Finance and convergence

SUMMARY

Recent studies have found that capital moves 'uphill' from poor to rich countries, and brings little or no growth dividend when it does flow into poor economies. We show that Europe does not conform to this paradigm. In the European experience of financial integration, capital has flown from rich to poor countries, and such inflows have been associated with significant acceleration of income convergence. Analysing broader samples of countries, we find that 'downhill' capital flows tend to be observed above certain thresholds in institutional quality and financial integration. But Europe remains different even when allowing for such threshold effects, and its experience is similar to that of interstate flows within the United States. Our findings are consistent with the notion that financial diversification reduces countries' incentives to save in order to self-insure against specific shocks.

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Financial integration, capital mobility, and income convergence

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1. INTRODUCTION

A view seems to be emerging from the recent literature that international capital more naturally flows 'uphill' from poor to rich countries. Moreover, such a reallocation of capital is inferred as having desirable growth consequences for both the poor countries originating the flow and the rich ones receiving it.[1] While provocative, this conclusion – driven in large part by the experience of China and some other Asian nations transferring capital to the United States – has obscured exploration of other important trends and propositions. We find that in Europe, deepening financial integration has helped capital flow 'downhill' from rich to poor countries, facilitating the convergence of per capita incomes.

The views expressed here are those of the authors and not necessarily those of the IMF. The authors are grateful to Olivier Blanchard for sharing the Blanchard and Giavazzi (2002) data, which allowed benchmarking those results, and for his willingness to respond to successive drafts. They are grateful also to Gian Maria Milesi-Ferretti, Catia Batista, Kenichi Ueda, and to seminar participants at the IMF, the European Central Bank, and the Norface Seminar in Dublin. Our discussants at the *Economic Policy* panel meeting, Klaus Adam and Jean Imbs, were particularly helpful.
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[1] Prasad *et al.* (2006, p. 10) conclude: 'while developing countries grow faster by relying less on foreign savings, it is just the opposite for industrial countries. Put another way, neither China nor the United States, both fast growing countries for their stage of development, are running perverse current account balances relative to the norm. They are just extreme examples of their respective class of country!' See also Gourinchas and Jeanne (2007).

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Does Europe offer a counterexample to the emerging consensus? Of course, growth dynamics vary across countries and regions for many deep historical and geographical reasons (see Pritchett, 2003). Our analysis, however, establishes that the European experience is consistent with the more conventional textbook perspective that financial integration fosters the downhill flow of capital, which, in turn, accelerates income convergence. This is not simply the result of Europe's institutions falling on the high side of a dividing threshold of institutional quality and financial integration: thresholds do matter for capital flows, but the European difference does not just depend on its countries' level of institutional development. Europe's experience corresponds more closely to intra-national flows within the United States, supporting the view that European trends reflect declining frictions associated with borders. Nevertheless, the echoes of the European experience with capital flows in the broader community of nations suggests that with the increased diversification brought about by integration, the incentives for countries to self-insure – with high savings rates and postponed consumption – may become less compelling.

The textbook theory is straightforward: a reallocation of capital from richer to poorer countries is twice blessed (Barro *et al.*, 1995; Gourinchas and Jeanne, 2006). It is efficient because the poorer receiving country, with its lower capital–labour ratio, also has a higher marginal product of capital (assuming the same production 'technology', in the broad sense of the word). The reallocation speeds up global per capita income convergence as incomes in the poorer countries rise faster to their steady-state levels than would be the case without capital mobility. To the extent that capital mobility brings with it collateral productivity benefits, long-run *levels* of per capita income in poorer nations would also rise. Such productivity gains may accrue from generalized knowledge transfer or from greater domestic financial sector efficiency, better governance, and improved macroeconomic discipline (see Kose *et al.*, 2006).

Our focus is on financial integration, which should promote this process of capital reallocation and income convergence. The logic of this proposition and our contributions within that context are as follows. First, greater financial openness encourages diversification and risk sharing, whether that openness is measured by *de jure* capital barriers (Lewis, 1996) or *de facto* international capital holdings (Fratzscher and Imbs, 2008). With enhanced possibilities of international portfolio diversification, investors will be more inclined to shift from safe low-yield to risky high-yield investments (Obstfeld, 1994; Sandri, 2008), promoting downhill capital flows. These capital inflows can be expected to accelerate income convergence but as the income gap closes, foreign capital inflows begin to decline, as does the growth dividend from the flows. External finance, therefore, has a self-limiting transitory influence, though the transition can be drawn out. This paper is, in the first instance, a documentation that the process implied by this logic holds in Europe.

Which begs the question: why is Europe different? While we cannot resolve this question definitively, we explore several possibilities. The first obvious stop is the role of 'institutions' that improve governance and protect property rights. Studies have

found that both the flow of capital and the value of that capital for growth appear to be aided by superior institutions (see, respectively, Alfaro, Kalemli-Ozcan, and Volosovych, 2008 and Klein, 2005). We confirm that beyond certain institutional thresholds, capital flows and income convergence in a broader sample of countries show similarities to those observed in Europe. This is a hopeful sign, suggesting that institutional progress may reproduce European-style capital flows and income convergence. However, the mystery remains since even after allowing for conventionally measured institutional thresholds, the European difference is significant.

Similarly, thresholds in financial integration itself may matter. To the extent that high levels of financial integration enable portfolio risk diversification and capital reallocation, European trends in financial integration may be a bellwether for the rest of the world, pointing to the policy objective of pressing ahead with financial liberalization. As Fratzscher and Imbs (2008) and Ju and Wei (2007) note, not only does integration promote greater risk-taking but it can also substitute, where necessary, for weak institutions: deeper links with global capital markets reduce countries' incentives to default on their external obligations. Europe is still different, but its uniqueness diminishes when one looks at countries in the higher quartiles of financial integration. That is, Europe's lead in financial integration goes some way toward explaining why Europe is different.

Europe, though, is not unique, as its experience bears a closer resemblance to intranational flows within the United States. Using new data on capital flows in US states, together with US state income and growth data, we report a new result: capital flows have moved from rich to poorer but fast-growing US states, and have accelerated income convergence. We can only speculate that regulatory harmonization and factor mobility within the European Union (EU), reflected in its accumulated body of law, the so-called *acquis communautaire*, played a role similar to the federal law in the United States.[2]

The remainder of the paper is structured as follows. Section 2 reports some stylized facts highlighting European financial integration developments. Section 3 investigates the determinants of the current account, focusing particularly on the role of financial integration in facilitating international capital flows from rich to poor countries. Section 4 then explores whether these capital flows influenced income convergence and, if so, through what mechanisms. Section 5 examines whether Europe is different simply because of its good institutions, or because of EU-specific phenomena such as EU transfers. Section 6 reports on the role of financial integration thresholds by examining both the global sample of countries and evidence from US intranational flows. Section 7 concludes.

[2] The role of the *acquis communautaire* remains speculative. Our sample ends in 2004 when ten of the countries in the EU sample were only at the threshold of entry into the European Union. As Sapir *et al.* (2003) cautioned, the implementation of the *acquis communautaire* was not a given; moreover, it risked creating its own rigidities through uniform applications of regulation to countries in widely diverse situations.

2. EUROPE IS DIFFERENT: SOME STYLIZED FACTS

Europe provides fertile ground for testing the relationship between financial integration and income convergence. First, Europe's international financial integration has progressed rapidly in the past 15 years. As shown in Figure 1, the sum of foreign asset plus liabilities as a share of GDP in European economies is well ahead of any other significant geographical region and, as shown in Table 1, this largely reflects cross-border capital flows within Europe. Eichengreen and Park (2003) note:

> One of the most striking aspects of Europe's recent development has been the growth and integration of financial markets. In Asia, in contrast, there has been less progress in financial integration. If anything, the countries of East Asia have developed stronger financial ties with Western Europe and the United States than with one another.

The financial integration in Europe, Blanchard and Giavazzi (2002) document, has eroded the so-called 'Feldstein–Horioka puzzle', increasing the dissociation of domestic savings and investment and, hence, generating a larger dispersion of current account balances across countries.

A particular implication of increased financial integration in Europe has been the flow of foreign capital from advanced countries to the new EU member states of

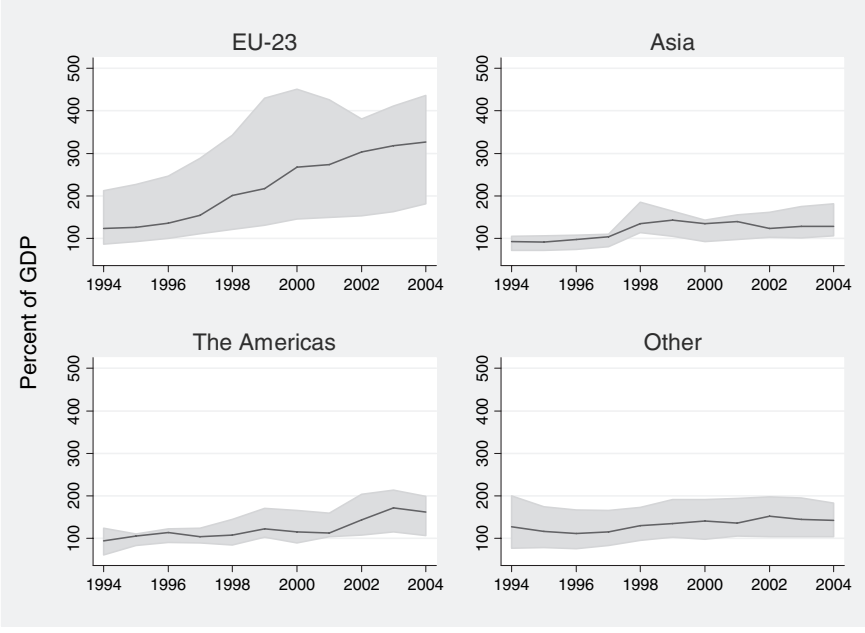

Figure 1. Financial integration in different regions of the world, 1994–2004

Note: Sum of foreign assets and foreign liabilities, in percent of GDP. Chart shows median and interquartile range for each country grouping. Ireland and Luxembourg are excluded from the European sample, as they are outliers in terms of financial integration (1,880 and 20,000% of GDP, respectively).

Source: Lane and Milesi-Ferretti (2006), and authors' calculations.

Table 1. Average cross-border portfolio holdings of long-term debt, 2001–3 (US$bn)

Investments From/To	Asia	Europe	Americas	Other	Total
Asia	42	531	455	254	1,282
Europe	87	2,968	678	405	4,138
Americas	52	335	100	252	738
Other	20	327	275	76	698
Total	200	4,161	1,508	988	6,856

Source: IMF, *Consolidated Portfolio Investment Survey*, and Eichengreen and Luengnaruemitchai (2006).

Central and Eastern Europe (CEE-8). In the past decade, following their initially traumatic transition to a market economy, a number of CEE-8 have run large current account deficits. The contrast with other emerging markets is stark in Figure 2. East Asian economies have run substantial surpluses in recent years. Even the emerging economies of Latin America have moved from deficits in the late 1990s to surpluses in the aggregate. Have capital inflows helped growth convergence in the CEE-8? The answer, as we show in Section 4, is yes, although we also note in Section 7 that some of these countries may have in recent years become vulnerable to financial instability.

Second, Europe has experienced significant periods of convergence. Figure 3 shows that this contrasts sharply with a global pattern where 'divergence, big time'

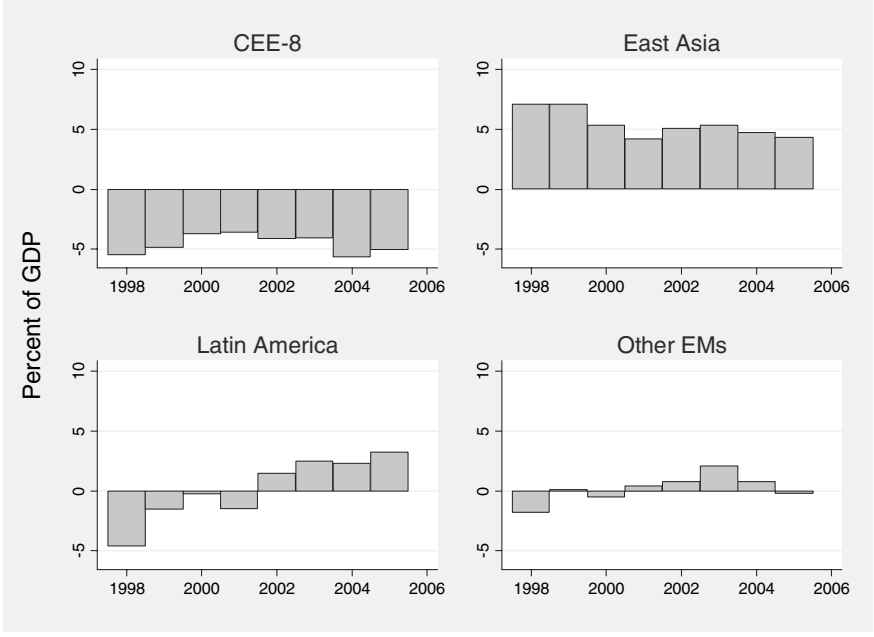

Figure 2. Emerging markets: current account balance, 1998–2005 (unweighted regional average)

Source: European Commission, AMECO database, and IMF World Economic Outlook.

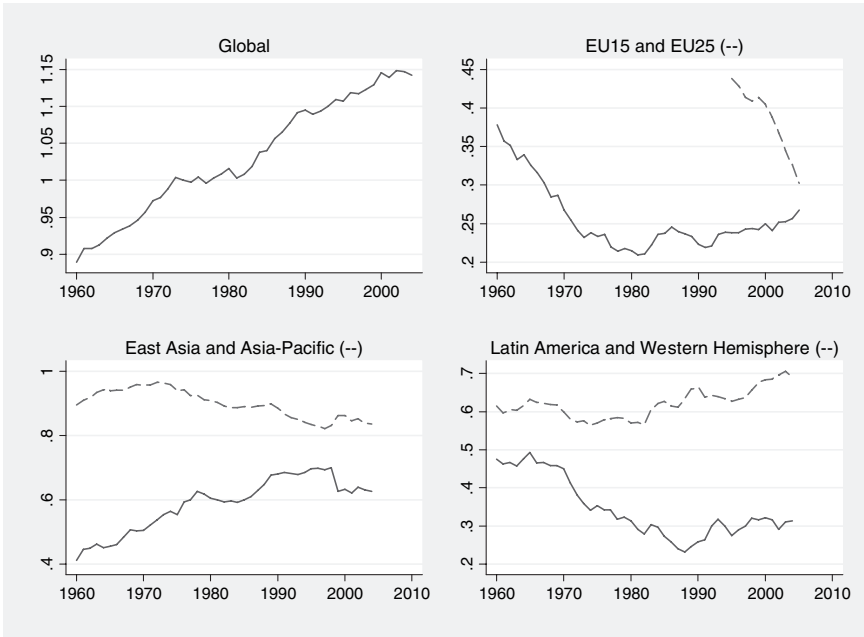

Figure 3. Income convergence in selected regions; standard deviation of log(GDP per capita), 1960–2004

Source: Penn World Tables 6.1, and IMF World Economic Outlook.

(Pritchett, 1997) has been the dominant outcome. Caselli and Tenreyro (2005) only somewhat overstate when they conclude that Europe has been the quintessential 'convergence club'. Impressive convergence was achieved in the 1960s and 1970s, when the standard deviation of per capita incomes fell sharply (Figure 3 documents this decline for the EU15 – the first 15 member states of the EU). The scope for convergence narrowed thereafter until the early 1990s when a prospective set of EU entrants began to benefit from European convergence possibilities. No other group of countries features a comparable mix of rich and relatively poor economies. Nevertheless, the contrast with the other regions is noteworthy. Although, within Latin America, there appears to have been some convergence in the 1960s and 1970s, in the full set of 'Western Hemisphere', countries, including the United States and Canada, there is no indication of significant or sustained convergence.[3] The countries of the Asia-Pacific region fall somewhere in between, with emerging East Asian nations diverging among themselves but catching up with the more advanced countries in the region such as Australia and New Zealand.

[3] For the purposes of this paper, the 'Western Hemisphere' region includes Argentina, Brazil, Canada, Chile, Colombia, Mexico, Peru, United States and Venezuela; 'Latin America' is the same as the 'Western Hemisphere' region minus the United States and Canada; the 'Asia-Pacific' region is defined as including Australia, China, Hong Kong, Indonesia, Japan, Korea, Malaysia, New Zealand, Philippines, Singapore, Thailand, and Taiwan; and 'East Asia' includes China, Indonesia, Korea, Malaysia, Philippines, Thailand, and Taiwan.

Thus, Europe has recently experienced an impressive step up in financial integration accompanied by rapid per capita income convergence. Were these two trends related?

3. CURRENT ACCOUNTS AND THE ROLE OF FINANCIAL INTEGRATION

A country's current account balance is, by definition, the difference between its savings and investment. In assessing the determinants of this balance, therefore, researchers have been guided by the underlying determinants of savings and investment. In turn, these include domestic and international influences. Until recently, domestic determinants (such as domestic growth rates, the fiscal stance, and dependency rates) received the bulk of the attention, not least because domestic savings and investment rates tended to be highly correlated, as documented originally by Feldstein and Horioka (1980).

In their focus on Europe, Blanchard and Giavazzi (2002) argued that the ongoing process of financial integration must have a bearing on the evolution of current accounts. They found that the increased dispersion of current account balances, shown in Figure 4, reflected an increase over time in the tendency for capital to flow 'downhill' from the richer to the poorer European countries. In Blanchard and Giavazzi's paper, the increasing size of the coefficient on per capita income in the current account equation meant that the current account balances had become more responsive to a country's per capita income, with richer countries running larger surpluses and poorer countries running larger deficits. They conjectured, but did not directly test, that this tendency was associated with the parallel process of financial integration within Europe.

Figure 5 shows the evolution of European financial integration, measured here as the sum of external financial assets and liabilities divided by GDP. Over 1975–2004, the median of that ratio increased from 45% to 326% of GDP in our European sample of 23 EU member countries. These include the ten new members who started the process of accession in the mid-1990s and formally joined the EU in 2004, and exclude Luxembourg and Ireland. As shown in the right-hand side panel of the figure, Ireland's integration ratio reached 1,880% of GDP in 2004, and Luxembourg's was an even more extreme outlier at 20,000%.[4] The 'old' member states are covered for the entire period from 1975 to 2004; the new member states are part of the sample starting in 1994 to exclude the disruptive period of transition from a centrally planned economy, and because their integration into Europe began in the mid-1990s. The median integration ratio was 403% of GDP in 2004 in the EU-15.

