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Understanding the Relationship between Financial Development and Monetary Policy

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ABSTRACT

In this paper we summarize the results of a broad exploratory empirical analysis where we attempt to relate the level of financial development with the effectiveness of monetary policy. The analysis is based on a panel of sixty plus countries for whom we calculate measures both of financial development and of monetary policy effectiveness. We correlate the above measures and other macroeconomic variables to look for statistically significant relationships between the indicators of financial development, the effectiveness coefficients and other country characteristics. We present our results in the form of a list of stylized facts that deserve to be given future attention. Given the focus of the analysis on financial development, our results have important implications for emerging markets.

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Abstract

In this paper we summarize the results of a broad exploratory empirical analysis where we relate the level of financial development with the effectiveness of monetary policy. The analysis is based on a panel of sixty plus countries for whom we calculate measures both of financial development and of monetary policy effectiveness. We correlate the above measures and other macroeconomic variables to look for statistically significant relationships between the indicators of financial development, the effectiveness coefficients and other country characteristics. We present our results in the form of a list of stylized facts that deserve to be given future attention. Given the focus of the analysis on financial development, our results have important implications for emerging markets.

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1 Introduction

One of the roles of monetary policy (MP) is to set short-term interest rates in order to influence prices and/or output. When short-term interest rates change, agents modify their consumption and investment patterns depending on how borrowing and lending rates, credit availability, market liquidity and asset prices are affected by the monetary policy stance.

There is still debate regarding the fundamental mechanism behind the effectiveness of monetary policy. At the theoretical level, the *monetary* approach stresses the liquidity channel: an increase in monetary supply reduces interest rates, which in turn affects private spending. An alternative approach stresses a *credit* channel. According to this view, the change in monetary conditions affects not only the "price of liquidity" (short-term interest rate), but also the conditions at which credit is allocated among the agents in the economy (external finance premium).

An important part of the empirical literature on MP effectiveness is concerned with the predominance of one channel over the other. However, since both channels operate through the financial system, the degree of financial development (FD) appears crucial in explaining MP effectiveness (MPE). For example, as the financial system develops, the relative power of one channel as MP transmitter could change. In fact, it seems to be the case that the credit channel is more relevant in emerging or underdeveloped countries -with poor financial systems-, whereas as the economy develops the monetary channel takes a more preeminent role in the transmission of MP (see Kamin et al., 1998). Additionally, it is a well-established fact that credit aggregates take longer to be impacted than interest rates, asset prices and exchange rates.

Furthermore, the increased attention devoted to the credit channel has generated a strand of literature on the interplay between MP and financial intermediaries. This literature has examined both how MP directly affects financial intermediaries –and, more generally, firms– by impacting their balance-sheets (Chatelain et al., 2003; Gertler and Gilchrist, 1994; Kashyap and Stein, 1995; Kashyap et al., 1993; Oliner and Rudebusch, 1996, among others) and how financial intermediaries intervene in the transmission channel through credit conditions (Freixas and Holthausen, 2006; Kashyap and Stein, 2000; Bolton and Freixas, 2005; Stein, 1998; Thakor, 1996; Van den Heuvel, 2000, among others).

Despite this intensified interest in the analysis of specific effects and channels of monetary policy actions, an in-depth study of the relationship between FD and MPE is still lacking, even though the issue has been raised in several forums.[1] This may be in part due to the lack of accepted measures of MPE but also to the limited cross-country evidence available. Data series for emerging or less developed countries -that therefore have less developed financial sectors- tend to be short or have numerous missing values, thus impeding meaningful analyses.

This last point is especially important from a practical point of view. Given that financial markets of emerging countries are in their developmental stages, a better understanding of how this development affects the workings of monetary policy would be key for policymakers and investors alike. Some studies have tried to analyze the workings of MP in emerging

[1] An example is the *Conference on Financial Innovation and Monetary Transmission* held at the Federal Reserve Bank of New York (see the FRBNY Economic Policy Review of May 2002).

markets in a country-case basis (see Kamin et al., 1998 or Loayza and Schmidt-Hebbel, 2002) but no study has attempted a cross-country comparative analysis of MPE or drawn conclusions that could be generalized or serve as guidance for future research and policy.

We attempt to fill this need of a systematic study by carrying out an empirical analysis of the relationship between financial sector development and MP effectiveness using a large panel of sixty countries. This panel includes developed, emerging and non-developed economies. We first calculate summary measures of both FD and MPE and then perform a correlation analysis to test the existence of a statistically significant relationship between the indicators of FD, some additional macroeconomic variables and the MPE measures. Given that this is, to our knowledge, the first systematic study on this issue, we keep our analysis at a general level and try to offer a set of stylized facts that could serve as future guidelines for researchers, policymakers and international investors.

We do not have strong priors about what general relationships will be uncovered by our analysis. On the one hand, it could be that a more developed financial sector would reduce the effectiveness of MP. The reason is that as financial innovation accelerates, the new set of instruments allows private agents to insure themselves against unexpected monetary shocks, thus reducing the volatility of their expenditure patterns. On the other hand, in a poorly developed financial system characterized by lack of competition and a small number of financial intermediaries, there exists inertia on interest rate formation and it may be difficult for credit to expand rapidly if banks are undercapitalized. Therefore, as changes in monetary conditions will take longer to affect borrowing and lending rates or the amount of credit, MP could be less effective or its impact might come after a longer time lag.

The paper is organized as follows. In Section 2 we briefly review the measures used in the literature for both FD and MPE, and explain how we have measured those two concepts. We also present some additional variables that will control for macroeconomic heterogeneity. Section 3 relates MP effectiveness to the level of financial development and to general macroeconomic variables by using a battery of methodologies. Section 4 puts together the conclusions of the analysis in the form of a set of stylized facts that have been uncovered. Finally, Section 5 concludes.

2 Empirical Analysis

We explore now the relationship between the level of financial development and the effectiveness of monetary policy. The paper merges the *empirical* literature on financial development and MP transmission. Thus, in order to understand the approaches followed and the choices made in our paper, we review how the previous literature has measured each concept before presenting our choices for the different measures.

2.1 Measuring Financial Development

Since the seminal paper by King and Levine (1993), different ways of measuring FD have been proposed. In Table 1 we present a summary of the most relevant contributions and the measures that have been used. The paper by Beck et al. (2000) is especially relevant, since it presents a new database of indicators of financial development and structure across

countries and over time. The database incorporates twenty two different indicators that measure the size, activity and efficiency of financial intermediaries and markets. The study is a major improvement with respect to the existing literature since it presents systematic data on most indicators for a large set of countries.

Given the considerable amount of possible measures of the degree of financial development, the challenge is indeed to find a manageable number of them that are both operational and informative.

