

The Structure of Capital Flows under Monetary Macroeconomic Volatility: an Empirical Analysis

June 2002

Gregorios D. Siourounis¹

(Preliminary version)

ABSTRACT

In the last decade we have seen a significant change in the composition of capital flows to developed as well as to developing countries. In this paper we investigate empirically the links between the volatility of monetary macroeconomic aggregates, as a measure of country specific measure of relative risk, and the structure of external liabilities in developed and developing countries. We estimate a “risk augmented gravity” equation a la Portes and Rey (2002) to show that the location of the country is irrelevant and that the main determinant of the composition of capital flows remains the state of the economy of the country.

JEL Classification: F21, F34

Keywords: government bonds, equities, external capital structure, macroeconomic volatility.

¹ I am grateful for very useful comments to Fabio Canova. I would also like to thank Richard Portes, Yonguip Oh, Elias Papaioannou and Morten Ravn. All errors are mine.

1. Introduction

Our objective is to show that volatile monetary macroeconomic variables and their relevance to agents' decisions to transact will differ across three different types of capital flows: government bonds, corporate bonds and corporate equities. To achieve this objective we study empirically cross-border transactions in these three categories of capital flows, using comparable data. We estimate a volatility augmented "gravity" equation for the three different types of flows to shed some light on the sensitivity of capital structure in country specific macroeconomic variable's volatility and information asymmetry. In the risk adjusted equation we've included country specific calculated values for the annual volatility of exchange rates, money market rate, and inflation rate. Our prediction is that investment decisions will exhibit some heterogeneity as regards investment decisions between the different types of capital flows due to different risk considerations about market specific characteristics.

We first discuss the existing literature on the relation between external capital structure and country specific economic conditions as well as information asymmetries, starting first with the theoretical models and then a survey of the relevant empirical work.

The question is why the composition of capital flows and external assets and liabilities should matter? Lane and Milesi-Ferretti (2000) document that different types of capital flows have different properties with regard to features such as risk, liquidity, tradability, reversibility, and exportability and tax treatment. Direct investment is connected with the transfer of technology and entrepreneurial skills whereas equity flows may be useful in stimulating stock market development and improvement, especially for developing countries. Also foreign direct investment and

equity flows entail different risk sharing properties between domestic and foreign residents in comparison to external debt flows.

International macroeconomic theory has not fully kept up pace with the evolution of international capital markets during the past decade. Corporate finance theory though, has offered a few insights on alternative sources of external finance and the optimal structure of firms². In the absence of information asymmetries and other distortions the Modigliani-Miller Theorem proves the irrelevance of capital structure. However, this literature stresses the role of information asymmetry, agency problems and corporate controls in determining the choice between equity and debt financing in the firm level. Asymmetric information reveals problems like ‘lemons’ where equity will be under-priced, since investors will be suspicious of the fundamentals of any firm that is willing to sell an equity share.

The problem in applying directly notions of asymmetric information in corporate finance to international capital flows is the absence of a distinction between foreign and domestic investors. The literature though in international capital flows has emphasized asymmetric information problems that are exacerbated for foreign investors. Razin, Sadka and Yuen (1998b) study how different degrees of informational asymmetries and differences in tax treatment affect the composition of capital flows.

Because of the “lemon” problem referred earlier, a high-productivity firm would prefer to issue debt rather than equity. However, under uncertainty, the existence of bankruptcy costs may lead to a preference for equity finance. Another important difference between domestic corporate finance and the external capital structure of countries is related to contract enforcement constraints. Although

² For a survey see Rajan and Zingales (1995).

domestic financial contracts can be enforced by the domestic legal system, this is not in general true for international investments.

In the firm level it is apparent that risk sharing as well as bankruptcy cost considerations can generate the use of equity financing. In the country level the desire to smooth consumption is an important additional motivation for international risk sharing. Cole and English (1992) show that equity investment by foreign residents has more desirable properties than debt. Moreover, Gertler and Rogoff (1990) show that moral hazard limits the scale of state-contingent financing. A simple debt contract might be the solution to the classic “costly state verification” problem studied by Townsend (1979). More recently, Hull and Tesar (2000a) find that when country-specific risk is large relative to industry specific risk the benefits of specialization through FDI are small and equity trade may substitute for FDI flows. Obstfeld (1994) suggest that the structure of capital flows can have significant effects on trade patterns and growth rates.

