficient in conducting risk management, in monitoring and in processing information than smaller ones. In addition, one can infer that whenever the financial intermediary sector of a country is larger than that of other countries, these greater flows of resources merely reflect the greater profitability and efficiency of the financial sector in that country. *LLY* is calculated as the ratio of a country's liquid liabilities to its GDP.

The second indicator measures the relative importance of deposit money banks in the financial system of a country. The variable *BANK* is calculated as the fraction of the total assets of the financial intermediary system that belongs to deposit money banks[3]. There are two problems with this measure, however. First, as pointed out by King and Levine (1993), deposit money banks are not the only financial institutions that provide risk management, monitoring, information processing and efficient allocation of resources. Second, in theory, central banks may actually be able to provide those services efficiently.

The last two indicators of financial development measures the amount of credit directed to the private sector. According to King and Levine (1993), financial systems that allocate a greater share of their resources to the private sector are likely to evaluate credit more efficiently that those systems whose resources flow more intensely to state-owned enterprises. The variable *PRIVATE* is calculated by dividing the amount representing the claims to the non-financial private sector by the total domestic credit[4]. *PRIVY*, in turn, is found by dividing the claims to the non-financial private sector by the GDP.

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[3] The total assets of the financial intermediary system are equal to the sum of the assets of deposit money banks and the domestic assets of the central bank.

[4] Total domestic credit excludes credit to domestic money banks.

At least one shortcoming associated with the use of these last two indicators can be pointed out. Financial systems that channel credit to state-owned enterprises are not necessarily less developed, as lending to public enterprises may the optimal choice of financial institutions that expect governments to honor their debts in any circumstance. A negative link between these variables and business cycles volatility only suggests that the prevalence of private credit yields reduced economic activity volatility.

Researchers have pointed out that some countries' financial systems rely more on "universal banks" (German model of financial intermediation or bank-based finance), while in other countries adopt the Anglo-American financial system style, in which stock markets and banks with limited functions have a more prominent role (see, for example, Hellwig, 1991; and Black and Moersch, 1998). Ferreira da Silva (2002) has shown that such distinction between bank-based finance and market-based finance is not relevant with regards to business cycles volatility. Moreover, empirical evidence suggests that bank and stock market development tend to occur concurrently, and some countries are gradually moving towards some intermediate system with features of both German and Anglo-American financial systems (see Steinherr, 1998; and Levine 2002).

2.2 Control Variables

Several variables are included in the tests in other to account for the importance of other determinants of business cycles volatility. These variables are: the Solow residual, the average inflation, government expenditures, openness to international trade, and exchange rate volatility.

Technological shocks to economic activity are represented by the volatility of the Solow residual (σ_{SOL}). The residual is equal to the change in the log of real GDP minus (1-α) times the change in the log of employment, where α is the capital share of output (see Kydland and Prescott, 1982; Backus, Kehoe and Kydland, 1992; and Karras and Song, 1996)[5].

The average inflation (*MPOLICY*) is used to proxy for the stance of monetary policy, while the variable *GOV* (the ratio of government

[5] The usual practice is to set the capital share equal to 0.36. Note that, by using this approach to calculate the technological shocks, we ignore the possibility that some countries may not have a Cobb-Douglas production function with constant returns to scale, or that some countries may have different capital shares. A second, but minor problem is that we do not take into account α times the change in capital stock (see Backus, Kehoe and Kydland, 1992 for their explanation). Yet, the lack of data renders alternative approaches unfeasible for the moment.

consumption expenditure to GDP) accounts for the effect of fiscal policy on the volatility of economic fluctuations.

International trade and exchange rate policies are also often linked to the volatility of business cycles. Openness to international trade may bring greater or reduced fluctuations in economic activity: economies with fewer barriers to trade are more vulnerable to shocks originated abroad, but they are also more capable of adjusting smoothly to domestic shocks by exporting them. The variable *OPENNESS* is calculated as the ratio of total trade to GDP (total trade equals the sum of exports and imports).