[Insert Table 1 here]

In this paper we use the database in Beck et al. (2000) but discard some variables that are not available for a sufficient number of countries.[2] In all cases, we use the average values of the different indicators from 1989:2001 for our analysis, adjusting the period for missing observations. The final database still contains a total of sixteen indicators of FD, arguably too many for a manageable analysis and discussion.[3] Since some of the variables refer to similar concepts, we have attempted to reduce the number of indicators and find a more compact set of measures. The procedure consists in summarizing the sixteen indicators with the most comprehensive "summary measures" coming from a principal components analysis. The methodology of principal components finds combinations of a set of variables that explain most of the variance/covariance of the original variables. These *components* are found from the characteristic vectors of the covariance matrix. There are as many components as original variables, but by taking the characteristic vectors associated with the highest eigenvalues one is able to capture most of the variation present in the data with only a few measures.[4]

These measures, which are linear combinations of the original variables, may not have a clear interpretation. Factor analysis can then be used to find an interpretation for the new variables, by rotating the identified components in order to associate more closely the original variables to each component. Thus, the rotated components -factors- can be interpreted in terms of which original variables are highly related to each of them.[5]

[2] This is a standard problem when dealing with emerging or less developed economies.

[3] Table 2 contains the final list of indicators that could be included in the analysis.

[4] Principal components has been successfully used, for example, by Beck and Levine (2002) in a similar context.

[5] The usual factor analysis setup represents the observed variables y_j, $j = 1...K$ for individuals $i = 1...N$ as being generated from linear combinations of the J common unobserved factors F_{ji} and K specific factors s_{ki}:

$$\begin{aligned} y_{1i} &= \alpha_{11}F_{1i} + ... + \alpha_{J1}F_{Ji} + s_{1i} \\ &... \\ y_{Ki} &= \alpha_{1K}F_{1i} + ... + \alpha_{JK}F_{Ji} + s_{Ki} \end{aligned}$$

The coefficients α_j are called the *factor loadings*. These loadings are normalized, so ideally we would like to have coefficients close to one and close to zero which would allow for interpretation of the factors. The amount of variance of the variable y_j explained by the common factors F_1 to F_J is called the *commonality* and the amount of variance unexplained -and therefore explained by the specific factor s_j- is called the *specificity*. Manuals on multivariate analysis contain more thorough descriptions of the methodologies. See, for example, Rencher (2002) or Anderson (2003).

The sixteen indicators selected were available for a total of fifty nine countries. We performed factor analysis on those indicators and decided to keep the first three components, which account for 53%, 11% and 8% of the total variation respectively (i.e. 72% of the total variation). The remaining thirteen components had a much lower explanatory power. We then rotated the components through a VARIMAX rotation and found the loadings that each variable had in the three factors. Table 2 shows the loadings of the sixteen observed indicators. Loadings with high absolute value have been highlighted in bold.

[Insert Table 2]

The results suggest a nice interpretation of the three factors. The first factor can be interpreted as the "overall size and depth of the *financial intermediaries* sector". Notice that the variables with high loadings reflect the relative size of financial assets to GDP or measure costs of the functioning of the financial intermediaries. The signs are relevant: variables with negative loadings are positively related to the size and efficiency of the financial sector whereas the two variables with positive loading are negatively related. The second factor can be thought of as reflecting the "level of *activity in the stock market*", or maybe the *volatility of the stock market*. The third factor is associated with the *relative size of the Central Bank*. All three factors are quite easy to understand and appealing from the point of view of finding a few relevant composite measures of financial development. We believe that the identification of these three factors and the simplification of the problem of measuring financial depth are by themselves nice contributions of this preliminary analysis.[6]

2.2 Measuring Monetary Policy Effectiveness

A key step in our analysis is how to measure MP effectiveness. The literature has been dealing with that issue mostly through the use of VAR analysis (see Bagliano and Favero, 1998; Bagliano et al., 1999; and Christiano et al., 1999, 2005) or through structural macroeconometric models (see Boivin and Giannoni, 2002; or Fair, 2005).

We construct several measures that are based on VAR models that include information on output, prices and a monetary policy instrument. The results of the VAR are used to compute measures of both the time it takes for changes in the monetary instrument to impact output significantly and the intensity of the impact. Our discussion in this subsection follows the setup in Christiano et al (1999, 2005), although slightly simplified so that it can be used in a wide cross-country exercise.

In order to develop some simple measures of MPE, we first define a reduced-form VAR

$$Y_t = \Gamma Y_{t-1} + e_t \tag{1}$$

where Y_t is divided into three blocks with a specific ordering:[7] $Y_t = \begin{pmatrix} Y_{1t} \\ mpi_t \\ Y_{2t} \end{pmatrix}$. The first block, Y_{1t}, is the set of variables that influence the decisions of the Central Bank (CB) but

[6] The list of countries included in this analysis and estimates of the three factor scores for each country can be found in the working paper version (Carranza et al., 2006a).

[7] The order is irrelevant for the estimation of the VAR coefficients, but it is key for the subsequent identification of the structural shocks.

are not contemporaneously affected by the MP instrument (MPI). The second block, mpi_t, is the specific MP instrument used by the CB, which responds to current values of the variables in Y_{1t}. Finally, Y_{2t} is a set of variables that are contemporaneously affected by the MPI and that enter the CB's decision only with a lag. Therefore, we assume that the CB follows a MP rule such as

$$mpi_t = f(Y_{1t}) + g(mpi_{t-1} + ... + mpi_{t-4} + Y_{1t-1} + ... + Y_{1t-4} + Y_{2t-1} + ... + Y_{2t-4}) + e_{mpi,t} \quad (2)$$

where $f(\cdot)$ and $g(\cdot)$ are (linear) functions and where we have already specified the number of lags (four). Variables in Y_{1t} only respond to their own lags and to lags of mpi_t and Y_{2t}. Variables in Y_{2t} respond to contemporaneous Y_{1t} and mpi_t, and to lags of all variables.

A large number of variables are included in both Y_{1t} and Y_{2t} in the original references.[8] Because of data limitations, we have included an output gap measure –HP-detrended (log)real GDP or (log)IIP–, the consumer price index (CPI)-based inflation rate and the long-term interest rate in Y_{1t}. For the MPI, we have tried two alternative specifications. Given the lack of uniform short-term interest rate measures, we use monetary aggregates. In our first specification, we use the growth in money, thus focusing only on the direct impact of money growth on output, inflation and interest rates. In a second specification we use growth in narrow money (the reserves measure available in the *International Financial Statistics,* IFS, database of the IMF) as the MPI and include the growth in the monetary aggregate as a variable in Y_{2t}.

After OLS estimation of the reduced-form VAR $Y_t = \Gamma Y_{t-1} + e_t$, the ordering above can be used to identify the structural shocks in a "block-Cholesky" ordering.[9] Once the structural shocks have been identified, the impulse response functions (IRFs) of the different variables to shocks in the MPI are calculated, and these constitute the traditional characterization of the response to MP. We follow a similar approach by using the simple Cholesky-ordering of variables –assuming that inflation does not respond contemporaneously to the output gap– and calculating the IRFs to shocks to the MPI.

We have collected data for as large a set of countries as possible. We placed special effort on ensuring that the final set overlapped with those for which we could effectively measure financial development. For coherence, we opted not to combine different data sources, and used only data available in the IFS. We obtained data for a total of 73 countries, although nine of them presented gaps and/or breaks in the data. For each country we collected quarterly data on five variables: an output measure (either GDP volume or an industrial production index), a measure of prices (CPI), the interest rate that was available in the database (long term if possible), a monetary aggregate (M2) and a measure of narrow money.

