CHAPTER II THREE CURRENT POLICY ISSUES

This chapter consists of three essays on current policy issues: the global house price boom, the experience with greater exchange rate flexibility in emerging market countries, and fiscal policy in euro area countries.

House prices in many industrial countries have increased unusually rapidly in recent years and in some cases these increases do not seem to be fully explained by economic fundamentals. More importantly, the analysis in the first essay shows that, even though housing is not traded, house prices are highly synchronized across industrial countries. Specifically, a large share (about 40 percent on average) of house price movements is due to global factors, which reflect global co-movements in interest rates, economic activity, and other macroeconomic variables, which in turn result from common underlying shocks. A key implication of this finding is that, just as the upswing in house prices has been a global phenomenon, it is likely that any downturn would also be highly synchronized, with corresponding implications for global economic activity.

Several emerging market countries have moved to more flexible exchange rate regimes over the past decade, but others remain concerned about potential costs of exchange rate volatility, including inflationary and balance sheet effects ("fear of floating"). The second essay finds that voluntary transitions to greater exchange rate flexibility were generally *not* associated with greater macroeconomic instability, though the results are based on a small sample and could reflect selection bias. An important reason for these results could be that transitions to greater exchange rate flexibility were on the whole associated with a strengthening of monetary and financial policy frameworks ("learning to float"), which directly address the key vulnerabilities that give rise to the fear of floating. Many countries adopted more flexible regimes while still in the process of improving policy frameworks.

Five years after the adoption of a single currency in the euro area, is there still a need for country-specific stabilization policies? The third essay finds that, despite progress toward greater trade and financial integration in the euro area, cross-country cyclical disparities remain important and adjustment mechanisms are still relatively weak, so there is a need for national fiscal policies to dampen output fluctuations—that is, to be countercyclical. However, over the past few decades the countercyclicality of fiscal policies in the euro area, which operates mainly through automatic stabilizers, has often been undermined by procyclical discretionary fiscal measures. While there has been some reduction in the procyclicality of discretionary fiscal policies under the monetary union's fiscal framework, owing mainly to fiscal expansions in bad times, many euro area member states, especially large countries, have continued to adopt expansionary measures in good times. This causes a deterioration in underlying fiscal balances in bad times without a corresponding improvement in good times. The key policy implications are that euro area countries should strive to improve structural fiscal balances during the current expansion and that the Stability and Growth Pact (SGP) should be strengthened to ensure discipline in good times.

The Global House Price Boom

The main author of this essay is Marco Terrones, with support from Christopher Otrok. Nathalie Carcenac provided research assistance.

House prices in industrial countries have increased unusually rapidly in recent years, with

their momentum seemingly little affected by the bursting of the stock market bubble or the subsequent global economic downturn. In some cases, notably Australia, Ireland, Spain, and the United Kingdom, prices have risen by 50 percent or more since 1997—increases that are difficult to explain in terms of economic fundamentals alone, including record-low interest rates (Box 2.1). In addition, some housing indicators—including the housing affordability ratio, the ratio of house prices to rent, and mortgage debt—have reached record-high levels in several industrial countries (Table 2.1). This has led some observers to suggest that a house price correction is imminent, possibly triggered by the tightening of monetary policy as economic recovery takes hold. Even an orderly correction would clearly weaken growth in the countries in which it occurred; as discussed in Chapter II of the April 2003 *World Economic Outlook*, an abrupt price correction could have significantly more serious adverse effects.

The profound economic implications of changes in house prices reflect the key role housing plays in societies. Housing satisfies people's basic need for shelter and for a place to carry on family activities, including childrearing. Moreover, housing conditions are often considered a yardstick of economic development and prosperity. Because of this, there is a long tradition of government involvement in the housing markets aimed at improving housing quality and fostering homeownership, for example through subsidized financing and special tax treatment.[1] Yet the bulk of housing activities is carried out by the private sector. Housing activities account for a large fraction of GDP and households' expenditures in industrial countries. Housing is the main asset and mortgage debt, the main liability held by households in these countries, and therefore large house price movements, by affecting households' net wealth and their capacity to borrow[2] and spend, have important economic implications.

This essay studies house price fluctuations in industrial countries, paying particular attention to the current house price boom. In particular, the essay addresses the following questions.

- What are the main features of house price fluctuations in industrial countries? Is the current boom in house prices "atypical"?
- Is there a global house price cycle? Are the fluctuations in house prices mainly related to global factors or to country-specific factors?
- What are the implications of global house price cycles for the future? What are the risks associated with an increase in world interest rates?

An important theme running through the essay is that house prices are highly procyclical, volatile, and synchronized across industrial countries, and that these features have evolved over time. In addition, the essay reports evidence suggesting that the current house price boom in many industrial countries is unusual in both its strength and duration. Innovative aspects of the analysis are the use of dynamic factor models to determine the extent to which house price comovements are explained by global or country-specific factors and of simple forecasting models that combine country-specific variables with world factors, obtained from the dynamic factor models.

The analysis of this essay uses data taken from diverse sources, including the European Mortgage Federation, Eurostat, Haver Analytics, and national authorities. The first section and boxes of the essay use annual data for 18 industrial countries during 1970–2003, while the second section uses quarterly data for 13 industrial countries during 1980:QI–2004:QI (see

[1]In many countries mortgage debt risks are carried by public institutions.

[2]Houses are typically used as collateral of mortgage loans. Changes in house prices, by affecting the value of collateral, can lead to significant credit expansions/contractions (see, for instance, Chapter IV of the April 2004 *World Economic Outlook*). Debelle (2004) finds that the current high levels of debt in industrial countries might have left households more sensitive to changes in interest rates, income, house prices, and stock prices, particularly if they are unexpected.

Table 2.1. Housing Indicators in Some Industrial Countries

Country	Year[1]	Mortgage Loans (percent of GDP)	Ownership Ratio (percent)	Affordability Ratio (1985 = 100)[2]	Price-Rent Ratio (1985 = 100)[3]	Population Density (people per square km.)
United States	1970	28.82	64.18	100.34	96.51	22.39
	1980	33.87	65.58	113.36	106.32	24.81
	1990	44.59	63.95	107.14	112.68	27.23
	2003	63.73	68.25	113.66	136.48	31.80
Germany	1970	. . .	. . .	129.41	96.97	217.90
	1980	41.88	41.00	114.45	115.73	219.53
	1990	42.52	39.00	94.81	99.32	222.70
	2003	54.31	43.60	79.71	73.07	231.19
France	1970	. . .	. . .	122.75	90.97	92.30
	1980	16.94	47.00	124.70	119.74	97.95
	1990	19.73	55.02	118.64	115.96	103.14
	2003	24.75	56.22	124.56	129.70	108.65
Italy	1970	. . .	. . .	. . .	. . .	183.00
	1980	3.06	59.00	134.72	. . .	191.88
	1990	3.62	68.00	129.89	100.00	192.85
	2003	13.33	80.00	130.66	91.43	196.69
Spain	1970	. . .	. . .	146.83	62.03	67.59
	1980	8.61	73.00	127.32	102.81	74.85
	1990	10.59	78.00	198.92	207.05	77.76
	2003	42.11	82.90	288.78	249.92	82.70
Netherlands	1970	. . .	. . .	136.69	120.20	384.86
	1980	33.62	42.00	151.42	161.13	417.65
	1990	40.18	45.00	111.43	109.94	441.32
	2003	99.88	53.00	243.14	203.58	478.34
Ireland	1970	. . .	. . .	. . .	57.07	42.82
	1980	. . .	74.00	135.63	126.82	49.37
	1990	18.45	79.30	110.47	100.79	50.89
	2003	45.00	76.92	200.81	272.45	57.03
Japan	1970	5.59	. . .	107.96	76.44	284.55
	1980	21.29	60.00	91.21	87.34	318.82
	1990	30.26	61.00	121.72	123.32	338.83
	2003	36.40	62.00	79.26	75.23	349.57
United Kingdom	1970	. . .	50.00	97.21	89.61	230.95
	1980	22.80	55.00	108.58	116.69	233.85
	1990	52.65	66.00	137.00	117.20	238.96
	2003	63.83	70.00	155.83	194.28	245.64
Canada	1970	27.57	60.00	112.51	79.17	2.31
	1980	33.73	62.00	124.23	122.25	2.67
	1990	39.81	63.00	138.47	140.73	3.01
	2003	42.79	65.20	155.54	182.59	3.42
Australia	1970	. . .	. . .	107.31	96.67	1.63
	1980	15.66	71.00	101.00	96.57	1.91
	1990	19.90	72.00	122.90	101.61	2.22
	2003	57.30	70.00	183.12	212.93	2.57

Sources: European Central Bank; European Mortgage Federation; Eurostat; OECD; national sources; RICS, *European Housing Review;* World Bank, *World Development Indicators;* and IMF staff calculations.

[1]If an observation is not available for the indicated year, data from the nearest year are used.

[2]Ratio of house prices to disposable income per worker.

[3]Ratio of house prices to rents (from CPI).

Appendix 2.1 for details). Differences in the sample coverage primarily reflect the availability of reliable quarterly data on house prices. The quality of the data is in many cases weak and nonstandardized; notably, countries use different coverage and methodologies to calculate house

Box 2.1. What Explains the Recent Run-Up in House Prices?

Over the past eight years, house prices have risen very rapidly in many industrial countries. While some observers argue that the run-up in house prices reflects strong fundamentals—such as income growth and low interest rates—others argue that house prices have been exuberant and divorced from market fundamentals. This box seeks to assess the extent to which fundamentals explain the recent run-up in house prices, building on and extending a dynamic panel model developed by Lamont and Stein (1999). This model is estimated for a sample of 18 countries during 1971–2003.

The model postulates that the growth rate of real house prices, in any given country and period, is explained by the following factors.

- *Past growth rates of real house prices.* If the growth rate of house prices is persistent, then the current growth rate must be serially correlated with the past growth rate. Higher values of this correlation coefficient imply higher persistence.[1]
- *Past housing affordability ratio.* If the growth rate of house prices shows long-run reversion to fundamentals, this implies that prices would tend to fall when they are out of line relative to income levels. Hence, the coefficient of the housing affordability ratio—the ratio of real house prices to (per capita) real income—must be negative.
- *Economic fundamentals.* The growth rate of house prices is positively affected by (per capita) real income growth—as this increases households' purchasing power and borrowing capacity—and negatively affected by interest rates (lower rates increase households' capacity to borrow). Other fundamentals influencing house prices include the growth rate of real credit, a proxy for mortgage debt, as this indicates that households are less credit rationed; the past growth rate of real stock prices—which captures households' efforts to rotate their portfolio in favor of housing; population growth, as this proxies for the growth rate of households; and a bank crisis dummy (a bank crisis is typically associated with a drop in house prices).

Table B2.1. What Determines House Prices in Industrial Countries?
(Summary of empirical results, 1971–2003)

	Dependent Variable
Explanatory Variables	Real house price (growth)
Lagged dependent variable	
Lagged real house price (growth)	0.521
	[0.030]*
Reversion	
Lagged housing affordability ratio	–0.144
	[0.021]*
Fundamentals	
Real disposable income (per capita, growth)	0.530
	[0.119]*
Short-term interest rate (percent)	–0.507
	[0.109]*
Real credit (growth)	0.109
	[0.036]*
Lagged real stock price (growth)	0.033
	[0.009]*
Population growth	1.754
	[0.623]*
Bank crisis	–2.426
	[0.952]*
Memorandum	
Number of observations	524
Sargan test[1]	
p-value	0.211
Arellano-Bond test [2]	
p-value	0.200

Sources: IMF, *International Financial Statistics*; Haver Analytics; OECD; national sources; World Bank, *World Development Indicators;* and IMF staff calculations.

Note: Country dummies are included in the regression but not reported here. The symbol * denotes significance at the 1 percent level. Significance is based on robust standard errors. Estimated using the Generalized Method of Moments estimator as suggested by Arellano and Bond (1991).

[1]Test of the validity of overidentifying restrictions.

[2]Test of no second-order autocorrelation.

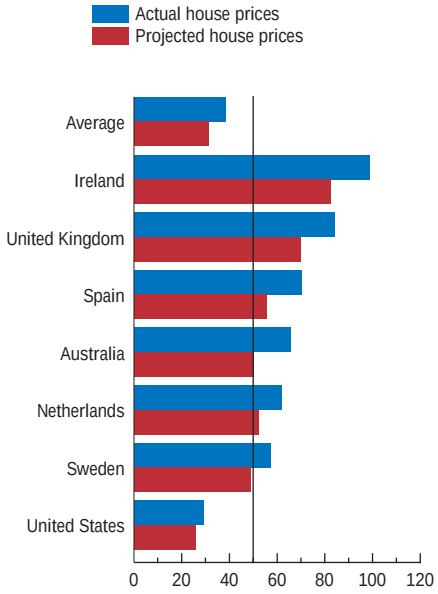
The econometric results confirm that real house prices in industrial countries show high persistence, long-run reversion to fundamentals, and dependence on economic fundamentals (see the table). The growth rate of real house prices in industrial countries is very persistent—with a serial correlation coefficient of 0.5—

Note: The main author of this box is Marco Terrones.

[1]If the absolute value of this coefficient exceeds one, the growth rate of real house prices would be explosive.

Current House Price Boom

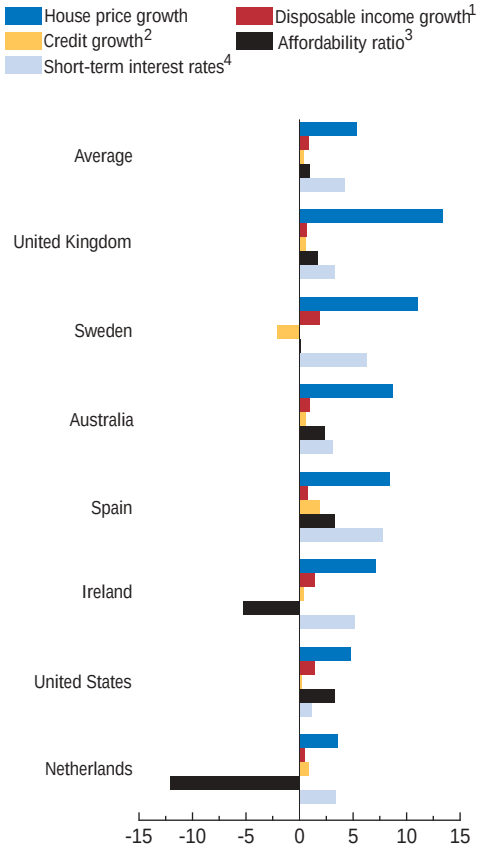
(1997–2003; cumulative growth rate; constant prices)



Sources: Haver Analytics; IMF, *International Financial Statistics;* national sources; OECD; and IMF staff calculations.

Explaining House Price Movements Between 1997–2003 and 1990–96

(Change of period averages; constant prices unless otherwise noted)



Sources: Haver Analytics; IMF, *International Financial Statistics;* national sources; OECD; and IMF staff calculations.
[1]Per capita.
[2]Credit to the private sector from banks and other official financial institutions.
[3]Ratio of house prices to disposable income.
[4]Interest rates are in nominal terms.

meaning that there is a strong tendency for real house prices to rise tomorrow if they rise today.[2] In addition, the growth rates of real house prices show fundamental reversion: if house prices are out of line with income, there is a gradual tendency for this misalignment to be corrected (about 15 percent every year). All of the economic fundamentals have the expected sign and are highly significant. Improvements in these fundamentals—such as higher income growth and lower interest rates[3]—lead to increases in the growth rate of real house prices over time. For instance, an increase in income growth by 1 percent would over time imply an increase of 1⅒ percentage points in the growth rate of real house prices. Likewise, a reduction in interest rates by 1 percent would over time imply an increase of 1 percent in real house

[2]Lamont and Stein (1999) find a similar result for house prices at the city level in the United States.

[3]Some have argued that the relevant interest rate affecting house prices is the real after-tax rate. This rate, however, is not readily available. When this variable was proxied by real ex post interest rates, the coefficient had the wrong sign and was statistically insignificant.

Box 2.1 *(concluded)*

price inflation.[4] Demographic factors do also have an effect on house prices; for example, an increase in the population growth rate by ¼ percent would over time lead to an increase of about 1 percent in real house price inflation.

How does the increase in house prices during 1997–2003 compare with the model's prediction? The first figure shows that, on average, the model is able to explain most of the increase in house prices during this period. There are, however, important differences across countries. For instance, house prices in Australia, Ireland, Spain, and the United Kingdom exceed their predicted values by 10 to 20 percent—thus suggesting that the sharp increase in prices observed in these countries over the past seven years can not be explained by movements in fundamentals alone.[5] In the case of other countries, including the United States, the differences between observed and predicted values are below 10 percent.

To understand the extent to which market fundamentals explain the run-up in house prices in the past seven years, compared, say, with the previous seven years, the IMF staff has made use of the above-described model. The second figure shows the rate of growth of real house prices and the contributions of the main fundamentals to this growth—between 1997–2003 and 1990–96 across countries. In particular, the following results stand out.

- The fall in average short-term interest rates explains the bulk of the house price increases across industrial countries. This is particularly true in Ireland and Spain, where real interest rates fell since the launch of European Monetary Union, reflecting nominal interest rate convergence and the relatively high inflation rates in these countries. Conversely, this suggests that real house price growth will slow down as interest rates rise.
- The increases in the average growth rate of disposable income and credit have also contributed to the current buoyancy in houses prices relative to the early to mid-1990s.
- In contrast, the rapid increase in the affordability ratio (house prices relative to income per capita) in Ireland and the Netherlands may have contained the pace of increase in real house prices in these countries.

All in all, the model explains most of the increase in real house prices in industrial countries; however, an important portion of the increase in some countries (Australia, Ireland, Spain, and the United Kingdom) remains unexplained.

[4]Short-term interest rates fell by 320 basis points in the United Kingdom and by 450 basis points in the United States during 1997–2003.

[5]The house price increases in France and Italy also appear out of line with fundamentals.

price indexes and mortgage debt. In addition, in most countries the house price indexes do not correct for changes in housing quality over time. Given the importance of the housing sector in modern industrial economies, improvements in the statistics in this area should be a priority for statistical agencies.

House Prices: The Stylized Facts[3]

Over the past three decades, real house prices in industrial countries have grown at an average rate of 1¾ percent a year, broadly similar to the growth of both per capita output and consumption.[4] Real house prices, however, have fluctuated over time—with the current boom standing

[3]Although there is an extensive literature in real estate cycles (surveyed by Pyhrr, Roulac, and Born, 1999), the cyclical behavior of real house prices in industrial countries has not been, to our knowledge, systematically examined. Henley and Morley (2001) and European Central Bank (2003) examine the volatility and co-movement of house prices in countries of the European Union.

[4]Davis and Heathcote (2004) develop a growth model with housing and find that, because land enters in the production of new housing, the relative price of houses will trend upward.

out because of its duration and strength (Figure 2.1).[5] Real house prices in industrial countries are very volatile, with an average standard deviation of the growth rate of real house prices of almost 7 percent a year, although volatility has declined substantially recently, partly reflecting the widespread reduction in macroeconomic volatility and a stable low-inflation environment across industrial countries.[6]

Turning to individual countries, the average growth of real house prices differs significantly—ranging from less than ½ percent a year in Germany, New Zealand, and Switzerland to over 3 percent a year in Ireland, Spain, and the United Kingdom (Figure 2.2). Interestingly, most of the countries that exhibited rapid growth of real house prices in 1986–2003 were laggards in 1971–85. House price volatility also varies significantly across countries, and—consistent with the well-known principle in finance that return and risk of an asset go hand-in-hand—is generally higher the more rapid the rate of underlying house price growth,[7] although this relationship has weakened over the past decade. It is perhaps more interesting that there is no evidence that house price volatility is directly related to the volatility of the economy, although it does appear to be related to the institutional structure of financial markets (see Box 2.2 for a more detailed discussion).

House prices and economic activity are tightly linked. Changes in house prices influence

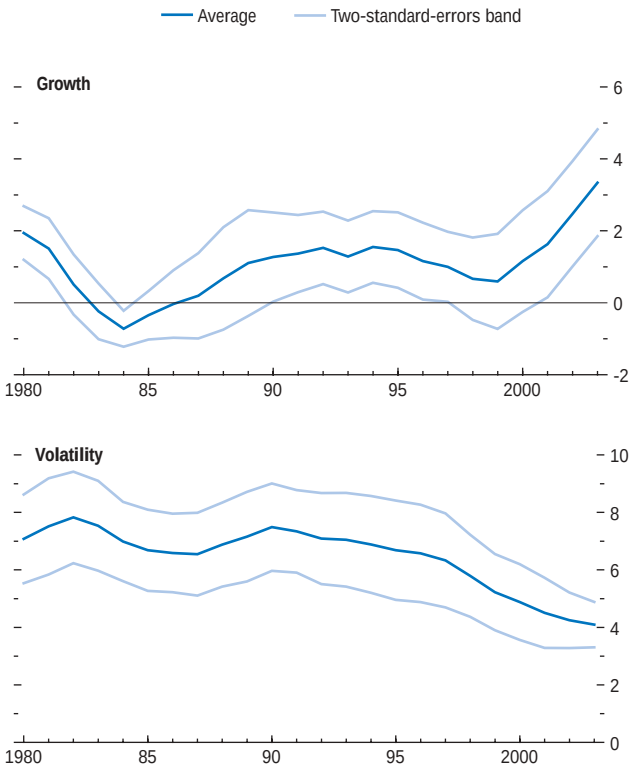
[5]House prices are not buoyant in all industrial countries. House prices in Germany and Japan have fallen in real terms over the past years, reflecting country-specific developments associated with the excessive supply of houses following the construction boom after the German unification and the bursting of house bubble in Japan in the early 1990s.

[6]See, for instance, Stock and Watson (2003) and Kose, Prasad, and Terrones (2004). Girouard and Blondal (2001) also report that house price volatility has declined in several OECD countries during the 1990s (relative to 1970–99). Low and more stable inflation has also created the conditions for financial deepening in industrial countries, which in turn has resulted in deeper mortgage markets.

[7]A similar result holds for real stock prices. However, the growth and volatility observed in house prices are much smaller than those observed for stock prices.

Figure 2.1. Average Growth and Volatility of House Prices in Industrial Countries
(Percent; constant prices; 10-year rolling window)

Real house prices fluctuate over time, but the recent boom is exceptional; while house prices have been buoyant, their volatility has declined markedly.

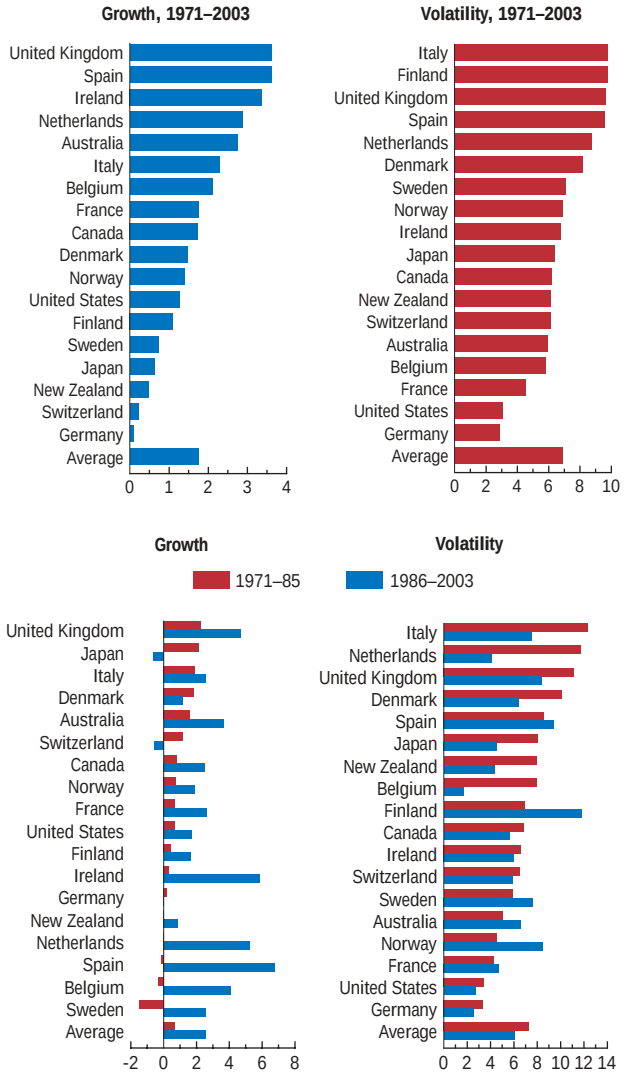


Sources: IMF, *International Financial Statistics;* national sources; and IMF staff calculations.

Figure 2.2. Growth and Volatility of House Prices in Industrial Countries

(Percent; constant prices)

The average growth rates of real house prices and their volatility differ significantly across countries and over time.



Sources: IMF, *International Financial Statistics;* national sources; and IMF staff calculations.

demand and output by affecting households' wealth and capacity to borrow.[8] Likewise, changes in economic activity, reflected in households' disposable income and employment prospects, can move house prices. Simple correlations between house prices and some key macroeconomic aggregates suggest the following (Figure 2.3).[9]

- *Real house prices in industrial countries are procyclical*, rising in a boom and falling in a recession.[10] The strength of the co-movement between real house prices and output, however, varies across countries, being weakest in Belgium, France, Italy, and Norway and strongest in Finland, Ireland, Switzerland, and the United Kingdom. The procyclicality of real house prices reflects the strong co-movement between these prices and private sector absorption.
- *The average correlation between house prices and long- and short-term interest rates is negative*, and particularly strong in Ireland, the Netherlands, and the United States.
- *The average correlation between real house prices and output (and consumption) has declined since the mid-1990s, reaching unprecedented low levels by 2003*. This tends to strengthen the notion that the current house price boom in industrial countries is atypical: prices have continued to rise while economic activity has weakened. Owing in part to record-low interest rates, the negative correlation between real house prices and interest rates has strengthened since the mid-1990s (Figure 2.3).
- *There is no contemporaneous correlation between housing and stock prices*. However, real stock

[8]Indeed, there is evidence suggesting that the strength of these effects varies across countries, reflecting differences in households' wealth composition and in the structure of the financial sector (see, for instance, Chapter II of the May 2002 *World Economic Outlook*).

[9]Co-movement is measured as the contemporaneous correlation between the growth rates of real house prices and the corresponding aggregate of interest (for instance, consumption).

[10]The average correlation between real house price growth and output growth is about 0.5 during 1971–2003. A related finding is reported by the OECD (2004).

prices often lead movements in house prices, particularly in Finland, Japan, and Norway.[11]

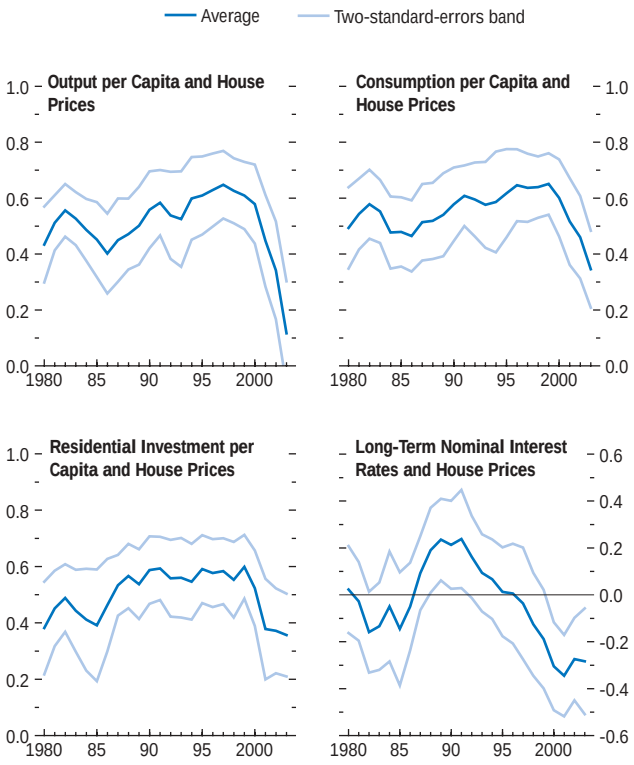
As is well known, industrial countries have become more integrated over the past two decades, reflecting rising trade and financial linkages. Some researchers have argued that increased international linkages led to more synchronized business cycles, whereby macroeconomic fluctuations spill over across countries (Figure 2.4).[12] Indeed, the co-movement of output/consumption across industrial countries increased during most of the 1990s, although it has reversed the past four years, reflecting in part the different intensities of the recent recession and the correction in stock prices following the burst of the stock market bubble.[13] With increasingly integrated financial markets, the synchronization of stock prices and long-term interest rates across industrial countries is high and increasing.

What are the implications of increased international linkages for the dynamics of house prices? While housing is the quintessential nontradable asset, house price cycles across countries may be synchronized if the forces driving house prices (such as output and interest rates) tend to move together across countries. There is growing evidence that

Figure 2.3. Co-movement Between Macroeconomic Aggregates and House Prices

(Rolling 10-year correlation coefficients of growth rates; constant prices unless otherwise noted)

Real house prices are procyclical. The average correlation between house prices and output (consumption) has declined sharply since the late 1990s.



Sources: Haver Analytics; IMF, *International Financial Statistics;* national sources; OECD; and IMF staff calculations.

[11]Quan and Titma (1998) find no significant contemporaneous correlation between the growth of real estate prices and stock prices for a sample of 17 industrial countries. However, they find a positive correlation between these rates of growth in the longer term.

