Journal of International Money and Finance 28 (2009) 880–901

Contents lists available at ScienceDirect

Journal of International Money and Finance

journal homepage: www.elsevier.com/locate/jimf

On the determinants of net international portfolio flows: A global perspective

Roberto A. De Santis [a], Melanie Lührmann [b,*]

[a] European Central Bank, Kaiserstrasse 29, D-60311 Frankfurt am Main, Germany
[b] Institute for Fiscal Studies, 7, Ridgmount Street, London WC1E 7AE, UK

JEL classification:
F21
F32
F41
O16

Keywords:
Net portfolio flows
Current accounts
Panel regressions

A B S T R A C T

In a panel covering a large number of countries from 1970 to 2003, we show that population ageing, institutions, money and deviations from the Uncovered Interest Parity (UIP) influence developments in net capital flows. Population ageing is associated with net equity inflows, net outflows in debt instruments and current account deficits. Better institutions favor net capital inflows. Higher money to GDP ratio – associated with lower interest rates – enhances international investments in domestic stocks to the detriment of the less attractive domestic bonds. As for the deviations from the UIP, a rise in the short-term domestic interest rate above its trend brings about an equilibrating portfolio shift away from domestic debt instruments.

1. Introduction

The theoretical and empirical literature on current account balances (CABs) is at the core of international macroeconomics. The key argument is that countries trade goods over time by borrowing and lending to each other in order to smooth final consumption (Obstfeld and Rogoff, 1995). Several empirical works have also been carried out to test the proposed hypothesis.[1] On the contrary, the

* Corresponding author. Tel.: +44 2072914804; fax: +44 2073234780.
E-mail address: m.luhrmann@ifs.org.uk (M. Lührmann).

[1] Empirical studies on the intertemporal approach to the current account have been carried out amongst others by Sheffrin and Woo (1990a,b), Otto (1992), Milbourne and Otto (1992), Glick and Rogoff (1995), Otto and Voss (1995), Bergin and Sheffrin (2000), Calderon et al. (2002), Chinn and Prasad (2003) and Bergin (2006).

0261-5606/$ – see front matter Crown Copyright © 2008 Published by Elsevier Ltd. All rights reserved.
doi:10.1016/j.jimonfin.2008.09.002

empirical determinants that systematically influence cross-border portfolio flows have received less attention.[2] Hence, we investigate two components of the financial account balance – net flows in equity securities and net flows in debt instruments – and analyze their determinants.

It is generally found that population ageing, institutions and monetary aggregate can affect CABs. In this paper, we aim at assessing whether such variables systematically influence developments in international portfolio flows and whether the effects on the different types of flows are symmetric. Such an investigation is relevant especially in the context of (i) population ageing and the "asset meltdown" hypothesis (i.e. a rapid fall in securities prices due to a withdrawal of assets by the retiring baby boomers),[3] (ii) the debate on capital flows from developing to developed countries and the role of institutions; and (iii) the effect of monetary liquidity on capital flows.

A structural determinant of national savings and investment is the demographic profile of a country. High youth and old-age dependency ratios would bring about a current account deficit and net capital inflows, as a relatively large population of dependent young and old has a relatively lower savings rate (Ando and Modigliani, 1963). Furthermore, countries with a large fraction of young dependents tend to have a high investment demand, as shown by Higgins (1998).[4] If cross-border capital flows were limited due to home bias, trade restrictions or large transaction costs, capital-intensive countries with a shrinking workforce could face an "asset meltdown", as a fall in domestic asset demand would not be sufficiently compensated by foreign demand (Abel, 2001, 2003; Brooks, 2000, 2004). On the contrary, in a financially integrated world, demographic cross-country differences create incentives to invest in younger economies characterized by higher capital demand and higher expected asset returns and in older economies if they offer a higher premium.

We instrument the idea that relative differences in countries' demographic profiles drive international capital flows by using countries' youth and old-age dependency ratios that are measured relatively to their world averages. To our knowledge, the link between demography and international capital flows has only been analyzed using the CABs. In this study, we address explicitly the role of demography on international portfolio flows in equity securities and debt instruments.

The expected positive relationship between dependency ratios and net capital inflows might not hold for all types of portfolio flows. If pensioners' savings were reallocated from equity securities to less risky assets, such as global government bonds, then the link with the dependency ratios would differ between types of portfolio flows; but still net equity inflows would be expected particularly due to the decline in the value of equity assets sold by domestic pensioners.[5]

[2] The literature on cross-border portfolio flows is mostly related to international investment in emerging markets (Calvo et al., 1993; Fernandez-Arias, 1996; Chuhan et al., 1998; Bekaert et al., 1999). Some related work has been carried out looking at international investment positions (Lane and Milesi-Ferretti, 2001).

[3] The "asset meltdown" hypothesis is based on a simple accounting exercise: when the oldest of the baby boomers begin to turn 65 (expected in the year 2010 in several developed countries), the baby boomers will be selling off their stocks to a much smaller generation of buyers, causing stock prices to decline. If, on the contrary, capital were mobile, the fall in asset prices would be cushioned by capital inflows in search of higher expected returns. The literature has looked at the relation between demographic changes and risk premia in asset prices. Poterba (2004) finds only modest effects of population age structure on real returns on Treasury bills, long-term government bonds, and corporate stocks. Bakshi and Chen (1994) present empirical evidence in favour of the link between the population age distribution and equity premia in the United States, and endorse the hypothesis that an investor's risk aversion increases with age. Ang and Maddaloni (2005) instead find that this relationship is weak when extended to other countries. The evidence, however, has to be interpreted with caution, as the dynamics of asset prices is too volatile relative to developments in the countries' demographic profile. See also IMF (2004) for a detailed discussion.

[4] The dependency hypothesis has also been tested by economic historians. Taylor and Williamson (1994), for example, found that high dependency rates did significantly depress domestic savings rates in the new world economies (Argentina, Australia and Canada) triggering foreign investment from Britain at the end of the 19th century.

[5] In general, households might take less financial risk, as they reach their retirement years (Constantinides et al., 2002). For a more risk-adverse domestic investor, the rational response is to demand higher returns on stock and/or a move to fixed income investment, thereby generating net equity inflows and net outflows in debt instruments. Findings by Riley and Chow (1992), for example, indicate a U-shaped relationship between relative risk aversion and age. Similarly, Ameriks and Zeldes (2004) estimated a hump-shaped age effect on the fraction of household financial assets held in equity securities. Heaton and Lucas (2000) found that the share of equity relative to marketable financial assets declines above age 65, but this effect disappears when the wealth measure includes private business.

It is generally accepted that sound institutions and a high degree of governance play an important role in the competitiveness of an economy as well as a country's credibility vis-à-vis international investors. Alfaro et al. (2005, 2008), for example, by looking at the liability side of an economy, find institutional quality to be a causal determinant of capital inflows. Reliable institutions enhance transparency, and a sound legal and political system offer a better protection against fraud. Therefore, countries' institutions, such as the rule of law, property rights, freedom, and democratic values do affect both domestic savings and investment decisions. In this paper, we look at net equity and debt flows (that is, the difference between liability and asset of both equity securities and debt instruments). We expect that an improvement in countries' civil liberties (i.e. freedom of expression and belief, association and organization rights, rule of law and human rights, personal autonomy and economic rights) reduces the cost of capital and encourage investment in these economies generating net portfolio inflows and current account deficits.

However, we expect that also the allocation of savings in global portfolios is influenced. If savings are more affected than investment, then net portfolio outflows and current account surpluses are expected to be positively correlated with institutions. We capture the development of a country's institutional framework by the civil liberties index compiled by Freedom House, which takes a value between 1 and 7, where 1 indicates a high degree of civil liberties including well-functioning rule of law and enforcement of civil rights.[6]

As for the role of liquidity, money stock to GDP ratio is often used in the literature as a proxy for the depth and sophistication of the financial system. The theoretical argument behind this link is that a well-developed financial system allows households to increase the savings rate (Edwards, 1996). However, this measure could also be a proxy for borrowing constraints, as a more stringent borrowing constraint (lower money to GDP ratio) decreases present consumption and aggregate investment, thereby generating current account surpluses (Edwards, 1996). Empirical studies have shown that savings rates and CABs are positively influenced by money to GDP ratio, thus endorsing the financial deepening hypothesis (Edwards, 1996; Chinn and Prasad, 2003).

We offer a third interpretation for such a relationship related to the theory of money demand. A high money stock to GDP ratio might imply lower real interest rates.[7] Such an environment is particularly attractive to international investors in domestic stocks, but it discourages investments in fixed income. We can verify empirically whether the money to GDP ratio is associated with improvements in CABs, net inflows in equity securities and net outflows in debt instruments. If this were the case, the money to GDP ratio would rather proxy a portfolio shift.

Finally, we test a recent hypothesis proposed by Bergin (2006), who argues that deviations from the Uncovered Interest Parity (UIP) might have an influence on the allocation of global portfolios. By estimating an intertemporal current account model for the US and an aggregate of the remaining G-7 countries, Bergin (2006) found that deviations from the UIP can explain two-thirds of movements in the current accounts. He argues that if the de-trended domestic interest rate exceeds the de-trended foreign rate adjusted for the change in the forward exchange rate, the demand for domestic bonds declines because an excess return is required to make household willing to hold domestic bonds in equilibrium. Specifically, a positive deviation from the UIP due to a rise in foreign exchange risk premia can bring about net outflows in debt instruments. This shock affecting the financial account would generate a surplus in the current account. As a consequence of such arguments, a portfolio shift due to deviations from the UIP can also occur across the different asset classes, as the foreign demand for domestic bonds can be partly shifted to domestic equity securities, thereby generating net equity inflows.

