

Nieminen, Mika

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Patterns of international capital flows and their implications for developing countries

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WIDER Working Paper 2017/171

Patterns of international capital flows and their implications for developing countries

Mika Nieminen*

September 2017

Abstract: According to a standard economic theory, capital should flow from rich capital-abundant countries to poor capital-scarce countries. However, a reverse pattern has prevailed in the world economy. This is the so-called Lucas paradox. In addition, it has been shown that counterintuitively there is negative correlation between capital inflow and productivity growth across developing countries. This is the so-called allocation puzzle. This survey attempts to shed light on the following questions: 1) What are the patterns of international capital flows in the world economy? 2) What are the most plausible explanations for these patterns? 3) What are the possible implications of these developments for developing countries?

Keywords: international capital flows, Lucas paradox, allocation puzzle

JEL classification: F21, F41

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* University of Jyväskylä, Finland, mika.p.nieminen@jyu.fi.

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Katajanokanlaituri 6 B, 00160 Helsinki, Finland

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1 Introduction

Few phenomena have had such a huge impact on the global economic landscape as financial globalization (i.e. the rise of cross-border capital flows). The merits of financial globalization have stirred a passionate debate. In light of economic theory, there are three kinds of gains from financial globalization: consumption smoothing, efficient investment and diversification of risk. On the other hand, it can be argued that financial liberalization resulted in financial crises for example in Latin America and Asia in the 1990s. Yet, there is another important tension: the contradiction between what standard economic theory proposes on the direction of net capital flows and the actual patterns of international flows that we observe. Economic theory assumes diminishing returns to capital and therefore capital should flow from rich capital-abundant countries to poor capital-scarce countries. In reality, too little capital has flowed to poor countries and during the first decade of the 21st century there was a net capital flow from emerging market and developing economies to advanced economies. From the perspective of development economics, perhaps the main rationale for international capital mobility is the possibility of net capital flow from rich to poor countries (Schularick 2006, p. 349). Hence, the question ‘Why doesn’t capital flow from rich to poor countries?’ which Nobel Laureate Lucas (1990) proposed in one of his influential papers, imposes an important challenge not only for open economy macroeconomics but also for development economics. The purpose of this survey is to 1) present stylized facts on the patterns of international capital flows, 2) put the stylized facts in a historical perspective, 3) summarize possible explanations for the stylized facts, and 4) discuss the implications of these findings for developing countries.

The remainder of this paper continues as follows: Stylized facts on the patterns of international capital flows are presented in Section 2.1. The current period of financial globalization (1973 onwards) is compared with the first period of financial globalization (1870-1914) in Section 2.2. Potential explanations for the observed patterns and paradoxes, such as Lucas paradox and allocation puzzle, are summarized in Section 3. Implications of these findings for developing countries are discussed in Section 4.

2 Descriptive analysis of international capital flows

In an open economy, savings and investments do not have to be equal. If domestic savings fall short of investment, the remainder can be financed by external borrowing (i.e. net capital inflow). Current account balance equals domestic savings minus investments. If we ignore capital account and measurement errors, current account balance equals net capital outflow (i.e. negative of financial account). Consequently, current account balances can be used as a proxy for net capital flows. It is important to distinguish between net capital flows and gross capital flows. Net capital outflow equals gross capital outflow (i.e. the increase in domestic holdings of foreign assets) minus gross capital inflow (i.e. the increase in foreign holdings of domestic assets). Six stylized facts on the patterns of international capital flows are proposed in Section 2.1. In Section 2.2 these patterns are looked at from a longer historical perspective.

2.1 Stylized facts on the patterns of international capital flows

Six stylized facts on the patterns of international capital flows are proposed in this section. The perspective is global but the emphasis is on developing countries. The classification of countries into advanced economies (39 countries) and into emerging market and developing economies (153 countries) follows IMF’s World Economic Outlook Database (see Tables A2-A3) and for the most

part we stick to this division.¹ This is due to the fact that from the point of view of growth theory, the pattern of net capital flows between rich and poor countries is the single most interesting aspect of international capital flows. Another reason is that it is not possible to analyze for example South-to-South flows without bilateral data on financial flows which is rather scarce.²

The first stylized fact relates to the size of net capital flows, whereas the second stylized fact considers the direction of net capital flows. The third stylized fact concerns the allocation of net capital inflow across developing countries. The fourth stylized fact is based on the decomposition of gross financial flows into private capital flows and foreign exchange reserves. The fifth stylized fact describes the growth of gross foreign assets and liabilities. The sixth stylized fact distinguishing between risky assets and debt securities and it considers the composition of external balance sheets.

Global current account imbalances began to increase in the 1990s and they peaked in the eve of the global financial crisis (see Figure 1). The US share of current account deficits has been substantial. There is a broad consensus that in addition to other failures, global current account imbalances were an essential macroeconomic cause of the 2008 financial crisis (see, e.g., Bank for International Settlement (2009, pp. 4–5), Bernanke (2009), Krugman (2009), and Obstfeld and Rogoff (2009)). After the 2008 financial crisis, global current account imbalances narrowed. Whether the narrowing of the global current account imbalances is a temporary or a permanent phenomenon is an open question (see, e.g., Chinn, Eichengreen and Ito (2014) and Gagnon (2011)). As the size of the global current account imbalance equals the GDP-weighted average of current account imbalances in all countries, Figure 1 portrays how the pattern of net capital flows has evolved in large economies.

Stylized fact 1: Global current account imbalances peaked in 2007. The US has been the major capital importer.

¹ In the text the terms ‘emerging market and developing economies’ and ‘developing countries’ are for the most part used as synonyms.

² If the world is decomposed into three regions, for example, country A, country B and the rest of the world, trade flows between A and B provide a poor indication of A-to-B financial flows (see, e.g., Hobza and Zeugner (2014)).

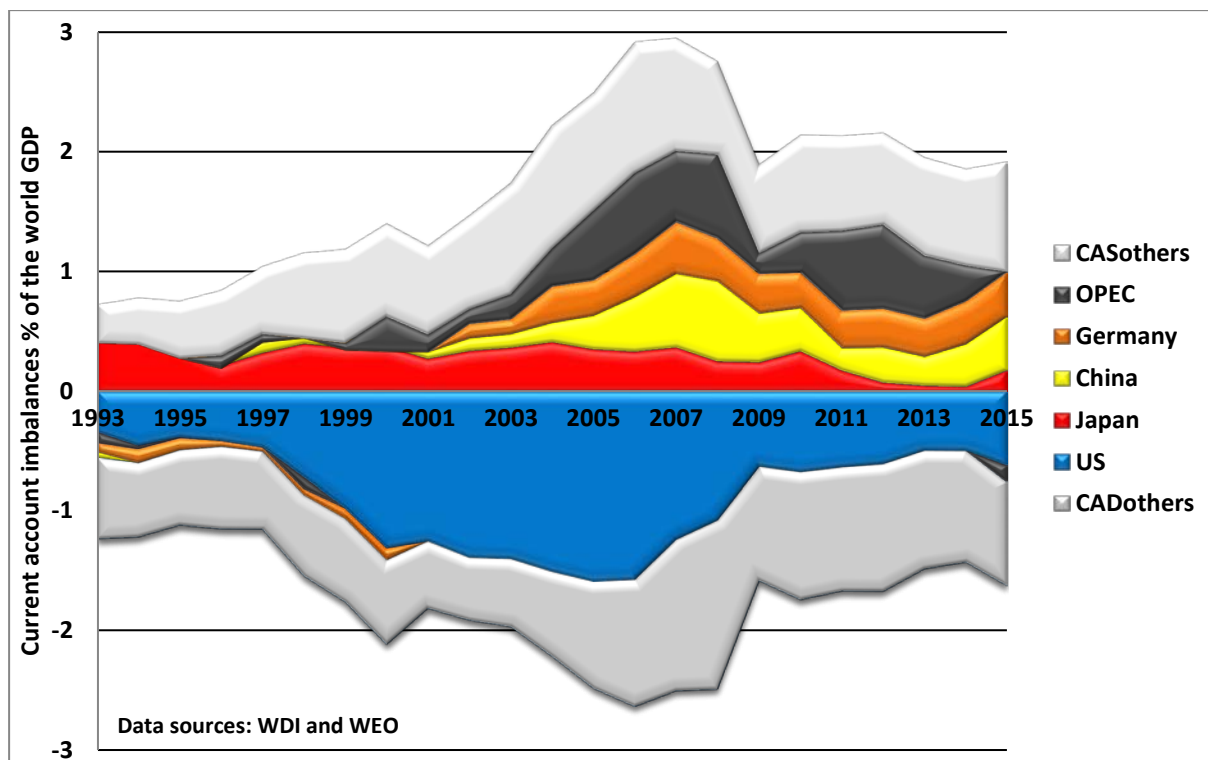


Figure 1. Global current account imbalances, 1993-2015³

In order to get closer to the Lucas paradox, we need to divide countries into two country groups. This is done in Figure 2 in which current account balance is drawn for both advanced economies and for emerging market and developing economies. During the period of 1999-2012, there was so-called uphill capital flow which means that more capital flowed from developing economies to advanced economies than from advanced economies to developing economies. This uphill capital flow began to decrease after 2008 and more recently the direction of net capital flows might even have reversed.

Stylized fact 2: During the first decade of the 21st century, capital flowed uphill from emerging market and developing economies to advanced economies. Since 2013 this flow has dried up.

³ Current account surpluses of other countries are stacked up to the CASothers components and current account deficits of other countries to the CADothers components.