[4] Blanchard and Giavazzi (2002) also exclude Luxembourg from their analysis of European current account dynamics, and Kose *et al.* (2006) exclude Ireland from their analysis of the relationship between financial integration and GDP growth. In addition to its high financial integration, explanation of Ireland's exceptional performance – with per capita GDP growth near double digits in the late 1990s – is, Blanchard (2002) notes, 'complicated by a number of unusual mechanisms at work.'

Figure 4. Europe: current account balances, 1975–2005

Source: AMECO database, and IMF World Economic Outlook.

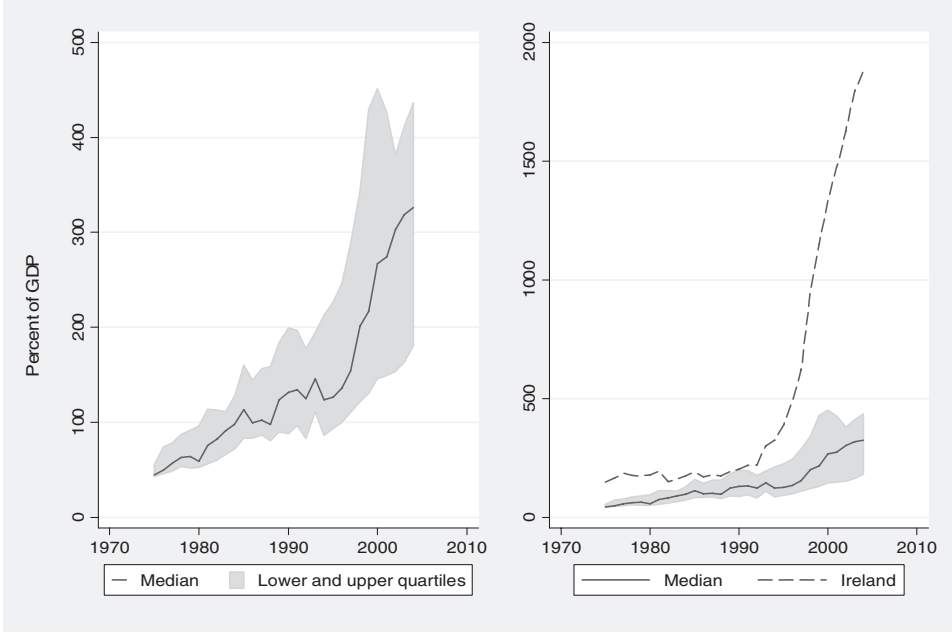

Figure 5. Europe: financial integration, 1975—2004 (sum of foreign assets and foreign liabilities)

Source: Lane and Milesi-Ferretti (2006).

Among the new member states, the CEE-8 were less integrated but even among them the median integration ratio reached 164% of GDP in 2004. As shown in Table 1, a large proportion of Europe's financial integration has been intra-regional.

Instead of allowing the size of the coefficient on the per capita income to vary with time, as Blanchard and Giavazzi do, we interact per capita income with

measures of financial integration. Such an exercise shows that the time trend in the coefficient is indeed a reflection of the generally increasing financial integration; however, because countries are integrated to differing degrees, they are taking advantage of this process at differing rates. We also document that the role of financial integration in determining the size of the current account is yet mainly a European phenomenon, and that while trade integration acts in the same way as financial integration, in Europe the two processes have operated independently enough to make their effects distinguishable.

3.1. Empirical approach

We begin with a reduced form specification similar to that proposed by Chinn and Prasad (2003) and widely used with small variations by, among others, Chinn and Ito (2007) and Gruber and Kamin (2005). The equation takes the following form:

$$\left(\frac{CA}{GDP}\right)_{it} = X'_{it}\alpha + \varepsilon_{it}. \quad (1)$$

The dependent variable in (1) is the current account (CA) balance-to-GDP ratio. A positive observation denotes a surplus and a negative value represents a current account deficit. The term α is the vector of regression coefficients, and ε_{it} is the error or disturbance term. Since our interest is in the medium-term determinants of the current account, in our main regressions we use five-year, non-overlapping observations of the current account balance constructed over 1975–9, 1980–4, 1985–9, 1990–4, 1995–9, and 2000–4. This procedure abstracts from short-run variations in current accounts and related variables. All regressions include time dummies, allowing the average current account balance to vary over time.[5] Following other studies in the current account literature (e.g., Chinn and Prasad, 2003; Gruber and Kamin, 2005), we use both the cross-sectional and intertemporal variation in the data. Estimation is performed via random effects generalized least squares (GLS) with clustered standard errors. The Hausman test does not reject the random effects specification.

The vector of explanatory variables, X_{it}, includes the contemporaneous government budget balance (as a ratio to GDP) and the lagged growth rate of real PPP-adjusted GDP per capita.[6] The other variables, the log of PPP-adjusted GDP per capita, the lagged net foreign assets-to-GDP ratio (NFA/GDP), the elderly and

[5] This follows Blanchard and Giavazzi (2002), and is meant to capture common influences on European current accounts. It is less important in the global regressions, since all countries' current accounts cannot improve at the same time; they are included there to maintain uniformity of specification across samples.

[6] We use the average growth rate of GDP per capita in the preceding five-year period, to reduce concerns about reverse causality (i.e., current account deficits affecting contemporaneous growth). An earlier working paper of this research found similar results using contemporaneous growth.

youth dependency ratios, and trade integration (i.e. the ratio of imports and exports to GDP), are all evaluated in the year prior to each five-year period. The data sources for these variables are reported in the Appendix.

To test for the role of financial integration, we include a measure of financial integration and its interaction with the level of per capita income. If rising financial integration has facilitated the flow of capital from rich to poor countries, then the coefficient on the interaction term should be positive, implying that poorer countries are able to run larger deficits the more financially integrated they are.[7] We measure financial integration using two variables used in other studies and available for a large range of countries. Our primary measure of financial integration, a *de facto* degree of financial integration or openness, is the ratio of gross stocks of foreign assets plus liabilities to GDP, as measured by Lane and Milesi-Ferretti (2006). We also report results using a *de jure* measure of a country's capital openness from Chinn and Ito (2007).

3.2. Estimation results

For the global sample, our results are very similar to those obtained by others. The first column of Table 2 shows that the current account balance is larger when the fiscal balance is larger. The positive sign on the NFA/GDP variable is what virtually all researchers find, and is consistent with NFA generating net investment income that improves the CA. However, as Chinn and Prasad (2003) and Chinn and Ito (2007) note, the expectation is that the sign would be negative, since countries with large net external liabilities will need to run larger trade surpluses, while those that have accumulated net assets should be able to run trade deficits. The implication of our analysis is that such a dynamic, consistent with consumption smoothing, is not being facilitated by financial markets on a global basis.[8] Higher GDP growth is associated with a smaller balance (or larger deficit), and higher dependency ratios are associated with a lower current account balance, presumably because higher dependency reduces the savings rate.

The relationship between initial per capita income and the current account balance is positive and statistically significant. In line with previous results, this is consistent with the prediction that capital flows from rich to poor countries. However, the size of the effect is small: a doubling of a country's per capita income improves the current account balance by 1.3% of GDP (ln(2)*0.02). In the global sample, there is no relationship between the country's financial integration and its current account directly (second column), but the interaction terms show that finan-

[7] Chinn and Prasad (2003) include a measure of capital controls in their current account specification, but do not interact these with the level of income.

[8] The implication that countries running deficits can continue indefinitely to accumulate liabilities raises concerns that the equation is misspecified.

Table 2. Benchmark current account regressions

	Dependent variable: CA/GDP											
	Global			Europe			Western Hemisphere			Asia-Pacific		
Log of p.c. GDP	0.02	0.02	0.01	0.05	0.03	−0.03	−0.02	−0.02	0.01	0.02	0.01	0.01
	[3.58]***	[3.72]***	[1.92]*	[3.28]***	[1.37]	[0.99]	[0.46]	[0.58]	[0.45]	[0.94]	[0.71]	[0.68]
Growth of p.c. GDP	−0.0001	−0.0001	−0.0003	−0.0005	−0.0005	0.0022	−0.0045	−0.0043	−0.0041	−0.0057	−0.0056	−0.0056
	[0.14]	[0.16]	[0.39]	[0.21]	[0.22]	[0.88]	[1.94]*	[1.97]**	[2.21]**	[1.94]*	[1.78]*	[1.77]*
Fiscal balance/GDP	0.33	0.33	0.31	0.05	0.05	−0.13	−0.10	−0.16	−0.16	−0.03	−0.04	−0.04
	[2.77]***	[2.73]***	[2.70]***	[0.35]	[0.32]	[0.98]	[0.33]	[0.49]	[0.47]	[0.07]	[0.08]	[0.06]
NFA/GDP	0.05	0.05	0.02	−0.02	−0.02	−0.03	0.09	0.10	0.11	0.07	0.06	0.06
	[4.14]***	[4.22]***	[1.71]*	[0.99]	[1.31]	[1.65]*	[2.60]***	[3.21]***	[4.99]***	[7.57]***	[3.03]***	[1.97]**
Old dependency ratio	−0.40	−0.39	−0.42	−0.11	−0.27	−0.23	−0.01	−0.05	0.01	−0.99	−0.98	−0.98
	[3.73]***	[3.52]***	[3.78]***	[0.55]	[1.20]	[1.32]	[0.02]	[0.16]	[0.04]	[3.34]***	[3.00]***	[3.05]***
Young dependency ratio	−0.04	−0.04	−0.04	0.25	0.07	−0.02	0.00	−0.01	0.02	−0.15	−0.15	−0.15
	[1.00]	[0.90]	[1.11]	[1.53]	[0.41]	[0.19]	[0.02]	[0.27]	[0.72]	[3.22]***	[3.62]***	[3.55]***
Trade openness/GDP	−0.02	−0.02	−0.01	0.00	−0.02	−0.01	0.06	0.04	0.05	−0.01	−0.01	−0.01
	[1.82]*	[1.85]*	[1.35]	[0.26]	[1.27]	[0.66]	[2.42]**	[1.21]	[1.45]	[0.51]	[0.61]	[0.51]
FI/GDP		0.00	−0.12		0.01	−0.46		0.02	0.28		0.00	0.00
		[0.16]	[1.91]*		[1.56]	[3.37]***		[0.98]	[2.89]***		[0.09]	[0.03]
Log of p.c. GDP × FI/GDP			0.012			0.048			−0.028			0.000
			[1.99]**			[3.41]***			[2.84]***			[0.02]
Observations	480	480	480	87	87	87	46	46	46	51	51	51
Number of countries	114	114	114	23	23	23	9	9	9	10	10	10
R-squared	0.33	0.33	0.35	0.20	0.26	0.40	0.44	0.46	0.51	0.73	0.73	0.73

Note: Estimates are on 5-year non-overlapping intervals, using random effects with clustered standard errors. Unless otherwise indicated, the values for the right-hand side variables are for the year preceding the 5-year interval (e.g., 1994 for the 1995–9 period). Constants and time dummies are not reported.

Robust *t* statistics in brackets.

*significant at 10%; ** significant at 5%; *** significant at 1%.

cial integration makes it easier for poor countries to gain access to capital (third column). As we show later, this global relationship is, in part, driven by Europe.

In next three columns, we present the same regressions for the European sample. The results are sharply different. Now there is no statistically significant relationship between the current account balance and several 'conventional' determinants. Growth is statistically insignificant, as are the dependency ratios. These domestic factors are apparently not driving European current accounts.

An especially interesting contrast is with respect to net foreign assets: a larger NFA/GDP is indeed associated with a lower current account balance in the European sample. The negative coefficient is even marginally significant in our preferred regression (sixth column). This is consistent with the expectation that a larger trade *deficit* is required to stabilize a growing stock of net assets, and is an indication of international consumption smoothing as countries borrow abroad to consume now and pay later. In addition, the finding could reflect a negative interest rate-growth differential during a number of high-growth years included in the sample, with the NFA/GDP generating negative net investment income.

The average coefficient on per capita income in the fourth column is larger in the European than in the global sample. Thus, there is more of a tendency for capital to move from the richer to poorer countries in Europe than in the rest of the world. We explore the source of this process by including financial integration and its interaction with per capita GDP in the fifth and sixth column.

The new finding is striking: in Europe, financial integration has a strong relationship with the current account deficit, and the direction of that relationship depends on a country's income. While poorer countries that are more financially integrated run larger deficits, richer countries that are more financially integrated run larger surpluses. In other words, financial integration leads countries to borrow more from abroad if they are poorer, and rich countries to lend more abroad if they are richer. The coefficient on the financial openness-to-GDP ratio, FI/GDP, given by $-0.46 + 0.048$*(Log of p.c. *GDP*), is negative for lower-income EU members (those with per capita incomes below $e^{(0.46/0.048)}$, approximately \$14,000), and is positive for higher-income EU members. As such, all else equal, an increase in financial integration by 100% of GDP would increase Lithuania's current account *deficit* by 2.1% of GDP, and would raise the Netherlands's *surplus* by 2.6% of GDP. This is our key result on current accounts. It shows that the general increase in financial integration in Europe is an important force in explaining the increased dispersion of current accounts.

Alternatively, we can focus on the coefficient on income, $-0.03 + 0.048$**FI/GDP*. Increasing income implies larger surpluses (or lower deficits). Blanchard and Giavazzi (2002) find that the income coefficient for the EU sample as a whole increased over time, reaching 0.2 by the year 2000. Our results (reported in Figure 6, based on the sixth column of Table 2) have the same time trend: the average income coefficient increased from small but positive values in the 1970s to above 0.15 by 2004.

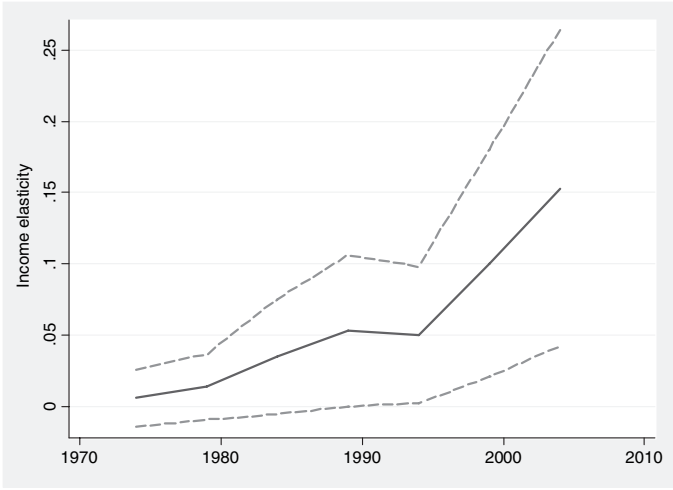

Figure 6. Europe: coefficients on output per capita over time for the observed range of financial integration (± 1 standard deviation)

Note: Figure reports coefficient on log of GDP per capita from benchmark current account equation in the sixth column of Table 2 (−0.03 +0.05 * Financial Integration/GDP) for three levels of Financial Integration/GDP: annual mean of European sample, annual mean + annual standard deviation, and annual mean − annual standard deviation.

While the Blanchard–Giavazzi approach provides a single income coefficient per year for all the countries in the sample, our approach estimates a different income coefficient for each country, every year. Thus, in 2004, for the most financially integrated country in our sample, the estimated coefficient exceeds 0.2. The variations in this respect across countries can be important. The size of the income coefficient for Lithuania (*FI/GDP* = 1.1 in 2004) is 0.025, so that if Lithuania doubled its income, its current account balance would improve by ln(2)*0.025 = 1.7 percentage points of GDP. Because the size of the income coefficient for Estonia (*FI/GDP* = 2.5 in 2004) is higher at 0.095, if Estonia were to double its income, its current account balance would improve by the larger amount of ln(2)*0.095 = 6.6 percentage points of GDP.[9]

These non-linearities are summarized in Figure 7 using current account isoquants derived from the sixth column of Table 2. Along each isoquant, financial integration and income levels change but current account deficit remains constant. For countries at the lower end of the income distribution, where countries tend to run current account deficits, the isoquants slope upwards: as income rises, the current account deficit tends to fall, but a higher degree of financial integration keeps the deficit unchanged. As a country moves along an isoquant and its income level increases, the marginal effect of additional financial integration on its current account deficit declines (the slopes of the isoquants become flatter). Thus, larger

[9] Note that, in 2004, the current account deficit-to-GDP ratios for Lithuania and Estonia were 6.2 and 11.5% of GDP, respectively.

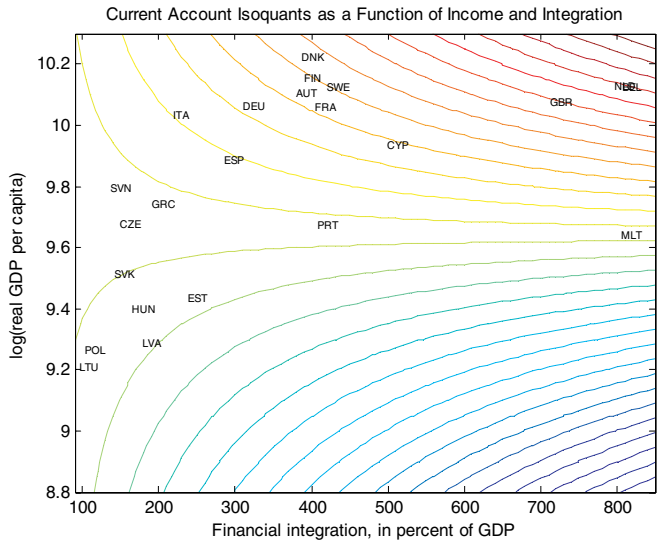

Figure 7. Europe: current account isoquants as a function of income and financial integration

increases in financial integration are required to induce the current account deficit to stay unchanged. The isoquants have negative slopes at higher levels of income. These 'rich' countries will tend to run current account surpluses, especially if they are also highly financially integrated. As a rich country's income increases, it would, other things equal, run larger current account surpluses. Thus, for an unchanged current account surplus, the level of financial integration has to decline.

What are the implications of our findings for the current account balances of the new member states in the future? The answer depends in part on how their levels of financial integration will evolve. While the financial integration of the CEE-8 has more than doubled over the past 10 years, it has not yet reached the levels observed in the old member states. As of end-2004, the median level of financial integration in the old member states was 403% of GDP versus only 164% in the CEE-8. Therefore, the financial integration of the CEE-8 could plausibly be expected to increase further in the future. That possibility of increasing financial integration should, our results suggest, keep their current account deficits large. But at the same time, these countries will also increase their income levels, which will dampen the current account deficit.

Finally, the seventh through the twelfth columns report the results for countries in the Western Hemisphere and in the Asia-Pacific region. For the Western Hemisphere countries, the coefficients on financial integration and the interaction of financial integration with per capita income are statistically significant. But the signs are the opposite of those for Europe! The implication is that greater financial openness was associated with capital flight from poorer countries. This finding is consistent with the view that greater *de facto* integration allowed residents in Latin

American countries to transfer their savings to the United States and Canada. For the Asia-Pacific countries, there is little evidence of cross-border flows responding to financial integration. Thus, the European pattern is distinctive.