On the information asymmetry issue, Revilla (2001) uses a search model approach to show that search frictions in the flows of capital among countries might serve to explain or shed light on the observed facts. Martin and Rey (2000) introduce a new theoretical framework to analyze imperfect competitive markets and trade in assets in an international context. Kraay and Ventura (2002) extend Dornbusch, Fischer and Samuelson (1977) and add asset markets to show that trade integration increase the effects of supply shocks on trade.

On the effects of the volatility of macroeconomic variables on the composition of international capital flows the theory is silent. Sercu and Uppal (1998) analyze the effects of exchange rate volatility on the volume of trade between countries (which in their setting is the mirror of capital flows). The analysis is carried out in a general

equilibrium stochastic endowment economy with imperfect international commodity markets to show that exchange rate volatility can either increase or decrease the volume of trade depending on the source of the shock. They show that when the source of the increase in exchange rate volatility is an increase in the volatility of the endowment process, their model predicts an increase in the volume of trade and thus a decrease in the volume of capital flows. When there is an increase in the segmentation of commodity markets, exchange rate volatility increases but the volume of trade deteriorates causing the opposite effect to capital flows. However Portes and Rey (2002) do document that there is strong empirical evidence that trade in financial markets is not a perfect substitute of trade in goods. Pereg and Steinherr (1989) argue that short-term exchange rate volatility may entail only small costs to international traders as this type of risk can usually be covered in financial markets. However it is much more difficult to hedge risk beyond a one year horizon both because financial markets are much less complete for periods beyond one year and because exchange needs are not known with precision.

In the empirical literature there are also very few well-established results on the determinants of international trade in assets, especially securities. Portes and Rey (2002) find that a “gravity” equation performs at least as well in explaining asset trade as goods trade. Using the micro-founded model of Martin and Rey (2000), they capture 70% of the variance of gross cross border equity transactions. They find that market size, efficiency of the transactions technology and distance are the most important determinants of transaction flows. The closer papers in our approach are the Portes, Rey and Oh (2001) and the Lane and Milesi-Ferretti (2000) ones. The former evaluate the conjecture that the information available to foreign transactors and its relevance to decisions to transact will differ across three different types of securities:

corporate equities, corporate bonds and government bonds to re-enforce their argument about the suitability of a gravity equation to capture the observed cross border equity volatility with no effect in the composition of external capital. The latter try to establish some broad empirical regularities by exploiting which country features are associated with a different composition of gross external liabilities and document a positive relation between net foreign asset position and GDP per capita, both in industrial and developing countries and also conclude that richer countries are larger creditors and smaller debtors.

The generality of the core theoretical principles means that plausible hypotheses can be examined regarding a large number of potential determinants. In the next section (section 2) we lay out a comprehensive way of constructing a plausible set of determinants of the structure of capital flows and test them using insights from panel data estimation techniques. Section 3 describes the data, section 4 reports the empirical results and section 5 concludes.

2. Empirical Specification

We estimate a “gravity” equation, as in Portes, Rey and Oh (2001), where our dependent variable is the gross cross border flow of transactions between US and 15 countries as the total of purchases plus sales of US government Bonds, US corporate bonds, US corporate stocks and foreign bonds and stocks from the US perspective. We also add country specific measures of monetary macroeconomic variables that might be relative to risk considerations and information asymmetries that investors might take into account when making international investment decisions. In the risk adjusted equation we’ve included country specific calculated values for the annual standard deviation of exchange rates, money market rate and inflation rate. Our

prediction is that investment decisions will exhibit some heterogeneity as regards the different types of capital flows due to different risk considerations about country specific characteristics.

All theoretical models emphasize the role of the level of development. Financial development likely means that asymmetric information problems are diminished, encouraging equity structures. Also less developed countries with many small businesses do not issue equities, thus capital inflows might be biased towards government debt. Another consideration is the issue of debt/equity split. Firms might grow large enough to be less exposed to bankruptcy risk, stimulating debt over equity. We include a measure of nominal GDP in order to proxy the degree of financial development³.

A major issue is the asymmetric information problems which are likely to be more severe, the greater the 'difference' between the investors and the location of the investment. Portes and Rey (2002) document that geographical distance, is in good part a proxy for information⁴. This difference may be related to factors such as proximity, cultural factors, and legal systems⁵. We also include distance as a proxy for information asymmetry and several dummies for adjacency, language proximity, common borders, etc.

