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Current account deficits during heightened risk: menacing or mitigating?

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Current account deficits during heightened risk: menacing or mitigating?

Kristin Forbes,[1] Ida Hjortsoe[2] and Tsvetelina Nenova[3]

Abstract

Large current account deficits, and the corresponding reliance on capital flows from abroad, can increase a country's vulnerability to periods of heightened risk and uncertainty. This paper develops a framework to evaluate such vulnerabilities. It highlights the central importance of two financial factors: income on international investments and changes in the valuations of those investments. We show how the characteristics of a country's international investment portfolio — the size of its international asset and liability holdings, their currency denominations, their split between equity and debt exposures, and their return characteristics — affect the dynamics of these financial factors. Then we decompose those dynamics into their drivers and explore how they are affected by domestic and global risk. We apply this framework to ten OECD economies, showing the flexibility of this approach and how the countries' different international investment portfolios generate different dynamics in international investment income and positions. These examples, including a more detailed assessment based on an SVAR for the United Kingdom, show that a substantial degree of international risk sharing can occur through current accounts and international portfolios. Our framework clarifies which characteristics of a country's international portfolio determine whether a current account deficit is 'menacing' or 'mitigating'.

Key words: Current account, risk, international investment income, valuation effects.

JEL classification: F32, F21, F36, F42.

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It is a privilege to write a paper in honor of Frank Hahn. Hahn was a talented economist who wrote on a range of topics central to macroeconomics today. He emphasized the importance of focusing on general equilibrium, and how this could improve our understanding relative to partial equilibrium analysis. What made Hahn particularly inspiring was his willingness to look at these central issues in new ways. For example, in *A Critical Essay on Modern Macroeconomic Theory* (1995) with Robert Solow, he argues that modern macroeconomic theory needs to put more emphasis on understanding financial markets – and especially failures in financial markets. Their warnings were prescient.

This paper applies these insights from Hahn to analyze the risks inherent in current account deficits. Just as Hahn emphasized the need to incorporate financial variables in macroeconomic analysis, we focus on the role of the financial components of current account balances. These financial components are critically important to the dynamics of current account deficits today, due to the large magnitude of cross-border financial exposures and flows. These financial components can also create greater sources of vulnerability than trade deficits, due to the speed and scale by which financial flows and valuations can adjust. Just as Hahn emphasized the need to consider general equilibrium effects, we extend our analysis of the financial components of current accounts to consider how they interact with changes in global and domestic risk. We show how these various interactions affect international financial flows and portfolio valuations, with their effects depending on the characteristics of a country's portfolio and the nature of the shocks. Current account deficits are not always "menacing". Instead, our analysis shows under what circumstances they can be "mitigating", in the sense of providing a form of automatic international risk sharing that reduces certain vulnerabilities related to large current account deficits.

We begin by discussing the potential vulnerabilities from large current account deficits. This discussion highlights the increased role of financial factors. Although some of these financial factors affecting a country's international portfolio have been analyzed in other research, we are one of the few to highlight the financial effects through the investment income component of the current account (as well as the better known valuation effects on international investments).[1] We are also the first to develop a unified framework to analyse the interrelationships between changes in risk and uncertainty (which often correspond to sudden stops in capital flows and current account adjustments) with these financial factors affecting current accounts and the corresponding dynamics in international portfolios.

After discussing these potential financial vulnerabilities, we develop a model to decompose the determinants of movements in current accounts and international portfolios. We show the role of variables such as: the size of international asset and liability holdings, their currency denominations, their split between equity and debt exposures, their return characteristics, and exchange rate movements. We document the importance of these variables to understanding current account dynamics in a sample of 10 OECD economies. Though there are well-documented issues related to the international financial data[2] used in these examples, they are useful to highlight the diversity across experiences, as well as the flexibility of this framework to understand the cyclical and structural sources of vulnerability across countries.

[1] Obstfeld (2012) and Borio and Disyatat (2015) also discuss the importance of financial variables in analysis of vulnerabilities related to current accounts. Key papers highlighting the importance of large international exposures and valuation changes are: Lane and Milesi-Ferretti (2006, 2012), Gourinchas and Rey (2007), Gourinchas *et al.* (2012), and Benetrix *et al.* (2015).
[2] See Zucman (2013), Lane (2014) and Curcuru, Dvorak and Warnock (2008) for issues.

Next, we extend this framework to show how these variables interact with increased global or domestic risk. Heightened risk and uncertainty – for whatever reason – can lead to sudden shifts in capital flows that make it difficult to finance a current account deficit and lead to painful macroeconomic adjustments. Heightened risk and uncertainty can also affect the exchange rate, the relative returns that foreign and domestic investors earn, and the valuation of any international borrowing and investments. This broader framework for analyzing the dynamics of current account deficits during heightened risk, an approach that incorporates financial flows, financial positions, and their various interactions, shows which country characteristics can be stabilizing and help mitigate vulnerabilities through international risk sharing. The framework also highlights, however, what country characteristics and types of shocks are more likely to increase a country's vulnerability. We then apply this framework to assess whether the international portfolio characteristics for 10 OECD countries should magnify, or mitigate, any current account vulnerabilities to periods of heightened risk and uncertainty.

Finally, to make the framework more tangible, we perform a more in-depth analysis of these vulnerabilities in one country with a large current account deficit: the United Kingdom. The UK's current account deficit reached 7.0% of GDP in Q4 of 2015, the largest of the advanced economies and for the United Kingdom in the 60 years for which data is available. This large current account deficit has been highlighted as a concern by a number of individuals and institutions.[3] Applying this paper's framework shows under which circumstances heightened risk can generate improvements in the UK's international investment position and current account – even without any trade adjustments. Key are the interactions of the structure of the UK international investment portfolio with currency movements (as sterling tends to depreciate when UK or global risk increases). It also shows that automatic risk sharing through the current account tends to be larger during periods of heightened UK risk than after heightened global risk. Estimates from an SVAR model suggest that these financial adjustments to changes in global and domestic risk explain a meaningful portion of changes in the UK's international investment position and income flows. Even though the structure of the UK's international borrowing and lending can reduce certain vulnerabilities related to its current account deficit, however, this is unlikely to fully mitigate the negative impact of heightened risk and uncertainty on the broader UK economy.

The remainder of this paper is divided into four parts. Section I discusses reasons to be concerned about current account deficits: historic examples, the academic evidence, and the importance of financial factors. Section II develops our broader framework for assessing the vulnerabilities related to current account deficits by simultaneously incorporating the effects of cross-border financial exposures and investment income. Section III then extends this framework to analyze how increases in global and domestic risk could interact with these financial vulnerabilities linked to current account deficits. It applies the analysis to 10 OECD economies and ends with a more detailed application to the United Kingdom. Section IV concludes and summarizes the main results.

I. Longstanding Concerns about Current Account Deficits

Current account deficits (and the corresponding borrowing from abroad) are a healthy outcome in many standard economic models. Even a large current account deficit should not automatically be a cause for

[3] For example, see the IMF's annual report on the UK economy (IMF, 2016) and the BoE's stress test of risks to the UK financial system related to its current account deficit (Financial Policy Committee, 2014). Also see Broadbent (2014) and Forbes (2016).

concern. For example, in a standard endowment economy model, a country which experiences a negative temporary shock to output (such as from a natural disaster) should borrow from abroad and run a current account deficit in order to smooth consumption over time. Classical economic models show that an optimal allocation of global capital implies that capital should flow from developed economies with low marginal returns to developing economies with higher marginal returns, thereby generating current account deficits in the latter. Various models incorporating demographic trends also show current account imbalances as an optimal solution, as countries with older populations should save less, drawing down assets and generating current account deficits (balanced by earlier surpluses).[4]

The historical experience and academic evidence on current account deficits, however, suggests that they are often not benign. There are numerous examples when current account deficits – and the corresponding reliance on financing from abroad – created substantial challenges and made a country vulnerable to the demands and whims of its external creditors.[5] These challenges are particularly apparent during periods of heightened uncertainty and risk aversion. This section first highlights some of those episodes when countries relying on external finance faced associated challenges and vulnerabilities. It then turns to the extensive economic literature pointing out the reasons why large current account deficits may increase a country's vulnerability to external shocks and can entail difficult and painful adjustments. The section closes by highlighting how the theoretical and empirical analyses contained in the remainder of this paper further contribute to our understanding of these vulnerabilities linked to large current account deficits.

A. Vulnerabilities Related to Current Account Deficits: Historic Examples

One of the more poignant historic examples (especially for the UK) of how reliance on external financing can make a country vulnerable to changes in foreign sentiment is the Suez Crisis of 1956. The UK experienced moderate capital outflows from the beginning of 1956, which when combined with sterling's fixed exchange rate, corresponded to a steady loss of international reserves (despite the UK running a small current account surplus). The UK government realized this was not sustainable. In September, UK officials began conversations to draw financial assistance from the IMF – a plan which initially received informal support from the US (a key vote as it was the only country with veto power). In October the UK joined a military campaign in Egypt aimed at regaining control of the Suez Canal. Although the campaign met with minimal resistance in Egypt, it generated a strong international backlash – including from the US. The military campaign and international reaction increased the perceived risk of investing in the UK, sharply accelerating UK capital outflows and reserve losses. The UK needed immediate financial assistance to avoid a devaluation – an option viewed as untenable. But now the US blocked any financial assistance from the IMF, unless the UK agreed to a full and immediate military withdrawal from Egypt. President Eisenhower even told his Treasury Secretary to make plans to begin selling US holdings of UK sterling bonds.[6] The UK, constrained by its need to stabilize capital flows from abroad, felt it had no choice and quickly agreed to full withdrawal from Egypt. It immediately received a large financial assistance package that the IMF described as "linked to the financing of the

[4] For example, Ferrero (2010) highlights the role of productivity and demographics behind US trade imbalances.
[5] In 2006, the IMF was sufficiently concerned about these issues that it led a multilateral consultative process for which a key goal was reducing current account imbalances.
[6] See: https://en.wikipedia.org/wiki/Suez_Crisis

current account"[7] and the situation stabilized. This experience highlighted the power of foreign investors over economies that are reliant on foreign financing.

More recently, investors have focused on current account balances as a proxy for a country's reliance on external financing and corresponding vulnerability to any increase in risk aversion, economic uncertainty or deterioration in investor sentiment. The logic is straightforward: countries with large current account deficits need to attract large net financial flows from abroad each year in order to fund this deficit (without drawing on any international reserves). This relationship between current account deficits and country vulnerability gained substantial attention during the 1997 Asian crisis. This is captured in Figure 1, which graphs the current account balances of 12 major Asian emerging markets in 1996 (before the crisis began). The 6 countries on the left of the graph (with the largest current account deficits, in different shades of red) all experienced a sharp currency depreciation of over 10% in 1997 and some also received an emergency financial package from the IMF (in light red). None of the six countries on the right (with the smaller current account deficits or surpluses), received an emergency package or experienced such a sharp depreciation. Although this is clearly not a scientific study, it suggests that many investors believed that large current account deficits were an indication of vulnerability.

This focus on current account deficits as a proxy for country vulnerability during periods of heightened risk has continued since. During the spring of 2013, concerns increased about China's growth and the US Federal Reserve Board began to discuss "tapering" its asset purchases. Measures of global risk (such as the VIX) increased sharply and investors quickly withdrew capital from emerging markets. Again, the sharpest capital outflows, currency depreciations, and increases in borrowing costs occurred in the countries with the largest current account deficits.[8] Figure 2 shows this relationship between currency depreciations (relative to the dollar) over the most volatile period from May 1 to June 30, 2013 and current account balances (at the end of 2012). The correlation is almost 70% – without even controlling for any other country characteristics. Highlighting this obsession with current account deficits as a badge of country vulnerability, the group of major emerging markets under the sharpest investor scrutiny during this period earned the moniker "The Fragile Five" – despite having little in common other than large current account deficits and a corresponding reliance on external financing.

But is the current account balance an appropriate proxy for assessing country vulnerability to increased risk and uncertainty? What are the channels through which current account deficits can correspond to increased vulnerabilities?

B. Vulnerabilities Related to Current Account Deficits: A Literature Review

Formal academic work suggests that large current account deficits and reliance on external financing can present risks – but these risks are more nuanced than a direct link from the size of a country's current account deficit to its vulnerability. Using the framework in Obstfeld (2012), this literature broadly points out three (related) reasons why current account deficits may lead to vulnerabilities:[9] (1) because they increase vulnerability to "sudden stops" in capital flows; (2) because they lead to a deterioration in the net international investment position (or NIIP), which can put pressure on that

[7] Boughton (2001). Technically the UK still had a small current account surplus, but the IMF described the financing as linked to the leads and lags in payments linked to financing the current account.
[8] For more details on this episode, see Forbes (2014a).
[9] See Obstfeld (2012) for more details on this literature and these risks related to current account deficits.

country's external debt solvency; and (3) because they reflect unsustainable macroeconomic imbalances that will eventually require a painful "reversal" in the current account.

The first strand of literature focuses on the risks associated with the fact that large current account deficits need to be funded through financing from abroad (albeit for a limited period they can be funded from any accumulated reserves). This results from standard balance of payments accounting, in equation (1), which shows that the current account (*CA*) plus capital account (*CAPACT)* must equal the financial account (*FINACT*) for each country *i* at time *t*:

$$CA_{i,t} + CAPACT_{i,t} = FINACT_{i,t} \ . \quad (1)$$

The capital account is generally quite small for most countries – and especially the advanced countries that will be the focus of this analysis – and so will be ignored in the rest of this paper.[10]

Intuitively, any country running a current account deficit is sending more money abroad than it is earning – through buying imports, paying returns on past investments, or outflows of other payments such as remittances. The country must finance this shortfall of funding through a financial account surplus – i.e. net financial flows from foreigners – through means such as selling debt and equities, bank loans, more inward FDI, and/or selling accumulated international reserves. Domestic or external shocks can cause a "sudden stop" in this external funding (whether due to domestic or external factors), leading to tighter financial conditions, reduced availability of credit, increased borrowing costs, asset market declines, and currency depreciations (for countries with flexible rates). In extreme cases, a "sudden stop" can spark a currency crisis or broader financial crisis – with a sharp devaluation and increase in bank collapses, corporate insolvencies and debt defaults. These situations generally occur in an environment of sharply slower growth, reduced consumption and investment, a sharp fall in real wages, and often high inflation (due to the currency depreciation).[11]

The empirical literature has established some link between sudden stops in capital flows and the adverse environment described above – albeit with more nuanced results. For example, Edwards (2005) and Freund and Warnock (2007) show that sudden stops are correlated with currency depreciations, slower growth, and higher interest rates. Catão and Milesi-Ferretti (2011) find that current account deficits increase the probability of debt crises (defined as requiring large disbursements from multilateral programs or external default), while Gourinchas and Obstfeld (2012) find that current account deficits precede systemic banking crises in advanced economies. Frankel and Saravelos (2010) review 80 papers estimating various forms of "early-warning models" that attempt to predict country vulnerability to various types of crises and provides a useful synthesis to this large literature. They find current account deficits are significant in predicting currency crises and vulnerabilities to current account reversals, but not as powerful as other variables (such as exchange rate appreciation and reserve accumulation).

[10] According to the IMF's Balance of Payments manual, the capital account is "credit and debit entries for non-produced nonfinancial assets and capital transfers between residents and non-residents. It records acquisitions and disposals of non-produced nonfinancial assets, such as land sold to embassies and sales of leases and licenses, as well as capital transfers, that is, the provision of resources for capital purposes by one party without anything of economic value being supplied as a direct return to that party."

[11] See Mendoza (2010).

The broader literature also finds that the type of financial flows corresponding to current account deficits can affect a country's vulnerability and the risk of a sudden stop. For example, there is evidence that countries have a lower probability of experiencing a sudden stop if a larger share of the current account is financed by capital flows that are more stable (such as FDI), that incorporate automatic risk sharing (such as equity), or that correspond to investors with a longer time horizon.[12] Perhaps most important, this literature has also shifted away from focusing on net financial flows (which net out gross inflows from foreigners less outflows from domestics) that correspond to the current account deficit. Instead, the literature is increasingly focusing on gross capital flows as a measure of a country's vulnerability.[13] The 1956 Suez Crisis, discussed above, when the UK had a small current account surplus but was still vulnerable to a sudden stop in financing from abroad, was an early example of this point.

The second strand of literature on the vulnerabilities related to current account deficits focuses on the fact that these deficits lead to a deterioration in the net international investment position (holding everything else constant). This deterioration can make investors question a country's ability to repay its external obligations, i.e. its solvency. To illustrate the link between the current account and the net international investment position, decompose the net international investment position (NIIP) of country *i* at time *t* into its holdings of foreign assets (*A*) net of foreign liabilities (*L*), for all asset/liability categories (c), such as FDI, portfolio equity, portfolio debt, bank lending, and "other", with all variables expressed in domestic currency:

$$NIIP_{i,t} = \sum_c \left(A^c_{i,t} - L^c_{i,t} \right) . \qquad (2)$$

Then further decompose any change in the NIIP into: changes in international capital flows (captured in the current account as shown in equation 1); changes in the valuation of existing investment positions (ΔVAL); and other adjustments to the value of international assets or liabilities that are not otherwise included (*OAdj*), such as data revisions or adjustments related to the relocation of headquarters:[14]

$$\Delta NIIP_{i,t} = CA_{i,t} + \Delta VAL_{i,t} + OAdj_{i,t} . \qquad (3)$$

The academic literature has found mixed evidence on this link between current account deficits and a country's vulnerability operating through deteriorating NIIP positions. For example, Blanchard *et al.* (2010) show that large external debt positions were a significant predictor of output losses during the global financial crisis, and Catao and Milesi-Ferretti (2014) show that the stock of net external debt is a robust predictor of external crises, even after controlling for current account balances. Frankel and Saravelos' (2010) previously mentioned review of 80 studies, however, shows that only a small proportion of these studies finds a significant relationship between a country's net external debt position and the probability of having a crisis. Their own analysis finds that external debt positions significantly predict equity market falls and recessions, but not currency depreciations, the need to borrow from the IMF, or other "crisis" measures.

[12] For evidence, see Forbes (2013) and Forbes and Warnock (2014).

[13] Forbes and Warnock (2012) first develops this approach of focusing on gross capital inflows and outflows by foreigners and domestics, rather than net capital flows, to analyse country vulnerability to sudden stops. Milesi-Ferretti and Tille (2010) also highlights the importance of looking at gross flows during the recent crisis, and Avdjiev, McCauley and Shin (2015) highlights the role of gross flows in banking.

[14] The decomposition used here is similar to that in Lane and Milesi-Ferretti (2001, 2007a) and Devereux and Sutherland (2010). Note that other adjustments also include the effect of real GDP growth on the past NIIP (the "denominator effect"). See Lane and Milesi-Ferretti (2005) and Lane (2015) for information on this *OAdj* term.

These mixed results undoubtedly reflect the challenges in determining a country's solvency, which would require incorporating factors in addition to the NIIP position (such as expected growth, the composition and liquidity of the international assets and liabilities,[15] the currency denomination of the borrowing, the country's ability to print its own currency, the country's willingness to repay, etc.) Although large external liabilities undoubtedly increase a country's vulnerability and cannot grow infinitely, assessing exactly when net external borrowing becomes a significant concern is a challenge.