3.3. Robustness

We subject these findings to a series of robustness tests. Maintaining the focus on Europe, an immediate question is whether the observed influence of financial integration reflects other global and domestic developments. While financial integration was increasing, so too was trade openness; moreover, the countries made important headways in their domestic financial and institutional development. Does the effect of financial integration hold even when these other trends are accounted for? The answer in Table 3 is yes.

Three findings are worth noting. First, trade openness operates in much the same way as the financial integration measure, and the two effects appear to coexist (first column). More trade openness is associated with a smaller balance (a larger deficit) in poorer economies (those with per capita incomes less than $e^{(0.704/0.0738)} =$ \$13,895) but with an improved balance in richer countries. The relative magnitudes of the trade and financial integration effects will depend on a country's income level.

Second, a *de jure* measure of the country's own capital account openness from Chinn and Ito (2007) also accelerates the inflow of capital for poorer countries (second column). Once again, greater financial integration and capital account openness, while conceptually similar, are sufficiently different in the data to reveal independent effects. Finally, a low level of domestic financial development, measured as the ratio of private credit/GDP, appears to attract more international capital (third column). In other words, countries where domestic credit systems are still in the early stages of development seek and obtain more external finance – and this effect is more pronounced the lower is initial per capita income.

4. CURRENT ACCOUNTS AND GROWTH

4.1. Empirical methodology

Do the capital inflows facilitated by the process of increased financial and trade integration help to raise growth? We turn to that question in this section in the context of a standard empirical specification, building on Bosworth and Collins (2003) and Sala-i-Martin *et al.* (2004). The equation, motivated by determinants of economic growth, takes the following form:

$$g_{it} = Z'_{it}\beta + \eta_{it} \tag{2}$$

where the dependent variable, g_{it}, is the annual average growth rate of per capita PPP-adjusted real GDP over each five-year period. The core controls in the vector of

Table 3. Europe: what has strengthened the CA–Income link? Financial integration vs. other 'enabling mechanisms'

	Dependent variable: CA/GDP					
Log of p.c. GDP	−0.0694**	−0.116***	0.00	−0.04	−0.05	−0.138**
	[−2.311]	[−5.008]	[−0.0382]	[−0.998]	[−1.061]	[−2.478]
Growth	0.0018	−0.00373*	0.0024	0.0018	−0.00515**	−0.00441**
	[0.766]	[−1.797]	[0.941]	[0.707]	[−2.455]	[−2.008]
Fiscal balance/GDP	−0.09	0.03	−0.13	−0.10	0.08	0.09
	[−0.711]	[0.279]	[−1.034]	[−0.779]	[0.602]	[0.611]
NFA/GDP	−0.03	−0.02	−0.02	−0.02	−0.02	−0.0271*
	[−1.507]	[−1.283]	[−1.370]	[−1.528]	[−0.986]	[−1.711]
Old dependency ratio	−0.17	0.03	−0.29	−0.26	0.00	−0.02
	[−1.052]	[0.289]	[−1.445]	[−1.429]	[−0.0304]	[−0.152]
Young dependency ratio	0.03	−0.05	−0.15	−0.09	0.18	0.15
	[0.190]	[−0.520]	[−1.288]	[−0.673]	[1.332]	[1.076]
FI/GDP	−0.336**	−0.506***	−0.610***	−0.497**		
	[−1.988]	[−5.480]	[−3.275]	[−2.516]		
Trade openness/GDP	−0.704**	0.02	−0.02	−0.52	0.02	−1.090**
	[−2.236]	[1.488]	[−1.365]	[−1.583]	[1.138]	[−2.379]
Capital account openness index		−0.333***			−0.464***	−0.397***
		[−4.539]			[−4.337]	[−3.139]
Private credit/GDP			1.186**	0.971*	−0.18	−0.31
			[2.517]	[1.804]	[−0.369]	[−0.567]
Log of p.c. GDP × FI/GDP	0.0349**	0.0520***	0.0634***	0.0517**		
	[2.019]	[5.415]	[3.322]	[2.549]		
Log of p.c. GDP × trade openness/GDP	0.0738**			0.05		0.116**
	[2.194]			[1.558]		[2.428]
Log of p.c. GDP × capital account openness index		0.0347***			0.0487***	0.0418***
		[4.508]			[4.416]	[3.214]
Log of p.c. GDP × private credit/GDP			−0.124**	−0.101*	0.01	0.03
			[−2.527]	[−1.817]	[0.300]	[0.515]
R-squared	0.43	0.60	0.44	0.44	0.49	0.51
Observations	86	78	83	82	74	73
Number of countries	22	23	23	22	23	22

Note: Estimates are on 5-year non-overlapping intervals, using random effects with clustered standard errors. Unless otherwise indicated, the values for the right-hand side variables are for the year preceding the 5-year interval (e.g. 1994 for the 1995–9 period). Constants and time dummies are not reported.

Robust *t* statistics in brackets.

*significant at 10%; ** significant at 5%; *** significant at 1%.

explanatory variables, Z_{it}, are those typically thought to be robust correlates of growth: the log of per capita GDP; the population growth rate; the level of schooling; the trade openness ratio to GDP; and the relative price of investment goods. In addition, we include the current account balance-to-GDP ratio, a measure of a country's capital 'outflows' – a negative current account balance is a capital inflow. To allow for the possibility that capital flows may have transitory or 'convergence' effects, we include the interaction of each country's current account balance with its level of per capita GDP. If capital inflows raise growth more in poorer than in richer countries, then the coefficient on the interaction of per capita GDP and the current account balance should be positive.

The core control variables, which change little from one year to another, are measured in the year prior to the five-year interval; for the current account, our main regressions include the average of the current account balance in the previous five-year period (as discussed in more detail below). All regressions include time dummies, allowing the average growth rate to vary over time. As in the estimation of the current account equation, our sample consists of non-overlapping five-year periods constructed over 1975–2004 for the same 23 EU countries. The principal estimation technique once again is random effects generalized least squares with clustered standard errors, though the main results are robust to a variety of techniques (Box 1).

Box 1. The empirical growth literature: where do we fit in?

We can identify three broad approaches to analyzing the determinants of economic growth. The first relies entirely on cross-country variation of long-term growth. Much of the early literature on growth, as summarized in Barro and Sala-i-Martin (2004), was directed at identifying characteristics that explain a country's 'steady state' growth, typically measured over 30 or 40 years. This approach lends itself to exploring the 'deep determinants' of growth, such as a country's geography (which can influence trade intensities), legal traditions (which can condition contractual conditions), and the mortality rate facing European settlers (which can set the trajectory of property rights' institutions). Along this line of research, a substantial literature runs 'horse races' between alternative deep determinants (see Acemoglu and Johnson, 2005). If persuasive, such analyses offer the best hope of identifying causality where the deep determinants isolate exogenous components of the variables of interest (such as trade or particular institutions). Often run with limited observations, controversies continue on techniques and interpretation (for an entertaining discussion, see the commentary on Bosworth and Collins, 2003).

A second approach uses shorter observation spells (of 5 or 10 years), allowing for multiple observations per country and utilizing both the cross-sectional and the within-country variation in the data. The advantage of this increasingly used approach (see Alesina *et al.*, 2003) is that the greater variation in growth outcomes and explanatory variables allows for estimation that is more precise. Another potential advantage is that the correlation in the error terms of a country (through random effects or seemingly unrelated regressions) can help control for unobserved country variables. For our purpose, this offers a sensible structure. The time-variation in growth outcomes in response to external financial integration and the resulting capital flows is valuable for our focus on convergence (as opposed to steady-state growth). As we note below, when we isolate this time variation in a fixed-effects model, our results stand; but we see no *prima facie* reason to discard the cross-sectional variation. A limitation is that deeper determinants, which do not change over time, tend to lose their significance when the time series variation dominates. Moreover, the concern remains, as in the pure cross-sectional analysis, that the explanatory variables are correlated with the error terms and, hence, the estimates are biased. Indeed, unlike for the current account equation, the Hausman test rejects the random effects specification for the growth regressions. However, as we report, the coefficients of interest to us remain robust to the technique used.

Some have preferred to focus solely on within-country, over-time variation, filtering out unchanging country characteristics that may be correlated with the included variables. While appealing, this fixed effects procedure introduces its own biases, because of endogeneity generated by the presence of initial per capita income, which is, in effect, a lagged dependent variable. To focus on the within-country changes but overcome the lagged dependent variable problem, dynamic panel data estimators, such as Blundell and Bond (1998), have been used, but these are subject to their own limitations, for example the internal instruments (lagged differences for the levels, and lagged levels for the differences) are weak instruments. In our case, the fixed effects estimates are very similar to the random effects estimates (as reported), as are the dynamic panel estimator results (not reported).

Given the importance of within-country variation in our data, causality – to the extent causality can be determined – needs to be assessed by interpreting the timing of the flows and growth. While high growth could be 'causing' the capital inflows, two factors argue against this possibility. First, we have used lagged values of the current account deficit. This may not be sufficient if the lagged current accounts are driven by the future prospects of growth. Such would be the case if a growth or productivity 'shock' in period $t - 1$ persisted into period t, and capital flows increase in $t - 1$ in

anticipation of this. In other words, the error term in the growth equation would need to be serially correlated, and current accounts in period $t - 1$ would respond to shocks to growth in period $t - 1$. We find that neither of these conditions hold. As noted in Section 2, the impact of growth on the current account is insignificant in the European sample. And the Arellano and Bond (1991) test statistic for serial correlation in the residuals of the growth regression is 0.04, with a *p*-value of 0.97, indicating that there is no serial correlation. The conclusion from the dynamic panel models, as in Levine *et al.* (2000) also implies a causal effect. While we do not get to the issue of 'deep determinants', we do examine in Section 6 whether the convergence we witness in Europe reflects 'thresholds' in institutional development. See also Klaus Adam's discussion below for arguments based on the plausibility of an underlying economic model with explicit treatment of causal relationships.

A related – but distinct – issue is that of mechanisms. In the growth equation, we claim that a larger current account deficit is associated with faster convergence of poorer countries. The current account deficit itself is larger, the greater the financial integration. The question is whether the current account's association with convergence reflects financial integration. When we use the 'fitted' or predicted value of the current account from the current account equation in the growth equation, the results remain unchanged in statistical significance and economic interpretation. Thus, financial integration acts through the mechanism of the current account. It is in this sense that we conclude that financial integration fosters capital mobility, which, in turn, is associated with more rapid convergence. This, of course, pushes the enquiry further back to understanding the 'deep determinants' of financial integration itself. We suspect that this will not be traced back to long-acting geographical or historical forces but rather will be linked to more contemporary forces, including self-reinforcing network externalities.

4.2. Estimation results

European growth differs in several respects from the global growth process. *Unconditional* convergence has characterized Europe for the past 30 years, i.e. poorer countries have grown faster even when not accounting for other growth drivers (Figure 8). In contrast, global growth has exhibited divergence and only conditional convergence (see Figure 8 and Table 4, panel A, first column). We also find that the European speed of *conditional* convergence is higher than the global average, as the larger coefficient on per capita GDP indicates (Table 4, panel A, fourth column). The effects of better schooling and trade openness, though statistically

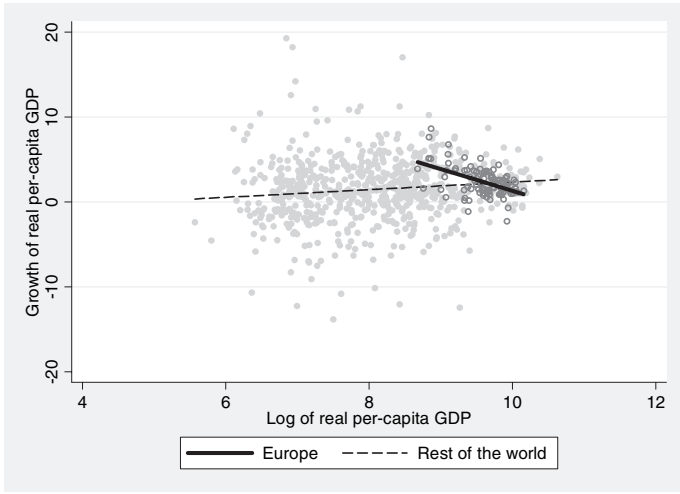

Figure 8. 'Unconditional' convergence in Europe: growth vs. per-capita GDP, 1975–2004

Note: Growth of real per capita GDP is computed as the average annual growth over the subsequent 5-year period (%).

significant, are economically less important in the European sample. Population growth and the relative price of investment have the same directional influence in the European sample but they are no longer statistically significant, possibly a reflection of the much smaller variation in these dimensions within Europe relative to the variation across the global sample of countries.

The fixed-effects models (Table 4, panel B), that allow only for within-country variation in the data, show a broadly similar pattern. The speed of conditional convergence in fixed-effects estimates is higher than in the random-effects estimates, as others have found, possibly reflecting the tendency towards mean reversion in addition to convergence in per capita incomes. In general, the other variables show less statistical significance since changes within a country over time tend to be limited. One exception is the relative price of investment, which is now more significant in the European sample.

When we add to Table 4 the relationship between current accounts and growth, the difference between the European and global samples is sharp. In the global sample, as others have documented, the current account deficit has no bearing on growth. In Europe, the effects are important. A larger current account deficit raises growth and this is all the more so the lower a country's per capita income.[10] In other words, a larger current account deficit contributes to the speeding up of the convergence process. Thus, the dispersion of current accounts in Europe – reflecting the financial integration process – has, by adding a new mechanism, reinforced

[10] The coefficients on the CA/GDP ratio are large because growth is expressed in percentage points.

Table 4. Benchmark growth regression

	Dependent variable: growth in p.c. GDP											
	Global			Europe			Western Hemisphere			Asia-Pacific		
A. Random effects												
Log of p.c. GDP	−1.35	−1.25	−1.32	−3.51	−3.36	−2.98	−3.46	−1.86	−1.12	−2.58	−2.79	−3.13
	[4.58]***	[4.06]***	[4.02]***	[5.23]***	[5.24]***	[4.47]***	[2.69]***	[1.12]	[0.65]	[2.98]***	[3.32]***	[4.08]***
Schooling	0.71	0.70	0.71	0.25	0.19	0.21	0.78	0.36	0.37	0.35	0.45	0.57
	[4.10]***	[4.02]***	[4.04]***	[2.98]***	[2.42]**	[2.71]***	[2.27]**	[0.78]	[0.79]	[0.81]	[1.12]	[1.57]
Population growth	−0.27	−0.27	−0.27	−0.29	−0.12	−0.09	−1.56	−1.62	−1.51	−0.04	−0.09	−0.14
	[3.88]***	[3.96]***	[4.12]***	[0.67]	[0.32]	[0.27]	[1.97]**	[3.03]***	[2.43]**	[0.12]	[0.27]	[0.39]
Trade openness/GDP	1.23	1.15	1.18	0.96	0.94	0.63	1.60	2.32	2.08	0.75	0.84	1.00
	[3.66]***	[3.34]***	[3.38]***	[3.25]***	[3.63]***	[1.77]*	[0.79]	[1.33]	[1.28]	[2.38]**	[2.99]***	[4.49]***
Relative price of investment	−0.56	−0.57	−0.55	−1.22	−0.89	−0.22	−2.58	−1.47	−1.34	−3.18	−3.70	−4.41
	[1.99]**	[2.01]**	[2.01]**	[0.99]	[0.68]	[0.14]	[5.22]***	[2.18]**	[2.14]**	[2.18]**	[2.65]***	[3.50]***
CA/GDP		−3.04	14.47		−10.49	−262.49		−19.92	−338.29		3.07	81.20
		[1.26]	[0.61]		[2.39]**	[3.09]***		[2.12]**	[1.68]*		[1.27]	[1.50]
Log of p.c. GDP × CA/GDP			−2.14			26.72			36.24			−8.21
			[0.79]			[2.97]***			[1.58]			[1.46]
Observations	597	597	597	95	95	95	54	54	54	65	65	65
Number of countries	135	135	135	23	23	23	9	9	9	11	11	11
R-squared	0.11	0.11	0.11	0.60	0.63	0.66	0.42	0.50	0.53	0.36	0.39	0.43

Continued

Table 4. Continued

	Dependent variable: growth in p.c. GDP											
	Global			Europe			Western Hemisphere			Asia-Pacific		
B. Fixed effects												
Log of p.c. GDP	−5.77	−5.75	−5.76	−10.85	−11.27	−11.79	−6.81	−6.78	−5.78	−4.74	−4.75	−5.07
	[8.52]***	[8.12]***	[8.03]***	[3.22]***	[3.35]***	[3.84]***	[2.35]**	[2.12]**	[1.75]*	[2.59]**	[2.42]**	[2.47]**
Schooling	0.23	0.23	0.23	−0.18	−0.12	−0.10	0.78	0.77	0.80	0.02	0.02	0.39
	[0.59]	[0.60]	[0.61]	[0.43]	[0.27]	[0.23]	[0.92]	[0.90]	[0.99]	[0.03]	[0.03]	[0.46]
Population growth	−0.16	−0.16	−0.16	−0.23	−0.22	−0.31	−0.02	−0.04	−0.05	−0.01	−0.01	−0.01
	[2.32]**	[2.32]**	[2.30]**	[0.47]	[0.45]	[0.74]	[0.02]	[0.03]	[0.04]	[0.05]	[0.06]	[0.05]
Trade openness/GDP	1.44	1.42	1.42	1.13	1.39	1.86	1.74	1.74	1.08	−0.46	−0.45	−0.86
	[1.62]	[1.54]	[1.53]	[0.63]	[0.85]	[1.26]	[0.59]	[0.58]	[0.35]	[0.54]	[0.48]	[0.85]
Relative price of investment	−0.32	−0.32	−0.32	−8.18	−7.31	−4.41	−2.76	−2.76	−2.63	2.86	2.85	3.65
	[0.91]	[0.91]	[0.92]	[7.89]***	[4.95]***	[2.30]**	[3.89]***	[3.74]***	[3.59]***	[1.02]	[1.02]	[1.22]
CA/GDP		−0.24	1.00		−6.66	−361.72		−0.45	−217.50		0.15	85.13
		[0.10]	[0.04]		[1.06]	[3.34]***		[0.05]	[1.28]		[0.04]	[1.07]
Log of p.c. GDP × CA/GDP			−0.15			37.04			24.68			−9.19
			[0.06]			[3.33]***			[1.26]			[1.08]
Observations	597	597	597	95	95	95	54	54	54	65	65	65
Number of countries	135	135	135	23	23	23	9	9	9	11	11	11
R-squared	0.22	0.22	0.22	0.67	0.68	0.74	0.59	0.59	0.6	0.38	0.38	0.4

Notes: Estimates are on 5-year non-overlapping intervals. Unless otherwise indicated, the values for the right-hand side variables are for the year preceding the 5-year interval (e.g. 1994 for the 1995–9 period). Constants and time dummies are not reported.