An important element not addressed in the empirical literature so far is the issue of country specific volatility of macroeconomic aggregates and their effect in the composition of capital flows. The main insight is that if we abstract from any volatility variable that gives some measure of friskiness of the local market we may

³ Portes and Rey (2002), Portes, Rey and Oh (2001), Portes and Rey (2000) and Milesi-Ferretti all use a measure of the size of an economy as a proxy to financial development.

⁴ Froot, O'Connell and Seasholes (2000) reject the hypothesis of Brennan and Cao (1998) that the positive covariance of returns and inflows is associated with disadvantages on the part of international investors.

run in the following fallacy: The estimated gravity equation (without risk consideration) will give the same quantity and quality of capital transactions between two countries that are identical in levels. Something that might not be true in practice when high volatility of country-specific inflation, for example, might deteriorate a risk-averse agent from investing in a foreign country since it might not be a risk improvement strategy for her portfolio given the increased implied market price of risk. More over exchange rate volatility seems to play a role in the time horizon of an investment and is definitely relevant for optimal resource allocations in the long run. Individual investors as well as institutions although not fully informed about the country specific risk level, do use some indicators to back up the relative riskiness of the domestic economy. In our empirical analysis we include the volatility of inflation, exchange rates and money market. To summarize, the basic equation arising out of the above analysis is the following:

$$\log(ICF_{ij,t}) = \beta_1 \log(GDP_{i,t}) + \beta_2 (GDP_{j,t}) + \beta_3 \log(\text{disance}_{ij,t}) + \beta_4 (\text{macro volatility}_{j,t}) + \beta_5 (\text{Adjacency dummies}_{ij,t}) + \text{constant} + \varepsilon_{ij,t} \quad (1)$$

We also perform a number of robustness tests by including additional dummies that account for region specific characteristics to conclude that there are no significant departures from the results reported here.

3. Data

We use a rather updated data set on bilateral flows between the US and a set of 15 advanced and developing markets. These are extracted from the US Treasury TIC

⁵ La Porta, Lopez-de-Silanes, Shleifer and Vishny (1998) document the implications of legal systems on the choice of financing by firms.

data set⁶. The panel expands 13 years, 1988-2000, and the data is in annual frequency for all variables. Portes, Rey and Oh (2001) use annual data for 11 years, 1988-1998, and for 40 developed and developing countries from the same source whereas Lane and Milesi-Ferretti include 132 countries and variable groupings from World Bank (Global Development Indices) for only one year, 1997.

Our data are bilateral flows of government bonds, corporate bonds, corporate equities, foreign (from the US perspective) bonds, and foreign stocks. We have to note that whereas foreign resident's transactions in US bonds are broken down in the data as between corporate and government, the converse is not true since the data aggregates US resident's transactions in foreign bonds to include all bonds for each foreign country. In all our regressions we use the gross variable as the sum of total sales plus total purchases. The set of destination includes only US and the set of the recipient country is the 14 selected countries. There are some missing observations, so the panel has a maximum of $13 \times 15 \times 7 = 1365$ observations (when pooled). The countries were selected to represent the global environment:

North America: *United States (reference country), Canada*

Latin America: *Argentina, Brazil, and Mexico*

East Asia: *Japan, Singapore, and Hong Kong*

EU Europe: *France, Germany, Italy, Netherlands, Spain*

Non- EU Europe: *Switzerland*

Pacific : *Australia.*

The share of our 15 countries sample in global equity market capitalization in 1996 was 72 per cent. We include nominal GDP of the destination country home country (denoted i) and foreign country (denoted j). We use distance between

⁶ As noted in Portes, Rey and Oh (2001) there are several drawbacks of this data set. They recognize

countries ij to represent information asymmetry as well as a number of adjacency and proximity dummies. These variables take the following names:

Distance: Distance is in kilometres

DIADJ=1 if the two share a common land borders and 0 otherwise

D2AP =1 if both are in Asia Pacific

D2NA=1 if both are in North America

DJA =1 if it is either exports from or imports by Japan

DIAP =1 if either exporter or importer is in Asia Pacific

HSA1 =1 if exporter/importer is Hong Kong/Singapore

WH2 =1 if both are in Western Hemisphere

For a measure of country specific risk we have calculated the standard deviation of the money market rate, exchange rate and inflation rate in foreign country j as:

$$SDV_j = \sqrt{\frac{1}{T-1} \sum_{t=1}^T (X_{jt} - \bar{X}_j)^2}$$

We also include in the regressions a numerical analogue for the Moody's credit rating scale, to account for information available to international investors about a local economy⁷.