The third and final focus in analyses of the concerns related to current account deficits bypasses any relationships with crises. Instead, this literature focuses on whether current account deficits reflect underlying macroeconomic imbalances that will require a "reversal" in the current account, which in turn entails slower growth and other costly macroeconomic adjustment (such as reduced consumption and real wages).[16] This literature builds on the traditional approach to modelling current account imbalances; countries must satisfy inter-temporal budget constraints, so any country that accumulates current account deficits will have to run a surplus in the future. An unsustainable current account could be generated by macroeconomic imbalances resulting from unexpectedly low productivity growth, excessive consumption or investment, inflated asset prices, or an unsustainable fiscal deficit. When the current account deficit reverses, it requires a change in production and consumption profiles – usually a fall in domestic demand, a currency depreciation, and potentially other difficult adjustments ensuring that the trade balance improves.[17]

The academic evidence on the characteristics of these types of reversals is not uniform, but suggests that they can be costly. For example, Freund and Warnock (2007) look at 26 episodes from 1980-2003 in industrial countries and find that income growth slows when current account deficits reverse and that larger current account deficits take longer to resolve. In one of the most careful recent analyses, Lane and Milesi-Ferretti (2012) find that current account reversals generally do not correspond to increased exports (which would support overall growth), but instead to "demand compression" – i.e. reduced imports and domestic demand. Analysis also suggests that structural reforms contributing to reversals by increasing domestic competitiveness over time may have a negative short-run impact on growth (e.g. Eggertsson, Ferrero, and Raffo, 2014). An earlier vein of this literature also attempted to find a "threshold" for current account deficits that corresponded to an impending difficult adjustment; some papers found evidence that 5% was a level at which a painful current account reversal was significantly more likely. But there is a huge variance around estimates of this threshold and there is now general agreement there is no "magic number".[18]

Most recently, several papers have highlighted an important link between these literatures focusing on different vulnerabilities related to current account deficits: rapid domestic credit growth (e.g. Gourinchas and Obstfeld, 2012, Schularick and Taylor, 2012, and Korinek, 2011).[19] These papers argue

[15] See Gourinchas (2011) for the role of liquidity in assessing global imbalances.
[16] See Adalet and Eichengreen (2007) for an analysis of current account reversals since the 1880s.
[17] Because the main component of the current account in these models is the trade balance, this "reversal" of a current account deficit into a surplus generally corresponds to a reversal of the trade deficit to a surplus.
[18] For example, Freund (2005) found that after current account deficits reach 5% of GDP, they are generally followed by a period of slowing income growth, currency depreciation, and declining investment. Summers (2004) also refers to this 5% threshold. In contrast, Milesi-Ferretti and Razin (1998) examine a larger sample of countries and do not find evidence that current account deficits above this level are systematically associated with slower growth and currency crises.
[19] Korinek (2011) models how these various factors could be related. In an economy with incomplete financial markets, a sudden stop of foreign financing generates a depreciation, which raises the value of foreign liabilities and tightens financial

that it is the rapid increase in domestic credit (which often corresponds to large current account deficits, capital inflows from abroad, and a deterioration in the NIIP) that has the greatest explanatory power in predicting crises. If a current account deficit is not accompanied by this macroeconomic imbalance of rapidly increasing credit growth, these papers find that countries with large current account deficits are not significantly more likely to experience a crisis or current account reversal. It is thus the end to unsustainable credit growth associated with borrowing from abroad that leads to sudden stops and painful reversals in the current account.

C. Vulnerabilities Related to Current Account Deficits: Missing Pieces

This recent focus on credit growth as a key link between current account deficits, capital inflows, macroeconomic imbalances, financial crises, external liabilities, and difficult reversals highlights an important shift in the literature on current account vulnerabilities – away from the simplistic view of the current account as equivalent to the trade balance and instead focusing on its financial component. This does not mean that trade is unimportant in the vulnerabilities and adjustments related to large current account deficits. Instead, this shift highlights the growing importance of financial channels due to increased cross-border financial exposures, as well as the much more rapid adjustments that can occur through financial channels than through trade.

Simple balance of payments accounting reminds us that the current account is a function of the trade balance (*TB*) and a financial component. This financial component can be decomposed into net primary investment income (*INVINC*) and other primary and secondary income (*OINC*):[20]

$$CA_{i,t} = TB_{i,t} + INVINC_{i,t} + OINC_{i,t} \ . \qquad (4)$$

Moreover, combining equations (3) and (4) yields:

$$\Delta NIIP_{i,t} = TB_{i,t} + INVINC_{i,t} + \Delta VAL_{i,t} + E_{i,t} \ , \qquad (5)$$

where $E_{i,t}$ denotes other primary and secondary income and other adjustments to the NIIP (which are generally small). This shows that analysis of the vulnerabilities related to a country's international investment position should consider valuation effects on international investment positions, as well as international investment income flows.

Figure 3 highlights why paying greater attention to the financial flows and financial positions linked to the current account has become more important: increased financial globalization since the early 1990s. The figure shows the sharp increase in cross-border financial assets and liabilities that occurred from about 1990 through 2007, broken out by the type of exposure. Cross-border financial exposures have roughly stabilized since then, largely reflecting a reduction in international bank flows.[21] Even if cross-border financial flows do not return to their pre-crisis levels, however, the past accumulation of international assets and liabilities implies that international financial exposures are likely to remain

constraints. Individuals do not internalize this effect of a sudden stop, causing them to borrow too much and generating the unsustainable credit boom and current account deficit.

[20] The trade balance includes trade in goods and services; net primary investment income is the return from past investment in financial assets and production processes (largely dividends and interest); other net primary income consists predominantly of compensation of employees; net secondary income is basically personal transfers, international assistance, charities and some inter-government payments (which is a small component of the current account for the countries considered here).

[21] For more information on this "deglobalisation" in capital flows, and especially banking, see Cerutti and Claessens (2014), Forbes (2014b), and Forbes, Reinhardt and Wieladek (2016).

substantially elevated relative to past decades. This increase in cross-border financial exposures has important implications for vulnerabilities related to the current account deficit as it affects both net international investment positions and international investment income.

Several important papers have considered the implications of these increased cross-border financial exposures for net international investment positions, focusing on the effects of valuation changes.[22] There has not, however, been comparable work assessing the related implications for international investment income – i.e. the financial component of the current account - and the NIIP. Moreover, little attention has been paid to how both valuation changes and international investment income could interact with risks related to the current account.

Therefore, in the analysis that follows, we will focus on the role of financial factors for the current account and international investment position. Financial factors such as investment income and valuation changes can be large, important, and fast moving – and therefore critical to assessing a country's vulnerability.

II. Incorporating International Financial Exposures and Investment Income into Vulnerability Analysis

This section investigates the role of investment income and valuation changes to understand the dynamics and vulnerabilities of current accounts and international investment positions. It begins with empirical evidence of their importance. Then it develops a basic theoretical framework to show what drivers determine the evolution of these financial factors. The section ends by providing evidence of the magnitudes and relative importance of these drivers in different countries.

A. The Importance of Financial Factors for the Current Account and NIIP

How important are financial factors (valuation changes and investment income) relative to trade (which traditionally receives more attention) in understanding the vulnerabilities related to current accounts?

Figure 4 provides an initial indication that these financial channels can be very important. It uses the decomposition in equation (5) to report the ratios of the variances of the trade balance, investment income, and valuation effects to the overall variance in the NIIP for a large sample of around 180 countries and then for the UK.[23] Figure 4a reports results for a long period from 1980 to 2014, and Figure 4b for the more recent and more "financially globalized" period from 2004 to 2014. Valuation effects play a significant role – and appear to be even more important than trade. More specifically, the variance of valuation effects amounted to 35% of the variance of overall NIIP changes for the full sample over the longer period, relative to 25% for trade and 8% for primary income (the largest component of which is net investment income). The role of valuation effects is even greater in the UK on an absolute basis and relative to trade – where they explain 45% of the variance compared to only 10% for trade. Even more striking is how these valuation effects have increased over time. Over the last 10 years (in

[22] Key papers are: Gourinchas and Rey (2007), Lane and Milesi-Ferretti (2006), Gourinchas, Rey and Treumpler (2012), Lane and Milesi-Ferretti (2012), Obstfeld (2012), and Benetrix *et al.* (2015).

[23] The shares do not add to 100% due mainly to covariances between the NIIP components, as well as to other smaller components and data issues that are not reported to simplify the comparisons. In Figures 4-8, we use net primary income as a proxy for net primary investment income due to data availability issues.

Figure 4b), the role of valuation effects in explaining the variance in the NIIP is substantially greater – reaching 61% for the full sample and 144% in the UK.[24] This increased role is not surprising given larger international financial exposures, as discussed in the previous section, which magnify the impact of a given change in the rate of capital gains on these positions. Concerns about country vulnerability linked to unsustainable NIIP positions should clearly include analysis of these valuation changes.

Any assessment of current account vulnerabilities should also consider financial effects through the investment income component of the current account. This link has been largely ignored in the literature (unlike for valuation effects) – possibly due to the common shortcut of treating the current account balance as equivalent to the trade balance. Figure 5 shows, however, that this shortcut is not valid. It graphs current accounts for the 15 OECD countries with the largest current account deficits over 2013-2014 and breaks these deficits into the three components shown in equation (4): the trade balance, investment income (proxied by primary income) and other income (proxied by secondary income). Large current account deficits are clearly not synonymous with large trade deficits; investment income balances can also be significant determinants of current account balances. In fact, the investment income balance (proxied by the primary income balance) constitutes a larger share of the current account deficit than trade in a number of countries, including South Africa, Colombia, Peru, Brazil, Australia, New Zealand, Indonesia, Chile and Mexico.

Even if international investment income is important in explaining the levels of some countries' current account deficits, is it also important in explaining changes in current accounts? This may be even more important for any analysis of vulnerabilities related to sudden stops and reversals in current accounts. Figure 6 performs this analysis by showing the share of the variance in the current account that is explained by the variance of trade, investment income (proxied by primary income) and secondary income for a large sample of countries and the UK. Figure 6a is again for the full period from 1980-2014, while Figure 6b just focuses on the last 10 years. The figures show that trade accounts for more of the variance in the current account than investment income for the full sample of countries in each of the windows. The estimates for the UK, however, indicate that this can vary substantially over time and across individual countries. In the UK, trade explained 87% of the variance in the current account over the full period – about twice as much as explained by investment income. In contrast, over the last ten years the relative importance of these components has basically reversed, with investment income recently explaining twice as much of the variance in the current account as trade.

This increased role of investment income in explaining movements in the UK's current account balance recently is even more striking when its evolution is viewed over time. Figure 7a graphs the 10-year rolling correlation of the UK's current account balance with the trade and primary income balances since 1989. In the 1980's and 1990's, movements in the UK current account almost perfectly corresponded to movements in the UK trade balance. This correlation fell throughout the 2000's and during the crisis, and is now negative. In contrast, the correlation between the UK's current account deficit and primary income balance has increased sharply since the early 2000's and is now close to one.[25] This transition is striking and suggests that movements in the UK current account balance have recently been driven

[24] The key results do not change significantly if we vary the start and end dates or exclude the recent crisis.
[25] The pattern of a lower correlation of the current account with the trade balance and higher correlation with the income balance is unchanged if we use a shorter rolling window of 5 years to exclude the financial crisis from the latest data point.

almost entirely by changes in investment income, with little impact of changes in trade. Treating the current account balance as a trade balance is clearly no longer appropriate.

Moreover, a similar analysis for other countries shows that the UK is not unique – and there is a range of experiences across countries. For example, Figures 7b through 7j perform the same analysis for 9 other OECD economies with flexible exchange rates: the US, Australia, Canada, Japan, Korea, New Zealand, Norway, Sweden, and Switzerland. The US figure also shows a similar correlation of nearly 100% between movements in investment income and current account balance today (although with different trade correlations). In contrast, Canada, Japan and Norway have negative – instead of positive – correlations between movements in their current account balances and investment income. These negative correlations are a sharp reversal from large positive correlations around 2004-2005 in these three countries.

This discussion has shown that any analysis of vulnerabilities related to current account deficits should no longer just treat the current account deficit as a trade deficit, but also incorporate an analysis of the investment income component of the current account. Similarly, any analysis of vulnerabilities related to the corresponding NIIP should no longer treat this as an accumulation of current account balances, but also incorporate an analysis of valuation effects on the NIIP. Incorporating analysis of these financial factors alongside trade could improve our understanding of the dynamics and risks related to current account deficits, as summarized in the literature review in Section I. For example, does the evidence suggesting that larger current account deficits increase the probability of having a "sudden stop" in capital flows hold regardless of whether the current account deficit is caused by a deficit in investment income or in trade? Or if a large current account deficit does not reflect any macroeconomic imbalances, but instead is driven by changes in investment income due to external shocks, is the current account less likely to "reverse" and cause a difficult economic adjustment? And should we be less concerned about any solvency risks from a large negative NIIP position if it is stabilized due to positive investment income flows or valuation effects?

While addressing all of these implications is beyond the scope of this paper, one additional example highlights how a broader framework that incorporates financial channels is useful to address these types of questions. Figure 8 shows the evolution of the NIIP for the same sample of 10 OECD economies with flexible exchange rates. The dotted blue lines graph cumulated trade balances (relative to GDP) since 1980 – and show the changes in the NIIPs that would have occurred if trade balances (instead of current account balances) corresponded to the financial accounts and there had been no valuation changes on the NIIP. The green lines show the cumulated investment income balances, and the red lines the cumulated valuation changes on the NIIPs. For some countries, such as the UK and US, the cumulated investment income balance and valuation changes are positive, generating substantial improvements in the actual NIIP positions (the black lines) relative to the cumulated trade deficits. These financial effects through international investment income and valuation effects have improved the UK and US NIIPs by about 10% and 20% of GDP, respectively. These are meaningful improvements and show how these financial factors have the potential to influence assessments of country solvency.

But it is also important to note that these effects could work in the opposite direction and weaken a country's NIIP relative to what it would have been without these financial effects. For example, the same analysis shows that Sweden would currently have a positive NIIP if this only captured cumulated trade surpluses. Instead, large negative valuation adjustments and primary income deficits over much

of this period have generated a small negative NIIP over this window. Korea is another country for which the NIIP is substantially lower than its cumulated trade balances (by over 20% of GDP), due to consistent large negative valuation effects and moderate negative investment income flows.

To summarize, when assessing a country's vulnerabilities related to current account deficits, it is no longer sufficient to simply assume that the deficits are mainly driven by changes in the trade balance and will translate directly into changes in the NIIP. Instead, it is necessary to take a closer look at the financial component of the current account (investment income) and the role of valuation changes for international assets and liabilities. These financial components may generate a meaningful deterioration – or improvement – in current account balances and NIIPs. But what determines the evolution and impact of these financial components?

B. A Framework for Understanding the Financial Determinants of the Current Account and NIIP

In order to better understand the determinants of valuation changes and investment income, we can use a simple decomposition. To begin, use the definitions and terminology from equations (1) through (5) above to decompose the changes in valuations:

$$\Delta VAL_{i,t} = \sum_c \left[A^c_{i,t-1} \left(\frac{kg^{A,c}_{i,t} ER^{A,c}_{i,t-1}}{ER^{A,c}_{i,t}} - \left(\frac{ER^{A,c}_{i,t} - ER^{A,c}_{i,t-1}}{ER^{A,c}_{i,t}} \right) \right) - L^c_{i,t-1} \left(\frac{kg^{L,c}_{i,t} ER^{L,c}_{i,t-1}}{ER^{L,c}_{i,t}} - \left(\frac{ER^{L,c}_{i,t} - ER^{L,c}_{i,t-1}}{ER^{L,c}_{i,t}} \right) \right) \right]$$

$$= \sum_c \left[\frac{A^c_{i,t-1}}{\Delta ER^{A,c}_{i,t}} \left(kg^{A,c}_{i,t} - \left(\Delta ER^{A,c}_{i,t} - 1 \right) \right) \right] - \sum_c \left[\frac{L^c_{i,t-1}}{\Delta ER^{L,c}_{i,t}} \left(kg^{L,c}_{i,t} - \left(\Delta ER^{L,c}_{i,t} - 1 \right) \right) \right], \quad (6)$$

where $kg^{A,c}_{i,t}$ ($kg^{L,c}_{i,t}$) denotes the rate of capital gain on external assets (liabilities), $ER^{A,c}_{i,t}$ ($ER^{L,c}_{i,t}$) is the exchange rate index which reflects the currency composition of country *i*'s asset (liability) holdings of class *c* ,and $\Delta ER^{A,c}_{i,t} \equiv \frac{ER^{A,c}_{i,t}}{ER^{A,c}_{i,t-1}}$ and $\Delta ER^{L,c}_{i,t} \equiv \frac{ER^{L,c}_{i,t}}{ER^{L,c}_{i,t-1}}$. The exchange rate is defined as the cost of one unit of domestic currency in units of foreign currency so that the exchange rate falls (increases) when the currency depreciates (appreciates). Equation (6) shows that capital gains resulting from changes in asset prices and exchange rate changes affect valuations.

Next, perform a similar decomposition of international investment income into changes in exchange rates and the returns received on assets from abroad (and the returns paid on liabilities owed to foreigners):

$$INVINC_{i,t} = \sum_c \left[A^c_{i,t-1} \left(\frac{r^{A,c}_{i,t} ER^{A,c}_{i,t-1}}{ER^{A,c}_{i,t}} \right) - L^c_{i,t-1} \left(\frac{r^{L,c}_{i,t} ER^{L,c}_{i,t-1}}{ER^{L,c}_{i,t}} \right) \right], \quad (7)$$

with $r^{A,c}_{i,t}$ denoting country *i*'s nominal return on *A* (foreign assets) or *L (*foreign liabilities) in terms of last period's stock, excluding exchange rate effects.

Finally, insert the decomposition in equation (6) for valuation changes and in equation (7) for investment income into the definition of changes in the NIIP position in equation (5) to get:

$$\Delta NIIP_{i,t} = TB_{i,t} + E_{i,t}$$

$$+ \sum_c \left[\frac{A^c_{i,t-1}}{\Delta ER^{A,c}_{i,t}} \left(r^{A,c}_{i,t} + kg^{A,c}_{i,t} - \left(\Delta ER^{A,c}_{i,t} - 1 \right) \right) \right] - \sum_c \left[\frac{L^c_{i,t-1}}{\Delta ER^{L,c}_{i,t}} \left(r^{L,c}_{i,t} + kg^{L,c}_{i,t} - \left(\Delta ER^{L,c}_{i,t} - 1 \right) \right) \right], \qquad (8)$$

where $E_{i,t} = OINC_{i,t} + OAdj_{i,t}$. That is, changes in the NIIP can be decomposed into the trade balance, other small effects (which we will largely ignore), and a term capturing the relevant financial variables related to international financial exposures.

More specifically, this series of equations shows that a country's international investment income and its valuation changes (and corresponding changes in its international investment position) depend on four sets of variables: last period's stock of international assets and liabilities, the nominal rate of return and capital gains on these international assets and liabilities[26], the composition of each asset and liability class (*c*), and exchange rates (which reflect the currency composition of the country's assets and liabilities). Before estimating the importance of each of these variables for different countries over time, it is worth briefly reviewing the role of each of these four sets of variables.

