

Does Financial Structure Matter for the Information Content of Financial Indicators?

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1. Introduction

Monetary policy works with long and variable lags. Because of these lags, policy makers need forward-looking indicators to predict the effect of policy changes on their intermediate and final target variables. The most useful indicators are those whose predictive capacity is invariant to changes in economic structure and to the state of the economic cycle. Unfortunately, few such indicators exist. A second-best solution is to determine how the predictive power of an indicator changes as economic structure or the state of the cycle changes. One can then use this information to determine which set of indicators is more likely to be reliable in a given circumstance.

Of particular concern to monetary policy is the considerable instability in the ability of financial variables to predict GDP growth and inflation – for example, as found in Stock and Watson (2003) some financial variables work well in some countries or over some time periods and forecast horizons, but the results do not show any clear pattern. One reason for this may be the changing nature of financial structures within countries across time, or the differing types of financial structures across countries. For example, one reason attributed to the poor performance of monetary aggregates as indicators for monetary policy in the United States is that financial markets in the US are highly developed, very complete and efficient so that financial asset prices contain all the information that monetary policy needs.

There are two aspects to this question. The first stems from the idea that prices may be informationally efficient when financial markets are so well developed that informational frictions do not exist and contracts are enforceable (Smith 1999). The second stems from the idea that financial prices do not reveal everything when financial markets are incomplete and/or information is costly to acquire. In particular, credit may be rationed in this case because of the residual imperfect information that persists even after financial institutions examine loan applications (Stiglitz and Weiss 1981). This imperfect information about the value of projects can cause creditors to deny loans to

borrowers who appear equivalent to those who receive loans, and hence loan demand can be greater than loan supply at the equilibrium interest rate. It is reasonable to believe that financial institutions make more use of quantity rationing than financial markets, who may be more likely to allocate credit using price rationing. This is because markets manage risk by distributing the financing of a project among many participants, each of whom takes a small standardized piece of the action, and therefore the entrepreneur is more likely to obtain all the credit that they want at the transacted interest rate. If financial institutions use quantity rationing but financial markets use price rationing, we should find that financial asset prices provide better indicators for monetary policy in countries where a greater proportion of credit is allocated through financial markets. Conversely, quantity indicators constructed from financial institution balance sheet data should be more useful in countries where borrowers have more limited access to or make more limited use of financial markets.¹

Moreover, highly developed financial systems tend to use standardized products that can be priced efficiently. If true, we should find that financial asset prices provide better indicators for monetary policy in countries with highly-developed financial systems. Conversely, bank-based financial quantity variables should provide better indicators in countries where pricing in financial markets is less efficient.

Our methodology is as follows. For 29 countries we select two common targets for monetary policy – fluctuations in GDP which we view as an intermediate target, and CPI inflation which we view as a final target. For each country we also select up to four commonly-used financial quantity variables and up to four commonly-used asset price variables. We choose variables for which data are readily available in the belief that these are the variables most likely used by policy analysts in that country. We then use the procedure in Stock and Watson (2003) to determine the power of each variable as an indicator of the target variable for time horizons up to and including eight quarters ahead. Finally, we test whether the best financial quantity indicator for a country contains

¹ Quantity indicators need not provide additional information when highly developed financial markets and financial institutions co-exist because competition at the margin could compel financial institutions to adopt market pricing for their products.

information about the future path of the target variable over and above that contained in the best asset price indicator.

In the second stage of the study we use financial structure indices and financial development indices constructed by Levine (2002) to classify countries according to the nature of their financial structures. Levine has constructed two financial structure indices, one based on the relative size of financial markets (namely, the market capitalization of exchange-traded companies relative to bank credit outstanding) and one based on the relative intensity of activity in financial markets (namely, the volume of equity traded on the stock exchange relative to bank credit outstanding). The financial development indices measure the activity, size and efficiency of the financial system as a whole. We also look at the regulatory and legal environment in which financial institutions in a country operate, based on indices developed by Levine (2003) and Ergungor (2003), respectively. The idea here is that market-based asset prices will be better indicators (i.e., contain relatively more information) in financial systems with less onerous regulatory restrictions and more flexible legal environments because financial markets in such economies are more likely to operate fairly and effectively. We relate the financial structure and development indices to the relative information content of financial quantities and asset prices to see if the two are related across countries.

The following section briefly reviews the relevant literature on financial structure and the economy, while Section 3 discusses measurement of financial structure. Section 4 outlines the data and methodology used to extract a measure of the information content of financial variables. The results are discussed in Section 5 and the final section concludes.

2. Related Literature

If asset markets are informationally efficient then they “work as a perfect shorthand for society’s collective knowledge regarding the future” (Smith 1999). That is, they reflect all relevant information about expected future events. In addition, if financial transactions follow passively from real decisions then financial quantities contain no information about the future that is not already contained in real variables or asset prices. Under these conditions, asset prices contain all the financial

information that monetary policy needs about the future. If financial quantities matter it is because financial markets are not informationally efficient or because financial transactions do not passively reflect real decisions.

Financial markets may not be efficient if transactions costs or other frictions make it costly for financial market participants to act fully on the information at their disposal (Grossman 1976). Or, it may simply be that information is costly to obtain and therefore prices do not reflect all available information (Grossman and Stiglitz 1980).

Financial transactions may not passively reflect real decisions – that is, financial considerations may constrain real behaviours – for a variety of reasons. It may be that credit is rationed such that firms cannot obtain all the credit they need to realize their real decisions at current asset prices (Stiglitz and Weiss 1981). In this case, an increase in the quantity of credit at unchanged asset prices will cause firms to expand their activities owing to the relaxation of the credit constraint. Alternatively, it may be that economic agents face liquidity constraints that limit their ability to realize their optimal real plans (Lucas 1980). In this case, an increase in the quantity of money at unchanged asset prices will cause an increase in economic activity. Or, there may be a financial accelerator at work in the economy (Bernanke, Gertler and Gilchrist 1999). Here, financial quantities contain information about the dynamic path of the economy over and above the information contained in asset prices because these quantities reflect financial restrictions on the real behaviours of firms. And finally, money may be active (Laidler 1999) such that an increase in the quantity of money causes economic agents to change their real behaviour because it signals easier monetary policy.

Financial markets are more likely to be informationally inefficient and real decisions are more likely to be constrained by financial considerations when the financial sector of an economy in general, or financial markets in particular, is underdeveloped. The literature on the effect of underdeveloped financial systems on economic growth is surveyed by Allen and Gale (2001). The early literature pointed to the conclusion that a well-developed banking sector promoted growth at early stages of

development whereas well-developed financial markets promoted growth at later stages of development. The evidence of more recent studies is consistent with the idea that the distinction between banks and financial markets is not important and that both promote growth if they are developed to the point where they provide financial services that stimulate innovation (Levine 2002). A modern and highly developed legal system is most likely the primary determinant of how well a financial system develops (La Porta et al. 1998).

Thus, the theoretical literature suggests that there may be a connection between financial structure and the information content of financial indicators. Specifically, where financial systems are underdeveloped (and likely bank based), financial markets are likely to be informationally inefficient and the ability of economic agents to realize real decisions is likely to be constrained by financial considerations. In such an economy, financial quantities are likely to be important indicators of future economic activity. On the other hand, in economies where financial systems are well developed, financial markets are likely to be informationally efficient and sufficiently developed that financial considerations do not constrain real decisions in normal times. The question is whether the data support these theoretical suppositions?

There have been no studies, to our knowledge, that look directly at the connection between financial structure and relative usefulness of financial indicators for monetary policy. Cecchetti and Krauss (2001) look at the related issue of whether financial structure affects the effectiveness of monetary policy, that is, the ease to which monetary policy can simultaneously reduce the variance of output and inflation. Imaginably, if financial structure matters for the effectiveness of monetary policy it also matters for the relative information content of financial indicators. Cecchetti and Krauss look at 23 developed and emerging market countries and find that financial structure does matter. Specifically, countries with less direct state ownership of banking system assets have lower variances of both output and inflation.