Robust *t* statistics in brackets.

*significant at 10%; ** significant at 5%; *** significant at 1%.

the historical convergence tendency in the region. The result that current account deficits are associated with faster income convergence in the European sample is robust to the two estimation methods used in Table 4. The data in panel A suggest that this relationship holds weakly in the Western Hemisphere but is not evident even in that weak form in the Asia-Pacific region.

In Table 5 we explore the timing of the relationship between capital flows and growth. In Table 4 all variables, including the current account deficit, were timed at the year preceding the five-year interval over which growth was measured. In the first column of Table 5 the current account is instead measured as the contemporaneous average over the same five-year period as growth. The finding is that there is no contemporaneous relationship. Thus, capital inflows do not appear to have an immediate impact on growth. In the other columns, we lag the five-year current account average successively by one year. The growth influence appears to kick in sometime between two and three years after the capital inflows occur. The relationship remains strong and robust even when we allow for a five-year lag, that is, the average current account deficit in the previous five-year period appears strongly associated with raising growth and convergence in the following five years.

What are the implications of our findings for the convergence prospects of the CEE-8? Figure 9 suggests that as an emerging market's current account deficit increases from 0 to 5% of GDP, the convergence parameter rises from −3 to −4.5, implying that the time it takes to close half the income gap between itself and the steady state declines by about 8 years. Interestingly, the convergence parameter is negative for the full range of current account positions observed in our sample, including current account surpluses of more than 8% of GDP. Hence, all the countries in our sample experienced convergence.[11]

Next, in Table 6, we distinguish between countries that export capital (run a current account surplus) and those that import capital (run a deficit). The coefficients indicate that capital exporting countries accumulate capital at a lower rate the more capital they export, and this is more the case the lower its income. Similarly, capital-importing countries accumulate capital more rapidly the more capital it receives, and this is more the case the lower its income. As to TFP productivity, it appears to be unaffected by capital transfers in capital exporting countries, and to be affected positively by them in importing countries. In Table 7, we distinguish between the foreign direct investment (FDI) and non-FDI component of capital flows. For GDP growth, both FDI and non-FDI flows matter. Non-FDI flows matter especially for capital accumulation; both FDI and non-FDI flows are relevant for productivity growth.

[11] Convergence implies that all countries move to the income level of the country on the technological frontier. Some authors (such as Aghion *et al.*, 2005) assume that this country is the United States and define growth rates and income levels relative to the US. However, as Aghion *et al.* (2005) point out, such transformations do not change the estimation results since they are the same for all countries in the sample and are thus absorbed in the intercept 'constant' term. Our approach is agnostic about the level of income of the country on the frontier.

Table 5. EU-25: Foreign savings' effect on growth, at different lags

	Dependent variable: growth in p.c. GDP					
	5-year CA	5-year CA ($t-1$)	5-year CA ($t-2$)	5-year CA ($t-3$)	5-year CA ($t-4$)	5-year CA ($t-5$)
A. Random effects						
Log of p.c. GDP	−2.893***	−2.731***	−2.593***	−2.690***	−2.826***	−2.959***
	[−5.232]	[−6.088]	[−5.562]	[−4.878]	[−4.736]	[−4.680]
Schooling	0.240***	0.229***	0.219***	0.225***	0.247**	0.260**
	[2.936]	[3.096]	[2.792]	[2.613]	[2.513]	[2.408]
Population growth	−0.34	−0.24	−0.16	−0.22	−0.20	−0.13
	[−0.915]	[−0.669]	[−0.550]	[−0.784]	[−0.753]	[−0.499]
Trade openness/GDP	0.647***	0.543***	0.364	0.320	0.344	0.357
	[3.558]	[2.614]	[1.619]	[1.558]	[1.587]	[1.601]
CA/GDP	98.07	−5.67	−189.10	−249.2***	−299.7***	−336.0***
	[0.551]	[−0.0321]	[−1.315]	[−3.082]	[−4.302]	[−5.204]
Log of p.c. GDP per capita × CA/GDP	−9.90	0.92	19.87	25.98***	31.09***	34.64***
	[−0.538]	[0.0502]	[1.331]	[3.039]	[4.177]	[5.016]
Observations	96	96	96	96	96	96
Number of countries	23	23	23	23	23	23
R-squared	0.57	0.57	0.59	0.61	0.63	0.64
B. Fixed effects						
Log of p.c. GDP	−11.15	−11.34	−12.82	−13.37	−13.43	−12.64
	[3.08]***	[3.15]***	[3.65]***	[4.10]***	[4.46]***	[4.30]***
Schooling	0.11	−0.11	−0.38	−0.28	−0.17	−0.02
	[0.19]	[0.20]	[0.66]	[0.52]	[0.31]	[0.04]
Population growth	−0.06	−0.03	−0.23	−0.35	−0.41	−0.29
	[0.10]	[0.06]	[0.44]	[0.75]	[0.97]	[0.64]
Trade openness/GDP	0.770	0.061	−0.214	0.470	1.430	2.260
	[0.30]	[0.02]	[0.07]	[0.20]	[0.74]	[1.50]
CA/GDP	241.67	−71.50	−478.67	−484.44	−525.88	−546.03
	[0.97]	[0.26]	[3.41]***	[5.95]***	[6.09]***	[6.38]***
Log of p.c. GDP × CA/GDP	−25.06	7.52	49.43	49.82	53.85	55.70
	[0.97]	[0.27]	[3.40]***	[5.77]***	[5.92]***	[6.20]***
Observations	96	96	96	96	96	96
Number of countries	23	23	23	23	23	23
R-squared	0.45	0.44	0.54	0.63	0.69	0.71

Notes: Estimates are on 5-year non-overlapping intervals. Unless otherwise indicated, the values for the right-hand side variables are for the year preceding the 5-year interval (e.g., 1994 for the 1995–9 period).

The 5-year period over which CA/GDP is averaged is for different horizons: for column 1 it is in the contemporaneous 5-year period as growth, and for columns 2 through 6 the 5-year period is lagged by one through 5 years, respectively.

Robust t statistics in brackets.

*significant at 10%; ** significant at 5%; *** significant at 1%.

If, as our results suggest, capital inflows raise the speed of convergence in Europe, do they act through the domestic financial system? It is possible, as Gourinchas (2002 and 2004) suggests, that international capital flows are not a substitute for domestic financial development but serve mainly to raise the level of domestic financial capabilities. If that were the case, then we would expect that if domestic financial development were accounted for, the independent influence of

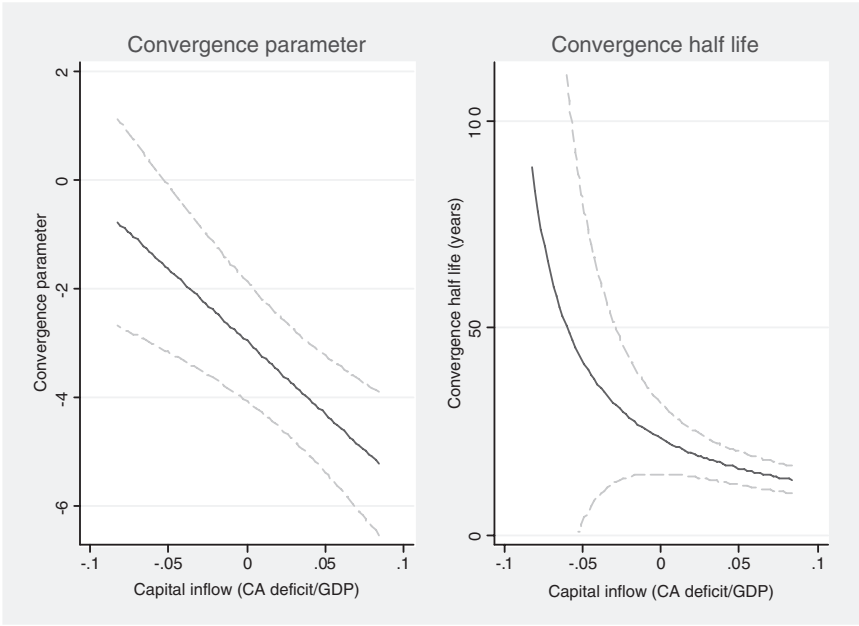

Figure 9. Europe: convergence parameter and half life over the observed current account deficit range

Note: The convergence parameter β is the coefficient on per capita income from column 6 of Table 4, panel A (positive values imply non-convergence). The convergence half-life is calculated as $-\ln(2)/\beta$, and the bands indicating the 90-percent confidence interval are obtained using the delta method.
Source: Authors' calculations.

international capital flows would disappear. This possibility is given special credence in light of results obtained by Aghion *et al.* (2005), who find, in an approach parallel to the one adopted in this paper, that domestic financial development (proxied by various measures of domestic credit relative to a country's GDP) raises the rate of a country's rate of income convergence in a global sample of countries.

In Table 8 we examine the effects of financial development (private credit/GDP) and its interaction with initial per capita income following Aghion *et al.* (2005), but in a panel data setting (using the random-effects estimation procedure) rather than for only a single cross-section of countries. The results for the global sample, in the first column, support their finding of more rapid income convergence with higher financial development, though we also find a direct effect of financial development on growth. Starting with the global sample, in the second column we add the current account balance and its interaction with initial per capita income. The domestic financial development measure and its interaction with initial per capita income continue to show their influence on the level of growth and the rate of convergence, though with somewhat reduced statistical significance suggesting mild correlation between international flows and domestic financial capabilities. However, as before, foreign capital flows do not appear to have a bearing on growth in the global sample. In the global sample,

Table 6. EU-25: The channels through which foreign savings affect growth

	Dependent variable is growth in:		
	GDP per capita	Capital per capita	TFP
Log of p.c. GDP	−2.05	−1.88	−2.18
	[1.81]*	[2.75]***	[2.83]***
Schooling	0.27	−0.07	0.28
	[2.00]**	[0.37]	[1.98]**
Population growth	−0.06	−0.23	0.12
	[0.21]	[0.77]	[0.41]
Trade openness/GDP	0.448	0.963	0.440
	[1.77]*	[1.46]	[1.32]
CA/GDP if CA/GDP>0	−121.41	−219.95	−2.54
	[0.77]	[2.12]**	[0.02]
Log of p.c. GDP × CA/GDP if CA/GDP>0	12.15	21.68	0.63
	[0.72]	[1.94]*	[0.05]
CA/GDP if CA<0	−659.46	−180.92	−308.32
	[3.94]***	[2.12]**	[2.41]**
Log of p.c. GDP × CA/GDP if CA/GDP<0	68.39	20.25	30.57
	[3.87]***	[2.18]**	[2.32]**
Observations	96	94	94
Number of countries	23	22	22
R-squared	0.65	0.55	0.58

Notes: Estimates are on 5-year non-overlapping intervals, using random effects with clustered standard errors. Unless otherwise indicated, the values for the right-hand side variables are for the year preceding the 5-year interval (e.g. 1994 for the 1995–9 period). CA/GDP is the average over the previous 5-year period.

Robust *t* statistics in brackets.

*significant at 10%; ** significant at 5%; *** significant at 1%.

we also do not find any direct effect on growth resulting from increased financial integration (third and fourth columns).

In the European case, the results are the opposite. Domestic finance has no statistically significant effect on growth (fifth column of Table 8). The international capital flows' influence remains strongly significant even when allowing for the possibility that it is mediated through the domestic system (sixth column). Thus, the strong result is that capital inflows act independently of the domestic financial system. This result is consistent with a highly integrated international financial market and institutions, which implies that the geographical location of the financial institutions is not crucial.[12] The result also suggests that we are indeed picking up a causal relationship between capital inflows and growth. If domestic financial institutions, with their local information, are not anticipating domestic growth, it seems unlikely that international capital is mainly responding to growth opportunities.

[12] Guiso *et al.* (2004) conclude that, even within financially integrated areas, local financial development does matter for small firms. We are unable to make that distinction in this paper. Anecdotal evidence suggests that multinational firms, able to borrow across borders, are a major source of growth.

Table 7. EU-25: The channels through which FDI and non-FDI flows affect growth

	Dependent variable: growth in p.c. GDP					
	GDP per capita		Capital per capita		TFP	
Log of p.c. GDP	−1.68	−3.21	−0.81	−1.59	−2.24	−3.01
	[3.20]***	[4.65]***	[0.89]	[2.29]**	[5.03]***	[6.85]***
Schooling	0.27	0.22	−0.17	−0.21	0.36	0.30
	[3.03]***	[2.22]**	[0.77]	[1.01]	[2.66]***	[2.06]**
Population growth	0.52	−0.34	−0.16	−0.45	0.47	0.02
	[0.97]	[1.20]	[0.44]	[1.59]	[1.22]	[0.08]
Trade openness/GDP	0.363	0.421	0.825	1.108	0.180	0.618
	[1.35]	[1.86]*	[1.35]	[1.48]	[0.42]	[1.73]*
FDI/GDP	609.18		232.33		401.42	
	[2.39]**		[1.30]		[2.29]**	
Log of p.c. GDP × FDI/GDP	−60.56		−23.40		−39.73	
	[2.39]**		[1.33]		[2.29]**	
Non-FDI Flows/GDP		193.58		205.25		83.05
		[2.91]***		[2.81]***		[2.10]**
Log of p.c. GDP × Non-FDI Flows/GDP		−19.61		−20.79		−8.20
		[2.84]***		[2.78]***		[2.08]**
Observations	94	94	92	92	92	92
Number of countries	23	23	22	22	22	22
R-squared	0.64	0.60	0.49	0.45	0.55	0.52

Notes: Estimates are on 5-year non-overlapping intervals, using random effects with clustered standard errors. A constant and time dummies are included in the equations, but are not reported.

Robust *t* statistics in brackets.

* significant at 10%; ** significant at 5%; *** significant at 1%.

Box 2. How much of EU convergence can be explained by capital flows?

While the regressions in Table 4 and the error-band charts in Figure 9 establish the statistical significance of capital flows in affecting growth and convergence, they do not directly quantify how much of the convergence observed in the EU is attributable to these capital flows. As Figure 3 indicates, most of the convergence within Western Europe took place in the 1960s and early 1970s, and predates both our regression sample and, more importantly, the breakdown of the Feldstein–Horioka puzzle which began in the mid- to late-1980s. So here we focus on explaining the convergence in the EU-25 in recent years. There are two approaches to this question.

First, we analyze *sigma convergence*, that is the decline in the dispersion of per capita incomes within the EU. The bold line in Figure B1 shows actual sigma convergence in the last five-year period in our sample. The dispersion of log per capita GDP dropped from 0.44 in 1999 to 0.34 in 2004. We can generate

growth predictions from the regression and ask how much of this decline in dispersion can be explained by the model's explanatory variables, and of this, how much is attributable to the current account. The dashed line shows the decline in dispersion explained by the 'non-current account' component, that is, predicted growth assuming balanced current accounts. Dispersion drops to 0.38 by 2004, explaining about 60% of the actual decline in dispersion. When we use predicted growth based on actual current accounts – which generates higher growth predictions in lower-income countries that ran current account deficits – the dispersion declines even further to 0.36, explaining about 80% of the observed decline in dispersion. Thus, 20% of the observed sigma convergence in the EU between 1999 and 2004 can be explained by capital flows, 60% by other factors in the regression (including unconditional convergence), and 20% cannot be explained by the regression model.

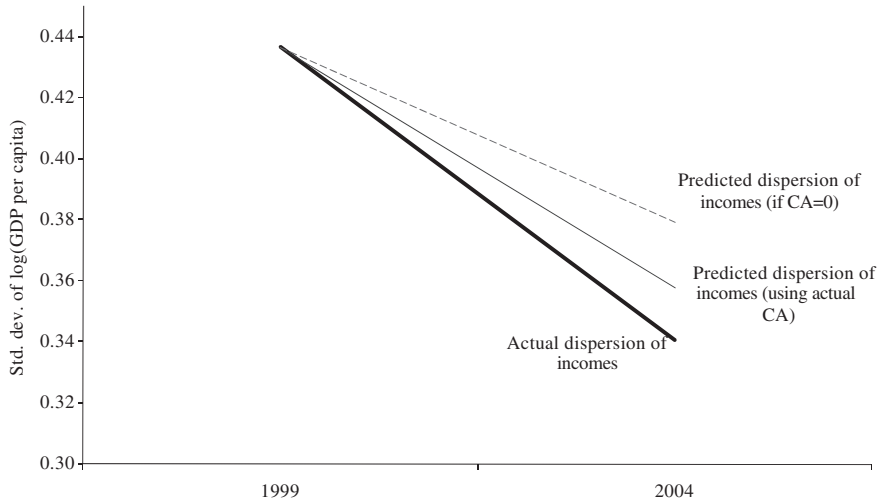

Figure B1: EU: actual vs. predicted sigma convergence, 1999–2004

Second, we analyze *beta convergence*, that is the 'catch-up' growth explained by the coefficient on per capita income. Here we focus on the extent to which the new member states converged to Germany in 1999–2004; Western European countries had to a large extent already converged by this time and growth differentials vis-à-vis Germany are relatively small (some countries, such as Portugal, actually diverged during this period). The decomposition of growth differences can be derived from the regression as

$$g_t - g_t^* = \beta_1(y_{t-1} - y_{t-1}^*) + \beta_2(CA_{t-1} - CA_{t-1}^*) + \beta_3(CA_{t-1}y_{t-1} - CA_{t-1}^*y_{t-1}^*) + \boldsymbol{\beta}'(\mathbf{X_{t-1}} - \mathbf{X_{t-1}^*}).$$

Table B1. Beta convergence: new Member States vis-à-vis Germany, 1999–2004

	Growth differential vs. Germany, 1999–2004	Growth differential explained by regression	Of which:						Half-life (in years):	
			Explained by convergence					Explained by other determinants		
			Total	CA-related convergence		Non-CA convergence			if CA = 0	with actual CA
Czech Republic	2.6	1.7	1.9	0.4	*(19%)*	1.5	*(81%)*	−0.2	23	18
Estonia	5.7	3.7	3.7	1.0	*(28%)*	2.7	*(72%)*	0.0	23	16
Hungary	2.9	3.4	3.7	1.3	*(36%)*	2.4	*(64%)*	−0.4	23	14
Latvia	7.6	4.2	4.6	1.2	*(27%)*	3.4	*(73%)*	−0.4	23	17
Lithuania	6.6	5.5	5.8	2.3	*(40%)*	3.5	*(60%)*	−0.3	23	13
Poland	2.7	2.3	3.1	0.3	*(11%)*	2.8	*(89%)*	−0.7	23	21
Slovak Republic	2.7	2.5	2.8	0.7	*(27%)*	2.0	*(73%)*	−0.2	23	16
Slovenia	2.5	1.1	1.3	0.1	*(8%)*	1.2	*(92%)*	−0.1	23	23

The first term on the right-hand side is the part of the growth differential attributable to unconditional convergence; the second and third terms are the components of the growth differential attributable to the current account; and the fourth term is the component attributable to other determinants in the regression. Table B1 presents these growth decompositions.