The measures of MP effectiveness that we employ refer to the lag with which the MPI affects output, the size of the direct impact of the MPI (the coefficient on the first significant MPI term in the output equation $y_t = a_0 + ... + a_{11}\Delta m_{t-1} + a_{12}\Delta m_{t-2} + a_{13}\Delta m_{t-3} + a_{14}\Delta m_{t-4} + e_{2t}$) and the accumulated effect after a number of periods of the structural shock (cumulated impulse response function to a monetary shock). One difficulty with the selected measures

[8] Specifically, in Christiano et al. (2000) Y_{1t} contains real GDP, real consumption, the GDP deflator, real investment, real wages and a measure of labor productivity. The second block, Y_{2t}, contains real profits, growth in a monetary aggregate and a measure of the real prices of stocks. Finally, mpi_t is a short-term interest rate, even though they alternatively use, as we do, a measure of reserves.

[9] See Hamilton (1994) for a review of this identification scheme.

has to be noted. If for a certain country none of the coefficients of the four lags of the MPI in the output equation is significantly different from zero, the first two measures cannot be calculated. This is why a number of countries have to be dropped from the analysis when the *lag* and *coefficient* variables are included.

Additionally, we attempt to ascertain whether monetary contractions have a different impact than monetary expansions. Some papers have argued that if the credit channel is important, then monetary expansions may not be effective if the financial system is underdeveloped and cannot expand credit fast enough (see, for example, Carranza et al., 2006b).

In order to identify this asymmetry, we estimate augmented versions of the VAR's in (1) that include a set of terms that identify monetary contractions. Thus, the equation for any variable k in the augmented VAR looks like:

$$\begin{aligned} y_{kt} &= a_0 + \boldsymbol{\gamma}_k' \left[Y_{t-1}' \;\; Y_{t-2}' \;\; Y_{t-3}' \;\; Y_{t-4}' \right]' + ... \\ &\quad ... + \gamma_{k1}^{mc} \left[\Delta mpi_{t-1} \right]^- + \gamma_{k2}^{mc} \left[\Delta mpi_{t-2} \right]^- + \gamma_{k3}^{mc} \left[\Delta mpi_{t-3} \right]^- + \gamma_{k4}^{mc} \left[\Delta mpi_{t-4} \right]^- + e_{kt} \end{aligned} \tag{3}$$

where $\boldsymbol{\gamma}_k$ is the $(4K \times 1)$ vector of coefficients of the regular lagged terms of the K variables and $[\Delta mpi_{t-i}]^-$ are lagged terms that are zero for monetary expansions and take the value of the change in the *mpi* for monetary contractions. Therefore the coefficients γ_k^{mc} measure the differential effects of lagged changes in the *mpi* when these changes correspond to contractionary policies.

The explanatory variables are the same in all K equations, so the VAR can still be estimated by simple OLS. Once the equations have been estimated, we find the impulse response functions to structural shocks. We use a Cholesky decomposition of the covariance matrix of the reduced-form errors to identify the structural shocks in a recursive framework, with the variables ordered in the same manner as before. We then simulate the response to reduced-form shocks, accounting for the sign of the lagged Δmpi terms in the simulation: we calculate the IRF twice, one for a positive shock to the *mpi* and one for a negative shock to the *mpi*. If there are significant asymmetric effects, the two IRFs should be different, and the measures of MPE will differ depending on the sign of the shock.

The measures of MP asymmetry employed are parallel to those in the regular VAR, but we also distinguish the lag, the size of the direct impact and the accumulated effects of structural shocks for monetary contractions (negative growth in money or reserves). We also construct four dummy variables that account for whether there is a significant asymmetric effect, and whether it is stronger: if the coefficient on the negative lagged MPI is significantly positive, that means that the effect of a monetary contraction is larger than that of a monetary expansion.

The final set of MPE measures appears in Table 3.[10]

[Insert Table 3 here]

We do not comment on the results for the separate countries.[11] Some stylized facts that provide the first relevant insights of the analysis can, however, be pointed out. First, there

[10] The list of countries, number of available observations for the final analysis -the period for which the different series overlap- and the measures used for output and the interest rate can be seen in the working paper version (Carranza et al., 2006a).

[11] The results of the country-by-country VAR's are available upon request.

is evidence that MP impacts developed countries faster than in emerging or less developed countries: lags tend to be shorter in developed countries. Second, there is some evidence that the final cumulative impact of MP is less intense in developed countries. Third, these results appear when either money or reserves are used as the MPI, thus hinting that the main differences across countries may lie in the impact of money on output and not on the multiplication of narrow money.

2.3 Additional Macroeconomic Variables

In addition to the measures of FD and MPE, we have collected data for a set of alternative macroeconomic variables from the World Bank Development Indicators Database. We also include a measure of the degree of dollarization of each country from the dollarization index calculated by Reinhart et al. (2004). The variables are listed and briefly described in Table 4. They are intended to characterize the different countries and to serve as controls for the relationships between our main concepts of interest.

[Insert Table 4 here]

3 Monetary Policy and Financial Development

We now discuss the results of the analysis of the relationship between MPE measures and FD. We have employed several different methodologies in an effort to detect significant regularities.

3.1 Classifying the World Economies

Given the numerous variables and the few countries for which data on all variables are available, a correlation or regression analysis may not be able to uncover all the relevant relationships. We perform a preliminary analysis by grouping the countries in terms of their characteristics using clustering techniques. Non-hierarchical cluster analysis is a methodology designed to find groupings of individuals based on their similarities along a set of characteristics. The methodology first takes several variables/characteristics that describe a set of individuals. In our case these will be the macroeconomic variables, FD factors and the MPE measures. Then some measure of dissimilarity between individuals is defined, and the different individuals are assigned to a pre-specified number of groups (clusters). The outcome is a set of clusters that contain those individuals that are similar –their values in the characteristics are similar– but different from individuals in the other clusters –the cluster means of the characteristics are dissimilar across clusters. This nicely complements a correlation-based analysis, that only detects significant relationships or differences if the groups are known. Cluster analysis finds the groups endogenously, thus allowing for a subsequent analysis of the relevant differences in the variables across groups.

We have performed a non-hierarchical cluster analysis using our full set of variables. Given that the number of clusters has to be defined beforehand and considering that we had data on fifty-some countries, we tried four, five and six clusters. The results tend to be quite

consistent and the output of the five and six-cluster procedures simply implies the splitting of one of the groups found in the four-cluster run.

Of all the available variables in our dataset, one effectively restricts the number of countries that can be included in the procedure. As we mentioned above, when no coefficient of lagged money or reserves growth was significant in the output equations of the VARs, the *lag* and *coefficient* variables were not defined and that observation would have to be dropped from the analysis. We replicated the cluster analysis several times, depending on whether or not the *lag* and *coefficient* variables were used, and depending on whether reserves or money (or both) were included as measures of MPE. The resulting clusters were comparable, so we show in Table 5 only the four-cluster result for the broadest set of countries:[12] the first part of the table contains the sample averages of the variables and the group averages. The last columns present an analysis of variance test that detects significant differences in means across the identified groups.[13] The cluster members are identified in the second panel of the table. We did not include the asymmetric measures of MPE in the cluster analysis: the clusters do not change significantly, and the discussion would make the paper unnecessarily lengthy.