4. Empirical Results

The last three decades we have witnessed large changes in the level and the composition of capital flows, both among industrial and between industrial and developing economies. Figure 1 shows the continues increase in capital flows from

only the country of the foreign transactor, not the foreign equity. For more details see Warnock and Mason (2000).

⁷ For more details on data see DATA APPENDIX.

1988 for 3 countries: Argentina, Singapore and Germany. It is apparent that the level of capital flows has increased regardless of the form of the liability. Notice though that the lines intersect, and in some cases more than ones, an indication of a change in the pattern of capital flows. Looking in Singapore one can see that the share of gross corporate stocks has increased dramatically and well above all the other forms of investment in US assets (*LCS* variable in the graph). For Argentina there is a tremendous increase in gross domestic bonds and stocks transactions reflecting the increase in demand for Argentinean bonds and stocks from US residents. For Germany we see that from an era where gross domestic bonds were the most active, a new pattern arose in the '90 that of an increased volume of gross domestic as well as US equities. The same change of patterns is evident in all the 15 countries. There is evidence of a change in the composition as well as the volume of international transactions. In order to investigate empirically the determinants of the pattern of capital flows we estimate a risk augmented gravity equation like (1).

We first estimate all countries as one panel and obtain the between estimates of a fixed effects model⁸ that includes only the GDP of US, the GDP of the foreign country and the distance between them. We then do the same exercise but now including measures of volatility of key macroeconomic monetary variables. Table 1 reports in the first column of each capital form the simple Portes-Rey model whereas the second column reports the “volatility augmented” model. We first discuss briefly the simple gravity model and then we proceed with our specification. When the model is estimated using all the 15 (including US) countries there is strong evidence that the main driving force of international transactions is the size of the US economy (*LGDPUS*). There is no evidence that distance or foreign GDP is related to any form

⁸ White robust heteroscedastic errors were obtained. We also corrected for serial correlation.

of capital flow. In the volatility augmented gravity equation the importance of the US economy is still there but there is also evidence that the monetary variables play a significant role. In all cases the adjusted R-square improves, in some cases more than 10%, regardless of the fact that we have included 3 more variables in the model. Market interest rate volatility is negatively related to US equity and corporate debt transactions, reflecting the negative effect of the increased uncertainty inherited in the foreign country. This is also supported from the fact that foreign inflation volatility deteriorates equity transactions in US as well as foreign equities whereas there are no effect on US bond transactions.

Surprisingly the stronger effect comes from exchange rate volatility in a positive way. There is a large theoretical as well as empirical literature on the question of the direction of trade flows in the presence of exchange rate volatility. In the general equilibrium framework of Sercu and Uppal (1998), both scenarios are possible depending on the source of the shock. Our empirical results comply with an increase in capital flows due to an increase in the exchange rate volatility implying that the source of uncertainty comes from the segmentation of international commodity markets. Increased exchange rate volatility affects all assets except US government bonds. One would expect the behaviour of capital flows to be different between developed and developing markets due to different economic as well as financial environment, risk, and information considerations. We break the sample and include Argentina, Brazil, Mexico, Hong Kong, Singapore and Spain in a group of developing markets and the rest in a group of 9 developed ones and re-estimate both the simple gravity equation and the volatility augmented one.

Table 2 reports the results for the developed markets. There is strong empirical evidence that volatility measures should be included in the estimated equation.

Moreover there is a clear negative effect of money market rate and inflation rate volatility in all forms capital flows except US government bonds. The volatility of exchange rate is still significant and with the same sign. Distance seems to be irrelevant in any form of capital transaction. Table 3 reports the results for the developing markets. In the developing markets, unlike the developed ones the volatility of money market rate as well as inflation rate is negative and significant for gross US government bonds transactions indicating the shift in demand for bonds in the presence of country specific volatility. However for foreign (from the US perspective) bonds and stocks the volatility of money market rate has a positive effect reflecting the anticipation of higher returns when investing in the foreign more volatile developing country. Distance is significant in three out of four cases but in two out of these 3 with a positive sign unlike Portes, Rey and Oh (2000) and Portes and Rey (2002) where distance is the main factor in explaining cross border equity flows. Overall this exercise shows that there is a significant difference between developed and developing markets as regards the flow of different forms of capital when country specific measures of volatility are taken into account. Moreover information asymmetries may have already been captured in these variables and there is little to gain from the inclusion of physical distance indicating a missing variables problem in the simple gravity model.