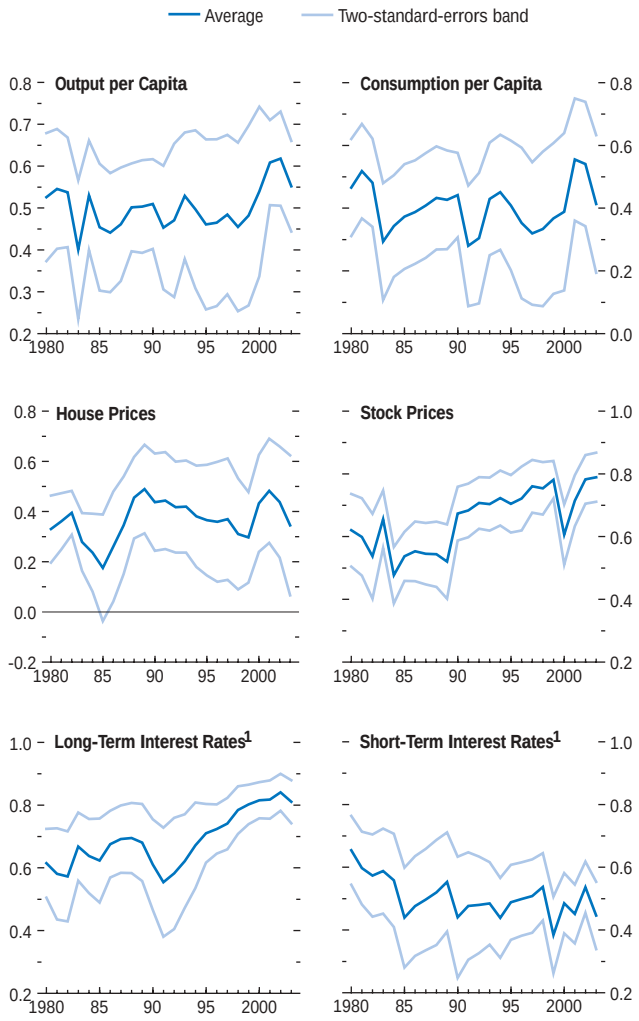
[12]The evidence on this issue is, however, ambiguous. Some have found that the synchronization of business cycles across industrial countries has increased (Kose, Prasad, and Terrones, 2003; and Otto, Voss, and Willard, 2003) while others have found evidence that the synchronization among some industrial countries has either remained unchanged or declined in the globalization period (Helbling and Bayoumi, 2003; Stock and Watson, 2003; and Doyle and Faust, 2003). Differences stem from different sample composition, time coverage, and construction of the "world" aggregates.

[13]The rates of growth of country *i*'s rest-of-the-world aggregate, say output, is calculated as the simple average of the output growth rates of all the industrial countries excluding *i*. (The results do not change much when the world aggregate is calculated instead using a PPP-weighted average of the output growth rates.)

Figure 2.4. Is There International Synchronization?

(Rolling 10-year correlation coefficients of growth rates; constant prices unless otherwise noted)

Industrial countries have become more synchronized over the past two decades. Although housing is the quintessential nontradable asset, house prices have also become more synchronized.



Sources: Haver Analytics; IMF, *International Financial Statistics;* national sources; OECD; and IMF staff calculations.

[1]Annual differences, in nominal terms.

house prices in some industrial countries have moved in tandem, at least during certain periods. For instance, Helbling and Terrones (2003) find evidence of synchronization of house price booms/busts across countries, which, they argue, is a reflection of the synchronization of monetary policy and financial liberalization—in addition to general business cycle linkages.[14]

The following stylized facts stand out from the analysis of the international co-movement of house prices across industrial countries (Figure 2.4):

- *House prices in industrial countries tend to move together*—the average cross-country correlation of house prices is 0.4. France, Sweden, the United Kingdom, and the United States show the strongest correlations with the rest of the industrial countries and Denmark, Germany, and Italy the weakest correlations.
- *House prices have become relatively more synchronized in the 1990s*, although this relationship has weakened somewhat over the past three years, as house prices in some industrial countries have continued to grow at a rapid clip while in others prices have moderated.

What Explains House Price Fluctuations and Co-movement?

To examine the nature of house price movements in industrial countries, and particularly the linkages between them, the IMF staff constructed a "dynamic factor" model for house price growth—and for six other key variables, including real stock prices, per capita output, per capita consumption, per capita residential investment, and changes in the short- and long-term interest rates—for 13 industrial

[14]The European Central Bank (2003) reports evidence that house price cycles were synchronized among some European Union (EU) countries. In contrast, PricewaterhouseCoopers (2002) finds little evidence of house price synchronization among the EU economies over the past 30 years.

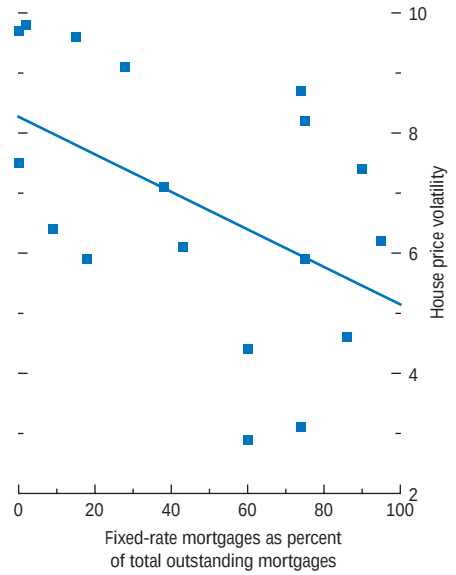
Box 2.2. Adjustable- or Fixed-Rate Mortgages: What Influences a Country's Choices?

With interest rates on the rise in many industrial countries, concerns about the effect of higher rates on housing markets have moved to the fore. Although there are several channels through which higher interest rates can affect housing, the household sector is likely to play a key role in countries with predominantly adjustable-rate mortgage (ARM) contracts since households bear the risk of higher rates directly through their higher mortgage payments and smaller remaining income. In fact, analysis suggests that countries with ARMs have typically displayed higher house price growth and volatility than countries with fixed-rate mortgages (FRMs) (see the figure).[1]

But a deeper question remains: what factors influence the types of mortgage contracts that are prevalent in a country? In short, why do ARMs predominate in some and fixed-rate mortgages in others? To answer these questions it is useful to look at how consumers make their mortgage decisions and the reasons lenders offer the specific types of contracts they do.

As regards consumers, one might start by asking whether there are national reasons why consumers might prefer certain types of mortgages over others. There are few cross-country studies that examine mortgage choices by consumers and, in general, their predictions do not match the evidence very well. Campbell and Cocco (2003) conduct a normative analysis, attempting to discover characteristics of a household that should lead it to prefer one form of mortgage over another. In a calibration of their theoretical model to the U.S. economic environment and household circumstances (with parameters reflecting inflation and its variability, interest rates, differential mortgage costs, and measures of income dependability), they find that ARMs have substantial advantages for most households, in contrast to the tendency for U.S. consumers to choose fixed-rate mortgages. The advantages stem from the typically short period many homeowners stay in a given house, allowing them to benefit from the low initial rates in an ARM, and the relatively stable income of homeowners. Interestingly, an application of the model to U.K. data suggests that a substantial proportion of households in the United Kingdom should find mortgages with longer-term fixed rates attractive, despite the very low take-up (about 2 percent of total

House Price Volatility and Fixed-Rate Mortgages[1]
(Percent)



Sources: European Central Bank; European Mortgage Federation; national sources; OECD; and IMF staff calculations.
[1]Volatility calculated as standard deviation of annual growth rates over 1971–2003.

Note: The main author of this box is Laura Kodres.
[1]Using a different grouping—bank-based and market-based financial systems—it is found that market-based economies have typically higher house price growth and lower volatility than bank-based economies. Appendix 2.1 provides a definition of bank- and market-based economies, the corresponding country grouping, and the criteria used to classify a country as having a predominance of fixed- or adjustable-rate mortgages.

Box 2.2 *(concluded)*

mortgages).[2] It appears, therefore, that either the models leave out relevant decision-making variables or make inaccurate assumptions—or many consumers fail to take up mortgage contracts that would best suit their needs. One assumption that bears further examination is whether consumers can accurately gauge their own future circumstances and, even if so, can freely choose either an ARM or a fixed-rate mortgage as appropriate.

There is evidence that consumers tend to prefer mortgage contracts that they consider to have the "most competitive rate" (that is, the ones with the lowest initial cost) and that they can understand. For most households a mortgage loan is large, long, and complex—and households are often not well-informed about the options available to them. Survey data from the United Kingdom suggest that, given the complexity and high degree of long-term uncertainty, U.K. households tend to focus on the immediate monthly mortgage costs, perhaps ignoring longer-term income or wealth risks.[3] The survey also found that the advice households receive about various mortgage products greatly influences their decisions. Much of this advice is, however, provided by lenders, whose interests may not be aligned with borrowers. Even with mandatory disclosure forms and other consumer protection mechanisms, research shows that professional advice was often taken at face value as consumers apparently feel that they have to meet the lenders' criteria and not vice versa.[4]

What then determines the type of mortgage contracts that lenders prefer to offer? The underlying structure of a country's financial markets greatly influences the various funding possibilities, and thus the risk-adjusted profits from mortgage contracts and their offerings. For instance, where covered bond markets or mortgage-backed securities markets are small and illiquid, mortgages tend to be funded through the use of short-term deposits. In order to reduce potential interest rate risks produced by different repricing terms (even when deposits are a stable form of funding), short-term interest rates are used to reprice mortgages at intervals close to that of deposits. Thus, in countries where funding for mortgages is based on short-term deposits (e.g., Australia, Spain, and United Kingdom), ARMs are prevalent. Though lenders tend to choose funding methods based on lowest cost, passing some of it onto their customers, in a few cases there are legal impediments to the use of longer-dated funds. In the United Kingdom, for instance, by law at least 50 percent of funds raised by building societies must be in the form of members' funds (e.g., short-term deposits), limiting building societies' use of longer-term funding sources.

Alternatively, countries with well-developed covered bond markets or deep and liquid mortgage-backed securities markets tend to have a higher proportion of fixed-rate mortgages.[5] The most obvious case is the United States, where the mortgage-backed securities market is aided by the perception of implicit government-backed guarantees of the dominant Freddie Mac and Fannie Mae mortgage institutions. This permits lower funding costs and thus cheaper long-term

[2]Miles (2004). A descriptive examination of housing leverage in Australia, although not explicitly modeling the type of mortgage contract chosen, shows that typical variables such as age, life-cycle stage, and time at a particular address explain much of the variation in Australian households' leverage. At the same time, the study finds a minority of households have higher leverage than similar households because they are involved in leveraged investment in both owner-occupied and rental housing. Overall, the study concludes that households' use of leverage in the Australian housing stock remains fairly moderate (see Ellis, Lawson, and Roberts-Thomson, 2003).

[3]Miles (2004) provides evidence of such myopic behavior among U.K. consumers.

[4]Research commissioned by the U.K. Financial Services Consumer Panel, 1999.

[5]A covered bond market refers to securities issued based on collateral (e.g., mortgage loans) that remain on the balance sheet of the issuer of such bonds, whereas mortgage-backed securities are typically held off balance sheet, often in a legally separate special purpose vehicle.

mortgage pricing (as some of the lower costs are passed onto consumers), spurring the popularity of long-term mortgages. Similarly, long-term fixed-rate mortgages are more prevalent in Denmark and Germany, where specialized private mortgage banks are granted licenses to issue long-term debt against mortgages. In fact, in Denmark, the size of the mortgage-backed securities market exceeds that of government debt.

While a long-term covered bond or mortgage-backed securities market can sometimes develop de novo (or with helpful government legislation), the close association between the liquidity of long-term government securities' markets and these markets is striking for some countries, such as the United States, Germany, and Denmark, since these markets are frequently used as benchmarks for pricing and for hedging activities. Liquid swap markets can also be used by lenders to transfer the receipt of long-term fixed mortgage payments into the payment of short-term variable deposit interest. There are some notable exceptions, however. Australia and the United Kingdom have fairly liquid long-term government bond markets, but few fixed-rate mortgages are offered there. And the Netherlands has mostly fixed-rate mortgages but its banks mostly fund themselves with deposits.

Moreover, the existence of other financial markets to hedge prepayment risks—the risk that a borrower may decide to prepay the mortgage before the term of the loan ends (allowable in some countries)—is also important to lower the costs of fixed-rate mortgages since the longer the loan maturity, the more difficult it is for the lender to replace it with one earning the same rate. Thus, markets where such contract provisions can be hedged through callable debt, swaptions (an option on a swap), options on government debt, and other derivative contracts tend to lower costs to lenders and permit contracts that make prepayment easier, thereby contributing to the increased use of longer-term fixed-rate mortgages.

Aside from funding sources for lenders, other country-specific institutional features may encourage or discourage certain types of mortgage contracts. For instance, bankruptcy laws and the ability to seize property influence the type of mortgage contracts. In Italy, for instance, lengthy and expensive procedures for repossession have meant higher operating costs and the desire to limit the length of contracts to lower the probability of default. Accounting standards also influence mortgage contract availability. For example, some countries permit the matching of an underlying portfolio of mortgages with the derivatives used to hedge the portfolio's maturity and prepayment risks while others do not. The ability to use matching techniques would make hedging longer-term fixed-rate mortgages more cost-effective. Limitations on the information about mortgage contracts to lenders can also influence the types of contracts. Countries in which there are readily available data on prepayment patterns allow these risks to be priced more efficiently and thus permit longer-term fixed-rate mortgages to be offered at lower costs.

In sum, it appears the supply side of mortgage markets—characterized by the types of contracts lenders are willing and able to offer—plays a large role in the preponderance of adjustable-rate- or fixed-rate-type mortgages in a country. Without complete information, consumers gravitate to the incentives provided by lenders, who are able to offer relatively cheaper mortgage contracts based on the funding sources readily available to them. Since it appears that countries with predominantly fixed-rate mortgages have better behaved housing prices and fewer negative spillover effects on their economies, countries where fixed-rate mortgages are inhibited by structural impediments, such as restrictions on financial institutions or accounting regulations, could usefully remove them. Other measures to strengthen long-term markets and the ability of institutions to use derivatives to hedge could also ultimately lower economic risks, strengthen financial stability, and enhance consumer welfare through better risk-sharing. As well, consumer education and information about the various types of mortgages available with their suitability for different types of borrowers should be encouraged.

countries, using quarterly data for the period 1980:QI to 2004:QI.[15] Dynamic factor models, which are gaining increasing popularity among economists, differ from standard econometric models in that, instead of seeking to estimate the relationship between two observable series—such as house prices and interest rates—they are used to identify the underlying (unobservable) forces, known as factors, which may be driving both.[16] For example, the dynamic factor model used in this essay assumes that house prices—and the other six variables mentioned above—can be explained by the following four types of factors:[17]

- an overall *global factor*, which affects all variables in all countries, capturing the common shocks affecting these variables;
- a *global housing factor*, which captures common shocks affecting house prices in all countries, but not other variables. Similarly, there is a *global interest rate factor* that captures common shocks to global interest rates, and so on.
- a *country-specific* factor, which captures common shocks to variables in a country; and
- an *idiosyncratic* factor that captures the effect of country-specific shocks for each individual variable in each country. [18]

These factors capture movements in the underlying forces driving these economies (i.e., monetary and fiscal policy shocks, productivity shocks, oil price shocks, etc.), the relative importance of which changes over time. For example, the co-movement across countries of variables affecting house prices, such as interest rates and disposable income, would be captured by the two global factors, while regulatory, policy, and structural changes affecting the housing market of a particular country would be captured by the idiosyncratic factor.

Consequently, a dynamic factor model is well suited to investigating movements in house prices across different countries, and assessing whether they primarily reflect underlying global forces affecting all variables (the global component), factors specific to global housing markets, or country-specific developments. While the detailed results are set out in Appendix 2.1, the main results are the following.

- Global developments—the combination of the aggregate global factor and the global variable-specific factors—explain 40 percent of house price movements, underscoring the importance of international linkages in the forces driving housing market developments. (Figure 2.5).[19] Unsurprisingly, global developments also play a substantial role in explaining movements in the six other variables.
- Within this, the overall global component—the global factor affecting all variables—explains about 15 percent of movements in house prices. The global housing factor—capturing global shocks to housing markets alone—explains 25 percent of house price movements.[20]
- The impact of global factors on house prices varies significantly across individual countries. For example, global factors appear to explain about 70 percent of house price movements in

[15]Case, Goetzmann, and Rouwenhorst (1999) were, to our knowledge, the first to apply a related approach to study the international returns on office and retail properties. They find that the surprisingly high international correlation among these returns may reflect changes in world economic activity.

[16]These models were originally introduced by Spearman, a century ago, to study the relationship between a set of (observable) test scores and underlying (unobservable) mental ability.

[17]These components are generally not correlated with each other. However, each component could follow an autoregressive process (that is, each component could be correlated with its own past). See, for instance, Kose, Otrok, and Whiteman (2003).

[18]More precisely, the model encompasses 1 global factor, 7 aggregate factors (one for each variable; i.e., house prices, stock prices, etc.), 13 country-specific factors (1 for each country), and 13 idiosyncratic terms. See Appendix 2.1 for more details.

[19]This result is consistent with the findings of the existing literature focusing on the role of global factors in explaining fluctuations in the main macroeconomic variables (see, for instance, Kose, Otrok and Whiteman, 2003).

[20]The fraction of variance and co-movement of a given time series explained by the world components are typically the same because the global component and the aggregate-specific component are not correlated with each other.

the United Kingdom and the United States, but only about 3 percent of house price movements in New Zealand.

- Country-specific factors play a surprisingly small role in most countries, with the exception of Ireland[21] and to a lesser extent New Zealand. Idiosyncratic factors—capturing country-specific forces affecting housing market developments—account for 50 percent of movements in house prices, and are especially important in Australia, Italy, New Zealand, Norway, and Switzerland.

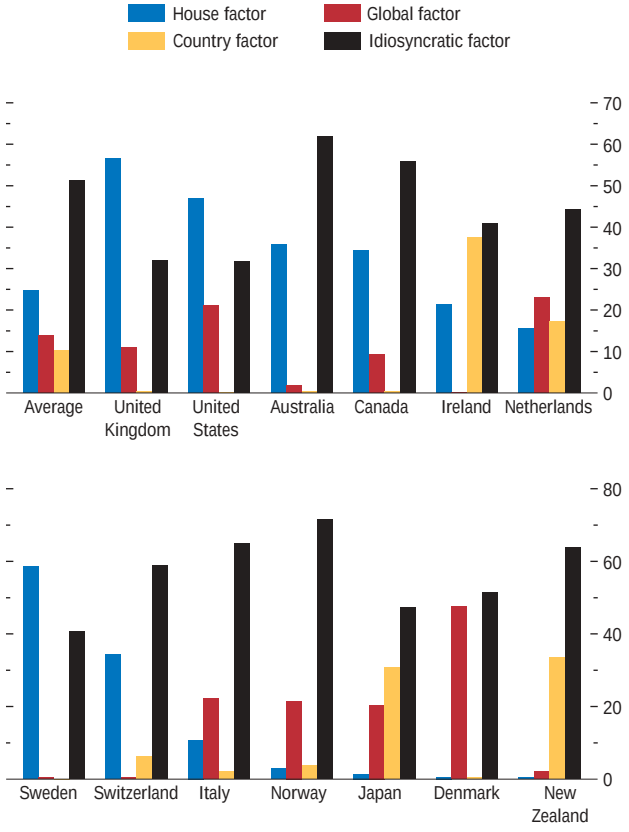
As can be seen from Figure 2.6, both the global and the country-specific factors fluctuate over time, reflecting the major shocks affecting them. However, it is striking that the overall global component moves quite closely with global GDP, including the recession of the early 1980s, the boom of the mid-1980s, the recession of the early 1990s, the long boom of the 1990s, and the mild recession of 2001. Moreover, the global housing component tracks the main developments in global housing markets over the past 25 years remarkably well, including the housing price bust of the early 1980s, the house price boom of the late 1980s, the bust of the early 1990s, and the current house price boom—which shows, as noted before, an unprecedented strength and duration. The global and house components have typically moved in the same direction, with the exception of the most recent years, during which they have diverged, possibly reflecting the recent "disconnect" between house prices and economic activity documented earlier.

It is reasonable to ask why it might be that global factors have such a significant impact on the price of a nontradable asset. While the dynamic factor model does provide only limited information on this issue; the fact that housing is part of households' wealth alongside interna-

[21]In this period, Ireland's economy was experiencing a strong boom and a strong flow of repatriates. To contain the rapid increase in house prices, in 1999–2000 the government introduced temporary measures to discourage "speculation" in the housing market.

Figure 2.5. Variance Decomposition of House Prices
(Percent change; constant prices)

Global developments explain 40 percent of real house price movements, reflecting the importance of international linkages in the housing markets.

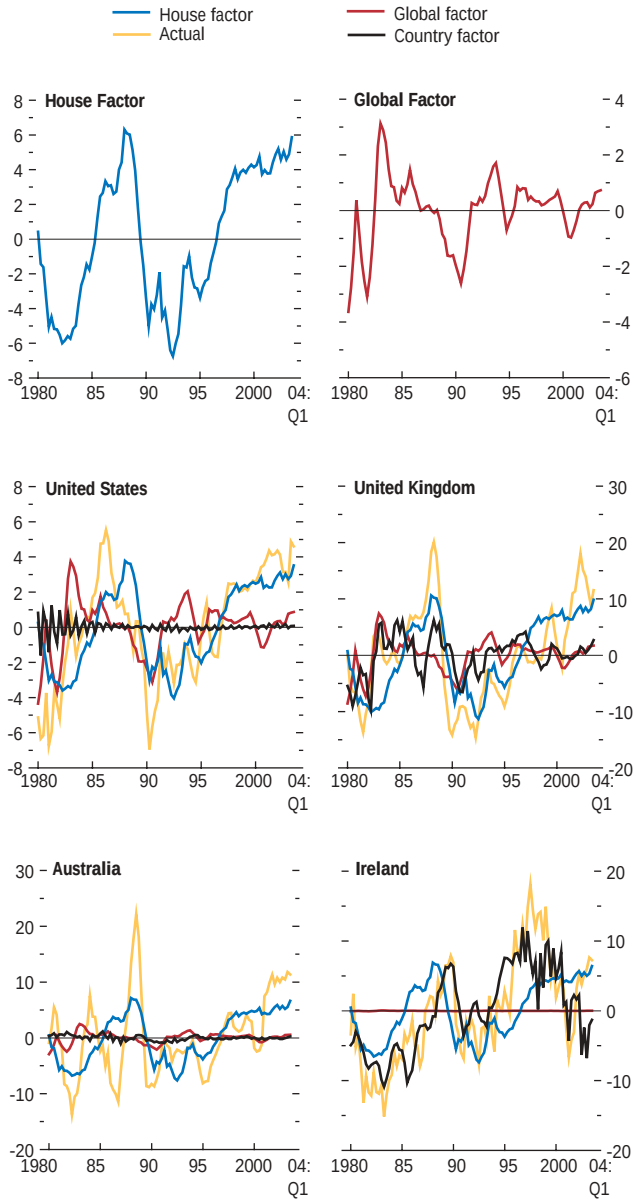


Sources: Haver Analytics; IMF, *International Financial Statistics;* national sources; OECD; and IMF staff calculations.

Figure 2.6. What Explains House Price Fluctuations?

(Percent change; constant prices; demeaned)

The global and country-specific factors fluctuate over time. The global and house factors have typically moved in the same direction, until recently.



Sources: Haver Analytics; IMF, *International Financial Statistics;* national sources; OECD; and IMF staff calculations.

tionally traded assets suggests that (risk-adjusted) rates of return are likely to move in a coordinated fashion across countries. In addition, recent years have witnessed a process of deepening of financial markets in general, and mortgage markets in particular, across all industrial countries. By easing borrowing constraints, this may also have contributed to a synchronized pickup in housing demand. To further investigate the potential sources of this relationship, the IMF staff regressed the aggregate global factor and the global housing factor against a number of explanatory variables. The main results were as follows.

- The aggregate global factor is positively correlated with output growth in the United States, possibly reflecting the fact that U.S. cycles are exported to the rest of the world.[22] Similarly, the aggregate global factor is negatively correlated with real oil and non-oil commodity prices, in line with the findings in the literature that these prices have a negative effect on global economic activity.
- The global housing factor is negatively correlated with interest rates in the United States—a reflection of the key role played by interest rates in real estate markets. In addition, the global housing factor is positively correlated with the mortgage-to-GDP ratio (perhaps reflecting the fact that the deepening of mortgage markets across industrial countries has been associated with higher global house prices) and the home ownership ratio (the movements of which often reflect cross-country structural and policy changes, including tax/subsidies, aimed at fostering home ownership).

How Could Higher Global Interest Rates Affect House Prices?

Given the importance of global factors in determining house prices, the question arises as to how future global developments—notably, the

[22]Note that the United States has the same weight as all other countries in the calculation of the global factor.

expected rise in interest rates—might affect housing markets in the coming year. To address this, the staff constructed a factor-augmented multivariate vector autoregression model (FAVAR) of housing prices for the United Kingdom and the United States.[23] To formulate the FAVAR, it is necessary first to establish which factors (e.g., world factor, house-price factor) and variables (e.g., interest rates, stock prices) best predict movements in house prices.[24] These tests—along with the analysis of the drivers of the global factors described above—suggested the following.

- Domestic interest rates play a key role in explaining house price movements. Not surprisingly, they are important drivers of house prices in nearly every country in the sample.
- The global interest rate factor is also important in explaining future movements in house prices, both directly and through the global house price component as described above. The former result suggests that global interest rates will affect domestic house prices. The latter result suggests that the co-movement observed in house prices across countries may be in large part due to the interest rate channel.
- At the country level, real sector variables, in addition to interest rates, have an impact on house prices as well.
- There is evidence that U.S. house prices lead the global house factor. This finding, together with the fact that global interest rates—which are also affected by changes in U.S. interest rates—drive world house prices, suggests that movements in both U.S. house prices and interest rates are key sources of global house price fluctuations.

Based on these results, FAVAR models were constructed for two countries—the United States and the United Kingdom—and used to simulate the impact of a rise in interest rates through mid-2005 consistent with current expectations in futures markets. The forecasting analysis suggests the following.

- The growth rate in the U.S. house prices is projected to slow down over the coming year and a half (see Figure 2.7). This slowdown is primarily due to the rise in long-term interest rates expected by the futures markets (i.e., a cumulative 100 basis points during March 2004–June 2005).[25] The analysis, however, does not find compelling evidence suggesting that a real house price drop is in the offing.[26]
- In contrast, the growth rate of real house prices in the United Kingdom is forecast to slow down significantly, and a fall in real house prices cannot be ruled out.[27] This forecast is predicated on the basis of an increase

[23]These models are becoming increasingly popular because they often yield better forecasts than simple VAR models of pure observable variables (see, for instance, Stock and Watson, 2002, and Bernanke, Boivin, and Eliasz, 2004). The use of estimated factors allows the model to capture large amounts of information of the world economy with only a few variables.

[24]This is accomplished through causality tests at the global and country level, with the emphasis on predictive causality. To assess predictive causality among factors and variables a battery of bivariate Granger causality tests are performed (see, for instance, Hamilton, 1994).

[25]The FAVAR used to forecast the growth rate of real house prices in the U.S. comprises, in addition to this variable, the house factor, the country factor, the consumption factor, and yearly changes in the long-term interest rate. Long-term interest rates are thus expected to rise to 5 percent in June 2005 (from 4.02 percent in March 2004). Interestingly, the increase in short-term interest rates expected by the futures markets over the same period is 210 basis points.

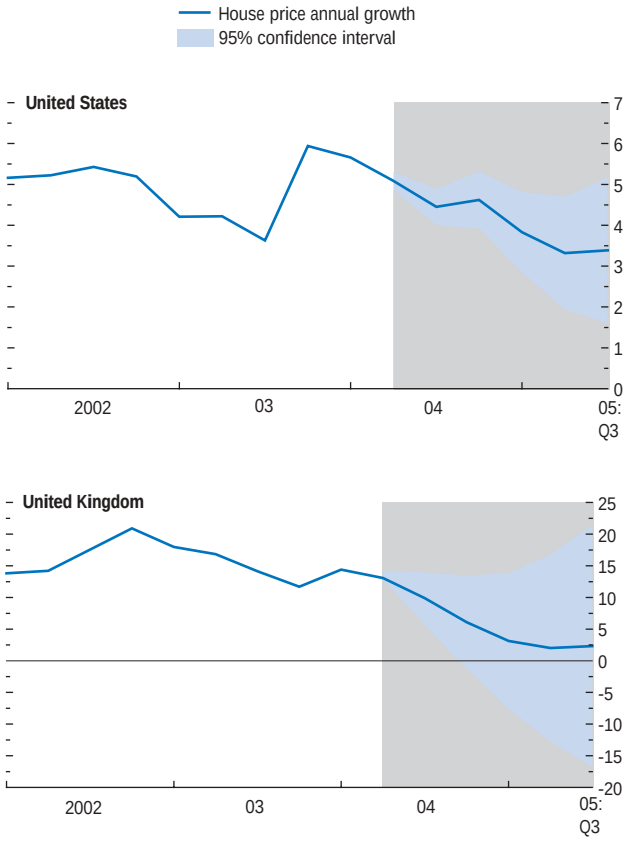
[26]This finding, however, does not rule out the possibility of house price drop at a regional level. McCarthy and Peach (2004) also find it unlikely that house prices in the United States would drop in response to deteriorating fundamentals. HSBC (2004) in contrast, argues that because house prices in the United States are 10 to 20 percent overvalued, an increase in short-term interest rates could bring house prices down by mid-2005.

[27]The FAVAR model used to forecast the growth rate of real house prices in the United Kingdom comprises, in addition to this variable, the house price factor, the stock price factor, the consumption factor, and changes in the United Kingdom's short-term interest rates. Interestingly, the consumption factor (and not the output factor) helps predict house prices. This could reflect the fact that, in consumption-based asset pricing models, consumption may be useful in forecasting house prices (Piazzesi, Schneider, and Tuzel, 2004, find that in an asset pricing model with housing, consumption growth helps predict stock returns). Short-term interest rates are expected to rise to 5½ percent in June 2005 (from 4.10 percent in March 2004).

Figure 2.7. How Would House Prices React to an Increase in Interest Rates?

(Percent change; constant prices)

An increase in interest rates as expected by futures markets would slow down house price growth in the United States and the United Kingdom; in the United Kingdom, a drop in prices cannot be ruled out.