The proportion of beta convergence that can be explained by current account deficits will depend, of course, on the size of the country's actual deficit: for countries such as Slovenia and Poland, which ran relatively small current account deficits, the current account explains only about 10% of convergence with Germany. For the other countries, current accounts explain a larger proportion – about 20 to 40% – of beta convergence. For these countries, the additional convergence associated with capital flows reduces the time it takes for these countries to close half the income gap: the convergence half-life drops from 23 years (if current accounts were in balance) to between 13 and 18 years, depending on the country.

Finally, we can gauge the roles of investment and savings – and the de-linking of the two with the increase in capital flows – in the convergence process. Figure B2 shows 'unconditional convergence' scatter plots of per capita income growth against initial per capita income, where the points and best-fit lines are grouped by quartiles of investment/GDP (left panel) and savings/GDP (right panel) for the whole European sample.

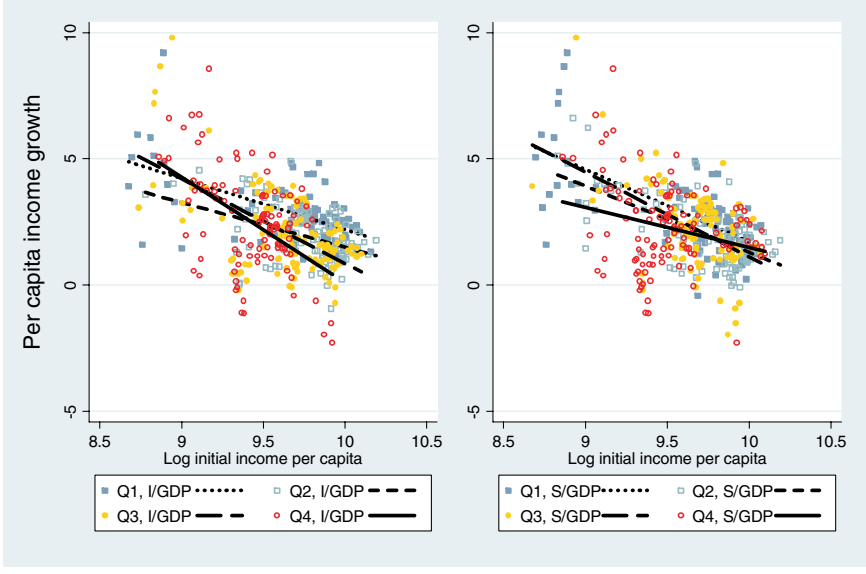

Figure B2. Convergence for different quartiles of I/GDP and S/GDP, Europe 1975–2004

The left panel is unsurprising: countries with higher investment rates have converged faster, as evidenced by the steeper *betas* (slopes) for higher quartiles of investment/GDP. In the absence of capital flows – i.e. if the Feldstein-Horioka puzzle held – one should expect to see the same pattern for saving/GDP, namely that countries with higher saving/GDP (and hence higher investment/GDP) should be converging faster. But we see exactly the opposite in the right panel: the countries that converged faster were the ones in the *lower* quartiles of saving/GDP. These findings are supportive of the neoclassical convergence mechanism: capital has flowed to countries with higher growth opportunities, enabling them not only to invest more than would otherwise have been possible, but also allowing them to consume more in anticipation of higher future income.

5. WHY IS EUROPE DIFFERENT?

In this section, we consider two possible answers to this question. First, the EU transfers funds to its lower income regions with the explicit purpose of achieving more rapid regional convergence. The question naturally arises whether it is these funds transfers that are reflected in our findings. If so, our claim that we are observing a textbook flow of capital within Europe, driven by private incentives for risk sharing and portfolio diversification, would be obviously misplaced. We report first on the general findings in the literature on the efficacy of EU transfers and then regressions within our framework that exclude EU transfers in the capital flows data. Both the literature and our results confirm that there is a tendency for transfers to go to relatively low-income regions, consistently with the policy's stated objective. However, so do private capital flows. Moreover, while the literature is, at best, ambiguous about the value of transfers in promoting convergence, our measure of private capital flows (the current account deficit stripped of capital transfers) shows a virtually unchanged effectiveness in accelerating convergence relative to the broader measure used in the rest of this paper.

Second, we probe the role of institutions. Good governance and stronger property rights have been found to play an important role in raising growth rates. Particularly relevant for this discussion, better institutions are seen to attract foreign capital and to help achieve more effective absorption of capital. Hence, the question for this analysis is whether the downhill flow of capital observed in Europe and the association of that flow with more rapid convergence are a reflection of Europe's institutional strengths. Put differently, do all countries with 'good' institutions show the European pattern that we report? Put more starkly, if we were to properly account for institutional effects, would Europe's uniqueness disappear? The answer, in short, is 'no'. Europe

Table 8. Domestic vs. foreign finance and growth: global and European samples

	Dependent variable: growth in p.c. GDP							
	Global				Europe			
Log of GDP per capita	−1.00	−0.98	−1.29	−1.15	−2.12	−2.16	−1.22	−1.75
	[2.71]***	[2.63]***	[3.23]***	[2.94]***	[2.43]**	[1.81]*	[1.29]	[1.18]
Schooling	0.65	0.65	0.57	0.56	0.23	0.26	0.28	0.33
	[3.70]***	[3.65]***	[3.24]***	[3.16]***	[2.95]***	[2.66]***	[3.00]***	[3.04]***
Population growth	−0.90	−0.89	−0.96	−0.95	−0.17	−0.17	−0.18	−0.18
	[4.85]***	[4.77]***	[5.10]***	[5.20]***	[0.46]	[0.51]	[0.48]	[0.53]
Openness ratio	0.98	0.93	1.08	1.01	0.52	0.31	0.10	−0.02
	[2.28]**	[2.11]**	[2.17]**	[2.00]**	[2.69]***	[1.26]	[0.23]	[0.04]
Private credit/GDP	13.22	12.31	11.99	12.78	6.51	12.53	2.61	11.18
	[1.82]*	[1.68]*	[1.33]	[1.42]	[0.46]	[0.65]	[0.19]	[0.65]
Log of p.c. GDP × Private credit/GDP	−1.44	−1.34	−1.33	−1.42	−0.73	−1.35	−0.35	−1.22
	[1.94]*	[1.80]*	[1.39]	[1.50]	[0.50]	[0.68]	[0.25]	[0.69]
CA/GDP		4.41		−11.50		−325.77		−339.33
		[0.21]		[0.47]		[4.58]***		[4.24]***
Log of p.c. GDP × CA/GDP		−0.82		0.90		33.62		35.28
		[0.35]		[0.33]		[4.41]***		[4.10]***
FI/GDP			−0.76	−1.34			11.67	7.35
			[0.66]	[1.16]			[1.34]	[0.77]
Log of p.c. GDP × FI/GDP			0.08	0.14			−1.18	−0.74
			[0.68]	[1.18]			[1.35]	[0.77]
Observations	511	511	477	477	92	92	92	92
Number of countries	120	120	111	111	23	23	23	23
R-squared	0.15	0.15	0.16	0.16	0.58	0.64	0.60	0.65

Notes: Estimates are on 5-year non-overlapping intervals, using random effects with clustered standard errors. A constant and time dummies are included in the equations, but are not reported.

Robust *t* statistics in brackets.

*significant at 10%; ** significant at 5%; *** significant at 1%.

remains different even when we consider the possibility that institutions introduce non-linearities in the relationships we estimate here.

5.1. The role of European Union transfers

Achieving economic convergence has been an explicit objective of EU policy. The primary instrument for achieving this objective has been the Structural Funds. These are targeted to specific administrative regions that subdivide national territories (these so-called NUTs II regions vary in population from 800,000 to 3 million people). In addition, Cohesion Funds have been deployed at the national level. Despite considerable research, the evidence on the role these funds have played in fostering convergence remains 'controversial' (Esposti, 2008, p. 1) or 'inconclusive' (De Michelis, 2008, p. 2). Recent research has done little to resolve the generally skeptical view of the influential Sapir report (Sapir *et al.*, 2003).

Boldrin and Canova (2001, pp. 226–7) present a compelling perspective. Income convergence, they note, was rapid in the 1950s and 1960s, during which period trade and factor flow movements were robust with the EU, but EU funds transfers were minimal. In contrast, from the early 1970s to the mid-1990s, when the scale of EU funds transfer was stepped up, the convergence process largely came to a halt. Differences in growth rates across countries and regions within countries were relatively narrow during this latter period, as presumably they were closer to their steady-state growth paths following convergence in the previous decades.

The absence of an evident link between EU transfers and convergence can be explained in a variety of ways. Some argue that the forces of divergence had gained strength in the 1970s and the 1980s and the funds' transfers mitigated these divergence forces. While this claim is disputed by some (Boldrin and Canova, 2001), to the extent it is true it is potentially an indictment of the policy, since the redistribution away from dynamic regions reinforced the lack of labour mobility and restricted overall EU growth. The Sapir Report (Sapir *et al.*, 2003) and other recent work (Santos, 2008) place greater emphasis on the inefficiency of the deployment of funds. These analyses note that the large bulk of the transfers has been redistribution across individuals within regions rather than from rich to poor regions, and that the resources have often been ineffectively targeted. Finally, an important variant of the ineffective targeting theme is the conclusion that absent complementary domestic policies, available funds are unlikely to provide value (Sapir *et al.*, 2003). Thus, Ireland, the one impressive catch-up story during the otherwise unspectacular 1970s and 1980s, is typically regarded as having made good use of EU funds. That, in turn, is attributed to the vigorous policies to attract foreign direct investment and create labour market flexibility.

This is not the place to explore the proposed refinements of the EU transfer policy – such as a focus on countries rather than regions, and greater emphasis on significant infrastructure projects with large externalities (Sapir *et al.*, 2003; Santos, 2008). The main lesson we draw from the evidence is that market-determined movements of capital and labour are likely to be more potent than official transfers in achieving convergence.

This significance of private capital flows is clearly supported by one further piece of analysis based on the framework in this paper. The balance of payments identity of interest is that the sum of the current account and capital transfers is equal to the (negative of) the financial account. Typically, capital transfers are small and can be ignored. In that case, the current account surplus (deficit) reflects the private capital outflows (inflows) as measured on the financial account. However, since capital transfers from the EU are non-trivial for some of the countries in our sample, the current account deficit is inflated by the extent of the capital transfers. To the extent that EU's capital transfers are inversely related to per capita incomes, the inverse relationship between the current account deficit and per capita income will overstate the relationship between private capital flows and per capita incomes.

In Table 9 we use the inflows on the financial account directly to measure private capital inflows (equivalently stated, we subtract capital transfer inflows from the current account *deficit*). Both the capital inflows regression and the growth regression are reported alongside our benchmark that used the current account deficit as the measure of capital inflows. As can be seen, the benchmark result is rather robust. The results indicate that the downhill flow of private capital is somewhat less pronounced than for the aggregate flows (not surprising since EU capital transfers are clearly directed at lower income countries); nevertheless, the downhill character of private flows is solidly statistically significant. For the growth regression, the results are virtually unchanged.

5.2. Institutional thresholds

The task here is to assess if the European effect is simply a reflection of Europe's good institutions. In particular, there is a presumption in the literature that institutional quality may have non-linear effects, and that beyond certain institutional thresholds, the variables of interest to us (the interaction terms in the current account and growth regressions) behave in the same manner as they do for Europe. If they do, does that also imply that the European effect weakens or even disappears? To evaluate if the European experience is just a special case of a more general phenomenon, we return to using the global sample of countries.

In what follows, we report the results for two conventional institutional variables. In each case, we use the median of the variable as the threshold for indicating high institutional quality. We also examined a number of other thresholds and the results

Table 9. Role of EU transfers

Capital flow equation			Growth equation		
Capital flow measure	CA (1)	Without EU transfers (2)	Capital flow measure	CA (1)	Without EU transfers (2)
Log of p.c. GDP	−0.0259	−0.0237	Log of p.c. GDP	−2.980***	−3.011***
	[−0.985]	[−0.904]		[−4.471]	[−4.575]
Growth in p.c. GDP	0.0022	0.0023	Schooling	0.207***	0.208***
	[0.883]	[0.909]		[2.713]	[2.687]
Fiscal balance/GDP	−0.127	−0.118	Population growth	−0.0931	−0.106
	[−0.977]	[−0.933]		[−0.269]	[−0.308]
NFA/GDP	−0.0272*	−0.0278*	Trade openness/GDP	0.628*	0.643*
	[−1.647]	[−1.737]		[1.774]	[1.837]
Old dependency ratio	−0.234	−0.201	Relative price of investment	−0.218	−0.249
	[−1.317]	[−1.258]		[−0.144]	[−0.164]
Young dependency ratio	−0.0237	−0.0357			
	[−0.187]	[−0.291]			
Trade openness/GDP	−0.00953	−0.0133			
	[−0.660]	[−0.892]			
FI/GDP	−0.464***	−0.400***	Capital outflow/GDP	−262.5***	−262.0***
	[−3.367]	[−3.002]		[−3.088]	[−3.070]
Log of p.c. GDP × FI/GDP	0.0481***	0.0417***	Capital outflow/GDP × Log of p.c. GDP	26.72***	26.68***
	[3.410]	[3.054]		[2.970]	[2.959]
R-squared	0.4	0.371	R-squared	0.656	0.656
Observations	87	87	Observations	95	95
Number of countries	23	23	Number of countries	23	23

Notes: Estimates are on 5-year non-overlapping intervals, using random effects with clustered standard errors. A constant and time dummies are included in the equations, but are not reported.

Robust *t* statistics in brackets.

* significant at 10%; ** significant at 5%; *** significant at 1%.

obtained are consistent with those reported here. More specifically, the current-account equation we now estimate takes the following form:

$$\left(\frac{CA}{GDP}\right)_{it} = X'_{it}\left\{\alpha + \left(I_{INS,it} \times \alpha_{INS}\right) + \left(I_{EUR,i} \times \alpha_{EUR}\right)\right\} + \varepsilon_{it} \quad (3)$$

where X_{it} denotes the matrix of explanatory variables used in the benchmark current-account equation (1). I_{INS} is an indicator variable that takes a value of 1 when institutional quality is high, and the value of 0 when institutional quality is low. Similarly, I_{EUR} takes the value of 1 when the observation is in the European sample, and 0 when it is not. For a country with high institutional quality that is not in Europe, the vector of regression coefficients is thus $\alpha+\alpha_{INS}$. The marginal effect of being in Europe once a country has high-quality institutions is α_{EUR}. Similarly, the growth equation we now estimate takes the following form:

$$g_{it} = Z'_{it}\left\{\beta + \left(I_{INS,it} \times \beta_{INS}\right) + \left(I_{EUR,i} \times \beta_{EUR}\right)\right\} + \eta_{it} \quad (4)$$

where Z_{it} denotes the matrix of explanatory variables used in the benchmark growth equation (2), and the indicator variables I_{INS} and I_{EUR} are defined as above. For a country with high institutional quality that is not in Europe, the vector of regression coefficients is thus $\beta + \beta_{INS}$ The marginal effect of being in Europe once a country has high-quality institutions is, here, β_{EUR}.

We have two objectives. The first is to check if the coefficients for countries with high-quality institutions ($\alpha + \alpha_{INS}$, and $\beta + \beta_{INS}$) are of the same sign as those found for the European sample (as reported in Tables 2 and 4). The second objective is to test whether the marginal effect of being in Europe for countries with high-quality institutions (α_{EUR} and β_{EUR}) is statistically significant. If the effect of being in Europe boils down to having high-quality institutions, then the coefficients α_{EUR} and β_{EUR} should be zero.

The two institutional variables we consider are governance quality and property rights. For governance quality, we use the first principal component of five variables from the International Country Risk Guide (ICRG): bureaucracy, corruption, accountability, government stability, and law and order. As a measure of property rights, we use the first principal component of indices of contract enforcement and property rights protection from La Porta *et al.* (1998, 1999).

We find some support for an institutional threshold view, but the Europe effect remains strong. The top panel of Table 10 reports the current account regressions, reporting only the coefficients of interest. There is evidence that the quality of governance matters. When the ICRG index is above the median, capital flows behave in the same way as for Europe. As financial integration increases, poorer countries run larger deficits and richer countries run larger surpluses. The property-rights variable does not, however, show this pattern. Nevertheless, while there is evidence that good governance may, in fact, help translate financial integration into downward capital

Table 10. Role of institutional thresholds

	Full sample		Above median		Above median	
			Governance quality (ICRG)		Contract/property rights	
CA equation						
FI/GDP	−0.115*	−0.117*	−0.169***	−0.115**	0.0258	0.134*
	[−1.862]	[−1.75]	[−2.974]	[−2.265]	[0.284]	[1.718]
Log of p.c.	0.0121*	0.0124*	0.0173***	0.0114**	−0.00217	−0.0127
GDP × FI/GDP	[1.946]	[1.85]	[2.983]	[2.23]	[−0.236]	[−1.624]
Europe effect						
FI/GDP		−0.284*		−0.449***		−0.790***
		[−1.808]		[−3.014]		[−5.690]
Log of p.c.		0.0294*		0.0468***		0.0800***
GDP × FI/GDP		[1.831]		[3.049]		[5.613]
R-squared	0.356	0.385	0.455	0.514	0.452	0.502
Observations	472	472	342	342	394	394
Number of countries	114	114	104	104	81	81
Growth equation						
CA/GDP	14.47	11.53	−6.392	−12.72	−40.87	−54.46*
	[0.608]	[0.454]	[−0.285]	[−0.532]	[−1.439]	[−1.792]
Log of p.c.	−2.143	−1.812	0.279	0.949	4.16	5.634*
GDP × CA/GDP	[−0.787]	[−0.621]	[0.115]	[0.357]	[1.354]	[1.701]
Europe effect						
CA/GDP		−336.6***		−238.7**		−275.6**
		[−4.475]		[−2.525]		[−2.108]
Log of p.c.		35.10***		24.99***		27.98**
GDP × CA/GDP		[4.315]		[2.618]		[2.102]
R-squared	0.115	0.132	0.241	0.267	0.161	0.181
Observations	597	597	365	365	475	475
Number of countries	135	135	116	116	90	90

Notes: Estimates are on 5-year non-overlapping intervals, using random effects with clustered standard errors. A constant and time dummies, as well as the other controls from the benchmark regressions, are included but are not reported. Governance quality is defined as the first principal component of five variables from the International Country Risk Guide (ICRG): *bureaucracy*, *corruption*, *accountability*, *government stability*, and *law and order*. Contract/property rights is defined as the first principal component of the *contract enforcement* and *property rights protection* variables from La Porta *et al.* (1998, 1999).

Robust *t* statistics in brackets.