Stock and Watson (2003) look at the relative information content of 38 indicators from seven developed economies. They find that the information content of these indicators varies over time and between countries. They do not, however, explore whether this variation in information content is related to differences in financial structure.

Allen and Gale (2001) and Dolar and Meh (2002), among others, look at the evidence related to differences in financial structure and growth between countries over a long average period of time. They find that, in general, financial structure does affect the aggregate real economic variables that are of interest to monetary policy analysts. However, they do not control for the changes in financial structure that may have taken place in individual countries over time, nor do they look at the temporal relationship between the financial indicators and economic variables. Thus, from this work we cannot be sure whether financial indicators contain information about future economic variables, or whether these economic variables affect the way financial structure develops.

To examine the question of whether financial structure matters for the information content of financial variables we combine the techniques used by Stock and Watson and Levine et al. We use high frequency time series data in order to be sure that the indicators are providing information about the future as does Stock and Watson, we use the measures of financial structure developed by Levine et al., and we limit our sample to a relatively short period of time so that we can be relatively confident that financial structure is not changing significantly within individual countries. In effect, we are bringing together different strands of the literature in order to explore the question of whether financial structure matters for the information content of financial indicators.

3. Measuring Financial Structure

By financial structure we mean the nature of the components that make up a financial system. Allen and Gale (2001) identify these components as the agents in the system (that is, the ultimate suppliers and demanders of credit), financial institutions,

financial markets, the central bank, the regulatory authority, the political system (that is, government and its policies), the legal system (particularly contract enforcement and governance mechanisms), custom (that is, the importance of reputation and other implicit mechanisms for contract enforcement), accounting systems, and the nature of the incentives to generate and disseminate information.

For this study we use the structure and development indices constructed by Levine (2002). We are interested in the indices that capture the relative size, activity and efficiency of financial markets relative to financial institutions. To construct these indices, Levine uses “data from individual country publications, international agencies, and a recent survey of national regulatory authorities.”

Levine finds that the indices he constructs do not help explain differences in long-term growth rates between countries. He posits that this result obtains because highly-developed banks and financial markets both are capable of providing the financial services that are important for growth. According to Levine, what does help explain differences in long-run growth is “the component of financial development explained by legal rights of outside investors and the efficiency of the legal system in enforcing those rights.” This is interesting because Demircuc-Kunt and Levine (1999) report that countries with common-law tradition have been found to be more market-based while countries with a French civil law tradition have been found to be more bank-based, suggesting that the relative importance of financial markets in a financial system is not independent of the legal structure used by the system.

Not all researchers measure financial structure the same way. Levine (2002) uses the traditional approach of constructing an index that reflects the aggregate size, activity, and efficiency of the financial institutions sector relative to the financial markets sector of a country. Ergungor (2003) focuses on the legal structures that underpin the financial system. These are the most basic attributes of financial structure.

Cecchetti (1999) focuses on the structural aspects of the financial system that are more important for the transmission mechanism. He constructs an aggregate index of financial structure based on the size and concentration of the banking sector, the health of

the banking system, the relative amount of credit allocated through banks, and on the size of the firms that use banks. These are the financial variables that the lending view of the transmission mechanism suggests should be important. Although Cecchetti's approach is based on variables that are thought to matter for the transmission mechanism, we do not use his approach because the number of countries in his data set is much less than is in Levine's data set.

Tadesse (2001) makes use of dummy variables to classifying a financial system as either market based or bank based. If Levine's conglomerate index of size, activity, and efficiency for a country is above the mean value of the index then Tadesse classifies the country as having a bank-based financial system. If the index is below the mean then Tadesse classifies the financial system as market based. We apply this approach to the indices we consider.

Andrés, Hernando and López-Salido (1999) take a highly disaggregated approach to identifying financial structure. They do not classify financial structure in aggregate but use a wide selection of separate financial market structure variables for each country. We do not follow their lead because including a wide range of structure indicators consumes a great number of degrees of freedom, and because we want to use financial market variables as indicators for monetary policy which precludes their use as indicators of financial structure.

Mojon (2000) also uses a highly disaggregated approach to identifying financial structure, but with a broader selection of structural variables – variables such as the heterogeneity of retail banking markets and balance sheet variables from non-financial firms and households. Although these variables are not among those we examine as potential financial indicators for monetary policy, this approach also consumes too many degrees of freedom to be feasible with our limited span of data.

4. Measuring the Predictive Content of Financial Variables

Data

Our data is taken from the OECD, IMF and BIS and includes 29 countries with as many as four asset prices and four financial quantities in nominal and real terms. These

sources were used to ensure as much compatibility within the definitions as possible across countries. We include a large number of countries to ensure a wide variance in financial structure. Attempts were made to make the sample periods as comparable as possible, although limitations of the data set mean that not all countries in our sample have data for all variables, and that sample sizes may vary across countries (see Appendix A for details).

As summarized in Table 1, the asset price data are market-based, including the monetary policy rate, the short-term rate (yield on a government Treasury bill), the long-term rate (yield on a long-term government bond) and the index of equity prices from the dominant stock exchange. Quantity data are mainly from the balance sheet of financial institutions, and includes the monetary aggregates M1 and M2, as well as bank credit, and private credit. The real values of the prices and quantities are constructed using the CPI, creating *ex post* real values.

Table 1: Series Descriptions

Series Label	Source and Sampling Frequency	Description
CPI	OECD\Q	Consumer Price Inflation
RGDP	OECD\Q	Real GDP
<i>Financial Prices*</i>		
POL	IMF\Q	Policy Rate
TBILL	IMF\Q	Tbill Rate
GY	IMF\Q	Gov't Long-bond Yield
ST	OECD\Q	Stock Index
<i>Financial Quantities*</i>		
M1	IMF\Q	Narrow Money
M2	IMF\Q	Broad Money
PC	IMF\Q	Private Credit
BC	BIS\Q&M	Bank Credit

* both nominal and ex-post real data are tested.

Unit root tests applied to the levels of all series indicate, as expected, mixed evidence on the stationarity of a few series. The evidence varies across test, time period

and country. For example, while M1 was unambiguously I(1) for some of the countries, the results of the test were not definitive for other countries. Even results for the same country could be ambiguous. For example, for Argentina, M1 was clearly I(1) while M2 could have been identified as either an I(1) or I(2) process. For simplicity and to ensure consistency across countries, we treat all variables except interest rates as I(1). We repeated the exercise with inflation treated as an I(2) variable but the qualitative nature of our results did not change in a significant way.

Methodology

We follow the methodology used in Stock and Watson (2003), largely because it is a widely-accepted and commonly-used method for extracting information from a large set of data and it facilitates comparisons with other results in the literature. The approach assumes that the target variables are linear functions of the indicator variables, according to the following general equation:²

$$\Delta y_{t+h}^h = a + b(L)\Delta y_{t-1} + g(L)\Delta x_{t-1} + x_t \quad (1)$$

Δy_{t+h}^h is the target variable (the variable that we want to predict) at different forecast horizons $h = 4$ and 8 quarters. x_t is the indicator variable. Variables are transformed by taking the log difference from one period to the next (i.e., $\Delta y_{t+h}^h = (400/h)(y_{t+h} - y_t)$). $b(L)$ and $g(L)$ are lag polynomials.