[Insert Table 5 here]

The grouping of countries into four clusters is quite intuitive. Two clusters are composed of high-income developed economies, while the other two contain emerging and less developed economies. The first cluster identified could be called "Old Developed Economies" (ODEs). It contains most Northern and Western European countries, Japan, Canada and the USA. The main characteristics of this group are: the group members have the highest per capita income; GDP growth and Investment (Gross Fixed Capital Formation, GFCF) growth in the last two decades has been low and quite stable; the countries in this group are not heavily indebted, and have no short-term debt; their financial system is the most developed, and the relative size of the Central Bank is the smallest of all groups.

The second group we call the "Newly Developed" (NDs). This group contains economies like Ireland, New Zealand and Spain. Their income per capita is smaller than those of the first group, and have experienced higher and more volatile rates of growth of GDP and GFCF. They are not heavily indebted and do not have short-term debt; their financial system is less developed and the relative size of the Central Bank is larger than in the ODEs.

The third group corresponds to the less developed countries with a higher level of income (LDHIs), and would include some of the emerging countries: Argentina, Hungary and South Africa are included in this group, but so are Greece, Portugal and South Korea. These countries have lower rates of GDP or GFCF growth than the least developed (LDs) or the NDs. Their financial systems are less developed than in the ODEs or NDs and the Central Bank tends to be larger in size. They have high levels of debt, sometimes significantly short-term. They also tend to be highly dollarized economies.

Finally, the fourth group includes the least developed-lowest income (LDs) countries in the sample. Countries such as Colombia, Brazil, India and Poland are included in this fourth group.[14] These countries present high and quite volatile rates of growth of GDP and GFCF.

[12] Again, the full set of results is available upon request.

[13] See, for example, Kanji (1999) for the specifics of the test, which is quite standard.

[14] Note that data for the poorest countries in the world are generally not available. Therefore, this LD

They are highly indebted, with large percentages of short-term debt. Their financial systems are the least developed, and their Central Banks are the largest in size. These economies tend to be very highly dollarized, a consequence of their inability to borrow in their home currency.

As it can be seen, the countries are clustered by income levels, but significant differences in the degree of development of their financial systems and size of their Central Banks are present.[15] We turn now to the MP effectiveness measures and their relationship with the clusters and the financial development.

First, there is evidence that lags in the impact of changes in monetary aggregates are larger in countries with a less developed financial system and a larger Central Bank. The evidence for changes in reserves is similar, although the differences in means tend not to be significant. *Lag* is the variable for which there is the least information, so the evidence is based on fewer observations. However, the result is quite consistent, beyond significance levels, across estimations: MP operates with longer lags in poorer countries with less developed financial systems.

Second, the *size* of the impact of monetary policy –both for monetary aggregates and for reserves– differs across countries and always in the same direction: countries with less developed financial systems have larger cumulative effects of MP. The evidence for this effect, that corresponds more correctly to the effect of shocks to the MPI, is quite consistent and robust across the different clustering analyses.

3.2 Monetary Policy Effectiveness and Financial Development

Table 6a shows the correlation matrix of our variables of interest, where the coefficients have been tested for significance.[16] Regarding the FD factors, most of the results were to be expected: first, high income countries present more developed financial systems and relatively smaller central banks.[17] Other variables that reflect economic development in general –stable growth rates, low and stable inflation, high share of services on GDP, low levels of short-term debt– are related to the FD factors.

[Insert Table 6 here]

We note that the FD factors are significantly correlated across countries, but these correlations are not as high as one would expect. Also, the Stock Market factor seems to be

group, which contains some solid emerging countries, has to be understood as the countries with the lowest income, and the least developed, of the final sample.

[15] We note that when five clusters are required, it is the ODE group that splits into two whereas when six clusters are formed, the LDHIs and LDs divide into four groups of less developed countries. This last division is usually carried out again in terms of income levels, but the differences in development of the financial system, degree of dollarization and size of the Central Bank are quite notable. In fact, one of the clusters is always made up of countries that are highly financially developed, but have low income levels. Countries such as Colombia, Peru and Thailand belong to this group. In any case, the difference among the four clusters of less developed countries are more quantitative than qualitative.

[16] See Kanji (1999).

[17] Note that for both the General and the Stock Market factors lower values mean deeper financial development whereas the opposite is true for the Central Bank, i.e. a higher value of the Central Bank factor means higher financial development or relatively smaller size of the Central Bank.

quite unrelated to the other variables, and the signs of the correlations are in some cases contrary to what one would expect. It may be that this factor is capturing the volatility of the stock market rather than the degree of financial development.[18]

Turning now to the MPE measures, we find some interesting results that will be subsequently qualified. The results again suggest that more financially developed economies have less effective MP: the immediate coefficient of changes in money growth and the cumulative effect of MP shocks are larger for less developed financial systems. The relative size of the central bank is positively related to the impact of MP, as would be expected, although in this case the evidence is not strong. The volatility/activity in the stock market is positively related to the impact of shocks in monetary aggregates –cumulative impact of shocks to monetary aggregates is larger in countries with more active stock markets–, but negatively related to changes in reserves. This difference may be capturing the effect of activity of the stock market on the differential impact of reserves on monetary aggregates, i.e., on the *money creation* process. Little can be said of the lags in MP effectiveness, since none of the correlations of the *lag* variable has been found to be statistically significant except for, maybe, the stock market activity factor (more on the *lag* variables in the next subsection).

The FD factors and the MPE measures are all correlated with some of the macroeconomic variables, so we may want to control for these multilateral correlations. Given our data constraints, we opt for simple regressions where the dependent variables are the MPE measures, and the independent variables are the FD factors, the degree of dollarization and some macroeconomic variables that we consider to be more relevant. In order to account for the overall degree of economic development and for the level of fixed investment, the expenditure that is more likely to be impacted by MP, we have included both the average and the standard deviation of the growth rate of GDP and of GFCF. Also, we include the standard deviation of inflation as an indicator for the volatility of MP. The results of these simple regressions are shown in Table 6b, where for simplicity we only include information on the significance of the explanatory variables.[19] These results have to be taken with care, given the low number of observations and the coarseness of the measures, especially of MPE. However, they do qualify the results above and offer some insights. Average GDP growth is positively related to measures of impact of reserve growth. This is indirect evidence that MP is more effective in countries in their development stages –where GDP growth is higher on average. The results for GFCF or inflation volatility are less clear.

Regarding the FD factors, there is little evidence about their relationship with MPE. The Stock Market volatility factor is positively related to the cumulative effect of changes in monetary aggregates, but negatively with changes in reserves –this factor is measured on an inverse scale. Other than this result, which in fact may seem a little contradictory, there is not much to be seen in the correlations/regression analysis.