Sources: Bloomberg Financial, LP; Haver Analytics; IMF, *International Financial Statistics;* national sources; OECD; and IMF staff estimates.

in short-term interest rates in line with futures markets (i.e., a cumulative 140 basis points during March 2004–June 2005). There is, however, a substantial degree of uncertainty in the forecast, which indicates that a drop in real house prices is an event with nonzero probability.

Overall, these results tend to suggest that the impact of rising interest rates would be significant—especially in the United Kingdom—but manageable. However, there is one very important caveat. The dynamic factor model/FAVAR analysis assumes that house prices are driven by fundamentals and is not designed to test for the existence of potential bubbles. In cases where house prices may have exceeded fundamentals—which may include Australia, Ireland, Spain, and the United Kingdom, as discussed in Box 2.1—there is a danger that higher interest rates could trigger a much larger downward adjustment in house prices, with considerably more severe consequences for real activity.

Conclusions

Since the mid-1990s, many industrial countries have been experiencing a boom in housing prices, unusual in both its strength and duration; moreover, despite the bursting of the information technology bubble and subsequent global downturn, the momentum of the housing boom has continued almost unabated. This boom has been associated with a very dynamic housing market and record-high levels of mortgage debt. The strength of the housing market has played an important role in supporting activity during and after the downturn. By the same token, the outlook for the housing market will play a key role in shaping the extent and nature of the recovery going forward.

While housing is generally thought to be the quintessential nontradable asset, the analysis in this essay suggests that house prices across countries are surprisingly highly synchronized, reflecting the key role played by global factors, primarily through global interest rates and economic activity. A key implication of this finding

is that, just as the upswing in house prices has been mostly a global phenomenon, it is likely that any downturn would also be highly synchronized, with corresponding implications for global economic activity. In particular, higher global interest rates will result in a slowdown in house prices, the extent of which will differ across countries, reflecting in part differences in their sensitivities to global developments. Simulations presented in the paper suggest that an increase of over 100 basis points in interest rates during March 2004–June 2005 would slow down the growth rate of house prices in the United Kingdom and the United States. For the United Kingdom, a drop in house prices cannot be ruled out, reflecting the higher forecasting uncertainty in that country. The evidence provided in Box 2.1 suggests that current house prices appear out of line with fundamentals in some countries, including the United Kingdom, highlighting the risk of a more pronounced drop in prices. Clearly, other factors, such as the size of households' debt and financial structure, could also play an important role, thus exacerbating the risks for an economy.

In those countries where house prices are elevated, central banks face the challenge of containing inflationary pressures while simultaneously seeking to minimize the risks of a house price bust. On the whole, the best compromise would appear to be an "early but gradual" tightening in monetary policy, as appears to be under way in the United Kingdom, maximizing the opportunity for households to adjust to higher interest rates. Indeed, there is evidence that most house prices busts of the past were triggered by a rapid tightening in monetary policy, as reducing inflation became an important policy objective (see, for instance, the April 2003 *World Economic Outlook*). Policymakers should also consider tightening lending requirements and strengthening surveillance of financial entities as household debt may be reaching (or may have reached already) unhealthy levels in some countries. More generally, policymakers should give increasing attention to developing mortgage market infrastructure; in particular, countries should aim at creating the conditions for the introduction of a richer set of mortgage contracts while strengthening their financial sector regulation. This could include reforming their bankruptcy laws and accounting standards, as well as improving the information and disclosure on mortgage contracts (as discussed in Box 2.2). In addition, countries should assess the extent and desirability of their implicit/explicit guarantees to mortgage debt.

Learning To Float: The Experience of Emerging Market Countries Since the Early 1990s

The main author of this essay is Dalia Hakura. Angela Cabugao and Ercument Tulun provided research assistance.

The benefits of more flexible exchange rate regimes increase as economies develop and become more integrated in global financial markets, a process that has been underscored in recent work by Rogoff and others (2003, 2004), and Husain, Mody, and Rogoff (2004). For emerging market economies, moving toward more flexible regimes can help to mitigate the risk from currency crises that have characterized pegged exchange rate regimes. Moreover, in industrial countries, flexible exchange rate regimes have conferred macroeconomic benefits in terms of better growth and inflation performance.

Although several emerging market countries have moved to more flexible exchange rate regimes, others have exhibited a "fear of floating" (Calvo and Reinhart, 2002; and Hausmann, Panizza, and Stein, 2001). The fear of floating derives from the actual or perceived costs of exchange rate volatility. For instance, currency fluctuations may cause a ratcheting up of inflation (exchange rate pass-through) and adversely affect balance sheets and debt-servicing burdens by raising the domestic-currency value of foreign-currency-denominated debt. Because of these costs, some policymakers in emerging market countries feel that the room to pursue an

independent monetary policy and increase exchange rate flexibility is, in practice, limited at best.

Against this background, stronger monetary and financial policy frameworks facilitate the introduction of greater exchange rate flexibility by directly addressing the key vulnerabilities that give rise to the fear of floating (Calvo and Mishkin, 2003). For instance, an independent central bank that has price stability as its main objective can help to reduce exchange rate pass-through (Campa and Goldberg, 2001; Choudhri and Hakura, 2001; and Gagnon and Ihrig, 2001). Similarly, strong financial sector supervision helps to reduce currency mismatches on banks' balance sheets (Goldstein and Turner, 2004).

This essay examines empirically the association between transitions to greater exchange rate flexibility, macroeconomic outcomes, and monetary and financial policy frameworks, both systematically across a group of emerging market countries and in three case studies (Box 2.3). Specifically, it addresses the following questions about the experience with exchange rate regimes since the early 1990s.[28]

- Have exchange rate regime transitions in emerging market economies since the early 1990s generally been toward greater flexibility or greater fixity? To what extent have the transitions been driven by crises?
- How have macroeconomic outcomes been associated with changes in exchange rate regimes? Have voluntary transitions been associated with an increase in macroeconomic instability?
- How have countries "learned to float"? Specifically, how have changes in policy frameworks been associated with changes in exchange rate regimes? Have changes in policy frameworks tended to precede or follow moves to more flexible exchange rates? Is the association different for crisis-driven transitions?

How Have Exchange Rate Regimes Changed?

This section investigates how exchange rate regimes in emerging market economies have changed over the past decade using the IMF's de facto classification system.[29] To keep the analysis manageable, the essay distinguishes three categories of exchange rate regimes: pegs, intermediate regimes, and free floats. The data suggest that there has been a trend toward greater flexibility in emerging market countries since the early 1990s (Figure 2.8). Specifically, the share of countries with free floats rose from virtually zero in the early 1990s to more than one-third in recent years.

Overall, there have been 28 transitions over the past decade, of which 20 have been to more flexible regimes. A transition is defined as a change from one exchange rate category, in which a country has been for at least two years, to another, in which a country remains for at least one year or which is followed by another shift in the same direction. The transitions to more flexible exchange rates are from pegs to intermediate regimes and from intermediate regimes to free floats; no emerging market country moved directly from a peg to a free float during the sample period. The transitions to more flexible rates are broadly evenly distributed across all regions—Asia and Latin America, among others—and across the sample period.

Transitions to greater flexibility can be characterized as voluntary or crisis-driven. Following Milesi-Ferretti and Razin (2000), a crisis-driven transition is defined as one that is associated with a depreciation vis-à-vis the U.S. dollar of more than 20 percent, at least a doubling in the

[28]Emerging market economies are defined in the essay as countries in the Morgan Stanley Capital International index (MSCI), which includes Argentina, Brazil, Chile, China, Colombia, the Czech Republic, Egypt, Hungary, India, Indonesia, Israel, Jordan, Korea, Malaysia, Mexico, Morocco, Pakistan, Peru, the Philippines, Poland, Russia, South Africa, Thailand, Turkey, and Venezuela.

[29]The results are robust to using the "Natural Classification" system developed by Reinhart and Rogoff (2004, Appendix 2.2).

Table 2.2. Emerging Market Countries' Transitions to More Flexible Regimes, 1992–2002
(IMF de facto classification)

Transition Type	Voluntary	Crisis-Driven
Peg to intermediate	Czech Republic, 1996 Egypt, 1999 Hungary, 1994 India, 1995 Pakistan, 2000	Argentina, 2001 Philippines, 1997 Thailand, 1997 Venezuela, 1996
Intermediate to free float	Chile, 1999 Peru, 1999 Philippines, 2000 Poland, 2000 South Africa, 1997 Turkey, 2001	Brazil, 1999 Colombia, 1999 Indonesia, 1997 Korea, 1997 Mexico, 1994

Source: IMF staff calculations.

depreciation rate compared with the previous year, and a depreciation in the previous year of less than 40 percent. The transitions that are not crisis-driven are defined as voluntary, though clearly there are different degrees of volition involved, with some occurring under threat of a crisis (such as in Hungary and Turkey).[30] Crisis-driven and voluntary transitions are both nearly evenly split between transitions from pegs to intermediate regimes and transitions from intermediate regimes to free floats (Table 2.2).

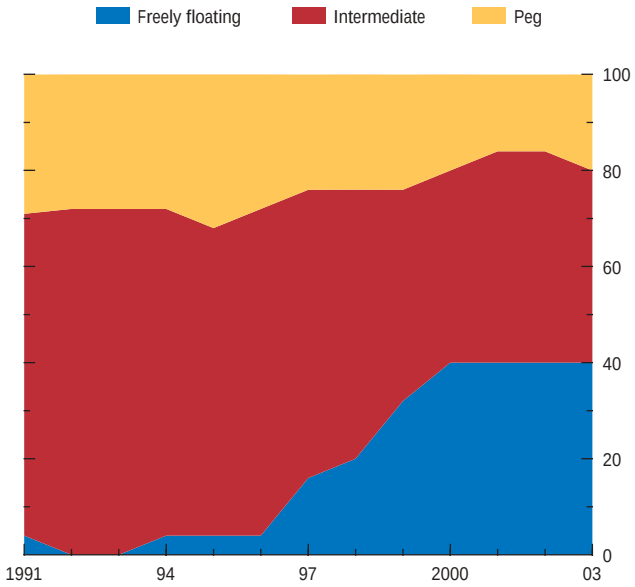
How Have Macroeconomic Outcomes Changed?

This section examines the association between transitions to more flexible regimes and macroeconomic outcomes. In contrast to earlier work that has analyzed voluntary and crisis-driven transitions together (Eichengreen and others, 1998 and 1999), the focus here is on voluntary transitions. The key questions are under what macroeconomic conditions have countries made voluntary transitions and whether voluntary transitions have been associated with an increase in macroeconomic instability.

[30]Turkey's adoption of a free float in 2001 does not qualify as crisis-driven, because the rate of exchange rate depreciation in that year was not at least double that in the previous year. The results reported in the essay are not sensitive to how this transition is classified.

Figure 2.8. Increasing Exchange Rate Flexibility in Emerging Markets
(Percent of annual observations)

The share of countries with freely floating exchange rate regimes has increased from virtually zero in the early 1990s to 40 percent in recent years.



Sources: Bubula and Ötker-Robe (2002); and IMF staff calculations.

Box 2.3. How Did Chile, India, and Brazil Learn to Float?

Several emerging market countries moved to greater exchange rate flexibility over the past decade, despite the potential costs of exchange rate fluctuations in terms of output and inflation volatility, and unfavorable balance-sheet and debt-service effects (see, for example, Calvo and Reinhart, 2002; and Hausmann, Panizza, and Stein, 2001). Recent work has emphasized that countries can "learn to float" by improving monetary and financial policy frameworks, which directly addresses the key vulnerabilities (Rogoff and others, 2004). For example, an independent central bank committed to price stability may be able to stabilize inflation expectations and thus reduce the pass-through of exchange rate changes to prices. Similarly, strong prudential regulations can moderate the balance-sheet mismatches in the financial and corporate sectors. This box illustrates these points by examining the experiences of three countries—Chile, India, and Brazil—that moved to greater exchange rate flexibility during the 1990s. These three case studies were selected because they offer a range of experiences across regions, types of transitions, and evolution of policy frameworks.

Chile

Chile made a transition from a crawling band to a free float in September 1999, having significantly enhanced its monetary and financial policy frameworks over the previous decade (see Kalter and others, 2004; Duttagupta, Fernández, and Karacadag, 2004; Morandé, 2001; and Ariyoshi and others, 2000). After gaining full independence in 1989, the central bank started anchoring inflation expectations by publishing short-term inflation targets and over time built a reputation for an anti-inflationary bias. In 1998, the central bank further shifted its policy framework toward influencing expectations by setting the rate of crawl for the peso at expected inflation. When the crawling band was abolished in 1999, the central bank adopted a full-fledged inflation targeting framework, making price stability its only monetary policy objective.

During the 1990s, the crawling band for the peso was widened several times and the central parity adjusted in response to strong capital inflows. To dampen pressures for exchange rate appreciation, Chile maintained restrictions on the capital account, mainly in the form of unremunerated reserve requirements on certain financial inflows (1991–98). Fluctuations of the exchange rate within the crawling band increased incentives for the deepening of forward and futures markets in foreign exchange, which helped to limit the impact of currency fluctuations on the real sector.

Chile had substantially strengthened its banking supervision before the transition to free floating. The banking law of 1986 and the subsequent amendments in 1989 and 1997 gave the regulators the essential tools to control risk taking by banks. The measures strengthened balance sheets by tightening capital requirements, imposing strong liquidity management rules, limiting bank's exposure to foreign exchange risk, and increasing banks' capital requirements in line with the recommendations of the Basel Committee.

India

India announced the transition from the peg of the rupee to the U.S. dollar to a managed float in March 1993, though the IMF de facto classification system dates the transition to August 1995. While India shifted to greater exchange rate flexibility when reforms to policy frameworks were still in progress, the managed float has been maintained without major distress, even during times of international market turbulence.

In 1991, India embarked on a wide-ranging liberalization program. Financial sector reforms were an important component of this reform program and were implemented gradually, beginning with interest rate liberalization, the introduction of greater competition in the banking system, measures to develop domestic securities markets, and steps to strengthen financial sector supervision (see Acharya, 2002; Ariyoshi and others,

Note: The main author of this box is Martin Sommer.

2000; and Chopra and others, 1995). Liquidity in financial markets benefited from fiscal reforms: the government shifted to borrowing at market interest rates (1992/93) and the automatic monetization of fiscal deficits by the central bank was phased out (1994–97). In the period after the floating of the rupee, many of the reforms launched in the early 1990s continued to be implemented and enhanced. Moreover, foreign exchange dealers were allowed to use derivatives to hedge their positions (1996–97) and the prudential requirements regarding the risks of foreign exchange exposures were tightened.

External financial liberalization was also gradual, and focused on long-term foreign direct investment and equity portfolio inflows. Extensive controls on short-term borrowing were retained throughout the 1990s, which together with the existing prudential norms limited foreign exchange vulnerabilities in the banking and corporate sectors and increased India's resilience during international financial crises. The policy of maintaining limited external public debt (and on concessional terms) also diminished the exposure of the economy to exchange rate volatility.

Monetary policy in India has traditionally focused on the twin objectives of maintaining price stability and supporting growth. In the first half of the 1990s, a surge in capital inflows pushed inflation higher but in the second half of the decade, the Reserve Bank of India succeeded in keeping inflation low. After abolishing the peg of the rupee, the central bank actively intervened in the foreign exchange market to reduce volatility. The exchange rate against the U.S. dollar remained quite stable until the end of the 1990s with occasional shifts at the times of large unfavorable shocks. In the past several years, the Reserve Bank of India has allowed even greater exchange rate flexibility but still maintains many controls on residents' capital account transactions.

Brazil

Brazil abandoned the crawling peg of the real to the U.S. dollar in January 1999. However, the rapid adoption of inflation targeting has helped to contain inflation expectations after the initial depreciation and moderate the adverse impact of a more volatile currency (see IMF, 2003; and Bogdanski, Tombini, and Werlang, 2000). To influence expectations, the bank increased the transparency of its decision making, communicated extensively with the public, and explained its performance relative to the inflation targets.

The financial sector weathered the sharp depreciation of the Brazilian real as a result of wide-ranging structural reforms launched in 1994 that reduced systemic foreign exchange and credit risks. In addition, both financial and corporate sectors had little exposure to foreign exchange risk because of extensive hedging through dollar-indexed government securities, derivatives, or foreign receivables. The prudential measures against the foreign exchange risk were further tightened after the crisis.

Restrictions aimed at discouraging short-term capital inflows (1993–97) were ineffective given the sophistication of the Brazilian financial market. This stands in contrast with India, where capital controls were more effective, reflecting in part the relatively less developed financial market.

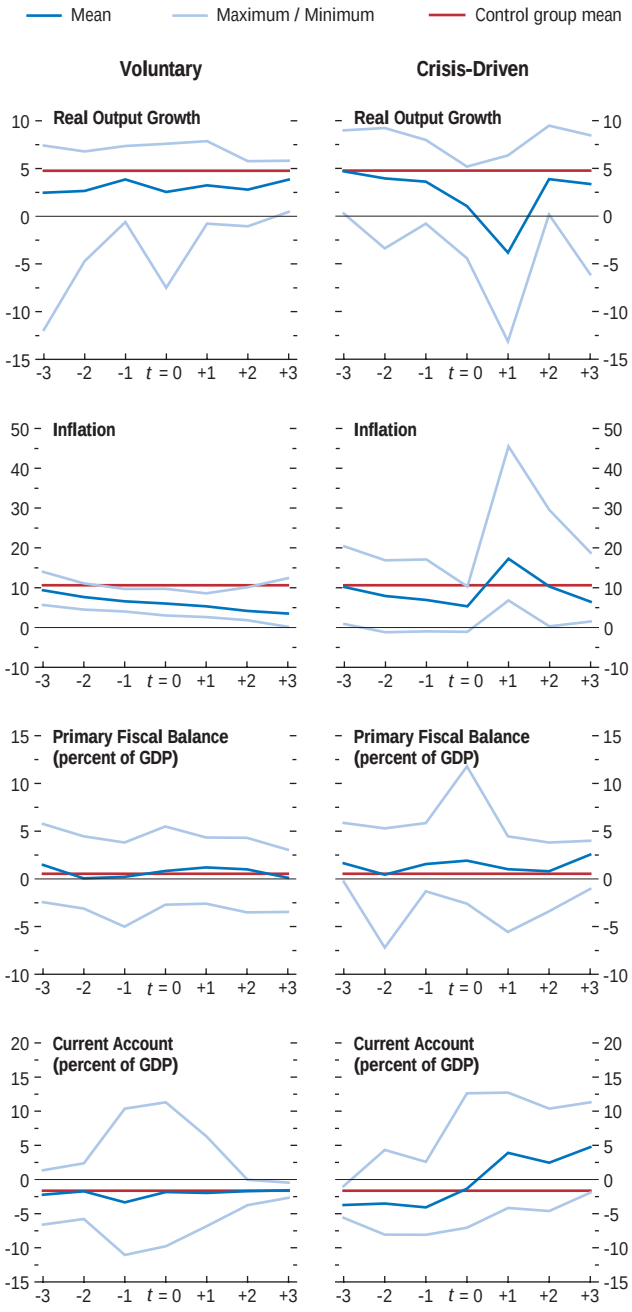
Concluding Remarks

The three case studies provide us with some interesting insights. First, all three transitions were associated with an improvement in the monetary and financial policy frameworks, which helped to diminish the potential costs of exchange rate flexibility in terms of inflationary and balance-sheet effects. Second, the timing of improvement in policy frameworks varied across the three cases. Chile made significant enhancements to its policy framework before the transition; India started off with partial reforms that continued after the transition; and Brazil quickly adopted a new nominal anchor following a crisis. Finally, the experience of India suggests that even with an imperfect policy framework, the potential costs of exchange rate volatility can be kept in check by capital controls, though—looking forward—gradual liberalization supported by strengthened policy frameworks would likely help to boost growth (see Chapter IV of the October 2001 *World Economic Outlook*).

Figure 2.9. Macroeconomic Indicators[1]

(Percent unless otherwise noted; t = 0 is year of transition)

Voluntary transitions were generally not associated with an increase in macroeconomic instability, unlike crisis-driven transitions.



Sources: World Bank, *World Development Indicators;* IMF, *International Financial Statistics;* and IMF staff calculations.

[1]The control group represents countries whose exchange rate regimes are the same as the starting regimes of transitioning countries in periods that are not within three years of a transition. Outliers are excluded from the panel for inflation.

In view of the limited number of transitions identified in the previous section, the analysis is mainly descriptive. Following standard event-study methodology, the paths of key macroeconomic variables in countries making transitions are compared with average values in countries not making transitions (the control group).[31] The analysis yields four key results regarding voluntary transitions.

- Voluntary transitions have been made in a macroeconomic environment not significantly different from that in the control group (Figure 2.9). Pretransition levels of indicators such as growth, the primary fiscal balance, and the current account balance, were, on average, broadly similar.[32]
- Voluntary transitions were mostly orderly in the sense that growth, inflation, and the primary fiscal balance, among other variables, were on average little affected by the transition. Indeed, voluntary transitions appear to have been associated on average with a sustained decline in inflation, which begins in the years preceding the transition and continues after the transition.[33] This finding may partly reflect sample selection bias: the countries that decided to transition may have done so with the expectation that the move would not be disruptive.
- Voluntary transitions were not associated on average with previously over- or undervalued exchange rates, unlike crisis-driven transitions that in most cases occurred against the backdrop of an overvalued exchange rate (Figure 2.10). Correspondingly, the levels of the nominal and real effective exchange rates did not on average change much immediately after the transition, though this reflects some cases

[31]See Appendix 2.2 for data definitions and sources.

[32]In addition, the ratio of reserves to imports in countries making voluntary transitions was, on average, similar to that for the control group.

[33]Forecasts of year-ahead inflation from surveys by *Consensus Forecasts* also suggest that voluntary transitions have on average been associated with a fall in inflation expectations.

where the rate appreciated and others where it depreciated.

- The volatility of real and nominal effective exchange rates increased somewhat in the period immediately after a voluntary transition and returned to pretransition levels soon thereafter (Figure 2.11).[34]

Not surprisingly, voluntary transitions were associated with lower vulnerabilities and far less macroeconomic disruption than crisis-driven transactions, consistent with the findings of earlier work. In the years immediately preceding transitions, the private sector external debt to exports ratio was higher, on average, by 100 percentage points in countries which experienced a crisis-driven transition (Figure 2.12). This is consistent with the hypothesis that, other things equal, extensive liability dollarization is associated with a greater reluctance on the part of the monetary authorities to float the exchange rate, inducing more liability dollarization and creating a situation from which it is hard to exit in an orderly manner (Eichengreen and others, 1998, 1999).[35] In addition, compared with crisis-driven transitions, voluntary transitions have been associated with higher growth, and lower inflation and exchange rate volatility in the years immediately after the transition.

From Fixed To Floating: How Do Policy Frameworks Change?

This section investigates the association between transitions to more flexible exchange rate regimes and changes in monetary and financial policy frameworks. The association with fiscal policy frameworks are not examined because time-series data on fiscal institutions are not available for a large sample of emerging market countries. The main idea is that strong

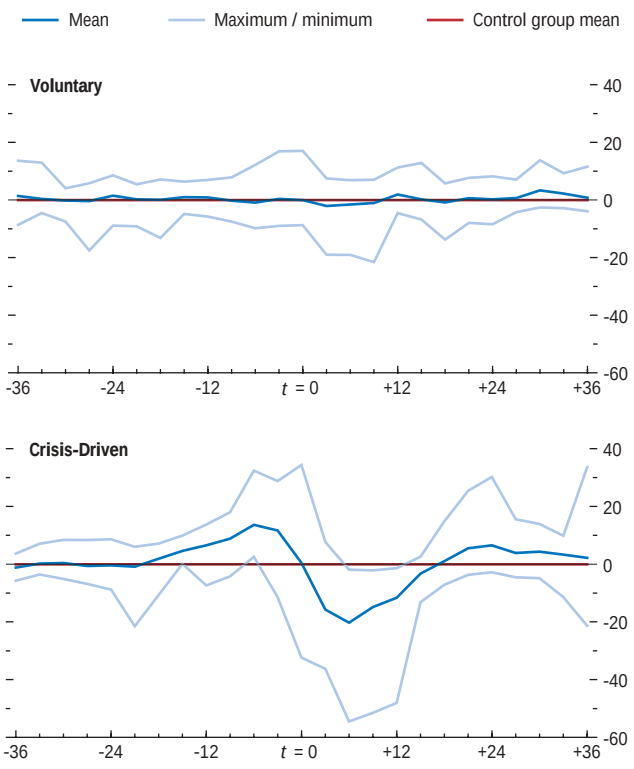
[34]This finding does not imply a problem with the post-transition exchange rate regime classification, because the classification is based on the volatility of a bilateral exchange rate as well as other factors.

[35]Data on total foreign-currency-denominated debt is not available for most countries.

Figure 2.10. Real Effective Exchange Rate Overvaluation[1]

(Percent deviation from trend; t = 0 is month of transition)

By contrast with crisis-driven transitions, voluntary transitions were generally not associated with previously over- or undervalued exchange rates.



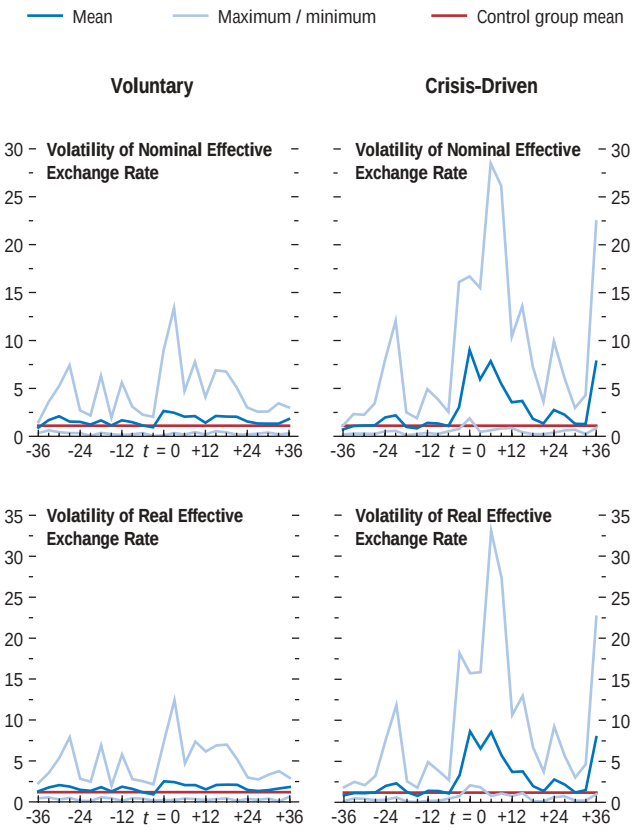
Source: IMF staff calculations.

[1]Real exchange rate overvaluation is calculated using the percentage difference between the actual real effective exchange rate (REER) and the Hodrick-Prescott filter of the REER. The control group represents countries whose exchange rate regimes are the same as the starting regimes of transitioning countries in periods that are not within three years of a transition.

Figure 2.11. Volatility of Exchange Rate[1]

(t = 0 is month of transition)

The volatility of real and nominal exchange rates increased in the period immediately after a voluntary transition but returned to pretransition levels soon thereafter.



Source: IMF staff calculations.

[1]Volatility is measured as the standard deviation of the monthly growth rate of the exchange rate over the last three months, averaged across transition cases. The control group represents countries whose exchange rate regimes are the same as the starting regimes of transitioning countries in periods that are not within three years of a transition.

policy frameworks address the key vulnerabilities that underlie the "fear of floating." The section first explains how the strength of the policy framework supports greater exchange rate flexibility, and then examines how the framework evolved in the years before and after the transitions to more flexible regimes. As in the previous section, the analysis is based on a limited number of transitions and is thus mainly descriptive. Complementing this analysis, Box 2.4 discusses the development of foreign exchange markets and intervention policies in countries that have moved to more flexible regimes.

Monetary Policy Framework

An independent central bank that has price stability as its main objective is more likely to gain the public's confidence that it can and will control inflation. These attributes help stabilize inflation expectations and lower the pass-through of exchange rate fluctuations to higher prices, directly addressing one of the concerns underlying the "fear of floating." This essay examines two measures of monetary policy frameworks.

- *Central bank independence.* This is measured using an indicator of political and economic independence, where political independence depends inversely on the extent to which the government is involved in the operations of the central bank and economic independence depends inversely on the involvement of the central bank in financing the fiscal deficit and in banking supervision (Grilli, Masciandaro, and Tabellini, 1991; and Arnone and Laurens, 2004). In the early 1990s, emerging market countries had similar levels of central bank independence, but by 2003 countries with free floats had on average more independent central banks than countries with pegs or intermediate regimes (Figure 2.13). However, even among countries with free floats, there is considerable variation in the degree of central bank independence.
- *Inflation targeting.* The explicit announcement of an inflation target and the creation of a

monetary policy framework geared toward achieving the inflation target also help to stabilize inflation expectations. In practice, inflation targeting was not a prerequisite for the move to a more flexible exchange rate regime: only one country (Poland) adopted full-fledged inflation targeting before it transited to a free float. Countries that moved to more flexible regimes introduced inflation targeting on average two years after they made the transition.[36] By 2003, about 90 percent of free floats were associated with inflation targeting, compared with just 40 percent of intermediate regimes (Figure 2.14).

Financial Sector Supervision and Development

Strong financial sector supervision helps banks and other financial market participants to better recognize and price risks, thereby reducing currency and maturity mismatches that can give rise to the fear of floating. Similarly, securities market development helps to improve long-term funding and thus reduces maturity mismatches. Both the quality of bank supervision and the degree of securities market development are measured using indicators put together by Abiad and Mody (2003). The indicators take values from 0 to 3, with increasing values indicating stronger bank supervision and greater securities market development. Figure 2.15 shows the evolution of these indicators in countries making peg-to-intermediate and intermediate-to-free-float transitions, distinguished by voluntary and crisis-driven transitions, compared to the relevant control groups.

- *Quality of bank supervision*.[37] Weak balance sheets, especially currency mismatches, amplify the cost of exchange rate volatility and thus tend to constrain the choice of exchange

[36]Carare and others (2002) provides a review of the initial conditions that can support an inflation-targeting monetary framework.