Lagged values of Δy_t are included as explanatory variables to account for serial correlation and to avoid misspecification problems. The benchmark equation is simply the identical equation without the indicator variable:

$$\Delta y_{t+h}^h = a_1 + b_1(L)\Delta y_{t-1} + x_{1t} \quad (2)$$

² Stock and Watson (2003) flag non linearity in the predictive relationship as a potential explanation for instability and uneven predictive content of financial variables, but conclude that the evidence that forecasting performance is improved by taking such non-linearities into account is mixed.

Equations 1 and 2 are estimated separately for each country and for each x variable. The White (1980) correction is applied to the variance-covariance matrix of the residuals to correct the error term for serial correlation and heteroscedasticity by calculating a consistent variance-covariance matrix. The typical estimation period is from 1990:Q1 to 2003:Q1 (see annex 1 for details), even though longer time horizons are available for some countries. The choice of sample length is based on three considerations: first, we want to estimate over a period close to that corresponding to the financial structure indicators we use; second, we want to maximize the number of countries and variables in the analysis; and, third, we want a common sample period across countries, to avoid the possibility that the results would be driven by heterogeneous samples.³

We measure the information content of each indicator, x , at horizons $h = 4$ and 8 , for every country as the difference between $R^2_{h,xi,1}$ (the R^2 from equation 1) and $R^2_{h,2}$ (the R^2 from the benchmark equation). $R^2_{h,xi,1} - R^2_{h,2}$ is set to zero whenever the F test shows that the residuals from both equations (1) and (2) are not statistically different at 5% level. If $R^2_{h,xi,1} - R^2_{h,2}$ different from zero, we conclude that x_i has information useful to predicting the target variable Δy_t . From these results, we compare the different $R^2_{h,xi,1} - R^2_{h,2}$ of every financial quantity variables and choose the one that adds the most for forecasting GDP growth or inflation, at each horizon. We do the same exercise for the financial asset prices variables. Thus, for every country we identify the best quantity variable and the best asset price variable for predicting GDP growth and inflation. The results are detailed in annexes 2 and 3 for forecast horizons 4 and 8 quarters ahead, respectively.

We construct a second measure of predictive content that focuses on the value added of the best quantity variable over and above that of the best price. We estimate

³ The exercise was repeated using the maximum sample available for each country without any significant change to the qualitative results.

equation (3) where x_p^* denotes the best asset price variable, and x_q^* denotes the best financial quantity variable (selected from the first step).

$$\Delta y_{t+h}^h = a_2 + b_2(L)\Delta y_{t-1} + g_2(L)\Delta x_{q,t-1}^* + f_2 x_{p,t-1}^* + x_{2t} \quad (3)$$

We then calculate the $R_{h,xi,1}^2 - R_{h,2}^2$ using R^2 s from of equation (3) to the R^2 s from equation (1) using the best price.⁴

5. Results

This section first discusses the information content of asset prices and financial quantities, and then tries to find patterns in these results with measures of financial structure of the countries. Tables 2a and 2b summarize the number of times and the proportion of our cross section in which financial variables have significant information (detailed results used to construct these tables are in annexes 2 and 4).

Table 2a: Number of Times Variables Have Significant Information, h=4

Table 2a. Number of Times Variables Have Significant Information, n = 1							
	GDP			Inflation			# of countries
		Number	Proportion		Number	Proportion	
BC	21	2	11	23	3	17	18
M1		7	29		9	31	29
M2		6	26		6	21	28
PC		7	24		5	17	29
GY	17	2	11	13	3	16	19
POL		2	7		3	11	28
ST		7	25		2	7	28
Tbill		6	22		5	19	27

⁴ We base our results on in-sample measures of predictive content. We do this because of our short sample sizes. Atsushi et al. (2002) and Killian and Taylor (2001) show that in-sample tests of predictive ability have more power than out-of-sample tests.

Table 2b: Number of Times Variables Have Significant Information, h=8

	Real GDP Growth			Inflation			# of countries
		Number	Proportion		Number	Proportion	
BC	22	2	11	23	4	22	18
M1		6	21		8	28	29
M2		4	15		4	15	27
PC		10	34		7	24	29
GY	21	3	16	15	1	5	19
POL		2	7		6	21	28
ST		12	43		4	14	28
Tbill		4	15		4	15	27

Financial quantities

Looking at GDP growth, there are only five countries (Argentina, Greece, Mexico, Turkey and US) where none of our financial quantity variables contain useful information for forecasting. Moreover, monetary aggregates are the best financial quantity indicators in more than 48% of the cases at four quarters and in 36% of the countries at eight quarters. While private credit and bank credit are, respectively, the best indicators in 24% and 7% of the countries at four quarters, this proportion grows to 34% of countries at eight quarters (Tables A2.1 and A4.1). Money helps improve the forecasts of GDP growth by 25 percentage points at four quarters and 34 percentage points at eight quarters. Comparable results are found for bank credit and private credit. The improvement in the forecasts lies between 22 and 33 percentage points (on average) for credit variables (bank credit and private credit) respectively at four and eight quarters

horizons. The marginal improvement in the forecast of GDP growth increases with the horizon length.

Regarding inflation, financial quantity variables are useful indicators in 23 of 29 countries. Monetary aggregates are the most useful variables, over all the countries, in predicting inflation. At four quarters, money is the best variable in 52% of the countries while credit outperforms in 28% of the cases (Table A2.2 and A4.2). At eight quarters, money and credit outperform the other financial quantity variables in 40% of the cases. Credit and money improve respectively the forecasts by 32 and 17 percentage points at four quarters and 27 and 26 percentage points at eight quarters. The marginal forecasts are positively correlated with the horizon considered for money and negatively for credit (bank and private credit).

Financial asset prices

For GDP growth, asset prices perform about as well as financial quantities as indicators of GDP growth at eight quarter, but less at four quarters ahead. Asset price are useful indicators in 17 countries at four quarters and in 21 countries at eight quarters. And, although there is a debate on the potential informational content of stock prices and their usefulness for monetary policy, our results show that relative to the sample considered, stock prices were the best asset-price indicator over asset-price variables for GDP growth for 25% of the countries at four quarters and just 12% of them at eight quarters (Table A2.1 and A4.1). At four quarters, for 22% of the countries, treasury bills are the best asset-price predictor, followed by government bond yield in 11% of countries. Over both horizons, stock indices and government bond yield improve the forecasting performances of our equations by 25 percentage points on average. The policy rate and treasury bill yield improve the forecasts by 20 percentage points on average over both horizons. It is worth noting that at four quarters government bond yield and stock indices perform outperform policy rates or treasury bills. At eight quarters ahead, however, all the asset-price variables perform equally well.

For inflation, financial asset prices have significant information content for 21 countries at four quarters, and just 15 countries at eight quarters. Policy variables and

treasury bills are the best asset price variables in 17% of the countries on average over both horizons. Stock prices outperform in just 11% of the countries over both horizons, being more informative at eight than at four quarters (Table A2.2 and A4.2). Government bond yield is the best predictor variable for inflation in 16% of the countries at four quarters but just in 5% at eight quarters ahead.

In summary, our results indicate that both asset prices and financial quantities contain potentially useful information for the future path of GDP and inflation, consistent with Stock and Watson (2003) and other studies. No single financial variable dominates as the best indicator for monetary policy in our sample. This result suggests that it is important to know the conditions under which one financial variable will outperform another as an indicator of monetary policy.

Value-added of financial quantities over asset prices

While asset prices and financial quantities individually may have useful information, we are also interested in knowing whether financial quantities have information over and above that in asset prices for predicting GDP growth and inflation.

For GDP growth, financial quantities have information over and above asset prices for 11 countries at four quarters and 16 countries at eight quarters, suggesting that financial quantity information is potentially useful in many circumstances (Table A3.1 and A5.1). However, financial quantities improve the forecast of GDP by only 6 percentage points on average over both horizons, not a large amount.