3.3 Monetary Policy Asymmetry and Financial Development

Tables 6a and 6b show information on the asymmetry issues: are monetary expansions more effective than monetary contractions? Are these effects related to the level of financial

[18] This factor was based on indicators of stock market activity and on the stock market turnover ratio.

[19] More comprehensive results are available from the authors upon request.

development?

Regarding FD, we find three main results worth noting. First, and most relevant, the general development of the financial system is related to the effectiveness of monetary expansions, in the way we had hinted at before: the medium to long-term effect of MP is more intense the lower the level of financial development. Additionally, it is more likely that the effect of monetary contractions is significantly different than that of monetary expansions in countries with less developed financial systems: the probit analyses on the binary variables (see Table 4) show that the less developed the financial system, the higher the likelihood that monetary contractions will have significantly different effects.

Second, activity/volatility in the stock market is negatively related to the medium-term effect of monetary expansions and contractions. The result appears to be quite robust: where the stock market is less active/volatile, the cumulative effect of money expansions/contractions is larger.

Finally, the size of the Central Bank is related to the probability that asymmetric effects are present and to the lag in effectiveness of changes in reserves. When the financial sector is relatively large with respect to the Central Bank, it is more likely that asymmetric effects will appear. Also, the smaller the Central Bank compared to the rest of the financial sector, the longer it takes for reserve changes to be effective.

The goodness of fit measures of the regressions are in general low for lag variables, but high in the other cases we commented on. Of course, we are aware of the limitations of these correlation-based analyses, given the low number of observations (40-50 in the regressions/correlations) and given that both the financial development factors and the MPE measures are cross-sectional variables generated after a time series analysis. However, we believe that the conclusions are reasonable, can be justified in the context of a theoretical discussion and definitely suggest important directions for future research.

3.4 Dollarization, Monetary Policy and Financial Development

Dollarization is a key feature in emerging markets, which sometimes find it difficult to borrow in their domestic currency. The degree of dollarization of an economy has significant impact on macroeconomic performance (see Reinhart et al., 2003). We find some results in our analysis regarding this issue.

First, more dollarized economies are less financially developed and tend to present relatively larger central banks. The degree of dollarization is positively related to the impact of money growth, and to the cumulative impact of MP shocks. Also, lags in the effect of changes in reserves are lower in dollarized economies. In other words, MP has faster and more noticeable effects when the economies are highly dollarized.

Second, regarding asymmetric effects of monetary contractions, little is found in the simple correlations, except that the degree of dollarization is negatively related with the impact of contractions in reserves. That is, in dollarized economies contractions in money may in fact lead to positive effects on output. This result appears quite robust in the regression analysis. Once the effect of other macroeconomic and financial variables is controlled for, still the effect of monetary expansions is significantly smaller, even negative, in highly dollarized countries. Furthermore, monetary contractions have an even smaller negative effect. That is, monetary expansions may be contractionary in highly dollarized countries; in the case of monetary

contractions, they could be expansionary, but the sign-reversal effect is stronger than for expansions. A balance-sheet effect of currency depreciations (appreciations) generated by monetary expansions (contractions) may be behind this important result (see Céspedes et al., 2005, or Carranza et al., 2004, for alternative analyses in this line). Additional evidence comes from the probit analyses: the level of dollarization is positively related to the probability that monetary contractions have a significantly higher impact than monetary expansions.

4 A Review of the main issues raised

We wanted this paper to be exploratory and have found the results of that exploration to be quite relevant. The paper raises issues that, so far, had not been uncovered by previous studies and opens a few fruitful avenues for research. We summarize them briefly in this section.

• The degree of financial development can be successfully measured by three composite factors: "overall size and depth of the *financial intermediaries* sector", "level of *activity in the stock market*" and *relative size of the Central Bank*.

• Monetary policy seems to have a larger cumulative impact when the financial system is less developed. This impact, however, takes longer time to appear than in more developed financial systems.

• Lags in the impact of changes in monetary aggregates are larger in countries with a relatively larger Central Bank.

• In countries with less developed financial systems it is more likely that the effect of monetary contractions is significantly different than that of monetary expansions.

• Activity/volatility in the stock market is negatively related to the medium-term effect of monetary expansions and contractions: where the stock market is less active/volatile, the cumulative effect of money expansions/contractions is larger.

• The size of the Central Bank is related to the probability that asymmetric effects are present and to the lag in effectiveness of changes in reserves. When the financial sector is relatively large with respect to the Central Bank, it is more likely that asymmetric effects will appear.

• More dollarized economies tend to be less financially developed and have relatively larger central banks.

• The degree of dollarization is positively related to the cumulative impact of MP shocks. Also, lags in the effect of changes in reserves are lower in dollarized economies.

• In highly dollarized economies, contractions in money may in fact lead to positive effects on output (a balance sheet effect).

5 Conclusion

We have done the first cross-country analysis of which we are aware of the relationship between financial development and the effectiveness of monetary policy. This type of analysis is plagued with difficulties that arise both from the lack of data for a number of countries and from the lack of uniform measures of the two economic concepts. We have used a

number of methodologies that have allowed us to find a few meaningful composite measures of financial development and several VAR-based measures of the effectiveness of monetary policy actions. This is the first main contribution of our analysis.

Our results, though tentative and subject to reexamination in the light of a more complete theoretical framework and when better data become available, suggest several important conclusions, which are especially relevant for emerging and developing economies. First, there seems to be evidence that monetary policy operates with longer lags the less developed the financial system. Second, the medium-term impact of monetary policy seems to be higher in countries with less developed financial systems. Third, the impact of monetary policy actions appears to be asymmetric: the effect of monetary expansions is different from that of monetary contractions. Specifically, there is some evidence that monetary contractions have more intense effects than monetary expansions in less developed the financial systems. Finally, dollarization is related to the effectiveness of monetary policy: more dollarized economies present more effective monetary policies, but at the same time present more asymmetry, until the point of giving evidence of strong balance-sheet effects (including a possible change in the sign of the impact of monetary policy).

All these results identify several exciting avenues for future research on the relationship between economic policies and the stage of development of emerging economies. Of course, it is of high priority to invest in data availability and compatibility among datasets: most of the limitations of our analyses stem from the lack of consistent measures for a broad set of countries. Second, a deeper look at the channels of monetary transmission in a theoretical model that includes the degree of financial development could give a more solid direction to the next steps to be taken in our empirical study. Finally, the issue of monetary policy asymmetry has been researched very little but our results suggest that there is quite a bit of room for significant contributions in the subject, both theoretical and empirical.