[37]The indicator for the quality of bank supervision reflects adoption of a capital adequacy regulation, the power and independence of the supervisory agency, and the extent and effectiveness of supervision.

Figure 2.12. Indicators of External Debt[1]

(Percent of exports of goods and services; t = 0 is year of transition)

Voluntary transitions were associated with much lower external debt ratios than crisis-driven transitions.

Source: IMF staff calculations.

[1]The control group represents countries whose exchange rate regimes are the same as the starting regimes of transitioning countries in periods that are not within three years of a transition. Only countries with observations for all periods shown around the time of transition are included.

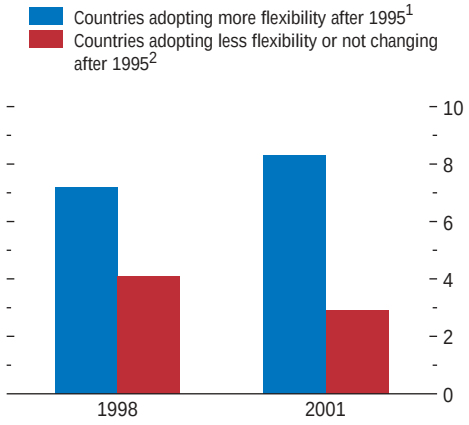
Box 2.4. Foreign Exchange Market Development and Intervention

For the growing number of emerging market countries that have adopted or are considering adopting more flexible exchange rate regimes, the development of the foreign exchange market and official intervention policies is crucial.[1] A sufficiently liquid and efficient foreign exchange market allows the exchange rate to respond to market forces and minimizes instances and durations of excessive volatility and deviations from equilibrium. In addition, whereas the timing and amount of foreign exchange intervention are largely determined by factors out of the control of the central bank under fixed regimes, intervention becomes discretionary under a flexible regime, creating the need to develop policies on the objectives, timing, and amounts of intervention.

Exchange rate rigidity itself hinders the development of the foreign exchange market. In a fixed exchange rate environment, market participants have less incentive to form views on exchange rate trends, take positions, or trade foreign exchange, which keeps them from gaining experience in price formation and exchange rate risk management and constrains interbank activity. A sense of two-way risk created by exchange rate variability encourages market participants to take short and long positions. Thus, an important step to develop the foreign exchange market is to gradually increase exchange rate flexibility, possibly within a band around a peg. For instance, in Israel, the exchange rate was initially allowed to vary within a band introduced in 1989; then, in 1990, the central bank organized daily market clearings on a multilateral basis until the system was replaced by an interbank market in 1994 through which market participants traded among themselves bilaterally and the central bank entered the market only at its own initiative. In fact, foreign exchange market turnover grew between 1998 and 2001 in emerging market countries that adopted more flexible exchange rate regimes, but declined from an already lower base in countries that adopted less flexible regimes or where regimes were unchanged (see the figure).

Foreign Exchange Market Turnover in Emerging Market Countries

(Percent of current and capital account flows)



Sources: Bank for International Settlements, *Triennial Central Bank Survey of Foreign Exchange and Derivatives Market Activity,* various issues; and IMF, *International Financial Statistics.*

[1]Brazil, Chile, the Czech Republic, the Philippines, Poland, Russia, South Africa, and Thailand.

[2]Hungary, India, Malaysia, and Mexico.

Emerging market countries have taken other measures to improve the depth and efficiency of their foreign exchange markets.

- *Reducing the central bank's market-making role*, which undercuts other market makers. For example, in Turkey, the central bank gradually withdrew from the market after the lira's flotation in early 2001, forcing market participants to trade among themselves.
- *Increasing market information* on foreign exchange flows and the balance of payments,

Note: The main author of this box is Cem Karacadag. Harald Anderson provided research assistance.

[1]See Duttagupta, Fernández, and Karacadag (2004) for an overview of the operational issues associated with the transition to greater exchange rate flexibility.

as a basis for market participants to develop well-founded views on the exchange rate.

- *Eliminating (or phasing out) regulations that stifle market activity*, among them requirements to surrender foreign exchange receipts to the central bank, taxes and surcharges on foreign exchange transactions, and restrictions on interbank trading.
- *Unifying and simplifying foreign exchange legislation* and avoiding ad hoc and frequent changes to the law to improve market transparency and reduce transaction costs. For example, India (in 1997) and Russia (in 2004) have revised their foreign exchange laws.
- *Facilitating the development of risk-hedging instruments* by lifting controls on forward market activity, once financial institutions achieve a certain level of sophistication in risk management.

Although emerging market countries sometimes announce greater exchange rate flexibility, many are reluctant to actually allow the exchange rate to fluctuate (Calvo and Reinhart, 2002). Central banks frequently intervene to—in their view—correct exchange rate misalignments, contain volatility, and calm disorderly markets. However, the experience of emerging market countries suggests several reasons why interventions should be selective and parsimonious.

- Exchange rate misalignments are difficult to detect, given the variety of methodologies to estimate the equilibrium exchange rate.
- Disorderly markets—defined as a collapse of liquidity—can be hard to distinguish from normal market dynamics. Although signs of market illiquidity include an acceleration in exchange rate changes, a widening of bid-offer spreads, and a sharp increase in interbank trades relative to customer-bank turnover, these can also result from changes in economic fundamentals or the arrival of new information, and may not always warrant intervention by the central bank.
- Official intervention may not always be effective in influencing the exchange rate level or reducing exchange rate volatility. Empirical studies find mixed evidence on the effectiveness of intervention in influencing the exchange rate level and that intervention tends to increase, rather than decrease, exchange rate volatility (Guimarães and Karacadag, 2004; and Tapia and Tokman, 2004).
- Finally, intervention is more effective when it is relatively infrequent, which maximizes the element of surprise and builds market confidence in the official commitment to exchange rate flexibility. Where a band is introduced as part of a gradual transition, intervention episodes may be more frequent, but the central bank should allow full use of the exchange rate flexibility provided by the width of the band.

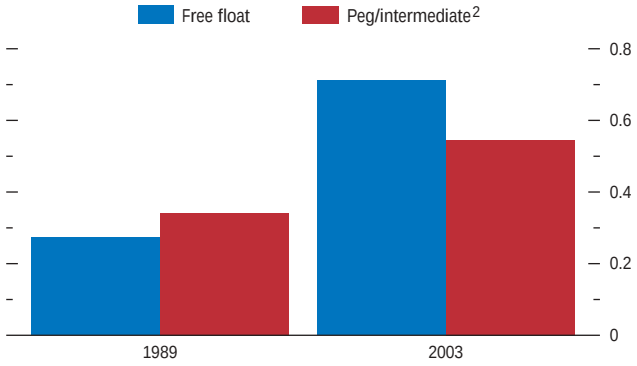
Transparency in intervention policies also helps to build confidence in the new exchange rate regime, especially in the aftermath of crisis-driven transitions. Many countries, among them the Philippines and Turkey, issued statements and published policy reports affirming their commitment to a market-determined exchange rate and confirming that intervention would not be conducted to target a certain exchange rate level. Moreover, a public commitment to the objectives of intervention enables market scrutiny of and accountability for the central bank's foreign exchange operations. For example, the published intervention policies of Australia and Sweden are clear on the reasons for and the objectives of intervention -(Rankin, 2001; and Sveriges Riksbank, 2002).

In sum, the development of the foreign exchange market and official intervention policies are important to support a more flexible exchange rate regime. Foreign exchange market development and exchange rate flexibility are mutually reinforcing: there is no better way to prepare for operating a flexible exchange rate regime than to introduce some flexibility in the first place. In the same vein, monetary authorities can facilitate market development by reducing their presence in the market, formulating clear and transparent intervention objectives, and intervening selectively and parsimoniously.

Figure 2.13. Central Bank Independence in Emerging Markets[1]

(Countries classified according to exchange rate regime in 2003)

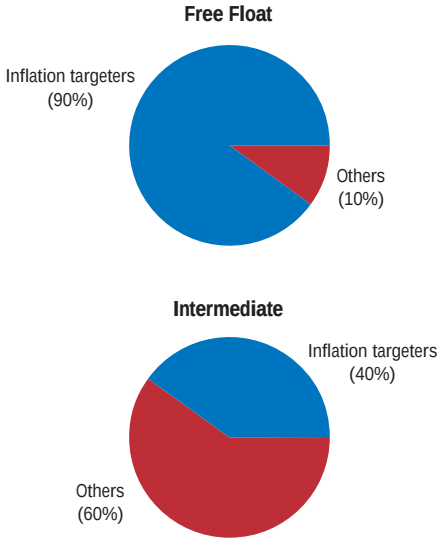
The central banks of emerging market countries that have free floats in 2003 appear to be, on average, more independent than the central banks of emerging market countries classified with peg/intermediate regimes.



Sources: Arnone and Laurens (2004); and IMF staff calculations.
[1]This measures central bank political and economic independence following the definition by Grilli, Masciandaro, and Tabellini (1991). The indicator ranges from 0 to 1, where a higher score indicates a higher level of central bank independence.
[2]This includes only one country with a peg in 2003.

Figure 2.14. Exchange Rate Regimes of Emerging Markets and Inflation Targeting, 2003

Ninety percent of emerging market countries classified as free floating are inflation targeters, compared with 40 percent of emerging market countries with intermediate floats.



Sources: Stone and Roger (2004); and IMF staff calculations.

rate regime. Therefore, by strengthening balance sheets, bank supervision can support greater exchange rate flexibility. The countries that made transitions to more flexible regimes on average had, before the transition, better bank supervision than their respective control groups. Also, crisis-driven transitions were associated with improvements in bank supervision around the time of transition though the latest available data (for 2002) suggest that countries that effected voluntary transitions on average have better-quality bank supervision than countries that experienced crisis-driven transitions.[38]

- *Securities market development.* In many emerging market countries, banks and nonfinancial firms usually face a shortage of long-term funding. This exposes them to cash flow and liquidity problems, which may constrain the conduct of monetary policy (Mishkin, 1996). The development of longer-term securities markets eases these constraints by lengthening the average maturity of financial instruments in the economy. In fact, countries that moved from intermediate regimes to free floats had above-average securities market development compared with the relevant control group. Again, crisis-driven transitions were associated with further securities market development.

The latest available data (for 2002) suggest that financial sector supervision and development in countries with free floats are on average stronger than those of countries with pegs or intermediate regimes (Figure 2.16). However, even among free floats there is substantial variation in the quality of bank supervision. Moreover, financial sector supervision and development in countries with intermediate regimes are not significantly stronger than those in countries with pegs.

[38]It is possible that the improvements in the quality of banking supervision in the countries that had crisis-driven transitions were a reaction to large costs of cleaning up the banking sector following the crisis, and not a reaction to the adoption of a floating rate per se.

Financial Sector Liberalization

When financial sector supervision is strong and financial institutions are healthy, gradual liberalization generally supports growth.[39] However, if financial sector supervision is weak, then it may be desirable to maintain financial controls, even while moving ahead with exchange rate flexibility. The extent of liberalization is measured using indicators from Abiad and Mody (2003), with increasing values showing greater liberalization.

- *Domestic financial liberalization* that is not supported by good bank supervision can allow risky behavior that weakens balance sheets and thus curtails the central bank's ability to stabilize inflation (Eichengreen and others, 1998). Liberalization may allow insolvent financial institutions to engage in potentially lucrative but risky projects, using expensive funding to "gamble for redemption." Also, by granting banks access to more complex financial instruments, evaluating bank balance sheets may become more difficult. It appears that countries that experienced crisis-driven transitions from pegs to intermediate regimes had, at the time of the transition, on average more liberalized domestic financial systems than countries that made voluntary transitions and countries in the control group (Figure 2.17).[40]
- *External financial liberalization*. As with domestic financial liberalization, if external financial liberalization is not supported by strong financial sector supervision, it can increase risks, such as the potential for sudden reversals of capital inflows. Indeed, countries that made voluntary transitions from pegs to intermediate regimes had, prior to the transition, on average less external financial liberalization

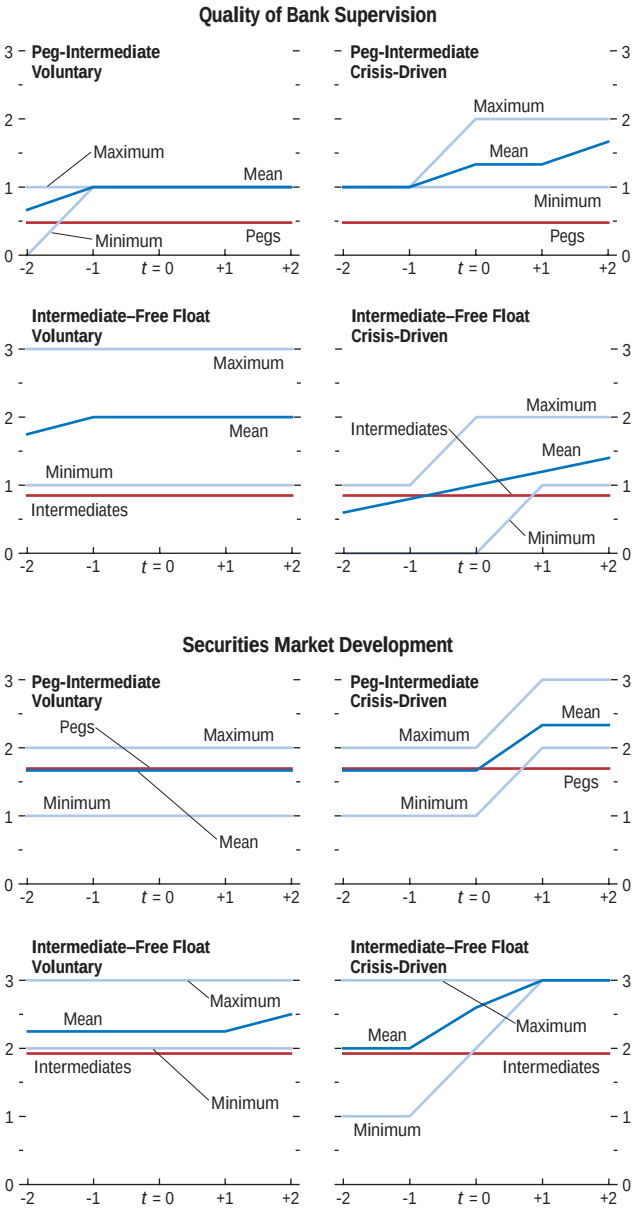
[39]Chapter IV of the October 2001 *World Economic Outlook*.

[40]The degree of domestic financial liberalization is measured by a composite index that assesses the extent to which direct credit controls, reserve requirements, and interest rate controls have been abolished, entry barriers against foreign banks eliminated, and the banking system privatized.

Figure 2.15. Indicators of Financial Sector Supervision and Development[1]

(t = 0 is year of transition; scale 0 to 3 with 3 representing strongest supervision and development)

Voluntary transitions on average had better quality bank supervision than their respective control groups in the period before the transition.



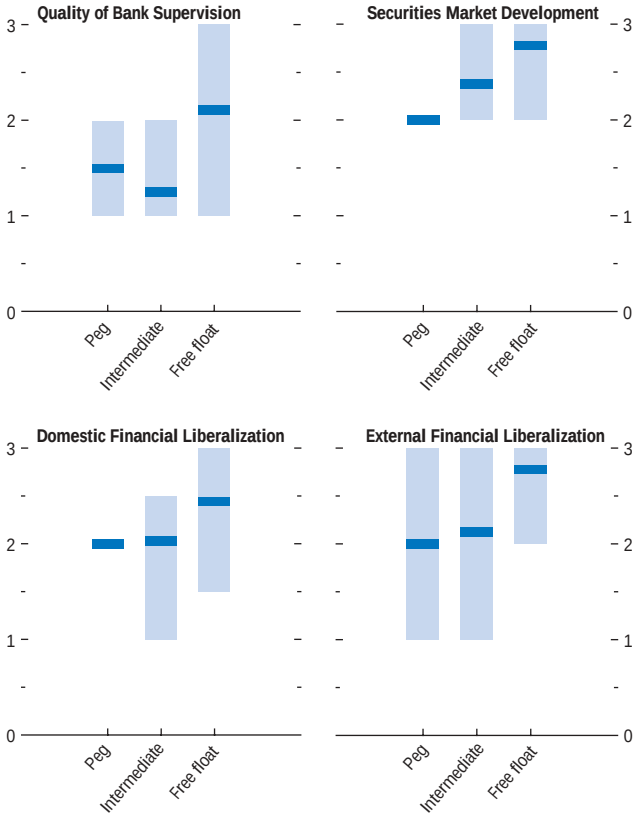
Sources: Abiad and Mody (2003); and IMF staff calculations; see Appendix 2.2 for variable definitions.

[1]The pegs/intermediates control groups are averages for the countries whose exchange rate regime is the same as the starting regime of transitioning countries in periods that are not within three years of a transition. Only countries with observations for all periods shown around the time of transition are included.

Figure 2.16. Financial Policy Frameworks, 2002[1]

(Averages across countries by type of exchange rate regime; scale 0 to 3 with 3 representing strongest policy frameworks)

Although emerging market countries classified as free floats on average have stronger financial policy frameworks than emerging market countries classified as having pegs or intermediate regimes, there is substantial variation in the quality of bank supervision even among the free floaters.



Sources: Abiad and Mody (2003); and IMF staff calculations; see Appendix 2.2 for variable definitions.

[1]The top of the bar represents the maximum; the dark blue line represents the mean; and the bottom of the bar represents the minimum value. Peg includes Morocco and Malaysia; intermediate includes Argentina, Egypt, Israel, Thailand, India, Indonesia, Pakistan, and Venezuela; free float includes Brazil, Chile, Colombia, Korea, Mexico, Peru, the Philippines, South Africa, and Turkey.

than countries that experienced crisis-driven transitions and countries in the control group.[41] By contrast, voluntary transitions from intermediate regimes to free floats were associated with a higher degree of external financial liberalization than in the control group, reflecting in part the higher levels of bank supervision and securities market development than in the control group.

The latest available data (for 2002) suggest that countries with free floats have more liberalized financial systems than countries with pegs or intermediate regimes, consistent with the fact that—in countries with less flexible exchange rates—external financial liberalization reduces the room to pursue independent monetary policy.

Concluding Remarks

Exchange rate flexibility in emerging market countries has increased substantially over the past decade. The share of emerging market countries with free floats rose from virtually zero in the early 1990s to more than one-third in recent years. While there have been some transitions toward less flexible regimes, most have been toward greater flexibility. The numbers of peg-to-intermediate and intermediate-to-free-float transitions were broadly similar, and both were nearly evenly split between voluntary and crisis-driven transitions. There were no transitions from pegs to free floats in the sample. Moreover, the transitions were broadly evenly distributed across regions.

Voluntary transitions were generally not associated with an increase in macroeconomic instability. Although the results are based on a small

[41]External financial liberalization is measured by a composite rules-based index that captures whether there are restrictions on capital inflows and outflows and whether the exchange rate system is unified. The main drawback of rules-based measures of capital controls is that they aim to capture restrictions irrespective of their effectiveness. However, using the outcome-based measure of capital controls constructed by Edison and Warnock (2003) yields similar results.

sample and could reflect sample selection bias, key indicators such as growth and real exchange rate overvaluation, among others, were on average little affected by the transition. Indeed, inflation performance continued to improve after the transitions, and, while exchange rate volatility increased a little immediately after the transitions, it soon returned to a level similar to that in the pretransition period.

Transitions to greater exchange rate flexibility were generally associated with a strengthening of monetary and financial policy frameworks, consistent with the idea that such moves can be facilitated by investing in "learning to float." Compared with the average behavior in the relevant control group, transitions to greater exchange rate flexibility over the past 10 years have been associated with increased central bank independence, the adoption of inflation targeting, and—for crisis-driven transitions—improved bank supervision and further securities markets development (in the case of intermediate to free float transitions). However, there clearly remains scope to further strengthen policy frameworks even in countries that already have free floats.

Many countries moved to more flexible exchange rate regimes while still in the process of strengthening their policy frameworks. It is true that, prior to the transition, bank supervision was generally stronger in countries making voluntary transitions than in the control groups, and that securities markets were more developed in countries that made voluntary transitions from intermediate to free floats. By contrast, only one country had introduced full-fledged inflation targeting before moving to a free float. Also, countries making a voluntary first step toward exchange rate flexibility had on average less financial liberalization than the control group.

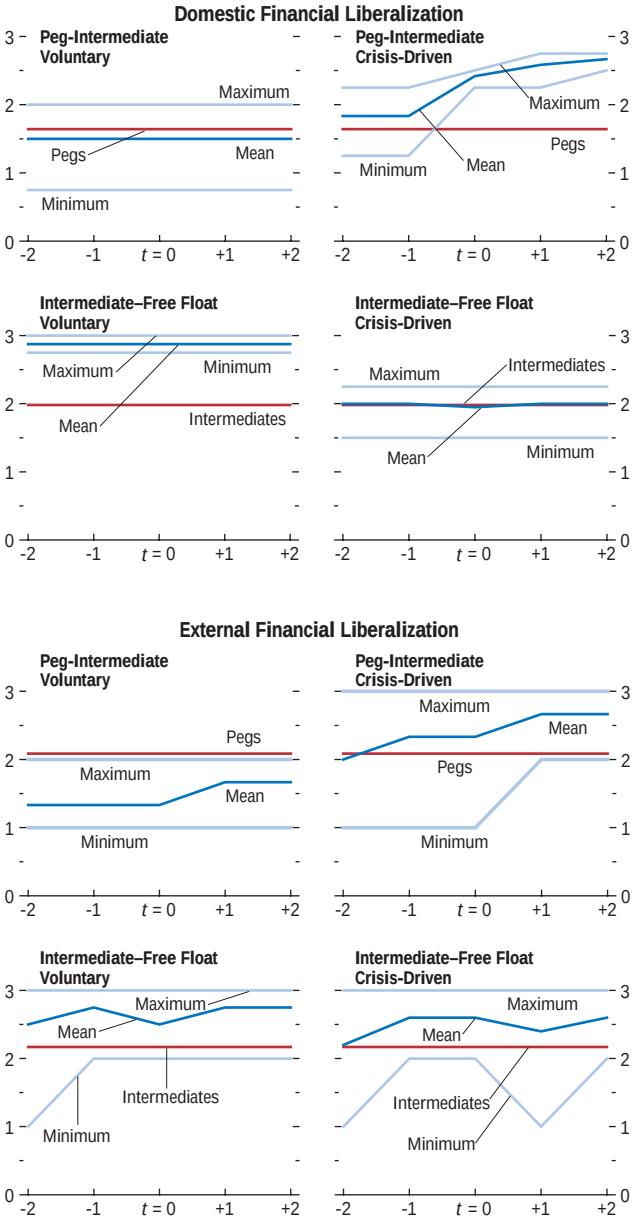
Has Fiscal Behavior Changed Under the European Economic and Monetary Union?

The main authors of this essay are Xavier Debrun and Hamid Faruqee, with support from Roel Beetsma. Paul Atang provided research assistance.

Figure 2.17. Indicators of Financial Sector Liberalization[1]

(t = 0 is year of transition; scale 0 to 3 with 3 representing most liberalized)

Voluntary transitions from pegs to intermediate floats on average had less liberalized domestic and external financial systems than the control group.



Sources: Abiad and Mody (2003); and IMF staff calculations; see Appendix 2.2 for variable definitions.

[1]The pegs/intermediates control groups are averages for the countries whose exchange rate regime is the same as the starting regime of transitioning countries in periods that are not within three years of a transition. Only countries with observations for all periods shown around the time of transition are included.

The adoption of the euro by 11 member states of the European Union on January 1, 1999 marked the birth of a currency conceived 30 years earlier, when the Heads of States and Governments of the then European Community declared "*. . . that the process of integration should end in a Community of stability and growth . . . with a view to the creation of an economic and monetary union*." After five years, there is now sufficient experience to make a preliminary assessment of how the European Economic and Monetary Union (EMU) may have affected policymakers' behavior. Of course, any conclusion in that respect inevitably remains tentative as such a profound regime change may take quite some time to impinge on average behaviors. Within this, the impact on fiscal policy—the only macroeconomic instrument available to national policymakers in a currency union—appears particularly important.

Of course, the effects of monetary unification go well beyond the macroeconomic policy sphere. The efficiency gains expected from the symbiosis between a single market and a single currency (Emerson and others, 1990), and the expanding role of the euro as an international currency are clearly critical; indeed, reduced transaction costs, greater price transparency, and lower uncertainty have already contributed to deeper trade and financial integration, aided by progress in regulatory reform (see Box 2.5). These developments are contributing to move EMU[42] closer to an "optimum currency area" (Mundell, 1961), where greater flexibility in product and labor markets lessens the need for country-specific fiscal stabilization policies. Although advancing structural reforms will accelerate this trend, there is still a long way to go, and country-specific macroeconomic stabilization will remain a central issue in the policy debate for the foreseeable future.

The role that national governments can play in providing such stabilization raises the issue of how fiscal policies can best serve that objective. There is a broad consensus that the *automatic stabilizers*—that is, the automatic variations in revenues and expenditures in response to changes in output and employment—should be allowed to operate fully over the business cycle, but the question whether governments should deliberately attempt to further stabilize the economy with *discretionary* budgetary actions is more contentious, particularly in countries where the tax system and social transfers imply large automatic stabilizers. Support for "active" fiscal stabilization policies under EMU is nonetheless growing (Calmfors, 2003; or Taylor, 2000) and, as documented below, appears to have emerged as a key feature of the recent protracted downturn. The potential conflict between active fiscal policies and a rules-based macroeconomic framework[43] (see Buti, In't Veld, and Roeger, 2001) has also been a factor in the increasingly active debate of the reform of the SGP itself, spurred by the fact that half the current members of the euro area are to various degrees at odds with the agreed standards of fiscal discipline.

Against this background, this essay seeks to answer the following three questions.

- To what extent do individual member states still need country-specific macroeconomic stabilization? And does this imply a strong case for deliberate fiscal policy actions to supplement automatic stabilizers?
- How have the fiscal authorities of countries now in the euro area behaved over the past three decades? To what extent were those behaviors consistent with the euro area's rules-based fiscal framework, which pre-supposes efficient stabilization policies and adherence to clear discipline standards?
- How has the SGP affected fiscal behaviors? In particular, has it fundamentally changed the

[42]Although the "first phase" of EMU officially started in March 1990, with the complete liberalization of capital movements, this essay will restrict the use of EMU to the "third phase" of monetary unification—that is, the introduction of the euro in 1999.

[43]Various sources give a detailed description of EMU's macroeconomic framework, including Chapter III of the October 1997 *World Economic Outlook*.

way governments conceive discretionary fiscal actions, for instance by enhancing their macroeconomic stabilization role?[44]

To assess the need for country-specific macroeconomic stabilization, the essay first describes real and nominal disparities within EMU, paying particular attention to the stabilizing response of relative prices (competitiveness) to real divergences. As governments may also try to coordinate the monetary-fiscal *policy mix* at the national level, the analysis looks at the gap between the common monetary policy and a hypothetical monetary stance commensurate to each country. The essay then analyzes fiscal policy behavior in individual euro area member states over the past three decades and examines their potential determinants, emphasizing the effect of EMU's fiscal framework. It concludes with some short-term and medium-term policy implications.

Does EMU Increase the Need for Stabilizing Fiscal Policies?

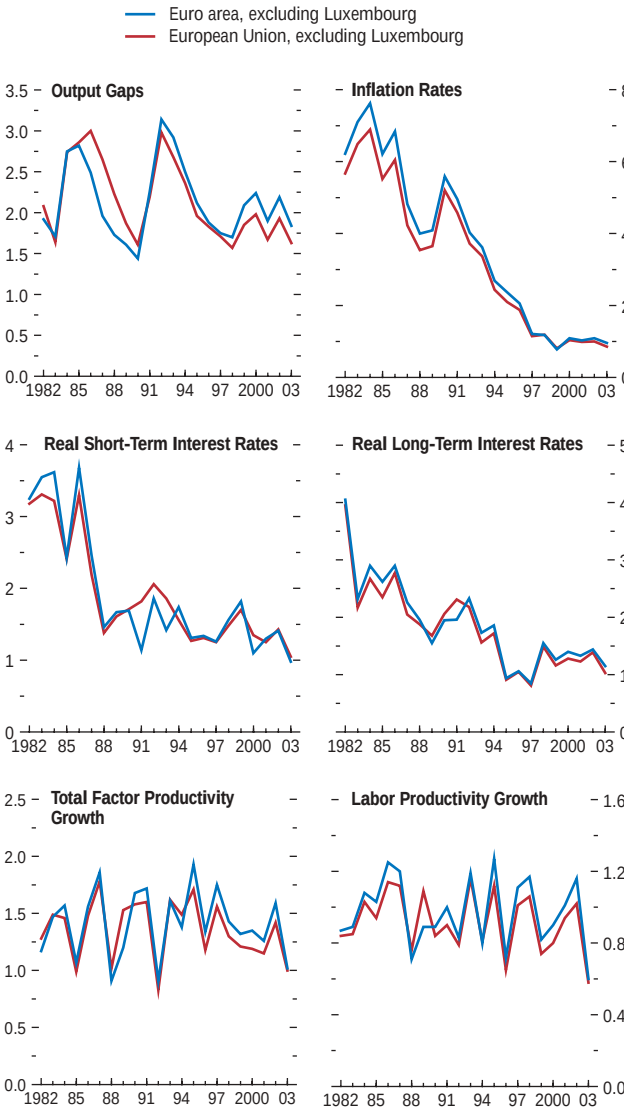
When economically diverse regions or countries share the same monetary policy, the costs of country-specific disturbances are potentially large. Early analyses of EMU generally concluded that these costs would be greater than in comparable federal currency unions such as Canada or the United States[45] because product and labor markets remained more segmented and price adjustment more sluggish; factors of production, and especially labor, did not move as swiftly from regions in recession to regions in expansion; and no significant centralized transfer system in favor of regions faced with a downturn existed or was likely to be created.