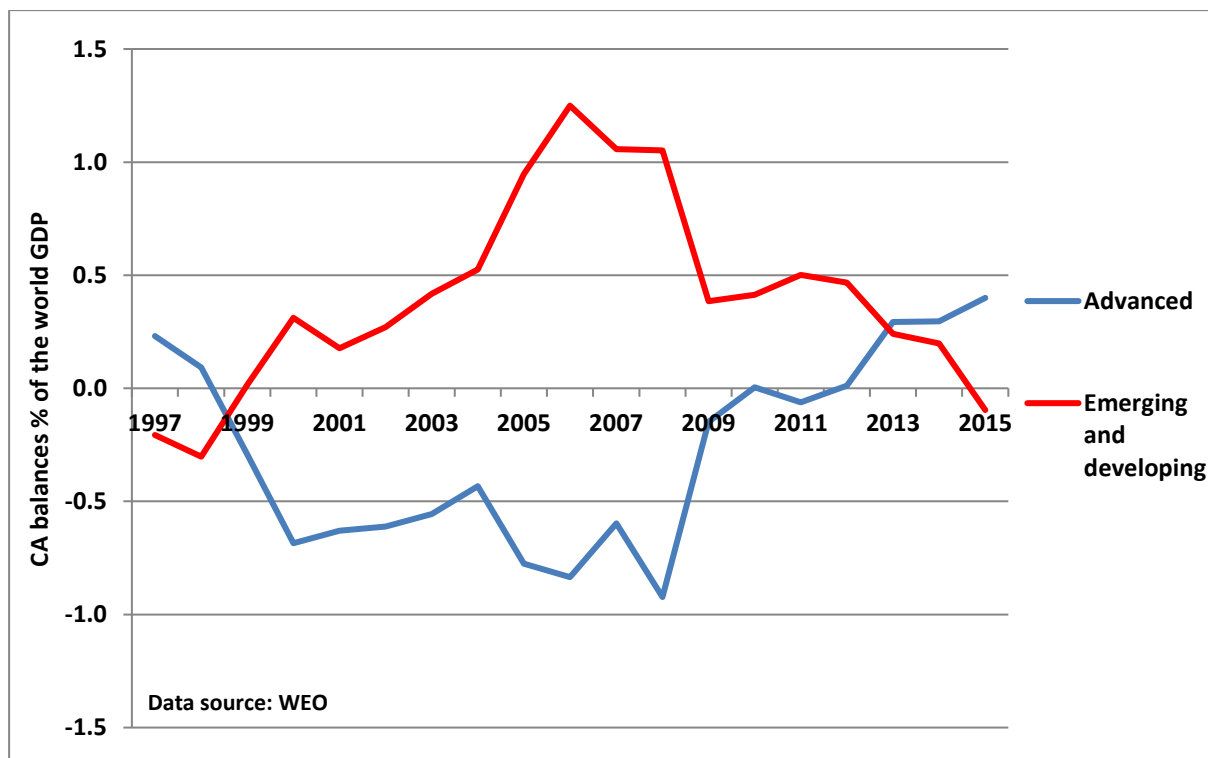


Figure 2. Current account balances, 1997-2015

Lucas paradox, which relates to the direction of net capital flows, is not the only mystery in international capital flows. The so-called allocation puzzle concerns the distribution of net capital inflows across developing countries. Theoretically it would seem plausible that a developing country with fast productivity growth would attract larger net capital inflow than a developing country with slow productivity growth. However, Figure 3 indicates that for example during the period of 1980-2000 there was a negative relation between the average capital inflow and productivity growth. Gourinchas and Jeanne (2007) as well as Prasad et al. (2006) were the first ones to point out this issue. However, Alfaro, Kalemli-Ozcan and Volosovych (2014) argue that this negative correlation is sample-specific.

Stylized fact 3: There has been a negative correlation, if any, between net capital inflow and productivity growth across developing countries.

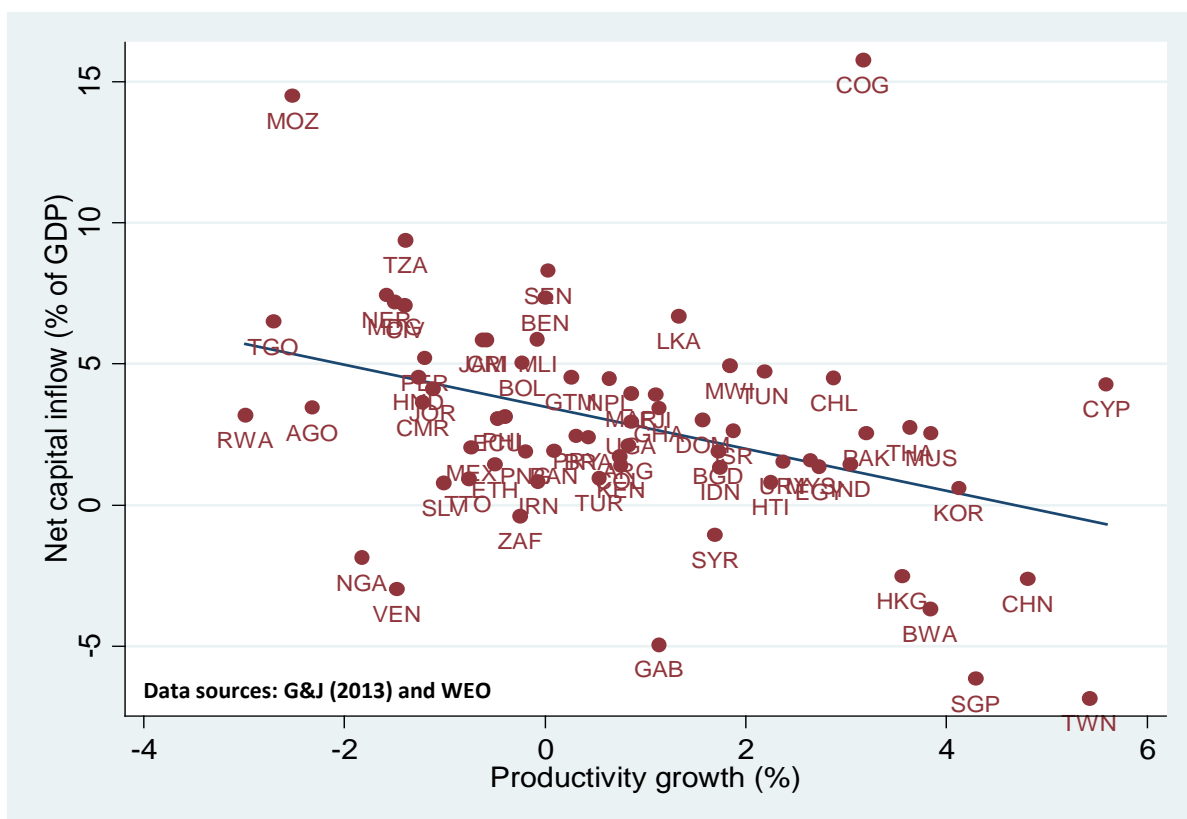


Figure 3. Average productivity growth and average net capital inflow for 68 developing countries between 1980 and 2000⁴

So far our descriptive analysis has concentrated on the long-term patterns of net capital flows. In Figure 4 we elaborate on the analysis in two ways: we consider financial account gross capital flows (i.e. inflow and outflow) instead of net capital flow and we decompose financial account into private capital flows and changes in international reserves held by central banks. It can be seen in Figure 4 that a large share of net capital flow from emerging market and developing economies to advanced economies has resulted from reserve accumulation in emerging market and developing countries (see also Figure A1 in Appendix A).⁵ Actually for the most part, more private capital flowed from advanced economies to developing economies than from developing economies to advanced economies.

Stylized fact 4: During the first decade of the 21st century, the net capital flow between emerging market and developing economies and advanced economies was dominated by the reserve accumulation by central banks in emerging market and developing economies (especially China).

⁴ Both the selection of countries and the data for productivity growth are from Gourinchas and Jeanne (2013, Table A1). See the list of included countries in Table A4.

⁵ According to Balance of Payments Statistics, China's share of this reserve accumulation was large.

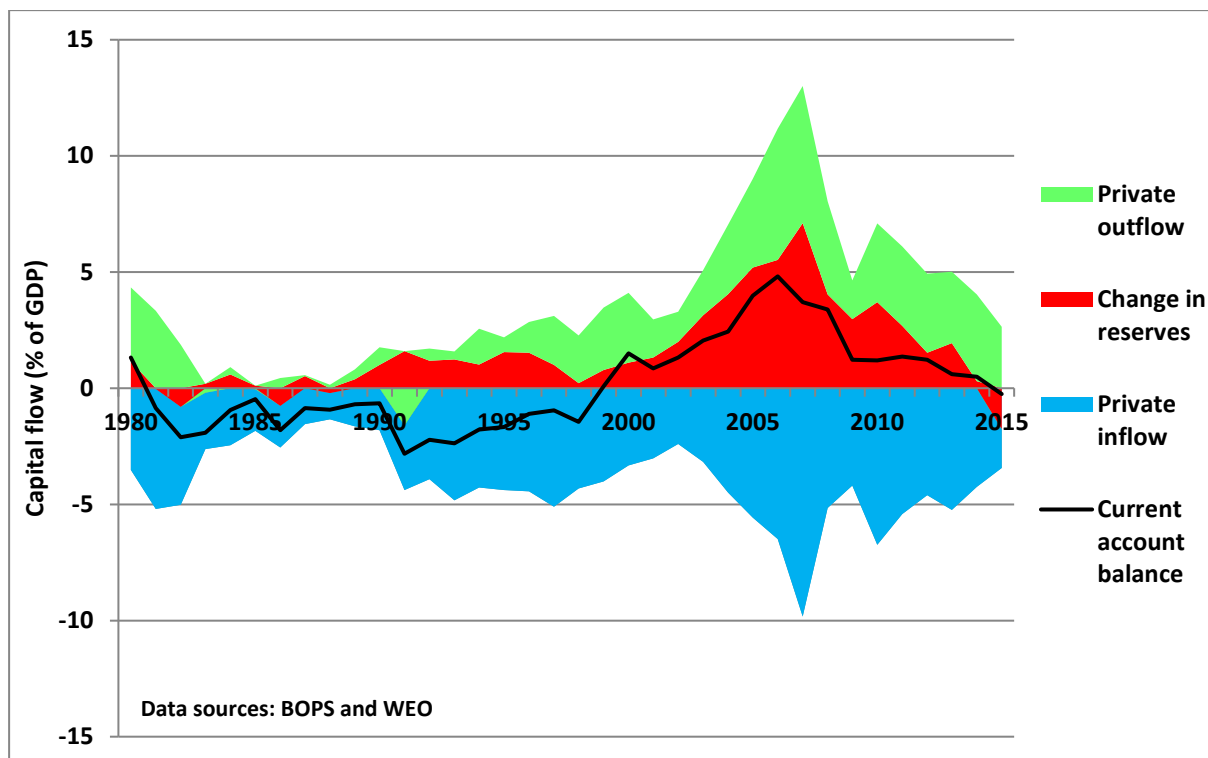


Figure 4. Private capital inflow, private capital outflow and change in reserves for emerging market and developing economies, 1980-2015