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Table 1: Measures of financial development used in the literature

Reference	Indicators
King, R.G. and R. Levine (1993)	1) Size of financial intermediary sector: "Financial Depth" 1.1) Liquid Liabilities / GDP 1.2) Deposit money bank domestic assets / (DMBDA+Central Bank assets) 2) Domestic Asset Distribution 2.1) Claims on nonfinancial private sector / total domestic credit not to banks) 2.2) Claims on nonfinancial private sector / GDP
Arestis, P. and P.O. Demetriades (1997)	1) Stock Market Development 1.1) Stock Market Capitalisation Ratio: Stock Market Value / GDP 1.2) Stock Market Volatility: standard deviation of changes in stock market prices 2) Size of financial intermediary sector: 2.1) M2/GDP 2.2) Domestic bank credit/NominalGDP
Rajan, R.G. and L. Zingales (1998)	1) Capitalization Ratio: (Domestic Credit + Stock market Capitalization) / GDP 2) Accounting Standards (CIFAR)
Luintel, K.B. and M. Khan (1999)	1) Total deposit liabilities of deposit banks / Nominal GDP 2) Real Interest rate
Khan, M.S. and A.S. Senhadji (2000)	1) Domestic credit to private sector / GDP 2) 1 + stock market capitalization / GDP 3) 2 + (private and public bond market capitalization / GDP) 4) Stock Market capitalization
Al-Yousif, Y.K. (2002)	1) Currency / M1 2) M2 / Nominal GDP
Levine, R., N. Loayza and T. Beck (2000)	1) Liquid Liabilities / GDP. 2) Deposit money bank domestic assets / (DMBDA+Central Bank domestic assets) 3) Private Credit / GDP 4) Bank Assets / GDP 5) Bank Credit / GDP 6) Accounting 7) Other measures on legal characteristics and risk, expropriation, corruption, etc…
Von Furstenberg, G.M. and M. Fratiani (1996)	1) "Quantity-Based" Indicators 1.1) Ratios of liquid liabilities to GDP (M3 or even M4) 1.2) Earning assets of deposit money banks / total domestic credit 1.3) Proportion of credit allocated to private enterprises 2) "Price-Based" Indicators: 2.1) Spread in lending and borrowing real rates (banking system)
Beck, T. and R. Levine (2002)	1) Log(Private Credit/GDP*Value traded in the stock market/GDP) 2) Log(Private Credit+Market Capitalization)
Beck, T., A. Demirgüç-Kunt and R. Levine (2000)	1) Central Bank assets to total financial assets 2) Deposit Money Bank Assets to total financial assets 3) Other Financial Instituions Assets to total financial assets 4) Deposit money bank to Central Bank assets 5) Liquid liabilities to GDP 6) Central Bank Assets to GDP 7) Deposit Money Bank Assets to GDP 8) Other Financial Institutions Assets to GDP 9) Private credit by deposit money banks to GDP 10) Private credit by deposit money baks and other fin. Inst. to GDP 11) Bank deposits 12) Financial system deposits 13) Concentration 14) Overhead costs 15) Net interest margin 16) Life insurance penetration 17) Non-life insurance penetration 18) Stock market capitalization to GDP 19) Stock market total value traded to GDP 20) Stockmarket turnover ratio 21) Private bond market capitalization to GDP 22) Public bond market capitalization to GDP

Table 2: Factor loadings of final set of indicators and percentage of variance explained
First three components VARIMAX Rotation

Indicator of Financial Development	Factor loadings			Variance Explained	
	1st factor	2nd factor	3rd factor	Common	Specific
Deposit money bank vs. central bank assets	-0.337	-0.178	**0.876**	0.999	0.001
Central Bank Assets to GDP	0.041	0.12	**-0.964**	0.999	0.001
Deposit Money Bank Assets to GDP	**-0.738**	-0.214	0.263	0.66	0.34
Private credit by deposit money banks to GDP	**-0.786**	-0.145	0.28	0.717	0.283
Private credit by deposit money banks and other financial institutions to GDP	**-0.773**	-0.271	0.253	0.735	0.265
Bank deposits	**-0.792**	0.398	0.227	0.999	0.001
Financial system deposits	**-0.814**	0.359	0.229	0.999	0.001
Concentration	0.161	0.021	-0.055	0.029	0.971
Overhead Costs	**0.795**	0.169	-0.016	0.999	0.001
Net Interest Margin	**0.781**	0.087	-0.064	0.999	0.001
Life insurance penetration	**-0.687**	-0.056	0.314	0.574	0.426
Non-life insurance penetration	-0.156	0.039	0.253	0.09	0.91
Stock market capitalization to GDP	**-0.768**	-0.119	0.196	0.999	0.001
Stock market total value traded to GDP	-0.509	**-0.696**	0.149	0.999	0.001
Stockmarket turnover ratio	-0.009	**-0.786**	0.08	0.999	0.001

Table 3: Measures of Monetary Policy Effectiveness - Asymmetric terms included

VAR specification	Measure	Measure Description
4-variable VAR	lag_mon	First significant lag of money growth in output equation
Money growth as MPI	coef_mon	Coefficient of the first significant lag of money growth in output equation
	sum_mon	Sum of the coefficients of the four lags of money growth in output equation
	abs_mon	Absolute value of sum_mon
	cum4_mon	Impulse response function: cumulative effect of structural shock to MPI on output after 4 quarters
	cum8_mon	Impulse response function: cumulative effect of structural shock to MPI on output after 8 quarters
	cum12_mon	Impulse response function: cumulative effect of structural shock to MPI on output after 12 quarters
	lagneg_mon	First significant lag of negative money growth term in output equation
	coefneg_mon	Coefficient of the first significant lag of negative money growth in output equation
	sumneg_mon	Sum of the coefficients of the four lags of negative money growth in output equation
	cum4neg_mon	Impulse response function: cumulative effect of negative structural shock to MPI on output after 8 quarters
	cum8neg_mon	Impulse response function: cumulative effect of negative structural shock to MPI on output after 4 quarters
	cum12neg_mon	Impulse response function: cumulative effect of negative structural shock to MPI on output after 8 quarters
	neg_terms_mon	1 if any of the terms of negative money growth is statistically significant in VAR, 0 otherwise
	sign_neg_mon	1 if the significant term has a positive sign, 0 otherwise
5-variable VAR	lag_res	First significant lag of reserves growth in output equation
Reserves growth as MPI	coef_res	Coefficient of the first significant lag of reserves growth in output equation
	sum_res	Sum of the coefficients of the four lags of reserves growth in output equation
	abs_res	Absolute value of sum_res
	cum4_res	Impulse response function: cumulative effect of structural shock to MPI on output after 4 quarters
	cum8_res	Impulse response function: cumulative effect of structural shock to MPI on output after 8 quarters
	cum12_res	Impulse response function: cumulative effect of structural shock to MPI on output after 12 quarters
	lagneg_res	First significant lag of negative reserves growth in output equation
	coefneg_res	Coefficient of the first significant lag of negative reserves growth in output equation
	sumneg_res	Sum of the coefficients of the four lags of negative reserves growth in output equation
	cum4neg_res	Impulse response function: cumulative effect of negative structural shock to MPI on output after 4 quarters
	cum8neg_res	Impulse response function: cumulative effect of negative structural shock to MPI on output after 8 quarters
	cum12neg_res	Impulse response function: cumulative effect of negative structural shock to MPI on output after 12 quarters
	neg_terms_res	1 if any of the terms of negative reserves growth is statistically significant in VAR, 0 otherwise
	sign_neg_res	1 if the significant term has a positive sign, 0 otherwise