First, the gross stocks of international assets and liabilities – i.e. existing international exposures – play an important role in determining investment income and changes in the NIIP. The larger the stock of assets, the higher is any investment income and the larger is the impact of any change in the rates of capital gains, the rates of return, or exchange rates. Equation (8) shows that even if a country's net financial position is zero, changes in the other variables, combined with large gross positions, can generate changes in the NIIP. For example, if the rate of capital gains on assets is higher than the rate of capital gains on liabilities, or if the exchange rate associated with assets depreciates more than that associated with liabilities, then the inherited asset position (in domestic currency) increases, even if the initial net position (NIIP) is zero. Gross positions matter!

Second, the difference between the nominal rates of return on assets and liabilities, $\sum_c \left[\left(r^{A,c}_{i,t} \right) - \left(r^{L,c}_{i,t} \right) \right]$, often denoted excess return, is important. The higher are returns on assets relative to liabilities, the higher is investment income. Similarly, differences in capital gains across assets and liabilities, $\sum_c \left[\left(kg^{A,c}_{i,t} \right) - \left(kg^{L,c}_{i,t} \right) \right]$, can have important valuation effects. The higher are capital gains on assets relative to liabilities, the greater the improvement in the NIIP.

Third, the composition of assets and liabilities between categories such as equity and debt (or more detailed breakdowns) matters for all components of these equations. For example, consider equation (7) for investment income – the simplest of these decompositions. It shows that even if returns and exchange rates are identical within each asset class, and the overall assets and liabilities net out to zero, a different asset composition across assets and liabilities could make investment income positive or negative. More specifically, still assuming identical returns and exchange rates within each asset class and an NIIP of zero, if a greater share of assets was held in equities than for liabilities, and equities earned a higher return than other investment categories, investment income would be positive.

Finally, each of the decompositions shows that exchange rates play a particularly important role for valuation effects and investment income, both through their direct impact on the value of net foreign assets (which affects valuation gains and investment income), but also because any movements in the

[26] The rates of return and capital gains both exclude exchange rate effects.

exchange rate might mitigate or accentuate the impact of contemporaneous changes in rates of return on investment income and of rates of capital gains on the NIIP. Accurately measuring the various exchange rates for different asset and liability classes if the currency denomination differs is also critically important to capture the corresponding effects. Complicating this analysis, the standard calculation for an exchange rate – say based on trade-weighted exposures – can differ from the appropriate exchange rate for assets or liabilities based on a country's financial exposures. For example, Figure 9 shows the standard trade-weighted exchange rate for the UK, as well as the financial-weighted exchange rate indices for UK international assets and liabilities, constructed from data compiled by Benetrix *et al*. (2015) using the methods set out in Lane and Shambaugh (2010). Although the various exchange rate measures move closely over some periods, they can also diverge at times. This can have a significant effect on international investment income and valuation effects – even if a country has a net zero international investment position and otherwise equal capital gains or returns on assets and liabilities. This is not obviously intuitive, so a concrete example may help.

Consider the broad-based depreciation of sterling, shown in Figure 9, which followed the financial crisis between 2007 and 2009. Had the UK's proportion of assets and liabilities denominated in foreign currency been identical, the exchange rate indices on assets and liabilities would have moved symmetrically. Because more assets than liabilities were denominated in foreign currency, however, the exchange rate on assets depreciated by 7% more than the exchange rate on liabilities over this period – increasing the sterling value of those assets (and reducing the negative impact of the fall in capital gains). That is, through its impact on the valuation of assets, the depreciation increased the UK's foreign assets. In contrast, the depreciation had the opposite impact on the liabilities side: it increased the value of liabilities denominated in foreign currencies (and mitigated the fall in capital gains on liabilities). Since more of the UK's foreign assets than liabilities are denominated in foreign currencies, the exchange rate on assets depreciated more than the exchange rate on liabilities. Even assuming similar capital gains and initial positions across assets and liabilities – this broad-based exchange rate depreciation would have had the effect of increasing the return on assets more than the return on liabilities, thereby on net improving the NIIP through valuation effects.[27] Conversely, from 2013 to 2015, the exchange rate on foreign assets appreciated by more than that on foreign liabilities, contributing to the deterioration in the NIIP position and international investment income over this period.

To summarize, this section has developed a theoretical framework to show how the determinants of a country's vulnerabilities related to the current account can be described using a limited set of variables. Financial variables play a key role – whether through exchange rate movements, international asset and liability positions, returns and capital gains on these positions, or the composition of these positions. But how important is each of these variables in practice?

C. Empirical Decompositions: The Drivers of Valuation Changes and Investment Income

The decomposition in the last section shows that four sets of financial variables are important to understand vulnerabilities related to current account deficits: last period's stock of international assets and liabilities, the nominal rate of return and capital gains on these international positions, the composition of these positions, and exchange rates. The relative importance of each of these four determinants varies by country and time period, depending on the country's international portfolio, on

[27] This has also been shown in Gourinchas, Rey and Treumpler (2012).

changes in rates of return and capital gains, and on changes in exchange rates. Applying this framework to available data to estimate the contribution of each of these variables, as shown in equations (6) through (8), however, is not straightforward. Previous academic literature suggests two different approaches. One strand of literature has focused on decomposing different countries' net foreign returns into a return effect and a composition effect, (i.e. focusing on the $\left(r_{i,t}^{A,c}\right) - \left(r_{i,t}^{L,c}\right)$ for each asset/liability and composition *c* in equation 7).[28] The second strand of literature has focused on the role of exchange rate adjustments, and especially how they can determine valuation changes based on the currency composition of assets and liabilities.[29] We unify these different approaches and build more closely on the decompositions developed in equations (6) through (8) in order to provide a framework to measure all of the different financial effects simultaneously. This requires some additional calculations and assumptions, which are described in detail in Appendix A.

Figure 10 reports the results of these decompositions into the four main financial determinants (last period's stock of international assets and liabilities, the excess nominal rate of return and capital gains, the composition of the portfolio, and exchange rates) using data from 1990 to 2014 for the sample of 10 OECD economies with flexible exchange rates used previously.[30] For each country in the sample, the panel on the left reports the decomposition for investment income, and the right for valuation changes. Not surprisingly, the relative importance of each of these four channels varies by country and time period, depending on the country's portfolio of international assets and liabilities and changes in exchange rates and rates of return and capital gains. The figures highlight the range of experiences.

For example, beginning with the decompositions for investment income, some countries have had large, positive income flows for much of the sample – such as the US and Japan (for the full period), Switzerland (except in 2008), the UK (from 2000 to 2012), and Norway and Sweden (since the early 2000s). In the US, this positive investment income largely reflects a consistent and large positive return effect (partially counteracted by consistent negative contributions from its stock of net liabilities). In contrast, the positive investment income in Switzerland and Japan reflects large positive stock effects (with both countries holding large net asset positions), combined with positive composition effects for Switzerland and return effects for Japan. In the UK, its strong investment income in the 2000s resulted primarily from the composition of its international investments (with a greater exposure to equity than debt) and a moderate boost from relative returns. Recently UK investment income deteriorated sharply, largely due to negative return effects (reflecting weaker relative economic performance abroad), combined with smaller gains from composition effects (due to an increasing share of UK liabilities in debt). Norway's transition to earning positive net investment income in the early 2000's largely resulted from a stock effect, while Sweden's transition largely reflected a positive return effect. Large negative flows for international investment income, such as in Australia, New Zealand, and Canada (until the early-2000s), are often driven by large stock effects – showing the challenges for countries with large net international liabilities.

Moving to the panels on the right, which decompose valuation changes, shows that not only does the role of the four different determinants fluctuate more from year to year than occurred for investment income, but even the direction of the net changes is much less stable. The stock effects, however,

[28] For examples of this approach, see Gourinchas and Rey (2007b) and Curcuru *et al.* (2013).
[29] For examples of this approach, see Lane and Shambaugh (2010) and Benetrix, Lane and Shambaugh (2015).
[30] For some countries the sample starts later due to data availability.

generally tend to be smaller. Trends in the UK and US highlight how the different channels can play different roles at different times. During the 2008 crisis, the UK experienced large positive valuation effects on its international investments, driven largely by the exchange rate channel (and sterling's depreciation), albeit partially counteracted by a negative composition effect (as more of its international assets were in equities, which lost more value than debt). In 2014 the UK experienced a negative valuation effect, which was largely driven by an exchange rate effect (and sterling's appreciation). In contrast, in 2008 the US experienced negative valuation effects, driven by a powerful composition effect. In 2014 the US also experienced large negative valuation effects, except in this case driven primarily by the return channel (at least partially reflecting higher yields on bonds and equities in the US relative to the returns US investors earned abroad in the same investment categories).

Given the range of different experiences, both across time and across countries, it is useful to try to quantify the relative importance of these four channels determining investment income and valuation effects over time. Table 1 provides one quantification – the correlation of international investment income and valuation changes with each of the four components for each country over the sample period. The averages for the sample highlight a number of points: a) the return effect is the most highly correlated with both investment income and valuation changes, indicating it plays an important role; b) the initial stock effect is also highly correlated with investment income, albeit somewhat less so with valuation changes; and c) many of the correlations vary substantially across countries. These differences are particularly noteworthy for exchange rate effects, whose correlations with investment income range from -0.34 in Sweden to about 0.34 for Switzerland. Similarly, although several countries have a large positive correlation between their exchange rate effects and valuation changes, others have negative effects (such as the US, Australia, and Switzerland) – with some of these differences reflecting whether the country's currency is treated as a safe haven.

One important consideration that is not captured in these averages, however, is how these different channels function during "good" times, such as from 2000 to 2007, relative to how these channels operate during periods of crisis or economic stress. For example, the graphs show that in 2008, the peak of the global financial crisis, some countries had large positive valuation effects (such as the UK and South Korea), while others had large negative valuation effects (such as the US, Japan and Norway). Switzerland also experienced a large negative investment income flow – a sharp turnaround from other years in the sample and largely caused by a negative return effect. It is precisely during such periods of crisis and heightened economic stress that concerns about vulnerabilities related to current accounts increase. Therefore, the final section of this paper will extend this analysis one step further. It will build on this framework to better understand how these financial components respond to various shocks – and especially the types of shocks that correspond to increased concerns about current account deficits.

III. Current Account Vulnerability during Heightened Domestic and Global Risk

The previous section showed that movements in investment income and the valuations of international investment positions (and thus in the current account and the NIIP) will be determined by structural and cyclical factors influencing the quantity and composition of international assets and liabilities, their returns (including capital gains) and changes in exchange rates. To see how this framework for analyzing vulnerabilities related to the current account works in practice, we extend the analysis to evaluate what

it implies during a period of heightened risk and uncertainty.[31] Research over the last few years has highlighted the strong relationship between changes in risk (as often measured by the VIX) and sudden shifts in capital flows and the broader global financial cycle in credit growth and leverage.[32] It is during these periods of heightened risk that current account deficits usually become harder to finance, requiring sharp movements in asset prices and difficult economic adjustments.

We model these periods of heightened risk as associated with increases in an "X-factor" (or risk factor). Changes in that risk factor could be caused by many types of events and can incorporate a global (X^G) and/or a domestic (X^D) component. The global component corresponds to any increased uncertainty about the evolution of the global economy, periods of reduced global market liquidity, any widespread financial crisis, or anything that makes global investors, consumers and businesses more risk averse. The domestic factor is local to one specific economy and does not affect global financial markets. It corresponds to events such as increased uncertainty about the domestic economy, or anything that makes domestic consumers, businesses and investors more "risk averse", including political uncertainty. How do the characteristics of a country's international investment position determine the extent to which a shock to global or domestic risk impacts that country's current account and NIIP? What are the characteristics which aggravate vulnerabilities? And what are those that mitigate them through international risk sharing?[33]

This section answers these questions, but to simplify the analysis, we focus on financial effects and ignore any effects through the trade balance. This is not to say that any adjustments through trade are unimportant, but trade relationships have been well studied elsewhere and are generally much slower than the financial channels on which this paper focuses. This section begins by showing the channels through which domestic and global risk, respectively, can affect the current account and NIIP. These channels correspond to the four sets of variables specified in equation (8) and discussed in Section II. The analysis then shows which country characteristics affect the relative importance of each of these channels and performs a comparison across the same sample of 10 OECD countries. The section closes with a more detailed analysis of the effects of risk shocks on investment income and positions using an SVAR model that we estimate using data on the UK. This allows us to assess not only the direction, but also the magnitude, of the effect of heightened global and domestic risk on UK vulnerabilities related to the current account.

A. How Risk Affects the Components of the Current Account and the NIIP

To begin, we build on the accounting framework developed in Section II to describe the channels through which changes in risk may affect the current account and the NIIP. Using equation (8) to calculate the impact of a change in risk on the various components of the NIIP yields:

[31] We will use the words "risk" and "uncertainty" interchangeably in the following discussion, although in many frameworks they capture two distinct concepts – changes in risk aversion and economic uncertainty.

[32] For evidence on the relationship of risk: with capital flows, see Forbes and Warnock (2012, 2014); with bank lending, see Bruno and Shin (2015); and with the global financial cycle, see Rey (2013) and Miranda-Agrippino and Rey (2015).

[33] See Gourinchas, Rey and Truempler (2012) for calculations of the amount of risk sharing through net international investment positions during the 2008 crisis. They estimate large effects. For example, they calculate that the US transferred $2,200 billion in wealth transfers abroad from 2007q4 to 2009q1, while the UK had a net gain of $542 billion between 2007q4 and 2008q4. While our approach has similarities with theirs, we consider more channels through which external positions can affect risk sharing, and we consider these channels over a longer period of time.

$$\frac{d\Delta NIIP_{i,t}}{dX_t} = \frac{dCA_{i,t}}{dX_t} + \frac{d\left[\sum_c \frac{A^c_{i,t-1}}{\Delta ER^{A,c}_{i,t}}\left(kg^{A,c}_{i,t} - \left(\Delta ER^{A,c}_{i,t} - 1\right)\right)\right]}{dX_t} - \frac{d\left[\sum_c \frac{L^c_{i,t-1}}{\Delta ER^{L,c}_{i,t}}\left(kg^{L,c}_{i,t} - \left(\Delta ER^{L,c}_{i,t} - 1\right)\right)\right]}{dX_t} + \frac{dOAdj_{i,t}}{dX_t}. \quad (9)$$

Then, in order to further break down how the current account is affected by increased risk, use the definition for the current account in equation (4) and the decomposition of investment income in equation (7) to obtain:

$$\frac{dCA_{i,t}}{dX_t} = \frac{dTB_{i,t}}{dX_t} + \frac{dINVINC_{i,t}}{dX_t} + \frac{dOINC_{i,t}}{dX_t} = \frac{dTB_{i,t}}{dX_t} + \frac{d\left[\sum_c \left(\frac{A^c_{i,t-1}}{\Delta ER^{A,c}_{i,t}}\right) r^{A,c}_{i,t} - \sum_c \left(\frac{L^c_{i,t-1}}{\Delta ER^{L,c}_{i,t}}\right) r^{L,c}_{i,t}\right]}{dX_t} + \frac{dOINC_{i,t}}{dX_t}. \quad (10)$$

Finally, combining the effects of heightened risk on the valuation channel (on the right side of equation 9) and the investment income channel (on the right side of equation 10), yields the overall impact of risk on the NIIP:

$$\frac{d\Delta NIIP_{i,t}}{dX_t} = \frac{dTB_{i,t}}{dX_t} + \frac{d\left[\sum_c \frac{A^c_{i,t-1}}{\Delta ER^{A,c}_{i,t}}\left(r^{A,c}_{i,t} + kg^{A,c}_{i,t} - \left(\Delta ER^{A,c}_{i,t} - 1\right)\right)\right]}{dX_t} - \frac{d\left[\sum_c \frac{L^c_{i,t-1}}{\Delta ER^{L,c}_{i,t}}\left(r^{L,c}_{i,t} + kg^{L,c}_{i,t} - \left(\Delta ER^{L,c}_{i,t} - 1\right)\right)\right]}{dX_t} + \frac{dE_{i,t}}{dX_t}, \quad (11)$$

where $E_{i,t} = OINC_{i,t} + OAdj_{i,t}$ reflects adjustments which are usually relatively small, and that we therefore abstract from.

Equations (10) and (11) show that, assuming a given trade balance, the impact of a risk shock on the current account (through investment income) and the NIIP (through both investment income and valuation changes) will be determined by: the initial stock of international assets and liabilities, the returns and capital gains on these positions, the composition of these positions, and the response of the exchange rates on assets and liabilities (which is determined by the currency denomination of these positions and the relevant bilateral exchange rate movements). To more closely analyze these various channels, we begin with the simpler case of increased domestic risk, and then move to the effects of global risk.

B. The Impact of Domestic Risk

The various effects of a shock to domestic risk, as shown in equations (10) and (11), can be simplified given our definition that this type of shock does not affect the returns and capital gains on foreign assets and only directly affects the domestic economy (through the returns and capital gains on domestic liabilities and the exchange rate).[34] Therefore focusing on the effect of the shock on liabilities, the key country characteristics and channels that determine how increased domestic risk affects a country's current account and the NIIP, are:

i. *The initial stock of liabilities*: a greater stock of liabilities will increase the impact of the shock on total capital gains and returns (leading to a greater reduction in payments abroad and greater reduction in the value of international liabilities, improving the current account and NIIP), as well as the overall impact from any change in exchange rates.

[34] While the shock does not have any direct impact on international assets, some characteristics related to assets, such as the effects of exchange rate movements, play a role in risk sharing following a domestic shock. This will be incorporated in the discussion of the impact of global risk shocks below, when the relative magnitudes become more important.

ii. *The composition of the initial stock of liabilities:* the more risky are the liabilities, the greater the impact on the rate of return and capital gains on these liabilities (reducing payments abroad, increasing net investment income, and improving the current account and NIIP).
iii. *The currency of denomination of assets*: the more assets are denominated in foreign currency, the more will the associated exchange rate depreciate (increasing receipts from abroad, increasing net investment income, and improving the current account and NIIP).
iv. *The currency of denomination of liabilities*: the more liabilities are denominated in foreign currency, the more will the associated exchange rate depreciate (increasing payments abroad, lowering net investment income, and deteriorating the current account and NIIP).
v. *The co-movement of rates of returns on liabilities with exchange rates*: the more does the exchange rate associated with liabilities depreciate as their rate of return falls, the less benefit will occur from lower returns on liabilities (the more will the negative effects from iv. counter the positive effects from i. and ii. on investment income, the current account and NIIP).
vi. *The co-movement of capital gains on liabilities with exchange rates*: the more does the exchange rate associated with liabilities depreciate as capital gains on liabilities fall, the less benefit will occur from lower capital gains on liabilities (the more will the negative effects from iv. counter the positive effects from i. and ii. on the NIIP).

Table 2 lists each of these key variables and summarizes what characteristics of each would mitigate the negative effects of a domestic risk shock on current account vulnerabilities by transmitting wealth to the domestic economy. In other words, it describes what country characteristics provide this type of international risk sharing through changes in the NIIP. It also reports how each of the 10 OECD economies in our sample perform according to each of these characteristics, as well as on average.