4. Concluding Remarks

We empirically investigated the question of how important is volatility of monetary macroeconomic variables in explaining the composition of international capital flows between US and 14 major countries around the globe. We found that distance is irrelevant for explaining any variability of cross-country capital flows

whereas volatility of money market rate, inflation and exchange rates do explain a large part of these flows. When pooled, the empirical analysis indicates that increased foreign inflation volatility leads to a decrease in gross cross border equity transactions of US equities whereas exchange rate volatility has the opposite effect in all capital forms except US government bonds. Splitting the data into developed and developing economies, we find that equity flows are negatively affected by increased volatility in money market rate regardless of the foreign country whereas inflation volatility seems to have an important impact in foreign developing markets. This is a very preliminary step in understanding the role of macro monetary volatility in the composition of international capital flows and much more work is needed in the theoretical as well as the empirical front.

5. References

- Brennan, M. J., and H. H. Cao, 1997, "International portfolio investment flows", *Journal of Finance*, v. 52, 1851-1880.
- Cole, H. L. and W. B. English, 1991, manuscript
- Gertler, M and K. Rogoff (1990), 'North-South Lending and endogenous Domestic Capital Markets Inefficiencies', *Journal of Monetary Economics*, v. 26, 245-266
- Hull, L and L. Tesar, 2000, "Risk, Specialization and the Composition of International Capital Flows," working paper, University of Michigan
- Froot, K. A., P. G. J. O'Connell and M. Seasholes, 1998, "The portfolio flows of international investors", NBER working paper No 6687.
- Kraay, A. and J. Ventura, 2002, "Trade Integration and Risk Sharing", manuscript.
- LaPorta, R., F. Lopez-de-Silanes, A. Shleifer and R. W. Vishny, 1998, 'Law and Finance', *Journal of Political Economy*, v. 106, December, 1113-55
- Lane, P. R. and G. M. Milesi-Ferretti, 2000, "External Capital Structure: Theory and Evidence", IMF working paper No 152.
- Obstfeld, M., 1994, "Risk Divesrification and Growth", *American Economic Review*, v. 84, 1310-1329
- Martin, P., and H. Rey, 2000, "Financial supermarkets: size matters for asset trade", working paper, Princeton University
- Peree, T and L. Steinher, 1989,
- Portes, R., H. Rey and Y. Oh, 2001, "Information and Capital Flows: The Determinants of Transactions in Financial Assets" *European Economic Review*, Papers and Proceedings, 783-796.

- Portes, R. and H. Rey, 2002, 'The determinants of Cross-Border Equity Transaction Flows', working paper
- Razin, A, E Sadka and C. Yuen, 1998b 'Capital Flows with Debt and Equity-Financed Investment: Equilibrium Structure and Efficiency Implications,' IMF working paper 98/159
- Revilla, E, 2001, "International Portfolio Flows and Search Frictions", manuscript
- Sercu, P and R. Uppal, 1998, "Exchange Rate Volatility and International Trade", manuscript
- Warnock , F., and M. Mason, 2000, "The reliability of U.S. data on transactions in foreign equities", Federal Reserve Board, Washington DC.

DATA APPENDIX

Capital Flows: The data series is based on submissions of monthly TIC Form S, "Purchases and Sales of Long-Term Securities by Foreigners." These reports are mandatory and are filed by banks, securities dealers, investors, and other entities in the U.S. who deal directly with foreign residents in purchases and sales of long-term securities (equities and debt issues with an original maturity of more than one year) issued by U.S. or foreign-based firms. The data series are revised for up to 24 months after the initial "as of" reporting date.

The data reflect only those transactions between U.S. residents and counterparties located outside the United States. The data cover transactions in six classifications of securities: There are four domestic types of securities, which include U.S. Treasury bonds and notes, bonds of U.S. government corporations and federally-sponsored agencies, U.S. corporate and other bonds, and U.S. corporate and other stocks; and two foreign types of securities, namely foreign bonds and foreign stocks.