Table 4: Other Macroeconomic Variables

	Measure	Source	Code in WDI database
Income level	1 to 4 score[a]	From World Bank classification	
Debt level	1 to 3 score[b]	From World Bank classification	
South Asia	0/1 indicator	From World Bank classification	
Europe & Central Asia	0/1 indicator	From World Bank classification	
East Asia & Pacific	0/1 indicator	From World Bank classification	
Latin America & Caribbean	0/1 indicator	From World Bank classification	
Middle East & North Africa	0/1 indicator	From World Bank classification	
Western Europe & North America	0/1 indicator	From World Bank classification	
Sub-Saharan Africa	0/1 indicator	From World Bank classification	
Central government debt	% of GDP	World Bank WDI Database	GB.DOD.TOTL.GD.ZS
GDP growth (annual %)	Average %	World Bank WDI Database	NY.GDP.MKTP.KD.ZG
	Std. Dev.	World Bank WDI Database	
GNI per capita, Atlas method	US$	World Bank WDI Database	NY.GNP.PCAP.CD
Gross fixed capital formation (GFCF)	% of GDP	World Bank WDI Database	NE.GDI.FTOT.ZS
GFCF (annual % growth)	Average %	World Bank WDI Database	NE.GDI.FTOT.KD.ZG
	Std. Dev.	World Bank WDI Database	
Inflation, GDP deflator (annual %)	Average %	World Bank WDI Database	NY.GDP.DEFL.KD.ZG
	Std. Dev.	World Bank WDI Database	
Services, etc., value added	% of GDP	World Bank WDI Database	NV.SRV.TETC.ZS
Short-term debt	% of total external debt	World Bank WDI Database	DT.DOD.DSTC.ZS
Degree of dollarization	0 to 25 score	Reinhart et al. (2004)	

All averages and standard deviations for the period 1989:1999

[a] Low income=1; Lower middle income=2; Upper middle income=3; High income=4

[b] Less indebted=1; Moderately indebted=2; Severely indebted=3

Table 5a: Cluster Analysis - Statistics

Lag and Coefficient Variables EXCLUDED. Both monetary aggregates and reserves MPE measures included - 4 clusters

	Means of the Variables					Significance of differences in means across clusters		
	Full Sample	Centroids of the Clusters						
		Group 1	Group2	Group3	Group4		Stat.	Level
Income level	**3.1132**	**3.3000**	**4.0000**	**2.1818**	**4.0000**	***	38.19	0%
South Asia	0.04	0.00	0.00	0.09	0.00		0.96	42%
Europe & Central Asia	**0.15**	**0.40**	**0.00**	**0.18**	**0.00**	***	3.22	3%
East Asia & Pacific	0.15	0.10	0.17	0.18	0.13		0.13	94%
Latin America & Caribbean	**0.19**	**0.20**	**0.00**	**0.36**	**0.00**	***	3.47	2%
Middle East & North Africa	0.06	0.00	0.17	0.09	0.00		1.10	36%
Western Europe & North America	**0.36**	**0.20**	**0.67**	**0.00**	**0.87**	***	26.33	0%
Sub-Saharan Africa	0.06	0.10	0.00	0.09	0.00		0.67	57%
Average GDP growth	**2.786**	**1.917**	**3.872**	**3.294**	**2.185**	**	2.26	9%
Std. Dev. of GDP growth	**3.519**	**4.185**	**2.763**	**4.751**	**1.573**	***	8.37	0%
GNI per capita, PPP adjusted	**12004.0**	**11264.1**	**15984.8**	**4560.7**	**21821.9**	***	205.56	0%
Gross Fixed Capital Formation / GDP	21.6224	23.2238	20.8343	21.5307	21.0046		0.47	70%
Average GFCF growth	**4.3607**	**3.9445**	**5.5186**	**5.5824**	**2.3833**	***	3.15	3%
Std. Dev. of GFCF growth	**11.1949**	**12.4893**	**10.8782**	**14.7665**	**5.2201**	***	8.70	0%
Average Inflation Rate	60.6062	60.4705	4.7269	115.5422	2.4758		1.36	27%
Std. Dev. of Inflation Rate	93.776	76.751	1.969	189.518	1.427		1.12	35%
Short term debt / Total debt	**10.603**	**19.487**	**0.000**	**16.686**	**0.000**	***	18.84	0%
Financial Development: General	**-0.3743**	**-0.3183**	**-0.5333**	**-0.2018**	**-0.6009**	***	13.04	0%
Financial Development: Stock market	0.3197	0.3110	0.3722	0.3871	0.2056		1.33	27%
Financial Development: Central Bank	**-3.1096**	**-3.1192**	**-3.0612**	**-3.1428**	**-3.0739**	**	2.34	8%
Degree of dollarization	**5.0000**	**5.3000**	**1.3333**	**9.2727**	**0.0000**	***	11.84	0%
Sum of four coefficients, Mon. Agg.	0.1342	0.2099	0.0633	0.1339	0.1125		0.80	50%
Absolute value of sum of coefficients	**0.1517**	**0.2472**	**0.0633**	**0.1578**	**0.1144**	*	1.63	19%
Cumulative effect after 4 quarters, Mon. Agg.	0.0067	0.0075	0.0069	0.0067	0.0061		0.06	98%
Cumulative effect after 8 quarters, Mon. Agg.	0.0132	0.0230	0.0107	0.0097	0.0127		0.71	55%
Cumulative effect after 12 quarters, Mon. Agg.	0.0109	0.0117	0.0108	0.0093	0.0125		0.11	95%
Sum of four coefficients, Reserves	0.0414	0.0785	0.0105	0.0290	0.0471		0.22	88%
Absolute value of sum of coefficients	0.1297	0.1485	0.0576	0.1635	0.0965		1.42	25%
Cumulative effect after 4 quarters, Reserves	**0.0055**	**0.0060**	**0.0010**	**0.0087**	**0.0021**	**	2.56	7%
Cumulative effect after 8 quarters, Reserves	0.0104	0.0080	0.0073	0.0157	0.0054		0.88	46%
Cumulative effect after 12 quarters, Reserves	**0.0188**	**0.0567**	**0.0079**	**0.0125**	**0.0070**	*	2.03	12%

Table 5b: Cluster Members - 4 clusters

Lag and Coefficient Variables EXCLUDED. Both monetary aggregates and reserves MPE measures included

LDHI	NDE	LD	ODE
Argentina	Cyprus	Brazil	Australia
Barbados	Finland	Chile	Austria
Czech Republic	Ireland	Colombia	Belgium
Greece	Israel	Costa Rica	Canada
Hungary	New Zealand	Côte d'Ivoire	Denmark
Korea, Rep.	Spain	Croatia	France
Portugal		Ecuador	Germany
Slovak Republic		India	Italy
Slovenia		Indonesia	Japan
South Africa		Jordan	Netherlands
		Latvia	Norway
		Malaysia	Sweden
		Mexico	Switzerland
		Morocco	United Kingdom
		Nigeria	United States
		Pakistan	
		Peru	
		Philippines	
		Poland	
		Thailand	
		Turkey	
		Uruguay	