For inflation, financial quantities improve forecasts over and above those based on asset prices alone in 21 countries. The value-added of financial quantities appears to be important, improving the forecasting performance by 17 percentage points on average over both horizons.

There are twelve countries where financial quantities do not help in predicting GDP growth over and above asset prices (Argentina, Belgium, Chile, Denmark, Germany, Greece, Japan, Malaysia, Mexico, Netherlands, Turkey, and the US) over both horizons. However for inflation, there are just four countries where financial quantity

variables do not improve inflation forecasts over and above the best asset price variable (Belgium, France, Ireland, and Sweden). The lack of commonality between the lists, and the lack of evidently similarity between countries on either list suggest that finding the conditions under which one financial indicator will be better than another will not be easy.

Financial structure and the relative predictive content of financial variables

In order to link our precedent results to the countries' financial structures, we consider four indices that characterize the financial environment in the economies considered. The details on the way categorize countries based on these indices are given in the Annex 6. The first three measure financial development, organization and regulation and are taken from Levine (2002). The financial development indices aims to measure the degree of development of the overall financial system by measuring its activity, size and efficiency. The financial organization index aims to measure the degree to which financial structure is market based or bank based, by measuring the relative activity, size and efficiency of each sector. The financial regulation index, also from Levine, measures the regulatory restrictions on commercial bank activities such as real estate, insurance, and securities. The fourth indicator identifies countries as having low legal flexibility if complaints and rulings must be justified by statutory law or a judge may not justify their judgment according to their conscience (in equity), and high otherwise (Ergungor et al. 2003).

To conduct our analysis we built a proportion table that relates the financial variables used (asset prices and financial quantities) to the indices of financial structures of the economy. Given a financial structure of an economy we would like to know how many times the asset prices outperform financial quantity variables in predicting GDP growth, and inflation. We can see this as a conditional probability for a financial variable (asset price or financial quantity) to help the most in predicting GDP growth or inflation given a financial structure. We built a table for four and eight quarters ahead forecasts, and because qualitatively the results are similar, we built a combined table for both horizons (Tables 3 and 4). For example, for GDP, asset prices are best in just 25% of

countries identified as having a bank-based financial structure and financial quantities are therefore best in 65% of countries identified as having a bank-based financial structure.

Table 3: Proportion of times that a variable is the best indicator in a specific financial structure state for GDP, combined horizons.

	Financial organization		Financial development		Financial regulation		Legal structure	
	Bank	Market	Less	More	Heavy	Light	Low	High
Asset prices	25	34	33	30	41	23	28	33
Financial quantities	65	55	50	62.5	45	67	60	56

Table 4: Proportion of times that a variable is the best indicator in a specific financial structure state for inflation, combined horizons.

	Financial organization		Financial development		Financial regulation		Legal structure	
	Bank	Market	Less	More	Heavy	Light	Low	High
Asset prices	25	23	22	25	20	26	21	26
Financial quantities	60	68	61	68	66	64	71	60

Looking at the results of Tables 3 and 4 show that financial quantities are important no matter what the financial structure of an economy is, for GDP growth and inflation. In particular, financial asset prices are not systematically more important in economies with highly developed market-based financial systems. Even in these economies, financial quantities are the best financial indicators in more than 60% of the countries. This is somewhat surprising given our hypothesis.

One shortcoming of our preliminary analysis is that we rely simply on whether a variable has information or not, which may be overly restrictive if the *degree* to which financial variables contain information varies significantly across countries. One way around this would be to specify a system of equations (SURE or Panel), and look at the mean effect and specific effect. This approach will also allow us to look at the

informational content of variables over several horizons together, while now it is done for each horizon separately. We can also think of building a kind of common distribution for all countries, assessing the informational content of financial variables on GDP growth and inflation by drawing cross country comparisons. And finally, we could allow for more variance in our classification of financial structure. These avenues are left to future versions of the paper.

6. Conclusion

Our goal in this paper was to determine to what extent financial structure has implications for the information content of financial variables for predicting real GDP growth and inflation. We thought that asset prices would dominate financial quantities in economies with highly developed market based financial systems.

To explore this question we looked at recent data from 29 countries using GDP growth and inflation as target variables for monetary policy and a variety of readily available financial asset prices and quantities as indicators. We concentrated on the period 1990-2003. We used the methodology in Stock and Watson (2003) to identify the marginal information content for our financial indicators.

We found that financial asset prices do not, on average, dominate financial quantities as an indicator for monetary policy. Financial quantities are the best single indicator for monetary policy in approximately as many countries as is a financial asset price, although asset prices do seem to provide more information at the margin on average than do financial quantities. This result held for both GDP growth and inflation. In a significant majority of countries, financial quantities contained information useful for monetary policy over-and-above that contained in asset prices. We could find no systematic pattern between financial structure and whether financial asset prices or quantities were the best financial indicator for monetary policy. Importantly, financial quantities were sometimes the best financial indicator even in countries with highly developed financial market based financial systems. These results lead us to conclude that it will be difficult to tell, a priori, whether a financial asset price or quantity will be

the best indicator for monetary policy at any particular point in time. These results also lead us to conclude that financial quantities remain important indicators for monetary policy.

One reason for our finding that financial quantities are oftentimes the best indicator for monetary policy may be that we did not include the best financial asset price indicator in our study. For example, we did not include the term spread or the risky spread as financial asset price indicators. However, neither did we include all possible financial quantity variables. For example, money gaps and credit gaps were not included as indicators in this study.

A second reason why we did not find a clear relationship between the indicator properties of financial variables and financial structure is that our measures of financial system structure may have been too simple to capture the aspects of financial structure important for the transmission mechanism.

Finally, our study is limited because it only considered changes in financial structure between countries. It may be easier to see the connections between financial structure and the indicator properties of financial variables by looking at how financial structure changes within an economy through time in addition to how financial structure differs between economies at a point in time.

Despite these limitations, our study did show that financial quantity variables can be good indicators for monetary policy whatever the financial structure of an economy. We did not, however, identify the conditions under which one financial indicator is better than another. Further work is needed to answer that question.

The master-economist must possess a rare combination of gifts...he must study the present in light of the past for the purposes of the future. No part of man's nature or his institutions must lie entirely outside his regard.

➤ John Maynard Keynes

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Annex 1: Data Sources and Samples