Up to this point the descriptive analysis has concentrated on financial flows. From a theoretical point of view net capital flows matter because they are related to change in net foreign asset positions. Net foreign asset position is a stock variable defined as the difference between gross foreign assets and gross foreign liabilities. Net foreign assets positions can change via trade channel (i.e. net capital flows) and via valuation channel (i.e. changes in asset prices and exchange rates). It can be seen in Figure 5 that the stocks of both domestically-owned foreign assets and foreign-owned domestic assets have grown fast especially in advanced economies. More specifically, gross foreign assets and liabilities are nowadays on a different scale than net foreign assets positions. This also holds true for emerging market and developing economies.⁶ This disproportion indicates that the valuation channel can potentially alter the net foreign assets positions quite a lot. In addition, it suggests that for the most part financial globalization has taken the form of diversification of country portfolios. The stocks are much higher in advanced economies than in emerging market and developing economies which implies that the diversification has been more evident across advanced economies. This is actually another manifestation of the Lucas paradox: North-to-North flows dominate and a relatively small amount of capital has flowed to emerging market and developing economies.

Stylized fact 5: Gross foreign assets and liabilities are much larger than net foreign asset positions or net capital flows. This is also true for emerging market and developing economies although in these countries the increase in gross foreign assets and liabilities has not been as massive as in advanced economies.

⁶ By comparing the numbers in Figure 5 to the numbers in Figures 1-2 and 4, we observe that the size of gross foreign assets and liabilities is also much larger than the size of net capital flows or the size of gross capital flows.

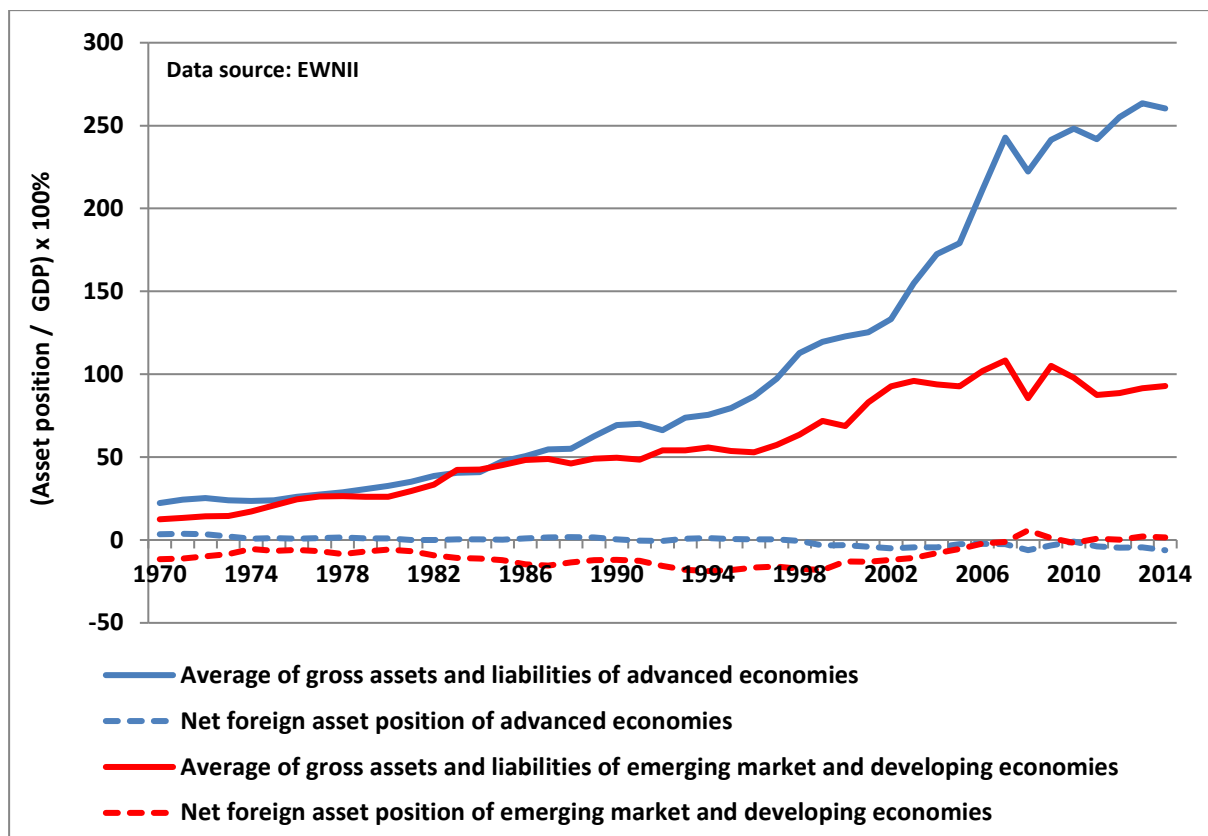


Figure 5: Average of gross foreign assets and liabilities and net foreign asset positions, 1970-2014

In Figure 5 we did not distinguish between risky assets and debt securities. If we take into account the composition of the external balance sheets, we can observe that advanced economies have invested in risky assets (i.e. portfolio assets and foreign direct investment (FDI)), whereas developing economies have invested in debt securities and accumulated foreign exchange reserves (see Figure 6).⁷ By using the terminology of Gourinchas and Rey (2007) we can describe advanced economies (especially the US) as venture capitalists.

Stylized fact 6: On aggregate level the net foreign assets position of emerging market and developing economies is close to zero but the composition of their external assets and liabilities differ quite a bit. They have a positive net international investment position in debt assets and foreign exchange reserves but a negative net international investment position in risky assets.

⁷ Here the riskiness of investment is considered from the investor's perspective and not from the recipient country's perspective (e.g. the risk of capital flight).

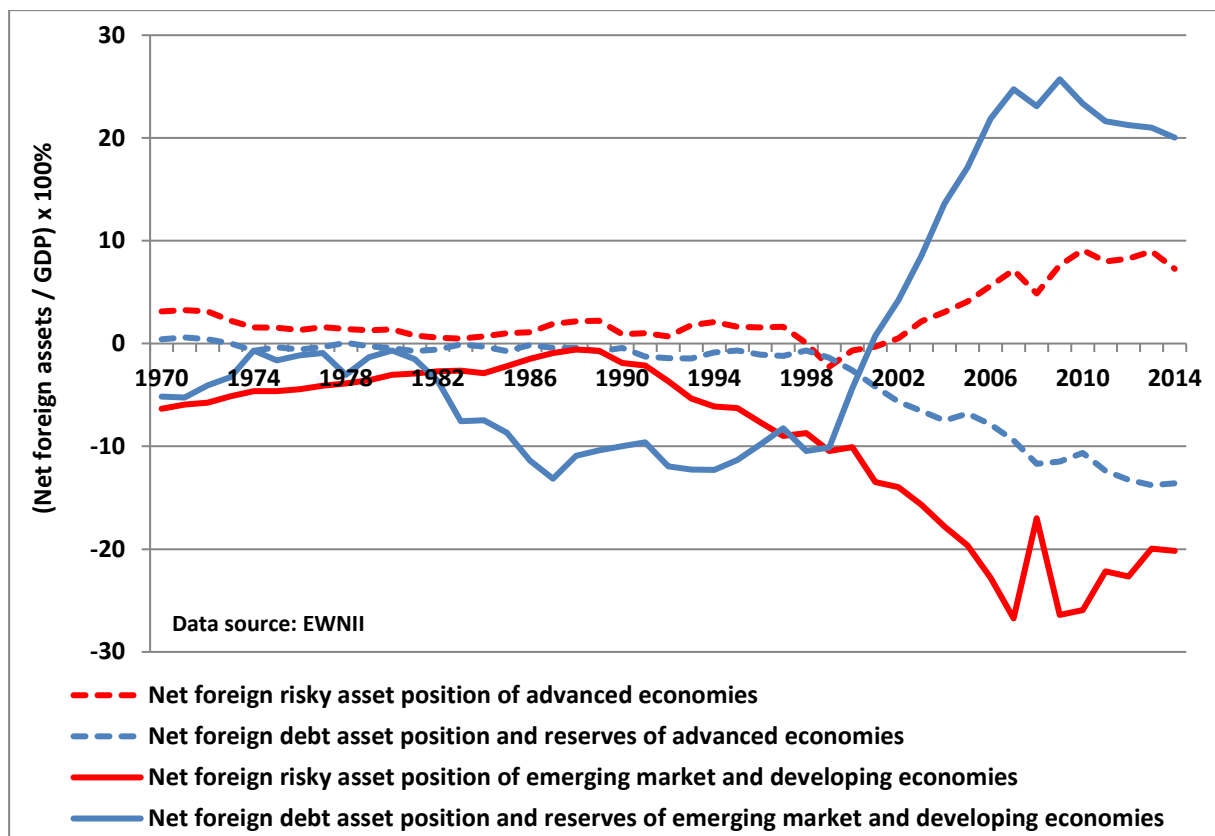


Figure 6: Composition of external balance sheets, 1970-2014⁸

2.2 Historical perspective

Although this survey concentrates on recent developments in international capital flows, it is useful to look at how the current patterns differ from the past. Evidently, it is not possible to measure the degree of international capital mobility or the extent of financial globalization by only one number. Obstfeld and Taylor (2004, pp. 46-122) consider both quantity and price indicators on globalization in capital markets and show that the development of international capital mobility during the last 150 years can be described in the following way: a steady increase until the year of 1914, a sheer drop by the time the First World War broke out, prevalence of low level until the collapse of the Bretton Woods system in the early 1970s, and a steady increase ever since. It is easily forgotten that at this time we are not witnessing the first period of financial globalization. The current degree of international capital mobility is comparable to the degree that existed in 1914.