The remainder of the paper is organized as follows: Section 2 presents the empirical model, describes the data and the methodology and discusses the control variables. Section 3 investigates

[6] Lührmann (2003) provides empirical evidence of a link between the civil liberties index and the CABs.

[7] Theoretically, real balances are a positive function of real income and the nominal rates of returns on financial assets included in the definition of the monetary aggregate (i.e. interest rate on money market instruments), and a negative function of the nominal rates of returns on financial assets excluded in the definition of the monetary aggregate (i.e. sum of the real interest rate on long-term bonds and expected inflation). If short-term interest rates co-move with expected inflation and the sensitivity of money to returns on both assets is the same, then money balances would be a function of real GDP and real interest rates on bonds.

empirically the ideas above discussed. Section 4 assesses the robustness of the results using additional control variables and applying alternative panel estimators. Section 5 restricts the analysis to OECD countries. Finally, Section 6 provides a summary and concludes.

2. The empirical model: methodology, controls, data

2.1. Methodology

There is an abundant theoretical literature on the determinants of CABs and capital flows. However, as pointed out by Calderon et al. (2002) and Chinn and Prasad (2003), no single theoretical model captures the entire range of empirical relationships affecting the savings–investment balance of a country and, thereby, its current and financial account balances.

Excluding errors and omissions, current account surpluses (deficits) are equal to the sum of net outflows (inflows) in foreign direct investment (FDI), equity securities (E), debt instruments (B), bank loans (L) plus the increase (decrease) in foreign official reserves (O):

$$\text{Savings} - \text{Investment} = \text{CAB} = \text{FDI} + E + B + L + O.$$

This implies that the set of variables affecting CABs, as found e.g. by Calderon et al. (2002) and Chinn and Prasad (2003), might not necessarily influence E and/or B.

Using the savings–investment balance approach, we provide a quantitative assessment of the importance of ageing, institutions, money and deviations from the UIP in explaining net equity flows, net debt flows as well as CABs in a broad sample of developing and industrial countries for the period 1970–2003 and investigate the medium-term fluctuations that are not purely driven by cyclical influences and temporary shocks. We also assess shorter-term effects, where variables linked to the business cycle and to the specificity of the asset flows might play a bigger role.

To facilitate the comparison of the results among the different model specifications, CABs and net portfolio flows are defined such that a positive coefficient on the explanatory variables implies an increase in the current account deficit and net portfolio inflows. We calculate the net portfolio inflows subtracting the net flows of assets from the net flows of liabilities. The three dependent variables are defined as a percentage of GDP in order to control for economy size.

2.2. Estimation

When analyzing panel data, a useful framework to work with is the unobserved effects model $y_{it} = x_{it}\beta + c_i + u_{it}$, where x_{it} contains observable variables for country i at time t, u_{it} is a random error and c_i denotes the unobserved heterogeneity that is fixed over time and country-specific. The appropriate estimation strategy then depends on the nature of the composite error $v_{it} = c_i + u_{it}$. If $E(x'_{it}v_{it}) = 0$ for all t, pooled OLS estimation gives consistent results. Since the composite errors are serially correlated due to the recurrence of c_i in every period, a robust variance matrix estimator must be applied.

If x_{it} and v_{it} are correlated, pooled OLS gives biased results. One possibility to account for the unobserved heterogeneity is to estimate a fixed-effects model. Fixed effects can be applied under the assumption of strict exogeneity of the explanatory variables conditional on c_i. The drawback of fixed effects is that time-constant factors cannot be included in x_{it}, as they cannot be distinguished from the time-constant unobservables, with the results that estimates will be imprecise. Under these circumstances, one is forced to apply random effects estimation in order to learn anything about the population parameters (Wooldridge, 2002). Under the assumption that c_i is orthogonal to x_{it}, this method produces consistent and more efficient estimates than a fixed effects estimator.

Quah (1996) and Barro (1996) criticize the use of fixed effects estimators in international studies, because they do not explain the source of variation across countries, which is often of key interest. By filtering out all the cross-country differences in levels, fixed effects detract much of the economically meaningful part of the analysis as some of the structural determinants of international capital flows mainly vary across countries and less over time. Indeed, the variance decomposition analysis of the data shows that a sizeable part of the variation of the dependent variables is of cross-sectional nature

Table 1
Decomposition of variance into cross section and time-series variation.

	CAB sample		Equity sample		Fixed income sample	
	Across countries	Over time	Across countries	Over time	Across countries	Over time
Current account/GDP	49.84	50.16				
Net equity flows/GDP			33.51	66.59		
Net debt flows/GDP					44.96	55.04
Relative old-age dependency ratio	87.20	12.80	85.69	14.31	85.52	14.48
Relative youth-dependency ratio	83.00	17.00	88.72	11.28	87.52	12.73
Civil liberties	65.56	34.44	76.49	23.51	75.84	24.16
M3/GDP	71.68	28.32	76.32	23.68	71.19	28.81
Deviation from the UIP	75.30	24.70	74.50	25.50	22.45	77.55
Real GDP growth	67.91	32.09	39.49	60.51	36.70	63.30
Relative income	79.24	20.76	78.09	21.91	77.54	22.46
REER growth	75.49	24.51	29.87	70.13	30.74	69.26
Labour productivity growth	76.13	23.87	76.11	23.89	22.61	77.39
NFA/GDP (initial)	100.00	–	100.00	–	100.00	–
Capital controls (current account)	54.32	45.68	57.92	42.08	57.41	42.59
Capital controls (capital account)	54.56	45.44	60.77	39.23	59.89	40.11
Long-term yields differential					17.32	82.68
Deviation of price–earnings ratio			11.19	88.81		
Market capitalization/GDP			57.65	42.35		
Equity return differential			33.37	66.63		

Notes: this table shows the proportion of total variance of each variable that is attributable to variation across countries and over time based on annual observations. A detailed description of the data sources of the variables can be found in Appendix A.

(see Table 1).[8] In particular, more than three quarters of the variance decomposition for population ageing, civil liberties and M3 to GDP ratio is across countries. In the case of ageing, as little as 15% of the overall variation is time-series; hence, parameter estimates would be very imprecisely estimated in a fixed-effects model.

In order to fully exploit the cross-sectional variation in the data that is (i) the key focus of the paper, and (ii) the main source of variation for our key explanatory variables, our main results will be based on the pooled regression model using the heteroskedasticity-robust Huber–White–Sandwich variance estimator. Moreover, we present the results using random effects model and discuss the results obtained with the fixed-effects model. Finally, we control for a large number of theory-based determinants and check the robustness of the results by using two alternative frequencies (non-overlapping five year averages and annual data) and by limiting the same analysis to OECD countries.

2.3. Control variables

We investigate the impact of ageing, institutions, money and deviations from the UIP controlling for a large number of macroeconomic and financial variables, which are listed in this section.

2.3.1. Real GDP growth

The interaction of the CABs and of capital flows with real GDP growth is theoretically well established. Modigliani (1970) argued that income growth has an important positive effect on private savings, as workers' savings increase relative to retirees' dissaving. Such a pro-cyclical response of CABs and a counter-cyclical response of capital flows would moderate the costs of business cycles. However, when the economy is growing, workers might anticipate future income increases and, as a result, tend

[8] We calculated the variance decompositions separately for each sample. The samples differ by the availability of data for the three dependent variables – the current account balance, net equity flows and net debt flows.

to increase present consumption (Tobin, 1967; Farrell, 1970; Summers, 1981). If this effect dominates, then capital flows are pro-cyclical and CABs counter-cyclical.[9] We employ one-period lagged real GDP growth given the potential collinearity with the labour productivity growth measure.

2.3.2. "Stages of development"

The 'stages of development' hypothesis for the balance of payments originates from the development economics literature. It suggests that countries in the early stages of development tend to experience current account deficits, arising from building the infrastructure and expanding domestic markets. In a subsequent phase, as new ideas are transformed into products and services and the country develops some comparative advantage in specific industries, its per capita income rises and the current account deficit declines. Hence, the 'stages of development hypothesis' postulates an inverse U-shaped relationship between current account deficits and relative per capita income. A similar relationship can be also hypothesized for portfolio flows, as investors in global portfolios attracted by expectations of higher asset returns allocate capital to economies with higher potential output growth. As in Chinn and Prasad (2003), we use the ratio of per capita income relative to the corresponding US level and the ratio squared in order to test this hypothesis.

2.3.3. International competitiveness

Another fundamental theoretical variable affecting CABs is countries' international competitiveness proxied by the ratio of price inflation across countries, which is often measured by the change in the real exchange rate. We measure competitiveness by the real effective exchange rate (REER), because it contains specific information on how the exchange rate changes within the group of a country's major trade partners. An appreciation of the real effective exchange rate is associated with loss in competitiveness and, as a result, in a deterioration of the CABs.[10]

2.3.4. Labour productivity growth

The relationship between current accounts and productivity is well understood and generally depends upon whether productivity growth is permanent or temporary. Permanent productivity growth increases both savings and investment. However, since profitable investment raises the economy's intertemporal consumption and since the capital stock takes time to adjust, the consequent rise in consumption deteriorates the CABs (Glick and Rogoff, 1995). Instead, temporary productivity shocks can lead to a higher increase in savings, due to the household's interest in reducing consumption volatility over time, thereby improving CABs.