*significant at 10%; ** significant at 5%; *** significant at 1%.

flows, the European effect remains strong and robust. The same general finding holds for the growth regressions, reported in the bottom panel. Here, it is the La Porta *et al.* index of property rights that, above its median, creates conditions that allow capital inflows to accelerate per capita income convergence. Once again, though, the Europe effect remains, indicating that being in Europe does not simply boil down to having good institutions, as measured by the ICRG and La Porta *et al.* variables.

6. IS EUROPE REALLY DIFFERENT?

Finally, and concluding our search for an explanation of the 'European effect', we examine the possibility that it is thresholds in financial integration itself that

generate the behaviour we see in Europe. This would be the case if risk sharing and portfolio diversification were undertaken to a notable extent only when financial integration reached some threshold. If reasonable, this proposition would also imply that we should observe the 'European' pattern in the capital flows and growth dynamics of US states, which, by definition, are deeply financially integrated. Of course, there are important differences between US states and Europe. In particular, with the inclusion of the new EU member states in the sample of countries designated here as Europe, per capita income differences have once again widened, creating greater scope for convergence. In contrast, the US states, having experienced a long period of convergence, are thought to have achieved a per capita income distribution that is broadly in equilibrium. However, shocks continue to generate cycles of divergence and convergence. Moreover, as discussed below, the measure of capital flows between states used here is a proxy. As such, in all candour, while the results are highly suggestive, that is what they are: suggestive. Results from both the global sample and the US states point to the significance of thresholds in financial integration; crossing the threshold results in greater financial diversification and risk bearing, and with that capital mobility that promotes convergence.

6.1. Financial integration thresholds in the global sample

This section reports threshold regressions similar in specification to the ones used in Section 4.2. The thresholds we examine here are those of financial integration itself. Does financial integration work for all countries as it does in the European sample when financial integration is at relatively high levels? Here, we present results that examine if the role of financial integration changes above the first, second, and third quartiles of financial integration. The results are in Table 11.

Even for the global sample, it is clear that financial integration matters for the strength and direction of capital flows. Already, above the first quartile of financial integration, the global sample mimics the European pattern. Above the median, the similarity is stronger, and stronger still above the third quartile. Europe is still significantly different, but its uniqueness diminishes when one looks at countries in the highest quartile of financial integration (last column). This suggests that Europe's lead in financial integration explains partly but not fully why Europe is different. Note, our regressions are not just saying that more financial integration results in more cross-border capital flows. We are making the further claim that financial integration stimulates flows from rich to poor countries. To that extent also our results are more specific than those of Fratzscher and Imbs (2008); these authors emphasize the critical importance of financial integration for international risk sharing and capital flows, but do not investigate the direction of capital flows.

While financial integration is influential in directing capital flows, in the global sample it does not appear to have any bearing on relating the resulting capital flows

Table 11. Role of financial integration thresholds

(Estimation results by quartile of FI/GDP) **Quartile of FI/GDP**	Full	>Q1	>Q2	>Q3	Full	>Q1	>Q2	>Q3
CA equation by quartile of FI/GDP								
FI/GDP	−0.115*	−0.144**	−0.189***	−0.324***	−0.117*	−0.135*	−0.166**	−0.275***
	[−1.862]	[−2.136]	[−2.76]	[−3.558]	[−1.75]	[−1.893]	[−2.313]	[−3.017]
Log of p.c. GDP × FI/GDP	0.0121*	0.015**	0.0195***	0.033***	0.0124*	0.014*	0.0171**	0.0278***
	[1.946]	[2.185]	[2.785]	[3.543]	[1.85]	[1.946]	[2.322]	[2.99]
Europe effect								
FI/GDP					−0.284*	−0.308**	−0.398**	−0.272*
					[−1.808]	[−2.075]	[−2.509]	[−1.762]
Log of p.c. GDP × FI/GDP					0.0294*	0.0319**	0.0410**	0.0284*
					[1.831]	[2.091]	[2.520]	[1.807]
R-squared	0.356	0.373	0.395	0.431	0.385	0.401	0.417	0.449
Observations	472	472	472	472	472	472	472	472
Number of countries	114	114	114	114	114	114	114	114
Growth equation by quartile of FI/GDP								
CA/GDP	14.47	9.614	2.242	−19.77	11.53	7.594	−0.38	−19.15
	[0.608]	[0.495]	[0.0916]	[−0.673]	[0.454]	[0.361]	[−0.0144]	[−0.616]
Log of p.c. GDP × CA/GDP	−2.143	−1.518	−0.789	2.377	−1.812	−1.33	−0.526	2.225
	[−0.787]	[−0.698]	[−0.281]	[0.707]	[−0.621]	[−0.566]	[−0.173]	[0.618]
Europe effect								
CA/GDP					−336.6***	−286.9***	−297.1***	−224.6**
					[−4.475]	[−3.260]	[−3.387]	[−2.391]
Log of p.c. GDP × CA/GDP					35.10***	30.04***	31.35***	23.38**
					[4.315]	[3.248]	[3.365]	[2.315]
R-squared	0.115	0.124	0.129	0.147	0.132	0.147	0.145	0.153
Observations	597	552	552	552	597	552	552	552
Number of countries	135	123	123	123	135	123	123	123

Notes: Estimates are on 5-year non-overlapping intervals, using random effects with clustered standard errors. A constant and time dummies, as well as the other control variables included in the benchmark regressions, are included in the equations, but are not reported. Observations above the first to third quartile of financial integration are denoted by >Q1, >Q2, and >Q3, respectively.

Robust *t* statistics in brackets.

*significant at 10%; ** significant at 5%; *** significant at 1%.

to more rapid income convergence. Europe remains distinctly different in this regard. The implication is that investors spreading their assets across integrated economies do so in significant part as a diversification device. This is also the conclusion reached by Mody and Murshid (2005). They find that over the 1990s, as financial integration increased, the link between foreign capital inflows and domestic investment in the global sample of countries actually weakened. Not only were international investors from rich nations diversifying, so were residents in poorer countries. In addition, governments in several countries were engaged in accumulating reserves to self-insure. Channelling the capital inflows to larger investment and rapid income convergence, Mody and Murshid (2005) argue, requires a strong policy environment. The implication is that as Europe became more financially integrated, a significant part of the increased capital flows was directed from rich to poor countries, but the parallel strengthening of the policy and institutional environment in the recipient nations was instrumental in raising convergence rates. Our results in Section 4.2 caution that the institutional strengthening of Europe cannot be gauged by standard cross-country metrics. Rather, the deeper integration achieved in harmonizing national laws to the higher standards of advanced Europe through the *acquis communautaire* presumably played an important role.

6.2. Capital mobility and income convergence in the US states

Income convergence among US states has been studied extensively (Barro and Sala-i-Martin, 1991, 1992). While the role that capital mobility plays in this convergence process has been raised (by Barro and Sala-i-Martin, 1991 and by Blanchard, 1991 in his comment on that paper), the ability to undertake a proper analysis has been compromised by the lack of capital flows data. Recently, Kalemli-Ozcan *et al.* (2006) have made a major effort to construct a proxy for 'external' holdings and 'capital flows' of US states. In the analysis presented below, we bring together these proxies for 'capital flows' with the state income and product data to study convergence among US states.[13]

Kalemli-Ozcan *et al.* (2006) use a state's output/income ratio as a proxy for a state's net external liabilities. The change over time in the output/income ratio is, therefore, a proxy for capital inflows.[14] There are several limitations to this measure, and many approximations are used in its construction. Nevertheless, it is an important advance necessary to examine questions of capital mobility and growth. By this measure, Kalemli-Ozcan *et al.* (2006) conclude that the size of

[13] We are grateful to Sebnem Kalemli-Ozcan for generously sharing their data. We drop the observation for Alaska in 1975. Oil was discovered in Prudhoe Bay in 1968, and construction of the Trans-Alaska pipeline took place between 1974 and 1977. This implied a big capital inflow into a rich state. Following Kalemli-Ozcan *et al.* (2006), we also drop the outlier state of Delaware from the sample of analysis.

[14] By the same token, multiplying a state's output/income ratio by −1 provides a proxy for its net foreign asset position, and multiplying the change in a state's output/income ratio by −1 provides a proxy for its net capital outflows.

capital flows within the US states is substantially larger than is the case between countries and, hence, the frictions associated with international borders (differences in language, currencies, laws and norms) matter. In this context, Blanchard (1991) points out that capital flows will not only be motivated by the search for returns in states with low capital–labour ratios, but, more so than in an international frictional setting, will also respond to shocks, taking advantage of short-term opportunities. Indeed, that is what Kalemli-Ozcan *et al.* (2006) find: growth in the previous five years (a signal of opportunities) is found to spur capital inflows into the state.

Thus, following the approach used for our cross-country analysis, we estimate cross-state regressions on five-year non-overlapping intervals for 1970–2005, using random effects with clustered standard errors. The values for the right-hand side variables are for the year preceding the five-year interval (e.g. 1969 for the 1970–5 period). Constants and time dummies are included but not reported. The results of the 'capital flows' regressions are presented in Table 12. It is clear that capital has moved to states with high growth, whether growth is measured in terms of output or income, confirming the role of shocks. Our focus is on whether capital has also moved downhill. Two observations are pertinent in this context. First, the downhill relationship is more evident when the 'capital flows' are stripped of federal transfers.[15] The implication is that US policy transfers are not necessarily targeted to the poorer states. In contrast, private capital flows are significantly more likely to move from richer to poorer states. Second, the downhill flow is more evident in the per capita output regressions. This is as would be expected; capital flows are driven by production relationships from rich to poor states, those with lower per capita output and hence installed capital. Thus, controlling for productivity shocks, which may draw capital to rich states, the evidence is that in the United States capital is attracted to states with relatively low capital–labour ratios.

Notice that in these capital flows regressions, we do not interact initial per capita income with financial integration, assuming that all states are fully and equally integrated. When we move to the growth regressions, we do interact capital inflows with initial per capita income. The question, as before, is whether capital inflows increase the pace of convergence (rather than steady-state growth). Given the importance of shocks, Blanchard (1991) cautions that to the extent that persistent shocks move capital to rich states, the tendency towards income convergence will be blurred. Despite this, the finding is clear. Whether we consider income or output as the dependent variable, capital inflows have a stronger impact on growth, the lower is the per capita income or output (Table 13 and Figure 10). In other words, larger capital inflows are associated with more rapid convergence (Figure 11). The convergence rate

[15] For details of how federal transfers are defined, see the Appendix.

Table 12. US states: capital flows

Dependent variable	Capital outflow	Capital outflow		Capital outflow	Capital outflow
		Excl. Fed. transfers			Excl. Fed. transfers
Log of p.c. income	0.00502	0.02	Log of p.c. GDP	0.0144	0.0347**
	[0.265]	[1.197]		[0.700]	[2.247]
Growth in p.c. income	−0.0118**	−0.0162***	Growth in p.c. GDP	−0.0104***	−0.0115***
	[−2.561]	[−3.418]		[−3.199]	[−3.423]
NFA proxy	0.208***	0.198***	NFA proxy	0.238***	0.221***
	[6.855]	[7.706]		[5.707]	[6.628]
Retirees/Population	0.00364**	0.0016	Retirees/Population	0.00500**	0.00294**
	[2.269]	[1.293]		[2.402]	[2.068]
Population growth	0.00189	0.00181	Population growth	0.00305	0.00235
	[0.562]	[0.534]		[0.824]	[0.709]
Number of states	49	49	Number of states	49	49
Observations	342	293	Observations	342	293
R-squared	0.26	0.33	R-squared	0.28	0.35

Notes: Estimates are on 5-year non-overlapping intervals, using random effects with clustered standard errors. A constant and time dummies are included in the equations, but are not reported.

Robust *t* statistics in brackets.

*significant at 10%; ** significant at 5%; *** significant at 1%.

varies with the level of capital inflows from about 2 to 4% for per capita GDP and over an even larger range for per capita income. This compares with the average of about 2% convergence reported by Barro and Sala-i-Martin (1991, 1992).

7. CONCLUSIONS

The absence of a more substantial flow of capital from rich to poor countries was spotlighted as a paradox by Lucas (1990). Prasad *et al.* (2006) suggest that there may be no paradox – rather the observed pattern of flows may be the norm. Before that intriguing conclusion is used to make predictions and policy, it is important to reassess the evidence.

In this paper, we emphasize that a proper test of the role of international capital flows must recognize its role as primarily influencing the income convergence process (rather than raising the steady-state rate of growth), and further must allow for differential dynamics in different groups of countries. With that in mind, we focus on Europe and find strong evidence in favour of a conventional view of international capital flows. The 'downhill' flow of capital has reinforced the traditional European tendency towards income convergence. This transitional process, made possible by rapid financial integration, is self-limiting. Greater financial integration allows for a further dissociation between domestic savings and investment, leading to a transfer of capital from rich to poor countries. That transfer accelerates income growth. But with higher incomes, financial integration plays less of a role in attracting foreign capital, reducing that growth impulse.

Table 13. US states: growth and capital flows

	(1)	(2)	(3)	(4)
Dependent variable: Growth in p.c. Income				
Log p.c. Income	−1.560***	−1.320***	−1.276***	−1.185***
	[−5.786]	[−3.572]	[−3.785]	[−3.735]
Population growth	−0.0572*	−0.114***	−0.125***	−0.119***
	[−1.938]	[−2.810]	[−3.067]	[−3.087]
Capital outflow		−1.292	−20.92**	−24.27**
		[−1.413]	[−2.061]	[−2.327]
Log p.c. Income × Capital outflow			7.255**	8.463**
			[2.023]	[2.279]
Delta method:				
Capital outflow at Lowest p.c. Income			−7.078**	−8.124**
		[−2.075]	[−2.333]	
R-squared	0.50	0.36	0.37	0.37
Observations	489	342	342	342
Number of states	49	49	49	49
Dependent variable: Growth in p.c. GDP				
Log per capita GDP	−2.353***	−2.547***	−2.506***	−2.442***
	[−6.426]	[−4.882]	[−4.990]	[−4.578]
Population growth	−0.027	−0.0834	−0.0949	−0.0766
	[−0.430]	[−1.277]	[−1.410]	[−1.137]
Capital outflow		−3.477***	−11.05*	−6.656
		[−3.286]	[−1.937]	[−1.185]
Log p.c. GDP × Capital outflow			2.34	1.133
			[1.493]	[0.718]
Delta method:				
Capital outflow at Lowest p.c. GDP			−6.079**	−9.708***
			[−2.352]	[−2.735]
R-squared	0.19	0.18	0.18	0.60
Observations	391	342	342	342
Number of states	49	49	49	49

Notes: Estimates are on 5-year non-overlapping intervals, using random effects with clustered standard errors. A constant and time dummies are included in the equations, but are not reported. Columns (1) – (3) relate to total net capital flows, while column (4) relates to capital flows excluding federal transfers.

Robust *t* statistics in brackets.

*significant at 10%; ** significant at 5%; *** significant at 1%.

Though often criticized for lagging behind the dynamic developments elsewhere in the world, this paper suggests that European financial markets have performed well their role of reallocating capital in the region. La Porta *et al.* (1998) conclude that 'civil law' countries, with a French, German, or Scandinavian legal system, have weaker investor protection. Possibly for that reason, banks play a greater role in Europe, while financial markets lag behind in fostering entrepreneurship, as in the United States. However, Allen *et al.* (2007) point out that the European banking system is more efficient than in the United States. Similarly, Blanchard (2004) reaches the assessment that 'Europe has done better than is often perceived; … there has been and continues to be a steady process of reform in the product and financial markets, that this process is likely to continue.' Our findings suggest that

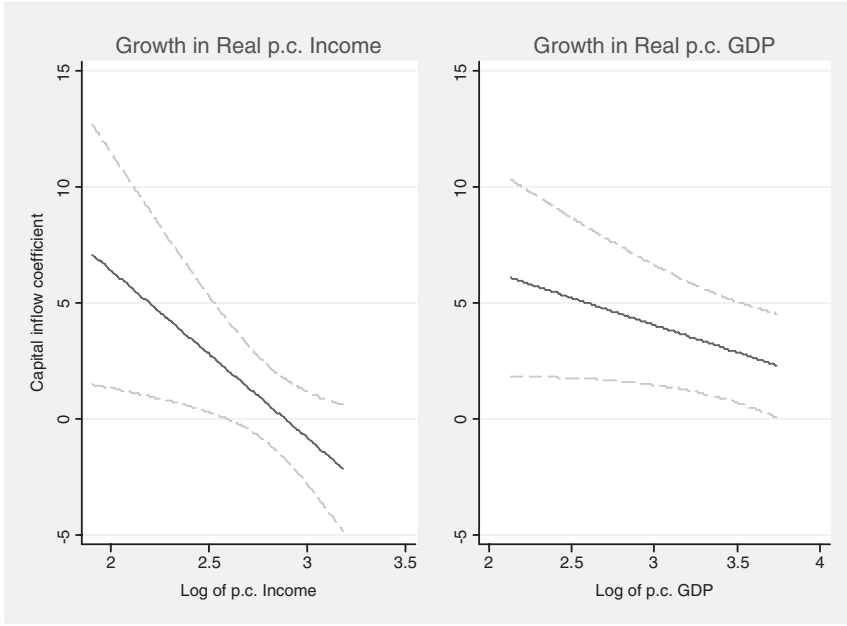

Figure 10. US states: growth and capital inflows (coefficient on capital inflows over observed p.c. income and GDP range)

Note: Figure reports parameter estimates and 90% confidence intervals obtained using the delta method.

European financial integration has been no less powerful than the better documented gains from trade integration (see Baldwin, 2006 for estimates from 'gravity' models).

We explored several avenues to identify the factors that make Europe different in the global sample of countries. In sum, we find that Europe's experience bears a close resemblance to intra-national flows within the United States, suggesting that the European experience is more akin to intra-national flows, with limited relevance for other regions where borders still represent significant barriers. However, there are echoes of the European experience in the global sample. We found, for example, as others have done, that institutional thresholds do matter even in the global sample, as do financial integration thresholds. The fact that Europe is ahead of other countries, even after accounting for these threshold effects, raises an intriguing possibility. Collins (2006, p. 9) comments that the focus on the apparently perverse direction of capital flows may be misplaced since it could be 'a slowly dissipating vestige of an old pattern'. If so, the patterns we see in a highly integrated Europe may well be the leading edge, the bellwether. As global financial integration proceeds apace, it may draw a wider circle of countries within its fold, changing the direction and effects of international capital flows.