The table suggests that, on average, the international portfolios of these major OECD economies with flexible exchange rates have many characteristics that would support some automatic risk sharing in the face of heightened domestic risk. The average stock of liabilities as a percent of GDP was above 200% in recent years, having increased from an average of less than 80% in 1990 and around 150% in 2000. Moreover, on average 44% of the borrowing is in the form of equities, up from 25% in 1990 and 40% in 2000. This suggests that when domestic risk increases and has the usual impact of causing domestic equity prices to decline, an increased portion of these losses are shared with foreign investors. Additional risk sharing also occurs through the currency denomination of assets and liabilities. With 90% of assets denominated in foreign currency and only 43% of liabilities, any heightened domestic risk that causes these countries' currencies to depreciate will – all else equal – generate an improvement in their NIIP simply because it increases the value of their international assets relative to the value of what they owe foreigners.[35] This channel of risk sharing has likely increased over time, as the share of liabilities denominated in foreign currency has fallen from almost 60% in 1990 and 46% in 2000, while the share of assets denominated in foreign currency has stayed around 90%.

While most of the countries' international portfolio characteristics, on average, support some risk sharing, other characteristics could at least partially counteract these effects. For example, the average positive correlations between the exchange rate and the rate of capital gains, as well as with the rate of

[35] Of course, if a country's currency appreciates after an increase in domestic risk, then these effects would be reversed. The estimated currency denominations are based on Benetrix *et al*. (2015) and refer to 2012.

return, suggests that exchange rate movements can partly offset the risk sharing from movements in rates of returns and capital gains on liabilities. For example, consider the 0.52 correlation between the exchange rate and capital gains on liabilities for the UK. Increased domestic risk tends to reduce the capital gains on UK liabilities, thereby improving the UK's NIIP position (assuming everything else stays constant). But the positive correlation between reduced capital gains and sterling suggests that the currency would simultaneously weaken, thereby lessening this reduction in capital gains (as some liabilities are denominated in foreign currency) and partially counteracting the risk sharing. All in all, however, despite these currency "hedging effects" for most countries, these 10 OECD countries with flexible exchange rates appear, on average, to have international portfolios that could provide some cushion against heightened domestic risk – at least in terms of reducing vulnerabilities related to any current account deficits.

There are noteworthy differences, however, between the individual countries in the group. For example, Switzerland has a number of characteristics that support a particularly high degree of international risk sharing after increased domestic risk: its high share of international liabilities to GDP (450%), high share of equities in liabilities (60%), high share of assets in foreign currency (95%), low share of liabilities in foreign currency (32%), and negative correlation between its exchange rate and foreign currency capital gains (-32%). Japan benefits from less international risk sharing after domestic shocks due to its: low share of international liabilities to GDP (104%), low share of equities in liabilities (37%), and lower share of assets in foreign currency (71%). The UK has some characteristics that should support a substantial degree of automatic risk sharing – such as its large stock of international liabilities (the highest in the sample at 558% of GDP) and 93% share of assets denominated in foreign currency (close to the sample average). But by other measures the UK would only have moderate risk sharing and less than the sample average, such as its 58% of liabilities denominated in foreign currency (compared to an average of 43%) and only 27% of liabilities in the form of equities (compared to an average of 44%). The UK's exchange rate movements also tend to improve risk sharing through its negative correlation with foreign currency returns, but reduce risk sharing through its positive correlation with foreign currency capital gains.

C. The Impact of Global Risk

While the international portfolios of these 10 OECD economies with flexible exchange rates appear to provide some automatic risk sharing in the face of domestic risk shocks, what do they imply in the face of global risk shocks? Analyzing the effects of heightened global risk is more complicated than for domestic risk, however, because it requires incorporating two additional considerations.[36] First, taking into account that some currencies are "safe havens" and appreciate in response to increased global risk, while others tend to depreciate. Second, the global risk shock affects not only capital gains and returns on foreign liabilities, but also on foreign assets.

To assess which currencies are generally treated as a safe haven by investors, Figure 11 reports the correlations between the VIX and the currencies of the 10 OECD economies in our sample, plus the euro, over different time periods. Currencies treated as a safe haven generally have a positive correlation – reflecting the fact that their value increases when global risk increases (and vice versa). The figure shows that the dollar, yen and Swiss franc have consistently been treated as safe havens, over each of these

[36] Other considerations might also be relevant, such as if increased global risk generated a rush to safe assets globally and caused the return on debt liabilities (relative to the return on equity liabilities) to fall less than when domestic risk increases. To simplify the analysis, we abstract from this effect.

windows, while other currencies have not. The euro has showed characteristics of a safe haven during some periods – but not others – so for the analysis that follows we will only treat the dollar, yen and Swiss franc as safe havens.

Next, we use the same framework as in the last section (and summarized in equation 11) to analyze how a global risk shock would be expected to impact key variables related to current account vulnerabilities and the NIIP, except now we extend the analysis for the additional effects on foreign assets, as well as differentiate between safe haven currencies and the rest. Many of the effects of global risk shocks are the same as for domestic risk shocks, so to simplify discussion, we will highlight the key differences in bold. More specifically, the impact of increased global risk on the current account and on the NIIP (incorporating the effects on investment income and valuation changes), will depend on:

i. *The initial stock of liabilities **and assets***: a greater stock of liabilities **relative to assets** will increase the shock's impact on overall capital gains and returns and through exchange rate changes (leading to a greater reduction in payments abroad relative to payments received from abroad and greater reduction in the value of international liabilities relative to assets, improving the current account and NIIP).
ii. *The composition of the initial stock of liabilities **and assets**:* the more risky are the liabilities **relative to assets,** the greater the impact on the rate of return and capital gains on these liabilities relative to assets (reducing payments abroad relative to those received from abroad, increasing net investment income, and improving the current account and NIIP).
iii. *The currency of denomination of assets*: the more assets are denominated in foreign **safe haven** currencies, the more will the associated exchange rate depreciate – or the less will it appreciate if it is a safe haven - (increasing receipts from abroad, increasing net investment income, and improving the current account and NIIP).
iv. *The currency of denomination of liabilities*: the more liabilities are denominated in foreign **safe haven** currencies, the more will the associated exchange rate depreciate – or the less will it appreciate if it is a safe haven - (increasing payments abroad, lowering net investment income, and deteriorating the current account and NIIP).
v. *The co-movement of returns on liabilities **and assets** with exchange rates*: the more does the exchange rate on liabilities depreciate as the returns on liabilities fall, the less benefit will occur from lower returns on liabilities (the more will the negative effects from iv. counter the positive effects from i. and ii. on investment income, the current account and NIIP). **But the more does the exchange rate related to assets depreciate as the returns on assets fall, the less will be the negative impact of lower returns on assets (the less will the negative effects from i. and ii. counter any positive effects from iii).**
vi. *The co-movement of capital gains on liabilities **and assets** with exchange rates*: the more does the exchange rate on liabilities depreciate as the rate of capital gains on liabilities fall, the less benefit will occur from lower capital gains on liabilities (the more will the negative effects from iv. counter the positive effects from i. and ii. on the NIIP). **But the more does the exchange rate related to assets depreciate as the rate of capital gains on assets fall, the lower will be the negative impact of the fall in capital gains on the NIIP (the less will the negative effects from i. and ii. counter any positive effects from iii)**.

These characteristics differ quite a bit across countries; countries have different quantities of assets relative to liabilities, hold different types of assets (with different shares of equity relative to debt), and invest using different currencies (with different shares in safe havens). Nonetheless, in an attempt to make these channels more concrete and provide some basis for comparisons, Table 3 repeats the analysis in Table 2, but for global (instead of domestic) risk. The table again describes what international portfolio characteristics mitigate the impact of global shocks through changes in the NIIP, and reports the average values for the same sample of 10 OECD economies with flexible exchange rates, as well as individual country characteristics.

The table suggests that, on average, these countries' international portfolios have some characteristics that could partially mitigate the impact of heightened global risk on the NIIP. Other characteristics, however, do not, making the aggregate effects less clear than after heightened domestic risk. For example, starting with the positives, 40% of assets are denominated in foreign safe haven currencies and only 24% of liabilities. Therefore, when global risk increases and safe-haven currencies appreciate, the value of international assets increase relative to liabilities, thereby boosting the NIIP and helping mitigate the wealth effects of the global risk shock. The higher correlation between exchange rates on assets and their rates of capital gains than that between exchange rates on liabilities and their rates of capital gains also implies that the exchange rate generally mitigates the fall in the NIIP after a global risk shock. Counteracting this effect, however, the countries hold fewer foreign liabilities than assets, on average, so that if these are hit identically by a global shock, their net foreign asset holdings decline, exacerbating the impact of the shock. Moreover, the smaller share of equity (relative to debt) for liabilities (relative to assets) further amplifies the negative effects of increased global risk on the NIIP.

The averages cited in Table 3, however, again incorporate significant differences in international portfolios across countries. Countries such as the US, UK, Australia and New Zealand have larger liabilities relative to assets[37], suggesting they tend to see improvements simply due to the stocks of their positions after global shocks. In contrast, countries such as Norway, Switzerland, and Japan have larger assets relative to liabilities, and are therefore more likely to be made worse off after a global shock simply due to the magnitudes of these positions. There are also substantial differences in the relative equity shares in liabilities relative to assets, with the US, Australia, Canada, and New Zealand, Norway and Sweden more heavily exposed to equity in their liabilities, and therefore more likely to benefit from these compositional effects after global risk shocks (which tend to reduce the values of equities relative to debt).[38] Most countries, however, have a substantially larger share of assets denominated in foreign safe-haven currencies than liabilities (with the smallest difference for Japan). This should increase the value of their assets relative to liabilities after an increase in global risk (which increases the value of safe-haven currencies), helping mitigate the wealth effects of the shock.[39]

[37] Based on 2014 market valuations. Most countries report market valuations for all asset classes excluding FDI. We use Lane and Milesi-Ferreti (2007b) FDI stocks, valued at replacement cost, and update them for 2012-2014 using growth rates calculated from official statistics reported in the IMF's International Financial Statistics database.

[38] Gourinchas, Rey and Truempler (2012) also highlight this impact of a greater share of equity in assets.

[39] It is not clear whether this channel has increased over time. The share of assets denominated in foreign safe haven currencies has fallen over time; but the share of liabilities denominated in safe haven currencies has also fallen.

D. The Magnitudes: Global and Domestic Risk Shocks and Current Account Vulnerabilities

Tables 2 and 3 show that the international portfolios for a sample of OECD economies with flexible exchange rates have a number of characteristics that should help mitigate the negative impact of heightened domestic risk, and possibly heightened global risk, on international exposures. The tables do not, however, provide any information on the magnitude of any such risk sharing through these channels in practice, or the relative importance of different channels that work in opposing directions (especially after global risk shocks). Therefore – as a final step – we estimate an SVAR model to calculate how domestic and global risk shocks have affected international investment income and valuation changes over time. We focus on one country, the United Kingdom, which currently has a very large current account deficit that has raised concerns about the country's vulnerability to various shocks.

We continue to model separate global and domestic risk shocks. Appendix B provides details of how these shocks are identified and estimated, as well as of the corresponding data. The identification allows us to evaluate the effects of exogenous changes in domestic and in global risk due to higher economic uncertainty separately from changes in risk due to other shocks, such as adverse demand shocks. We also continue to focus on the implications for UK net international investment income and valuation changes on its international portfolio.

Figures 12 and 13 show the UK investment income and valuation changes on its international portfolio, respectively, as well as the estimated historical contributions to these variables from the two risk shocks identified using our SVAR model. The contributions of the risk shocks typically move in the same direction as movements in international investment income and valuation changes. They also appear to explain a material portion of the movements in both variables. A substantial share of the variation is not explained by the risk shocks, but this is expected as we only focus on the impact of two, narrow types of shocks (from exogenous global and domestic risk), and we do not plot the impact of other fundamental shocks that affect investment income and valuation changes (such as from relative demand, supply, monetary policy, and exogenous exchange rate movements). More specifically, the UK risk shock accounts for around 15% of the forecast error variance of investment income and 14% of valuation changes. The global risk shock accounts for a slightly smaller proportion of the variance, for around 12% for both investment income and valuation changes. Therefore, our model suggests that just over a quarter of the unpredicted variance of net international investment income and valuation changes can be attributed to the domestic and global risk shocks.

But are these contributions to international investment income and the NIIP positive when risk increases, thereby mitigating the adverse impact of heightened risk on the UK economy? Or do they decrease national net wealth and exacerbate the real effects of higher uncertainty on the economy? The SVAR estimates indicate that the answer has depended on the source of that risk – whether it originates in the domestic economy or reflects a general increase in global risk.

On one hand, an increase in domestic risk tends to have positive effects on the valuation of the UK's international portfolio, largely reflecting the effects of the corresponding sterling depreciation and the currency composition of the UK's international portfolio. The effects on net investment income tend to be smaller and less robust to different specifications. This suggests that the structure of the UK international portfolio facilitates international risk sharing after country-specific risk shocks through its effect on the NIIP. This effect can be seen in Figure 13 during 2012 and early 2013, which was a period when UK risk increased relative to global risk. Sterling depreciated, increasing the sterling value of UK

foreign asset holdings, while having a much smaller impact on the value of UK liabilities (a smaller share of which is denominated in foreign currencies, as shown in Table 2). These effects can, however, also work in the opposite direction during periods of reduced UK risk. For example, in the second half of 2013 and 2014, UK domestic risk fell and sterling appreciated, reducing the sterling value of UK foreign asset holdings and shifting wealth abroad.

On the other hand, an increase in global risk has historically been associated with net valuation losses on the UK's international portfolio and lower international investment income. Sterling still tends to depreciate after heightened global risk, which should generate some positive valuation effect as occurred after a depreciation in response to heightened domestic risk. Heightened global risk, however, also generates an additional effect on the foreign currency returns on UK foreign assets, independent from any movements in the exchange rate. This effect through relative returns has been less favorable for the UK due to the composition of its assets and liabilities. More specifically, UK international assets have historically had a larger share of risky investments (such as FDI and portfolio equity) than UK international liabilities, such that the returns on UK assets abroad are likely to fall more than the returns on safer UK liabilities during periods of heightened global risk aversion. This effect is evident in Figures 12 and 13 in the period before the crisis from 2005 to 2007. Global risk was low, corresponding to higher capital gains and investment income flows on UK assets relative to that on UK liabilities, and thereby contributing to positive net valuation gains and net investment income surpluses. In contrast, when global risk aversion increased sharply during the financial crisis, there was a negative impact on net valuation changes and investment income (as the UK's riskier assets earned lower returns and underperformed its safer liabilities).

These SVAR results provide more detailed information on how the specific characteristics of a country's international portfolio can affects its vulnerabilities related to the current account in the face of heightened domestic and global risk. The results show not only the net direction of these effects, but also give a rough sense of the magnitudes. For the UK, an increase in domestic risk leads to positive valuation effects on its international portfolio that help share the costs of heightened domestic uncertainty internationally in a meaningful way. However, an increase in global risk generates negative valuation and return effects due to the composition of the UK's international portfolio.

IV. Conclusions

Although current account deficits – even large ones – should not automatically imply country vulnerability, the historical and empirical evidence suggests that they are often not benign. They correspond to a greater reliance on investment and capital flows from abroad, thereby increasing a country's vulnerability to anything that affects these capital flows or investor sentiment. Sudden shifts in these capital flows can trigger difficult economic adjustments. In some cases, however, the factors affecting investor sentiment and the corresponding capital flows will also influence the current account and international investments, potentially aggravating or mitigating any related vulnerabilities. This paper developed a framework to evaluate these effects. It allows us to assess and better understand when a current account deficit is menacing, versus when it can provide some mitigation against adverse shocks through international risk sharing.

Before developing this framework, the paper began by reviewing why current account deficits often generate concerns. Recent evidence suggests that key vulnerabilities reflect the financial components of the current account, despite the common shorthand of treating current account balances as synonymous with trade balances. A series of empirical decompositions for a sample of OECD economies shows that these financial components are increasingly important, and sometimes more important than trade, in explaining movements in current account balances and changes in net international borrowing positions. These financial components include changes in the valuations of a country's international investments ("valuation effects"), as well as the income earned and paid on past cross-border investments ("investment income"). Although previous academic work has explored these valuation effects, little attention has been paid to the role of international investment income, or to the drivers and interactions of these financial factors. Understanding the determinants and dynamics of these financial factors is critical to understanding the vulnerabilities related to current account deficits.

Therefore, we next developed a unified framework that decomposes these financial factors into four sets of variables that determine their evolution: the existing stock of international assets and liabilities in a country's portfolio, the composition of this portfolio (between more and less risky investments), the returns and capital gains on this portfolio, and exchange rate movements. We showed that the relative importance of each of these variables differs across countries and time, reflecting both the characteristics of each country's portfolio as well as the confluence of changes in markets around the world. But the decomposition also showed several noteworthy patterns – such as how the size of international asset positions has large and consistent effects over time, the importance of relative rates of return on international assets and liabilities in driving valuation effects and international investment income, and the effects of exchange rate movements.

After developing this framework to better understand the drivers of current account balances and international investment positions, we extended the framework to evaluate the vulnerabilities related to current account deficits during periods of heightened risk and uncertainty. These are the periods that often correspond to sudden shifts in capital flows that make it more difficult to finance a current account deficit. These periods could reflect an increase in domestic risk (such as related to domestic political or economic uncertainty) or global risk (such as related to commodity price fluctuations, global economic uncertainty, or global financial conditions). We showed which characteristics of a country's international investment portfolio tend to aggravate the negative impact of heightened risk and uncertainty on a country's vulnerabilities, and which characteristics can mitigate these effects by shifting some of the adjustment costs abroad.

While the framework developed in this paper can be applied to any country, we primarily focused on the financial factors and drivers for a sample of 10 OECD economies with flexible exchange rates. This includes a number of countries which currently have, or have had, large current account deficits. The sample allows us to highlight the role that exchange rate adjustments can play in the buildup – or unwinding – of any vulnerabilities. The examples highlight the flexibility of this framework to analyze very diverse experiences across countries. Future work could apply this to a broader set of economies—including the euro area, other economies with fixed exchange rates, and emerging markets.

The analysis ended with a more detailed application of this framework to one country with a large current account deficit, the United Kingdom, in order to better assess the net direction and magnitudes of these various effects. These financial channels have been critical to the evolution of the UK current

account – with changes in its current account since 2004 almost entirely driven by changes in international investment income, and changes in its international investment position primarily corresponding to valuation adjustments. The SVAR estimates showed that although the UK has historically experienced lower investment income and net valuation losses during periods of heightened global risk, it has generally experienced net improvements on its international exposures during periods of heightened UK risk. The current composition of the UK's cross-border portfolio suggests that this risk sharing should continue and help mitigate the impact of increased domestic risk on UK international exposures. Although these shocks explain a meaningful portion of changes in UK international investment income and investment positions, they do not account for other important effects of heightened risk on the broader economy.[40] For example, a key part of these financial adjustments to heightened risk occurred through sterling depreciation – which would in itself incur other adjustments.[41]

This analysis should be read with several important caveats. First, the international financial data is far from perfect, so all empirical calculations and estimates should be interpreted as having a wide margin of error. Second, the analysis focused on understanding the vulnerabilities related to current account deficits that occur during periods of heightened risk and uncertainty. It did not incorporate the additional vulnerabilities and effects of heightened risk on an economy, such as through any effects of delayed investment and consumption, or any additional effects on the real economy from the corresponding movements in financial markets. It also does not make any attempt to consider any effects of heightened risk on the liquidity or functioning of financial markets.[42] Finally, the analysis focuses only on the financial vulnerabilities and immediate adjustments related to current accounts and ignores the slower moving, but often important, adjustments that can occur through trade.