The impact of productivity growth on net portfolio flows could take both signs. Domestic permanent productivity growth could act as a pull factor of international portfolio flows as returns on domestic assets would be expected to rise. However, if productivity growth is temporary, the consequent increase in domestic savings could be partly allocated into global stock and bond markets, which translate into net outflows in portfolio investment.

Glick and Rogoff (1995) define the productivity measure for the G-7 countries as a residual from a Cobb–Douglas production function of the manufacturing sector. Given the role of services particularly in the last two decades and the sizeable country coverage of our study, which include several developed and developing countries for which data to estimate a Cobb–Douglas production function are missing, we employ as a measure of productivity the growth rate in GDP per worker.

2.3.5. Net financial assets

In the steady state, current accounts should be zero for all countries, and there should be no relation between their current accounts and the initial conditions like net foreign assets (NFA).

[9] For alternative explanations for the relationship between capital flows and economic growth relevant for emerging markets, see Kaminsky et al. (2004).

[10] The real exchange rate could be also considered as a proxy of terms-of-trade (defined as price of exports in terms of imports), given the positive relationship between an appreciation of a country's real exchange rate and an increase in its terms-of-trade (Obstfeld and Rogoff, 1995).

However, in growing economies, one might expect persistent non-zero CABs that evolve as a product between the growth rate of nominal GDP and a stable net foreign asset position (Chinn and Prasad, 2003). Hence, the link between net capital inflows and the initial NFA positions would be negative.

However, there might be differential effects for net creditors and net debtors. Kraay and Ventura (2000) argue that when hit by a positive transitory income shock, the response of the current account is equal to the resulting increase in savings multiplied by the share of foreign assets in total assets. Hence, debtor countries might run current account deficits while creditor countries tend to have surpluses.

2.3.6. Restrictions on the current and capital account

The degree of countries' openness of international trade in goods, services and financial assets can affect CABs and net portfolio flows. Capital controls or restrictions on the current account can be of administrative nature (i.e. direct prohibition, quantity limits or approval procedure) or market-based (i.e. high taxation on foreign transactions). Generally, capital controls are imposed to prevent capital flight. Therefore, one might expect smaller current account deficits and smaller net portfolio outflows.

We measure restrictions on the capital and on the current account separately. The two measures are dummy variables that take the value of 1 if restrictions are in place according to the IMF's annual report *Exchange Arrangements and Exchange Restrictions*. Key shortcomings of these indices are that restrictions imposed on domestic or foreign residents cannot be distinguished and their intensity and effectiveness cannot be measured (Dreher and Siemers, 2005).

2.3.7. Momentum or portfolio re-balancing?

Net equity flows might be positively influenced by past returns (Brennan and Cao, 1997; Bohn and Tesar, 1996; Froot et al., 2001). The relationship is associated with the country's positive momentum (Asness et al., 1997; Rouwenhorst, 1998). This evidence is supported by a parallel literature suggesting that equity portfolio weights assigned to firms' stocks are determined also by the firms' lagged returns (Brandt et al., 2004). However, international investors might sell the "winning" financial assets to rebalance their portfolio such that the portfolio weights remain constant (Bohn and Tesar, 1996). Therefore, we control for differentials in lagged equity returns and long-term bond yields in local currencies to determine net flows in equity securities and debt instruments, respectively. A related literature on portfolio flows is that on portfolio weights. Brandt et al. (2004) provide evidence that the equity portfolio weight assigned to each stock is a function of the firm's past performance as we all as its value and size.

2.3.8. Market valuation

The price–earnings ratio of a composite index measures how expensive the stock market index is relative to the ability of firms to earn profits. It is a good predictor of equity returns (Campbell and Shiller, 1988) and can be used to value stocks (Campbell and Shiller, 2001). The higher the positive deviation of the price–earnings ratio from its fundamental value, the more overvalued the market. This might result in a re-allocation of the global equity portfolio. Therefore, we investigate whether the deviation of a market's price–earnings ratio from its fundamental value affects the country's net equity flows.

2.3.9. Size effect

The size effect was first documented by Banz (1981), but subsequently found by other authors including Fama and French (1992) and Brandt et al. (2004) at the firm level. The underlying hypothesis is that companies with a lower market capitalization are expected to perform better. Fama and French argue that the cross-sectional dispersion in mean returns is due to differences in size risk. In other words, given the ex-ante competitive hedge of large companies, which can better exploit economies of scale, smaller firms ought to offer higher returns on their stocks. This relationship has been studied on a country basis by Asness et al. (1997) in a sample of developed countries and by Bekaert et al. (1997) for the emerging markets. Put into a country context, we expect net equity inflows to be negatively related to a country's stock market capitalization.

2.4. Data

Depending upon data availability, we conduct the econometric analysis on a sample, which ranges between 44 and 130 countries for the CABs, 27 and 72 countries for net equity flows, and 27 and 74 countries for net flows in debt instruments (see Appendix B for the list of countries). The country data on CABs, asset and liabilities of portfolio flows and other macroeconomic key variables originate from the International Financial Statistics of the IMF and the World Development Indicators of the World Bank. Additional data were added from other sources after extensive consistency checks. The financial variables are taken from Thomson Financial DataStream, while the demographic variables originate from the UN World Population Prospects.

The empirical analysis is carried out using annual data from 1970 to 2003 as well as over the sub-sample period 1990–2003. The choice of the sub-sample period is motivated by the large increase in cross-border equity and bond flows in the 1990s due to technical change and deregulation of financial markets across the world. Technical change has reduced transaction costs and the costs linked to calculus and computations. Deregulation has mainly increased competition among financial products and markets. Ultimately, countries' international portfolio flows on both the asset and liability sides skyrocketed over the 1990s. To account for a potential structural break in the sample, we investigate whether the determinants of CABs and net portfolio flows are significantly different from 1990 onwards.

3. Results

3.1. The impact of ageing, institutions and money

We aim at assessing the role of ageing, institutions and money on net portfolio flows using the panel data set at two frequencies: first we use non-overlapping 5-year averages of the data to capture medium-term effects and then we employ annual observations to capture shorter-term effects, where variables linked to the business cycle might have a greater influence.

The results of the medium- and shorter-term determinants are reported in Tables 2 and 3, respectively. The first three specifications of Table 3 are obtained using the full annual sample period from 1970 to 2003, while the following three specifications are based on the sub-sample 1990–2003 in order to verify whether global financial integration – enhanced over the 1990s – has altered the determinants of CABs and net portfolio flows, or changed the impact of these determinants. Owing to data availability, the specification for net equity flows, net debt flows and CABs in these two tables are based on a sample of 72, 74 and 130 countries, respectively.

The results suggest that youth and old-age dependency ratios affect countries' net equity flows and current account deficits. The coefficients are positive and statistically significant in both the medium- and

Table 2
On the role of ageing, institutions and money on net capital flows in the longer-term (pooled OLS estimation with time effects, non-overlapping 5-year averages, 1970–2003).

	Net equity flows	Net debt flows	CA deficit
Relative old-age dependency ratio	0.0074** (2.09)	0.0011 (0.22)	0.0215*** (3.04)
Relative youth-dependency ratio	0.0098* (1.82)	−0.0025 (0.47)	0.0520*** (4.39)
Civil liberties	−0.3254** (1.98)	−0.4480* (1.86)	−0.6209*** (3.03)
M3/GDP ($t-1$)	0.0053* (1.78)	−0.0202*** (3.85)	−0.0183*** (2.66)
Real GDP growth ($t-1$)	0.0090 (0.51)	0.0487 (0.93)	0.0013 (0.02)
Relative income	−0.0143 (0.71)	−0.0021 (0.05)	−0.0517 (1.25)
Relative income^2	−0.0003 (1.46)	−0.0001 (0.14)	−0.0004 (0.95)
Constant	−0.4001 (0.45)	2.3618** (2.11)	0.4095 (0.20)
Number of observations	222	266	645
Number of countries	72	74	130
Adjusted R^2	0.19	0.12	0.16

Notes: Robust t statistics are reported in parentheses. The symbols *, ** and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 3
On the role of ageing, institutions and money on net capital flows in the shorter-term (pooled OLS regression with time effects, annual data).

	Net equity flows	Net debt flows	CA deficit	Net equity flows	Net debt flows	CA deficit
	1970–2003			1990–2003		
Relative old-age dependency ratio	0.0075*** (3.31)	−0.0032 (1.20)	0.0201*** (5.12)	0.0124*** (3.68)	−0.0051 (1.30)	0.0224*** (4.06)
Relative youth-dependency ratio	0.0074** (2.14)	−0.0069* (1.77)	0.0501*** (7.56)	0.0160*** (3.19)	−0.0082 (1.62)	0.0567*** (6.67)
Civil liberties	−0.3388*** (3.33)	−0.3215*** (2.81)	−0.5835*** (5.39)	−0.4304*** (3.41)	−0.2757* (1.95)	−0.9532*** (6.72)
M3/GDP ($t-1$)	0.0042** (2.34)	−0.0185*** (5.67)	−0.0189*** (4.90)	0.0044** (2.02)	−0.0183*** (4.70)	−0.0210*** (4.64)
Real GDP growth ($t-1$)	−0.002 (0.12)	0.0520* (1.95)	0.0218 (0.70)	−0.0038 (0.19)	0.0247 (0.87)	0.0999*** (2.73)
Relative income	−0.0365** (2.42)	0.0138 (0.58)	−0.0397* (1.73)	−0.0315** (1.98)	0.0046 (0.17)	−0.0514* (1.77)
Relative income^2	−0.00003 (0.19)	−0.0002 (0.70)	−0.0005** (2.22)	−0.0002 (1.11)	−0.0001 (0.20)	−0.0005 (1.59)
Constant	0.4802 (0.65)	3.3581*** (3.34)	−1.1282 (0.69)	−0.4735 (0.52)	3.0022** (2.46)	0.8434 (0.50)
Number of observations	894	1035	2901	654	736	1673
Number of countries	72	74	130	72	74	130
Adjusted R^2	0.12	0.06	0.13	0.17	0.05	0.16
Chow test				8.80 (0.000)	2.17 (0.035)	4.40 (0.000)