The securities data are collected and presented from the perspective of the foreign parties to the transactions. By definition, "gross purchases by foreigners" are gross sales by U.S. residents. Similarly, "gross sales by foreigners" are gross purchases by U.S. residents. As an example, to derive net foreign purchases of U.S. Treasury bonds and notes vis-a-vis a particular country or geographical area, take the difference between the two columns labeled "gross purchases by foreigners of U.S. Treasury bonds and notes" and "gross sales by foreigners of U.S. Treasury bonds and notes." As another example, to derive net U.S. purchases of foreign equities, you would take the difference between "gross purchases by foreigners of foreign stocks" and "gross sales by foreigners of foreign stocks." In each example, a positive difference indicates

net foreign purchases from U.S. residents (U.S. capital inflow); a negative difference indicates net foreign sales to U.S. residents (U.S. capital outflow).

Please note that the geographical breakdown of Form S securities transactions indicates country of location of the foreign buyers and sellers who deal directly with entities resident in the U.S. (i.e., reporting institutions). The data do not necessarily indicate the country of beneficial owner or issuer, nor the currency of denomination of securities. For instance, a U.S. purchaser's order for Japanese securities may be placed directly with an intermediary in London. In this instance, the transaction for Form S reporting purposes would be recorded opposite the U.K. and not opposite Japan. Similarly, purchases and sales of U.S. securities for the account of an Italian resident may be placed, for example, in the Swiss market. In such an arrangement, the trades would be reported opposite Switzerland and not opposite Italy

(Available at <http://www.treas.gov/tic>)

Exchange Rates: Beginning December 1, 1998, most exchange rates are available as noon spot rates on the same day at noon Pacific Time, courtesy of a data feed from the Bank of Canada. As of January 1, 1999, exchange rates vis-à-vis the twelve old currencies (e.g., German Mark or French Franc) were calculated using the Euro exchange rate and the official Euro-to-old-currency conversion rates. For the pre-1999 period, euro exchange rates are ecu (XEU) rate.

(Available at <http://pacific.commerce.ubc.ca>)

Nominal GDP: Source IFS.

CPI % change: Source IFS.

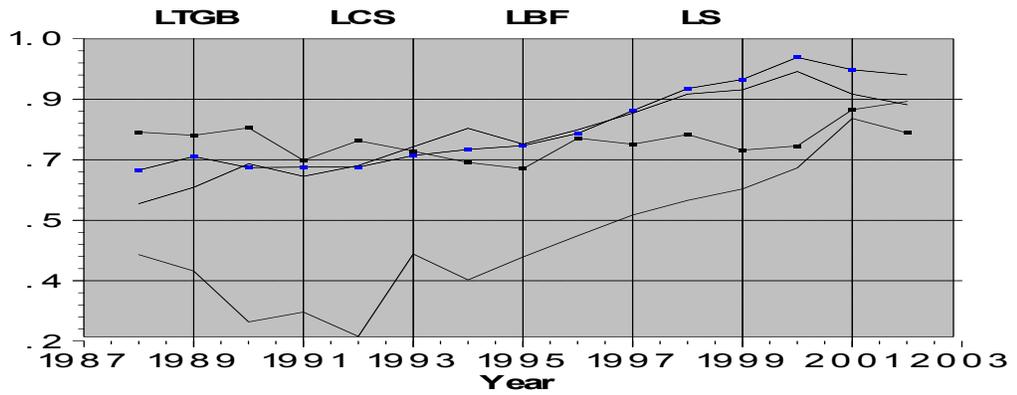
Money Market Rate: Is the rate on short-term lending between financial institutions.

Source IFS.