The impact of exchange rate policies is also ambiguous. Fixed or flexible exchange rate regimes will respond differently depending on whether the shock has a monetary or fiscal origin. *EXCFLEX* equals to the absolute value of the change in the exchange rate (SDRs per unit of national currency).

Finally, Ramey and Ramey (1994) have pointed out that there is a negative and statistically significant link between business cycles volatility and long-term growth. *LTGROWTH* is estimated as the growth rate in the trend component of the log of real GDP per capita.

3. The methodology

The time series data for each country is divided into six time segments: 1961-66, 1967-72, 1973-78, 1979-84, 1985-90 and 1991-97 (thus, each country has six observations for each variable). Using panel data allows one to analyze how the development of the financial system affects the volatility of the business cycles within a country over time. In addition, panel data analysis takes into account the possibility that all regressors are actually endogenous variables, which is likely in the present study.

The interpretation of the panel data regressions is different from that of the cross-section results: while in the cross section regressions one is analyzing how different *levels* of financial development affect the *level* of business cycles volatility across countries, in the panel regressions the concern is on how *changes* in financial development over time leads to *changes* in business cycles volatility.

In accordance with recent research in business cycles, this study uses a Band-Pass filter (BP filter) to isolate the business cycle component of the output, investment, consumption and the Solow residual time series (see, for example, Stock and Watson, 1998; Hornstein, 1998; Baxter and King, 1999; and Basu and Taylor, 1999)[6]. Then, the standard deviation of

[6] BP filters are moving-averages designed such that the researcher can determine ex-ante the periodicities of the business cycles. In other words, BP filters eliminate the components of the

these business cycle components of each of these variables is calculated over the time segments indicated above.

With regards to the monetary policy indicator, it is represented by the average inflation rate for each time segment. For all other control variables and for the financial development indicators, the median of the series values for each time period is used instead.

The econometric tests are conducted using a Generalized Method of Moments (GMM) technique. If the variables included as regressors are endogenous, the fixed effects model usually employed in panel data studies yields biased estimates. The solution proposed is the use of a dynamic GMM technique (see Arellano, 1989; and Greene, 1997). The first difference of the dependent variable is regressed on the first difference of the independent variables and on the second difference of the dependent variable:

$$\sigma_{m_t} - \sigma_{m_{t-1}} = \beta_1 + \beta_2 (X_t^1 - X_{t-1}^1) + \beta_3 (X_t^2 - X_{t-1}^2) + \beta_4 (\sigma_{m_{t-1}} - \sigma_{m_{t-2}}) + \beta_5 \eta_i + \beta_6 \mu_j$$

where σ_m equals the volatility of the business cycle component of the output, investment or consumption series; X_t^1 equals *BANK*, *LLY*, *PRIVATE* or *PRIVY*, X_t^2 is the matrix of control variables (σ_{SOL}, *MPOLICY*, *GOV*, *OPENNESS*, *EXCFLEX* and *LTGROWTH*), η_i is a vector of country dummies, and μ_j is a vector of time segment '*t*' dummies.

The inclusion of the second difference of the dependent variable as a regressor, and the fact that X_t^1 and X_t^2 are likely endogenous yields biased estimates when applying the fixed effects model. When dealing with this problem, Arellano (1989) has suggested the use of the lagged levels of X^1, X^2 and σ_m as instruments[7].

Although this approach may have some shortcomings, lack of data availability yields more advanced approaches inapplicable. For instance,

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data with frequencies out of a pre-specified range. This paper uses the filter designed by Baxter and King [1999]. This filter removes unit roots, rendering the time-series stationary. In addition, the filter does not alter the timing relation of the variables, it isolates the business cycle frequencies without re-weighting components, it constitutes an optimal approximation to the ideal band-pass filter and it generates business cycles components that are independent of the length of the sample period.

[7] Arellano (1989) shows that the use of lagged levels is superior to the alternative option of using of lagged differences.

the system method suggested by Beck, Levine and Loayza (1999) is only valid if the number of cross-section units is very large, but lack of data to calculate the Solow residual implies that there would be data available to run such system for only twenty-nine countries[8].