ODE: Old Developed Economies
NDE: Newly Developed Economies
LDHI: Less-Developed High-Income Economies
LD: Least-Developed Low-Income Economies

Table 6a: Correlations - MPE measures of asymmetric effects included

	Financial Development			Dollarization	Income level	Debt level	GEOGRAPHIC AREA							Debt/GDP	GDP Growth	
	General	Stock M.	C. Bank				S.A.	E. & C.A.	E.A. & P.	L.A. & C.	M.E.& N.A.	W.E. & N.A	S-S. A.		Avg.	Std. Dev.
General		**-0.376**	**-0.360**	**0.445**	**-0.545**		*0.171*	**0.336**	*-0.189*	**0.322**		**-0.539**			***-0.225***	**0.341**
Stock	**-0.376**		**0.369**			***0.308***										
CB	**-0.360**	**0.369**		*-0.202*	**0.372**		***-0.249***					**0.277**	*-0.188*	***-0.268***		
DOLLARIZATION	**0.445**		*-0.202*		**-0.398**	**0.464**		**0.271**		**0.419**		**-0.538**			*-0.178*	**0.539**
lag_mon															**0.310**	
coef_mon		**-0.455**										*0.194*				
sum_mon		**-0.373**										*0.188*				
abs_mon		**-0.373**										*0.189*				
cum4_mon							***0.259***		**-0.354**	*-0.217*			**0.494**	**0.342**		
cum8_mon	***0.258***	*0.204*							**-0.448**				**0.416**	**0.345**		
cum12_mon	*0.227*	**0.333**							**-0.309**				**0.311**	*0.251*		
lagneg_mon			*0.247*									***0.322***	*-0.248*			
coefneg_mon		**0.424**	*0.277*									*-0.272*				
sumneg_mon					*0.213*					***0.255***		*0.188*				***-0.270***
cum4neg_mon		**0.336**			*-0.220*					**-0.341**	**0.292**		**0.280**	***0.264***		
cum8neg_mon		**0.371**			*-0.198*					*-0.231*	*0.220*		**0.290**	*0.223*		
cum12neg_mon		*0.244*														
lag_res																
coef_res	*-0.291*	**-0.442**				*-0.338*						*0.290*				
sum_res		**-0.382**				*0.253*			**0.287**							
abs_res		**-0.371**				***-0.327***			**0.286**							
cum4_res					***0.254***		***0.281***		**-0.308**				***-0.261***	*0.257*		
cum8_res					*0.226*				**-0.358**					*0.262*		
cum12_res									**-0.341**					*0.272*		
lagneg_res								*-0.239*	**-0.337**			**0.394**				**-0.329**
coefneg_res		**0.419**				***0.371***						***-0.266***				
sumneg_res								**-0.400**		*0.200*					**0.377**	**-0.386**
cum4neg_res				*-0.212*						***-0.254***			**0.607**			
cum8neg_res				*-0.211*				*0.197*	**-0.300**		*0.217*		**0.371**		***-0.288***	
cum12neg_res				*-0.236*					***-0.271***		**0.310**					

Boldface indicates statistically significant at the 5% level
Boldface-italics indicates statistically significant at the 10% level
Italics indicates statistically significant at the 20% level

Table 6a (continued): Correlations - MPE measures of asymmetric effects included

			GFCF Growth		Inflation			
	GNIpc_PPP	GFCF/GDP	Avg.	Std. Dev	Avg.	Std. Dev	Services / GDP	shorterm / totaldebt
General	**-0.715**	**-0.266**		***0.234***	**0.293**	**0.262**	**-0.496**	**0.389**
Stock			*0.186*	***0.218***			***0.230***	
CB	**0.433**						**0.380**	
DOLLARIZATION	**-0.499**			**0.397**	**0.401**	**0.376**	**-0.387**	**0.351**
lag_mon		**0.527**			*-0.200*	*-0.208*		
coef_mon	**0.310**							
sum_mon	**0.265**							
abs_mon	**0.266**							
cum4_mon								*-0.222*
cum8_mon		*-0.187*						*-0.205*
cum12_mon		**-0.309**						
lagneg_mon				***-0.287***				
coefneg_mon	**-0.396**						**0.356**	
sumneg_mon	***0.254***			*-0.205*			**0.315**	
cum4neg_mon		*-0.222*		*0.185*	***-0.263***	***-0.266***	***-0.273***	
cum8neg_mon		*-0.216*		*0.195*	***-0.268***	**-0.334**	*-0.200*	
cum12neg_mon					***-0.263***	**-0.334**		
lag_res		***-0.302***						
coef_res	**0.430**			*-0.256*				
sum_res							***0.272***	
abs_res							***0.272***	
cum4_res								**-0.441**
cum8_res		*-0.220*						**-0.384**
cum12_res		**-0.308**		*-0.214*				**-0.336**
lagneg_res		*-0.236*		***-0.261***				***-0.275***
coefneg_res	**-0.366**							
sumneg_res			***0.279***	**-0.393**				
cum4neg_res					**-0.332**	**-0.355**		***0.252***
cum8neg_res		*-0.199*						
cum12neg_res								

Boldface indicates statistically significant at the 5% level
Boldface-italics indicates statistically significant at the 10% level
Italics indicates statistically significant at the 20% level

Table 6b: Significance of independent variables in simple regressions with MPE measures as DV's

		Independent Variables									
		GDP growth		GFCF growth		Inflation	Financial Development			Dollarization	Adjusted R2
	Dep. Variable	Average	Std. Dev.	Average	Std. Dev.	Std. Dev.	General	Stock Market	Central Bank		/ Pseudo R2
1	lag_mon		+			–					-0.048
2	coef_mon	–	+	+	–		+				0.218
3	sum_mon	–	+	+	–		+			–	0.199
4	abs_mon			+			+				0.073
5	cum4_mon	–		+						–	0.208
6	cum8_mon	–	+	+	–		+	+		–	0.308
7	cum12_mon						+	+		–	0.076
8	lagneg_mon	+	+		–						0.093
9	coefneg_mon	–	–		+			–			0.152
10	sumneg_mon		–								0.022
11	cum4neg_mon		+			–		+			0.103
12	cum8neg_mon					–		+			0.21
13	cum12neg_mon					–		+			0.058
14	neg_terms_mon	+	+				+		+		0.416
15	sign_neg_mon	+							+	+	0.242
16	lag_res								+	+	0.114
17	coef_res										0.172
18	sum_res										-0.273
19	abs_res										-0.243
20	cum4_res	–		+							-0.055
21	cum8_res	–		+							0.069
22	cum12_res	–		+							0.175
23	lagneg_res										-0.197
24	coefneg_res										-0.346
25	sumneg_res	+	–			+				+	0.417
26	cum4neg_res	–				–					0.066
27	cum8neg_res	–	+	+					–	–	0.393
28	cum12neg_res	–	+	+	–					–	0.185
29	neg_terms_res						+			–	0.258
30	sign_neg_res	+									0.264

The cells include the sign of the relationship, when significant at the 15% level