Table A1.1: GDP, CPI and Price Variables

Table A1.1: GDP, CPI and Price Variables	OECD etsintoeed	IMF "etsintimf"		OECD etsintoeed	IMF "etsintimf "		BIS "etsintbis"
	Economic Variables			Prices			
	CP (CPI)I	Real GDP (GDP)	Policy Rate (POL)	Stock Index (ST)	T-bill rate (Tbill)	Govt Bond Yield (GY)	Residential property prices (HP)
Country	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Various
Argentina	1957-2003	1993-2002	1988-2003	1993-2003	1979-2003	1998-2003	NA
Australia	1960-2003	1959-2003	1969-1996	1960-2003	1969-2002	1957-2003	q.1986- 2003
Austria	1960-2003	1976-2003	1957-1998	1968-2003	1967-1998	1970-2000	1960-2003
Belgium	1960-2003	1980-2002	1957-1998	1985-2003	1957-2003	1957-2003	q. 1981- 2003
Brazil	1980-2003	1990-2002	1957-2003	1980-2003	1995-2003	1998-2003	NA
Canada	1960-2003	1961-2002	1957-2003	1960-2003	1957-2003	1957-2003	m. 1980- 2003
Chile	1957-2003	1980-2003	1993-2003	1974-2003	2000-2003	NA	NA
Denmark	1960-2003	1988-2003	1957-2003	1983-2003	1972-2003	1957-2003	q.1971- 2003
Finland	1960-2003	1960-2003	1957-1998	1987-2003	1981-2003	1993-2003	q.1978- 2003
France	1960-2003	1970-2003	1969-2003	1960-2003	1970-2002	1957-2003	q.1994- 2003
Germany	1960-2003	1960-2003	1957-1998	1960-2003	1975-2003	1957-2003	a.1975- 2003
Greece	1960-2003	1948-2002	1957-2000	1985-2003	1983-2003	1985-2003	q.1994- 2003
Hong Kong	1990-2003	1986-2002	1992-2003	1994-2003	1992-2003	NA	m.1993- 2003
Iceland	1959-2003	1982-1997	1957-2003	1993-2003	1984-2003	1992-2003	1993-2002
Indonesia	1968-2003	1997-2001	1990-2003	1995-2003	1974-2003	NA	NA
Ireland	1960-2003	1997-2002	1957-1998	1960-2003	1973-1998	1957-1998	q.1988- 2003
Israel	1957-2003	1968-2003	1982-2003	1957-2003	1984-2003	NA	NA
Italy	1960-2003	1960-2003	1964-1998	1975-2003	1977-2003	1957-2003	a.1970- 1998
Japan	1960-2003	1957-2003	1957-2003	1960-2003	1980-2000	1966-2003	a.1970- 1999
Korea	1970-2003	1970-2002	1957-2003	1981-2003	1976-2003	1973-2003	1990-2003
Luxembourg	1957-2003	1995-2002	1990-1999	1980-1999	1980-1999	1970-1999	1995-2003
Malaysia	1957-2003	1991-2003	1959-1996	1991-2003	1974-2003	2002-2003	NA
Mexico	1957-2003	1980-2003	1981-2003	1984-2003	1978-2003	1995-2000	1980-2003
Netherlands	1960-2003	1977-2002	1957-1993	1983-2003	1960-1998	1957-2003	m.1999- 2003
New Zealand	1957-2003	1987-2003	1957-2003	1961-2003	1978-2003	1957-2003	q.1962- 2003
Norway	1960-2003	1979-2003	1957-2003	1986-2003	1978-2003	1957-2003	q.1991- 2003
Philippines	1957-2003	1981-2003	1957-2003	1957-2003	1976-2003	1994-2003	NA
Portugal	1960-2003	1988-2003	1957-1998	1988-2003	1980-1998	1957-2000	m.1988- 2003
South Africa	1957-2003	1960-2002	1957-2003	1957-2003	1957-2003	1957-2003	NA
Spain	1960-2003	1980-2003	1957-1998	1985-2003	1979-2003	1978-2003	q.1999- 2003
Sweden	1960-2003	1990-2003	1957-2002	1960-2003	1961-2001	1957-1995	q.1986- 2003
Switzerland	1960-2003	1967-2003	1957-2003	1960-2003	1980-2003	1957-2003	q.1970- 2003
Turkey	1969-2003	1987-2003	1957-2003	1986-2003	1985-2003	1999-2003	1994-2003
United Kingdom	1960-2003	1957-2002	1985-2003	1960-2003	1957-2003	1957-2003	m.1983- 2002
United States	1960-2003	1957-2003	1957-2003	1964-2003	1957-2003	1957-2003	m.1975- 2002

Table A1.2 GDP, CPI and Price Variables

	IMF "etsintimf"			BIS "etsintbis"
	Quantities			
	M1 (M1)	M2 (M2)	Private Sector Credit (PC)	Bank credit to business (BC)
Country	Quarterly	Quarterly	Quarterly	Various
Argentina	1957-2003	1957-2003	1957-2003	1957-2003
Australia	1960-2002	1957-2002	1957-2002	1976-2003
Austria	1960-1998	1958-1998	1958-1998	1999-2001
Belgium	1979-1998	1958-1998	1958-1998	NA
Brazil	1957-2003	1957-2003	1957-2003	1957-2003
Canada	1960-2003	1957-2002	1957-2002	m. 1956-2003
Chile	1960-2003	1960-2003	1960-2003	1960-2003
Denmark	1988-2003	1957-2003	1957-2003	m.1993-2003
Finland	1980-1998	1957-1998	1957-1998	NA
France	1977-1998	1957-1998	1957-1998	q.1977-1998
Germany	1960-1998	1957-2003	1957-1998	q.1968-1997
Greece	1957-2000	1957-2000	1957-2000	m.1980-2003
Hong Kong	1991-2003	1991-2003	1990-2003	1990-2003
Iceland	1957-2003	1957-2003	1957-2003	1957-2003
Indonesia	1967-2003	1968-2003	1968-2003	1980-2003
Ireland	1960-1998	1982-1998	1957-1998	NA
Israel	1957-2003	1957-2003	1957-2003	1957-2003
Italy	1974-1998	1974-2003	1970-1998	NA
Japan	1960-2003	1957-2003	1957-2002	q.1992-2003
Korea	1960-2003	1960-2003	1957-2003	NA
Luxembourg	1983-2003	1957-2003	1977-2003	1957-2003
Malaysia	1957-2003	1957-2003	1957-2003	1957-2003
Mexico	1957-2003	1957-2003	1957-2003	1957-2003
Netherlands	1960-1998	1959-1997	1957-1997	1999-2003
New Zealand	1957-2003	1957-2003	1957-2003	1957-2003
Norway	1992-2003	1957-2003	1957-2003	NA
Philippines	1957-2003	1957-2003	1957-2003	1957-2003
Portugal	1966-1998	1957-1998	1957-1998	NA
South Africa	1965-2003	1971-2003	1971-2003	1971-2003
Spain	1962-1998	1961-1998	1957-1998	1999-2003
Sweden	NA	1960-2000	1969-2000	q.1976-2003
Switzerland	1960-2002	1957-2003	1957-2003	1976-2003
Turkey	1962-2003	1962-2003	1959-2003	1959-2003
United Kingdom	1963-1989	1982-2003	1959-2003	q.1975-2003
United States	1960-2003	1957-2002	1957-2002	w.1972-1996

Table A1.3: Sample Size and Variables Tested*

	Sample retained	Variables tested	
		Price	Quantity
Argentina	1993:01 - 2001:01	TBILL	M1, M2, BC, PC
Australia	1990:01 - 1996:01	POL, TBILL, GY, ST	M1, M2, BC, PC
Austria	1990:01 - 1998:01	POL, TBILL, GY, ST	M1, M2, PC
Belgium	1990:01 - 1998:01	POL, GY, ST, TBILL	M1, M2, PC
Brazil	1993:01 - 2002:01	POL, ST	M1, M2, BC, PC
Canada	1990:01 - 2003:01	POL, TBILL, GY, ST	M1, M2, BC, PC
Chile	1993:01 - 2003:01	TBILL, ST, POL	M1, M2, BC, PC
Denmark	1993:01 - 2003:01	POL, TBILL, GY, ST	M1, M2, PC
Finland	1990:01- 1998:01	POL, ST, TBILL	M1, M2, PC
France	1990:01 - 1998:01	POL, TBILL, GY, ST	M1, M2, BC, PC
Germany	1990:01 - 1997:03	POL, TBILL, GY, ST	M1, M2, BC, PC
Greece	1990:01 - 2000:04	POL, TBILL, ST	M1, M2, BC, PC
Ireland	1990:01 - 1998:01	POL, TBILL, GY, ST	M1, M2, PC
Israel	1990:01 - 2003:01	POL, TBILL, ST	M1, M2, BC, PC
Italy	1990:04 - 1998:04	POL, TBILL, GY, ST	M1, M2, PC
Japan	1990:01 - 2000:04	POL, TBILL, GY, ST	M1, M2, PC
Malaysia	1992:01 - 2003:01	POL, TBILL, ST	M1, M2, BC, PC
Mexico	1990:01 - 2003:01	POL, TBILL, ST	M1, M2, BC, PC
Netherlands	1990:01 - 1997:04	POL, TBILL, GY, ST	M1, M2, PC
New-Zealand	1990:01 - 2003:01	POL, TBILL, GY, ST	M1, M2, BC, PC
Norway	1992:01 - 2003:01	POL, GY, ST, TBILL	M1, M2, PC
Philippines	1990:01 2001:04	POL, TBILL, ST	M1, M2, BC, PC
South-Africa	1992:01 - 2003:01	POL, TBILL, GY, ST	M1, M 2, BC, PC
Spain	1990:01 - 1998:04	POL, TBILL, GY, ST	M1, M2, PC
Sweden	1990:01 - 2000:04	POL, TBILL, ST	M2, PC
Switzerland	1990:01 - 2003:01	POL, TBILL, GY, ST	M1, M2, PC
Turkey	1990:01 - 2003:01	POL, ST	M1, M2, BC, PC
U- K	1990:01 - 2002:04	POL, TBILL, GY, ST	M1, M2, BC, PC
USA	1990:01 - 2003:01	POL, TBILL, GY, ST	M1, M2, BC, PC