There are, however, some important differences between the two eras. According to the numbers by Obstfeld and Taylor, the size of global current account imbalances was often as high as 4 to 5 % of GDP before the First World War, Britain being the major capital exporter, whereas the stocks of gross foreign assets of the most advanced economies peaked at 20-50 % of GDP. It is interesting to compare these numbers to the stylized facts in Section 2.1. First, global current account imbalances were not necessarily at an all-time high when they peaked in 2007 (see Figure A2 in Appendix A). Second, during the pre-1914 period the most dominant country (Britain) was the major capital exporter, whereas now the most dominant country (the US) is the major capital importer. Third, the relative size of gross foreign assets and liabilities to net capital flows is much

⁸ Risky assets include portfolio equity assets / liabilities and FDI assets / liabilities.

larger today than what it was a century ago. According to Obstfeld and Taylor (2004, pp. 231-241), the principal flows were long-term investment capital and unilateral in the pre-1914 era, whereas in the current period the growth of the global capital market has taken the form of diversification investment between rich countries.⁹ Consequently, the comparison of the two eras of financial globalization signals a shift from ‘development finance’ to ‘diversification finance’.¹⁰

One interpretation of the Lucas paradox is that there is a positive wealth bias in capital inflows. According to Nurkse (1954), two-thirds of the British pre-1914 capital export went to newly settled regions (Canada, US, Argentina and Australia). Acemoglu, Johnson and Robinson (2001, 2002) provide evidence that these regions had good institutions. The remaining of the British capital went to poor regions to finance raw-material extraction (Nurkse 1954).¹¹ Clemens and Williamson (2004) analyze the determinants of British capital inflows during the period of 1870-1913. They conclude that at that time wealth bias was even stronger than in the 1990s. However, the result depends on the set of control variables. Schularick (2006) makes a comparison on the strength of the wealth bias between the two periods of financial globalization. He finds statistically significant positive relationship between GDP per capita and capital inflow per capita during both periods but the correlation is stronger for the 1990-2001 period than for the 1890-1914 period. In sum, it is not straightforward to make comparisons between the two periods but it seems that the wealth bias which is one manifestation of the Lucas paradox is not a new phenomenon. Nevertheless, as Obstfeld and Taylor (2004) show, the pattern of international capital flows has changed.

3 Explanations for Lucas paradox and allocation puzzle

In this section we review the academic literature to find explanations for the stylized facts presented in Section 2.1. We have already argued that according to a standard economic theory, capital should flow from rich to poor countries. However, it is important to understand what the underlying assumptions are in such a prediction. This is illustrated in Section 3.1. In Section 3.2 we summarize the papers which consider that differences in financial development are central to explaining the patterns of international capital flows. As shown in Figure 4 reserve accumulation has played a large role. In Section 3.3 we summarize papers which quantitatively analyze the importance of reserves in explaining the observed patterns as well as the motives behind the reserve accumulation.¹² Papers focusing on other important aspects or limitations of the proposed explanations are briefly summarized in Section 3.4.

3.1 Assumptions of the neoclassical growth model and Lucas paradox

Gross domestic product (GDP) of a country can be modelled by a production function¹³:

$$(1) \quad Y = Af(K, L),$$

where Y is GDP, A is a parameter for technology, K is (physical) capital and L is labor.¹⁴ Cobb-Douglas type of production function is widely-used:

$$(2) \quad Y = AK^\alpha L^{1-\alpha},$$

⁹ During the period of 1870-1914 one-third of total British saving was devoted to overseas investments and half of the investments in Australia, Canada and Argentina were financed by capital inflow (Obstfeld and Taylor 2004, pp. 238-240).

¹⁰ For example Schularick (2006) supports this view.

¹¹ Due to these features of colonialism and exploitation of natural resources, the term ‘developing finance’ can be called into question.

¹² The phenomenon of precautionary saving and the motives of reserve accumulation are obviously linked to the heterogeneity in financial development. However, for the sake of clarity, these are discussed in separate sections.

¹³ See Banerjee and Duflo (2005) for a criticism of aggregate production function.

¹⁴ In equation (1) technology is Hicks neutral.

were α is the share of capital in production ($0 < \alpha < 1$).¹⁵ If we use the following notations $y = Y/K$ and $k = K/L$, we can write the following equation for the GDP per capita:

$$(3) \quad y = Ak^\alpha,$$

where y is GDP per capita (Y/L) and k is capital intensity (K/L). As the share of capital in the production function is less than one, the marginal product of capital (MPK) is positive but decreasing:

$$\frac{\partial f(\cdot)}{\partial k} = \alpha Ak^{\alpha-1} > 0$$

$$\frac{\partial^2 f(\cdot)}{\partial k^2} = (\alpha - 1)\alpha Ak^{\alpha-2} < 0.$$

This implies that the MPK is higher in countries with low capital intensity than in countries with high capital intensity. Following Lucas (1990), it is possible to write marginal product of capital (MPK) in terms of production per worker (see the derivation in the Appendix B):

$$(4) \quad \frac{\partial f(\cdot)}{\partial k} = \alpha A^{1/\alpha} y^{(\alpha-1)/\alpha}.$$

According to IMF's World Economic Outlook database, the GDP per capita in advanced economies was on average 7.1 times what it was in emerging market and developing economies during the 2000-2015 period. If we assume that the share of capital is 1/3 and that technology is the same in all countries, this implies that MPK in emerging market and developing economies was about 50 times the MPK in advanced economies. Hence, a standard economic theory with some simplifying assumptions proposes that there should be one-way capital flow from rich capital-abundant countries to poor capital-scarce countries.¹⁶ However, as was show in Section 2.1 (e.g. Figure 2), the reality contradicts the theory.

In a very influential paper Lucas (1990) presented a similar sample calculation as above and proposed the question 'Why doesn't capital flow from rich to poor countries?' Lucas himself proposed four possible answers to this paradox: 1) differences in human capital, 2) external benefits of human capital (i.e., learning by doing), 3) capital market imperfections, and 4) the legacy of European colonialism (the optimal policy for an imperialist was to retard capital flows to a colony in order to keep wage levels as low as possible). Equation (4) was derived under the assumption that physical capital (K) and labor (L) are the only factors of production. As a matter of fact, we should augment the production function by human capital (i.e. education) and allow it to vary across countries. In reality, also the level of technology varies across countries. Most likely advanced economies are rich partly because compared to emerging market and developing economies, they have more human capital, as well as a higher level of technology. If this is true, the hypothesis that MPK is higher in poorer countries than in rich countries might not hold true anymore. Furthermore, it is important to notice that investing is risky and international investors are more willing to invest in a country with good legal institutions than in a country that does not have good legal institutions.¹⁷ Capital market imperfections, however, have yet another implication. So far, we have implicitly assumed one-way capital flows. In reality, capital flows simultaneously in and out from any particular country or country-group. This is motivated for example by diversification of risk. As long as shocks are not perfectly correlated across countries, it is possible to diversify investment risks internationally. Portfolio diversification allows agents to reduce the volatility of their consumption levels without any net foreign lending or borrowing (Feenstra and Taylor 2008, p. 692).

¹⁵ Typical assumption of constant returns to scale is done (i.e. the share of capital and labor sum up to one).

¹⁶ This is closely related to Samuelson's (1948) classic factor-price equalization theorem.

¹⁷ The implications of heterogeneity in financial development are studied in Section 3.2.

3.2 Heterogeneity in financial development

Gertler and Rogoff (1990) were among the first to build a two-country general equilibrium model for North-South capital flows. In their model there is informational asymmetry between lenders and borrowers but no enforcing problems. All domestic capital market imperfections are determined endogenously and depend solely on a country's, or to be more precise, on an entrepreneur's, wealth. Gertler and Rogoff assume that one country is poor, and the other is rich, but in such a manner that entrepreneurs in neither country can finance first-best investment levels without borrowing. Because there are no enforcement problems, and financial markets are fully integrated, the pattern of investment would be totally independent of the cross-country wealth distribution under conditions of perfect information. Nevertheless, information asymmetries have a dampening effect on investments in the poor country because entrepreneurs cannot obtain financing of their projects. This lack of financing, which results from the agency costs of lending, is a bigger problem in the poor country than in the rich country. In the equilibrium under asymmetric information, marginal products of capital are not equalized between the countries; instead, the marginal product of capital will be higher in the poor country. The pattern of world investment depends on the relative agency costs of lending between the countries which in turn depend on the relative wealth of entrepreneurs between the countries. Gertler and Rogoff prove that as a result of information asymmetries less savings flow from the rich country to the poor country, and it is even possible that the direction of net capital flows will be reversed.

Also the papers by both Caballero, Farhi, and Gourinchas (2008) and Mendoza, Quadrini and Ríos-Rull (2009) were influential as they show that several features of global current account imbalances (especially stylized facts 1 and 2) can be explained as an equilibrium outcome of financial integration across countries with heterogeneous domestic financial markets. Although these two papers are closely related, they differ both in how they derive the motivation of their general equilibrium model and in how they model the heterogeneity in financial development. Caballero et al. (2008) motivate their model using the following three observations: 1) The US has run a persistent current account deficit since the early 1990s; 2) The long-run real interest rate has declined; and 3) The importance of US assets in global portfolios has increased. Mendoza et al. (2009) derive their motivation from the following three observations: 1) Financial development varies widely, with the US on top; 2) Persistent decline in the US net foreign asset position began in the early 1980s together with a gradual process of international financial integration; and 3) The portfolio composition of US net foreign assets is characterized by increased holdings of risky assets and a large increase in debt.