Prior to calculating the GMM estimates, the sample of moments was 'prewhitened', by applying a vector auto-regression VAR(1). The 'Bartlett Kernel' option was then selected to insure that the covariance matrix of the sample moments is positive semi-definite, while the 'Andrews Method' was used to determine how the weights given by the kernel change with the lags of the autocovariances in the computation of the covariance matrix of the sample moments.

4. Tests results

The following main results emerge from panel data regressions:

- In the short-run, output volatility is largely irresponsive to changes in financial development. Yet, fluctuations in investment become smoother and consumption volatility surprisingly increases in response to changes in financial development over short horizons.
- The volatility of the Solow residual is consistently positively related to business cycles volatility and, with very few exceptions, the coefficient on this variable is statistically significant at least at the 5% confidence level.
- The instruments chosen are considered informative: the number of observations times the J statistic is always lower than the table value for $\chi^2_{.05}(l\text{-}k)$ (the null hypothesis that the over-identifying restrictions are satisfied is accepted in all tests).

The following sections discuss in detail the results outlined above, and points out possible explanations for the puzzling finding that consumption volatility actually increases as the financial system develops.

4.1 Output volatility: panel data results

In the short run, changes in financial development seem not to be related to changes in the business cycle component of the output series (see Table 1). Although increases in financial development – as measured by *BANK*, *LLY* and *PRIVY* – are associated with decreases in the volatility of output during economic fluctuations, this relationship is not statistically significant. In addition, the coefficient on the variable *PRIVATE* is actually positive, but this too is not a significant result. This

[8] The system method could be applied without including the Solow residual, but the results would be questionable, since the Solow residual constitutes a significant factor in determining business cycles volatility.

is an interesting outcome, since previous results have show that financial development does lead to decreases in output volatility in the long run[9].

Table 1

Dependent Variable: Change in the Volatility of Output ($\Delta\sigma_{Yt}$)

FDEV =	*BANK*	*LLY*	*PRIVATE*	*PRIVY*
Constant	-0.0003	-0.002	-0.005	-0.013***
	(-0.130)	(-0.685)	(-1.321)	(-2.771)
$\Delta FDEV_t$	-0.009	-0.004	0.008	-0.004
	(-1.017)	(-0.909)	(1.493)	(-0.892)
ΔGOV_t	0.026*	0.019	0.004	0.001
	(1.694)	(1.228)	(0.178)	(0.085)
ΔMPI_t	0.0001***	0.0001***	0.0001*	-0.000002
	(4.030)	(3.156)	(1.738)	(-0.067)
$\Delta\sigma_{SOLt}$	0.883***	0.819***	1.470***	1.634***
	(5.802)	(4.624)	(9.531)	(8.634)
$\Delta\sigma_{Yt-1}$	0.144**	0.090	-0.054	-0.208*
	(2.021)	(1.223)	(-0.732)	(-1.853)
$\Delta OPENNESS_t$	-0.001	-0.001	-0.004	0.007
	(-0.166)	(-0.120)	(-0.629)	(1.008)
$\Delta LTGROWTH_t$	-0.008	-0.009	0.012	0.024
	(-0.172)	(-0.185)	(0.328)	(0.542)
$\Delta EXCFLEX_t$	0.0187	0.009	-0.001	-0.033
	(1.382)	(0.552)	(-0.032)	(-1.600)
observations	192	192	192	192
J-Statistic	0.062	0.070	0.067	0.044
n x J-Statistic	11.907	13.404	12.847	8.517
$\chi^2_{.05}(1)$	15.507	15.507	15.507	15.507

Notes:
(1) FDEV = Financial Development Indicator
(2) Numbers reported in parenthesis are the t-statistics; *, ** and *** denote significance levels of 1%, 5% and 10%
(3) Weighting Matrix: the GMM estimates will be robust to heteroskedasticity and autocorrelation of unknown form (Kernel Option: Bartlett; Bandwidth: Andrews; Prewhitening)
(4) Country and time dummy variables included
(5) Instruments: two lags of each independent variable, two lags of the dependent variable and the country/time dummies