With these caveats, the analysis clearly showed that any analysis of a country's vulnerabilities related to current account deficits and international borrowing needs to prominently feature financial factors, drivers, and interactions. Although these effects can vary substantially across countries, a fairly straightforward and limited set of measurable characteristics of a country's international investment portfolio can go a substantial way to understanding the dynamics of current accounts, international investment positions, and their related vulnerabilities. This framework showed that current account deficits are not automatically "menacing". Instead, in countries with certain characteristics of their international portfolios (including many of the OECD economies analyzed in this paper), current account deficits can automatically mitigate the negative impact of certain shocks (especially domestic risk shocks) through international risk sharing. Although this paper focuses on the potential benefits of this risk sharing to individual countries, future work could attempt to aggregate these effects and assess the benefits to the global economy from this type of risk sharing.[43]

[40] For example, Carroll *et al.* (2011) and Case *et al.* (2013) estimate that changes in the valuation of international exposures have minimal impact on domestic incomes and growth in the UK and would therefore be unlikely to counteract the negative effects of heightened uncertainty on these domestic variables.

[41] See Forbes, Hjortsoe and Nenova (2015) for an analysis of how the source of the shock behind an exchange rate movement will determine its impact on import prices, inflation, and the broader economy.

[42] For a discussion of these risks, see Financial Policy Committee (2014).

[43] An extensive literature assesses the extent of international risk sharing (through measures such as the cross-country comovement in consumption and output growth) and found less risking sharing than optimal or would be expected given high levels of financial globalization. See Flood, Marion and Matsumoto (2012) and Kose, Prasad, Terrones (2007). One exception is Gourinchas *et al.* (2012), which documents the substantial risk sharing that occurred during the global financial crisis.

Appendix A: Decomposing Investment Income and Valuation Changes

The decomposition of investment income, valuation changes, and overall changes in the NIIP shown in equations (6) through (8) shows that four sets of financial variables are important in understanding vulnerabilities related to current account deficits: the existing stock of international assets and liabilities, the exchange rate indices reflecting the currency composition of the country's assets and liabilities, the composition of each asset and liability class (*c*), and the nominal rate of return and capital gains on last period's foreign assets and liabilities. Using the framework in equations (6) through (8) to estimate the contribution of each of these variables, however, is not straightforward. Previous academic literature has taken two different directions, which we attempt to unify within the framework used in this paper.

One strand of literature has focused on decomposing different countries' net foreign returns into a return effect and a composition effect, (i.e. focusing on the $\left(r_{i,t}^{A,c}\right) - \left(r_{i,t}^{L,c}\right)$ for each asset/liability and composition c in equation (7)). This literature, including Gourinchas and Rey (2007) and Curcuru *et al*. (2008), has decomposed different countries' net foreign returns into a return and a composition effect. The first captures whether a given country is paying more or less on its foreign liabilities than it receives on its assets of the same type. A positive net return effect has been described as a country's "exorbitant privilege". The composition effect, on the other hand captures whether a country's international portfolio yields more based on the types of investments in its portfolio and not the returns for each type. For example, a country could have a higher average yield on its international portfolio because it has a higher share of assets (than liabilities) in equities and FDI, which tend to yield more than bonds and cross-border bank loans and deposits.

The second strand of literature has focused on the role of exchange rate adjustments, and especially how they can determine valuation changes based on the currency composition of assets and liabilities. This literature, led by Lane and Shambaugh (2010) and Benetrix, Lane and Shambaugh (2015), has pointed out that exchange rate movements play a role in valuation changes if a country has a nonzero initial net position or if the currency composition of its assets and liabilities differs. For instance, countries that issue much of their liabilities in their own currency (such as the US), but hold foreign assets denominated in other currencies, can benefit substantially from a depreciation. These exchange rate effects can exacerbate or mitigate the effects of certain shocks on a country's external position. Not explicitly accounting for these exchange rate effects when constructing measures of the composition and return effects can make the latter two very volatile and less informative about the underlying structure of a country's vulnerability.

For our analysis, we unify these different approaches and build more closely on the framework developed in equations (6) through (8). This allows us to provide a decomposition of investment income and valuation changes into all four of the different financial determinants simultaneously (i.e. the existing stock of international assets and liabilities, differences in exchange rates across assets and liabilities, differences in the composition of these portfolios, and differences in returns and capital gains on these positions.) This more detailed decomposition, however, requires some additional calculations and assumptions.

First, we begin by calculating the effect of the initial international stocks on investment income and on valuations effects, the "stock effect". This effect captures any net income or valuation changes that the previous period net asset positions would have generated stripping out the impact resulting from assets

and liabilities yielding different returns (both due to composition and return effects) and from exchange rate movements differing across assets and liabilities. The stock effect is thus computed assuming that rates of return and capital gains as well as exchange rate movements are identical across assets and liabilities. This yields an equation to derive the initial stock effect for the net investment income as:

$$INVINC\_stock_t \equiv (A_{t-1} - L_{t-1})\left(\frac{r_t^A + r_t^L}{2}\right)\left(\frac{1}{2\Delta ER_{i,t}^A} + \frac{1}{2\Delta ER_{i,t}^L}\right). \quad \text{(A1)}$$

The initial stock effect for valuation changes can, in turn, be written as:

$$\Delta VAL_{stock_t} \equiv (A_{t-1} - L_{t-1}) * \left[\left(\frac{kg_t^A + kg_t^L}{2}\right)\left(\frac{1}{2\Delta ER_{i,t}^A} + \frac{1}{2\Delta ER_{i,t}^L}\right) + \left(\frac{1}{2\Delta ER_{i,t}^A} + \frac{1}{2\Delta ER_{i,t}^L} - 1\right)\right]. \quad \text{(A2)}$$

All the variables are defined as before[44]. The only notable difference is that, to simplify, these calculations use aggregated exchange rates and returns on assets and liabilities, denoted with subscript *A* or *L*, rather than the asset-class specific *A,c* or *L,c*. ER_0 denotes the base period exchange rate.

Second, the exchange rate effects on net investment income and valuation changes can be expressed as:

$$INVINC\_er_t \equiv \left(\frac{A_{t-1} + L_{t-1}}{2}\right) * \left(\frac{r_t^A + r_t^L}{2}\right) * \left(\frac{1}{\Delta ER_t^A} - \frac{1}{\Delta ER_t^L}\right), \quad \text{(A3)}$$

$$\Delta VAL\_er_t \equiv \left(\frac{A_{t-1} + L_{t-1}}{2}\right) * \left\{\left(\frac{kg_t^A + kg_t^L}{2}\right) * \left(\frac{1}{\Delta ER_t^A} - \frac{1}{\Delta ER_t^L}\right) + \left(\frac{1}{\Delta ER_t^A} - \frac{1}{\Delta ER_t^L}\right)\right\}. \quad \text{(A4)}$$

In line with previous literature we also compute the effect from the foreign currency excess yield and excess capital gain. These can be decomposed following the "exorbitant privilege" literature (see Habib, 2010) into return and composition effects. To do so, define $\alpha_{c,t}$ as the share of a given asset *c* in a country's total assets in period *t,* and $\lambda_{c,t}$ as the share of a given asset *c* in a country's total assets in period *t*, holding the exchange rates associated with all asset classes fixed.

The third channel, the composition effect, for net investment income and valuation changes is then:

$$INVINC\_comp_t \equiv \left(\frac{A_{t-1} + L_{t-1}}{2}\right) \sum_c [(\alpha_{c,t-1} - \lambda_{c,t-1}) * \frac{(r_{c,t}^A + r_{c,t}^L)}{2}\left(\frac{1}{2\Delta ER_{i,t}^{A,c}} + \frac{1}{2\Delta ER_{i,t}^{L,c}}\right)] \text{ , and} \quad \text{(A5)}$$

$$\Delta VAL\_comp_t \equiv \left(\frac{A_{t-1} + L_{t-1}}{2}\right) \sum_c [(\alpha_{c,t-1} - \lambda_{c,t-1}) * \frac{(kg_{c,t}^A + kg_{c,t}^L)}{2}\left(\frac{1}{2\Delta ER_{i,t}^{A,c}} + \frac{1}{2\Delta ER_{i,t}^{L,c}}\right)] \text{ .} \quad \text{(A6)}$$

Finally, the return effects for net investment income and valuations changes are then:

[44] When applying these decompositions to UK data, the foreign currency rates of return on assets are calculated from Balance of Payments and NIIP data as follows: $r_t^S = \frac{F_t^S * ER_t^S}{S_{t-1} * ER_{t-1}^S}$ and $kg_t^A = \frac{S_t * ER_t^S - S_{t-1} * ER_{t-1}^S - CF_t^S * ER_t^S}{S_{t-1} * ER_{t-1}^S}$. S_t is the stock of assets or liabilities in domestic currency; F_t^S is the corresponding current account income flow and CF_t^S is the associated financial account capital flows. These definitions implicitly assume no hedging, i.e. every exchange rate movement is reflected fully in the stocks of foreign assets and liabilities and the exchange rate impact on different stocks only differs depending on their currency denomination. In reality, it is likely that some asset holdings are hedged against exchange rate movements and the exchange rate effect is not full, at least in the short run. We are not aware of any data to quantify these hedging effects, but if they are substantive, the decompositions here might be overestimating the effect of the exchange rate and as a result underestimating the effects of the foreign currency excess returns.

$$INVINC\_ret_t \equiv \left(\frac{A_{t-1}+L_{t-1}}{2}\right)\sum_c[\left(r^A_{c,t} - r^L_{c,t}\right) * \frac{(\alpha_{c,t-1}+\lambda_{c,t-1})}{2}\left(\frac{1}{2\Delta ER^{A,c}_{i,t}} + \frac{1}{2\Delta ER^{L,c}_{i,t}}\right)] \text{ , and} \quad \text{(A7)}$$

$$\Delta VAL\_ret_t \equiv \left(\frac{A_{t-1}+L_{t-1}}{2}\right)\sum_c[\left(kg^A_{c,t} - kg^L_{c,t}\right) * \frac{(\alpha_{c,t-1}+\lambda_{c,t-1})}{2}\left(\frac{1}{2\Delta ER^{A,c}_{i,t}} + \frac{1}{2\Delta ER^{L,c}_{i,t}}\right)] \text{ .} \quad \text{(A8)}$$

Appendix B: Estimating the impact of global and domestic risk shocks on UK international investment income and valuation changes

We develop a Structural Vector Autoregression (SVAR) model to identify domestic and global risk shocks, differentiate them from other fundamental shocks, and study their effects on UK net international investment income and net valuation changes on its international portfolio. This appendix summarizes (i) the dataset from which structural shocks are extracted, (ii) the identification of those shocks, and (iii) the estimation of the model.

(i) Data

Our dataset includes eight macroeconomic and financial variables at quarterly frequency over the period 1997Q1 – 2015Q3. The data and transformations used to construct these are summarized below:

Net valuation changes: Difference between the change in the value of UK foreign assets minus gross capital outflows and the change in the value of UK foreign liabilities minus gross capital inflows; expressed as percent of nominal UK GDP.

Net income balance: Difference between the investment income from UK foreign assets and UK foreign liabilities; expressed as percent of nominal UK GDP.

Relative GDP growth: Quarterly real GDP growth in the UK minus quarterly real GDP growth in the rest of the world; weighted by the value of UK trade with each country.

Relative inflation: Quarterly CPI inflation in the UK minus quarterly CPI inflation in the rest of the world; weighted by the value of UK trade with each country.

Interest rate differential: Difference between one-year sterling instantaneous forward interest rates and a weighted average of one-year forward dollar and euro interest rates. The euro and dollar interest rates are aggregated using the shares of the Euro Area and the USA in the UK's trade with these two regions.

Sterling exchange rate index: Quarterly changes in the trade-weighted sterling effective exchange rate index.

UK uncertainty index: Difference between UK and a weighted average of Euro Area and US news-based uncertainty indices developed by Baker, Bloom and Davis (2015) and available at www.policyuncertainty.com. The Euro Area and US uncertainty indices are aggregated using the shares of the Euro Area and the USA in the UK's trade with these two regions.

Global uncertainty index: Weighted average of Euro Area and US news-based uncertainty indices developed by Baker, Bloom and Davis (2015) and available at www.policyuncertainty.com. The Euro

Area and US uncertainty indices are aggregated using the shares of the Euro Area and the USA in the UK's trade with these two regions.

(ii) Identification

Using this set of variables, we identify six structural shocks with the short- and long-run zero restrictions and the sign restrictions shown in Table B1. More specifically, we identify relative supply, demand and monetary policy shocks, as well as an exchange rate shock and a domestic and global risk shock.

The first three relative shocks are identified primarily through sign restrictions that are standard in the SVAR literature. In addition, we assume that relative demand and monetary policy shocks cannot affect long-term relative output. Next, we also use standard sign restrictions to identify an exogenous exchange rate shock, which also has no effect on relative long-term output. In addition, we assume that the two uncertainty measures do not react to exchange rate shocks in the short- or the long-run to exclude any exchange rate movements that are driven by changes in risk captured in the UK and global uncertainty measures.

To differentiate between the first three fundamental shocks, which can affect uncertainty, and genuine exogenous increases in risk, we assume that changes in uncertainty driven by the two risk shocks only lead to changes in relative output with a lag. Finally, to separately identify a UK and a global risk shock, we assume that global uncertainty is unaffected by higher UK risk and that UK uncertainty does not increase by more than global uncertainty in response to higher global risk. In addition, an increase in UK uncertainty leads to a sterling depreciation.

Table B1: SVAR shock identification scheme

Shocks:	Relative supply	Relative demand	Relative monetary policy	Exchange rate	Domestic risk	Global risk
Short-run restrictions						
Net valuation changes						
Net income balance						
Relative GDP growth	-	+	+		0	0
Relative inflation	+	+	+	+		
Interest rate differential		+	-	+		
Sterling exchange rate index		+	-	-	-	
UK uncertainty index				0	+	0
Global uncertainty index				0	0	+
Long-run restrictions						
Net valuation changes						
Net income balance						
Relative GDP growth		0	0	0		
Relative inflation						
Interest rate differential						
Sterling exchange rate index						
UK uncertainty index				0		0
Global uncertainty index				0	0	

(iii) Estimation

We estimate the model using Bayesian methods with standard Minnesota priors[45]. We include two lags of the endogenous variables but impose the short-run restrictions in Table B1 for one period only, i.e. on the contemporaneous effect of the structural shocks. The combination of sign, short-run and long-run zero restrictions outlined above is imposed using the algorithm suggested by Rubio-Ramirez *et al.* (2010) and extended by Binning (2013) for under-identified models. The historical decompositions and forecast error variance decomposition results reported in this paper refer to the average values from the final 1,000 repetitions of a Gibbs sampling procedure.

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[45] This prior, proposed by Litterman (1986), assumes each variable follows a random walk process and is independent from the other endogenous variables in the model. The hyperparameter values used here are as follows: λ1=0.2, λ2=0.5, λ3=1, λ4=10,000.

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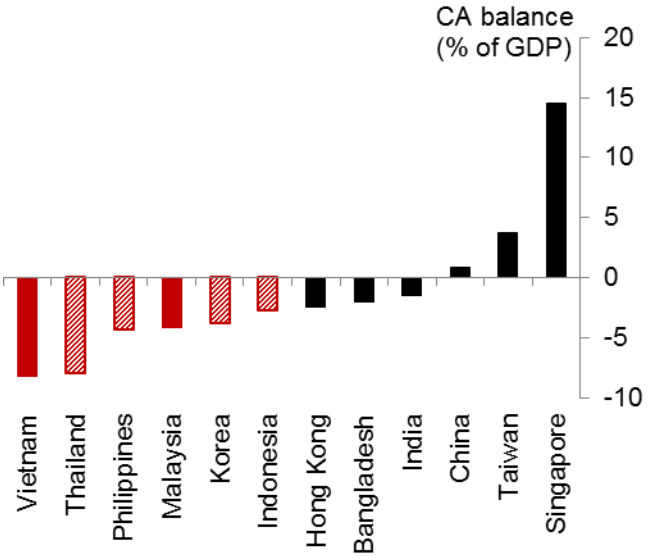
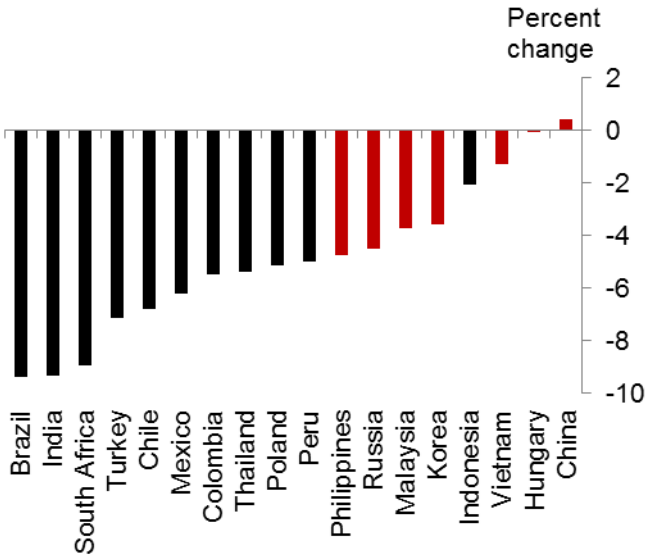
Figure 1: Current account balances of selected Asian economies in 1996



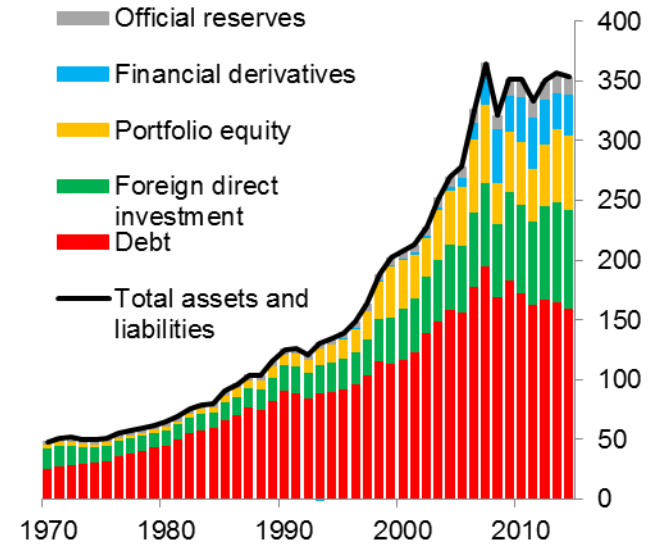
Red (solid and patterned): countries which experienced an average currency depreciation of at least 10% in 1997 and 1998;
Patterned: countries which also received an IMF package.
Source: Datastream, IMF International Financial Statistics and World Economic Outlook, and own calculations.