Notes: Robust t statistics are reported in parentheses. The symbols *, ** and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. As for the Chow test, we report the F-statistics and the P-value, the latter in brackets.

the shorter-terms. This is consistent with the view that a high future workforce potential triggers a higher investment demand, while generating low savings domestically. Equally, the repatriation of foreign savings by ageing investors generates net capital inflows and current account deficits.[11]

As life-cycle theory predicts, net aggregate capital inflows as well as net equity inflows increase with an ageing population; instead, we do not find significant effects for net flows in debt instruments. The likelihood that ageing would cause a fall in equity prices is therefore low; while the risk of a fall in bond prices, as baby boomers withdraw funds after retirement, cannot be excluded. However, as pointed out in Section 1, we did not expect a symmetric link between dependency ratios and net capital inflows for all types of portfolio flows. If retired persons behaved as if they were more risk-averse and rebalanced their portfolios in favor of less risky assets, we would expect that a relatively large old-age dependency ratio triggered net outflows of debt instruments, as also the demand for foreign debt securities would increase. In this case, the risk of an excessive fall in bond prices, as baby boomers withdraw funds after retirement, would not be so acute. However, if net outflows in debt instruments are due to lower purchases of domestic bonds by non-residents, then an "asset meltdown" in fixed income can be expected, as a fall in domestic bond demand would not be sufficiently compensated by foreign demand.

It is worth pointing out that the coefficient on the youth-dependency ratio for the CABs specification exceeds that of the old-age dependency ratio by two to three times. However, to illustrate and compare the magnitude of the demographic effects, we compute the effect of a change in the relative dependency ratios by one standard deviation. The standard deviation of a country's youth (old-age) dependency ratios from the world average is in the range of 34% (53%) and the median deviation is 6.7% (21.5%).[12] Hence, if relative youth (old-age) dependency ratios rise by one standard deviation, i.e. by 34% (53%), the increase in the current account deficit will be in the range of 1.4%–1.5% (1%–1.1%) of GDP. In the future, these relative demographic differences will become even larger: one standard deviation in youth (old-age) dependency ratio, averaged over the period 2005–2050, is expected to have a value of 42.6% (65.7%). Therefore, the CAB is expected to decline by an average of 59–64 basis points as a percentage of GDP as a result of future population dynamics.

As for the equity flows, if relative youth (old-age) dependency ratios rise by one standard deviation, i.e. by 34% (53%), the increase in net equity inflows will be in the range of 0.33%–0.64% (0.36%–0.42%) of GDP.

With regard to the quality of the institutions, we find a robust negative coefficient of the civil liberties index across all specifications. Countries with better institutions (i.e. lower index in civil liberties) are characterized by net portfolio inflows and current account deficits, because they are relatively better able to attract foreign capital. As expected, an improvement in a country's civil liberties encourages international investments to purchase this economy's stocks and debt. This result can help to understand why capital flows move from developing to developed countries against theory and complements the findings of Alfaro et al. (2005, 2008), who look at the liability side of the international equity investment.

Another important determinant of capital flows is the monetary aggregate. All specifications indicate that a rise in M3 relative to GDP is associated with net equity inflows, net debt outflows and current account surplus. Chinn and Prasad (2003) associate the link between CABs and money with financial deepening. If a country's financial system deepens, the domestic savings rate is stimulated, which leads to current account surplus and net portfolio outflows. However, the positive coefficient estimated on the net equity flows does not corroborate such hypothesis. The alternative preferred explanation is linked to the portfolio shift argument. If a higher monetary aggregate to GDP ratio is due to lower real interest rates, then investment in fixed income is less attractive and net outflows in debt

[11] The results for the CABs are similar to the IMF's findings that are based on a 115-country panel data set covering the period 1960–2000, where the data for each country are averaged over each decade. The IMF (2004) finds that CABs increase with the relative size of the working-age population, and decrease when the elderly dependency ratio rises. Moreover, the magnitude of the coefficients is very similar to those reported in Table 2. These results have been also confirmed by Higgins (1998) and Lührmann (2003).

[12] These statistics are average deviations over the sample period.

securities would be observed, while investment in equities becomes more attractive encouraging domestic and foreign investors in the purchase of domestic stocks. There is indeed a large body of anecdotic evidence pointing to the fact that an interest in equities materializes when interest rates are rather low and a shift towards fixed income occurs when interest rates rise.[13]

Tables 2 and 3 also control for real GDP growth and income. The impact of the past real GDP growth on the current account deficit is strongly significant and positive over the annual period 1990–2003. This suggests a counter-cyclical relation, as a rise in GDP growth is accompanied by a decline in CABs. The results on the "stages of development" hypothesis instead are very weak. On the contrary, it seems that richer countries record net equity outflows as they might invest their savings in global equity portfolios.

All in all, ageing, institutions and money play a key role in explaining developments in international capital flows across the globe and this conclusion is robust across the two different data frequencies. In terms of adjusted R^2, these variables are able to explain 12–19% of the variance of the net equity flows, 6–12% of the variance of debt flows and 13–16% of the variance of CABs.

The Chow tests reported in the last row of Table 3 reject the hypothesis of equal coefficients in the samples before and after 1990 for net equity flows and the CABs. Conversely, the Chow test for net debt flows indicates a potential structural break between the pre-1990 period and the time afterwards. This structural break could be partly explained by the liberalisation of capital accounts, and technological advances in payment, settlement and trading systems during the 1990s, which facilitated the cross-border investment in fixed income global portfolios. When testing for equal coefficients of the regressors separately, it turns out that only the civil liberties variable and the relative youth-dependency variable is systematically different between the two time periods for the CAB and net equity flow specifications. In general, therefore, we argue that the structural changes are not substantial.

3.2. The impact of deviations from the UIP

From a theoretical perspective, the optimal international portfolio choice implies the UIP condition which is defined as $E_t(s_{t+h} - s_t) = i_{t+h} - i^*_{t+h}$, where s_t denotes the nominal domestic exchange rate in terms of foreign currency, $E_t s_{t+h}$ is the expected spot rate in period $t+h$, i_{t+h} and i^*_{t+h} denote, respectively, domestic and foreign interest rates over the horizon h. However, one of the puzzles in exchange rate economics is the UIP puzzle, which highlights that the forward exchange rate is a biased predictor of the future spot rate, or, put it differently, that short-term interest rate differentials fail to explain changes in spot exchange rates. Deviations from the UIP could be due to time-varying risk premia, which might have an influence on the allocation of global portfolios.

Bergin (2006) argues that if the de-trended domestic interest rate exceeds the de-trended foreign rate adjusted for the change in the forward exchange rate, the demand for domestic bonds declines because an excess return is required to make household willing to hold domestic bonds in equilibrium. A positive deviation from the UIP due to a rise in foreign exchange risk premia can bring about net outflows in debt instruments. This shock, which is affecting the financial account, would generate a surplus in the current account. This idea is investigated empirically in this study by constructing the following variable: $\tilde{i}_{t+h} - \tilde{i}^*_{t+h} - E_t(\tilde{s}_{t+h} - \tilde{s}_t)$, where tildes indicate deviations from the steady state.

A portfolio shift due to deviations from the UIP can also occur across the different asset classes, as the foreign demand for domestic bonds can be partly shifted to domestic equity securities, thereby generating net equity inflows.

We test these hypotheses by extending the previous specifications (see Table 4). The country coverage declines due to the lack of comparable data on interest rates. Despite the reduction of the sample, the empirical findings are generally quite robust across all specifications.[14] Ageing, institutions and money continue to play a key role in explaining developments in international portfolio flows.

[13] See, for example, Deutsche Bank Research, "Global liquidity "glut" and asset price inflation. Fact or fiction?", May 29, 2007.

[14] The results for the CABs are not reported, because the deviation for the UIP is not statistically significant, as it can be seen when discussing the comprehensive Table 6. They can, however, be found in the working paper version (De Santis and Lührmann, 2006).

Table 4
The role of deviations from the UIP on net portfolio flows (pooled OLS regression with time effects, annual data).