The volatility of the Solow residual is positively related to output volatility. This outcome is not only statistically significant (1% level of confidence), but also economically relevant, since the coefficient on the $\Delta\sigma_{SOLt}$ is by far the largest in size. This result should be interpreted with caution, however. The Solow residual is a crude measure of technological

[9] Denizer, İyigün and Owen (2002) and Ferreira da Silva (2002) have shown that, in a cross-section framework, financial development is negatively related to the volatility of the fluctuations in output during business cycles.

shocks, and its measurement relies on strong assumptions with regards to the production function; moreover this variable may be capturing not only technological shocks, but also quality of human capital, on-the-job training and vintage effects (see Hall and Jones, 1998).

The positive impact of changes in average inflation on output volatility is also statistically significant in three out of the four regressions, although the small size of the coefficient of this variable indicates that its economic impact is not relevant. The changes in the level of government expenditures, in turn, tend to be positively related to output volatility, but the other control variables do not exhibit a consistent performance.

4.2 Investment volatility: panel data results

The coefficients of the financial development indicators remain negative in sign when running the investment volatility panel-data regressions (see Table 2). As the indicators of financial development rise, σ_I falls in the short run. *BANK* and *LLY* are statistically significant at the 1% confidence level, while *PRIVY* is significant at the 5% level and *PRIVATE* is not statistically significant. Thus, financial development does bring less volatility in investment during the business cycles: the greater ability of the financial system in screening and monitoring borrowers reduces the external finance premium and, thereby, the volatility investment activity.

Again, the coefficient of the change in the volatility of the Solow residual is positively related to σ_I, statically significant and economic relevant in all but the *LLY* regression. Increases in openness in the short-run tend to be associated with reduced changes in investment volatility, while increases in government expenditure seem to reduce investment volatility. Changes in average inflation and in long-term growth, in turn, are positively related to increases in investment volatility. None of the coefficients of these control variables are statistically significant.

Table 2
Dependent Variable: Change in the Volatility of Investment ($\Delta\sigma_{It}$)

FDEV =	*BANK*	*LLY*	*PRIVATE*	*PRIVY*
Constant	0.0069	0.010	-0.014	0.0005
	(0.559)	(0.748)	(-1.121)	(0.036)
$\Delta FDEV_t$	-0.101***	-0.041***	-0.016	-0.026**
	(-2.908)	(-3.262)	(-0.670)	(-2.172)
ΔGOV_t	0.026	-0.080	-0.003	-0.064
	(0.560)	(-1.561)	(-0.057)	(-1.279)
ΔMPI_t	0.0001	0.0001	0.0001	0.0001
	(1.680)	(0.699)	(1.551)	(0.876)
$\Delta\sigma_{SOLt}$	0.992**	0.380	1.343***	1.150*
	(1.991)	(0.732)	(2.481)	(1.961)
$\Delta\sigma_{It-1}$	0.071**	0.084***	0.100***	0.089***
	(2.038)	(2.572)	(3.826)	(2.956)
$\Delta OPENNESS_t$	-0.007	-0.013	-0.006	-0.007
	(-0.382)	(-0.656)	(-0.290)	(-0.341)
$\Delta LTGROWTH_t$	0.091	0.021	0.134	0.070
	(0.572)	(0.138)	(0.872)	(0.483)
$\Delta EXCFLEX_t$	-0.013	0.025	-0.015	0.031
	(-0.198)	(0.397)	(-0.243)	(0.508)
observations	192	192	192	192
J-Statistic	0.032	0.052	0.032	0.029
n x J-Statistic	6.224	10.078	6.198	5.604
$\chi^2_{.05}(1)$	15.507	15.507	15.507	15.507

Notes:
(1) FDEV = Financial Development Indicator
(2) Numbers reported in parenthesis are the t-statistics; *, ** and *** denote significance levels of 1%, 5% and 10%
(3) Weighting Matrix: the GMM estimates will be robust to heteroskedasticity and autocorrelation of unknown form (Kernel Option: Bartlett; Bandwidth: Andrews; Prewhitening)
(4) Country and time dummy variables included
(5) Instruments: two lags of each independent variable, two lags of the dependent variable and the country/time dummies

4.3 Consumption volatility: panel data results

The consumption regressions show that, contrary to the investment and output results, changes in the financial development indicators are positively associated with changes in consumption volatility (see Table 3). This is a somewhat surprising result, as one would expect that financial development should facilitate consumption smoothing. The coefficients of *LLY* and *PRIVY* are significant at the 1% level, the coefficient of *BANK* is significant at the 5% level and the coefficient of *PRIVATE* is not statistically significant.