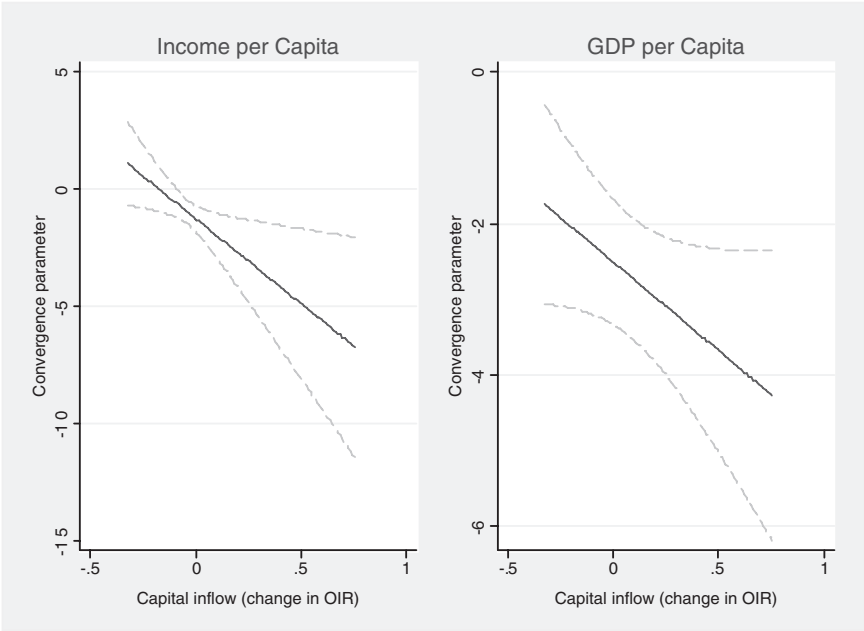

Figure 11. US states: convergence parameter and capital inflows (positive values imply nonconvergence)

Note: Figure reports parameter estimates and 90% confidence intervals obtained using the delta method.

Thus, alongside the more visible (and more sizeable) uphill flows from Asia to the United States, a more conventional model fits the European experience, where financial integration eases downhill capital flows and even substitutes for institutional quality. Access to foreign capital has allowed converging European nations to step up their consumption early. However, capital flows can be fickle, with costly reversals all too familiar from the emerging market crises of the 1990s. Higher early consumption, therefore, comes at the cost of facing severe downturns when international capital flows pull back. The countries that have gained so much from large capital inflows are now facing significant retrenchment of these flows and recession-like conditions. The long-term implications of financial integration and global risk sharing are hard to predict at this point in the moving global crisis (Box 3). Of relevance in this context is the finding of Calvo *et al.* (2008) that although an initial increase in financial integration increases the probability of sudden stops in capital flows, beyond a threshold of financial integration, the probability of a sudden stop actually declines. Deeper financial integration may imply that investors are better diversified and hence willing to take a longer view, reducing the risk of a 'sudden stop' in capital flows. The enticing prospect of higher growth possibilities with lower risk – at least in more normal times – remains. That prospect will be greater the better the current crisis is monitored and managed (see Schadler *et al.*, 2006).

Box 3. Markets differentiate and amplify vulnerabilities

The world is currently witnessing a correlated shock of huge magnitude, and this shock is moving through the world economy in waves with no country immune. In Eastern Europe in particular, countries reliant on capital inflows now face retrenchment of those flows, growth has slowed sharply and some economies face the possibility of contraction. Is it possible that, in some longer-term perspective, the relationship we have documented between capital inflows and growth convergence will be overturned? The short answer is we do not know.

What we do know is that countries with fragile policies have been differentiated by markets. In Eastern Europe, some countries have exceeded 'speed limits' even relative to the aggressive convergence process described in this paper. Figure B3 reports out-of-sample predictions of

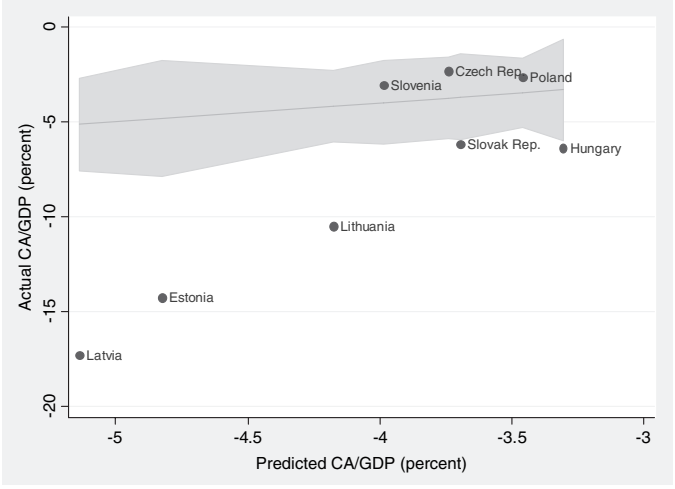

Figure B3. Predicted vs. actual current account balances

Note: Figure reports out-of-sample prediction based on benchmark current-account equation (Table 2, column 6). In addition to the coefficient estimates reported in Table 2, two additional assumptions are required to compute the out-of-sample predictions: the fiscal balance during 2005–9, for which the average observed during 2005–7 is used; and, secondly, the coefficient on the period dummy, for which the same value as for the 1999–2004 period is used.

our benchmark current-account model beyond 2004 (the year in which our data end) on the x-axis, against their actual values during 2005–7 on the y-axis. Countries whose current account balances were predicted exactly will fall on the 45 degree line, and the shaded area represents the 90% confidence interval of the prediction. Latvia's current account deficit in 2005–7 was clearly much larger than projected by its per capita income and financial integration.

Hungary, in contrast, was close to the edge of its projected band; the markets focused on Hungary for the more classical (first-generation) vulnerability created by sustained fiscal weakness. Similar differentiation is occurring elsewhere: in Asia, Indonesia and Korea have experienced sharp currency corrections and foreign exchange reserve losses. It remains, thus, to be seen whether the current crisis will fundamentally change trends in financial integration and country strategies to interface with global financial currents.

In the European model, a gush of capital inflows can also hurt if that leads to overvaluation of the exchange rate and a loss of international competitiveness. The seriousness of this possibility depends on whether the inflows are channelled to raising productivity. The evidence in this paper is that gains in productivity have especially accompanied foreign direct investment. Fabrizio *et al.* (2006) also show that the new member states of the EU, as substantial recipients of international capital, have also achieved significant transformation of their production structures, raising the technology content and quality of their products. Again, such a favourable outcome is not a given and the risks of exchange rate overvaluation cannot be ruled out.

The alternative is to self-insure against the vagaries of international financial markets, as many countries in East Asia have attempted. This, of course, implies that savings rates need to be higher, exchange rates more competitive, and consumption postponed. From a global perspective, high Asian savings rates have been associated with so-called 'imbalances' in current accounts accompanied by mispriced exchange rates and risks from the unwinding of the imbalances. The implication of our analysis is that as financial integration increases, this alternative model could become less attractive. With expanded diversification possibilities, the potential of harnessing international capital increases, and the need to self-insure declines.

Discussion

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This paper presents intriguing evidence on international capital flows around the world and documents that capital flows in Europe seem to display a different pattern than in the rest of the world: within Europe capital appears to flow from rich to poor countries and these flows are stronger the more financially integrated European countries are. Moreover, in Europe capital inflows are associated with higher growth rates and thus faster income convergence. None of these patterns appears to emerge outside Europe.

The empirical evidence suggests that a causal link may exist between increased financial integration within Europe, on the one hand, and increased income convergence at the European level, on the other. However, the absence of econometrically identified independent variations in financial integration does not – at least strictly speaking – allow for such a causal interpretation. My comments below aim at increasing the confidence one might reasonably have in such a causal relationship. To this end, I discuss a simple model of international capital flows that features a causal link between the degree of financial integration and income convergence and that – in addition – is consistent with a number of empirical findings reported for Europe in the paper. The fact that the existence of a causal link gives rise to empirical predictions that are supported by the data should increase our confidence in the view that increased financial integration is indeed causal for some of the observed income convergence at the European level. For the world at large, however, the model tentatively suggests that income convergence may not be easily achieved via increased financial integration. According to the model, the evidence for the world at large would suggest that international income differences may be partly the result of international productivity differences.

A simple model of international capital flows with imperfect financial integration

Consider a world in which the gross real marginal return to international investment in physical capital is equal to $R > 1$. Assume that low income countries' returns to investment are higher than R, while high income countries' returns are equal to or below R, so that it is socially efficient for capital to flow from rich to poor countries. This classic setting implies that relative income differences should disappear quickly, provided capital is allowed to flow freely between countries.

In the setting below, the flow of capital is constrained by poor countries' ability to borrow against future income and the tightness of this constraint will be interpreted as the degree to which a country is financially integrated in international capital markets. The model then makes predictions regarding the impact of initial income and financing constraints on current accounts and income growth that can be compared to the findings in the paper.

The decision problem of a low income country regarding its consumption, investment and foreign borrowing decisions can formally be illustrated by the following simple optimization problem:

$$\max_{(c,c',d,k)} \log c + \beta \log c' \qquad s.t.: c \leq y + d - k$$

$$c' \leq Ak - dR$$

$$d \leq \theta \frac{y'}{R} = \theta \frac{Ak}{R}$$

where c denotes consumption today, c' future consumption, y output today (exogenously given and indexing whether a country today is 'rich' or 'poor'), y' output tomorrow, k investment in capital, d borrowing abroad (with $d > 0$ indicating a capital inflow). R denotes the gross real marginal costs of borrowing on the international capital market, $A > R$ the gross real return on domestic investment in the poor country, and $\beta \in (0, 1)$ a discount factor. Finally, $\theta \in (0, R/A)$ is a parameter constraining international borrowing. For $\theta = 0$ a low income country cannot pledge any of its future output on the international capital market. For positive values this constraint is relaxed, which allows interpretation of an increase in the value of θ as an increase in the country's degree of international financial integration.

Since $A > R$ in low income countries, the borrowing constraint is binding. The first order conditions to the above problem then deliver the following solution for the country's optimal investment level (k^*) and the current account deficit (d^*/y):

$$k^* = \frac{\beta}{(1+\beta)} \frac{y}{\left(1 - \theta \frac{A}{R}\right)}$$

$$\frac{d^*}{y} = \frac{\beta}{(1+\beta)} \frac{1}{\left(\frac{R}{\theta A} - 1\right)}.$$

The implied growth rate of output is:

$$\frac{y'}{y} = \frac{\beta}{(1+\beta)_y} \frac{1}{\left(\frac{R}{\theta A} - 1\right)}.$$

Clearly, in this simple model a relaxation of the borrowing constraint (an increase in θ) will give rise to an increased current account deficit, to higher domestic investment and to larger output growth. This is essentially the causal chain that the paper attempts to document empirically.

Interestingly, the model suggests very non-linear effects of financial integration on current accounts and growth. Specifically, the marginal effects of financial integration are minor for low degrees of financial integration (low θ), but become very large as $\theta \to (R/A)$ from below. This empirical model prediction is confirmed by the threshold regressions in Table 11 of the paper, and shows that for high degrees of financial integration, current accounts and output growth become more sensitive to a further increase in financial integration.

The model at this very basic level, however, also makes predictions that are inconsistent with the evidence presented for European and world wide capital flows. In particular, the model predicts that a country's current account deficit (as a share of GDP) is independent of the income level

$$\frac{\partial \frac{d^*}{y}}{\partial y} = \mathbf{0}$$

and as a consequence, there exists no interaction between a country's degree of financial integration and income on the current account deficit:

$$\frac{\partial^2 \frac{d^*}{y}}{\partial y \partial \theta} = \mathbf{0}.$$

Yet, as can be seen in Table 2 of the paper, the empirical findings show this not to be true.

What makes Europe different?

To replicate the European evidence on the relationship between current accounts, income levels and financial integration, one needs to assume that in Europe the profitability of investment projects varies systematically with the countries' income levels. Specifically, assume that the marginal return of a project in a European low income country is higher, the lower the country's current income, i.e.:

$$A = A(y) \text{ with } \frac{\partial A(y)}{\partial y} < \mathbf{0}.$$

This assumption is implied, for example, by the presence of a decreasing returns to scale production technology, which is shared by all countries in Europe. Due to the lower capital stock in low income countries, the marginal returns to capital would then be higher. This interpretation of Equation (1) also suggests that in Europe some of the countries are relatively poor mainly because of the existence of an external borrowing constraint which prevents them from quickly accumulating the efficient level of capital.

With assumption (1), the optimal current account deficit becomes:

$$\frac{d^*}{y} = \frac{\beta}{(1+\beta)} \frac{1}{\left(\frac{R}{\theta A(y)} - 1\right)} = \frac{\beta}{(1+\beta)} \frac{\theta A(y)}{(R - \theta A(y))}$$

which implies that relatively poorer countries will run larger current account deficits

$$\frac{\partial \frac{d^*}{y}}{\partial y} = \frac{\beta}{(1+\beta)} \frac{\theta A'(y) R}{(R - \theta A(y))^2} < \mathbf{0}$$

as is suggested by the European evidence. Moreover, more financially integrated countries will run larger deficits

$$\frac{\partial \frac{d^*}{y}}{\partial \theta} = \frac{\beta}{(1+\beta)} \frac{RA(y)}{(R-\theta A(y))^2} > \mathbf{0}$$

and the more so the poorer the country, i.e., the cross derivative is negative:

$$\frac{\partial^2 \frac{d^*}{y}}{\partial y \partial \theta} = \frac{\beta}{(1+\beta)} \frac{(R+\theta A(y))RA)'(y)(R-\theta A(y))}{(R-\theta A(y))^4} < \mathbf{0}.$$

Both of these facts are documented in the paper. The model, therefore, lends credibility to the thesis that increased financial integration at the European level has partly caused the observed income convergence at the European level. Interestingly, the model also points to possible reasons explaining the empirical differences between relatively poor European countries and poor countries in the rest of the world. If countries outside Europe are poor mainly because a low income level indicates a low level of productivity, i.e., if outside Europe

$$A = A(y) \text{ with } \frac{\partial A(y)}{\partial y} > \mathbf{0}$$

then the signs in Equations (2) and (3) are reversed, so that increased financial integration of poor countries is associated with larger capital outflows (or less capital inflows). This is the case, in the paper's Table 2, for the bloc of countries belonging to the Western Hemisphere.

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Recent contributions have argued that international capital flows from poor to rich countries, or 'uphill'. This paper argues that Europe (and US states) provide a counter-example. Relatively poor European countries tend to borrow – that is, run current account deficits – while rich ones lend. Interestingly, the pattern is amplified for economies with large net foreign assets and liabilities, that is, ones that are supposedly integrated financially. Contrary to existing evidence, these international capital flows appear to translate in accelerated GDP growth and economic convergence.

The result is established in a two-step procedure. First, current account balances are regressed on per capita GDP, net foreign assets and liabilities as a proportion of GDP [(A + L)/GDP], and an interaction between the two. Per capita GDP enters with a positive sign, suggesting rich economies tend to run surpluses. The interaction term does as well, so that downhill capital flows are magnified by financial integration. Second, a conventional growth regression is augmented with a measure of the current account, and an interaction between the current account and initial per capita GDP. The level of the current account enters negatively, suggesting borrowing

economies have faster growth rates. And the interaction enters positively, suggesting convergence is accelerated with current account deficits.

The paper then proceeds with an exhaustive battery of robustness checks and variations around the same theme. The results are economically meaningful. They are not driven by omitted measures of goods trade openness, nor by the development of domestic finance, nor by European structural funds. The growth acceleration seems to work via both total factor productivity (TFP) and capital accumulation. But TFP seems to respond to the foreign direct investment component of the current account, whereas capital accumulation is associated with the other components. Most results obtain as well in an intra-national sample of US states. Needless to say, the growth regressions are performed using frontier econometrics, using the now conventional time variation in the panel to alleviate endogeneity issues.

The authors have no doubt covered a lot of ground in establishing an intriguing set of results. In the context of the econometrics they deploy, it is hard to take issue with the robustness of their results. But, as often with reduced form regressions, caution is in order when formulating interpretations, and especially causal inferences. This discussion will first elaborate on these words of caution. Second, some results are especially intriguing: ultimately, the paper does not quite tell us what makes Europe so special. In fact, in light of some of the results here, one wonders where the exception is in the data, in Europe, or in the rest of the world.

Causality

The implicit assumption that underpins a causal interpretation of the results in this paper rests on the existence of financial frictions. As frictions are lifted, constraints to foreign borrowing weaken, the current account enters deficit and growth accelerates in a conventional neo-classical sense. This extremely intuitive sequence of events is at the basis of most of the economic interpretations developed in the paper. But obvious intuition should not obscure equally plausible interpretations, ones that cannot be rejected by the paper's reduced form approach. And ones that have little to do with financial integration *per se*.

The first stage estimations regress current account balances on net assets and liabilities as a proportion of GDP. In other words, they regress a flow measure on the corresponding stock. Both are likely to respond to exogenous shocks. For instance, consider a temporary domestic positive supply shock. Savings will increase, generating a current account surplus. The response of net foreign assets (A) or liabilities (L) will depend on the specific model of portfolio choice considered. But in general, it is entirely plausible that (A + L)/GDP should respond positively. That would drive a positive correlation between the dependent variable – the current account – and the main regressor of interest, (A + L)/GDP. This positive correlation has no relation whatsoever with any change in frictions on financial markets, and thus casts doubt on some of the paper's interpretations.

The authors are perfectly aware of that possibility, and propose to address endogeneity issues using a conventional time-series argument. It is quite possible that using lagged values of the regressors indeed alleviates some of the endogeneity concerns. But we do not know that for sure, and so some caution is in order. By the same token, the current account may significantly enter a conventional growth regression simply because borrowing occurs in anticipation of future positive shocks. Once again, using lagged values can go some way towards addressing the concern. But there is no guarantee it does, so that structural interpretations rest on somewhat thin ice.

Comparability

The paper opens with a reminder that the conventional result is that capital flows uphill, the so-called Lucas puzzle. Yet some of the results in the paper suggest that there is actually little evidence of a Lucas puzzle. For instance, Table 2 suggests that, *in the global sample*, rich countries do tend to run surpluses, that is, to lend. The coefficient on per capita GDP is positive and significant, just as it is in the European sub-sample. So, where is the puzzle? How can we reconcile these results with the literature? Is it sampling, or perhaps the set of controls? In fact, from Table 2, there are no regions of the world where capital seems to flow uphill. It either flows downhill, or the coefficient is simply insignificant.

Answering these questions is important in general, to clarify where in the literature this paper stands. Perhaps capital is not flowing uphill after all, once the question is investigated in the context of Equation (1). It is also important, to make sense of the European exception. On the basis of Table 2 it is not clear whether capital flows downhill in the global sample because of the European sub-sample, or because it is a general empirical regularity. In fact, the table implies non-significance in most instances, not quite the Lucas puzzle.