Caballero et al. (2008) divide the world into four groups: The US (U); the euro area; Japan; and the rest of the world (R). Financial imperfections are captured by the regions' ability to supply financial assets in a world without uncertainty. They analyze global equilibrium in a U-R world, including the implications not only of a collapse in asset markets in (R) but also of a gradual financial integration of fast-growing R economies. They show that both phenomena generate a rise in capital flows toward U, a decline in real interest rates, and an increase in the importance of U's assets in global portfolios. Consequently, R's inability to produce assets for savers can explain why capital flows from high- (R) to low- (U) growth economies.

Mendoza et al. (2009) assume that countries are inhabited by ex ante identical agents who experience two types of risk because of idiosyncratic endowment shocks and idiosyncratic investment shocks. Investment shocks can be avoided by choosing not to purchase a productive asset (capital income). Because there is a distinction between riskless and risky investments, it is possible to analyze how financial development affects not only net foreign asset positions but also their composition. Countries differ in their financial development, which is defined as the extent

to which a country's legal system can enforce financial contracts among its residents so that they can use these contracts as insurance against idiosyncratic risks. Mendoza et al. analyze the implication of financial globalization and financial market heterogeneity in a two-country model that is calibrated to both the US and the rest of the world. Contingent claims (i.e., insurance against idiosyncratic risk) are partially available in the US and unavailable in the rest of the world. They show that in the steady state, the US accumulates a net positive position in productive assets but a much larger negative position in contingent claims (bonds).

For most of the time, the US current account deficit has accounted for more than one-half of the global deficit (see Figure 1). Bernanke (2005) argues that the US current account deficit requires a global perspective. A combination of diverse forces created a significant increase in the global supply of savings, which helps explain both the US current account deficit and the low level of real interest rates. This increase in the global supply of savings is called the global savings glut. Bernanke considers the shift that transformed developing and emerging economies from net borrowers to net lenders as a more important source of the global savings glut than the savings motive of rich countries with aging populations. Two questions remain: first, what caused the shift; and second, why does capital flow to the US in particular. According to Bernanke, the shift was caused by a series of financial crises in developing countries from 1994 to 2002 and a sharp rise in oil prices at the beginning of the 2000s. The US current account deficit increased because of endogenous changes in equity values, housing prices, real interest rates, and the exchange rate of the dollar. The effects of the increase in desired global savings were felt disproportionately in the US relative to other industrial countries because of that country's sophisticated financial markets and the international status of the dollar. (Bernanke 2005.)

There is a vast theoretical literature that considers differences in financial development as the main driver of global current account imbalances (see, e.g., Angeletos and Panousi (2011), Benhima (2013b), von Hagen and Zhang (2014) as well as Eugeni (2015) which are closely related to Caballero et al. (2008) and/or to Mendoza et al. (2009), Ju and Wei (2010) as well as Wang et al. (2017) which model two-way capital flows, and Coeurdacier et al. (2015) which provides microfoundations for the emergence of a global saving glut.)¹⁸ To summarize, these theoretical papers suggest that capital market imperfections and heterogeneity in financial development are central to explaining stylized facts 1, 2 and 6. Empirical studies such as Alfaro, Kalemli-Ozcan and Volosovych (2008), Papaioannou (2009), Forbes (2010) as well as Vermeulen and de Haan (2014) support this view.

Reinhart and Rogoff (2004) suggest that the tendency of poor countries to default explains why such little capital flows to poor countries. Kraay et al. (2005) build a model which highlights the role of sovereign risk in explaining the low level of capital inflow to developing countries and inefficient renegotiation in explaining a bias toward loans.

Both Gourinchas and Jeanne (2013) and Benhima (2013a) build on the neoclassical growth model in order to understand the mechanism behind the allocation puzzle (stylized fact 3). Gourinchas and Jeanne (2013) augment the Ramsay-Cass-Koopmans model with a saving wedge that distorts saving decisions and an investment wedge that distorts investment decisions. They find that the

¹⁸ See also Devereux and Sutherland (2009) as they develop a DSGE model of the interaction between an emerging market economy and an advanced country which incorporates two-way capital flows. The main difference compared to Mendoza et al. (2009) is that Devereux and Sutherland compare equilibrium portfolios in a range of alternative financial market structures, whereas Mendoza et al. assume differences in the degree of enforcement of financial contracts.

saving wedge is essential for the observed pattern of net capital flows across developing countries. Benhima (2013a) incorporates uninsurable investment risk (see also Sandri (2014)).¹⁹

Although the question of whether or not the recognition of differences in financial development fully explains the Lucas paradox is open to dispute (see, e.g., Azémar and Desbordes (2013) and Göktan (2015)), the heterogeneity in financial development argument explains many features of the recent patterns on international capital flows quite well. During the pre-1914 period the most dominant country (Britain) was the major capital exporter, whereas now the most dominant country (the US) is the major capital importer. Someone might argue that this poses a problem for the institutional explanation. However, one should realize that newly settled regions which received the majority of the British capital exports (Nurkse 1954), had relatively good institutions (see, e.g., Acemoglu, Johnson and Robinson (2001, 2002)). In addition, as Obstfeld and Taylor (2004, p. 244) point out, in 1913 many of the core countries were empires and consequently core-periphery flow represented an intraempire investment. This mitigated default risk while both institutional and cultural links facilitated contracting. These considerations suggest that the historical perspective does not undermine the soundness of the institutional explanation.

3.3 Public flows, reserve accumulation and the role of the US dollar

Aguiar and Amador (2011) were possibly the first ones to show that the allocation puzzle (i.e. the negative relationship between net capital inflow and productivity growth across developing countries) is driven by the net foreign asset position of the public sector.²⁰ Public net foreign assets is defined as international reserves minus public or publicly guaranteed external debt. Aguiar and Amador augment the neoclassical growth model with two political economy frictions: incumbent government's preference for immediate spending and its lack of commitment regarding foreign debt. They show that these two frictions generate dynamics in which countries with relatively high growth rate tend to have governments that accumulate large net foreign asset positions. Gourinchas and Jeanne (2013) confirm the importance of public flows for the allocation puzzle and note that in actuality, it is international reserves which dominate. Alfaro, Kalemli-Ozcan and Volosovych (2014) do a comprehensive empirical analysis on the matter. Their benchmark sample includes 98 developing countries. They find that the relation between net capital inflow and productivity growth is sample-specific and confirm that private and public flows behave differently. More specifically they show that when sovereign-to-sovereign flows (i.e. public and publicly guaranteed debt from official creditors, official aid grants, and the IMF credit, net of reserves) are subtracted from the total, net capital inflows are on average positively correlated with productivity growth.²¹ These observations raise at least two questions: what are the motives for reserve accumulation and why do private flows not offset the effect of these public flows?

Dooley, Folkerts-Landau and Garber (2004) interpret the global current account imbalance as a re-establishment of the Bretton Woods era, which they call Bretton Woods II. Asian countries on the periphery have now adopted the same strategy as Japan and Europe did after the Second World War. This periphery strategy is characterized by export-led growth supported by undervalued exchange rates, capital controls and the accumulation of reserve assets claims in the center country (the US). Alternatively, one could argue that accumulation of reserves is driven by precautionary saving motive induced by the Asian financial crisis of 1997-1998. Aizenman and Lee (2007) compare the importance of precautionary and mercantilist motives in the accumulation of international reserves by developing countries. Their estimations indicate that crisis variables are

¹⁹ The specification of Gourinchas and Jeanne (2013) is nested in Benhima's model (see Benhima (2013a, p. 333)).

²⁰ This notion is consistent with Figure 4 and with stylized fact 4 in Section 2.1.

²¹ See Avdjiev et al. (2017) for a documentation of the patterns of gross inflows by sector.

more important than the variables reflecting mercantilist motives in explaining reserve accumulation. In addition, the degree of capital account liberalization has a positive effect on international reserves which is consistent with the precautionary motive.²² Ilzetzki, Reinhart and Rogoff (2017) provide evidence that relatively inflexible exchange rate regimes have remained very important. The desire to stabilize exchange rate despite generally increasing international capital mobility has contributed to the demand for reserves. The US dollar is the leading anchor currency as well as the leading reserve currency (see Figure A3 in Appendix A).

The current period of financial globalization differs from the pre-1914 period in terms of the international monetary system. The first period was characterized by gold standard, whereas since the early 1970s several advanced economies have adopted flexible exchange rate while many emerging and developing economies have pegged their currencies to the US dollar. The latter has presumably increased the demand for US dollar reserve assets and this, on the other hand, has induced capital to flow uphill. However, apparently the reasons for the average rise in the reserve holdings held by emerging market and developing economies (see Figure A1 in Appendix A) or the dispersion among them are not fully understood. This is not to say that reserve accumulation has not been rational.

Choi and Taylor (2017) document that the effects of reserve accumulation on real exchange rates are different from that of private assets and that capital controls are behind this difference. In financially open economies the effect of reserve accumulation on the real exchange rate is close to zero whereas in financially closed economies it is negative (i.e. reserve accumulation is associated with real exchange rate depreciation). This finding provides an answer to our question, why private flows do not offset the effect of public flows. They cannot do this due to the capital controls.

3.4 Other aspects and limitations

In Section 2.2 we described how international capital mobility has evolved over time. There are, however, large differences in financial openness across countries. Reinhardt, Ricci and Tressel (2013) argue that capital account restrictions solve the Lucas paradox. They perform regression analysis on 110 countries over the period of 1980-2006 to study how financial openness affects the relation between net capital outflows and relative income. They find that the coefficient of GDP per capita is statistically insignificant and close to zero but the interaction term between financial openness and income is statistically significant and positive. This implies that in countries with no capital account restrictions there is a positive correlation between the net capital outflow and GDP per capita. Consequently, the study confirms the prediction of the standard neoclassical theory.

So far, we have, at least implicitly, assumed that 1) marginal product of capital (MPK) is higher in poor countries than in rich countries, 2) aggregate production function exists, and 3) official statistics on net foreign assets are unbiased. Next we will summarize studies which call these assumptions into question. Caselli and Feyrer (2007) construct a measure for marginal product of capital (MPK) by calculating the share of capital income of total income and the value of total capital stock.²³ Their main finding is that MPKs are essentially equalized across countries. Thus, it is not necessary to appeal to capital-market frictions in order to rationalize the current pattern of international flows. According to Banerjee and Duflo (2005), heterogeneity in the MPKs within a single country is larger than heterogeneity across countries. They stress the shortcomings of the growth theory in dealing with the problems with the aggregate production function. Zucman (2013)

²² See Aizenman et al. (2015) and Ghosh et al. (2016) for more recent studies.