	Net equity flows			Net debt flows		
	5-Year average	Annual	Annual	5-Year average	Annual	Annual
	1970–2003	1970–2003	1990–2003	1970–2003	1970–2003	1990–2003
Relative old-age dependency ratio	0.0068* (1.73)	0.0057** (1.98)	0.0112** (2.48)	0.0004 (0.07)	−0.0052 (1.56)	−0.0079 (1.60)
Relative youth-dependency ratio	0.0190** (2.05)	0.0113 (1.53)	0.0254** (2.37)	0.0030 (0.38)	−0.0003 (0.03)	−0.0081 (0.77)
Civil liberties	−0.5888** (2.35)	−0.6553*** (4.33)	−0.7885*** (4.31)	−0.6509 (1.59)	−0.4783*** (2.68)	−0.5236** (2.30)
M3/GDP ($t-1$)	0.0060* (1.71)	0.0047** (2.23)	0.0046* (1.78)	−0.0176*** (3.32)	−0.0179*** (4.72)	−0.0164*** (3.56)
Real GDP growth ($t-1$)	0.0066 (0.19)	−0.008 (0.27)	−0.0122 (0.37)	0.0361 (0.51)	0.0487 (1.25)	0.0308 (0.68)
Relative income	−0.0251 (0.93)	−0.0613*** (2.97)	−0.0562*** (2.63)	0.0066 (0.11)	0.0098 (0.32)	−0.0089 (0.26)
Relative income^2	−0.0002 (0.87)	0.0001 (0.77)	.00002 (0.10)	−0.0003 (0.57)	−0.0002 (0.64)	−0.00002 (0.05)
REER growth ($t-1$)	0.0134 (0.73)	−0.009 (1.38)	−0.0061 (0.73)	−0.0467 (1.37)	−0.0087 (0.82)	−0.0103 (0.71)
Labour productivity growth	−0.0013 (0.83)	−0.0003 (0.46)	−0.0006 (0.71)	−0.0113*** (5.21)	−0.0057*** (5.59)	−0.0058*** (5.39)
Deviation from the UIP	0.0002*** (6.55)	0.0002*** (5.93)	0.0002*** (4.61)	−0.0005*** (6.08)	−0.0002*** (3.12)	−0.0003*** (3.84)
Constant	0.0844 (0.06)	1.4489 (1.12)	0.6963 (0.42)	2.7647 (1.37)	4.9434*** (2.90)	4.9444*** (2.60)
Number of observations	158	645	466	183	718	513
Number of countries	50	50	50	54	54	54
Adjusted R^2	0.24	0.17	0.22	0.23	0.10	0.09
Chow test			8.48 (0.000)			3.14 (0.001)

Notes: Robust t statistics are reported in parentheses. The symbols *, ** and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. As for the Chow test, we report the F-statistics and the P-value in brackets.

The results on deviations from the UIP validate the hypothesis suggested by Bergin (2006). Positive shocks to the UIP yield net debt instrument outflows, as the demand for domestic bonds declines to achieve a new equilibrium. Net equity flows are also affected by deviations from the UIP. The sign of the coefficient is endorsing the global portfolio shift hypothesis. The positive effect on net equity flows and the negative effect on debt flows might offset each other, as the impact on the CABs is not statistically significant.

Table 4 also shows the impact of international competitiveness – measured by the change in the real effective exchange rate – and labour productivity growth. The impact of the latter on debt flows is negative. However, we will show that this effect is not robust when controlling for additional variables in Section 4.

In terms of adjusted R^2, these variables are able to explain 17–24% of the variance of the net equity flows and 10–23% of the variance of debt flows. The Chow tests reported in the last row of Table 4 reject the hypothesis of equal coefficients in the samples before and after 1990 for both net equity and debt flows.

4. Robustness checks

4.1. Alternative estimation methods

In Section 3, we have discussed the results obtained with pooled OLS estimations including time effects. As a sensitivity analysis, we now employ a random effects model with time dummies in order to account for potential unobserved country heterogeneity. Table 5 underlines the robustness of our results. We also report random effects estimations including region dummies in order to filter as much of the potential unobserved heterogeneity as possible. We define the regions as EU member countries, new EU countries, non-EU OECD members and non-EU less developed countries. The results – shown in the second panel of Table 5 – remain invariant.

Finally, we also estimated fixed-effects models (not reported). The parameters, which are estimated imprecisely due to the cross-sectional variation of our international database (see discussion in Section 2.2), are broadly consistent with the pooled results, with the exception of a negative sign for the youth-dependency parameter estimate in the net equity flow regression. The civil liberties index is not longer statistically significant but still has a negative sign. We attribute these weaker results to the low time-series variation of these variables (see Table 1).

4.2. Additional control variables

To further assess whether the main findings are robust we add additional control variables, in particular the financial variables which could explain net portfolio flows. The disadvantage of such an exercise is that country coverage declines amply. Nevertheless, the main results on the determinants of international capital flows remain generally invariant (see Table 6). Moreover, real GDP growth is positively related to current account deficit as predicted by theory and the 'stages of development' hypothesis seems to hold for debt instruments.

4.2.1. The use of financial variables

Net debt instrument inflows are positively influenced by past performance when using non-overlapping 5-year averages, and negatively when using annual observations. This means that in the shorter-term international investors tend to move into fixed income markets to rebalance their portfolio in order to keep their portfolio weights constant.

4.2.2. Net financial assets

The empirical evidence suggests a negative relationship between the initial NFA position and international portfolio flows corroborating the results already found by Chinn and Prasad (2003) for CABs. Fixed income operations imply debt contracts, which explicitly state the maturity, the coupon and the amount to be repaid. This might explain why the initial NFA position does affect developments in cross-border debt instruments in the shorter- and medium-term.

Table 5
Robustness check: alternative estimators (random effects regression with time effects and region dummies, annual data, 1970–2003).

	Net equity flows	Net debt flows	CA deficit	Net equity flows	Net debt flows	CA deficit
	Random effects model			Random effects model with region dummies		
Relative old-age dependency ratio	0.0096** (2.21)	0.0100 (1.55)	0.0291*** (3.19)	0.0074* (1.88)	0.0109 (1.49)	0.0329*** (3.61)
Relative youth-dependency ratio	0.0074 (0.68)	0.0163 (1.26)	0.0256 (1.08)	0.0067 (0.54)	0.0168 (1.20)	0.0315 (1.23)
Civil liberties	−0.3900** (2.23)	−0.2475 (0.85)	−0.3815* (1.69)	−0.3984** (2.30)	−0.2612 (0.89)	−0.3751* (1.65)
M3/GDP ($t-1$)	0.0075** (2.20)	−0.0066 (1.17)	−0.0164*** (2.60)	0.0093** (2.55)	−0.0063 (1.08)	−0.0204*** (3.18)
Real GDP growth ($t-1$)	0.009 (0.33)	0.0509 (1.37)	0.2622*** (5.53)	0.012 (0.43)	0.0538 (1.45)	0.2563*** (5.37)
Relative income	−0.0612** (2.16)	−0.0067 (0.13)	−0.1438** (2.25)	−0.0684** (2.52)	−0.0019 (0.04)	−0.1188* (1.79)
Relative income^2	0.0001 (0.49)	−0.0002 (0.31)	0.0006 (1.03)	0.0001 (0.56)	−0.0003 (0.49)	0.0006 (0.97)
REER growth ($t-1$)	−0.0071 (1.23)	−0.0116 (1.09)	0.0359** (2.39)	−0.0066 (1.15)	−0.0106 (0.98)	0.0335** (2.25)
Labour productivity growth	0.0003 (0.50)	−0.0063*** (6.91)	−0.0015 (1.21)	0.0004 (0.62)	−0.0063*** (6.69)	−0.0016 (1.33)
Deviation from the UIP	0.0001*** (5.55)	−0.0002*** (3.09)	−0.0001 (1.25)	0.0001*** (5.39)	−0.0002*** (3.18)	−0.0001 (1.29)
Constant	0.4255 (0.30)	−0.7716 (0.38)	3.1115 (0.94)	0.9303 (0.74)	−0.5783 (0.29)	1.2207 (0.34)
Old EU member states				0.4228 (0.90)	−0.5457 (0.65)	−1.3256 (1.03)
New EU member states				−0.3472 (0.83)	−1.0572 (1.16)	3.5305** (2.21)
Less developed non-EU countries				−0.3694 (0.49)	−0.4428 (0.48)	1.1277 (0.54)
Number of observations	645	718	980	645	718	980
Number of countries	50	54	63	50	54	63

Notes: Robust t statistics are reported in parentheses. The symbols *, ** and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 6
Robustness check: controlling for financial variables and capital controls (pooled OLS regression with time effects).

	Net equity flows	Net debt flows	CA deficit	Net equity flows	Net debt flows	CA deficit
	5-Year average (1970–2003)			1990–2003		
Relative old-age dependency ratio	0.0092 (1.28)	−0.0110* (1.73)	0.0210** (2.42)	0.0101** (2.00)	−0.0124*** (2.79)	0.0172*** (3.45)
Relative youth-dependency ratio	0.0064 (0.31)	0.0038 (0.15)	0.0451* (1.78)	0.0011 (0.08)	0.0167 (0.91)	0.0494*** (3.50)
Civil liberties	−0.5916* (1.76)	0.5961 (1.20)	−0.9055** (2.21)	−0.6498*** (3.72)	0.5760* (1.90)	−0.9089*** (4.09)
M3/GDP ($t-1$)	0.0079* (1.74)	−0.0136*** (3.08)	−0.0208** (2.60)	0.0069*** (2.67)	−0.0135*** (3.99)	−0.0204*** (4.81)
Real GDP growth ($t-1$)	0.0064 (0.09)	−0.1685 (1.52)	0.2462* (1.70)	−0.0453 (0.86)	−0.0407 (0.71)	0.2082*** (3.68)
Relative income	−0.0605 (1.05)	0.1679** (2.30)	0.0186 (0.26)	−0.0995*** (3.17)	0.1417** (2.45)	−0.0378 (0.79)
Relative income^2	0.0001 (0.18)	−0.0013** (2.12)	−0.001 (1.33)	0.0004 (1.62)	−0.0009* (1.78)	−0.0002 (0.50)
REER growth ($t-1$)	0.0319 (0.67)	−0.0226 (0.51)	−0.0483 (0.88)	−0.0055 (0.48)	−0.0122 (0.90)	0.0303 (1.64)
Labour productivity growth	0.0004 (0.11)	0.1501 (0.82)	−0.0048 (1.18)	−0.0013 (1.30)	−0.0827 (1.51)	−0.0017 (1.08)
Deviation from the UIP	0.0003 (0.57)	−0.0004*** (9.46)	−0.0001 (0.36)	0.0002 (1.17)	−0.0002*** (5.04)	−0.0001 (0.59)
Equity return differentials ($t-1$)	0.0029 (0.44)			0.0038 (1.28)		
Long-term yield differentials ($t-1$)		0.0001*** (2.99)			−0.0001*** (3.88)	
Market capitalization ($t-1$)	−0.0068 (0.93)			−0.003 (0.60)		
Deviation of price–earnings ratio ($t-1$)	−0.0675 (0.85)			0.0074 (0.31)		
NFA/GDP (0)	−0.0096 (1.02)	−0.0245* (1.67)	−0.0447** (2.40)	−0.0141** (2.24)	−0.0326*** (3.22)	−0.0563*** (5.59)
Capital controls (current account)	0.2006 (0.50)	0.8058 (1.42)	−0.0242 (0.03)	0.0586 (0.22)	0.6534* (1.84)	−0.8535** (2.27)
Capital controls (capital account)	0.1504 (0.24)	−1.6712*** (2.92)	−0.3483 (0.38)	0.5612 (1.41)	−0.9440** (2.41)	−0.2989 (0.64)
Constant	1.2910 (0.40)	−2.5009 (0.66)	−1.8102 (0.50)	1.7244 (0.90)	−0.3776 (0.14)	0.7611 (0.31)
Number of observations	108	114	190	447	473	810
Number of countries	29	27	44	29	27	44
Adjusted R^2	0.19	0.33	0.25	0.14	0.16	0.26