Note: variables for which there was insufficient or no data were excluded from the analysis.

Annex 2: Results from Augmented AR Regressions, 4 quarters ahead

Table A2.1: Measure of Marginal Information for Best Quantity and Price Variable for Predicting GDP Growth (1990 – 2003)*

	Quantity Var	Price Var	Best Quantity	Best Price
Argentina	0	0	-	-
Australia	0.65	0.22	M2	P-L
Austria	0.18	0.17	M1	ST
Belgium	0.12	0	M1	-
Brazil	0.09	0	PC	-
Canada	0.3	0	M2	-
Chile	0.14	0.19	BC	ST
Denmark	0.1	0	M2	-
Finland	0.51	0.25	PC	GY
France	0.21	0.11	M2	Tbill
Germany	0.14	0.47	BC	Tbill
Greece	0	0.28	-	ST
Ireland	0.22	0.23	M1	ST
Israel	0.29	0	M2	-
Italy	0.56	0.28	PC	Tbill
Japan	0.1	0	M2	-
Malaysia	0	0	-	-
Mexico	0	0	-	-
Netherlands	0.35	0.41	PC	Tbill
New-Zealand	0	0	-	-
Norway	0.11	0	PC	-
Philippines	0.12	0.22	M1	GY
South-Africa	0.23	0	M1	-
Spain	0.31	0.24	M1	ST
Sweden	0.3	0.44	PC	ST
Switzerland	0.4	0.1	M1	P-L
Turkey	0	0.24	-	Tbill
United-Kingdom	0.3	0.29	PC	Tbill
USA	0	0.13	-	ST

Notes: “-“ indicates no variable had significant predictive content.

Table A2.2: Measure of Marginal Information for Best Quantity and Price Variable for Predicting Inflation (1990 – 2003)*

	Quantity Var	Price Var	Best Quantity	Best Price
Argentina	0.06	0	M1	-
Australia	0.23	0.53	M2	P-L
Austria	0.19	0.12	M2	Tbill
Belgium	0	0.14	-	ST
Brazil	0.21	0	M1	-
Canada	0.1	0.12	M1	P-L
Chile	0	0	-	-
Denmark	0.33	0	BC	-
Finland	0.12	0	PC	-
France	0	0.16	-	GY
Germany	0.64	0.29	BC	Tbill
Greece	0.03	0	PC	-
Ireland	0	0.08	-	Tbill
Israel	0.05	0	M1	-
Italy	0.07	0.06	M1	P-L
Japan	0.32	0	PC	-
Malaysia	0.37	0	PC	-
Mexico	0.11	0	M1	-
Netherlands	0.45	0.35	M2	ST
New-Zealand	0.35	0	M1	-
Norway	0.03	0	M1	-
Philippines	0.21	0.09	M2	Tbill
South-Africa	0.15	0.4	M2	GY
Spain	0	0	-	-
Sweden	0	0	-	-
Switzerland	0.19	0.2	PC	GY
Turkey	0.33	0.35	BC	Tbill
United-Kingdom	0.22	0	M2	-
USA	0.08	0	M1	-

Notes: “-“ indicates no variable had significant predictive content.

Annex 3: Results from Test of Valued-added of Best Quantity, 4 quarters ahead

Table A3.1: Marginal Information of Best Quantity over Best Price for Predicting GDP Growth and Inflation (1990 – 2003)*

	GDP	Inflation	GDP	Inflation
Argentina	0.00	0.06	-	M1
Australia	0.00	0.00	-	-
Austria	0.12	0.18	M1	M2
Belgium	0.00	0.00	-	-
Brazil	0.12	0.21	M2	M1
Canada	0.15	0.10	M2	M1
Chile	0.00	0.00	-	-
Denmark	0.00	0.33	-	BC
Finland	0.00	0.00	-	-
France	0.00	0.00	-	-
Germany	0.00	0.44	-	BC
Greece	0.00	0.02	-	M2
Ireland	0.00	0.00	-	-
Israel	0.16	0.05	M1	M1
Italy	0.12	0.07	PC	M1
Japan	0.00	0.32	-	PC
Malaysia	0.00	0.37	-	PC
Mexico	0.00	0.11	-	M1
Netherlands	0.00	0.31	-	PC
New-Zealand	0.00	0.35	-	M1
Norway	0.12	0.03	M1	M1
Philippines	0.10	0.52	M1	M2
South-Africa	0.10	0.15	M1	M2
Spain	0.40	0.00	M1	-
Sweden	0.13	0.00	PC	-
Switzerland	0.12	0.16	M1	PC
Turkey	0.00	0.61	-	BC
United-Kingdom	0.00	0.20	-	M2
USA	0.00	0.09	-	M1

Notes: “-“ indicates quantity variable had no significant value-added.

Annex 4: Results from Augmented AR Regressions, 8 quarters ahead

Table A4.1: Measure of Marginal Information for Best Quantity and Price Variable for Predicting GDP Growth (1990 – 2003)*

	Quantity Var	Price Var	Best Quantity	Best Price
Argentina	0	0	-	-
Australia	0.81	0.31	M2	P-L
Austria	0.28	0.36	PC	ST
Belgium	0	0.3	-	ST
Brazil	0.11	0	PC	-
Canada	0.22	0.2	M1	GY
Chile	0.3	0.26	BC	ST
Denmark	0.25	0.11	PC	ST
Finland	0.6	0.17	PC	Tbill
France	0.27	0.33	M2	ST
Germany	0	0.57	-	Tbill
Greece	0	0.19	-	P-L
Ireland	0.2	0.19	M1	ST
Israel	0.29	0	BC	-
Italy	0.38	0.33	PC	ST
Japan	0.26	0	M2	-
Malaysia	0.15	0	PC	-
Mexico	0	0	-	-
Netherlands	0.58	0.47	PC	Tbill
New-Zealand	0.18	0	M2	-
Norway	0.36	0.16	PC	ST
Philippines	0.14	0.37	M1	GY
South-Africa	0.11	0	M1	-
Spain	0.57	0.37	M1	ST
Sweden	0.32	0.43	PC	ST
Switzerland	0.6	0.25	M1	ST
Turkey	0	0.37	-	Tbill
United-Kingdom	0.51	0.32	PC	GY
USA	0	0.17	-	ST

Notes: “-“ indicates no variable had significant predictive content.