Looking at the magnitude of cross-country disparities (Figure 2.18), the 15 years preceding the

Figure 2.18. Cross-Country Dispersion of Selected Economic Indicators

(Standard deviations)

Although a great deal of convergence has been achieved in financial variables and inflation rates, real divergences remain significant in the euro area.



Sources: OECD analytical database; European Commission, Annual Macroeconomic Database; and IMF staff calculations.

[44]It should be kept in mind that macroeconomic stabilization is only one among three key functions of fiscal policy, which also include redistribution and allocative efficiency.

[45]See Bayoumi and Eichengreen (1997) and Bayoumi and Masson (1998) on the operation of those adjustment mechanisms in the Canadian and U.S. currency unions. For a first assessment of adjustment mechanisms in EMU, see Deroose, Langelijk, and Roeger (2004).

Box 2.5. Trade and Financial Integration in Europe: Five Years After the Euro's Introduction

Five years ago, the advent of the euro marked a historic milestone on the path to European integration. Though the nature of this young currency union continues to evolve, the euro's impact on the economic landscape—at both the macroeconomic and microeconomic level—is already quite visible. The most salient change, of course, has been the replacement of member states' national currencies with the euro—the symbol of Economic and Monetary Union (EMU). In conjunction with the new currency, EMU also established new institutions underlying the conduct of area-wide monetary and fiscal policies, most notably the European Central Bank (ECB) and the fiscal framework known as the Stability and Growth Pact (SGP). But in addition to these up-front "macroeconomic" transformations—discussed more in detail in the main text—the euro's existence over the past five years has also had a catalytic role for the functioning of specific markets. Specifically, in the realms of trade and finance, the single currency has impelled changes that have fostered greater market integration—a process that is ongoing.

Trade within the euro area has benefited from lower costs of foreign exchange transactions, the elimination of exchange rate uncertainty, and greater price transparency. Whether trade has appreciably increased since the euro's arrival, however, ultimately remains an empirical question. Estimating the precise trade effects of EMU has been the subject of renewed interest since the work of Rose (2000) and Glick and Rose (2002), who found that trade flows among partner countries belonging to the same currency union were strikingly larger (on the order of 100 to 200 percent) than if these countries had currencies of their own. While much subsequent work has suggested that the trade gains are not that large, the basic finding—that currency unions have significant trade-creating effects—has held up reasonably well (see Rose, 2004, for a survey). Nevertheless, most of these studies did *not* include the euro area in the sample for lack of observations. More recently, Micco, Stein, and Ordoñez (2003) have focused on the trade effects of EMU in the context of the so-called "gravity model" of trade, which essentially assumes that trade flows between countries decrease with the distance between them but increase with their respective economic mass. The study examines whether EMU membership figured as an additional and independent determinant of goods trade. It finds that—when compared with trade among other industrial countries—intra-area trade flows have received a significant boost from monetary union with no harm to extra-area trade flows. Hence, the euro seems to have *created* trade, not *diverted* it.

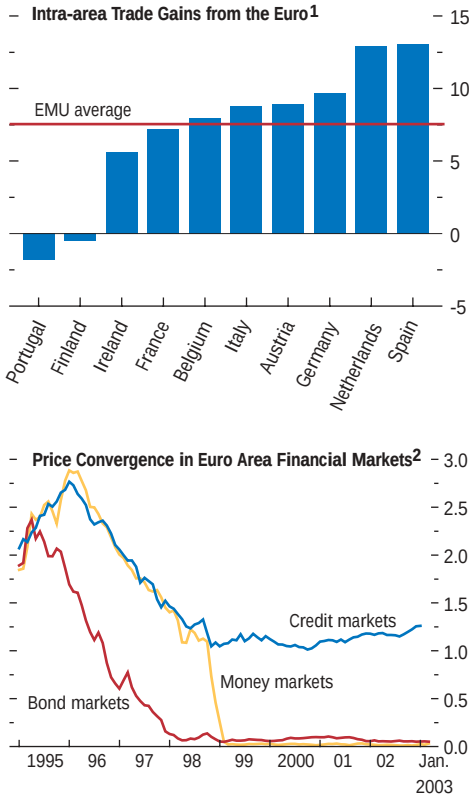
The figure shows the estimated impact of EMU on goods trade within the euro area, based on the results in Faruqee (2004), which employs a methodology similar to Micco, Stein, and Ordoñez (2003). The trade effects (on average) are significant in a statistical sense and indeed quite sizable considering that the currency union is still quite young. In that sense, these findings should be interpreted as a "progress report" of the effects to date. The figure also shows, however, that the trade benefits of the euro have not been evenly distributed. Some countries have benefited to a greater extent and continue to do so as dispersion measures of trade effects at the country level have not narrowed over time. This may naturally reflect differences in the structure of trade, but also different capacities to reap the benefits that may accrue from joining a currency area. It is thus important not to take these trade gains for granted, but focus instead on structural measures needed to increase them.

Financial integration has taken an even more visible leap forward since the introduction of the euro. Enhanced market competition has been the main driver behind financial integration in Europe, complemented by regulatory harmonization efforts at the EU level—in the form of the Financial Services Action Plan. While overall progress has been considerable, the pace of integration across various euro area financial markets has been uneven. (See

Note: The main author of this box is Hamid Faruqee.

Measuring Trade and Financial Integration in Europe

(Percent)



Sources: European Central Bank; and IMF staff calculations.

[1]See Faruqee (2004). Greece joined the euro area in 2001 and is therefore not comparable with the other countries.

[2]Cross-sectional standard deviation in overnight lending rates, 10-year government bond yields, and bank lending and deposit rates.

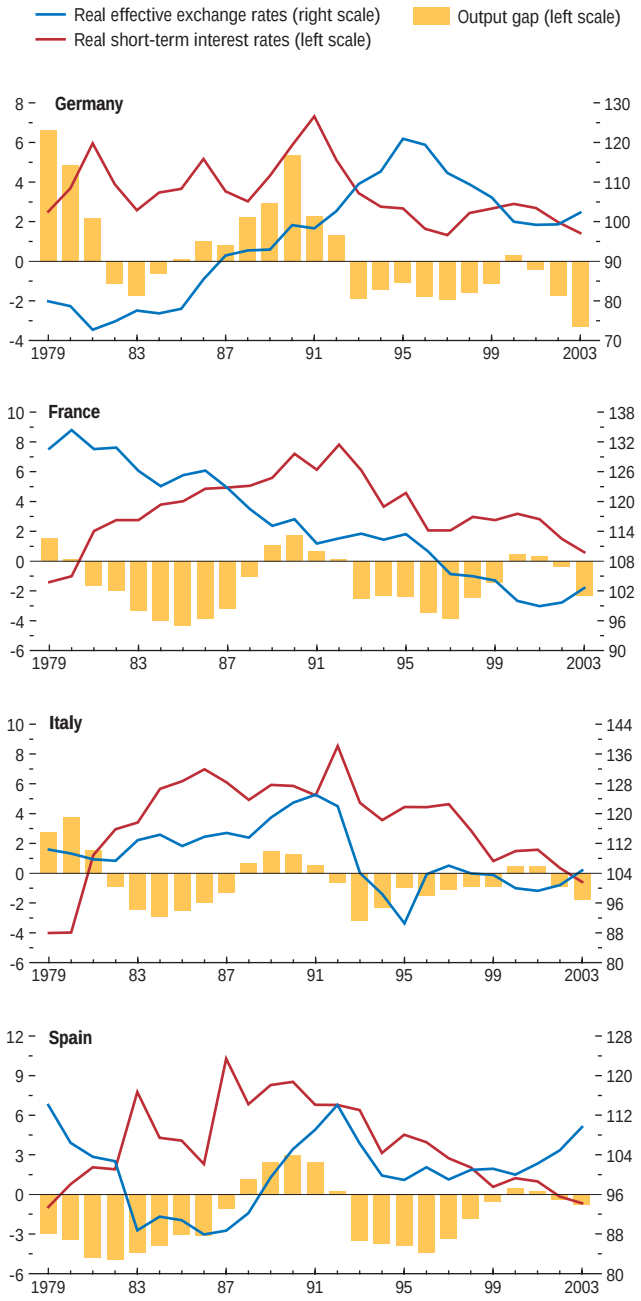
Commission of the European Communities, 2004; and Baele and others, 2004.) At present, money markets have shown the most integration, essentially forming a single market, particularly for (unsecured) money market (e.g., EONIA and EURIBOR) instruments. Bond markets, particularly for short-term government securities, have also become much more closely integrated. Equity and credit markets—particularly on the retail side—however, remain more fragmented. Major hurdles to further integration include national differences in legal frameworks—e.g., bankruptcy and consumer protection laws—and taxation.

The figure shows the degree of financial integration—as measured by price convergence—across euro area money, bond, and credit markets. In principle, deeper, more integrated financial markets should eliminate price differentials for financial assets with the same risk-return characteristics. Return differentials in money markets have indeed vanished after 1999. Similarly, the dispersion of bond yields has narrowed considerably. Credit markets—represented by various bank lending and deposit rates, however, have shown limited convergence, reflecting barriers such as the importance of geographical proximity. Other measures—for example, based on quantities rather than prices—generally exhibit signs of increasing integration. For example, the "home bias" in portfolios—that is, the tendency to hold a disproportionately large share of assets from one's own country—is on the decline as cross-border diversification across area-wide markets rises, particularly among institutional investors. Cross-border mergers and acquisitions activity, however, has been subdued, particularly in banking where consolidation has predominantly occurred along national boundaries.

Overall, substantial progress has been made in further integrating the euro area's product and financial markets since the birth of the euro. With the five-year-old currency serving as the catalyst, market forces, supported by regulatory harmonization efforts at the EU level, have been the primary driver in that process. Further economic integration holds the promise of substantial gains as the euro area's real and financial resources are allocated more efficiently, but securing additional gains will require addressing national barriers and enhancing market flexibility. In particular, effective national implementation of existing policy initiatives (e.g., the Financial Services Action Plan) and the design of new policy measures (e.g., competition and labor market policies) will be increasingly important.

Figure 2.19. Real Interest Rates and Competitiveness

In sharp contrast with the pre-1999 period, movements in real interest rates were significantly smaller after 1999, hardly contributing to stabilize national economies. In some cases, changes in real interest rates were even destabilizing.



introduction of the euro witnessed a remarkable convergence of inflation and interest rates. The convergence process, driven by increasingly similar policies, received a further impetus from the nominal convergence criteria laid out in the Maastricht Treaty (1992). By contrast, real disparities, in terms of productivity differentials as well as relative business cycle positions,[46] did not exhibit any clear trend. Since 1999, real disparities have persisted—despite the recent synchronized downturn—whereas inflation and real interest rate differentials have increased somewhat. Under EMU, rising inflation differentials partly reflect market-driven price adjustments to dissimilar cyclical patterns, as goods produced in booming economies become more expensive relative to those produced in sluggish regions. Other important factors include the volatility of the euro vis-à-vis other currencies, given different degrees of openness to non-EMU trade (Honohan and Lane, 2003), and productivity growth differentials (productivity gains are often located in sectors exposed to external competition while the corresponding wage pressures are more widespread, forcing other sectors to raise prices to keep up with higher labor costs).

Did inflation differentials ultimately contribute to stabilize output? That is an open question and the answer depends on the country. The effect on real interest rates has tended to be procyclical (Box 2.5 and Figure 2.18) with rising inflation in booming economies, especially Ireland, the Netherlands, and Portugal, leading to lower real interest rates, stimulating domestic demand even further (Figure 2.19). Similarly, in countries experiencing protracted downturns, such as Germany, falling inflation tended to result in relatively high real rates. In fact, the estimated average stabilizing response of the real short-term interest rate to the output gap disap-

[46]Cross-country standard deviations do not account for the relative economic size of member states, and may exaggerate the challenge posed by those disparities to monetary authorities. Given the essay's concern for national fiscal policies, it appears appropriate to consider each individual country on an equal footing throughout the essay.

Table 2.3. Euro Area: Real Short-Term Interest Rates and Competitiveness

Estimated Average Response of the Real Short-Term Interest Rate to the Output Gap		
	Before EMU[1]	0.18***
	After EMU[1]	–0.01
Estimated Average Response of the Real Effective Exchange Rate to:		
Output gap	Before EMU[1]	0.44***
	After EMU[1]	–0.20
Real interest rate	Before EMU	–0.26***
	After EMU[2]	–0.64***

Source: IMF staff estimates.

Note: Panel estimates for euro area member states (excluding Luxembourg) over the period 1982–2003. Equations estimated by three-stage least-squares to account for correlation between residuals and dependent variables. *** indicates that the estimated response is significantly different from zero at the 1 percent level.

[1]A positive sign indicates a stabilizing response.

[2]After EMU, a negative sign indicates a stabilizing response.

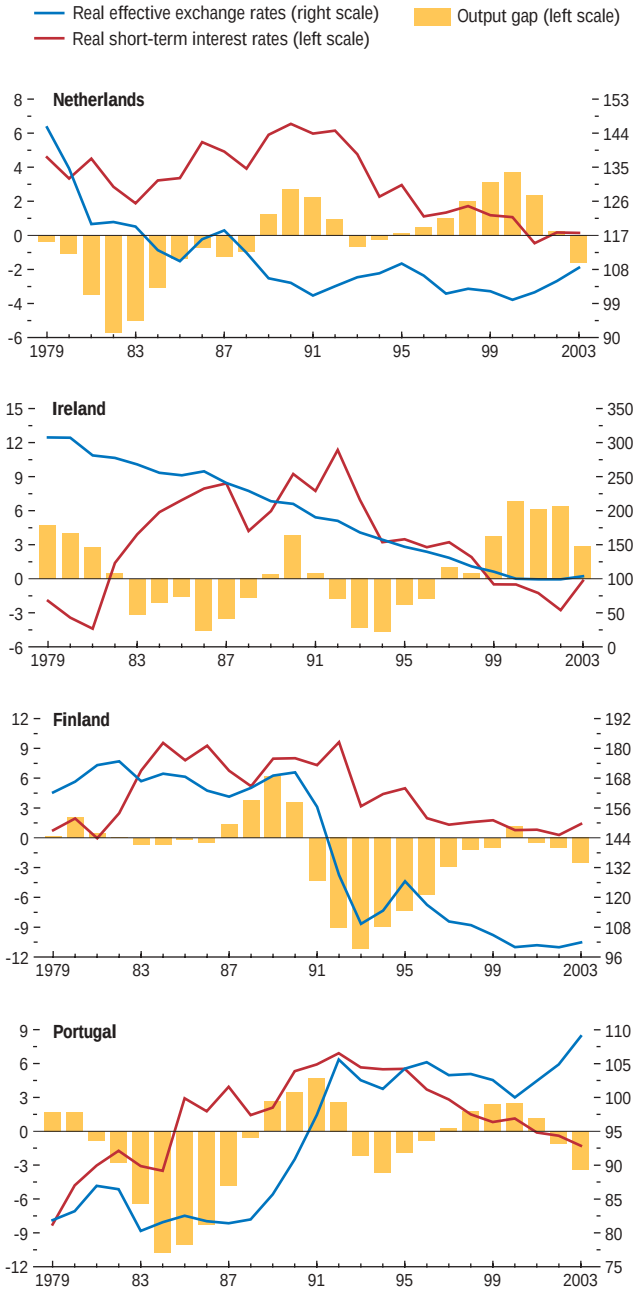
peared after EMU (Table 2.3). On the other hand, the effect on external competitiveness should be stabilizing, since higher inflation leads to real appreciation (and vice versa). In practice, however, the stabilizing effect of inflation differentials through this channel does not seem to have been particularly strong (Figure 2.19 and Table 2.3), although in the specific case of booming countries confronted with declining real interest rates, the real exchange response appears to have increased since EMU was adopted (bottom panel of Table 2.3).

But to what extent do such disparities make the common monetary policy at odds with each country's needs? One crude but simple way to look into that issue is to compare actual short-term interest rates with country-specific benchmarks generated by a monetary policy "rule" (Taylor, 1993). Despite obvious shortcomings,[47] these rules yield a useful first-order approximation of an "appropriate" monetary policy, assum-

[47]Taylor (1999) shows that these rules perform quite well for the (large and relatively closed) U.S. economy over the 1980s and the 1990s. Significant deviations from the rules are nevertheless inevitable in particular instances (for instance, during asset price bubbles and their aftermath), and when external competitiveness is critical (as in small open economies).

Figure 2.19 *(concluded)*

Destabilizing moves in the real interest rates were particularly pronounced in Ireland and to a lesser extent in the Netherlands.

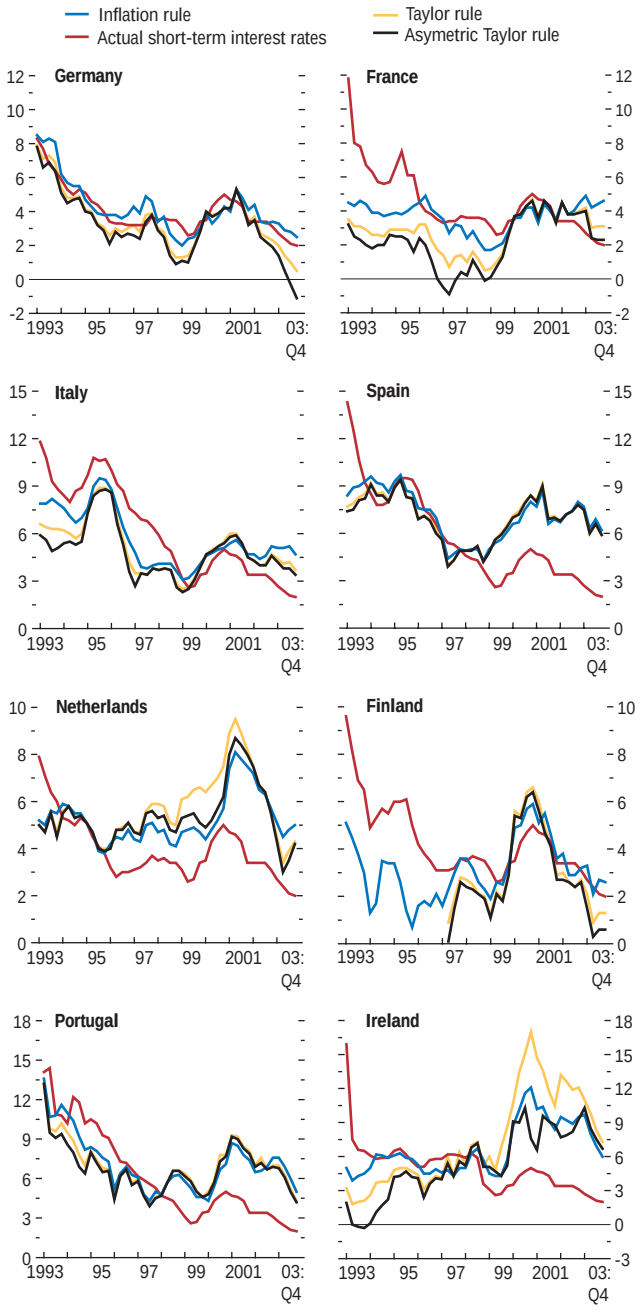


Sources: OECD analytical database; and IMF staff calculations.

Figure 2.20. Monetary Policy Rules for Selected Euro Area Economies

(Percent)

Prior to 1999, short-term interest rates were broadly in line with the benchmarks in Germany only, signaling the leadership position held by the Bundesbank within the European exchange rate mechanism. After the euro, deviations from the benchmarks were smaller in the other two large economies but increased in Germany toward the end of the period. Elsewhere, substantial deviations continued.



Sources: OECD analytical database; and IMF staff calculations.

ing that short-term interest rates should move to close the output gap and bring inflation in line with a pre-set target. Different policy rules were considered (see Appendix 2.3), each allowing for two country-specific elements—namely, "neutral" policy rates above potential GDP growth[48] and inflation targets in line with cross-country differences in productivity growth (see above) but consistent with the ECB' s objective of keeping area-wide inflation "below but close to 2 percent."

Prior to 1999, monetary gaps (defined here as the difference between actual rates and the relevant benchmarks) were significant and generally positive for all countries except Germany (Figure 2.20)—a clear indication of the Bundesbank's dominant position in the Exchange Rate Mechanism. After the inception of EMU, monetary gaps became more typical of a monetary policy calibrated for the euro area as whole. In Germany, they became larger—especially at the end of the period—reflecting the particularly protracted slowdown in that country; in France and Italy, in contrast, they tended to decline. The smaller economies experiencing different cyclical patterns from the rest of the area—meaning in general above-average growth—continued to face large, and mostly negative, gaps.

Given the persistent cyclical disparities and relatively weak adjustment mechanisms, there would—as noted above—appear to be a prima facie case for active fiscal policies to counteract local disturbances, an argument that seems even more persuasive given the potentially greater effectiveness of fiscal policy in a currency area. Indeed, the typical offsetting effects of a fiscal stimulus through higher interest rates and exchange rate appreciation are much weaker because both variables are determined by area-wide developments.[49] Has greater activism

[48]If that is not the case, no well-defined limit to debt accumulation by economic agents exists, as income growth can always make up for higher interest payments.

[49]This is especially the case if the economy is small (little effect on union-wide interest rates) and if it trades a

indeed been observed? Or has the SGP hampered stabilizing fiscal impulses? To answer these questions, the remainder of this essay is devoted to a more detailed look at the factors explaining fiscal policy behavior in the euro area.

What Drives Fiscal Policies in the Euro Area?

To understand the forces shaping fiscal policymaking in the euro area, the IMF staff began by calculating fiscal "reaction functions" for each euro area country over the past 30 years, building on—and extending—substantial existing work in this area.[50] A fiscal reaction function relates fiscal policy decisions—here proxied by the *cyclically adjusted* primary balance of the general government (Galí and Perotti, 2003)—to the various objectives and constraints that governments face, including the gap between actual and potential GDP, the level of the public debt, and the monetary gap (as above, defined as the differences between actual short-term interest rates and the benchmark interest rate, and capturing the extent to which area-wide monetary policy is inconsistent with local conditions).

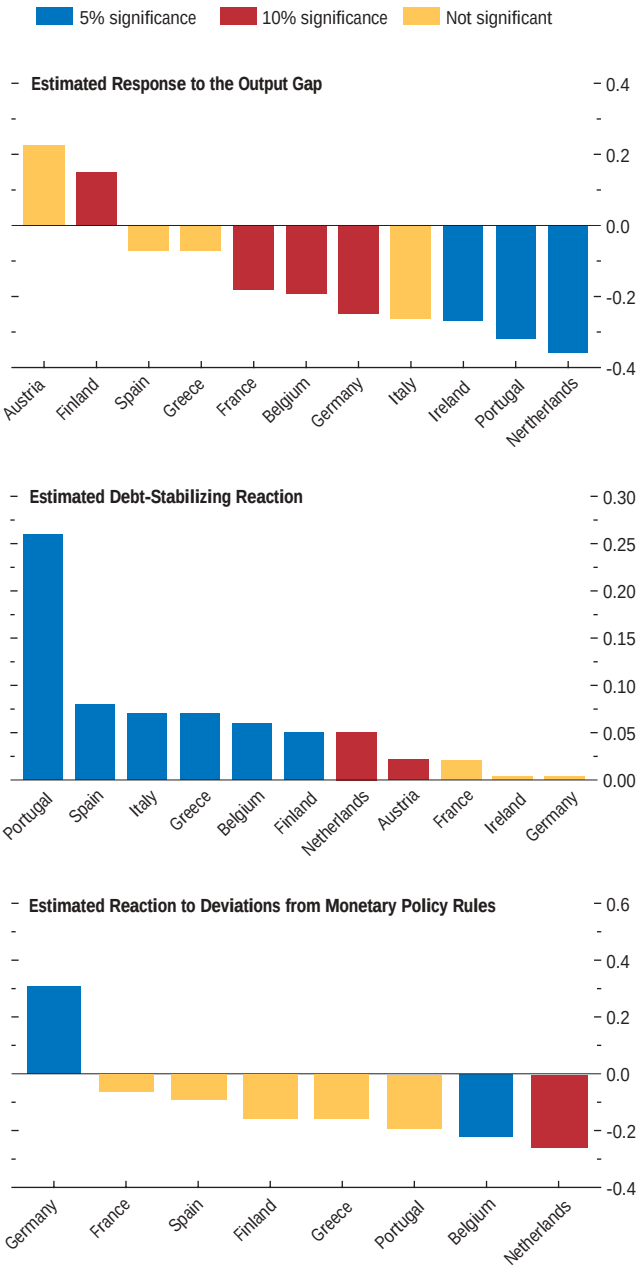
The key results—supported by the econometric evidence in Appendix 2.4—are the following (see Figure 2.21):

- *Discretionary fiscal policies in euro area countries over the past three decades have generally been procyclical—that is, expansionary in good times, contractionary in bad times— thereby undermining the role of automatic stabilizers.* Fiscal policy was countercyclical only in Austria (where the effect was statistically insignificant) and Finland.

Figure 2.21. Fiscal Behavior in the Euro Area

(Estimates over 1971–2003)

Country-specific reaction functions reveal a tendency toward policies that destabilize output instead of stabilizing it. Most countries also actively seek to stabilize their debt ratios. Some member states systematically respond to deviations in short-term interest rates from their benchmarks.



Source: IMF staff calculations.

lot more with other member states than with extra-union partners (the exchange rate of the common currency matters little for competitiveness). Of course, this does not change the fact that fiscal policy effectiveness in small economies is inevitably limited by greater leakages to trading partners.

[50]These studies include, among others, Mélitz (1997), Bohn (1998), Debrun and Wyplosz (1999), von Hagen, Hughes Hallett, and Strauch (2001), Jaeger (2001), Ballabriga and Martinez-Mongay (2002), Favero (2002), Fatàs and Mihov (2003), Galí and Perotti (2003), and Muscatelli, Tirelli, and Trecroci (2004).

- *Most countries have tightened fiscal policy in response to high public debt ratios, in line with long-term sustainability requirements.* Only France, Germany, and Ireland exhibit a weaker sensitivity, pointing to large swings in debt ratios over the sample period. Steep upward trends in public debt ratios were indeed observed in the first two countries, whereas in Ireland the prominent role of growth (as opposed to policy) in driving the debt-to-GDP ratio presumably explains the result.
- *Some countries have systematically reacted to monetary policy.* In line with Mélitz (1997) and subsequent studies, it appears that some governments have sought to offset monetary policy gaps, signaling conflicts between monetary and fiscal authorities over the policy mix. Even though the evidence to date is generally weak in a statistical sense, such a pattern may well continue or even amplify under EMU, considering the potential for large monetary gaps illustrated above. In Germany, however, fiscal and monetary policies have been found to generally go hand in hand, pointing to an apparent consensus on the orientation of the policy mix.[51]
- *Only three member states (France, Greece, and the Netherlands) appear to have experienced substantial and lasting changes in fiscal behavior following the Maastricht Treaty*. This suggests either that there was only a limited effect (in scope or time) on government incentives elsewhere or—at least in some cases—that national fiscal setups were already broadly consistent with Maastricht's rules-based approach. Of course, that assessment concerns fiscal policy parameters taken as a whole and, as the remainder of the analysis shows, does not preclude significant changes in specific dimensions of policymaking, nor temporary shifts in overall behavior such as during major adjustment episodes.

These results—broadly in line with those in the existing literature—tend to confirm that country-specific factors have played a substantial role in shaping policymakers' incentives. Among those, fiscal institutions (e.g., von Hagen, Hallerberg, and Strauch, 2004), various features of the political system (e.g., Tornell and Lane, 1999; Lane, 2003; Hallerberg and Strauch, 2002), and structural characteristics of the economy (e.g., Lane, 2003) have been shown to play an important role. Given that EMU's fiscal framework could be expected to operate precisely through such channels, a deeper understanding of the role of these factors is critical to assess its potential impact on national policymaking.

Has EMU Changed Fiscal Policies?

To look into this issue more deeply, the IMF staff undertook a panel analysis of fiscal reaction functions. Besides offering insights on the causes of *cross-country differences* in the estimated reactions, and thereby on the ultimate determinants of fiscal behaviors, panel estimates also allow an assessment of whether *area-wide* changes have occurred in relation to the implementation of the new fiscal framework. In practice, the analysis focuses on *interactions* between the characteristics of fiscal policy and a number of institutional, political, and economic variables likely to influence fiscal behaviors, including the inception of the Maastricht Treaty, the discretion left to the finance ministry in budget preparation (Hallerberg, 2004), the economic situation (good times or bad; asset price boom or bust), the initial fiscal position, and the openness to trade (see Appendix 2.4).

The analysis finds that these factors have a significant effect in determining the response of fiscal policy to cyclical conditions, but have no systematic impact on the response either to public debt or to monetary gaps. The broad conclusion supported by these results is that factors that favor greater discretion also tend to be associated with greater procyclicality, reflecting the difficulty of resisting political pressures to

[51]Of course, the "consensus" may sometimes be "forced." For instance, Berger and Schneider (2000) report various cases of successful political pressures on the Bundesbank.

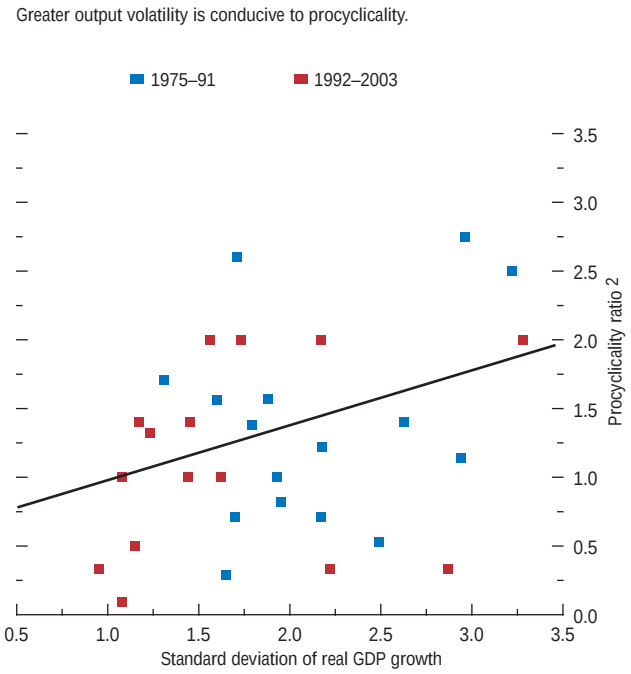
increase spending (Tornell and Lane, 1999; Talvi and Vegh, 2000).