Notes: robust t statistics are reported in parentheses. The symbols *, ** and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Countries with an initial NFA debtor position might have had a better access to international capital markets and be favored by international investors. Higher rates of expected returns in these countries or a higher future net export growth might have encouraged the foreign financing. However, their borrowing has to be repaid by future generations. Since in our sample, the NFA positions are largely debtor positions (i.e. the median and mean NFA position in the 1970s amounted to −12.4% and −11.9%, respectively), one could expect current account surpluses and net capital inflows associated with the initial stock of NFA positions.

4.2.3. Restrictions on the current and capital account

Restrictions on the capital account systematically affect net flows in debt instruments. The coefficient is negative and statistically significant at the 1% level. Countries frequently introduce capital controls on portfolio flows to limit the consequences of capital flights. These capital controls make the domestic financial market less attractive for foreigners and domestic residents can react to the restrictive policies by allocating their savings abroad, if capital flows are not blocked completely. Restrictions on the current account are statistically significant and with the expected sign when using annual observations.

5. Are OECD countries different?

How would the main results discussed in Sections 3 and 4 change if we focus on the OECD countries only? There are three main reasons to expect different effects of some of our covariates on CABs and portfolio flows within the OECD. First, middle and high-income countries are generally characterized by a smoother business cycle and by a reduced number of balance of payments crises. Therefore, OECD economic variables should not suffer much from unobserved heterogeneity. Second, most of the cross-border transactions occur among them due to well-developed capital markets that are able to channel global savings. Third, their national statistics offices are generally well established. Therefore, measurement error should be less severe. At the same time, OECD countries are much more homogenous in terms of demographic structures and the quality of institutions. Thus, one could expect potentially weaker results for these latter two covariates.

Due to sample size considerations, Table 7 reports the results based on the annual frequency.[15] We found that estimates are robust and generally comparable to those obtained using the full sample (compare with Tables 4 and 5).

As expected, the results differ when looking at population ageing variables. We do not find any significant effect of relative old-age dependency on CABs and net equity flows, while ageing is associated with net outflows in debt instruments in OECD countries in all specifications.

The results might confirm the empirical evidence that people prefer to hold safe assets when they get older and re-allocate part of their investment towards global fixed income portfolios. Alternatively, it can be argued that international investors are less keen in purchasing fixed income securities of ageing economies. Also civil liberties, while clearly influencing CABs, have a much weaker capability in explaining developments in net portfolio flow.

Otherwise, the results are broadly consistent with the full sample results; with the exception of the real GDP growth rate which is no longer significant in the specification for CABs, while the relative income polynomial has a stronger significant impact on net flows in debt instruments as well as on CABs and net equity flows.

CABs and net portfolio flows in OECD countries continue to be driven by the portfolio shift effect. A higher M3 to GDP ratio – associated with lower interest rates – favours global investment in domestic stocks and makes investments in fixed income less attractive, thereby generating net equity inflows, net outflows in debt instruments and current account surpluses.

The deviation from the UIP influences net portfolio flows in OECD countries. A rise in the domestic interest rate above its trend brings about a global portfolio shift out of domestic fixed income. Similarly

[15] The empirical results of those specifications that we could estimate on the basis of the 5-year averaged data are available from the authors upon request.

Table 7
On the determinants on international capital flows among OECD countries (pooled OLS regression with time effects, annual data, 1970–2003).

	Net equity flows	Net debt flows	CA deficit	Net equity flows	Net debt flows	CA deficit
Relative old-age dependency ratio	−0.0015 (0.40)	−0.0109*** (2.77)	0.0012 (0.23)	−0.0012 (0.23)	−0.0140*** (3.10)	0.0061 (1.15)
Relative youth-dependency ratio	−0.0093 (0.48)	0.0149 (0.88)	0.0543*** (2.89)	0.0161 (0.54)	0.0335 (1.35)	0.1164*** (4.98)
Civil liberties	0.2270 (1.28)	0.0652 (0.27)	−0.5784** (2.40)	0.5225* (1.86)	0.8057** (2.30)	0.2030 (0.75)
M3/GDP ($t-1$)	0.0060** (2.40)	−0.0174*** (4.79)	−0.0111*** (2.71)	0.0038 (1.47)	−0.0150*** (4.18)	−0.0113*** (2.87)
Real GDP growth ($t-1$)	0.0025 (0.07)	0.0265 (0.49)	0.0673 (1.03)	−0.0100 (0.23)	−0.0798 (1.24)	−0.0075 (0.11)
Relative income	0.0345 (1.12)	0.1060** (2.42)	0.1187** (2.46)	0.1040** (2.07)	0.2130*** (3.00)	0.2502*** (3.81)
Relative income^2	−0.0005* (1.94)	−0.0009** (2.20)	−0.0019*** (4.01)	−0.0011*** (2.60)	−0.0014** (2.36)	−0.0025*** (4.26)
REER growth ($t-1$)	−0.0081 (0.79)	−0.0067 (0.47)	0.0242 (1.45)	−0.0063 (0.53)	−0.0138 (1.00)	0.0110 (0.63)
Labour productivity growth	0.0163 (0.51)	0.0756 (1.23)	−0.0316 (0.41)	0.0337 (0.71)	−0.0964 (1.12)	−0.1619** (1.97)
Deviation from the UIP	0.0002*** (5.33)	−0.0002*** (4.45)	−0.0001 (1.54)	0.0002 (1.20)	−0.0002*** (5.13)	−0.0001 (1.37)
Equity return differentials ($t-1$)				0.0026 (0.86)		
Long-term yield differentials ($t-1$)					−0.0001*** (3.04)	
Market capitalization ($t-1$)				0.0046 (0.84)		
Deviation of price–earnings ratio ($t-1$)				0.0143 (0.60)		
NFA/GDP (0)				−0.0152** (2.22)	−0.0331*** (3.25)	−0.0458*** (4.08)
Capital controls (current account)				0.3575 (1.56)	0.7296** (1.97)	−0.3060 (0.78)
Capital controls (capital account)				−0.3389 (0.54)	−0.6535* (1.66)	−0.4405 (0.66)
Constant	0.0940 (0.04)	1.0732 (0.43)	−0.8090 (0.29)	−4.7673 (1.28)	−4.1171 (1.18)	−10.7246*** (2.97)
Number of observations	460	511	602	357	437	548
Adjusted R^2	0.11	0.11	0.23	0.06	0.25	0.26

Notes: Robust t statistics are reported in parentheses. The symbols *, ** and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 8
Summary table of the empirical results.

	5-Year non-overlapping averages			Annual frequency		
	Net equity flows	Net debt flows	CA deficit	Net equity flows	Net debt flows	CA deficit
Relative old-age dependency	+		+	+	−	+
Relative youth-dependency	+		+	+		+
Civil liberties	−	−	−	−	−	−
Lagged M3/GDP	+	−	−	+	−	−
Deviation from the UIP	+	−		+	−	
Relative income		+			+	
Relative income^2		−			−	
Lagged real GDP growth			+			+
Initial NFA/GDP		−	−	−	−	−
Capital controls – current account					+	−
Capital controls – capital account		−			−	
Lagged long-term interest rate differentials		+			−	

Notes: The symbol +(−) indicates a deterioration (improvement) of the CABs and net inflows (outflows) in portfolio investment. The choice is based on the hypotheses that variables are statistically significant at minimum 10% level.

to the portfolio re-balancing results obtained with the full sample, a rise in one-year lagged long-term interest rate differentials brings about net debt outflows in OECD countries.

The empirical evidence also supports the hypothesis that the initial foreign debt triggered – in the subsequent decades – current account surpluses and net portfolio outflows. Finally, the results corroborate the "stages of development" hypothesis. Relatively poorer countries finance their development by issuing or selling debt instruments and reversing this process as they become richer.

We can therefore safely argue that the general conjectures from the full sample estimates are robust.