²³ In case of perfect competition, the share of each factor of production is equal to the elasticity of the production function with respect to the factor in question.

points out yet another problem: due to the failure to capture most of the assets in offshore tax havens, official statistics underestimate the net foreign asset positions of rich countries.

4 Discussion

The findings of Section 3 can be summarized as follows: 1) marginal product of capital is not necessarily higher in poor capital-scarce countries than in rich capital-abundant countries, 2) capital market imperfections and heterogeneity in financial development explain why capital tends to flow from poor to rich countries and why developing countries are short in risky assets, 3) a combination of mercantilist, precautionary and exchange rate stabilization motives (i.e. motives other than seeking the highest return) have contributed to reserve accumulation in developing countries which explains why capital has flowed from poor to rich countries, why developing countries are long in non-risky assets and why some studies have found a negative correlation between capital inflow and productivity growth, and 4) capital controls have prevented private flows from offsetting the effect of reserve accumulation. These findings suggest that perhaps the Lucas paradox is not a paradox after all and that there is no such thing as an allocation puzzle in private capital. Consequently, as developing countries progress in financial development, they should receive more private capital unless capital controls prevent this from happening. This implies neither that foreign aid is not needed nor that capital controls are always bad.

By comparing the first era of financial globalization (1870-1914) to the current period (Section 2.2), we learned that wealth bias in capital inflows is not a new phenomenon. Yet, with respect to the pattern of international capital flows, the two periods are different. Long-term investment capital and unilateral flows have changed to diversification finance and two-way capital flows between rich countries. However, it is also true for emerging market and developing economies that gross foreign assets and liabilities are nowadays much larger than net foreign asset positions or net capital flows. One thing that has not changed is that most developing countries are not able to borrow in their domestic currency (the so-called original sin) (Hausmann and Panizza 2011).²⁴ Taken together, these two facts imply that valuation changes, for example, due to a devaluation of domestic currency, may have larger deterioration effects on their net foreign asset positions than ever before. Naturally, this is one reason why many of these emerging market and developing economies have accumulated large foreign exchange reserves. Another thing that has limited their vulnerability is that since 2002, the trend of the stock of foreign debt liabilities has been decreasing (see Figure A4 in Appendix A).

In terms of economic development it would seem desirable that savings from rich countries would finance much-needed investments in poor countries. However, the empirical evidence on the relationship between economic growth and foreign capital is mixed (see, e.g., Kose et al. (2009, Table 3a)).²⁵ Henry (2007) argues that this is due to not distinguishing between the growth effect and the level effect. The neoclassical model predicts that liberalizing the financial account of a capital-scarce country will temporarily increase the growth rate of its GDP per capita. However, for the most part, the empirical studies which have failed to find a positive correlation between financial openness and economic growth have performed cross-sectional regressions. As Henry points out, this means testing whether financial openness has a permanent growth effect which is something that the theory does not propose. Kose et al. (2009) stress the importance of indirect benefits of financial globalization. Contrary to the standard neoclassical framework these benefits

²⁴ The term ‘original sin’ was introduced by Eichengreen and Hausmann (1999).

²⁵ The allocation puzzle suggests that there is a negative correlation, if any, between net capital inflow and GDP per capita growth across developing countries (see also Aizenman et al. (2007) and Prasad et al. (2007)).

do not result from enhanced access to financing domestic investment. They argue that indirect benefits work through the development of domestic financial sector, through improvements in institutions as well as enhanced macroeconomic policies. Obstfeld (2009) assesses, however, that the empirical evidence on the indirect benefits is sketchy. Nevertheless, perhaps the following summary can be made: The effects of financial liberalization on economic growth depend on 1) the type of capital flow (FDI vs. equity vs. debt), 2) a set of initial conditions (i.e. quality of institutions), 3) exchange rate system (i.e. flexibility of exchange rate), and 4) time horizon. Compared to debt flows, foreign direct investments (FDI) and portfolio equity flows are potentially less volatile but more likely to generate technological spillovers. Capital account liberalizations differ from each other and the effects of equity market liberalization, for example, are different than the effects of removal of some other capital account restrictions. Kose et al. (2009, pp. 43-44), among others, suggest that financial openness leads to good macroeconomic outcomes when certain threshold conditions are met.²⁶ The trilemma of international finance proposes that the flexible exchange rate regime may insulate economies from foreign financial and monetary shocks.²⁷ On the other hand, Rey (2015, 2016) claims that financial cycle transforms the trilemma into a dilemma which means that independent monetary policies are possible if, and only if, the financial account is managed. The recognition of indirect benefits suggests that the positive effects occur over time. Overall, these considerations suggest that the effects of financial liberalization on economic growth depend on country-specific circumstances. In addition, even if the total output increased, financial globalization would create losers as well as winners (see, e.g., Furceri and Loungani (2015)). Hence, it is not surprising that there is hardly any consensus on the merits of financial globalization. Traditionally the International Monetary Fund (IMF) has promoted capital account liberalizations.²⁸ More recently, however, the IMF has adopted a more cautious view and supports the use of capital controls (or ‘capital flow management measures’) in certain circumstances (see International Monetary Fund (2012)).

Patterns of international capital flows are linked to the international monetary system. The US dollar is the leading anchor currency as well as the leading reserve currency. Prasad (2014) argues that the global financial crisis strengthened the dollar’s prominence in global finance. It is indisputable that the hegemony of the US dollar affects the pattern of international flows. What is open to dispute is whether this hegemony strengthens or weakens the stability of the global financial system. Farhi et al. (2011) as well as Ocampo (2015) have proposed a reform of the international monetary system.

For the most part, this survey concentrated on net capital flows between advanced economies and emerging market and developing economies. However, capital flows between emerging market economies are becoming increasingly important. The capital flow between China and Sub-Saharan Africa is perhaps one of the best examples of this kind of development.

²⁶ Kose et al. (2009, pp. 43-44) note that this creates a tension as many of the threshold conditions are also on the list of indirect benefits.

²⁷ See Obstfeld et al. (2017) for a recent study lending support for the hypothesis.

²⁸ See International Monetary Fund (2005) for an evaluation report on the IMF’s approach to capital account liberalization.

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Appendix A: Additional tables and figures

Table A1. Data sources for the figures

Figure	Series	Source ^a
Figure 1	Current account balance (in US dollars)	WDI; WEO
	GDP (in US dollars) for the world economy	WDI
Figure 2	Current account balance (in US dollars) for two country groups ‘Advanced economies’ and ‘Emerging market and developing economies’	WEO
	GDP (in US dollars) for the world economy	WEO
Figure 3	Productivity growth	G&J 2013
	Current account balance (percent of GDP)	WEO
Figure 4	Private inflow (in US dollars) is the sum of ‘Direct Investment: Net Incurrence of Liabilities’, ‘Portfolio Investment: Net Incurrence of Liabilities’, ‘Financial Derivatives (other Than Reserves) And Employee Stock Options: Net Incurrence of Liabilities’ and ‘Other Investment: Net Incurrence of Liabilities’	BOPS
	Private outflow (in US dollars) is the sum of ‘Direct Investment: Net Acquisition of Financial Assets’, ‘Portfolio Investment: Net Acquisition of Financial Assets’, ‘Financial Derivatives (other Than Reserves) And Employee Stock Options: Net Acquisition of Financial Assets’ and ‘Other Investment: Net Acquisition of Financial Assets’	BOPS
	Change in reserves (in US dollars) is ‘Reserve Assets’	BOPS
	GDP (in US dollars)	WEO
Figure 5	Gross foreign assets (in US dollars) is ‘Total assets’	EWNII
	Gross foreign liabilities (in US dollars) is ‘Total liabilities’	EWNII
	Net foreign asset positions (in US dollars) is ‘NFA’	EWNII
	GDP (in US dollars)	EWNII
Figure 6	Net foreign risky asset position (in US dollars) is ‘Portfolio equity assets’ plus ‘FDI assets’ minus ‘Portfolio equity liabilities’ minus ‘FDI liabilities’	EWNII
	Net foreign debt asset position and reserves (in US dollars) is ‘Debt assets’ plus ‘FX Reserves minus gold’ minus ‘Debt liabilities’	EWNII
	GDP (in US dollars)	EWNII

^a BOPS: Balance of Payments Statistics (IMF); EWNII: External Wealth of Nations Mark II database by Lane and Milesi-Ferretti; G&J 2013: Gourinchas and Jeanne (2013, Table A1) (see References); WEO: World Economic Outlook Database April 2017 (IMF); WDI: World Development Indicators (The World Bank).

Table A1. Data sources for the figures (continues)

Figure	Series	Source ^a
Figure A1	Reserves (in US dollars) is ‘FX Reserves minus gold’	EWNII
	GDP (in US dollars)	EWNII
Figure A2	Current account balance (in local currency)	JST
	GDP (in local currency)	JST
	USD exchange rate	JST
Figure A3	Total Foreign Exchange Reserves: Allocated Reserves and Unallocated Reserves	COFER
Figure A4	Debt assets (in US dollars)	EWNII
	Debt liabilities (in US dollars)	EWNII
	Net foreign debt asset positions (in US dollars) is ‘Debt assets’ minus ‘Debt liabilities’	EWNII

^a COFER: Currency Composition of Official Foreign Exchange Reserves (IMF); EWNII: External Wealth of Nations Mark II database by Lane and Milesi-Ferretti; JST: Jordá-Schularick-Taylor Macroeconomy Database.