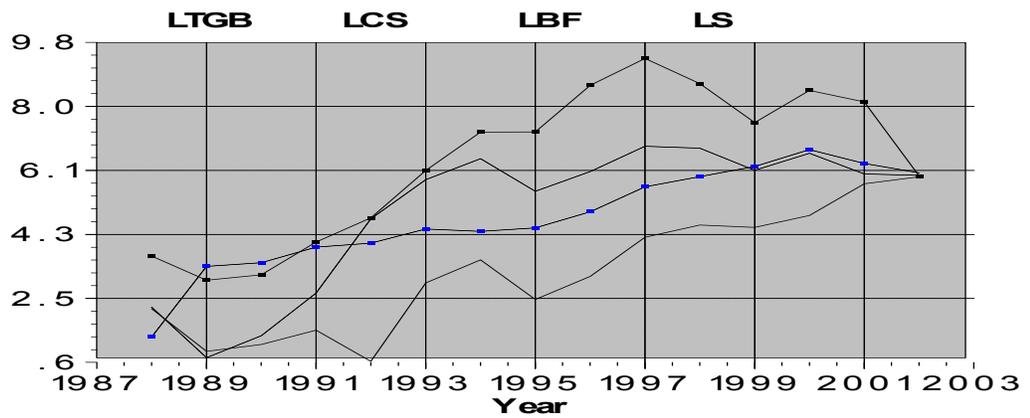
Distance and Adjacency Dummies: Available at <http://www.nber.org/~wei>

FIGURE 1. *The Structure of Capital Flows over time for three different regions.*

GERMANY



ARGENTINA



SINGAPORE

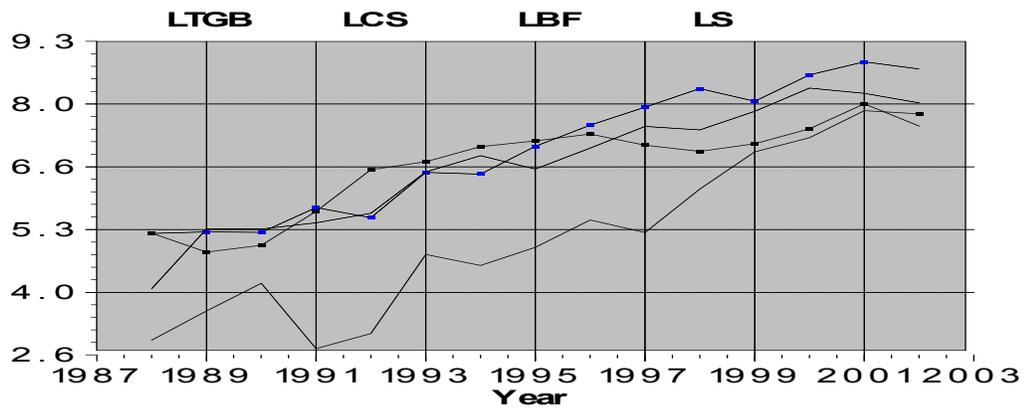


TABLE 1: OLS estimates with group dummy variables for all 15 countries.

	<i>LTGB</i>		<i>LCB</i>		<i>LCS</i>		<i>LBF</i>		<i>LS</i>	
<i>LGDPF</i>	4.62E-04	-4.61E-03	3.37E-04***	3.60E-04***	2.38E-05***	7.54E-03	1.26E-03	4.70E-04	9.10E-02***	8.50E-02***
<i>LGDPUS</i>	155.4783**	150.030868*	98.02864*	83.3263*	6.22E-03*	70.27923*	158.6765*	143.5013*	1019.125*	843.3111*
<i>MRATEV</i>		-5.71E-04***		-4.22E-03		-8.74E-03***		2.95E-04		-1.50E-02
<i>INFV</i>		-1.77E-03		-8.82E-04		-4.05E-03**		-5.37E-03*		-3.91E-02*
<i>FXV</i>		3.32E-03		1.08E-02*		3.13E-02*		9.47E-03*		0.119751*
<i>LDIST</i>	-4.44E-03	5.00E-04	-4.34E-04	7.04E-05	1.63E-03	3.41E-03*	-6.83E-05	1.57E-04	2.31E-04	4.99E-03
<i>R-SQ-ADJ</i>	0.75	8.20E-01	0.7	7.80E-01	0.58784	0.72622	0.84578	0.87311	0.88782	0.90158

NOTES: *, **, ***, denote significance in the 1%, 5% and 10% respectively. The sample is monthly data for all variables and spans from 01/1988 until 12/2000 for a total of 195 observations (the panel includes the maximum 1365 observations). The first column of each variable states the standard gravity equation. The second reports the volatility augmented gravity equation.

KEY:

LTGB: Log gross US government Bonds

LCB: Log gross US corporate Bonds

LCS: Log gross US corporate stocks

LBF: Log gross foreign bonds

LS: Log gross foreign stocks

LDGPF: Log foreign GDP

LDGPUS: Log US GDP

MRATEV: Standard deviation of foreign money market rate

INFV: Standard deviation of foreign inflation rate

FXV: Standard deviation of

LDIST: Log distance between capital cities

R-SQ: Adjusted-R-square

TABLE 2: OLS estimates with group dummy variables for 9 developed countries.