6. Conclusions

The empirical literature has shown that population ageing, quality of institutions and monetary aggregate have an important role in explaining developments in CABs. We show that these variables also shape net portfolio flows. The summary table reports the key results (see Table 8).

The impact of countries' relative demographic profiles is not symmetric across the alternative types of flows. Consistently with the life-cycle theory, countries with relatively high youth and old-age population ratios are characterized by lower CABs and net equity inflows. However, countries with high relative old-age dependency ratios – particularly OECD countries – are associated with net outflows in debt instruments. These results have alternative implications. Either they corroborate the hypothesis that investors prefer to hold and purchase safer assets when they get older re-allocating part of their investments towards fixed income portfolios, or they endorse the hypothesis that foreign investors may reduce their investment in bonds issued by ageing countries with potential negative consequences on future domestic bond prices. Hence, further research is needed to analyze whether a shift from stocks to bonds can be observed in older populations or whether international investors are less keen on purchasing fixed income assets of ageing economies.

Countries' institutions can affect savings and investment decisions of firms and households. Indeed, net portfolio inflows and current account deficits are negatively correlated with the lower quality of the institutions. This could help explain the puzzle that portfolio flows are moving from developing to developed countries, rather than in the other direction as one would expect from neoclassical economic theory.

Literature suggests that a higher money stock to GDP ratio is associated with an improvement in CABs, as a result of financial deepening. Our preferred interpretation for this result is related to the theory of money demand. A high money stock to GDP ratio implies lower interest rates. Such an environment is particularly attractive to international investors in domestic stocks, but it discourages investments in fixed income. Consistently, we find that M3 to GDP ratio is associated with improvements in CABs, net inflows in equity securities and net outflows in debt instruments. Therefore, money to GDP ratio is a proxy for a portfolio shift effect.

With regard to the deviations from the UIP, we find that a rise in the short-term domestic interest rate above its trend brings about an equilibrating portfolio shift out from domestic debt instruments.

Furthermore, we show that CABs worsen with lagged real GDP growth, as suggested by economic theory. We cannot find any empirical support for an impact of financial factors specific to the equity market, such as market performance, market valuation and market size. However, we find that net flows in debt instruments are driven by long-term interest rate differentials. The effect is, however, positive in the medium-term (momentum motive) but negative in the shorter-run (portfolio re-balancing motive).

Finally, the results corroborate the "stages of development" hypothesis for debt instruments (i.e. relatively poorer countries finance their development by issuing or selling debt instruments and revelrsing this process as they become richer) and the hypothesis that the initial foreign debt triggered – in the subsequent decades – current account surpluses and net portfolio outflows.

The results obtained for the sub-sample period of enhanced global financial integration are broadly similar. There is some evidence of a structural break between the pre- and post-1990 period, but it does not strongly alter the way in which CABs and net portfolio flows are determined.

Acknowledgements

We are indebted to Paul Bergin, Luca Dedola, Gikas Hardouvelis and Dimitris Malliaropulos for very helpful discussions. We also thank Gian-Maria Milesi-Ferretti and Axel Dreher, who kindly provided data on net foreign assets and capital controls on the current as well as capital accounts. The usual disclaimer applies. The views expressed in this paper are those of the authors and do not necessarily represent those of the European Central Bank or the Eurosystem.

Appendix A. List of variables and data sources

Variable	Description	Source
Current account balances	Current account deficit to GDP ratio (%)	WDI, IFS
Net equity flows	Net inflows in equity securities to GDP ratio (%)	IFS, ECB, DRIASIA
Net debt flows	Net inflows in debt instruments to GDP ratio (%)	IFS, ECB, DRIASIA
Relative old-age dependency ratio	Old-age dependency ratio (65+/15 – 65) relative to the world average (%)	UN World population prospects
Relative youth-dependency ratio	Youth-dependency ratio (0 – 15/15 – 65) relative to the world average (%)	UN World population prospects
REER growth	Growth rate of the real effective exchange rate (REER appreciates if it moves upwards) (%)	IFS, WDI, MEI, ECB, WMMD, AMECO
Civil liberties	Civil liberties index	FreedomHouse
Real GDP growth	Real GDP growth (%)	WDI
M3/GDP	M3 to GDP ratio (%)	WDI, IFS, ECB
Labour productivity growth	Growth in real output per worker (%)	WDI, IFS, ILO, AMECO
Relative income	Ratio of country *i*'s per capita GDP to US per capita GDP (both in PPP terms)	WDI
Equity return differentials	Growth of domestic equity price index including dividends minus growth of world price index (in US dollar) (%)	Thomson Financial DataStream and own calculations
Deviation of price–earnings ratio	Actual minus de-trended (using Hodrick–Prescott filter method) equity price–earnings ratio	Thomson Financial DataStream and own calculations
Market capitalization	Stock market capitalization to GDP ratio (%)	Thomson Financial DataStream and own calculations
Deviation from the UIP	Domestic short-term interest rate gap, minus US short-term interest rate gap, minus one-year lead depreciation gap of the domestic currency (gaps are calculated as difference between the nominal rates and the Hodrick–Prescott de-trended rates) (%)	IFS and own calculations

Appendix A (*continued*)

Variable	Description	Source
Long-term yields differentials	Domestic long-term interest rate, minus US long-term interest rate, minus depreciation of the domestic currency (%)	IFS and own calculations
Initial NFA/GDP	Net foreign assets to GDP ratio (%, average value 1970–1980)	Milesi-Ferretti (1998)
Capital controls (current account)	Capital restrictions on the current account (dummy = 1 if capital controls exist)	Milesi-Ferretti (1998) and Dreher and Siemers (2005)
Capital controls (capital control)	Capital restrictions on the capital account (Dummy = 1 if capital controls exist)	Milesi-Ferretti (1998) and Dreher and Siemers (2005)

Appendix B. Sample description of the countries

The countries comprising the sample are as follows:

Regressions for the current account balances (130 countries)

Albania, Angola, Argentina, Armenia, Australia, Austria, Azerbaijan, Bahamas, Bahrain, Bangladesh, Barbados, Belarus, Belize, Benin, Bolivia, Botswana, Brazil, Bulgaria, Burkina Faso, Burundi, Cambodia, Canada, Cape Verde, Chile, China, Colombia, Republic of Congo, Costa Rica, Cote d' Ivoire, Croatia, Cyprus, Czech Republic, Denmark, Dominican Republic, Ecuador, Egypt, El Salvador, Estonia, Ethiopia, Finland, France, Georgia, Germany, Ghana, Greece, Guatemala, Guinea-Bissau, Guyana, Haiti, Honduras, Hungary, Iceland, India, Indonesia, Iran, Ireland, Israel, Italy, Jamaica, Japan, Jordan, Kazakhstan, Kenya, Republic of Korea, Kyrgyz Republic, Lao, Latvia, Lesotho, Lithuania, Macedonia, Madagascar, Malawi, Malaysia, Mali, Malta, Mauritius, Mexico, Moldova, Mongolia, Morocco, Mozambique, Nepal, Netherlands, New Zealand, Nicaragua, Norway, Oman, Pakistan, Panama, Papua New Guinea, Paraguay, Peru, Philippines, Poland, Portugal, Romania, Russian Federation, Rwanda, Saudi Arabia, Senegal, Sierra Leone, Singapore, Slovak Republic, Slovenia, South Africa, Spain, Sri Lanka, St. Lucia, St. Vincent and the Grenadines, Sudan, Swaziland, Sweden, Switzerland, Syrian Arab Republic, Tanzania, Thailand, Togo, Tonga, Trinidad and Tobago, Tunisia, Turkey, Uganda, Ukraine, United Kingdom, United States, Uruguay, Vanuatu, Venezuela, Vietnam and Republic of Yemen.

Regressions for the net flows in equity securities (72 countries)

Argentina, Armenia, Australia, Austria, Bahrain, Bangladesh, Barbados, Belarus, Benin, Botswana, Brazil, Bulgaria, Canada, Chile, China, Cote d' Ivoire, Croatia, Cyprus, Czech Republic, Denmark, Egypt, Estonia, Finland, France, Germany, Greece, Guinea-Bissau, Hungary, Iceland, India, Israel, Italy, Japan, Jordan, Kazakhstan, Kenya, Republic of Korea, Latvia, Lithuania, Macedonia, Malaysia, Mali, Malta, Mauritius, Netherlands, New Zealand, Norway, Pakistan, Peru, Philippines, Poland, Portugal, Romania, Russian Federation, Senegal, Singapore, Slovak Republic, Slovenia, South Africa, Spain, Sri Lanka, Swaziland, Sweden, Switzerland, Thailand, Togo, Turkey, Ukraine, United Kingdom, United States, Uruguay and Venezuela.

Regressions for the net flows in debt instruments (74 countries)

Argentina, Armenia, Australia, Austria, Bahrain, Barbados, Belarus, Benin, Brazil, Bulgaria, Canada, Chile, China, Colombia, Costa Rica, Cote d' Ivoire, Croatia, Cyprus, Czech Republic, Denmark, Dominican Republic, El Salvador, Estonia, Finland, France, Germany, Greece, Guatemala, Guyana, Hungary, Iceland, Ireland, Israel, Italy, Jamaica, Japan, Kazakhstan, Kenya, Republic of Korea, Kyrgyz Republic, Latvia, Lithuania, Macedonia, Mali, Malta, Mexico, Moldova, Netherlands, New Zealand, Norway, Panama, Paraguay, Peru, Philippines, Poland, Portugal, Romania, Russian Federation, Senegal, Singapore, Slovak

Republic, Slovenia, South Africa, Spain, Sweden, Switzerland, Thailand, Togo, Turkey, Ukraine, United Kingdom, United States, Uruguay and Venezuela.