This outcome seems to indicate that consumers do not attempt to smooth consumption, as predicted by the Life-Cycle/Permanent Income

Hypothesis. Proponents of this theory suggest that one reason empirical results do not show support for the hypothesis is that the presence of liquidity constraints makes smoothing consumption unviable. Thus, one would expect that as the financial system develops, and consumers have better access to credit, the volatility of consumption would decline. Zeldes (1989) has suggested that not only the presence of liquidity constraints in the present matters, but also the possibility of future liquidity constraints lowers consumption. Thus, even impatient household would have some saving if there is a possibility that liquidity constraints may bind in the future.

Table 3

Dependent Variable: Change in the Volatility of Consumption ($\Delta\sigma_{Ct}$)

FDEV =	*BANK*	*LLY*	*PRIVATE*	*PRIVY*
Constant	0.002	0.006**	0.007**	0.006**
	(0.677)	(2.031)	(2.121)	(2.176)
$\Delta FDEV_t$	0.028**	0.014***	0.010	0.017***
	(2.054)	(2.592)	(0.933)	(3.922)
ΔGOV_t	0.041	0.048*	0.061*	0.080***
	(1.144)	(1.740)	(1.745)	(3.036)
ΔMPI_t	-0.00002	-0.00001	-0.000001	0.00001
	(-0.558)	(-0.415)	(-0.038)	(0.444)
$\Delta\sigma_{SOLt}$	0.965***	1.580***	1.377***	1.304***
	(3.152)	(5.620)	(5.664)	(5.414)
$\Delta\sigma_{Ct-1}$	-0.040***	-0.035***	-0.036***	-0.029***
	(-3.565)	(-3.666)	(-4.037)	(-3.338)
$\Delta OPENNESS_t$	-0.011	-0.013	-0.023*	-0.021*
	(-0.854)	(-1.052)	(-1.743)	(-1.729)
$\Delta LTGROWTH_t$	-0.014	-0.035	-0.055	-0.033
	(-0.215)	(-0.513)	(-0.751)	(-0.486)
$\Delta EXCFLEX_t$	0.063**	0.067***	0.055***	0.047**
	(2.156)	(2.763)	(2.425)	(2.207)
#observations	192	192	192	192
J-Statistic	0.077	0.073	0.075	0.072
n*J-Statistic	14.875	13.966	14.482	13.883
$\chi^2_{.05}(1)$	15.507	15.507	15.507	15.507

Notes:

(1) FDEV = Financial Development Indicator

(2) Numbers reported in parenthesis are the t-statistics; *, ** and *** denote significance levels of 1%, 5% and 10%

(3) Weighting Matrix: the GMM estimates will be robust to heteroskedasticity and autocorrelation of unknown form (Kernel Option: Bartlett; Bandwidth: Andrews; Prewhitening)

(4) Country and time dummy variables included

(5) Instruments: two lags of each independent variable, two lags of the dependent variable and the country/time dummies

Greater financial system development implies that there is a lower likelihood that liquidity constraints will bind in the future. In addition, it also implies that households need to set less income aside for precautionary reasons. As Blanchard and Mankiw (1988) pointed out, the marginal propensity to consume may vary depending on the level of uncertainty. As the financial system develops, uncertainty regarding binding liquidity constraints reduces, and consumption shows greater responses to shocks in economic activity.

Similarly to the output and investment volatility regressions, changes in the volatility of the Solow residual perform consistently in all consumption volatility regressions: the coefficients of this variable are positive and statistically significant at the 1% confidence level. Increases in government expenditures and in exchange rate flexibility are associated with increases in consumption volatility, while changes in openness and in long-term growth are negatively related to changes in consumption volatility. However, the coefficients of these variables are almost always statistically insignificant. With regards to average inflation, the results are inconclusive with respect to the coefficient sign and not statistically significant.