	<i>LTGB</i>		<i>LCB</i>		<i>LCS</i>		<i>LBF</i>		<i>LS</i>	
<i>LDGPF</i>	-6.26E-03	-6.38E-03	-1.43E-03	4.85E-04	8.38E-03		-4.58E-04	1.60E-03	-4.07E-02	-8.06E-02
<i>LDGPUS</i>	176.3983*	178.8866*	83.26109*	74.43999*	74.00954*		144.8745*	135.0527*	935.4491*	933.0708*
<i>MRATEV</i>		2.27E-03		-5.90E-03***				-7.06E-03**		8.14E-02***
<i>INFV</i>		-2.22E-02		-1.47E-02***				-4.50E-03		-0.21795**
<i>FXV</i>		-5.36E-03		1.49E-02**				1.70E-02***		2.81E-02
<i>LDIST</i>	8.00E-04	-1.93E-03	-6.54E-04	-1.23E-03***	1.22E-03		-2.74E-04	3.57E-04	-3.30E-04	-1.43E-02
<i>R-SQ</i>	0.85309	0.85398	0.91942	0.93535	0.66586		0.90064	0.91956	0.88423	0.88851

NOTES: *, **, ***, denote significance in the 1%, 5% and 10% respectively. The sample is monthly data for all variables and spans from 01/1988 until 12/2000 for a total of 117 observations (the panel includes the maximum 819 observations). The first column of each variable states the standard gravity equation. The second reports the volatility augmented gravity equation.

KEY:

LTGB: Log gross US government Bonds

LCB: Log gross US corporate Bonds

LCS: Log gross US corporate stocks

LBF: Log gross foreign bonds

LS: Log gross foreign stocks

LDGPF: Log foreign GDP

LDGPUS: Log US GDP

MRATEV: Standard deviation of foreign money market rate

INFV: Standard deviation of foreign inflation rate

FXV: Standard deviation of

LDIST: Log distance between capital cities

R-SQ: Adjusted-R-square

TABLE 3: OLS estimates with group dummy variables for 6 developing countries

	<i>LTGB</i>	<i>LCB</i>	<i>LCS</i>	<i>LBF</i>	<i>LS</i>					
<i>LGDPF</i>	-3.08E-03	-3.09E-03	-5.69E-04	-4.05E-04	6.80E-03	7.03E-03	3.74E-03	3.13E-03	0.171257	0.169355**
<i>LGDPUS</i>	166.138*	149.1764*	125.7923*	112.7827*	176.04*	123.4879*	189.7407*	172.3154*	1193.382*	898.5515*
<i>MRATEV</i>		-1.12E-02*		4.97E-03		1.70E-02		2.31E-02**		9.59E-02***
<i>INFV</i>		-7.21E-04		-3.96E-04		-3.70E-03**		-5.31E-03*		-3.74E-02**
<i>FXV</i>		9.34E-03**		6.56E-03**		2.40E-02*		3.82E-03		0.115449*
<i>LDIST</i>	-8.48E-02*	-794.26	-28.6762	-6.45874	-24.4942	67.96415	-52.2807	289.4915	3345.629***	4206.448*
<i>R-SQ</i>	0.7093	0.71879	0.76276	0.77057	0.49548	0.64396	0.75409	0.8033	0.85803	0.88379

NOTES: *, **, ***, denote significance in the 1%, 5% and 10% respectively. The sample is monthly data for all variables and spans from 01/1988 until 12/2000 for a total of 78 observations (the panel includes the maximum 546 observations). The first column of each variable states the standard gravity equation. The second reports the volatility augmented gravity equation.

KEY:

LTGB: Log gross US government Bonds

LCB: Log gross US corporate Bonds

LCS: Log gross US corporate stocks

LBF: Log gross foreign bonds

LS: Log gross foreign stocks

LDGPF: Log foreign GDP

LDGPUS: Log US GDP

MRATEV: Standard deviation of foreign money market rate

INFV: Standard deviation of foreign inflation rate

FXV: Standard deviation of

LDIST: Log distance between capital cities

R-SQ: Adjusted-R-square