Table A2. List of advanced economies^b (39 countries)

Country	Abbreviation	Country	Abbreviation	Country	Abbreviation
Australia	AUS	Iceland	ISL	Norway	NOR
Austria	AUT	Ireland	IRL	Portugal	PRT
Belgium	BEL	Israel	ISR	Puerto Rico	PRI
Canada	CAN	Italy	ITA	San Marino	SMR
Cyprus	CYP	Japan	JPN	Singapore	SGP
Czech Rep.	CZE	Korea	KOR	Slovakia	SVK
Denmark	DNK	Latvia	LVA	Slovenia	SVN
Estonia	EST	Lithuania	LTU	Spain	ESP
Finland	FIN	Luxembourg	LUX	Sweden	SWE
France	FRA	Macao	MAC	Switzerland	CHE
Germany	DEU	Malta	MLT	Taiwan	TWN
Greece	GRC	Netherlands	NLD	UK	GBR
Hong Kong	HKG	New Zealand	NLZ	US	USA

^b This classification follows IMF’s World Economic Outlook Database.

**Table A3. List of emerging market and developing economies^b
(153 countries)**

Country	Abb.	Country	Abb.	Country	Abb.	Country	Abb.
Afghanistan	AFG	Dominica	DMA	Madagascar	MDG	Serbia	SRB
Albania	ALB	Dominican	DOM	Malawi	MWI	Seychelles	SYC
Algeria	DZA	Ecuador	ECU	Malaysia	MYS	Sierra Leone	SLE
Angola	AGO	Egypt	EGY	Maldives	MDV	Solomon	SLB
Antigua	ATG	El Salvador	SLV	Mali	MLI	South Africa	ZAF
Argentina	ARG	Equatorial	GNQ	Marshall Is.	MHL	South Sudan	SSD
Armenia	ARM	Eritrea	ERI	Mauritania	MRT	Sri Lanka	LKA
Azerbaijan	AZE	Ethiopia	ETH	Mauritius	MUS	St. Kitts	KNA
Bahamas	BHS	Fiji	FJI	Mexico	MEX	St. Lucia	LCA
Bahrain	BHR	Gabon	GAB	Micronesia	FSM	St. Vincent	VCT
Bangladesh	BGD	Gambia	GMB	Moldova	MDA	Sudan	SDN
Barbados	BRB	Georgia	GEO	Mongolia	MNG	Suriname	SUR
Belarus	BLR	Ghana	GHA	Montenegr	MNE	Swaziland	SWZ
Belize	BLZ	Grenada	GRD	Morocco	MAR	Syrian Arab	SYR
Benin	BEN	Guatemala	GTM	Mozambiq	MOZ	Tajikistan	TJK
Bhutan	BTN	Guinea	GIN	Myanmar	MMR	Tanzania	TZA
Bolivia	BOL	Guinea-	GNB	Namibia	NAM	Thailand	THA
Bosnia Her.	BIH	Guyana	GUY	Nauru	NRU	Timor-Leste	TLS
Botswana	BWA	Haiti	HTI	Nepal	NPL	Togo	TGO
Brazil	BRA	Honduras	HND	Nicaragua	NIC	Tonga	TON
Brunei	BRN	Hungary	HUN	Niger	NER	Trinidad	TTO
Bulgaria	BGR	India	IND	Nigeria	NGA	Tunisia	TUN
Burkina	BFA	Indonesia	IDN	Oman	OMN	Turkey	TUR
Burundi	BDI	Iran	IRN	Pakistan	PAK	Turkmenista	TKM
Cambodia	KHM	Iraq	IRQ	Palau	PLW	Tuvalu	TUV
Cameroon	CMR	Jamaica	JAM	Panama	PAN	Uganda	UGA
Cape Verde	CPV	Jordan	JOR	Papua New	PNG	Ukraine	UKR
Central Af.	CAF	Kazakhstan	KAZ	Paraguay	PRY	United Arab	ARE
Chad	TCD	Kenya	KEN	Peru	PER	Uruguay	URY
Chile	CHL	Kiribati	KIR	Philippines	PHL	Uzbekistan	UZB
China	CHN	Kosovo	XKX	Poland	POL	Vanuatu	VUT
Colombia	COL	Kuwait	KWT	Qatar	QAT	Venezuela	VEN
Comoros	COM	Kyrgyz	KGZ	Romania	ROU	Vietnam	VNM
Dem.	COD	Lao PDR	LAO	Russia	RUS	Yemen	YEM
Congo	COG	Lebanon	LBN	Rwanda	RWA	Zambia	ZMB
Costa Rica	CRI	Lesotho	LSO	Samoa	WAM	Zimbabwe	ZWE
Cote	CIV	Liberia	LBR	Sao Tome	STP		
Croatia	HRV	Libya	LBY	Saudi	SAU		
Djibouti	DJI	FYR	MKD	Senegal	SEN		

^b This classification follows IMF's World Economic Outlook Database.

**Table A4. List of countries included in Figure 3^c
(68 countries countries)**

Country	Abb.	Country	Abb.	Country	Abb.
Angola	AGO	Guatemala	GTM	Pakistan	PAK
Argentina	ARG	Haiti	HTI	Panama	PAN
Bangladesh	BGD	Honduras	HND	Papua New	PNG
Benin	BEN	Hong Kong	HKG	Paraguay	PRY
Bolivia	BOL	India	IND	Peru	PER
Botswana	BWA	Indonesia	IDN	Philippines	PHL
Brazil	BRA	Iran	IRN	Rwanda	RWA
Cameroon	CMR	Israel	ISR	Senegal	SEN
Chile	CHL	Jamaica	JAM	Singapore	SGP
China	CHN	Jordan	JOR	South Africa	ZAF
Colombia	COL	Kenya	KEN	Sri Lanka	LKA
Congo	COG	Korea	KOR	Syrian Arab	SYR
Costa Rica	CRI	Madagascar	MDG	Taiwan	TWN
Cyprus	CYP	Malawi	MWI	Tanzania	TZA
Cote d'Ivoire	CIV	Malaysia	MYS	Thailand	THA
Dominican	DOM	Mali	MLI	Togo	TGO
Ecuador	ECU	Mauritius	MUS	Trinidad	TTO
Egypt	EGY	Mexico	MEX	Tunisia	TUN
El Salvador	SLV	Morocco	MAR	Turkey	TUR
Ethiopia	ETH	Mozambique	MOZ	Uganda	UGA
Fiji	FJI	Nepal	NPL	Uruguay	URY
Gabon	GAB	Niger	NER	Venezuela	VEN
Ghana	GHA	Nigeria	NGA		

^c The selection of countries is from Gourinchas and Jeanne (2013).

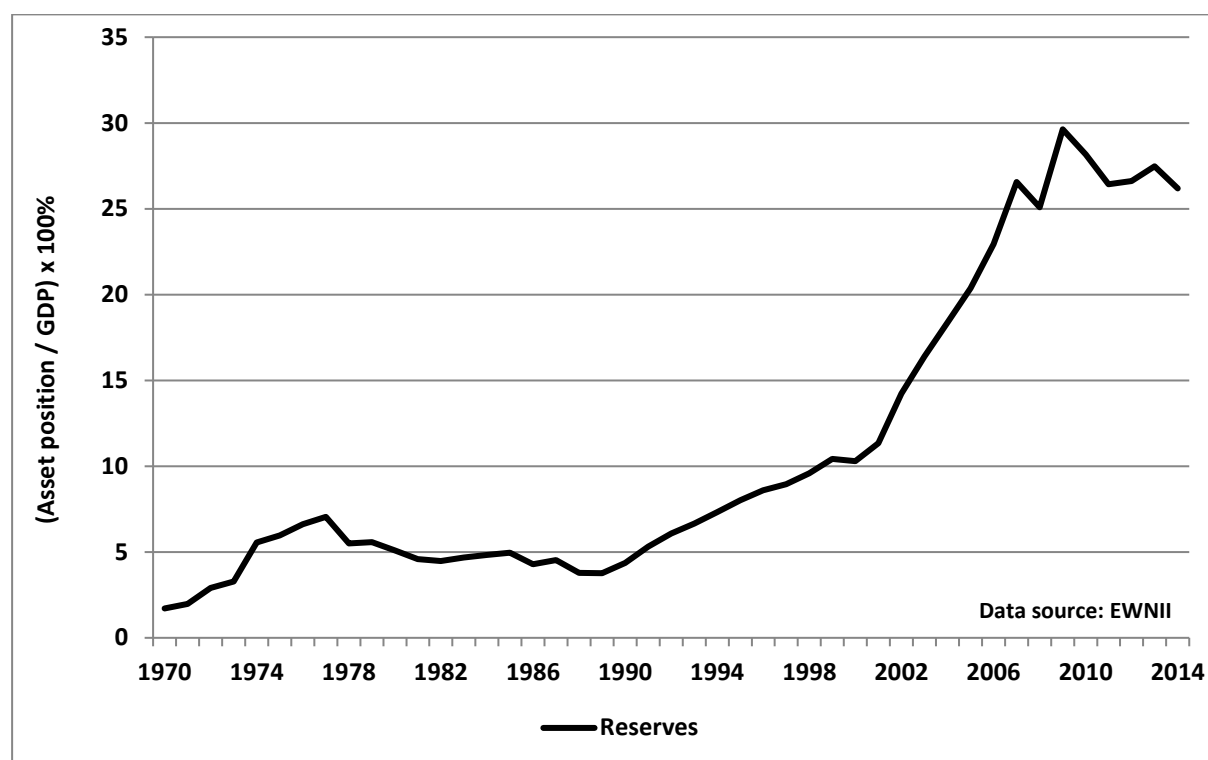


Figure A1. International reserves held by emerging market and developing economies, 1970-2014