Figure 2: Change in US dollar exchange rate between 1 May and 30 June 2013



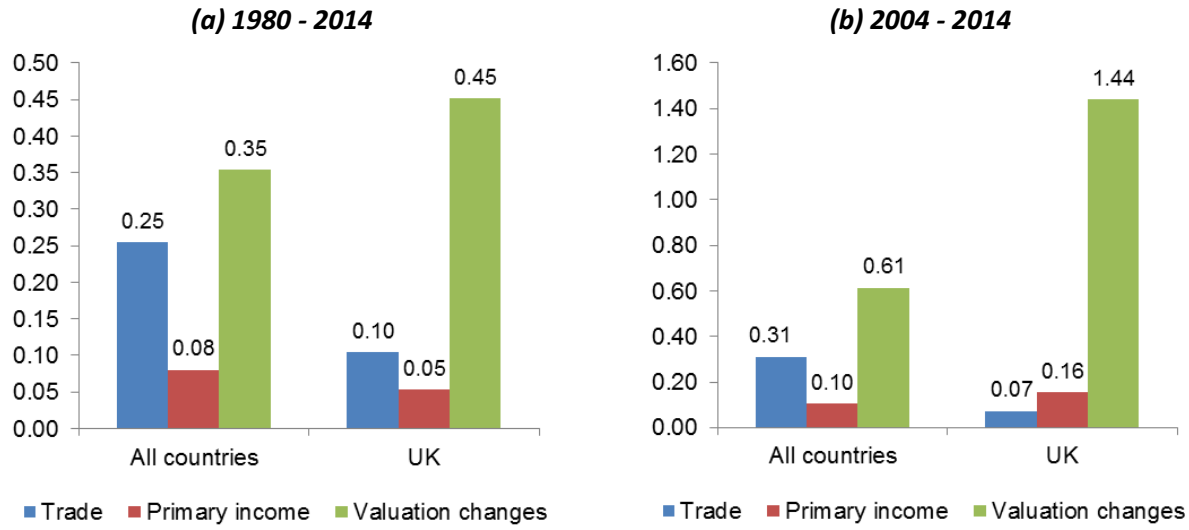
Note: Countries coloured in black ended 2012 with a current account deficit; those in red had a surplus.
Source: WM/Reuters, IMF International Financial Statistics, IMF World Economic Outlook and own calculations.

Figure 3: World financial assets and liabilities (% of world GDP)*



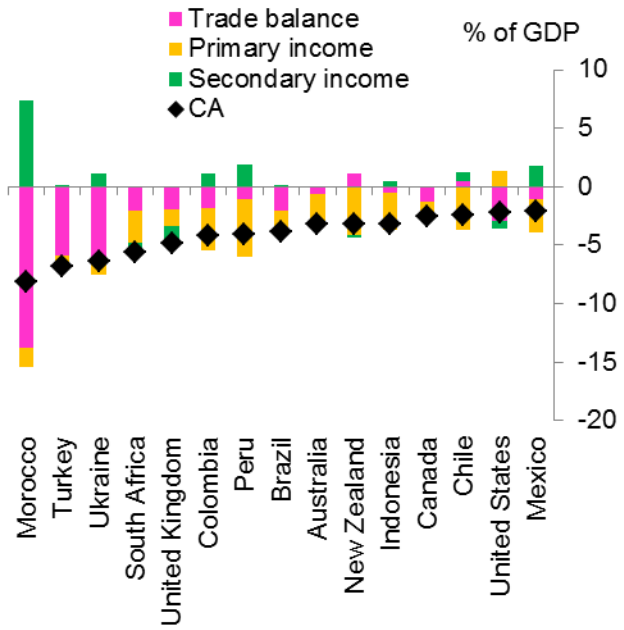
* Sample includes all countries with data on financial assets and liabilities going back to 1970. Debt includes portfolio debt and bank stocks.
Source: Lane and Milesi-Ferretti (2007b), IMF International Financial Statistics and World Economic Outlook, and own calculations.

Figure 4: Ratios of the variances in trade, primary income and valuation changes to the overall NIIP variance[(a)]



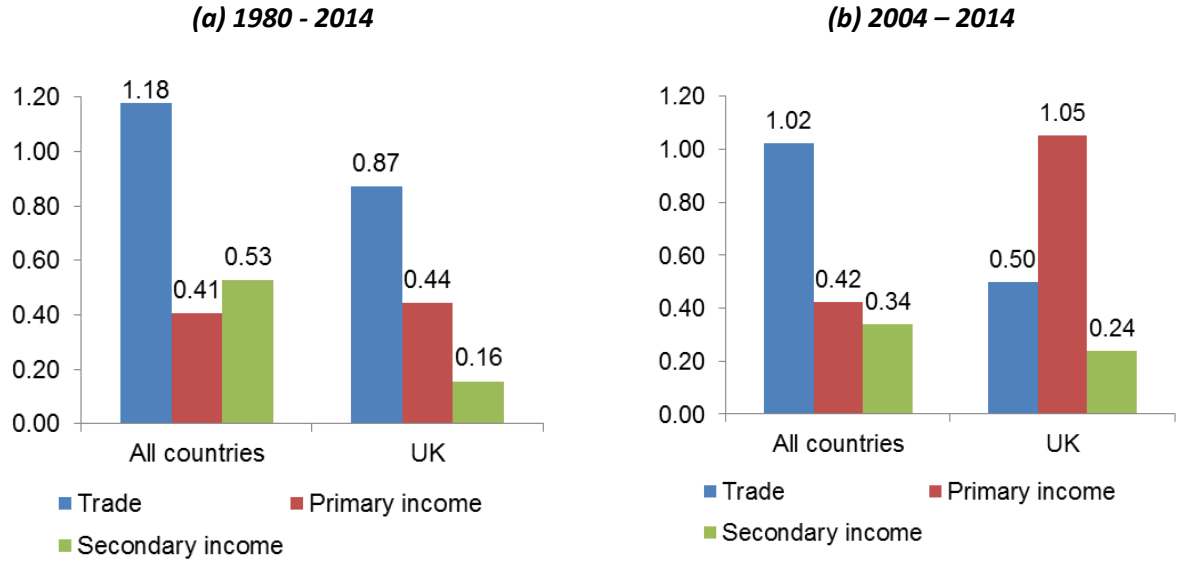
(a) We calculate the standard deviations of each country's trade and primary income balances, net valuation changes and overall NIIP changes and use these to construct ratios of the standard deviation of each of the first three terms to the standard deviation of the last one. Figure 4 plots the simple unweighted average of these ratios across countries.
Source: Lane and Milesi-Ferretti (2007b), IMF International Financial Statistics and World Economic Outlook, and own calculations.

Figure 5: Largest current account imbalances and their composition (2013-14 averages)



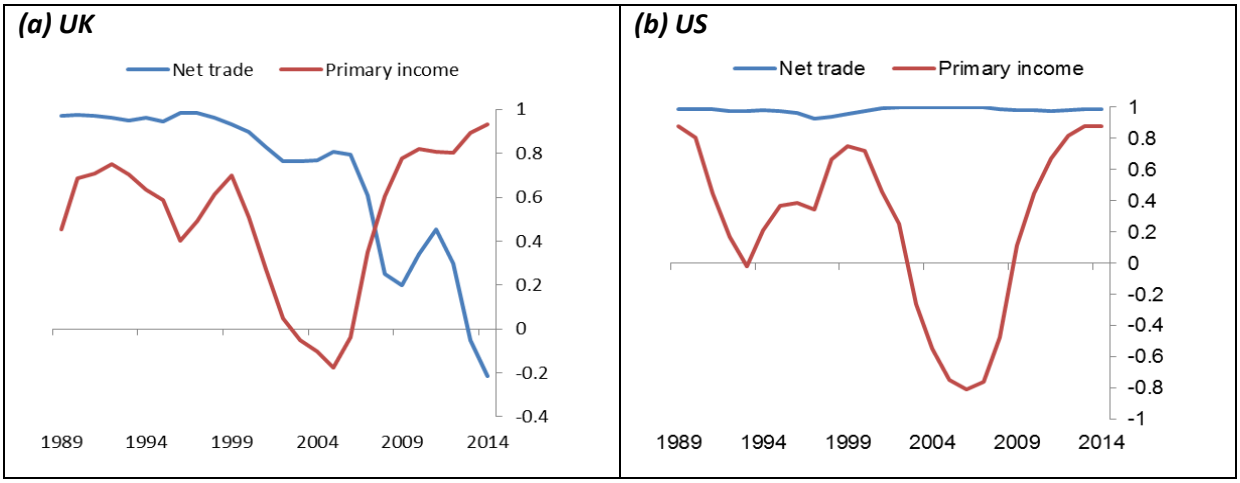
Note: The sample includes all countries with available data and average 2013-14 GDP of at least $100bn.
Source: IMF International Financial Statistics, World Economic Outlook and own calculations.

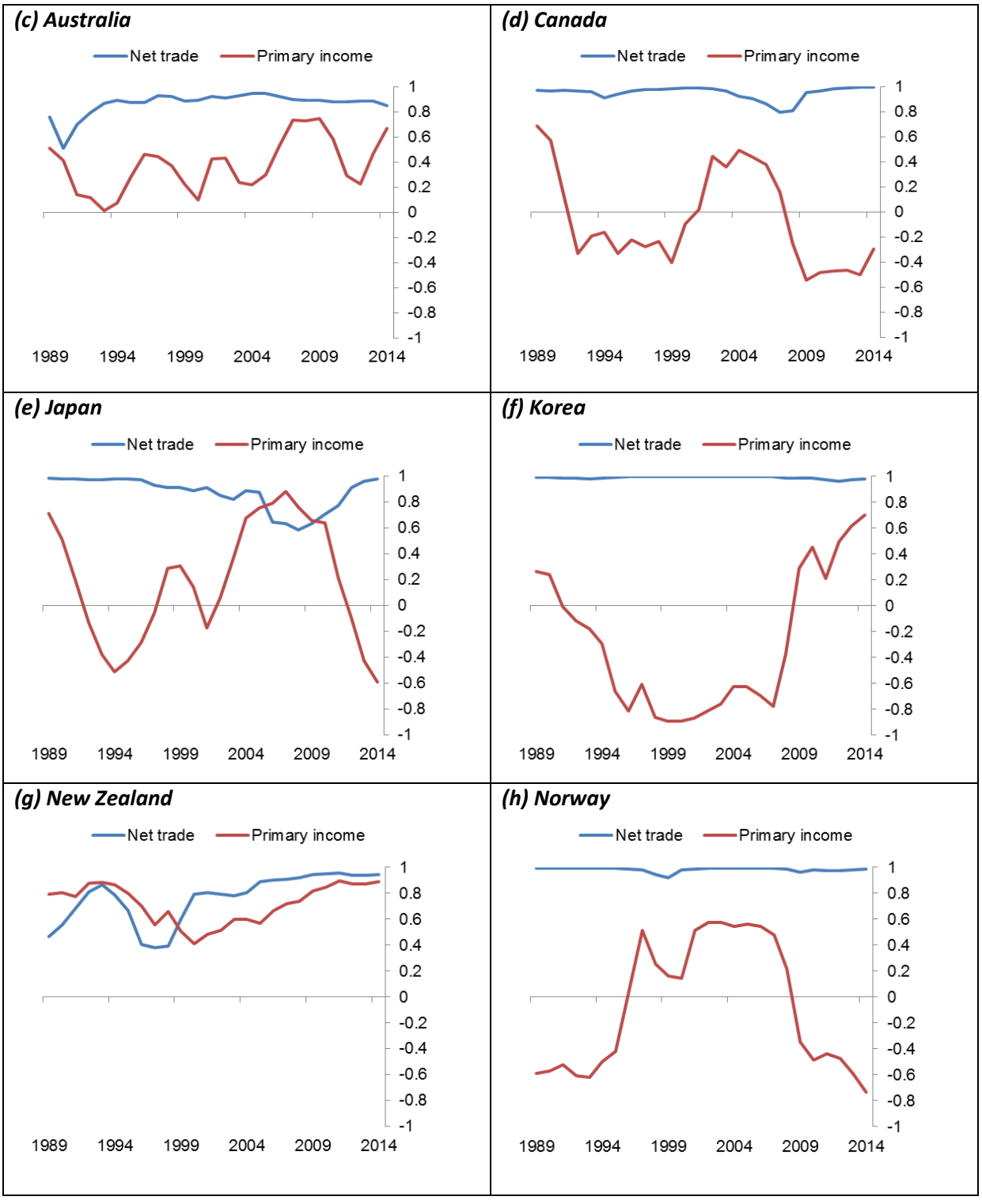
Figure 6: Ratios of the variances in trade, primary and secondary income to the current account variance[(a)]

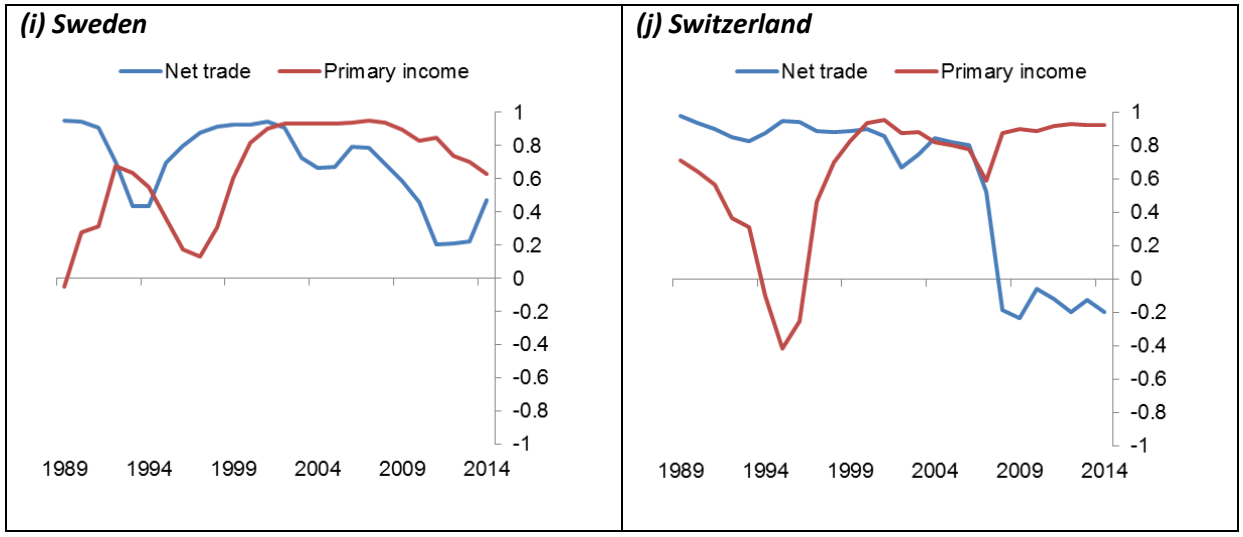


(a) We calculate the standard deviations of each country's trade, primary and secondary income balances as well as the standard deviation of the overall current account balance. We then use these to construct ratios of the standard deviation of each of the first three terms to the standard deviation of the last one. Figure 6 plots the simple unweighted average of these ratios across countries.
Source: IMF International Financial Statistics, World Economic Outlook and own calculations.

Figure 7: Ten-year rolling correlation of current account balances with trade and primary income balances[(a)] for 10 OECD economies

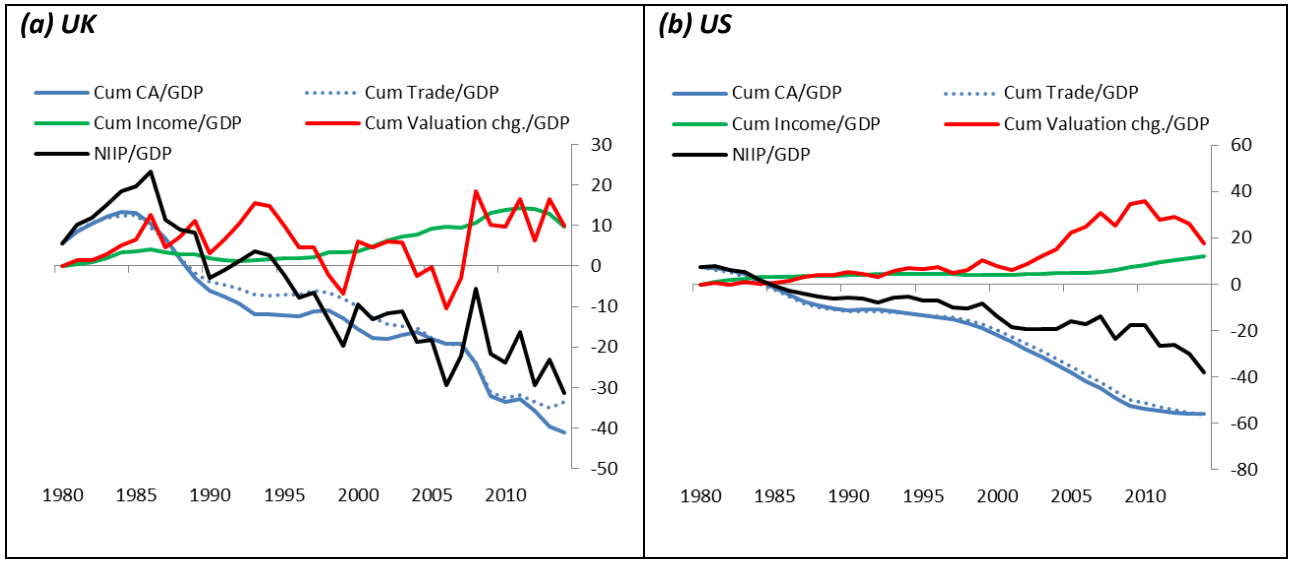



(c) Australia
Net trade
Primary income
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
1989
1994
1999
2004
2009
2014
(d) Canada
Net trade
Primary income
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
1989
1994
1999
2004
2009
2014
(e) Japan
Net trade
Primary income
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
1989
1994
1999
2004
2009
2014
(f) Korea
Net trade
Primary income
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
1989
1994
1999
2004
2009
2014
(g) New Zealand
Net trade
Primary income
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
1989
1994
1999
2004
2009
2014
(h) Norway
Net trade
Primary income
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
1989
1994
1999
2004
2009
2014

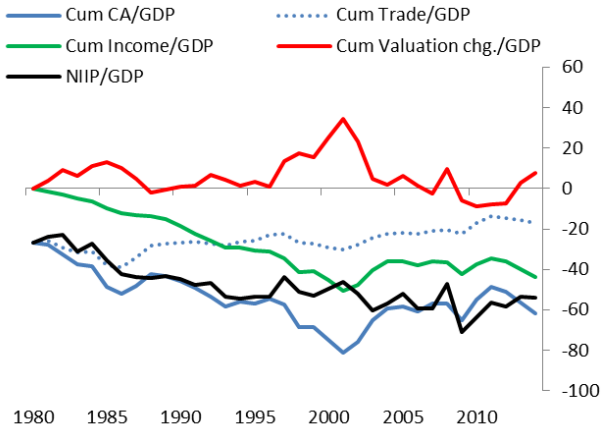


(a) The net trade, primary income and current account balances are all expressed as percentages of nominal GDP.
Source: IMF International Financial Statistics, World Economic Outlook and own calculations.