If there is a European exception, how can we make sense of it? The fact that a similar result obtains for US states suggests perhaps that it is 'deep integration', especially in financial terms, that may drive capital downhill. But it is far from clear how that can come about theoretically. What kind of frictions would actually revert the direction of international capital flows? In addition, while financial markets in the United States are deeply integrated, can we really think the same about Europe? For instance, by what measures are European financial intermediaries integrated internationally at the same level as US banks are across US states? Perhaps financial integration is not the only (nor perhaps the main) explanatory variable for the cross-section in (A + L)/GDP. It would seem, therefore, that a useful complement to the exercise performed in this paper would be to explore empirically the determinants of a European exception in a panel of net foreign assets and liabilities across countries and over time.

Panel discussion

Kevin O'Rourke remarked that some centuries ago capital was flowing uphill in Europe, too. The historical evidence, however, is consistent with theoretical mechanisms if land and institutional heterogeneity are included as explanations. He also thought that interest rate differentials on similar assets would be better than quantities as measures of financial integration.

Jacques Delpla noticed that before EMU, in peripheral countries high inflation only made short-term borrowing available. Upon joining EMU, borrowing became much easier and capital unsurprisingly flowed into such countries as Spain. Negative real interest rates may have triggered a bubble, and it will be interesting to follow developments in these and future EMU member countries. Volker Nitsch wondered how much the process of European integration fits with the story in the paper: there is more than one 'Europe', and it would be interesting not to exclude Luxembourg or to include Switzerland in the analysis.

As to reasons why Europe appears different in the relevant regressions, Andrea Bassanini noticed that the convergence parameter in the growth regression is not easy to estimate. The speed of convergence is different across countries in reality, and is theoretically predicted to depend on technology, population growth, tax rates, and many other variables. This implies a bias in regressions that force a single parameter to be estimated. As the bias is stronger when the sample includes more heterogeneous countries, and also affects the interaction coefficients, the European subsample could be different and feature significant interactions just because it is more homogeneous than the overall sample, and other subsamples. Fabrizio Coricelli pointed out that some global factors are important and are not taken into account by the paper's specification. For instance, it seems important to consider that up to 50% of oil surpluses were recycled towards Eastern Europe. Eastern European convergence was strong without deficits in the 1990s (and Spain was converging with moderate deficits in the 1980s). In the 2000s, conversely, fast-converging countries ran large deficits.

APPENDIX

Data for cross-country analysis

The sample of analysis is 1975–2004. For the European sample, we include 23 countries of the EU. Luxembourg and Ireland are excluded due to their exceptionally large financial integration. The new member states that joined the EU in 2004 are included in the sample starting from the year 1994 to avoid the structural breaks associated with the shift to a market economy, and because their accession to the EU started in the mid-1990s.

Following the growth literature, income per capita is real PPP GDP per capita in 1985 dollars, using the 'rgdpch' variable from *Penn World Tables 6.1* (http://pwt.econ.upenn.edu) up to 2000. We extrapolated using per capita real GDP growth rates from the IMF's *World Economic Outlook* (WEO) database in subsequent years. The current account is measured as a ratio to GDP and is taken from the Annual Macroeconomic database (AMECO) of the European Commission's Directorate General for Economic and Financial Affairs (http://ec.europa.eu/economy_finance/indicators_en.htm) where available, and from the WEO database otherwise. Per capita income growth and average current accounts are calculated over the following five-year non-overlapping periods: 1975–79, 1980–84, 1985–89, 1990–94, 1995–99, and 2000–04.

Unless otherwise noted in the tables, the values for the right-hand side variables in the regressions are for the year preceding the five-year interval (e.g. 1994 for the 1995–99 period). Data on schooling comes from the Barro-Lee educational attainment dataset (http://www.economics.harvard.edu/faculty/barro/data.html); we use the average years of schooling in the total population. Population growth and dependency ratio data come from the World Bank's *World Development Indicators* (WDI) database; the old (young) dependency ratio is calculated as the ratios of population aged above 64 (below 15) years of age, relative to the population aged 15–64. Trade openness is defined as the sum of exports and imports divided by GDP, and is the variable 'openc/100' in the Penn World Tables. The relative price of investment is calculated as the price level of investment divided by the GDP deflator, 'pi/p' in the Penn World Tables. The fiscal balance is the overall fiscal balance of the general government divided by GDP, taken from the WEO database.

Growth accounting data are taken from Bosworth and Collins (2003). However, the Bosworth–Collins growth accounts do not cover any of the countries from Central and Eastern Europe. For these countries the capital stock is constructed using the perpetual inventory method, with a depreciation rate of 5% (for consistency with Bosworth and Collins) and using investment data from the WEO database. The initial capital stock for these countries is obtained using predicted values from a regression of capital stock on per capita income and investment/GDP ratios for countries in the Bosworth–Collins dataset.

Financial integration is calculated as the sum of foreign assets and foreign liabilities divided by GDP, using the External Wealth of Nations Mark II database of Lane and Milesi-Ferretti (2006). The same database was used to construct the net foreign asset position, defined as foreign assets *minus* foreign liabilities divided by GDP. Financial deepening is measured as bank credit to the private sector divided by GDP, and is from the Financial Structure dataset of the World Bank http://siteresources.worldbank.org/INTRES/Resources/FinStructure_60_05_final.xls

The International Country Risk Guide (ICRG) data used to construct our composite index of governance quality is available online at http://www.prsgroup.com/ICRG.aspx. The five indexes we use – namely, *bureaucracy*, *corruption*, *accountability*, *government stability*, and *law and order* – are defined by the ICRG as follows. *Bureaucracy* quality (0–4 scale): 'high points are given to countries where the bureaucracy has the strength and expertise to govern without drastic changes in policy or interruptions in government services.' *Corruption* (0–6 scale): 'corruption within the political system.' Higher values on this scale indicate less prevalence of corruption. Democratic *accountability* (0–6 scale): 'a measure of how responsive government is to its people.' *Government stability* (0–12 scale): 'an assessment both of the government's ability to carry out its declared program(s), and its ability to stay in office. The risk rating assigned is the sum of three subcomponents, each with a maximum score of four points and a minimum score of 0 points.' The three subcomponents are 'Government Unity,' 'Legislative Strength,' and 'Popular Support.' *Law and order* (0–6 scale): 'Law and Order are assessed separately, with each sub-component comprising zero to three points. The Law sub-component is an assessment of the strength and impartiality of the legal system, while the Order sub-component is an assessment of popular observance of the law.' For further details on the methodology used to construct the ratings, see http://www.icrgonline.com/page.aspx?page=icrg-methods. The first principal component of these five variables is computed using the STATA principal component analysis function 'pca'.

Following La Porta *et al.* (1999), data for the *property rights* variable are taken from the Heritage Foundation's *Index of Economic Freedom* (http://www.heritage.org/Index/). Data for the efficiency of *contract enforcement* is taken from La Porta *et al.* (1998).

Data for US states

State-level GDP is published by the Bureau of Economic Analysis (BEA), which defines it as 'the state counterpart of the Nation's gross domestic product (GDP), the Bureau's featured and most comprehensive measure of US economic activity (http://www.bea.gov/regional/). GDP by state is derived as the sum of the GDP originating in all the industries in a state.' State GDP estimates are available for 1963–2007. Given that state-level overall price indexes are unavailable, we obtain real state GDP by dividing by the US Consumer Price Index for all urban consumers obtained from the US Department of Labor: Bureau of Labor Statistics. State per-capita real GDP is then obtained by dividing by state population, obtained from the BEA.

State-level income is also published by the BEA, which defines it as 'the income received by all persons from all sources. Personal income is the sum of net earnings by place of residence, rental income of persons, personal dividend income, personal interest income, and personal current transfer receipts.'

State-level retiree-to-population ratios are obtained by dividing the number of people of age 65 and above (available from the Census Bureau) by state population.

Federal government transfers are defined as in Kalemli-Ozcan *et al.* (2006), who generously shared their data with us. The series is the sum of 11 different series, each of which are identified as 'measuring transfers from the U.S. federal government to individuals or state-specific institutions (typically governments)' (Kalemli-Ozcan *et al.*, 2006). The series are published by the BEA and are: 'Old age, survivors and disability insurance payments,' 'Railroad retirement and disability payments,' 'Workers' compensation payments (Federal and State),' 'Medical payments,' 'Supplemental security income (SSI) payments,' 'Food stamps,' 'Other income maintenance,' 'Unemployment insurance benefit payments,' 'Veterans' benefits payments,' 'Federal education and training assistance payments (excl. veterans),' 'Federal government payments to nonprofit institutions.'

Robustness

This appendix reports additional robustness tests of the results in the main text. First, Table A1 examines whether the effects of capital inflows on growth were being driven by a few outliers by dropping one country at a time from the regressions. The results are robust to this test. We also examined whether the estimated association between financial integration and current account balances was being driven by the new member states from Central and Eastern Europe (CEE-8). To address this possibility, we re-estimated the benchmark current account equation with the addition of a dummy variable for the CEE-8, as well as its interactions with the key variables of interest. As Table A2 reports, the results are robust to this test. In particular, the coefficient on financial integration and on its interaction with per capita GDP remains statistically significant at the 1% level, even when the CEE-8 dummy and its interactions with per capita income and with financial integration are included in the equation. This result suggests that, in Europe, greater financial integration is associated with a faster 'downhill' flow of capital both in the CEE-8 and in non-CEE-8 countries. However, it does appear that the downhill flow is particularly strong to the CEE-8, as indicated by the positive and significant interaction of the CEE-8 dummy with per capita GDP. Similarly, we added the CEE-8 dummy variable and its interactions to the benchmark growth regression, and found the estimated relationship between the current account and growth remained unchanged. In this case, the estimated coefficients for the CEE-8 dummy and its interactions were found to be statistically insignificant.

Table A1. Europe:robustness to dropping one country at a time

	Europe	excl. GBR	excl. AUT	excl. BEL	excl. DNK	excl. FRA	excl. DEU	excl. ITA
Log of GDP per capita	−2.9797	−3.1113	−3.0029	−2.8716	−2.9143	−3.1061	−2.8977	−3.0856
	[4.47]***	[4.55]***	[4.51]***	[4.55]***	[4.32]***	[4.56]***	[4.24]***	[4.40]***
Schooling	0.2066	0.2333	0.2263	0.1822	0.1915	0.2284	0.2075	0.2376
	[2.71]***	[2.77]***	[2.46]**	[2.08]**	[2.65]***	[2.78]***	[2.34]**	[2.85]***
Population growth	−0.0931	−0.0763	−0.0959	−0.135	−0.0849	−0.0909	−0.1162	−0.0575
	[0.27]	[0.21]	[0.27]	[0.36]	[0.24]	[0.26]	[0.31]	[0.16]
Trade openness/GDP	0.6278	0.6849	0.6527	0.7461	0.5986	0.6742	0.5882	0.6954
	[1.77]*	[1.89]*	[1.83]*	[1.41]	[1.71]*	[1.85]*	[1.68]*	[1.87]*
Relative price of investment	−0.2181	−0.2777	−0.2669	−0.2686	−0.128	−0.3373	−0.2111	−0.2834
	[0.14]	[0.18]	[0.18]	[0.16]	[0.08]	[0.22]	[0.14]	[0.19]
CA/GDP	−262.4881	−261.7361	−241.1008	−262.9579	−274.1485	−256.1679	−243.4209	−248.3186
	[3.09]***	[2.88]***	[2.56]**	[3.02]***	[2.95]***	[2.96]***	[2.71]***	[2.81]***
Log of p.c. GDP × CA/GDP	26.7218	26.6687	24.4304	26.8214	27.9986	26.0763	24.6617	25.256
	[2.97]***	[2.77]***	[2.44]**	[2.91]***	[2.83]***	[2.85]***	[2.59]***	[2.70]***
Observations	95	89	89	89	89	89	89	89
Number of countries	23	22	22	22	22	22	22	22
	excl. NLD	excl. SWE	excl. FIN	excl. GRC	excl. MLT	excl. PRT	excl. ESP	excl. CYP
Log of GDP per capita	−2.9834	−2.9408	−3.0343	−3.085	−3.1888	−3.1605	−3.0387	−3.0997
	[4.18]***	[4.27]***	[4.13]***	[4.47]***	[4.67]***	[4.54]***	[4.55]***	[4.50]***
Schooling	0.2145	0.2244	0.2069	0.2482	0.2418	0.2512	0.2021	0.1992
	[2.71]***	[2.64]***	[2.60]***	[2.88]***	[2.98]***	[2.49]**	[2.44]**	[2.65]***
Population growth	−0.0694	−0.0886	−0.1089	0.1367	−0.1724	0.0743	−0.0212	−0.2891
	[0.19]	[0.25]	[0.32]	[0.45]	[0.43]	[0.19]	[0.06]	[0.82]
Trade openness/GDP	0.6997	0.6162	0.6421	0.5617	0.5258	0.6953	0.5752	0.6347
	[1.83]*	[1.66]*	[1.63]	[1.57]	[1.40]	[1.77]*	[1.53]	[1.66]*
Relative price of investment	−0.2398	−0.1692	−0.1988	0.0916	−0.4601	−0.2976	−0.1549	−0.5823
	[0.15]	[0.11]	[0.13]	[0.06]	[0.29]	[0.19]	[0.10]	[0.36]
CA/GDP	−265.7466	−283.4832	−266.1771	−308.8211	−274.8008	−259.3007	−278.5561	−249.981
	[2.86]***	[3.46]***	[2.95]***	[3.95]***	[3.26]***	[3.23]***	[3.23]***	[2.85]***
Log of p.c. GDP × CA/GDP	27.1261	29.0079	27.0177	31.7911	28.092	26.0622	28.4324	25.5601
	[2.73]***	[3.34]***	[2.82]***	[3.84]***	[3.16]***	[3.08]***	[3.10]***	[2.77]***
Observations	89	89	89	89	94	89	89	94
Number of countries	22	22	22	22	22	22	22	22
	excl. CZE	excl. SVK	excl. EST	excl. LVA	excl. HUN	excl. LTU	excl. SVN	excl. POL

Continued

Table A1. Continued

	Europe	excl. GBR	excl. AUT	excl. BEL	excl. DNK	excl. FRA	excl. DEU	excl. ITA
Log of GDP per capita	−2.8502	−2.9862	−3.08	−3.7686	−3.4786	−2.9031	−2.7833	−2.7799
	[4.37]***	[4.47]***	[4.39]***	[4.44]***	[6.34]***	[4.26]***	[3.95]***	[3.18]***
Schooling	0.1847	0.1995	0.2101	0.2149	0.1931	0.2535	0.188	0.1921
	[2.60]***	[2.63]***	[2.85]***	[2.46]**	[2.38]**	[3.15]***	[2.54]**	[2.58]***
Population growth	−0.0968	−0.0839	−0.1193	−0.1008	−0.2273	−0.0035	−0.1467	−0.0902
	[0.29]	[0.24]	[0.27]	[0.29]	[0.71]	[0.01]	[0.43]	[0.26]
Trade openness/GDP	0.6248	0.6559	0.5923	1.1518	0.6458	0.542	0.5108	0.6191
	[1.83]*	[1.88]*	[1.64]	[2.64]***	[1.70]*	[1.87]*	[1.41]	[1.77]*
Relative price of investment	−0.0797	−0.216	−0.4825	−2.2955	−0.7345	0.6521	−0.0268	−0.0417
	[0.05]	[0.14]	[0.29]	[1.25]	[0.49]	[0.64]	[0.02]	[0.03]
CA/GDP	−271.034	−255.1894	−247.2749	−254.404	−294.8233	−310.0697	−279.4924	−268.7033
	[3.07]***	[3.00]***	[2.79]***	[2.99]***	[3.48]***	[2.56]**	[3.29]***	[3.16]***
Log of p.c. GDP × CA/GDP	27.6081	25.9086	25.2019	25.8063	29.9188	31.734	28.4228	27.357
	[2.95]***	[2.88]***	[2.70]***	[2.93]***	[3.32]***	[2.51]**	[3.16]***	[3.04]***
Observations	93	94	93	93	93	93	93	93
Number of countries	22	22	22	22	22	22	22	22

Notes: Estimates are on 5-year non-overlapping intervals, using random effects with clustered standard errors. A constant and time dummies are included in the equations, but are not reported.

Robust *t* statistics in brackets.

* significant at 10%; ** significant at 5%; *** significant at 1%.

Table A2. Europe: robustness to inclusion of CEE-8 dummy variable

Dependent variable: CA/GDP					
Log of p.c. GDP	−0.01	−0.03	−0.09	−0.09	−0.10
	[0.29]	[0.70]	[2.68]***	[2.52]**	[2.67]***
Growth in p.c. GDP	0.0044	0.0044	0.0043	0.0042	0.0032
	[1.10]	[1.00]	[1.06]	[1.00]	[0.74]
Fiscal balance/GDP	−0.12	−0.08	−0.06	−0.05	−0.07
	[0.76]	[0.47]	[0.47]	[0.38]	[0.53]
NFA/GDP	−0.03	−0.03	−0.03	−0.03	−0.03
	[1.88]*	[2.65]***	[2.56]**	[2.66]***	[2.67]***
Old dependency ratio	−0.29	−0.35	−0.20	−0.21	−0.21
	[1.39]	[1.38]	[0.78]	[0.80]	[0.80]
Young dependency ratio	−0.02	−0.07	−0.10	−0.10	−0.10
	[0.12]	[0.46]	[0.74]	[0.69]	[0.73]
Trade openness/GDP	−0.01	−0.01	−0.01	−0.01	−0.01
	[1.04]	[0.73]	[0.66]	[0.66]	[0.55]
FI/GDP	−0.43	−0.42	−0.59	−0.58	−0.60
	[2.64]***	[2.36]**	[3.20]***	[2.91]***	[2.95]***
Log of p.c. GDP × (FI/GDP)	0.04	0.04	0.06	0.06	0.06
	[2.70]***	[2.40]**	[3.24]***	[2.94]***	[2.98]***
CEE-8 dummy variable		−0.02	−1.01	−1.02	−2.15
		[0.69]	[3.00]***	[3.01]***	[2.80]***
NFA/GDP × (CEE-8 dummy variable)		0.03	0.03	0.03	0.04
		[0.98]	[0.84]	[0.70]	[0.87]
Log of p.c. GDP*(CEE-8 dummy variable)			0.11	0.11	0.23
			[2.93]***	[2.92]***	[2.78]***
FI × (CEE-8 dummy variable)				0.00	1.35
				[0.07]	[1.55]
Log of p.c. GDP × (FI/GDP) × (CEE-8 dummy variable)					−0.15
					[1.57]
Observations	87	87	87	87	87
Number of countries	23	23	23	23	23
R-squared	0.39	0.42	0.51	0.51	0.51

Notes: Estimates are on 5-year non-overlapping intervals, using random effects with clustered standard errors. Unless otherwise indicated, the values for the right-hand side variables are for the year preceding the five-year interval (e.g. 1994 for the 1995–9 period). Constants and time dummies are not reported.

Robust *t* statistics in brackets.

*significant at 10%; ** significant at 5%; *** significant at 1%.

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