This unexpected positive link between changes in consumption volatility and in financial development may be the reason why changes in the volatility of output fluctuations seem not to be responsive to changes in financial development. Although improvements in financial development reduce the volatility in the business cycle component of investment fluctuations, the opposite is true for consumption volatility. As investment and consumption constitute the most significant components of output, and the investment response is offset by the consumption response, in the end, output volatility does not seem to be influenced by changes financial development.

6. Concluding remarks

Despite previous empirical evidence that financial development leads to smoother fluctuations in economic activity in long time horizons, the overall result that emerges from the panel-data regressions is that the link between the volatility of business cycles and financial system development of a country is not straightforward in the short run.

Although investment volatility reduces as a country experiences growth in its financial sector, changes in the volatility of output during business cycles are largely irresponsive to financial development. Moreover, the empirical results presented above suggest that consumption volatility surprisingly increases as commercial banks expand their role in the financial sector (relative to central banks), as the size of the financial sector increases and as more credit is channeled to

the private sector rather than to the government. The increased consumption volatility in response to greater financial development constitute empirical support for researchers who have pointed out that as liquidity constraints become less binding and uncertainty reduces, consumption can show 'excess sensitivity' to fluctuations in income.

The results also show that the Solow residual have a significant role in explaining cross-country variations in business cycles volatility, not only in the long run, but also in short horizons. Due to the problems associated in measuring what part of the Solow residual actually proxies for technology shocks and what part captures other determinants of productivity, future research should focus on finding the extent of technological innovations.

The other control variables do not exhibit a consistent pattern. Surprisingly, when including the financial development indicators, these other control variables largely lose the statistical significance once attributed to them by other international business cycles studies (see Ramey and Ramey, 1994; and Karras and Song, 1996).

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Appendix 1

List of Variables:

INDICATORS OF ECONOMIC ACTIVITY

σ_Y	Standard deviation of the business cycle component of the real GDP series
σ_I	Standard deviation of the business cycle component of the real private investment series
σ_C	Standard deviation of the business cycle component of the real private consumption series

INDICATORS OF FINANCIAL DEVELOPMENT

LLY	Liquid Liabilities as a fraction of GDP*
BANK	Assets of deposit money banks as a fraction of the total assets of the financial intermediary system*
PRIVATE	Claims to the non-financial private sector as a fraction of the total domestic credit*
PRIVY	Claims to the non-financial private sector as a fraction of the GDP*

CONTROL VARIABLES

σ_{SOL}	Standard deviation of the business cycle component of the Solow residual series
MPOLICY	Average inflation rate
GOV	The ratio of government consumption expenditure to GDP*
OPENNESS	The ratio of total trade to GDP, where total trade equals the sum of exports and imports*
EXCFLEX	The absolute value of the change in exchange rate, which is defined as SDRs per unit of national currency*
LTGROWTH	The growth rate of the trend component of the log of real GDP per capita series*

* Median value over the relevant time period

Özet

Finansal Gelişme ve Makroekonomik Dalgalanmalar

Bu makale finansal sistem gelişimi ile makroekonomik dalgalanmalardaki değişkenlik ilişkisi konusunda ampirik kanıtlar ortaya koymaktadır. Bundan önce yapılan çalışmalar finansal sistemdeki gelişmenin ekonomik dalgalanmalardaki değişken yapıyı azalttığını ortaya koymuştur. Bu çalışma bahsedilen sonuçların kısa dönem söz konusu olduğunda ve millî gelirin tüketim ve yatırım bileşenlerinin konjonktürel davranışları ele alındığında o kadar doğru olmadığını gösterir. Dinamik GMM (Generalized Method of Moments) tekniği ve ülke bazında panel veriler kullanılarak yapılan bu çalışma finansal sistemdeki gelişmenin gerçekte tüketimdeki oynaklığı arttırdığını ortaya koyar.