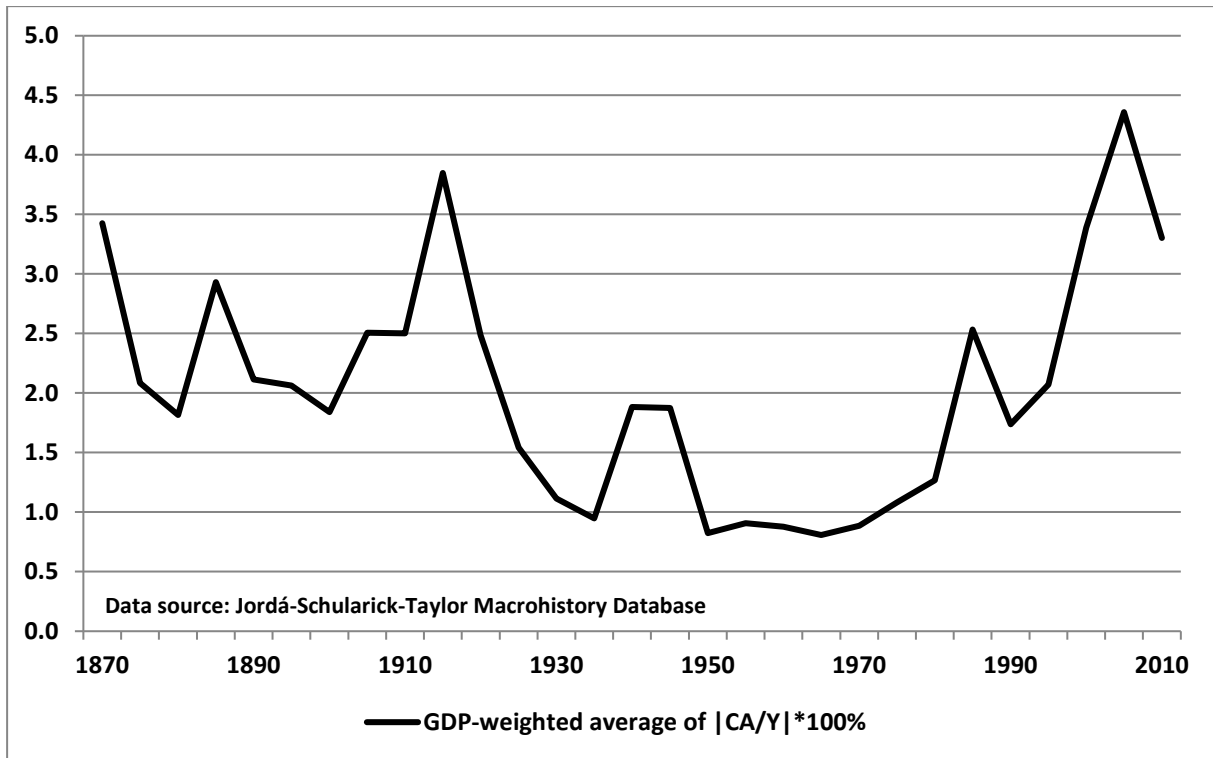


Figure A2. GDP-weighted average of current account imbalances in 17 advanced economies, 1870-2013 (5-year nonoverlapping averages)

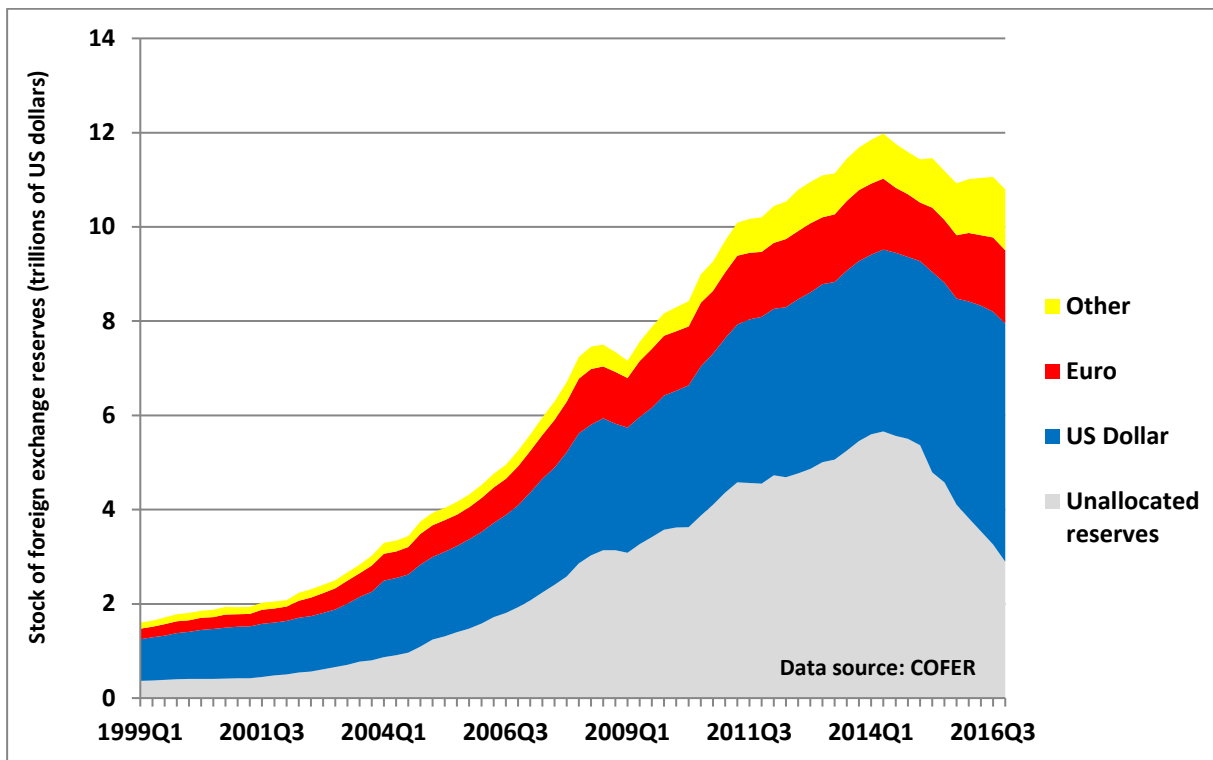


Figure A3. Currency composition of official foreign exchange reserves, 1999Q1-2016Q4

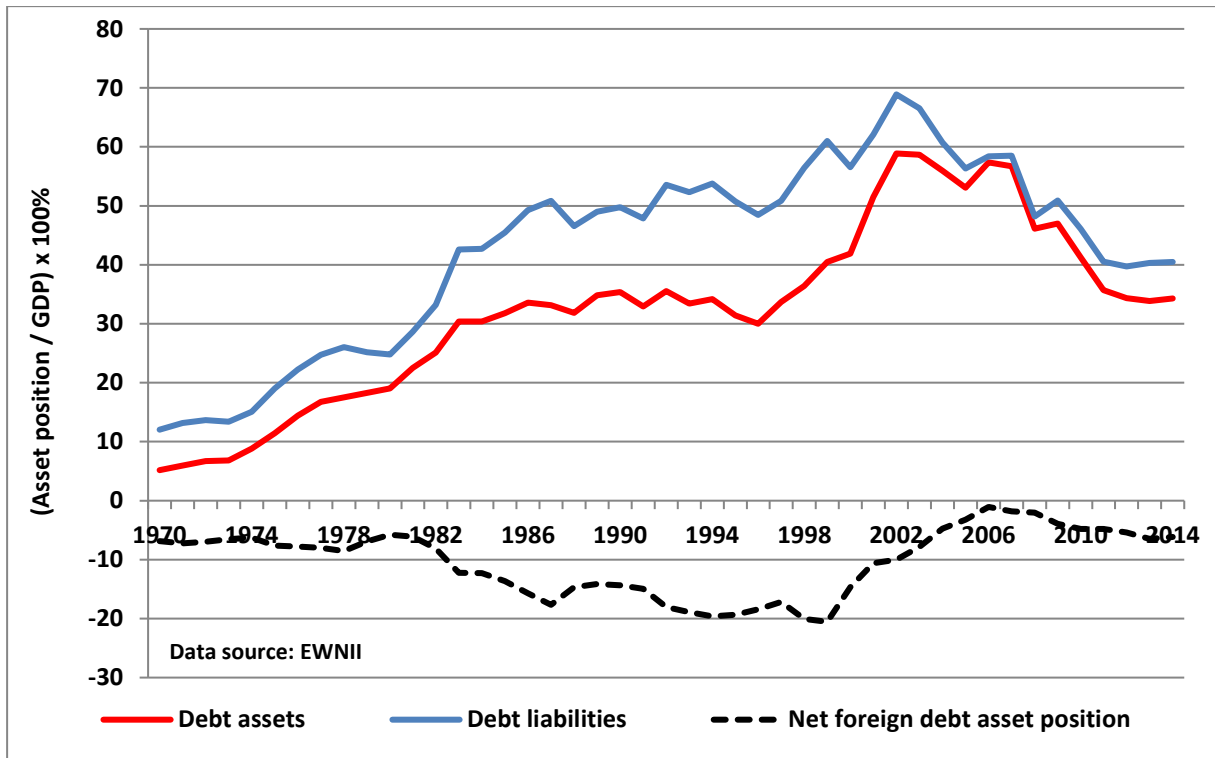


Figure A4. Debt assets, debt liabilities and net foreign debt asset position of emerging market and developing economies, 1970-2014

Appendix B: Equations

We will show that

$$\frac{\partial f(\cdot)}{\partial k} = \alpha A k^{\alpha-1} = \alpha A^{\frac{1}{\alpha}} y^{\frac{\alpha-1}{\alpha}}.$$

Let's start from production function:

$$\begin{aligned} y &= A k^{\alpha} & || & \left(\right)^{\frac{\alpha-1}{\alpha}} \\ y^{\frac{\alpha-1}{\alpha}} &= A^{\frac{\alpha-1}{\alpha}} k^{\alpha-1} & || & : A^{\frac{\alpha-1}{\alpha}} \\ k^{\alpha-1} &= y^{\frac{\alpha-1}{\alpha}} A^{\frac{1-\alpha}{\alpha}} \end{aligned}$$

Thus it holds that

$$\alpha A k^{\alpha-1} = \alpha A y^{\frac{\alpha-1}{\alpha}} A^{\frac{1-\alpha}{\alpha}} = \alpha A^{\frac{\alpha+1-\alpha}{\alpha}} y^{\frac{\alpha-1}{\alpha}} = \alpha A^{\frac{1}{\alpha}} y^{\frac{\alpha-1}{\alpha}}.$$