- *Procyclical behavior is particularly evident in good times*, as incentives to restrain expenditures are generally weak in such circumstances. For the same reason, *strong initial budget positions also lead to more procyclical behaviors* as expansions in good times are likely to be larger if long-term sustainability is not perceived as a pressing issue.
- *Procyclicality is greater in countries where fiscal institutions leave significant discretion* to the finance ministry in the preparation of the budget rather than relying on rules and pre-set targets. That interpretation relies on the distinction between two institutional arrangements designed to ensure that requests from spending ministries remain consistent with fiscal discipline—namely, the "commitment" approach, based on rules and pre-set targets—and the "delegation" approach where the finance ministry is entrusted with the coordination of the budgetary process.[52] Although both approaches have generally proven effective in curbing expenditure requests (Annett, 2004), discretion may weaken the enforcement of spending restraint in good times and strengthen it in bad times—a pattern conducive to more procyclicality. The choice between the two approaches depends on the nature of the political system, with single-party governments often preferring delegation and coalition governments preferring commitment (Hallerberg, 2004). In the euro area, the three *largest economies* have opted for delegation. Large countries may also be particularly encouraged to take advantage of discretion because of the greater effectiveness of fiscal impulses when the domestic market is large.
- *The perceived need for more activist fiscal policies may lead to more procyclical policies*. The larger external disturbances affecting more open economies as well as their revealed preference for fixed exchange rates—especially in the European Union—may have contributed to

[52]See Annett (2004), Hallerberg (2004), and Appendix 2.4.

Figure 2.22. Procyclicality and Output Volatility[1]

(Correlation coefficient = 0.29; 1975–2003)



Sources: OECD analytical database; and IMF staff calculations.

[1]Evidence is based on euro area countries (excluding Luxembourg) and Australia, Denmark, Sweden, the United Kingdom, and the United States.

[2]The procyclicality ratio is the frequency of procyclical impulses relative to countercyclical impulses.

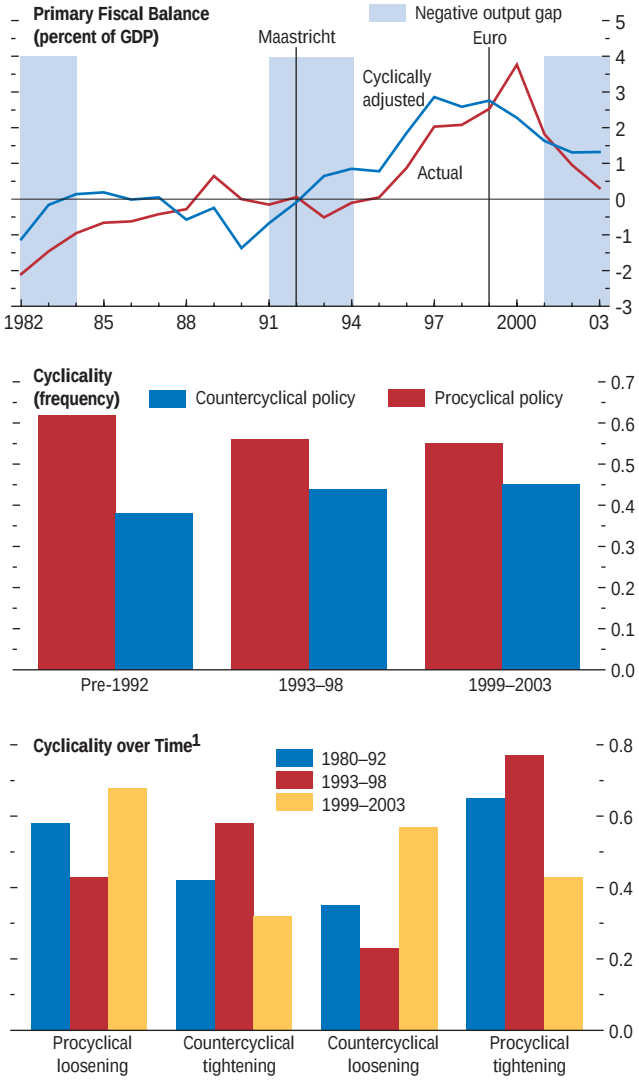
procyclicality in the euro area. In fact, a positive correlation between output volatility and procyclicality seems to exist for industrial countries (Figure 2.22, p. 43).[53]

The apparent link between fiscal discretion and procyclicality tends to suggest that EMU's rules-based, discipline-oriented fiscal framework could be expected to improve fiscal behaviors. Indeed, earlier work by Galí and Perotti (2003) suggests that the average fiscal response to the cycle changed after the Maastricht treaty came into force in 1992, with procyclicality virtually disappearing. This general result is confirmed by the panel analysis above (see Appendix 2.4, including Table 2.8), which also suggests that the other features of fiscal policy, including the concern for debt sustainability, have not been affected. At first sight therefore, automatic stabilizers have indeed been allowed to play more fully than in the past, an undoubtedly welcome development.

However, a more detailed assessment of fiscal behavior since 1992 suggests that this improvement could be more apparent than real, possibly disguising some disturbing post-EMU trends. As illustrated by Figure 2.23, while fiscal policy has in general become less procyclical, it appears that this has come about entirely because there has been more tightening in good times between 1992 and 1997—reflecting adjustments spurred by the desire to secure EMU membership—and less tightening in bad times after 1999. However, fiscal policies have actually become more procyclical in good times under EMU. This assessment is confirmed by Table 2.4, which provides two sets of estimated cyclical responses: before and after Maastricht, and before and after EMU.[54] Although these tests—unlike Figure 2.23—cannot capture the specifics of the 1992–97 period, they confirm the persistent tendency to loosen fiscal policy in

Figure 2.23. Fiscal Stance in the Euro Area,1982–2003

While procyclicality remained a prominent feature of fiscal policy in the euro area, it has become tilted toward loosening under EMU. The same is true for countercyclical impulses.



Sources: OECD analytical database; and IMF staff calculations.
[1]Frequency adjusted for the occurence of good versus bad times (defined as growth above or below potential, respectively).

[53]Of course, that positive correlation also partly reflects the lesser stabilizing effect of fiscal policy when discretionary impulses tend to be procyclical.

[54]The other parameters of reaction functions were kept constant over time.

good times—a bent that may have worsened under EMU—whereas the fiscal tightening in bad times has disappeared.[55] Obviously, such a trend cannot be sustained as it would lead to a bias toward increasing deficits in bad and good times alike.

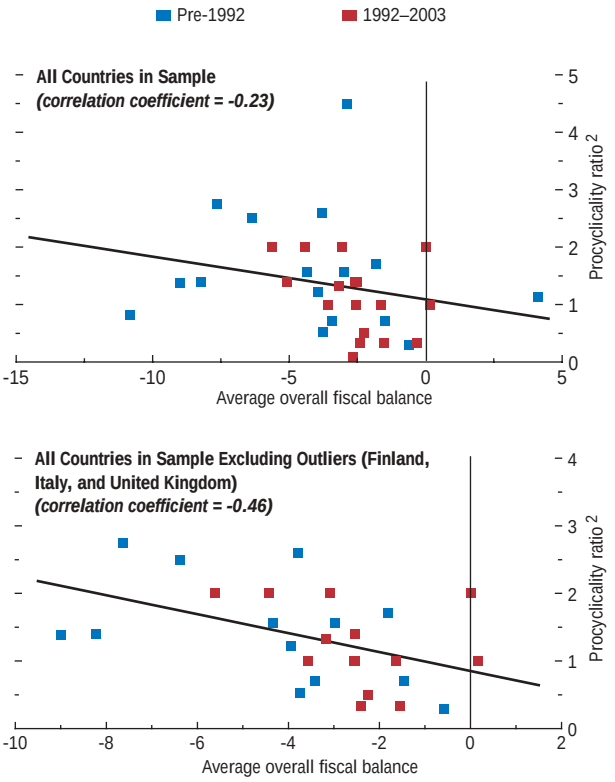
Looking back, procyclical policies have in fact been associated with higher average deficits (Figure 2.24), confirming that a deficit bias inevitably emerges when procyclical impulses occur mainly in good times. In fact, the discretionary fiscal retrenchments observed in bad times may result from unsustainable loosening in good times, an argument supported by the positive association between the frequency of procyclical loosening and procyclical tightening episodes (Figure 2.25). Particularly striking is the fact that, according to the econometric analysis, countries in breach of or close to SGP's deficit limits have on average opted for more procyclical policies than the other member states (see Appendix 2.4).

It could of course be argued that the observed increase in procyclical behavior in good times—in practice mainly in the late 1990s—may have been due to temporary or unexpected factors, rather than deliberate policy actions, and therefore will not persist. For example, overly optimistic growth forecasts in the context of asset price booms and corresponding revenue windfalls may have distorted policymakers' real-time assessment of present and future structural fiscal positions (Jaeger and Schuknecht, 2004).[56] This, along with a temporary adjustment fatigue following long years of pre-EMU austerity, could have made it difficult to resist structural expansionary measures such as tax cuts—indeed much needed in many countries. That said, it should also be noted that pre-EMU adjustments greatly

Figure 2.24. Procyclicality and Deficit Bias, 1975–2003[1]

(Percent of GDP)

Procyclical fiscal policies ultimately lead to greater average deficits, suggesting a deficit bias.



Sources: OECD analytical database; and IMF staff calculations.

[1]Evidence based on the euro area countries (excluding Luxembourg), Australia, Denmark, Sweden, the United Kingdom, and the United States.

[2]Ratio between the frequency of procyclical episodes and the frequency of countercyclical episodes.

[55]The power of those tests is inevitably weak, given the relatively small number of observations on which they are based.

[56]The significant downward revision of potential output growth in a number of euro area countries indeed had direct repercussions on estimated output gaps and cyclically adjusted fiscal balances.

Table 2.4. Discretionary Fiscal Policies: Stabilizing or Destabilizing?
(Response of cyclically adjusted primary balance to the output gap; a negative coefficient implies a destabilizing response)

	Before or After Maastrich?			Before or After EMU?		
	Before	After	Different before/after?[1]	Before	After	Different before/after?[1]
Response in good times[2]	–0.173	–0.169	0.001	–0.071	–0.412	3.233
Standard error	0.083	0.087	—	0.080	0.181	—
Significance threshold (*P*-value)	0.037	0.053	0.973	0.373	0.024	0.072
Response in bad times[3]	–0.115	0.013	3.038	–0.175	0.044	1.932
Standard error	0.047	0.051	—	0.037	0.151	—
Significance threshold (*P*-value)	0.014	0.796	0.081	0.000	0.772	0.165
Different in good or bad times?[4]	0.245	3.518		0.954	2.718	
Significance threshold (*P*-value)	0.621	0.061		0.329	0.099	
Number of observations		242			242	

Note: Details about specification and estimation of the underlying model are in Appendix 2.2.
[1]This column reports the Wald test statistic as well as its statistical significance threshold.
[2]Good times correspond to years with positive output gaps.
[3]Bad times correspond to years with negative output gaps.
[4]This line reports the Wald test statistic.

benefited from lower interest rates (Figure 2.26) and one-off measures,[57] and therefore may not have been exceptionally painful nor deeply structural in nature.[58] Also, the advisability of spending uncertain revenue windfalls in the face of certain long-term challenges, such as population aging, is arguably questionable. Overall, while it is admittedly difficult to make a definitive judgment over a relatively short period, the empirical analysis suggests that fiscal behavior under EMU has not improved as much as might have been hoped for, and in some respects—notably, the increase in procyclical fiscal policy in good times—may have slipped, resulting in an increasing bias toward deficits. At the present conjuncture, this underscores the danger that—without a significant change in fiscal behavior relative to the past—euro area countries could once again fail to take advantage of an upturn to make progress in dealing with their substantial medium term fiscal problems (see Beetsma, 2004).

Conclusion

The analysis in this essay builds on and extends a rapidly growing body of research investigating fiscal authorities' behavior along three dimensions potentially affected by EMU—namely, the reaction of discretionary fiscal policy to the business cycle, its sensitivity to long-term debt sustainability, and its reaction to the monetary policy stance. The essay illustrates that the cyclicality of fiscal policy is the central feature of fiscal behavior, affecting both macroeconomic stabilization and long-term sustainability. Fiscal behavior in euro area countries has generally been procyclical, with the degree of procyclicality reflecting, inter alia, country-specific budgetary institutions, structural characteristics—such as the sensitivity to real disturbances—and inher-

[57]Panel estimates of the fiscal reaction function indicate that the year 1997 alone saw an exceptional improvement in cyclically adjusted primary balances, on the order of 0.6 percent of GDP on average across member states, suggesting that some governments indeed took advantage of the margins for "creative accounting" allowed by the Treaty's definition of the fiscal balance. Using government balance sheet data, Milesi-Ferretti and Moriyama (2004) confirm that fiscal adjustments over the period 1992–97 were to a significant extent achieved by measures that had no durable impact on public finances as they left government net worth largely unaffected.

[58]Netting out the cumulative changes in overall balances from those savings, fiscal adjustment does not look particularly ambitious and may explain why most countries failed to meet the SGP's underlying requirement to enter EMU with an overall structural position close to balance or in surplus. Had this been the case, and barring any serious measurement error of structural balances in 1999, none of the countries currently at odds with the SGP would be in that situation today (Figure 2.27).

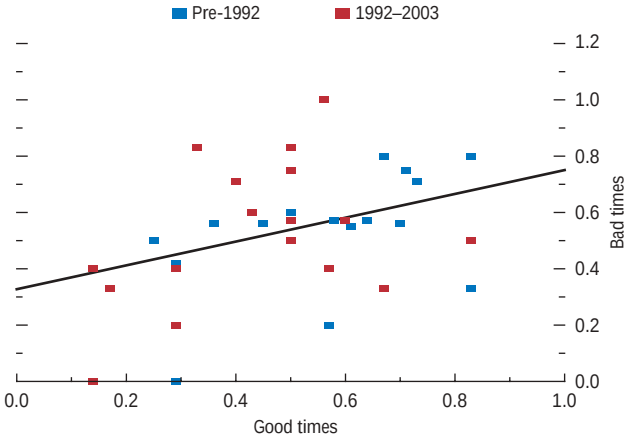
ited fiscal positions. Procyclical fiscal impulses turn out to be more pronounced in good times (loosening) than in bad (tightening), pointing to the difficulty of resisting pressures to increase spending or cut taxes in the face of revenue windfalls (Tornell and Lane, 1999; Talvi and Vegh, 2000).

Maastricht's fiscal framework appears to have led to some reduction in procyclical fiscal behavior under EMU, owing to a more countercyclical policy stance in bad times. However, this was in general not balanced by sufficient deficit reduction in good times. The continuation of such behavior would result in an underlying—and unsustainable—deficit bias. The ongoing recovery will be a decisive test of whether history will again repeat itself, or whether governments will be able to resist past tendencies to take advantage of the upturn to address underlying fiscal problems before the pressures from aging populations are felt with full force.

In terms of the current debate on the SGP, the essay reinforces the need—as often pointed out by both the IMF staff and the European Commission—to ensure greater adjustment in good times. This could be done by putting a greater emphasis on structural balances in fiscal surveillance. More emphasis on debt reduction (already desirable for sustainability reasons) may also have welcome repercussions by putting a premium on increasing structural surpluses in good times. The country-specific incentives for adjustment could be reinforced by the creation of national bodies that would make and publish independent assessments of fiscal sustainability, raising public awareness of the issues, and strengthening the national debate. Finally, incentives for adjustment would also be strengthened by a more credible enforcement mechanism of the SGP, reserving swift sanctions to flagrant breaches and showing flexibility in the face of *temporary* violations that reflect policies with positive long-term effects on growth (including the possible costs of fiscal measures related to labor and product market reforms) and fiscal sustainability (including tax and pension reforms).

Figure 2.25. Procyclicality in Good and Bad Times[1]

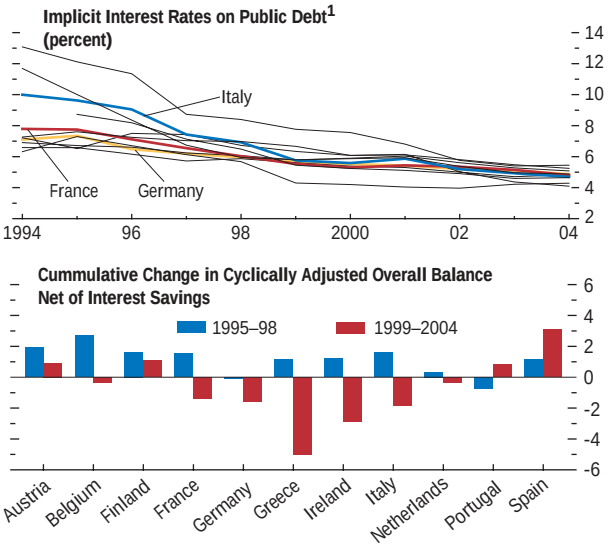
Procyclical loosening (in good times) appears to lead to procyclical tightening (in bad times).



Source: IMF staff calculations.
[1]Evidence based on the euro area countries (excluding Luxembourg), Australia, Denmark, Sweden, the United Kingdom, and the United States. Good and bad times are defined as growth above or below potential, respectively.

Figure 2.26. Interest Payments: Where Did the Savings Go?

EMU member states benefited from significantly lower interest rates on public debt (top panel). Taking that into account, pre-EMU fiscal performance is less impressive (bottom panel).

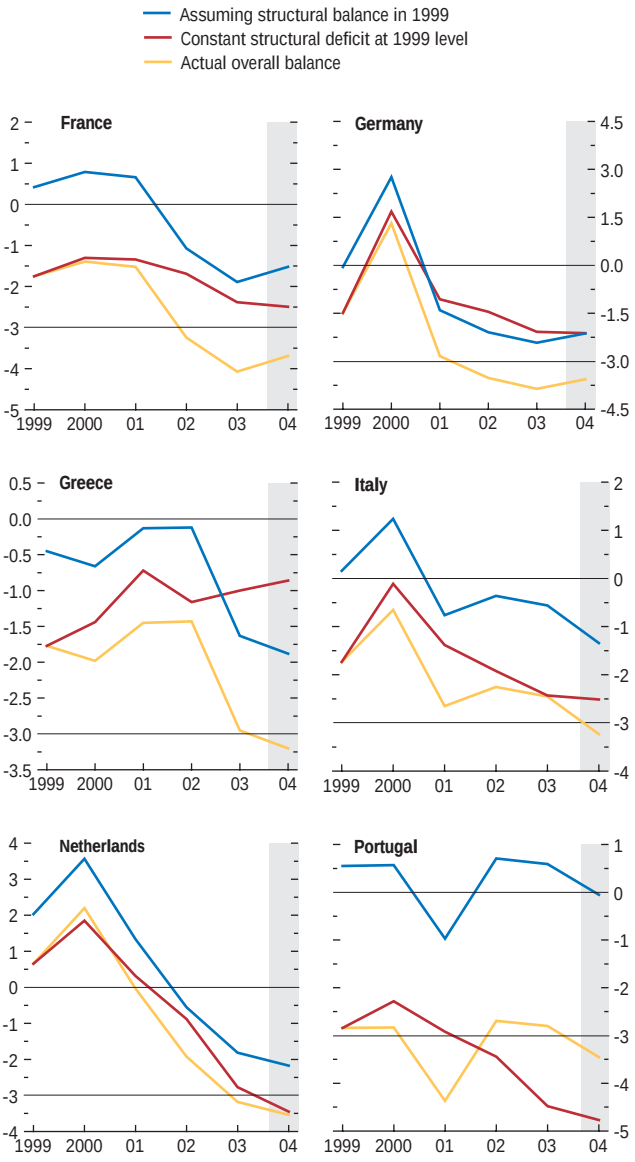


Sources: European Commission, Annual Macroeconomic Database; and IMF staff calculations.
[1]Interest payments divided by the stock of public debt at the end of the previous year.

Figure 2.27. Countries at Odds with the Stability and Growth Pact

(Percent of GDP)

Assuming identical policies, countries currently in breach or close to stability and growth pact deficit caps would have remained within the limits had they entered the EMU with a structural balance.



Sources: European Commission, Annual Macroeconomic Database; and IMF staff calculations.

Appendix 2.1. The Global House Boom: Sample Composition, Data Sources, Methods, and Results

The main authors of this appendix are Marco Terrones and Christopher Otrok. Nathalie Carcenac provided research assistance.

This appendix provides details on the data sources, samples, and econometric method and results of the first essay, on the global house boom.

Sample and Data Sources

The sample used in the first two sections of the essay and in Box 2.1 comprises the following 18 countries: Australia, Belgium, Canada, Denmark, Finland, France, Germany, Ireland, Italy, Japan, the Netherlands, New Zealand, Norway, Spain, Sweden, Switzerland, the United States, and the United Kingdom. The data are yearly and cover 1970–2003.

The sample used in the last two sections of the essay includes the following 13 countries: Australia, Canada, Denmark, Ireland, Italy, Japan, the Netherlands, New Zealand, Norway, Sweden, Switzerland, the United States, and the United Kingdom. The data are quarterly and covers 1980:QI–2004:QI.

For purposes of Box 2.2, countries are classified as bank- or market-based depending on the ratio of the value of domestic equities traded on the domestic stock markets to the claims on the private sector by commercial banks (see Beck, Demirgüç-Kunt, and Levine, 1999; and Chapter II of the April 2003 *World Economic Outlook*). The group of bank-based financial system countries comprises Austria, Belgium, Denmark, Finland, France, Germany, Italy, Japan, Norway, New Zealand, and Spain, while the group of market-based financial system countries includes Australia, Canada, Ireland, the Netherlands, Sweden, Switzerland, the United Kingdom, and the United States. Likewise, countries are classified as having a fixed- (variable) rate mortgage system if the fraction of mortgage loans with this characteristic exceeds 74 (72) percent,

respectively.[59] Thus, the following countries are characterized as having a fixed-rate mortgage system: Belgium, Canada, Denmark, France, and the United States. Similarly, the following countries are characterized as having a variable-rate mortgage system: Australia, Finland, Ireland, Norway, Spain, and the United Kingdom. The remaining countries are characterized as having a mixed-rate mortgage system.

Data were taken from a variety of sources, including the European Central Bank (ECB), European Mortgage Federation (EMF), Eurostat, Haver Analytics, the IMF's *International Financial Statistics*, national authorities, the OECD Analytical Database, and the World Bank's World Development Indicators.

Main financial and housing series used in the essay are as follows.

- Real asset prices. These are calculated as the ratio of the nominal house price (stock price) index to the consumer price index. The house price index is obtained from national sources, while the stock price index and consumer price indexes are obtained from the IMF *International Financial Statistics*.
- Interest rates. The short- and long-term interest rate series were obtained from the OECD's analytical database and Haver Analytics. Short-term interest rates are the three-month inter-bank rates while long-term rates are government bonds rates (typically 10-year bonds).
- Mortgage loans typically refers to outstanding residential mortgage loans and these data were obtained from a variety of sources including the ECB, the EMF, the OECD, and national sources.
- Data on consumer price index for rents were obtained from the OECD's main economic indicators, national sources, and the ECB.
- The home ownership rates series were obtained from Eurostat, the EMF, the ECB, the Royal Institution of Chartered Surveyors, European Housing Review, and national sources.

Dynamic Factor Model

Dynamic factor models are a generalization of the static factor models that are commonly used in psychology. The motivation underlying these models, which are gaining increasing popularity among economists, is that the covariance or comovement between a group of (observable) time series is the result of the relationship between these variables and a small number of unobservable variables, known as factors, which are thought of as the underlying forces of the economy.[60] The unobserved factors are then indexes of common activity—across the entire data set (e.g., global activity) or across subsets of the data (e.g., a particular country).

One important objective of this literature is to obtain estimates of these unobserved factors to quantify both the extent and nature of comovement in a set of time-series data.[61] Toward this objective, the dynamic factor model decomposes each observable variable—e.g., the house price index for the United Kingdom, output in Japan—into components that are common across all observable variables or common across a subset of variables.

The model used in this essay comprises 13 blocks, 1 for each country; each block comprises 7 equations, 1 for each variable (real house prices, per capita real GDP, per capita consumption, per capita residential investment, short- and long-term interest rates, and real stock prices). These equations relate each variable in the model to a global factor, a country factor—1 for each of the 13 countries, and global factors

[59]These thresholds correspond to the top 33 percent in each case. Data refer to the latest available observation.

[60]The popularity of these models has risen as methods have been developed to perform factor analysis on the large datasets that these models naturally apply to (e.g., Stock and Watson, 2003; Forni and others, 2000; Otrok and Whiteman, 1998).

[61]The second major objective of this literature is using the information in the cross section of time series to forecast one time series.

that are common to each aggregate variable across the data set—1 for each of the 7 observable variables. For example, the block of equations for the first country (the United States) is

$$\begin{aligned}
House_{US,t} &= a_{House,US} + b^{Global}_{House,USi} f^{Global}_t + b^{Country}_{House} f^{US}_t \\
&\quad + b^{Global}_{House,US} f^{Global\ House}_t + \varepsilon_{House\ US,t} \\
GDP_{US,t} &= a^{GDP}_{GDP,US} + b^{Global}_{House,US} f^{Global}_t + b^{Country}_{GDP} f^{US}_t \\
&\quad + b^{Global\ GDP}_{GDP,US} f^{Global\ GDP}_t + \varepsilon_{GDP\ US,t} \\
&\vdots \\
Stock_{US,t} &= a_{Stock,US} + b^{Global}_{Stock,USi} f^{Global}_t + b^{Country}_{Stock} f^{US}_t \\
&\quad + b^{Global\ Stock}_{Stock,US} f^{Global\ Stock}_t + \varepsilon_{Stock\ US,t},
\end{aligned}$$

and the block of variables for the second country (the United Kingdom) is

$$\begin{aligned}
House_{UK,t} &= a_{House,UK} + b^{Global}_{House,UKi} f^{Global}_t + b^{Country}_{House} f^{UK} \\
&\quad + b^{Global\ House}_{House,UK} f^{Global\ House}_t + \varepsilon_{House\ UK,t} \\
GDP_{UK,t} &= a_{GDP,UK} + b^{World}_{GDP,UKi} f^{World}_t + b^{Country}_{GDP} f^{U.K}_t \\
&\quad + b^{GlobalGDP}_{GDP,UK} f^{GlobalGDP}_t + \varepsilon_{GDP\ UK,t} \\
&\vdots \\
Stock_{UK,t} &= a_{Stock,UK} + b^{World}_{Stock,UKi} f^{World}_t + b^{Country}_{Stock} f^{UK}_t \\
&\quad + b^{Global\ Stock}_{Stock,UK} f^{Global\ Stock}_t + \varepsilon_{Stock\ UK,t}.
\end{aligned}$$

The same form is repeated for each of the 13 countries in the system.

In this system we see that the world factor is the component common to all variables in all countries. That is, every variable depends on this common factor and that dependence varies across each variable through the parameter b_i^k, which is called the factor loading of variable *i* on factor *k*. The factor loading measures the sensitivity of a variable to a factor. There is a second global factor for each type of aggregate variable. This factor captures co-movement across the world in each variable that is not explained by the common world factor. For example, housing prices in each country are influenced by the world house price factor. There is also a factor for each country that captures co-movement across all variables within each country that is not already captured by either type of global factor.

The model captures dynamic co-movement by allowing the factors (*f*s) and idiosyncratic terms (ε) to be (independent) autoregressive processes. That is, each factor depends on lags of itself and an i.i.d. innovation to the variable:

$$f^{Global}_t = \phi(L) f^{Global}_{t-1} + u_t,$$

where $\varphi(L)$ is a lag polynomial and u_t is normally distributed. All the factor loadings (*b*s), and lag polynomials are independent of each other. The model is estimated using Bayesian techniques as described in Kose, Otrok, and Whiteman (2003) and in Otrok, Silos, and Whiteman (2003).

To measure the importance of each factor for a particular variable, we calculate variance decompositions that decompose the volatility in each aggregate into components due to each factor. The formula for the variance decomposition is derived by applying the variance operator to each equation in the system. For example, for the first equation, we have

$$\begin{aligned}
var(House_{US}) &= (b^{Global}_{House,USi})^2 var(f^{Global}_t) \\
&\quad + (b^{Country}_{Global\ House})^2 var(f^{US}) \\
&\quad + (b^{Global\ House}_{House,U.S})^2\ var(f^{Global\ House}_t) \\
&\quad + var(\varepsilon_{House\ US}).
\end{aligned}$$

The variance in housing prices attributable to the global house factor is then

$$\frac{(b^{Global\ House}_{House,US})^2\ var\ (f^{Global\ House})}{var(House_{US})}.$$

A variance-decomposition analysis is performed to assess the contribution of each of these components to the volatility of a given variable. In particular, for each country, the fraction of the variance of a variable explained by each component is computed. The following findings—in addition to those reported in the essay—stand out from the analysis (Table 2.5).

- Global developments—the combination of the global factor and the global-specific variable—explain between 20–40 percent of the variation of output, consumption, and residential investment. The importance of global develop-

ments, however, varies across countries. For example, they account for over 75 percent of the variation of these three variables in the United States and for less than 15 percent in New Zealand.