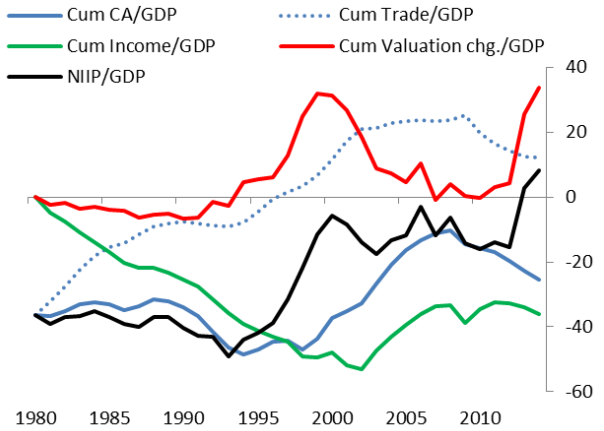
Figure 8: NIIP and accumulated current account, trade, primary income balances and valuation changes over time for 10 OECD economies



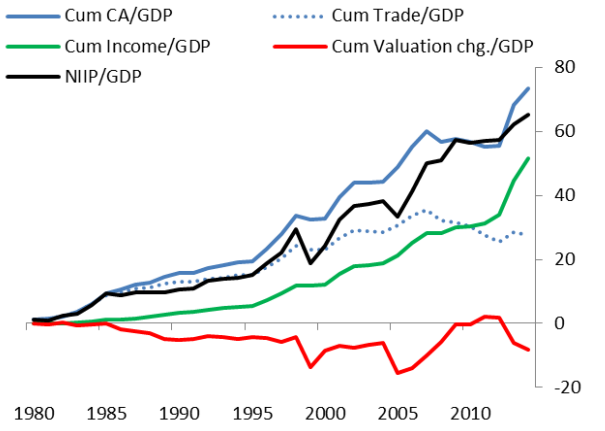
(c) Australia



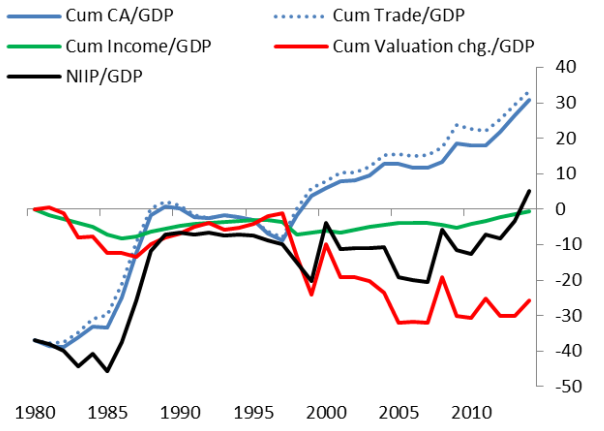
(d) Canada



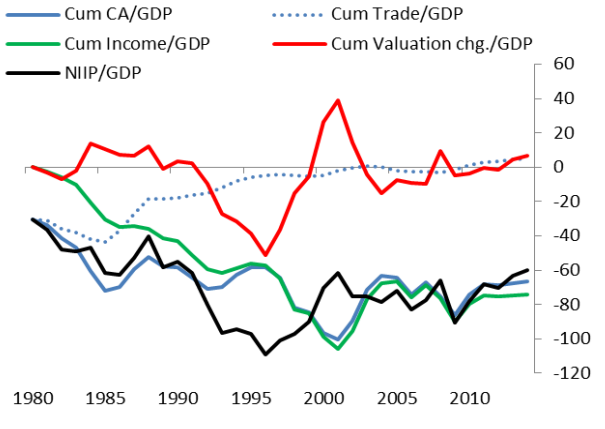
(e) Japan



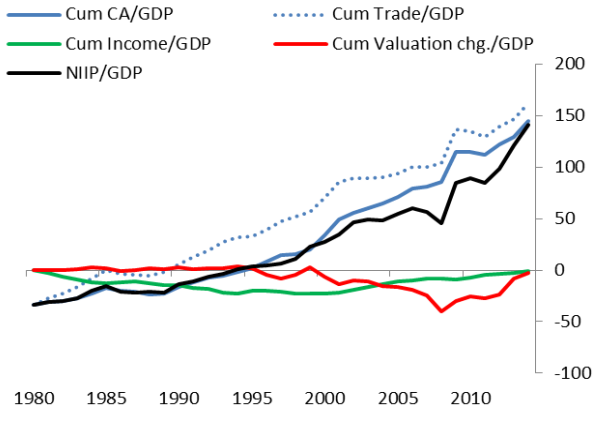
(f) Korea

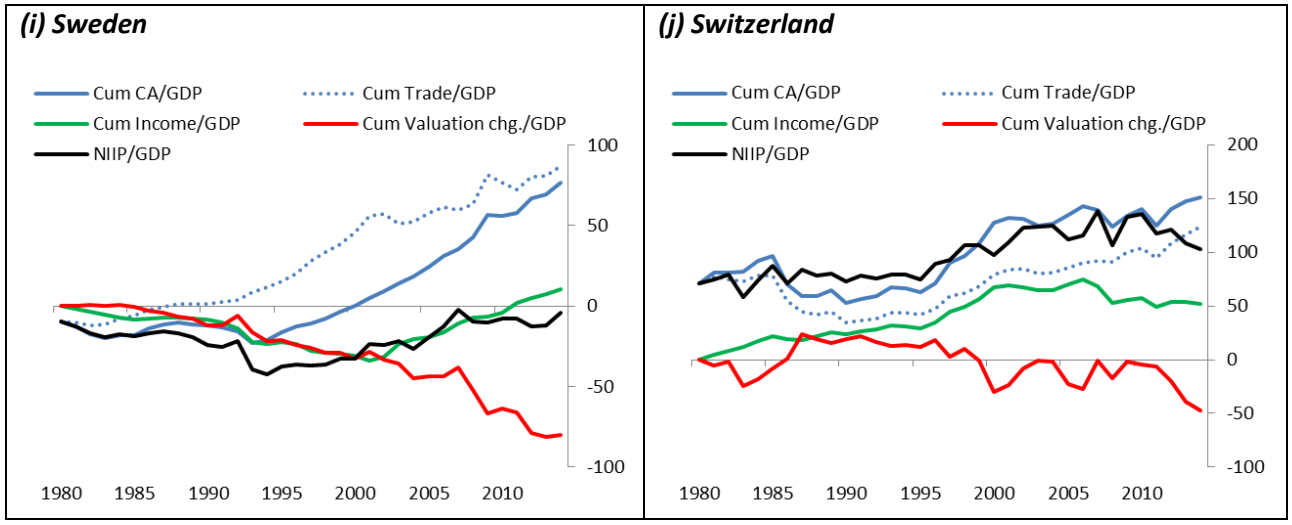


(g) New Zealand



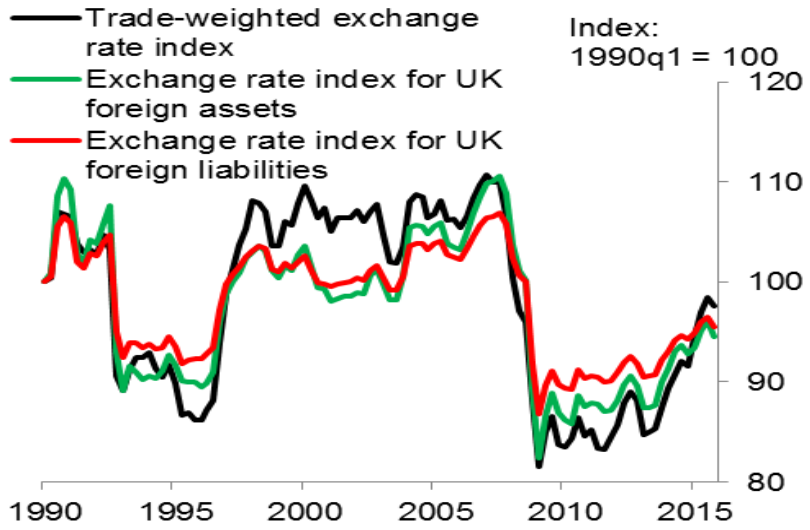
(h) Norway





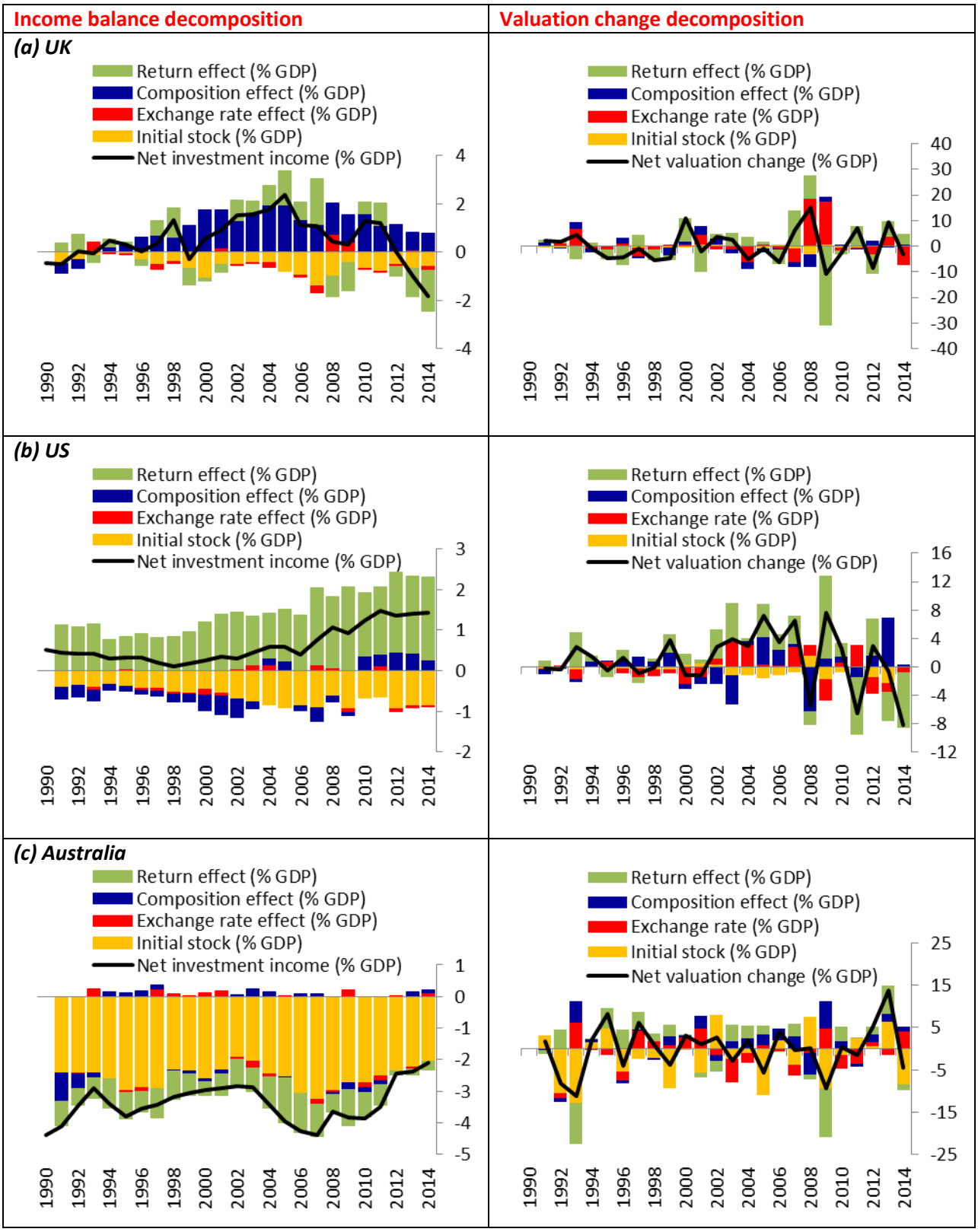
Note: The accumulated current account and valuation changes sum up to the NIIP. The accumulated current account comprises the accumulated trade and primary income balances, as well as the accumulated secondary income balances (not shown here). For each country, the accumulation of current account and trade balances starts using the first year's NIIP, while the accumulation of valuation changes and income begins with a zero initial value. This assumption is necessary in order to decompose the level of the NIIP rather than its change since the first period.
Source: IMF International Financial Statistics, World Economic Outlook, Lane and Milesi-Ferretti (2007b) and own calculations.

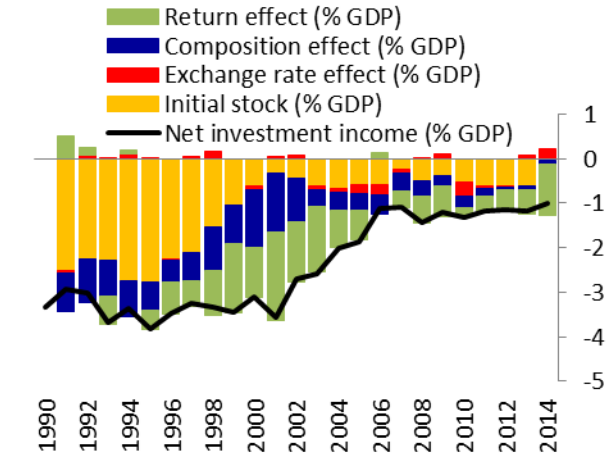
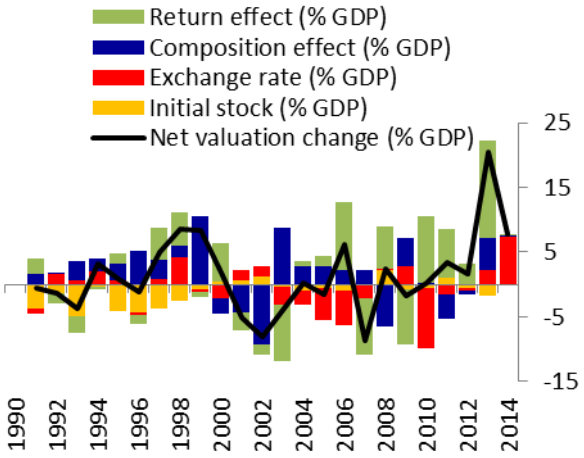
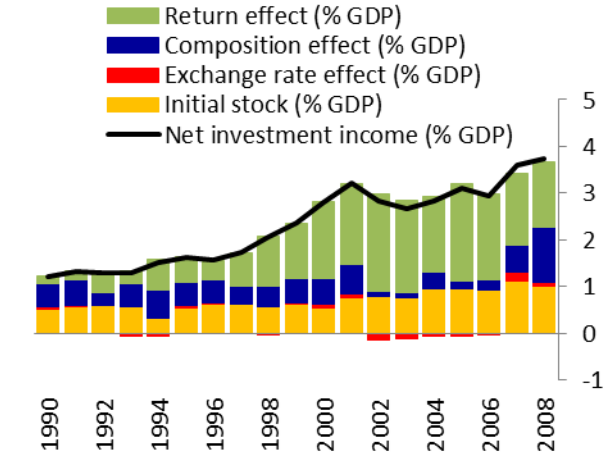
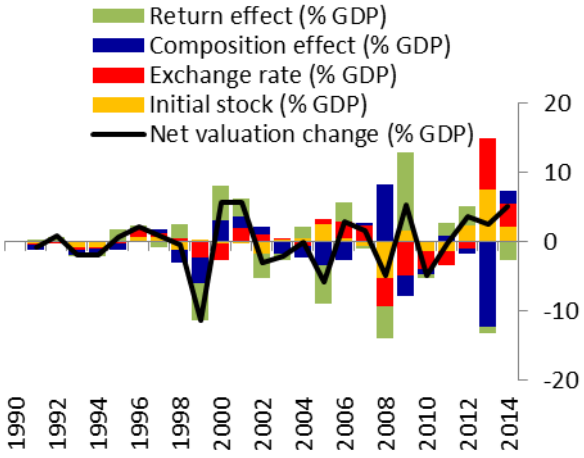
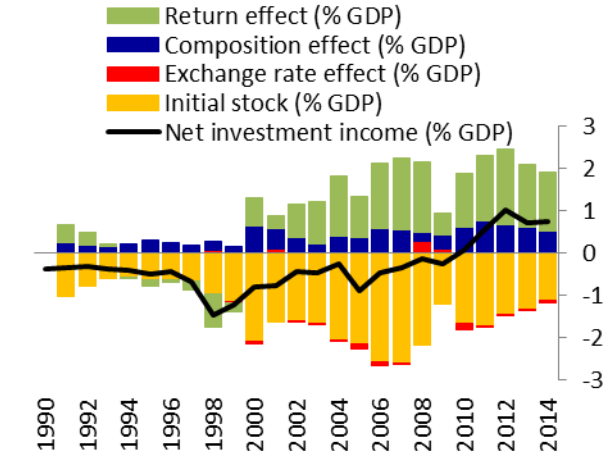
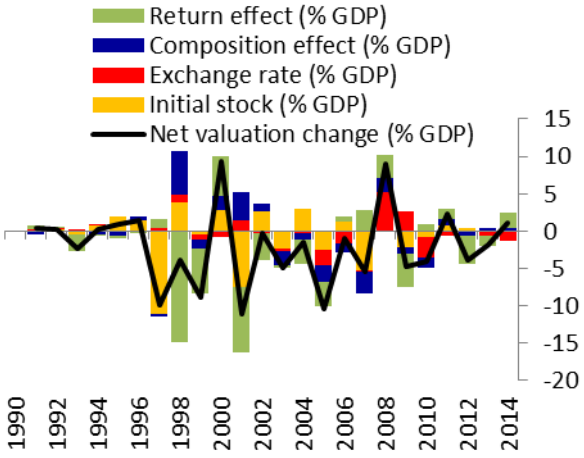
Figure 9: Sterling exchange rate indices