Table A4.2: Measure of Marginal Information for Best Quantity and Price Variable for Predicting Inflation Growth (1990 – 2003)*

	Quantity Var	Price Var	Best Quantity	Best Price
Argentina	0.21	0	BC	-
Australia	0.29	0.26	M1	P-L
Austria	0.31	0.23	M2	Tbill
Belgium	0.07	0.12	M1	ST
Brazil	0.21	0	M1	-
Canada	0	0.5	-	P-L
Chile	0	0	-	-
Denmark	0.41	0.24	BC	P-L
Finland	0.18	0	PC	-
France	0	0.06	-	GY
Germany	0.56	0.51	BC	Tbill
Greece	0.03	0.02	PC	ST
Ireland	0	0	-	-
Israel	0.06	0	M1	-
Italy	0.14	0.17	M1	P-L
Japan	0.38	0	PC	-
Malaysia	0.48	0.09	M1	ST
Mexico	0.19	0	M1	-
Netherlands	0.78	0.81	M2	P-L
New-Zealand	0.27	0	M2	-
Norway	0.28	0.36	PC	P-L
Philippines	0.25	0	PC	-
South-Africa	0	0.19	-	ST
Spain	0.05	0	PC	-
Sweden	0	0	-	-
Switzerland	0.24	0.13	PC	Tbill
Turkey	0.14	0.09	BC	Tbill
United-Kingdom	0.26	0	M2	-
USA	0.16	0	M1	-

Notes: “-“ indicates no variable had significant predictive content.

Annex 5: Results from Test of Valued-added of Best Quantity, 8 quarters ahead

Table A5.1: Marginal Information of Best Quantity over Best Price for Predicting GDP Growth and Inflation (1990 – 2003)*

	GDP	Inflation	GDP	Inflation
Argentina	0.00	0.21	-	BC
Australia	0.05	0.24	M2	M1
Austria	0.29	0.28	M2	M2
Belgium	0.00	0.00	-	-
Brazil	0.08	0.21	M2	M1
Canada	0.16	0.00	M2	-
Chile	0.00	0.01	-	BC
Denmark	0.00	0.49	-	BC
Finland	0.04	0.11	PC	PC
France	0.14	0.00	M1	-
Germany	0.00	0.22	-	BC
Greece	0.00	0.04	-	PC
Ireland	0.13	0.00	PC	-
Israel	0.00	0.06	-	M1
Italy	0.15	0.11	M2	M1
Japan	0.00	0.38	-	PC
Malaysia	0.00	0.48	-	M1
Mexico	0.00	0.19	-	M1
Netherlands	0.00	0.31	-	M2
New-Zealand	0.19	0.27	M1	M2
Norway	0.18	0.41	M1	PC
Philippines	0.00	0.79	-	PC
South-Africa	0.04	0.00	M1	-
Spain	0.35	0.05	M2	PC
Sweden	0.13	0.00	PC	-
Switzerland	0.06	0.19	M1	PC
Turkey	0.00	0.38	-	BC
United-Kingdom	0.07	0.14	M2	M2
USA	0.00	0.09	-	M1

Notes: “-“ indicates quantity variable had no significant value-added.

Annex 6: Measures of Financial Development, Structure, Regulation and Legal Flexibility

Table 6.1: Financial Development, Financial Structure and Financial Regulation (Levine 2002) and Legal Flexibility (Djankov et al. 2003)*

Country	Financial Development	Financial Structure	Financial Regulation	Legal Flexibility
Argentina	Less	Bank	Light	Low
Australia	More	Market	Light	High
Austria	More	Bank	Light	Low
Belgium	Less	Bank	Heavy	High
Brazil	Less	Market	Heavy	Low
Canada	More	Market	Light	High
Chile	Less	Bank	Heavy	High
Denmark	More	Market	Light	High
Finland	More	Bank	Light	High
France	More	Bank	Light	Low
Germany	More	Market	Light	Low
Greece	Less	Bank	Heavy	Low
Ireland	More	Market	Light	High
Israel	More	Market	Heavy	Low
Italy	Less	Bank	Heavy	Low
Japan	More	Market	Heavy	Low
Malaysia	More	Market	Heavy	High
Mexico	Less	Market	Heavy	Low
Netherlands	More	Market	Light	High
New-Zealand	More	Market	Light	High
Norway	More	Bank	Light	High
Philippines	Less	Market	Light	Low
South-Africa	More	Market	Light	High
Spain	More	Bank	Light	Low
Sweden	More	Market	Heavy	High
Switzerland	More	Market	Light	Low
Turkey	Less	Market	Heavy	Low
U.K.	More	Market	Light	High
USA	More	Market	Heavy	High

* Comparisons are relative to the average of the total sample in each study.

The categorization of degree of financial structure is constructed from the financial structure indices in Levine (2002). The financial structure indices consist of the following three indices: Structure-Activity, Structure-Size and Structure-Efficiency and are defined as follows:

1. *Structure-Activity* = $\ln (\text{total value traded ratio} / \text{bank credit ratio})$

2. *Structure-Size* = $\ln (\text{market capitalization ratio} / \text{bank credit ratio})$

3. *Structure-Efficiency* = $\ln (\text{total value traded ratio} * \text{overhead costs})$

These indices were constructed using data from 48 countries over various sub samples covering the 1980 to 1995 period. Sample averages were taken for each index to compute the three financial structure indices for each country. Based on the most frequent reading of the three indices for each country, the overall financial structure index was constructed , as reported in the above table.

The categorization of degree of financial development is constructed in a similar manner, using the financial development indices in Levine (2002). The financial development indices consist of the following three indices: Finance-Activity, Finance-Size and Finance-Efficiency and are defined as follows:

1. *Finance-Activity* = $\ln (\text{total value traded ratio} * \text{private credit ratio})$

2. *Finance-Size* = $\ln (\text{market capitalization ratio} + \text{private credit ratio})$

3. *Finance-Efficiency* = $\ln (\text{total value traded ratio} / \text{overhead costs})$

Sample averages were taken for each index to compute the three financial development indices for each country. Based on the most frequent reading of the three indices for each country, we constructed the overall financial development index.

The categorization of degree of financial regulation is constructed from the index of financial regulation of commercial banks in Levine (2002). This index is based on survey data, which determines whether national regulators allow commercial banks to own non-

financial firms or to participate in the following activities: securities (e.g., underwriting, brokering, etc.); insurance (e.g., selling, underwriting); and, real estate (e.g., investment, development, management). The index is a sum of scores for each component which are given depending on the degree of permissiveness (1= unrestricted; 2 = allowed with some restrictions; 3= restricted). As for financial organization and financial development, we make classifications between ‘light’ and ‘heavy’ by comparing individual country scores relative to the total sample average.

The measure of legal flexibility is taken from Ergungor (2003) to classify countries as having “high” or “low” legal flexibility relative to the sample average (the sample covers 48 countries). A system may be classified as having low flexibility if complaints and rulings must be justified by statutory law or a judge may not justify their judgment according to their conscience (in equity).