- Global developments also explain over 50 percent of the variation of stock prices and changes in long-term interest rates as well as 30 percent of the variation of the changes in short-term interest rates. Interestingly, most of the common changes in stock prices and interest rates are captured by the corresponding global-specific factors. This suggests that developments in these markets separate from developments in other markets (and to a lesser extent developments in the global real economic activity) are key to explain the volatility of these variables. Moreover, there are important differences across countries in the strength of the co-movement of stock prices (interest rates) with their global counterparts. Global developments account for over 80 percent of the co-movement in stock prices in the Netherlands and 30 percent in New Zealand. Similarly, global developments account for over 70 percent of the co-movement of long-term interest rates in Canada, the Netherlands, the United Kingdom, and the United States.
- Country-specific factors play a smaller role explaining the movements in output, residential investment, stock prices, and long-term interest rates. However, they explain over 25 percent of the variations of short-term interest rates. This is consistent with the low cross-country correlations of short-term interest rates reported in the main text of the essay.
- The idiosyncratic factors seem to be playing an important role in driving the fluctuations of residential investment. These factors explain on average 70 percent of the fluctuations in this variable; this is consistent with the low cross-country investment correlations reported elsewhere (see, for instance, Kose, Otrok, and Whiteman, 2003).

Appendix 2.2. Learning to Float: Methodology and Data

The main author of this appendix is Dalia Hakura.

This appendix provides details on the methodology used in the second essay to characterize emerging market countries' exchange rate regime transitions, and the definition of the variables used in the analysis and their data sources.

Methodology

The essay examines the evolution of exchange rate regimes in emerging market economies over the past decade using the IMF's de facto classification system.[62] Accordingly, exchange rate regimes are classified based on the behavior of nominal bilateral exchange rates and reserves in combination with information on countries' exchange rate and monetary policy frameworks and policy intentions obtained during bilateral discussions between IMF staff and country authorities (see Bubula and Ötker-Robe, 2002). The IMF de facto system classifies countries' exchange rate regimes into eight categories, which—for the analysis in the essay—are aggregated into three broad categories: pegs, intermediates, and free floating. The pegs category includes countries with currency board arrangements and conventional pegs. The intermediates category includes countries with limited flexible regimes—that is, pegs within horizontal bands, crawling pegs, and crawling bands-—and the managed floats. The free floats are countries classified as independently floating. To check robustness, a comparison is also made with the "natural classification" system developed by Reinhart and Rogoff (2004).[63]

[62]Alternatively, exchange rate regimes can be classified based on official notifications to the IMF (de jure classification system). Other de facto classification systems include Reinhart and Rogoff (2004), Levy-Yeyati and Sturzenegger (2002, 2003), and Ghosh and others (1997).

[63]The essay extends the Reinhart-Rogoff classification system from 2001 to 2003.

Table 2.5. Variance Decomposition for Selected Countries
(Percent)

Country	Factor	Real House Price	Real Stock Price	Long-Term Interest Rate	Short-Term Interest Rate	Consumption[1]	Output[1]	Residential Investment[1]
United States	Global	21	10	2	1	65	57	78
	Country	0	0	1	7	1	0	1
	Aggregate	47	53	69	69	8	23	0
United Kingdom	Global	11	12	2	2	26	32	23
	Country	0	12	24	56	1	3	0
	Aggregate	57	46	62	16	31	17	1
Italy	Global	22	6	30	29	4	0	1
	Country	2	1	20	56	5	2	12
	Aggregate	11	34	30	9	33	48	1
Netherlands	Global	23	20	9	3	4	7	14
	Country	17	1	15	21	40	46	5
	Aggregate	15	62	65	33	15	32	1
Canada	Global	9	26	7	1	36	41	41
	Country	0	0	0	0	6	0	0
	Aggregate	34	41	76	93	18	37	1
Ireland	Global	0	30	22	9	11	1	14
	Country	37	0	2	0	27	49	16
	Aggregate	21	4	37	3	10	35	5
Australia	Global	2	21	6	3	0	13	5
	Country	0	2	34	39	15	0	0
	Aggregate	36	27	43	23	7	34	3
New Zealand	Global	2	17	0	1	16	12	6
	Country	33	5	0	2	66	34	31
	Aggregate	0	12	2	4	7	2	2
Average	Global	14	16	10	8	15	16	19
	Country	10	5	15	26	19	16	8
	Aggregate	25	37	42	23	19	26	3

Source: IMF staff calculations.
[1]Per capita.

Unlike the IMF's de facto classification system, the Reinhart-Rogoff classification system relies entirely on an examination of the behavior of official or parallel market exchange rates vis-à-vis the currency to which the national currency is permanently or occasionally pegged. There are merits to having a classification system that incorporates a wider set of information, because the behavior of the exchange rate on its own does not always give an accurate picture of exchange rate policy. For example, in an emerging market country with a free float, high exchange rate pass-through, and inflation targeting, exchange rate depreciation (as a leading indicator of inflation) may prompt an increase in interest rates, which in turn will tend to dampen the exchange rate depreciation. Thus, moving to a float does not necessarily mean that key nominal bilateral exchange rates have to fluctuate very much (see also Genberg and Swoboda, 2004).

Exchange rate regimes in emerging market countries are classified in the same way by the IMF de facto and Reinhart-Rogoff systems nearly two-thirds of the time. Also, both classification systems suggest that there has been a trend toward greater exchange rate flexibility in emerging market countries since the early 1990s. According to the IMF de facto classification system, in 1991–92 there were virtually no emerging market countries classified as having free floats, compared with 40 percent in 2003. Although the proportion is slightly different, the Reinhart-Rogoff classification picks up the same

trend of a marked increase in the number of countries classified as free floaters.[64]

An exchange rate regime transition is defined as a shift from one exchange rate category, in which a country has been for at least two years, to another, in which a country remains for at least one year or which is followed by another shift in the same direction. A crisis-driven transition is defined as a transition that is associated with an exchange rate depreciation vis-à-vis the U.S. dollar of at least 20 percent, at least a doubling in the rate of depreciation with respect to the previous year, and a rate of depreciation the previous year below 40 percent (following Milesi-Ferretti and Razin, 2000).[65]

The essay compares the countries that move to a more flexible exchange rate category with a control group. The control group consists of the countries whose exchange rate regime is the same as the starting regime of transiting countries in periods that are not within three years of a transition. Depending on the availability of data, the pegs control group includes the following countries in the relevant years: Argentina, China, Colombia, Jordan, Malaysia, Morocco, and Thailand. Similarly, the intermediates control group includes the following countries in the relevant years: Chile, Colombia, Czech Republic, Hungary, India, Indonesia, Israel, Korea, Russia, South Africa, Thailand, and Turkey.

Data Definitions and Sources

Depending on availability of the data, the indicators cover the period 1991–2003 for the 25 countries listed in footnote 28 in the main text of this chapter.

Macroeconomic Indicators

Real output growth is measured using the annual growth rate of real per capita GDP. The source of the data is the World Economic Outlook database.

Inflation is measured using the growth rate of the Consumer Price Index. The source of the data is the IMF's International Financial Statistics (IFS).

Real and nominal effective exchange rates are obtained from the IMF's Information Notice System. An increase in the index denotes an exchange rate appreciation. The data are monthly.

Real exchange rate overvaluation is calculated using the percentage difference between the actual real effective exchange rate (REER, reported in the IMF's Information Notice System) and a Hodrik-Prescott filter of the REER.

The primary fiscal balance as a percent of GDP is obtained from Chapter III of the September 2003 *World Economic Outlook*.

The current account as a percent of GDP is obtained from the IMF's International Financial Statistics.

The ratio of external debt to exports of goods and services is calculated as the ratio of total external debt outstanding at year-end divided by exports of goods and nonfactor services plus net total transfers minus net official transfers. The source of the data is the World Economic Outlook database.

The ratio of private sector external debt to exports of goods and services is constructed as total external debt outstanding at year-end minus the debt outstanding to official debtors divided by exports of goods and nonfactor services plus net total transfers minus net official transfers. The source of the data is the World Economic Outlook database.

International Reserves in months of imports is obtained from the IMF's International Financial Statistics.

Indicators of Monetary Policy Frameworks

Central bank independence. This measures central bank political and economic independence fol-

[64]The updated Reinhart-Rogoff classification identifies 7 free floats in 2003, compared with 10 under the IMF de facto system.

[65]Exchange rate movements that meet these criteria in a three-year window around the exchange regime transition are attributed to the transition.

lowing the definition by Grilli, Masciandaro, and Tabellini (1991). Political independence measures the extent to which the government is involved in the operations of the central bank, where a lower degree of government involvement implies a higher degree of central bank political independence. Economic independence measures the involvement of the central bank in financing the fiscal deficit and in banking supervision. The smaller the involvement the greater the economic independence. The indicator ranges from 0 to 1, where higher values indicate a higher level of independence. The data, which is available for only 10 of the emerging market countries in the sample for 1989 and 2003, is obtained from Arnone and Laurens (2004).

Dummy for whether a country is inflation targeting or not. The date of adoption of inflation targeting is obtained from Stone and Roger (2004).

Indicators of Financial Sector Supervision and Development

The aggregate index of the *quality of banking supervision* includes (1) banks' adoption of a capital adequacy regulation in line with standards developed by the Bank for International Settlements; (2) the independence of the supervisory agency from the executive's influence and whether it has sufficient legal power and (material) supervisory power; (3) the effectiveness of the supervision; and (4) the extent to which supervision covers all financial institutions.

The securities market development index captures whether a country has taken measures to develop a securities or bond market and the openness of its equity market to foreign investors. The measures to develop a securities market include the introduction of auctions for government paper and the establishment of a securities commission, the establishment of equity and bond markets, the opening of these markets to foreign participants, and liberalization of portfolio investments for pension funds and other institutional investors.

The data are obtained from Abiad and Mody (2003). The indicators take values from 0 to 3, with increasing values indicating stronger bank supervision and greater securities market development. Data are missing for some of the emerging market countries in the sample.

Indicators of Financial Sector Liberalization

The index for *domestic financial liberalization* is constructed as the average of four indicators that measure the extent to which (1) direct credit controls and reserve requirements have been abolished; (2) interest rate controls have been removed; (3) entry barriers against foreign banks have been eliminated; and (4) the banking system has been privatized.

External financial liberalization is an aggregate index that captures whether there are restrictions on capital inflows and outflows, and whether the exchange rate system is unified.

The data are obtained from Abiad and Mody (2003). The indicators take values from 0 to 3, with increasing values indicating greater liberalization. Data are missing for some of the emerging market countries in the sample.

Appendix 2.3. Monetary Policy Rules for the Euro Area

The main author of this appendix is Xavier Debrun.

This appendix provides details on the monetary policy rules used to obtain the hypothetical interest rate benchmarks for euro area member states (Figure 2.20). The original specification of simple, mechanical policy rules is due to Taylor (1993), who observed that U.S. monetary policy in the 1980s and 1990s moved surprisingly well in line with an interest rate benchmark i_t^* defined as

$$i_t^* = r^* + \pi_t + h(\pi_t - \pi^*) + g y_t, \qquad (1)$$

where π_t is the inflation rate; π^* is the inflation rate implicitly or explicitly targeted by the monetary authorities; y_t is the output gap (difference between actual GDP and some measure of potential GDP in percent of the latter); r^* denotes an "equilibrium" real interest rate; and h and g are the relative weights assigned to output and inflation stabilization in the monetary

policy framework. The interest rate level consistent with a "neutral" monetary policy (that is, when both objectives are met: $y_t = 0$ and $\pi_t = \pi^*$) is given by $r^* + \pi^*$.

Taylor (1999) discusses in detail the rationale underlying Equation (1) and suggests using i_t^* as a normative tool, interpreting large deviations of actual interest rates from i_t^* as "mistakes." IMF staff analysis considers i_t^* only as a first-order approximation of what might have been an "appropriate" policy for individual euro area member states. Indeed, these countries are relatively open economies so that external competitiveness, and specifically the real exchange rate or unit labor costs, may also play an independent role in monetary policy choices. Another reason not to give a normative interpretation to the interest rate benchmark at all times is that the monetary rule does not capture the possible need to manage the risk of deflation.

But does the ECB's behavior appear at least broadly consistent with the prescription of Equation (1)? The vast empirical literature on monetary policy has confirmed that models comparable to Equation (1)—but including well-specified dynamics—fitted actual policy relatively well, both for the Bundesbank (Clarida, Galí and Gertler, 1998) and the ECB (see Gerlach and Schnabel, 2000; Siklos, Werner, and Bohl, 2004; Gerlach-Kristen, 2003; or Castelnuovo, 2003).

Taylor's (1993) original calibration of Equation (1) implies $g = h = 0.5$ and $\pi^* = r^* = 2$, meaning that the central bank pays equal attention to real activity and to inflation. The rule also implies that the interest rate response to a unit change in inflation is $1 + h$ so that the *real* interest rate moves to ensure that inflation reverts to its target (that is, a monetary contraction if $\pi_t > \pi^*$ and an expansion when $\pi_t < \pi^*$).

IMF staff constructed five different benchmarks for each individual member state of the euro area, the United States, and the euro area as a whole. While the relative weights h and g were kept constant across countries, r^* and π^* were allowed to differ as follows.

- $r_j^* = k_j + \hat{y}_j$, where $\hat{y}_j$ denotes the average growth rate of potential GDP over the period 2004–08; k_j, a positive constant equal to 0.75 in euro area countries and 0 in the United States; and j, a country index. As a result, $r_j^* \geq \hat{y}_j$ and the dynamic efficiency condition, which requires all debts to be ultimately repaid (see, for instance, Obstfeld and Rogoff, 1996), is satisfied. Indeed, if $r_j^* < \hat{y}_j$, then economic agents could in principle roll over any given amount of debt forever because it would always decrease as a proportion of income. For the United States, k_j was set to zero to be as close as possible to Taylor's (1993) original calibration for that country.
- $\pi_j^* = c + (2/3)[\theta_j^T - \theta_j^{NT}]$, where θ_j^T and θ_j^{NT} symbolize productivity growth in the "tradable" sector (exposed to external competition) and "nontradable" sector (protected from external competition) respectively. This formula allows for inflation differentials linked to the so-called Balassa-Samuelson effect, which claims that prices in the nontradable sector (which represent roughly two-thirds of the economy) have to make up for the economy-wide wage pressures created by faster productivity growth in the tradable sector. According to Sinn and Reutter (2001), Germany exhibits the lowest productivity growth differential between the tradable and nontradable sectors and should thus be expected to experience the weakest "structural" inflationary pressure in the euro area. Hence, the German inflation target was set to 1 percent. To ensure that the weighted average of individual inflation targets is in line with the ECB's objective for the euro area—that is, keeping inflation below but close to 2 percent—c is set to 0.66, corresponding to an average inflation target of 1.75 percent (Table 2.6).

In addition to the traditional specification of monetary rules (Equation (1)), the following alternatives were also considered.

- *Inflation rule.* As in Alesina and others (2001), it is assumed that $g = 0$; that is, the central bank only reacts to deviations of actual inflation from the target.

- *Asymmetric Taylor rule.* The central bank is assumed to be more concerned by negative output gaps than by positive ones. In practice, the rule is written as $i_t^* = r^* + \pi_t + 0.5(\pi_t - \pi^*) + 0.5y_t - 0.1y_t^2$.
- *Augmented Taylor rules.* In small open economies, the central bank may pay attention to elements other than inflation and the output gap, including unit labor cost growth (that is, the extent to which nominal wage growth exceeds or falls short of productivity growth) and the real effective exchange rate (that is, the economy's competitiveness). The response to rising unit labor costs is assumed to be a monetary tightening (with a coefficient of 0.1), whereas a real appreciation is supposed to be counteracted by a monetary loosening (with a coefficient of 0.05).

Table 2.6 reports for two subperiods (1993–98 and 1999–2003 using quarterly data) simple descriptive statistics assessing the relevance of these rules—namely, the average and root-mean-squared deviations of actual interest rates from benchmarks implied by the rule. Bold numbers identify the rule with the smallest root-mean-squared deviation (that is, the best fit to the data). The good fit of the Taylor rule (and its asymmetric variant) is confirmed for the United States and the euro area as a whole. For a majority of euro area member states, however, actual interest rates have on average been closer to the benchmark rate derived from the inflation rules, which precludes country-specific output stabilization.

Appendix 2.4. Estimating Fiscal Reaction Functions

The main author of this appendix is Xavier Debrun.

This appendix provides technical details on the econometric evidence discussed in the third essay, about fiscal behaviors in the euro area, including the specification of the underlying models, and estimation procedures.

Specification

The specification of the econometric equation is similar to Galí and Perotti (2003) and several related studies,[66] focusing on three critical characteristics of discretionary fiscal policy—namely, the response to cyclical fluctuations, the sensitivity to movements in the public debt, and the reaction to deviations of short-term interest rates from benchmarks implied by monetary policy rules (in short, the "monetary gaps"—see Appendix 2.3). The model also allows for persistence in fiscal policy choices. Hence, the basic equation can be written as

$$S_t = \beta_0 + \beta_1 S_{t-1} + \beta_2 GAP_t + \beta_3 B_{t-1} + \beta_4 M_t + \varepsilon_t, \quad (1)$$

where t is a time index; S_t denotes the primary surplus (cyclically adjusted in percent of potential GDP); GAP_t is the output gap; B_t, the gross public debt in percent of potential GDP; M_t represents the deviations of short-term interest rates from the benchmarks; and ε_t is an error term.

Both for data availability reasons and to ease comparability with other studies (especially Galí and Perotti, 2003), regressions use annual data from the OECD's analytical database. The study focuses on euro area member states, excluding Luxembourg.

Estimation and Results

The empirical investigation proceeds in two steps. First, the fiscal policy equation (1) is estimated separately for each individual country (Table 2.7) with the maximum number of observations available, that is from 1971 (at the earliest) to 2003. The fact that the output gap and monetary policy can be expected to react to current fiscal policy actions implies a likely correlation with the error term so that standard

[66]See also the September 2003 *World Economic Outlook* for a detailed discussion of a similar specification.

Table 2.6. Monetary Gaps: Descriptive Statistics

	Austria	Belgium	Finland	France	Germany	Ireland
Inflation target	2.07	1.54	3.37	2.01	1.00	3.45
Equilibrium interest rate	2.25	2.47	2.52	2.34	2.09	4.00
Taylor rule (TR)						
1993–98 Mean	0.16	0.60	5.34	3.07	0.50	2.06
1993–98 RMSE	0.51	1.58	6.16	3.42	0.81	3.48
1999–2003 Mean	–0.73	–1.22	0.12	0.08	0.60	–7.51
1999–2003 RMSE	1.02	1.43	1.06	1.00	0.87	7.92
Inflation rule						
1993–98 Mean	0.18	**0.31**	**2.22**	1.65	–0.32	**1.10**
1993–98 RMSE	0.67	**1.37**	**2.65**	2.39	0.78	**2.58**
1999–2003 Mean	–0.38	**–1.06**	**–0.27**	–0.26	**–0.02**	–4.92
1999–2003 RMSE	0.81	**1.26**	**0.67**	1.25	**0.66**	5.22
Adding ULC to TR[1]						
1993–98 Mean	**0.03**	0.47	5.36	**2.96**	**0.41**	1.94
1993–98 RMSE	**0.50**	1.42	6.25	**1.05**	**0.74**	3.34
1999–2003 Mean	–0.82	–1.44	–0.11	–0.12	0.45	. . .
1999–2003 RMSE	1.07	1.66	1.08	1.05	0.77	. . .
Adding REER to TR[1]						
1993–98 Mean	0.03	0.56	5.22	3.02	0.56	1.70
1993–98 RMSE	0.51	1.65	6.07	3.41	0.94	3.31
1999–2003 Mean	–0.74	–1.26	0.05	**0.06**	0.54	–7.63
1999–2003 RMSE	1.05	1.47	1.14	**0.95**	0.88	8.04
Asymmetric TR						
1993–98 Mean	0.22	0.70	10.46	3.93	0.78	2.97
1993–98 RMSE	0.54	1.68	12.79	4.15	1.01	4.46
1999–2003 Mean	**–0.48**	–1.10	0.36	0.26	0.94	**–4.34**
1999–2003 RMSE	**0.80**	1.30	1.18	1.04	1.32	**4.66**

	Italy	Netherlands	Portugal	Spain	Euro Area	United States
Inflation target	2.17	2.07	1.66	2.16	1.75	2.50
Equilibrium interest rate	2.13	2.50	2.41	3.13	2.36	2.56
Taylor rule (TR)						
1993–98 Mean	2.61	–0.69	1.35	0.73	. . .	**0.00**
1993–98 RMSE	2.80	1.60	2.26	1.87	. . .	**0.95**
1999–2003 Mean	–0.96	–3.09	–3.29	–3.57	**–0.78**	–1.40
1999–2003 RMSE	1.16	3.26	3.44	3.64	**0.99**	1.68
Inflation rule						
1993–98 Mean	**1.78**	**–0.47**	**0.77**	**0.31**	. . .	–0.03
1993–98 RMSE	**1.99**	**1.20**	**1.70**	**1.60**	. . .	1.44
1999–2003 Mean	–1.22	**–2.31**	**–3.03**	**–3.40**	–1.01	–1.31
1999–2003 RMSE	1.51	**2.54**	**3.25**	**3.51**	1.33	2.11
Adding ULC to TR[1]						
1993–98 Mean	2.45	–0.80	. . .	0.43	. . .	**–0.17**
1993–98 RMSE	2.61	1.65	. . .	1.65	. . .	**0.94**
1999–2003 Mean	–1.12	–3.83	. . .	–3.92	. . .	–1.31
1999–2003 RMSE	1.29	3.95	. . .	3.99	. . .	1.77
Adding REER to TR[1]						
1993–98 Mean	2.51	–0.69	. . .	0.63	. . .	0.06
1993–98 RMSE	2.71	1.69	. . .	1.82	. . .	1.00
1999–2003 Mean	–0.95	–3.04	. . .	–3.49	–0.82	–1.35
1999–2003 RMSE	1.12	3.22	. . .	3.55	1.06	1.78
Asymmetric TR						
1993–98 Mean	2.99	–0.58	1.60	0.83	. . .	0.37
1993–98 RMSE	3.23	1.49	2.53	1.97	. . .	1.00
1999–2003 Mean	**–0.84**	–2.43	–3.12	–3.52	–0.82	–0.53
1999–2003 RMSE	**1.03**	2.70	3.28	3.60	1.03	1.41

Source: IMF staff estimates.
Note: Bold numbers identify the rule with the smallest root-mean-squared deviation (that is, the best fit to the data).
[1]ULC stands for unit labor costs and REER, for real effective exchange rate.

Table 2.7. Country-Specific Estimates of Fiscal Reaction Functions

(Dependent variable: cyclically adjusted primary balance in percent of potential GDP)

	Austria	Belgium[1]	Finland	France	Germany	Greece	Ireland	Italy	Netherlands	Portugal	Spain[1]
Lagged dependent variable											
Coefficient	0.50	0.71	0.45	0.63	0.45	0.69	0.86	0.51	0.43	0.22	0.47
Standard error	0.17	0.10	0.16	0.15	0.15	0.16	0.06	0.13	0.15	0.15	0.17
t-statistic	2.99***	6.90***	2.77***	4.17***	3.13***	4.32***	14.04***	3.88***	2.83***	1.52	2.72***
Output gap											
Coefficient	0.22	–0.19	0.15	–0.18	–0.25	–0.06	–0.27	–0.26	–0.36	–0.32	–0.06
Standard error	0.16	0.11	0.08	0.09	0.14	0.20	0.13	0.18	0.17	0.07	0.06
t-statistic	1.35	–1.73*	1.81*	–1.97*	–1.80*	–0.32	–2.06**	–1.45	–2.14**	–4.37***	–0.97
Lagged debt ratio											
Coefficient	0.02	0.06	0.05	0.02	0.00	0.07	0.00	0.07	0.05	0.26	0.08
Standard error	0.01	0.02	0.02	0.01	0.03	0.03	0.02	0.02	0.03	0.11	0.02
t-statistic	1.91*	2.98***	2.89***	1.31	0.09	2.09**	0.23	3.65***	1.86*	2.49**	3.96***
Monetary "gap"[2]											
Coefficient		–0.22	–0.15	–0.06	0.31	–0.15			–0.25	–0.19	–0.09
Standard error	[3]	0.10	0.09	0.05	0.11	0.16	[3]	[3]	0.12	0.17	0.07
t-statistic		–2.29**	–1.57	–1.21	2.87***	–0.93			–1.99*	–1.10	–1.32
Summary statistics											
R^2	0.34	0.92	0.62	0.55	0.78	0.83	0.91	0.92	0.52	0.82	0.84
Number of observations	30	31	27	26	32	27	24	33	28	26	24
Breaks[4]	No	1982	No	1992	1982	1991	No	No	1991	No	No

Source: IMF staff estimates.

[1]Robust standard errors (Newey-West correction) when evidence of first- and/or second-order autocorrelation is found.

[2]Monetary gaps are measured as the deviation of actual short-term interest rates from either the Taylor rule or the inflation rule described in Appendix 2.3.

[3]Likelihood ratio test identifies the monetary gap as a redundant variable and keeping it in the equation seriously affects other estimated coefficients.

[4]Identified on the basis of Chow tests. "Candidate" break dates are selected from a preliminary screening with Cusum-of-squares tests operated on OLS estimates.

ordinary least squares (OLS) estimates are biased. Individual equations are therefore estimated by two-stage least squares using as instruments all exogenous variables, own lagged output gaps, and lagged output gaps of the United States and Germany for all non-German European countries, and of the United States and France for Germany. In several cases, standard specification tests strongly reject the relevance of monetary gaps as an explanatory variable of fiscal behavior. They are consequently ignored for these countries. Finally, country-specific estimates also allow testing for structural breaks in the relationship, to see whether the *overall* fiscal policy behavior significantly changed over the sample period. The results are reported at the bottom of Table 2.7 and commented on in the main text.

The second step in the analysis takes advantage of the cross-country dimension of the dataset, looking at panel estimates of the monetary policy equations. On the one hand, this can be seen as the appropriate approach to check whether *area-wide* changes have occurred over time, for instance as a result of the new fiscal policy framework set out in the Maastricht Treaty and the Stability and Growth Pact. Country-specific estimates may indeed underplay these effects, in part because of the small number of observations over time and the correspondingly low power of the related tests. On the other hand, the panel approach can also offer useful insights on the causes of *cross-country differences* in the estimated coefficients, and thereby on the ultimate determinants of fiscal behaviors.

In practice, dummy variables can discriminate between different groups of countries or between periods in time. Interaction variables can also be used to look into the effect of time-varying country characteristics, such as openness to trade or the fiscal position of the government. The idea is to differentiate the estimated β coef-

ficients according to time- or country-specific features that may influence behaviors. In the case of dummy variables, statistically significant differences between the two sets of coefficients (e.g., before and after the inception of the Maastricht Treaty) will suggest that the criterion used to construct those two sets of estimates matters for fiscal behaviors. Statistical significance of interaction variables indicates that the β coefficients are linear functions of these variables.

To cope with the likely correlation of the output gap and the monetary gap with the error term, both explanatory variables are instrumented using their own lags and exogenous variables. The analysis also accounts for the possibility of common fiscal shocks (as may occur under coordinated discretionary actions) so that a three-stage least squares estimator is preferred.[67] The estimation also includes country dummies (fixed effects) unless particular dummies (such as the one indicating the start of EMU's fiscal framework) are allowed to have country-specific slopes. To account for the structural breaks identified in 1982 in two countries (see Table 2.7), the sample period is 1982–2003, unless otherwise indicated (the other structural breaks occurred in or close to 1992 and are therefore explicitly investigated). Finally, all equations include a dummy for 1997, the year considered by the European Union to evaluate fiscal positions in the perspective of entering EMU.

Tables 2.8 and 2.9 present a number of regressions allowing for two sets of estimates (first and second column associated with each equation). The Wald tests relating to the null hypothesis of identical coefficients between the two groups are reported in the third column of each equation. In Table 2.8, the Maastricht Treaty dummy takes a value of one after 1992 and zero otherwise. Bad times are defined as years with negative output gaps (that is, output below its potential level), the rest being considered as good times.[68] The dummy variables for "commitment states" and "delegation states" refer to a broad classification of budgetary institutions (as set out in Hallerberg, 2004; and Annett, 2004). Although both systems are intended to promote fiscal discipline by solving the common pool problem inherent to budget preparation,[69] they differ by the *degree of discretion* left in the hands of the finance ministry, with delegation models granting more discretion than commitment models. In practice, delegation models have been adopted by France, Germany, Greece, and Italy, with all other countries except Portugal (unclassified) being considered as having adopted the commitment model.

Table 2.8 also presents the distinction between the group of countries in breach (or having been in breach) of the SGP limits (France, Germany, and Portugal) and the rest. A similar exercise is run separating out the six countries in breach or close to breaching the SGP's limits (adding Italy, Greece, and the Netherlands). These regressions were run on a slightly shorter sample period (1982–2000), to capture behaviors *before* any breach. Table 2.9 confirms a conjecture by Jaeger and Schuknecht (2004) about the apparent lack of countercyclicality during asset price booms and busts. The boom/bust dummy was constructed on the basis of Table 2 in Jaeger and Schuknecht (2004).

Table 2.10 considers the impact of trade openness and the initial fiscal position on cyclicality through interaction variables. The interactions between these and the other explanatory variables of the model were found to be insignificant and to reduce the precision of estimates.

[67]As suggested by Judson and Owen (1999), the relatively long time-series dimension of this panel implies that the bias inherent to dynamic panel estimations should not have serious effects on the results.

[68]Notice that Table 2.4 in the main text combines the Maastricht Treaty dummy with the good-times dummy to refine the analysis of cyclicality. However, for that particular exercise, the other parameters were assumed constant over time.

[69]Von Hagen, Hallerberg, and Strauch (2004) show that both models indeed provide fiscal discipline through different channels. They also show that political institutions and constitutional features of countries determine the choice for one system against the other. The dummies are based on Box 2 in Annett (2004).