References

Abel, A.B., 2001. Will bequests attenuate the predicted meltdown in stock prices when baby boomers retire? Review of Economics and Statistics 83 (4), 589–595.

Abel, A.B., 2003. The effects of a baby boom on stock prices and capital accumulation in the presence of social security. Econometrica 71 (2), 551–578.

Alfaro, L., Kalemli-Ozcan, S., Volosovych, V., 2005. Capital flows in a globalized world: the role of policies and institutions. NBER Working Paper No. 11696. Cambridge, MA.

Alfaro, L., Kalemli-Ozcan, S., Volosovych, V., 2008. Why doesn't capital flow from rich to poor countries? An empirical investigation. Review of Economics and Statistics 90 (2), 347–368.

Ameriks, J., Zeldes, S., 2004. How do household portfolio shares vary with age? Graduate School of Business, Columbia University Working Paper.

Ang, A., Maddaloni, A., 2005. Do demographic changes affect risk premiums? Evidence from international data. Journal of Business 78 (1), 341–379.

Ando, A., Modigliani, F., 1963. The 'life cycle' hypothesis of saving: aggregate implications and tests. American Economic Review 53 (1), 55–84.

Asness, C.S., Liew, J.M., Stevens, R.L., 1997. Parallels between the cross-sectional predictability of stock returns and country returns. Journal of Portfolio Management 23 (Spring), 79–87.

Bakshi, G.S., Chen, Z., 1994. Baby boom, population aging, and capital markets. Journal of Business 67 (2), 165–202.

Banz, R.W., 1981. The relationship between return and market value of common stocks. Journal of Financial Economics 9 (1), 3–18.

Barro, R., 1996. Democracy and growth. Journal of Economic Growth 1 (1), 1–27.

Bekaert, G., Erb, C., Harvey, C.R., Viskanata, T.E., 1997. What matters for emerging market investment? Emerging Market Quarterly 1 (2), 17–46.

Bekaert, G., Harvey, C.R., Lumsdaine, R.L., 1999. Structural breaks in emerging market capital flows. NBER Working Paper No. 7219. Cambridge, MA.

Bergin, P.R., 2006. How well can the new open economy macroeconomics explain the exchange rate and current account? Journal of International Money and Finance 25 (5), 675–701.

Bergin, P.R., Sheffrin, S., 2000. Interest rates, exchange rates and present value models of the current account. Economic Journal 110 (463), 535–558.

Bohn, H., Tesar, L.L., 1996. U.S. equity investment in foreign markets: portfolio rebalancing or trend chasing. American Economic Review 86 (2), 77–81.

Brandt, M.W., Santa-Clara, P., Valkanov, R., 2004. Parametric portfolio policies: exploiting characteristics in the cross-section of equity returns. NBER Working Paper No. 10996. Cambridge, MA.

Brennan, M.J., Cao, H.H., 1997. International portfolio investment flows. Journal of Finance 52 (5), 1851–1880.

Brooks, R., 2000. What will happen to financial markets when the baby boomers retire? IMF Working Paper No. 00/18. Washington, DC.

Brooks, R., 2004. The equity premium and the baby boom. Presented at the Econometric Society 2004 North American Winter Meetings 155.

Calderon, C.A., Chong, A., Loayza, N.V., 2002. Determinants of current account deficits in developing countries. Contributions to Macroeconomics 2 (1), 1–31.

Calvo, G., Leiderman, L., Reinhart, C., 1993. Capital Inflows and real exchange rate appreciation in Latin America: the role of external factors. IMF Staff Papers 40 (1), 108–151.

Campbell, J.Y., Shiller, R.J., 1988. Stock prices, earnings, and expected dividends. Journal of Finance 43 (3), 661–676.

Campbell, J.Y., Shiller, R.J., 2001. Valuation ratios and the long-run stock market outlook: an update. NBER Working Paper No. 8221. Cambridge, MA.

Chinn, M.D., Prasad, E.S., 2003. Medium-term determinants of current accounts in industrial and developing countries: an empirical exploration. Journal of International Economics 59 (1), 47–76.

Chuhan, P., Claessens, S., Mamingi, N., 1998. Equity and bond flows to Latin America and Asia: the role of global and country factors. Journal of Development Economics 55 (2), 439–463.

Constantinides, G., Donaldson, J., Mehra, R., 2002. Junior can't borrow: a new perspective on the equity premium puzzle. Quarterly Journal of Economics 117 (1), 269–296.

De Santis, R., Lührmann, M., 2006. On the determinants of external imbalances and net international portfolio flows – a global perspective. ECB Working Paper No. 651. Frankfurt.

Dreher, A., Siemers, L., 2005. The intriguing nexus between corruption and capital account restrictions. RWI Discussion Paper No. 0035. Rheinisch-Westfälisches Institut für Wirtschaftsforschung, Essen.

Edwards, S., 1996. Why are Latin America's savings rates to low? An international comparative analysis. Journal of Development Economics 51 (1), 5–44.

Fama, E.F., French, K.R., 1992. The cross-section of expected stock returns. Journal of Finance 47 (2), 427–465.

Farrell, M.J., 1970. The magnitude of 'rate-of-growth' effects on aggregate savings. Economic Journal 80 (323), 873–894.

Fernandez-Arias, E., 1996. The new wave of private capital inflows: push or pull? Journal of Development Economics 48 (2), 389–418.

Froot, K.A., O'Connell, P.G.J., Seasholes, M.S., 2001. The portfolio flows of international investors. Journal of Financial Economics 59 (2), 151–193.

Glick, R., Rogoff, K., 1995. Global versus country-specific productivity shocks and the current account. Journal of Monetary Economics 35 (1), 159–192.

Heaton, J., Lucas, D.J., 2000. Portfolio choice and asset prices: the importance of entrepreneurial risk. Journal of Finance 55 (3), 1163–1198.
Higgins, M., 1998. Demography, national savings and international capital flows. International Economic Review 39 (2), 343–369.
IMF, 2004. How will demographic change affect the global economy? IMF World Economic Outlook September 2004, 137–180. Washington, DC.
Kaminsky, G., Reinhart, C., Végh, C.A., 2004. When it rains, it pours: pro-cyclical capital flows and macroeconomic policies. In: Gertler, M., Rogoff, K. (Eds.), NBER Macroeconomics Annual 2004. MIT Press, Cambridge, MA, pp. 11–53.
Kraay, A., Ventura, J., 2000. Current accounts in debtor and creditor countries. Quarterly Journal of Economics 115 (4), 1137–1166.
Lane, P.R., Milesi-Ferretti, G.M., 2001. The external wealth of nations: measures of foreign assets and liabilities for industrial and developing countries. Journal of International Economics 55 (2), 263–294.
Lührmann, M., 2003. Demographic change, foresight and international capital flows. MEA Discussion Paper No. 38. Mannheim.
Milbourne, R., Otto, G., 1992. Consumption smoothing of the current account. Australian Economic papers 31 (59), 369–384.
Milesi-Ferretti, G.M., 1998. Why capital controls? Theory and evidence. In: Eijffinger, S., Huizinga, H. (Eds.), Positive Political Economy: Theory and Evidence. Cambridge University Press, Cambridge, MA, pp. 217–247.
Modigliani, F., 1970. The life cycle hypothesis of saving and intercountry difference in the savings ratio. In: Eltis, W.A., Scott, M.F., Wolfe, J.N. (Eds.), Induction, Growth and Trade: Essays in Honour of Dir Roy Harrod. Clarendon, Oxford, pp. 197–225.
Obstfeld, M., Rogoff, K., 1995. Foundations of International Macroeconomics. MIT Press, Cambridge, MA.
Otto, G., 1992. Testing a present value model of the current account: evidence form the U.S. and Canadian time series. Journal of International Money and Finance 11 (5), 414–430.
Otto, G., Voss, G.M., 1995. Consumption, external assets and the real interest rate. Journal of Macroeconomics 17 (3), 471–494.
Poterba, J., 2004. The impact of population aging on financial markets. NBER Working Paper No. 10851. Cambridge, MA.
Quah, D., 1996. Convergence empirics across economies with (some) capital mobility. Journal of Economic Growth 1 (1), 95–124.
Riley, W.B., Chow, K.V., 1992. Asset allocation and individual risk aversion. Financial Analysts Journal 48 (6), 32–37.
Rouwenhorst, K.G., 1998. International momentum strategies. Journal of Finance 53 (1), 267–284.
Sheffrin, S., Woo, W.T., 1990a. Testing an optimising model of the current account via the consumption function. Journal of International Money and Finance 9 (2), 220–233.
Sheffrin, S., Woo, W.T., 1990b. Present value tests of an intertemporal model of the current account. Journal of International Economics 29 (3–4), 237–253.
Summers, L.H., 1981. Capital taxation and accumulation in a life cycle growth model. American Economic Review 71 (4), 533–544.
Taylor, A., Williamson, J.G., 1994. Capital flows to the new world as an intergenerational transfer. Journal of Political Economy 102 (2), 348–371.
Tobin, J., 1967. Life cycle saving and balanced growth. In: Fellner, W. (Ed.), Ten Economic Studies in the Tradition of Irving Fisher. John Wiley, New York, pp. 231–256.
Wooldridge, J.M., 2002. Econometric Analysis of Cross Section and Panel Data. MIT Press, Cambridge, MA.