Annex 7: Sorting of Results by Financial and Legal System Type, 4 Quarters Ahead

Table A7.1: GDP Growth, 4 Quarters Ahead

Country	Legal Flexibility	Financial Development	Financial Organization	Financial Regulation	GDP				
					Information In:	Best Indicator	Quantity Variable	Best Quantity Given Best Price	Price Variable
Greece	low	less	bank	heavy	price	price			stock index
Italy	low	less	bank	heavy	both	quantity	credit	credit	gov rate
Belgium	high	less	bank	heavy	quantity	quantity	money		
Chile	high	less	bank	heavy	both	price	credit		stock index
Argentina	low	less	bank	light	neither	neither			
Brazil	low	less	market	heavy	quantity	quantity	credit	money	
Mexico	low	less	market	heavy	neither	neither			
Turkey	low	less	market	heavy	price	price			gov rate
Philippines	low	less	market	light	both	price	money	money	gov rate
Austria	low	more	bank	light	both	quantity	money	money	stock index
France	low	more	bank	light	both	quantity	money		gov rate
Spain	low	more	bank	light	both	quantity	money		stock index
Finland	high	more	bank	light	both	quantity	credit		gov rate
Norway	high	more	bank	light	quantity	quantity	credit	money	
Israel	low	more	market	heavy	quantity	quantity	money	money	
Japan	low	more	market	heavy	quantity	quantity	money		
Malaysia	high	more	market	heavy	neither	neither			
Sweden	high	more	market	heavy	both	price	credit	credit	stock index
USA	high	more	market	heavy	price	price			stock index
Germany	low	more	market	light	both	price	credit		gov rate
Switzerland	low	more	market	light	both	quantity	money	money	policy rate
Australia	high	more	market	light	both	quantity	money		policy rate
Canada	high	more	market	light	quantity	quantity	money	money	
Denmark	high	more	market	light	quantity	both	money		
Ireland	high	more	market	light	both	price	money		stock index
Netherlands	high	more	market	light	both	price	credit		gov rate
New Zealand	high	more	market	light	neither	neither			
South Africa	high	more	market	light	quantity	quantity	money	money	
U.K.	high	more	market	light	both	quantity	credit		gov rate

Table A7.2: Inflation, 4 Quarters Ahead

Country	Legal Flexibility	Financial Development	Financial Organization	Financial Regulation	Inflation				
					Information In:	Best Indicator	Quantity Variable	Best Quantity Given Best Price	Price Variable
Greece	low	less	bank	heavy	quantity	quantity	credit	money	
Italy	low	less	bank	heavy	both	quantity	money	money	policy rate
Belgium	high	less	bank	heavy	price	price			stock index
Chile	high	less	bank	heavy	neither	neither			
Argentina	low	less	bank	light	quantity	quantity	money	money	
Brazil	low	less	market	heavy	quantity	quantity	money	money	
Mexico	low	less	market	heavy	quantity	quantity	money	money	
Turkey	low	less	market	heavy	both	price	credit	credit	gov rate
Philippines	low	less	market	light	both	quantity	money	money	gov rate
Austria	low	more	bank	light	both	quantity	money	money	gov rate
France	low	more	bank	light	price	price			gov rate
Spain	low	more	bank	light	neither	neither			
Finland	high	more	bank	light	quantity	quantity	credit	money	
Norway	high	more	bank	light	quantity	quantity	money	money	
Israel	low	more	market	heavy	quantity	quantity	money	money	
Japan	low	more	market	heavy	quantity	quantity	credit	credit	
Malaysia	high	more	market	heavy	quantity	quantity	credit	credit	
Sweden	high	more	market	heavy	neither	neither			
USA	high	more	market	heavy	quantity	quantity	money	money	
Germany	low	more	market	light	both	quantity	credit	credit	gov rate
Switzerland	low	more	market	light	both	price	credit	credit	gov rate
Australia	high	more	market	light	both	price	money		policy rate
Canada	high	more	market	light	both	price	money	money	policy rate
Denmark	high	more	market	light	quantity	quantity	credit	credit	
Ireland	high	more	market	light	price	price			gov rate
Netherlands	high	more	market	light	both	quantity	money	credit	gov rate
New Zealand	high	more	market	light	quantity	quantity	money	money	
South Africa	high	more	market	light	both	price	money	money	gov rate
U.K.	high	more	market	light	quantity	quantity	money	money	

Annex 8: Sorting of Results by Financial and Legal System Type, 8 Quarters Ahead

Table A8.1: GDP Growth, 8 Quarters Ahead

Country	Legal Flexibility	Financial Development	Financial Organization	Financial Regulation		GDP				
						Information In:	Best Indicator	Quantity Variable	Best Quantity Given Best Price	Price Variable
Greece	low	less	bank	heavy		price	price			policy rate
Italy	low	less	bank	heavy		both	quantity	credit	money	stock index
Belgium	high	less	bank	heavy		price	price			stock index
Chile	high	less	bank	heavy		both	quantity	credit	money	stock index
Argentina	low	less	bank	light		neither	neither			
Brazil	low	less	market	heavy		quantity	quantity	credit	money	
Mexico	low	less	market	heavy		neither	neither			
Turkey	low	less	market	heavy		price	price			gov rate
Philippines	low	less	market	light		both	price	money		gov rate
Austria	low	more	bank	light		both	price	credit	money	stock index
France	low	more	bank	light		both	price	credit	money	stock index
Spain	low	more	bank	light		both	quantity	money	money	stock index
Finland	high	more	bank	light		both	quantity	credit	credit	gov rate
Norway	high	more	bank	light		quantity	quantity	credit	money	stock index
Israel	low	more	market	heavy		quantity	quantity	credit		
Japan	low	more	market	heavy		quantity	quantity	money		
Malaysia	high	more	market	heavy		quantity	quantity	credit		
Sweden	high	more	market	heavy		both	price	credit	credit	stock index
USA	high	more	market	heavy		price	price			stock index
Germany	low	more	market	light		price	price			gov rate
Switzerland	low	more	market	light		both	quantity	money	money	stock index
Australia	high	more	market	light		both	quantity	money	money	policy rate
Canada	high	more	market	light		both	quantity	money	money	gov rate
Denmark	high	more	market	light		both	quantity	money		stock index
Ireland	high	more	market	light		both	quantity	money	credit	stock index
Netherlands	high	more	market	light		both	quantity	credit		stock index
New Zealand	high	more	market	light		quantity	quantity	money	money	
South Africa	high	more	market	light		quantity	quantity	money	money	
U.K.	high	more	market	light		both	quantity	money	money	gov rate

Table A8.2: Inflation, 8 Quarters Ahead

Country	Legal Flexibility	Financial Development	Financial Organization	Financial Regulation	Inflation				
					Information In:	Best Indicator	Quantity Variable	Best Quantity Given Best Price	Price Variable
Greece	low	less	bank	heavy	both	quantity	credit	credit	stock index
Italy	low	less	bank	heavy	both	price	money	money	policy rate
Belgium	high	less	bank	heavy	both	price	money		stock index
Chile	high	less	bank	heavy	neither	neither			
Argentina	low	less	bank	light	quantity	quantity	credit	credit	
Brazil	low	less	market	heavy	quantity	quantity	money	money	
Mexico	low	less	market	heavy	quantity	quantity	money	money	
Turkey	low	less	market	heavy	both	quantity	credit	credit	gov rate
Philippines	low	less	market	light	quantity	quantity	credit	credit	
Austria	low	more	bank	light	both	quantity	money	money	gov rate
France	low	more	bank	light	price	price			gov rate
Spain	low	more	bank	light	quantity	quantity	credit	credit	
Finland	high	more	bank	light	quantity	quantity	credit	credit	
Norway	high	more	bank	light	both	price	credit	credit	policy rate
Israel	low	more	market	heavy	quantity	quantity	money	money	
Japan	low	more	market	heavy	quantity	quantity	credit	credit	
Malaysia	high	more	market	heavy	both	quantity	money	money	stock index
Sweden	high	more	market	heavy	neither	neither			
USA	high	more	market	heavy	quantity	quantity	money	money	
Germany	low	more	market	light	both	quantity	credit	credit	gov rate
Switzerland	low	more	market	light	both	quantity	credit	credit	gov rate
Australia	high	more	market	light	both	quantity	money	money	policy rate
Canada	high	more	market	light	price	price			policy rate
Denmark	high	more	market	light	both	quantity	credit	credit	policy rate
Ireland	high	more	market	light	neither	neither			
Netherlands	high	more	market	light	both	price	money	money	policy rate
New Zealand	high	more	market	light	quantity	quantity	money	money	
South Africa	high	more	market	light	price	price			stock index
U.K.	high	more	market	light	quantity	quantity	money	money	