Table 2.8. Fiscal Authorities' Behavior in the Euro Area: Panel Analysis, 1982–2003

(Dependent variable: cyclically adjusted primary balance in percent of potential GDP)

		Maastricht Treaty			Behavior in:		
	Benchmark	Before	After	Wald test	Good times	Bad times	Wald test
Persistence	0.685	0.498	0.527	0.158	0.668	0.653	0.075
Standard error	0.027	0.048	0.055	—	0.046	0.032	—
P-value	0.000	0.000	0.000	0.691	0.000	0.000	0.784
Output stabilization	–0.120	–0.175	–0.040	5.811	–0.231	–0.073	2.607
Standard error	0.023	0.032	0.046	—	0.091	0.043	—
P-value	0.000	0.000	0.386	0.016	0.012	0.092	0.106
Debt stabilization	0.029	0.059	0.0422	1.145	0.034	0.034	0.000
Standard error	0.004	0.014	0.008	—	0.009	0.005	—
P-value	0.000	0.000	0.000	0.285	0.000	0.000	0.983
Reaction to monetary gap	–0.063	–0.115	–0.050	2.016	–0.122	0.026	4.931
Standard error	0.018	0.031	0.033	—	0.039	0.021	—
P-value	0.001	0.000	0.130	0.156	0.002	0.232	0.026
Number of observations	242		242			242	

		Commitment State?			Delegation State?		
	Benchmark	Yes	No	Wald test	Yes	No	Wald test
Persistence	0.685	0.621	0.632	0.032	0.594	0.674	0.874
Standard error	0.027	0.057	0.037	—	0.084	0.029	—
P-value	0.000	0.000	0.000	0.857	0.000	0.000	0.350
Output stabilization	–0.120	–0.066	–0.142	1.877	–0.248	–0.095	4.641
Standard error	0.023	0.047	0.030	—	0.062	0.027	—
P-value	0.000	0.158	0.000	0.171	0.000	0.001	0.031
Debt stabilization	0.029	0.040	0.030	11.542	0.034	0.029	1.410
Standard error	0.004	0.005	0.004	—	0.005	0.005	—
P-value	0.000	0.000	0.000	0.001	0.000	0.000	0.235
Reaction to monetary gap	–0.063	–0.084	–0.022	1.531	–0.001	–0.063	1.072
Standard error	0.018	0.043	0.024	—	0.055	0.022	—
P-value	0.001	0.051	0.360	0.216	0.989	0.005	0.301
Number of observations	242		242			242	

		3 In Breach of SGP?[1]			6 at Odds With SGP?[1]		
	Benchmark	Yes	No	Wald test	Yes	No	Wald test
Persistence	0.685	0.349	0.714	30.144	0.556	0.677	4.295
Standard error	0.027	0.061	0.031	—	0.052	0.034	—
P-value	0.000	0.000	0.000	0.000	0.000	0.000	0.038
Output stabilization	–0.120	–0.165	–0.066	5.550	–0.230	–0.017	13.860
Standard error	0.023	0.036	0.031	—	0.038	0.038	—
P-value	0.000	0.000	0.036	0.019	0.000	0.667	0.000
Debt stabilization	0.029	0.023	0.032	0.748	0.053	0.028	5.794
Standard error	0.004	0.010	0.005	—	0.008	0.006	—
P-value	0.000	0.019	0.000	0.387	0.000	0.000	0.016
Reaction to monetary gap	–0.063	–0.057	–0.046	0.072	–0.067	–0.039	0.302
Standard error	0.018	0.030	0.029	—	0.027	0.038	—
P-value	0.001	0.057	0.114	0.789	0.014	0.316	0.583
Number of observations	242		209			209	

Source: IMF staff estimates.
[1]Estimated over the period 1982–2000.

Table 2.9. Fiscal Authorities' Behavior in the Euro Area: Panel Analysis, 1982–2003

(Dependent variable: cyclically adjusted primary balance in percent of potential GDP)

		Asset Price Boom/Bust?		
	Benchmark	Yes	No	Wald test
Persistence	0.685	0.660	0.666	0.014
Standard error	0.027	0.039	0.037	—
P-value	0.000	0.000	0.000	0.907
Output stabilization	–0.120	–0.016	–0.175	11.560
Standard error	0.023	0.038	0.032	—
P-value	0.000	0.666	0.000	0.001
Debt stabilization	0.029	0.038	0.032	5.925
Standard error	0.004	0.005	0.005	—
P-value	0.000	0.000	0.000	0.015
Reaction to monetary gap	–0.063	0.010	–0.084	6.045
Standard error	0.018	0.032	0.023	—
P-value	0.001	0.750	0.000	0.014
Number of observations	242		242	

Source: IMF staff estimates.

Table 2.10. Fiscal Authorities' Behavior in the Euro Area: Panel Analysis, 1982–2003

(Dependent variable: cyclically adjusted primary balance in percent of potential GDP)

	Benchmark	Fiscal Position	Openness
Persistence	0.685	0.670	0.614
Standard error	0.027	0.028	0.032
P-value	0.000	0.000	0.000
Output stabilization	–0.120	–0.117	0.009
Standard error	0.023	0.025	0.053
P-value	0.000	0.000	0.863
Output stabilization and trade openness	—	—	–0.002
Standard error	—	—	0.001
P-value	—	—	0.006
Output stabilization and fiscal position[1]	—	–0.026	—
Standard error	—	0.013	—
P-value	—	0.054	—
Debt stabilization	0.029	0.027	0.033
Standard error	0.004	0.004	0.004
P-value	0.000	0.000	0.000
Reaction to monetary gap	–0.063	–0.077	–0.026
Standard error	0.018	0.019	0.021
P-value	0.001	0.000	0.227
Number of observations	242	242	242

Source: IMF staff estimates.
[1]Fiscal position corresponds to the lagged cyclically adjusted primary surplus.

References

Abiad, Abdul, and Ashoka Mody, 2003, "Financial Reform: What Shakes It? What Shapes It?" IMF Working Paper 03/70 (Washington: International Monetary Fund). Also forthcoming in the *American Economic Review*.

Acharya, Shankar, 2002, "Macroeconomic Management in the Nineties," *Economic and Political Weekly*, Vol. 37 (April), pp. 1515–38.

Alesina, Alberto, Olivier Blanchard, Jordi Galí, Francesco Giavazzi, and Harald Uhlig, 2001, *Defining a Macroeconomic Policy Framework for the Euro Area: Monitoring the European Central Bank 3* (London: Centre for Economic Policy Research).

Annett, Tony, 2004, "Enforcement and the Stability and Growth Pact: Where Do We Go from Here?" (unpublished; Washington: International Monetary Fund).

Arellano, Manuel, and Stephen Bond, 1991, "Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations," *Review of Economic Studies*, Vol. 58 (April), pp. 277–97.

Ariyoshi, Akira, Karl Habermeier, Bernard Laurens, Inci Ötker-Robe, Jorge Ivan Canales-Kriljenko, and Andrei Kirilenko, 2000, *Capital Controls: Country Experiences with Their Use and Liberalization*, IMF Occasional Paper No. 190 (Washington: International Monetary Fund).

Arnone, Marco, and Bernard Laurens, 2004, "Measures of Central Bank Autonomy: Empirical Evidence for OECD and Developing Countries, and Emerging Market Economies" (unpublished; Washington: International Monetary Fund).

Baele, Lieven, Annalisa Ferrando, Peter Hördahl, Elizaveta Krylova, and Cyril Monnet, 2004, "Measuring Financial Integration in the Euro Area," ECB Occasional Paper No. 14 (Frankfurt: European Central Bank).

Ballabriga, Fernando, and Carlos Martinez-Mongay, 2002, "Has EMU Shifted Policy?" Economic Paper No. 166 (Brussels: European Commission).

Bayoumi, Tamim, and Barry Eichengreen, 1997, "Shocking Aspects of European Monetary Unification," in *European Monetary Unification: Theory, Practice and Analysis*, ed. by Barry Eichengreen (Cambridge, Massachusetts: MIT Press), pp. 73–109.

Bayoumi, Tamim, and Paul Masson, 1998, "Liability-Creating Versus Non-Liability-Creating Fiscal Stabilization Policies: Ricardian Equivalence, Fiscal

Stabilization, and EMU," *Economic Journal*, Vol. 108 (July), pp. 1026–45.

Beck, Thorsten, Asli Demirgüç-Kunt, and Ross Levine, 1999, "A New Database on Financial Development and Structure," World Bank Working Paper No. 2146 (Washington: World Bank).

Beetsma, Roel, 2004, "Europe's Future Fiscal Challenges" (unpublished; Washington: International Monetary Fund).

Berger, Helge, and Friedrich Schneider, 2000, "The Bundesbank's Reaction to Policy Conflicts," in *The History of the Bundesbank*, ed. by Jakob de Haan (London: Routledge), pp. 43–66.

Bernanke, Ben, Jean Boivin, and Piotr Eliasz, 2004, "Measuring the Effects of Monetary Policy: A Factor-Augmented Vector Autoregressive (FAVAR) Approach," Finance and Economics Discussion Series No. 2004-3 (Washington: Board of Governors of the Federal Reserve System).

Bogdanski, Joel, Alexandre Antonio Tombini, and Sérgio Ribeiro da Costa Werlang, 2000, "Implementing Inflation Targeting in Brazil," presented at the International Monetary Fund seminar "Implementing Inflation Targets," Washington, March 20–21.

Bohn, Henning, 1998, "The Behavior of U.S. Public Debt and Deficits," *Quarterly Journal of Economics*, Vol. 113 (August), pp. 949–63.

Bubula, Andrea, and Inci Ötker-Robe, 2002, "The Evolution of Exchange Rate Regimes Since 1990: Evidence from De Facto Policies," IMF Working Paper 02/155 (Washington: International Monetary Fund).

Buti, Marco, Jan In't Veld, and Werner Roeger, 2001, "Stabilising Output and Inflation in EMU: Policy Conflicts and Co-operation Under a Stability Pact," *Journal of Common Market Studies*, Vol. 39, No. 5, pp. 801–28.

Calmfors, Lars, 2003, "Fiscal Policy to Stabilise the Domestic Economy in the EMU: What Can We Learn from Monetary Policy?" *CESifo Economic Studies*, Vol. 49, No. 3, pp. 319–53.

Calvo, Guillermo, and Carmen Reinhart, 2002, "Fear of Floating," *Quarterly Journal of Economics*, Vol. 117 (May), pp. 379–408.

Calvo, Guillermo, and Frederic Mishkin, 2003, "The Mirage of Exchange Rate Regimes for Emerging Market Countries," NBER Working Paper No. 9808 (Cambridge, Massachusetts: National Bureau of Economic Research).

Campa, Jose, and Linda Goldberg, 2001, "Exchange Rate Pass-Through into Import Prices: A Macro or Micro Phenomenon?" Staff Report No. 149 (New York: Federal Reserve Bank).

Campbell, John, and João Cocco, 2003, "Household Risk Management and Optimal Mortgage Choice," *Quarterly Journal of Economics*," Vol. 118 (November), pp. 1449–94.

Carare, Alina, Andrea Schaechter, Mark Stone, and Mark Zelmer, 2002, "Establishing Initial Conditions in Support of Inflation Targeting," IMF Working Paper 02/102 (Washington: International Monetary Fund).

Case, Bradford, William Goetzmann, and K. Geert Rouwenhorst, 1999, "Global Real Estate Markets: Cycles and Fundamentals," Yale ICY Working Paper No. 99–03 (New Haven, Connecticut: Yale International Center for Finance).

Castelnuovo, Efrem, 2003, "Taylor Rules and Interest Rate Smoothing in the US and EMU" (unpublished; Milan: Bocconi University).

Chopra, Ajai, Charles Collyns, Richard Hemming, and Karen Parker, with Woosik Chu and Oliver Fratzscher, 1995, *India: Economic Reform and Growth*, IMF Occasional Paper No. 134 (Washington: International Monetary Fund).

Choudhri, Ehsan, and Dalia Hakura, 2001, "Exchange Rate Pass-Through to Domestic Prices: Does the Inflationary Environment Matter?" IMF Working Paper 01/194 (Washington: International Monetary Fund). Also forthcoming in the *Journal of International Money and Finance*.

Clarida, Richard, Jordi Galí, and Mark Gertler, 1998, "Monetary Policy Rules in Practice: Some International Evidence," *European Economic Review*, Vol. 42 (June), pp. 1033–67.

Commission of the European Communities, 2004, "Financial Integration Monitor: Commission Staff Working Document," SEC(2004) 559. Available via the Internet: http://europa.eu.int/comm/internal_market/en/finances/cross-sector/fin-integration/sec–2004–559_en.pdf.

Davis, Morris, and Jonathan Heathcote, 2004, "Housing and the Business Cycle," Finance and Economics Discussion Series No. 2004–11 (Washington: Board of Governors of the Federal Reserve System).

Debelle, Guy, 2004, "Macroeconomic Implications of Rising Household Debt," BIS Working Paper No. 153 (Basel: Bank for International Settlements).

Debrun, Xavier, and Charles Wyplosz, 1999, "Onze Gouvernements et Une Banque Centrale," *Revue*

d'Economie Politique, Vol. 109 (May–June), pp. 387–424.

Deroose, Servaas, Sven Langedijk, and Werner Roeger, 2004, "Reviewing Adjustment Dynamics in EMU: From Overheating to Overcooling," Economic Paper No. 198 (Brussels: European Commission).

Doyle, Brian, and Jon Faust, 2003, "Breaks in the Variability and Co-Movements of G-7 Economic Growth," International Finance Discussion Paper No. 786 (Washington: Board of Governors of the Federal Reserve System).

Duttagupta, Rupa, Gilda Fernández, and Cem Karacadag, 2004, "From Fixed to Floating: Operational Aspects of Moving Toward Exchange Rate Flexibility," IMF Working Paper 04/126 (Washington: International Monetary Fund).

Edison, Hali, and Francis Warnock, 2003, "A Simple Measure of the Intensity of Capital Controls," *Journal of Empirical Finance*, Vol. 10 (February), pp. 81–103.

Eichengreen, Barry, and Paul Masson, with Hugh Bredenkamp, Barry Johnston, Javier Hamann, Esteban Jadresic, and Inci Ötker, 1998, *Exit Strategies: Policy Options for Countries Seeking Greater Exchange Rate Flexibility*, IMF Occasional Paper No. 168 (Washington: International Monetary Fund).

Eichengreen, Barry, Paul Masson, Miguel Savastano, and Sunil Sharma, 1999, "Transition Strategies and Nominal Anchors on the Road to Greater Exchange-Rate Flexibility," Essays in International Finance No. 213 (Princeton, New Jersey: Princeton University).

Ellis, Luci, Jeremy Lawson, and Laura Roberts-Thomson, 2003, "Housing Leverage in Australia," Research Discussion Paper No. 2003–09 (Sydney: Reserve Bank of Australia).

Emerson, Michael, and others, 1990, "One Market, One Money," European Economy No. 44 (Brussels: Commission of the European Communities).

European Central Bank, 2003, "Structural Factors in the EU Housing Markets" (unpublished; Frankfurt).

Faruqee, Hamid, 2004, "Measuring the Trade Effects of EMU," IMF Working Paper (Washington: International Monetary Fund, forthcoming).

Fatás, Antonio, and Ilian Mihov, 2003, "On Constraining Fiscal Policy Discretion in EMU," *Oxford Review of Economic Policy*, Vol. 19, No. 1, pp. 1–28.

Favero, Carlo, 2002, "How Do European Monetary and Fiscal Authorities Behave?" CEPR Discussion Paper No. 3426 (London: Centre for Economic Policy Research).

Forni, Mario, Marc Hallin, Marco Lippi, and Lucrezia Reichlin, 2000, "The Generalized Dynamic-Factor Model: Identification and Estimation," *Review of Economics and Statistics*, Vol. 82 (November), pp. 540–54.

Gagnon, Joseph, and Jane Ihrig, 2001, "Monetary Policy and Exchange Rate Pass-Through," International Finance Discussion Paper No. 704 (Washington: Board of Governors of the Federal Reserve System).

Galí, Jordi, and Roberto Perotti, 2003, "Fiscal Policy and Monetary Integration in Europe," *Economic Policy*, Vol. 37 (October), pp. 535–72.

Genberg, Hans, and Alexander K. Swoboda, 2004, "Exchange Rate Regimes: Does What Countries Say Matter?" (unpublished; Geneva: Graduate Institute of International Studies).

Gerlach, Stefan, and Gert Schnabel, 2000, "The Taylor Rule and Interest Rates in the EMU Area," *Economics Letters*, Vol. 67 (May), pp. 165–71.

Gerlach-Kristen, Petra, 2003, "Interest Rate Reaction Functions and the Taylor Rule in the Euro Area," ECB Working Paper No. 258 (Frankfurt: European Central Bank).

Ghosh, Atish, Anne-Marie Gulde, Jonathan Ostry, and Holger Wolf, 1997, "Does the Nominal Exchange Rate Regime Matter?" NBER Working Paper No. 5874 (Cambridge, Massachusetts: National Bureau of Economic Research).

Girouard, Nathalie, and Sveinbjorn Blondal, 2001, "House Prices and Economic Activity," OECD Economics Department Working Paper No. 279 (Paris: Organization for Economic Cooperation and Development).

Glick, Reuven, and Andrew K. Rose, 2002, "Does a Currency Union Affect Trade? The Time Series Evidence," *European Economic Review*, Vol. 46, No. 6, pp. 1125–51.

Goldstein, Morris, and Philip Turner, 2004, *Controlling Currency Mismatches in Emerging Markets* (Washington: Institute for International Economics).

Grilli, Vittorio, Donato Masciandaro, and Guido Tabellini, 1991, "Political and Monetary Institutions and Public Financial Policies in the Industrial Countries," *Economic Policy: A European Forum*, Vol. 6 (October), pp. 342–91.

Guimarães, Roberto, and Cem Karacadag, 2004, "The Empirics of Foreign Exchange Rate Intervention in Emerging Markets: The Cases of Mexico and

Turkey," IMF Working Paper 04/123 (Washington: International Monetary Fund).

Hallerberg, Mark, 2004, *Domestic Budgets in a United Europe: Fiscal Governance from the End of Bretton Woods to EMU* (Ithaca, New York: Cornell University Press).

———, and Rolf Strauch, 2002, "On the Cyclicality of Public Finances in Europe," *Empirica*, Vol. 29, No. 3, pp. 183–207.

Hamilton, James, 1994, *Time Series Analysis* (Princeton, New Jersey: Princeton University Press).

Hausmann, Ricardo, Ugo Panizza, and Ernesto Stein, 2001, "Why Do Countries Float the Way They Float?" *Journal of Development Economics*, Vol. 66, pp. 387–414.

Helbling, Thomas, and Tamim Bayoumi, 2003, "Are They All in the Same Boat? The 2000–2001 Growth Slowdown and the G-7 Business Cycle Linkages," IMF Working Paper 03/46 (Washington: International Monetary Fund).

Helbling, Thomas, and Marco Terrones, 2003, "Asset Price Booms and Busts—Stylized Facts from the Last Three Decades of the 20th Century," presented at the European Central Bank workshop "Asset Prices and Monetary Policy," Frankfurt, December 11–12.

Henley, Andrew, and Bruce Morley, 2001, "European House Price Volatility and the Macroeconomy: The Implications for European Monetary Union," Royal Economic Society Conference Paper, University of Wales, Aberystwyth.

Honohan, Patrick, and Philip Lane, 2003, "Divergent Inflation Rates in EMU," *Economic Policy*, Vol. 18, No. 37, pp. 357–94.

HSBC, 2004, "The U.S. Housing Bubble: The Case for a Home-Brewed Hangover." U.S. Economics Special Report (New York: HSBC, June).

Husain, Aasim, Ashoka Mody, and Kenneth Rogoff, 2004, "Exchange Rate Regime Durability and Performance in Developing Versus Advanced Economies" (unpublished; Washington, Cambridge, Massachusetts: IMF and Harvard University).

IMF Independent Evaluation Office, 2003, *The IMF and Recent Capital Account Crises: Indonesia, Korea, Brazil* (Washington: International Monetary Fund).

Jaeger, Albert, 2001, "Cyclical Fiscal Policy Behavior in EU Countries," Selected Issues paper for 2001 Euro Area Article IV Consultation (Washington: International Monetary Fund).

———, and Ludger Schuknecht, 2004, "Boom-Bust Phases in Asset Prices and Fiscal Policy," IMF Working Paper 04/54 (Washington: International Monetary Fund).

Judson, Ruth, and Ann Owen, 1999, "Estimating Dynamic Panel Data Models: A Guide for Macroeconomists," *Economics Letters*, Vol. 65 (October), pp. 9–15.

Kalter, Eliot, Steven Phillips, Marco A. Espinosa-Vega, Rodolfo Luzio, Mauricio Villafuerte, and Manmohan Singh, 2004, *Chile: Institutions and Policies Underpinning Stability and Growth*, IMF Occasional Paper No. 231 (Washington: International Monetary Fund).

Kose, Ayhan, Christopher Otrok, and Charles Whiteman, 2003, "International Business Cycles: World, Region, and Country-Specific Factors," *American Economic Review*, Vol. 93 (September), pp. 1216–39.

Kose, Ayhan, Eswar Prasad, and Marco Terrones, 2003, "How Does Globalization Affect the Synchronization of Business Cycles?" *American Economic Review, Papers and Proceedings*, Vol. 92 (May), pp. 57–62.

———, 2004, "Volatility and Co-movement in a Globalized World Economy: An Empirical Exploration," in *Macroeconomic Policies in the World Economy*, ed. by Horst Siebert (Berlin: Springer-Verlag, forthcoming).

Lamont, Owen, and Jeremy Stein, 1999, "Leverage and House Price Dynamics in U.S. Cities," *Rand Journal of Economics*, Vol. 30 (Autumn), pp. 498–514.

Lane, Philip, 2003, "The Cyclical Behavior of Fiscal Policy: Evidence from the OECD," *Journal of Public Economics*, Vol. 87, No. 12, pp. 2661–75.

Levy-Yeyati, Eduardo, and Federico Sturzenegger, 2002, "Classifying Exchange Rate Regimes: Deeds Versus Words" (Buenos Aires: Universidad Torcuato Di Tella). Available via the Internet: http://www.utdt.edu/~fsturzen.

———, 2003, "To Float or to Fix: Evidence on the Impact of Exchange Rate Regimes on Growth," *American Economic Review*, Vol. 93 (September), pp. 1173–93.

McCarthy, Jonathan, and Richard Peach, 2004, "Are Home Prices the Next 'Bubble'?" FRBNY Economic Policy Review (unpublished; New York: Federal Reserve Bank).

Mélitz, Jacques, 1997, "Some Cross-Country Evidence About Debts, Deficits, and the Behavior of Monetary and Fiscal Authorities," CEPR Discussion Paper No. 1653 (London: Centre for Economic Policy Research).

Micco, Alejandro, Ernesto Stein, and Guillermo Ordoñez, 2003, "The Currency Union Effect on Trade: Early Evidence from EMU," *Economic Policy*, Vol. 18 (April), pp. 315–56.

Miles, David, 2004, "The UK Mortgage Market: Taking a Longer-Term View. Final Report and Recommendations" (London: The Stationery Office).

Milesi-Ferretti, Gian Maria, and Assaf Razin, 2000, "Current Account Reversals and Currency Crises: Empirical Regularities," in *Currency Crises*, ed. by Paul Krugman (Washington: International Monetary Fund).

Milesi-Ferretti, Gian Maria, and Kenji Moriyama, 2004, "Fiscal Adjustment in EU Countries: A Balance Sheet Approach," IMF Working Paper (Washington: International Monetary Fund, forthcoming).

Mishkin, Frederic, 1996, "Understanding Financial Crises: A Developing Country Perspective," NBER Working Paper No. 5600 (Cambridge, Massachusetts: National Bureau of Economic Research).

Morandé, Felipe G., 2001, "Exchange Rate Policy in Chile: Recent Experience," presented at the International Monetary Fund conference "Exchange Rate Regimes: Hard Peg or Free Floating?" Washington, March 19–20.

Mundell, Robert, 1961, "A Theory of Optimum Currency Areas," *American Economic Review*, Vol. 51 (September), pp. 657–65.

Muscatelli, V. Anton, Patrizio Tirelli, and Carmine Trecroci, 2004, "Monetary and Fiscal Policy Interactions Over the Cycle: Some Empirical Evidence," in *Monetary Policy, Fiscal Policies and Labour Markets: Macroeconomic Policymaking in the EMU*, ed. by Roel Beetsma and others (Cambridge, Massachusetts: University Press).

Obstfeld, Maurice, and Kenneth Rogoff, 1996, *Foundations of International Macroeconomics*, (Cambridge, Massachusetts: MIT Press).

Organization for Economic Cooperation and Development (OECD), 2004, *Economic Outlook, May*, Chapter IV (Paris).

Otrok, Christopher, and Charles Whiteman, 1998, "Bayesian Leading Indicators: Measuring and Predicting Economic Conditions in Iowa," *International Economic Review*, Vol. 39, No. 4, pp. 997–1014.

Otrok, Christopher, Pedro Silos, and Charles Whiteman, 2003, "Bayesian Dynamic Factor Models for Large Datasets: Measuring and Forecasting Macroeconomic Data" (unpublished; Charlottesville, Virginia: University of Virginia).

Otto, Glenn, Graham Voss, and Luke Willard, 2003, "A Cross Section Study of the International Transmission of Business Cycles" (unpublished; Victoria, British Columbia: University of Victoria).

Persson, Torsten, 2001, "Currency Unions and Trade: How Large is the Treatment Effect?" *Economic Policy*, Vol. 33 (October), pp. 435–48.

Piazzesi, Monika, Martin Schneider, and Selale Tuzel, 2004, "Housing, Consumption, and Asset Pricing" (unpublished; Chicago: University of Chicago).

PricewaterhouseCoopers, 2002, *European Economic Outlook*, May.

Pyhrr, Stephen, Stephen Roulac, and Waldo Born, 1999, "The Real Estate Cycles and Their Strategic Implications for Investors and Portfolio Managers in the Global Economy," *Journal of Real Estate Research*, Vol. 18, No. 1, pp. 7–68.

Quan, Daniel, and Sheridan Titma, 1998, "Do Real Estate Prices and Stock Prices Move Together? An International Analysis," *Real Estate Economics*, Vol. 27, No. 2, pp. 183–207.

Rankin, Bob, 2001, "The Exchange Rate and the Reserve Bank's Role in the Foreign Exchange Market" (Sydney: Reserve Bank of Australia). Available via the Internet: http://www.rba.gov.au/Education/exchange_rate.html.

Reinhart, Carmen, and Kenneth Rogoff, 2004, "The Modern History of Exchange Rate Arrangements: A Reinterpretation," *Quarterly Journal of Economics*, Vol. 119 (February), pp. 1–48.

Rogoff, Kenneth, Aasim Husain, Ashoka Mody, Robin Brooks, and Nienke Oomes, 2003, "Evolution and Performance of Exchange Rate Regimes," IMF Working Paper 03/243 (Washington: International Monetary Fund).

———, 2004, *Evolution and Performance of Exchange Rate Regimes*, IMF Occasional Paper No. 229 (Washington: International Monetary Fund).

Rose, Andrew K., 2000, "One Money, One Market: Estimating the Effect of Common Currencies on Trade," *Economic Policy*, Vol. 15, No. 30, pp. 7–45.

———, 2004, "A Meta-Analysis of the Effect of Common Currencies on International Trade," NBER Working Paper No. 10373 (Cambridge, Massachusetts: National Bureau of Economic Research).

Siklos, Pierre, Thomas Werner, and Martin Bohl, 2004, "Asset Prices in Taylor Rules: Specification, Estimation and Policy Implications for the ECB"(unpublished). Available via the Internet: http://www.wlu.ca/~wwwsbe/faculty/psiklos/papers/buba_ii_04–2004.pdf.

Sinn, Hans-Werner, and Michael Reutter, 2001, "The Minimum Inflation Rate for Euroland," NBER Working Paper No. 8085 (Cambridge, Massachusetts: National Bureau of Economic Research).

Spearman, Charles, 1904, "'General Intelligence,' Objectively Determined and Measured," *American Journal of Psychology*, Vol. 15, pp. 201–93.

Stock, James, and Mark Watson, 2002, "Macroeconomics Forecasting Using Diffusion Indexed," *Journal of Business and Economic Statistics*, Vol. 20 (April), pp. 147–62.

———, 2003, "Understanding Changes in International Business Cycle Dynamics," NBER Working Paper No. 9859 (Cambridge, Massachusetts: National Bureau of Economic Research).

Stone, Mark, and Scott Roger, 2004, "Home on the Range: Country Experiences with Inflation Targeting" (unpublished; Washington: International Monetary Fund).

Sveriges Riksbank, 2002, "The Riksbank's Interventions in the Foreign Exchange Market—Operations, Decision-Making and Communication" (Stockholm).

Talvi, Ernesto, and Carlos Vegh, 2000, "Tax Base Variability and Procyclical Fiscal Policy," NBER Working Paper No. 7499 (Cambridge, Massachusetts: National Bureau of Economic Research).

Tapia, Matias, and Andrea Tokman, 2004, "Effects of Foreign Exchange Intervention Under Public Information: The Chilean Case," Central Bank of Chile Working Paper No. 255 (Santiago: Central Bank of Chile).

Taylor, John, 1993, "Discretion Versus Policy Rules in Practice," *Carnegie-Rochester Conference Series on Public Policy*, Vol. 39 (December), pp. 195–220.

———, 1999, "A Historical Analysis of Monetary Policy Rules," in *Monetary Policy Rules*, ed. by John Taylor (Chicago: University of Chicago Press).

———, 2000, "Reassessing Discretionary Fiscal Policy" (unpublished; Stanford, California: Stanford University).

Tenreyro, Silvana, 2001, "On the Causes and Consequences of Currency Unions"(unpublished; Cambridge, Massachusetts: Harvard University). Available via the Internet: http://www.faculty.haas.berkeley.edu/arose/tenreyro.pdf.

Tornell, Aaron, and Philip Lane, 1999, "The Voracity Effect," *American Economic Review*, Vol. 89 (March), pp. 22–46.

Von Hagen, Jürgen, Mark Hallerberg, and Rolf Strauch, 2004, "The Design of Fiscal Rules and Forms of Governance in European Union Countries" (unpublished; Bonn: Zentrum für Europäische Integrationsforschung/Center for European Integration Studies, Reinische Friedrich-Wilhelms-Universität).

Von Hagen, Jürgen, Andrew Hughes Hallett, and Rolf Strauch, 2001, "Budgetary Consolidation in EMU," Economic Papers No. 148 (Brussels: European Commission).