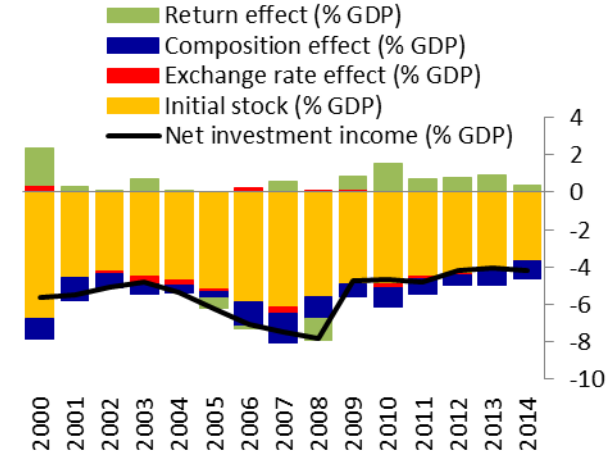
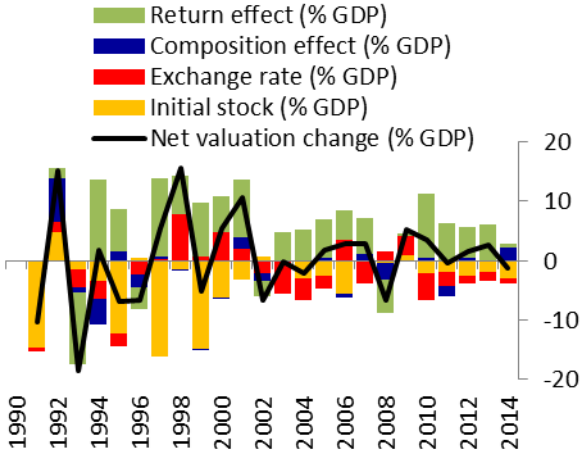
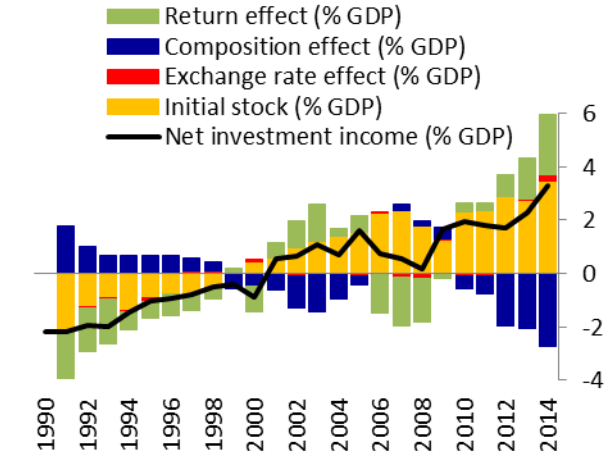
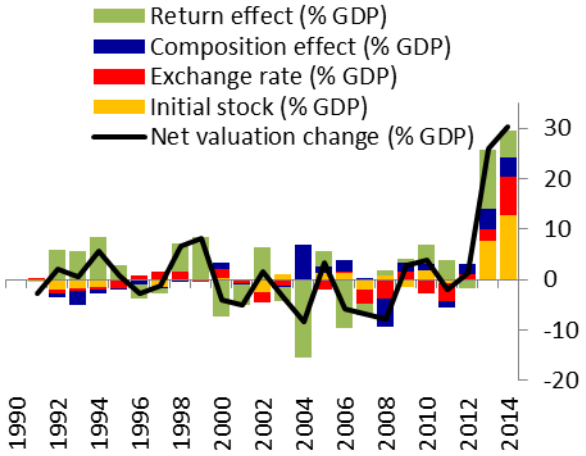
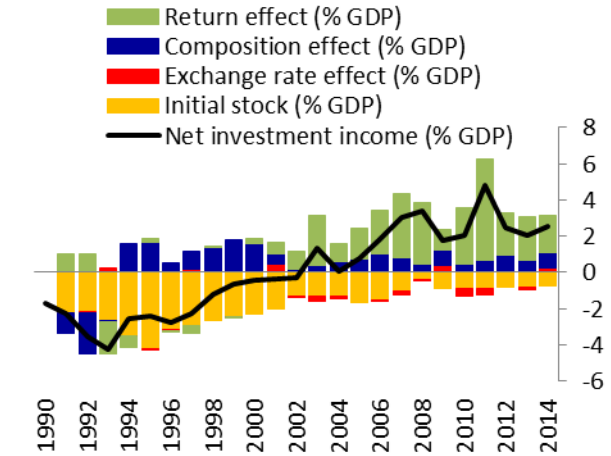
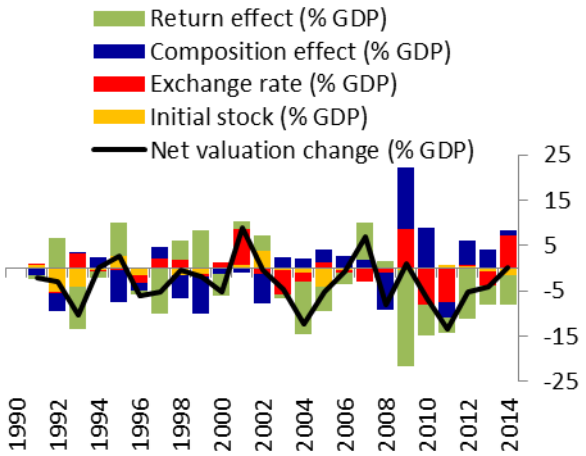


Source: Own calculations, using data from Benetrix et al. (2015), IMF International Financial Statistics, and Datastream.

Figure 10: Breakdown of investment income and valuation changes in 10 OECD economies



Income balance decomposition	Valuation change decomposition
(d) Canada 	
(e) Japan 	
(f) Korea 	

Income balance decomposition	Valuation change decomposition
(g) New Zealand 	
(h) Norway 	
(i) Sweden 	

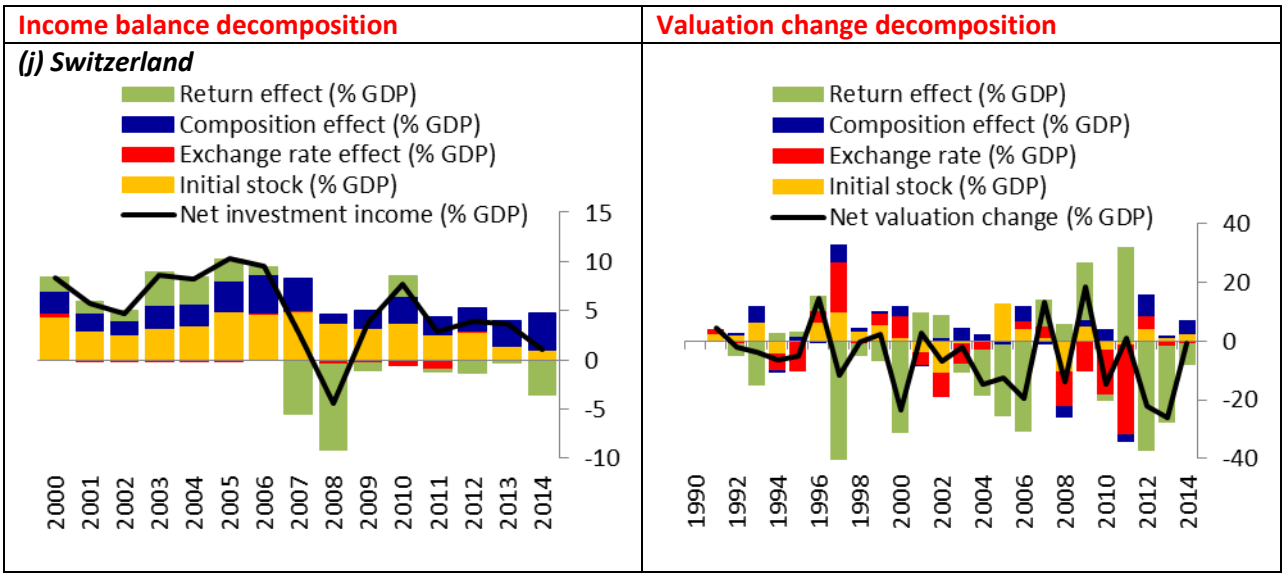
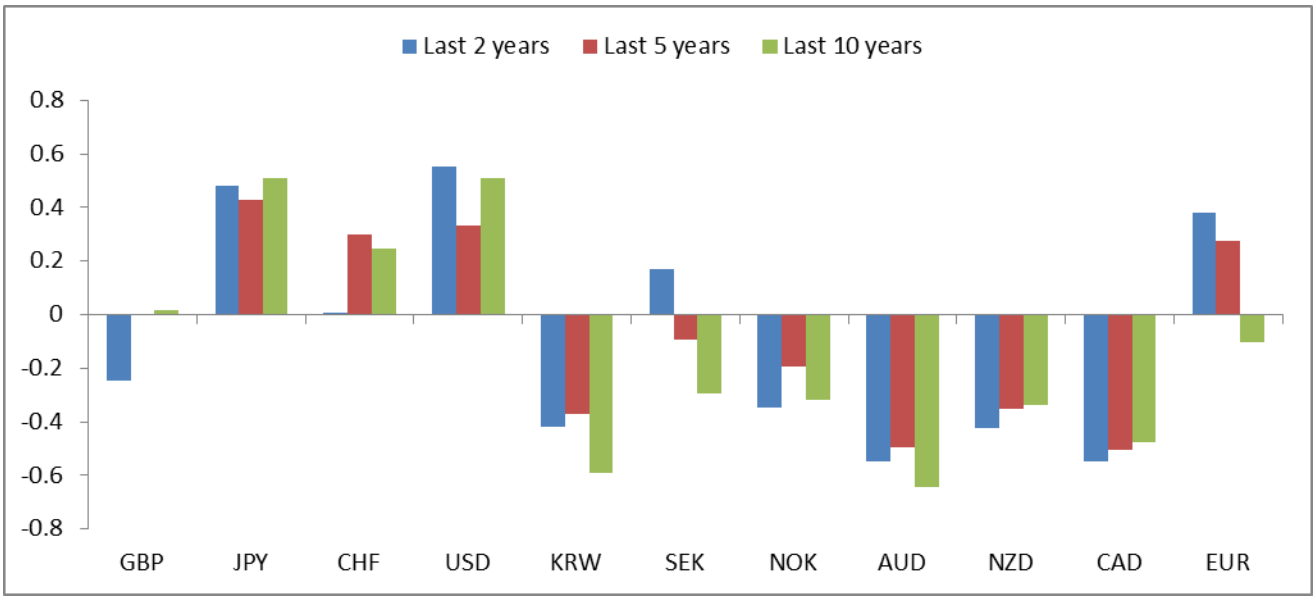


Figure 11: Correlations between changes in US VIX index and nominal effective exchange rates for 10 OECD economies



Source: Bloomberg, Bank for International Settlements and own calculations.

Figure 12: UK investment income balance and contributions from domestic and global risk shocks

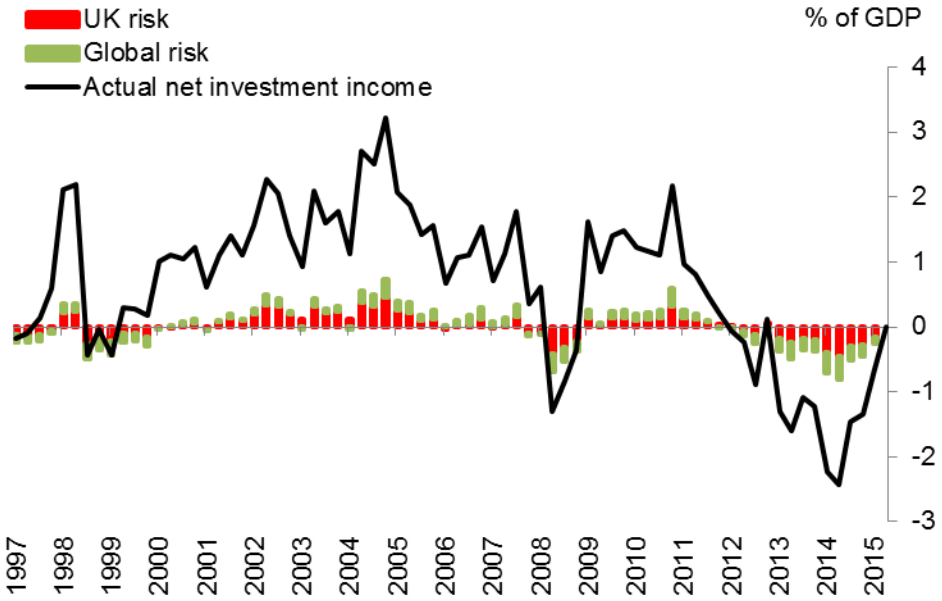


Figure 13: UK valuation changes and contributions from domestic and global risk shocks

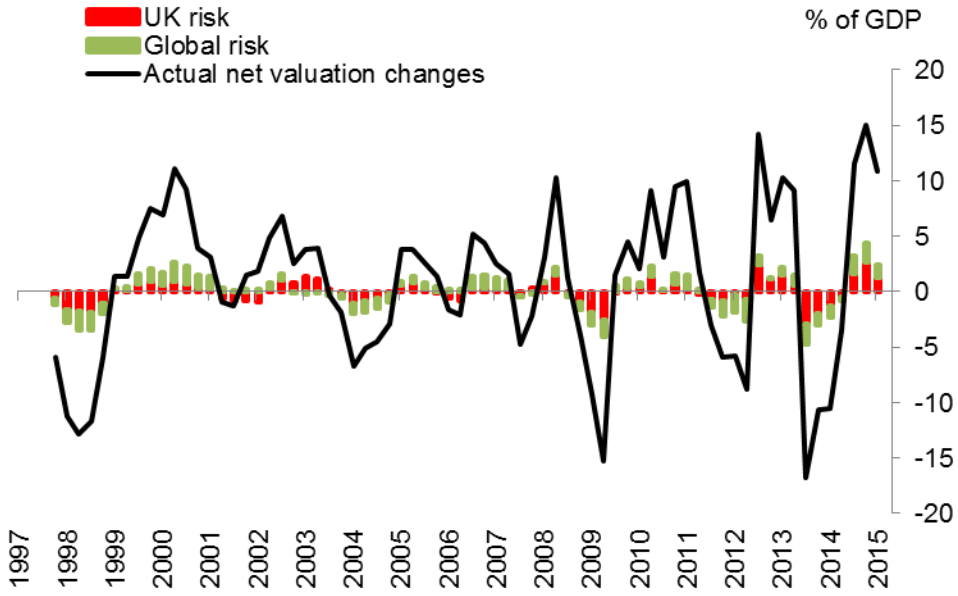


Table 1: Correlations of international investment income and valuation changes with their determinants

Correlations of…	Investment balance with:				Valuation changes with:			
	Initial stock effect	Exchange rate effect	Composition effect	Return effect	Initial stock effect	Exchange rate effect	Composition effect	Return effect
UK	-0.19	-0.14	0.59	0.76	-0.50	0.25	-0.33	0.72
US	-0.58	0.18	0.78	0.84	-0.60	-0.04	0.31	0.89
Australia	0.76	0.27	0.27	0.74	0.79	-0.25	-0.28	0.54
Canada	0.71	-0.28	0.80	0.24	-0.12	0.25	0.28	0.71
Japan	0.83	0.18	0.15	0.88	0.34	0.30	0.03	0.70
Korea	-0.05	-0.06	0.58	0.70	0.64	0.25	0.22	0.53
New Zealand	0.74	-0.20	0.55	0.56	0.25	0.51	0.47	0.57
Norway	0.93	0.08	-0.81	0.76	0.79	0.66	0.35	0.67
Sweden	0.84	-0.34	0.25	0.89	0.28	0.46	-0.01	0.41
Switzerland	0.37	0.34	0.20	0.79	0.10	-0.13	-0.33	0.72
AVERAGE	**0.44**	**0.00**	**0.34**	**0.71**	**0.20**	**0.23**	**0.07**	**0.65**
MEDIAN	0.73	0.01	0.41	0.76	0.26	0.25	0.12	0.68
AVERAGE of absolute correlations	**0.60**	**0.21**	**0.50**	**0.71**	**0.44**	**0.31**	**0.26**	**0.65**

Table 2. Characteristics Determining the Impact of a Domestic Risk Shock

Variables Determining the NIIP Impact	Risk sharing is higher …	Statistics	United Kingdom	United States	Australia	Canada	Japan	Korea	New Zealand	Norway	Sweden	Switzerland	AVERAGE	MEDIAN
Quantity of liabilities	... the higher the stock of foreign liabilities	Liabilities/GDP	558%	170%	156%	154%	104%	71%	133%	164%	246%	450%	**221%**	**160%**
Composition of international liabilities	…. the riskier are liabilities, i.e. the higher is the *proportion of equity liabilities relative to debt liabilities*	Share of equity in liabilities	27%	43%	43%	51%	37%	57%	43%	34%	41%	60%	**44%**	**43%**
Currency denomination of international assets	… the higher the *proportion of assets denominated in foreign currency*	Assets denominated in foreign currency	93%	68%	90%	96%	71%	100%	100%	100%	87%	95%	**90%**	**94%**
Currency denomination of international liabilities	… the lower the *proportion of liabilities denominated in foreign currency*	Liabilities denominated in foreign currency	58%	16%	43%	34%	40%	44%	61%	64%	39%	32%	**43%**	**42%**
Hedging ability of the exchange rate with respect to capital gains on liabilities	… the less does the exchange rate associated with liabilities co-move with their capital gains	Correlation between exchange rate and foreign currency capital gains on liabilities	0.52	0.26	-0.12	0.30	0.06	0.45	0.84	0.23	0.31	-0.32	**0.26**	**28%**
Hedging ability of the exchange rate with respect to returns on liabilities	… the less does the exchange rate associated with liabilities co-move with their rate of return	Correlation between exchange rate and foreign currency return on liabilities	-0.14	-0.14	0.28	0.29	-0.39	0.28	0.16	0.22	0.26	0.20	**0.10**	**21%**

Note: The correlation between exchange rates and rates of return and capital gains are based on the contribution of rates of return to investment income and the contribution of rates of capital gains to NIIP respectively.

Table 3. Characteristics Determining the Impact of a Global Risk Shock

Variables Determining the NIIP Impact	Deterioration of financial position less pronounced…	Statistics	United Kingdom	United States	Australia	Canada	Japan	Korea	New Zealand	Norway	Sweden	Switzerland	AVERAGE	MEDIAN
Quantity of assets and liabilities	… the higher the stock of liabilities relative to assets	Assets/GDP:	527%	140%	102%	162%	169%	76%	73%	305%	243%	553%	**235%**	**166%**
		Liabilities/GDP:	558%	170%	156%	154%	104%	71%	133%	164%	246%	450%	**221%**	**160%**
Composition of liabilities relative to assets	… the riskier are liabilities relative to assets i.e. the higher is the *proportion of equity relative to debt liabilities compared to equity relative to debt assets*	Equity/debt in assets:	0.37	0.77	0.76	1.06	0.58	1.34	0.74	0.51	0.7	1.51	**83%**	**75%**
		Equity/debt in liabilities:	0.38	1.99	1.55	2.89	0.63	1.45	1.44	1.28	1.4	1.13	**141%**	**142%**
Currency denomination of international assets	… the higher the *proportion of assets denominated in foreign safe haven currency*	Assets denominated in USD, CHF and JPY	43%	9%	47%	62%	39%	63%	48%	36%	26%	30%	**40%**	**41%**
Currency denomination of international liabilities	… the lower the *proportion of liabilities denominated in foreign safe haven currency*	Liabilities denominated in USD, CHF and JPY	26%	2%	29%	30%	35%	37%	34%	19%	13%	10%	**24%**	**28%**
Hedging ability of the exchange rate with respect to capital gains on assets and liabilities	… the lower is the co-movement between the exchange rate associated with liabilities and their capital gains relative to the co-movement between the exchange rate associated with assets and their capital gains	Correlation between exchange rate and foreign currency capital gains on assets	0.56	0.31	0.07	0.37	0.32	0.52	0.66	0.06	0.44	0.34	**0.36**	**0.36**
		Correlation between exchange rate and foreign currency capital gains on liabilities	0.52	0.26	-0.12	0.30	0.06	0.45	0.84	0.23	0.31	-0.32	**0.26**	**0.28**
Hedging ability of the exchange rate with respect to returns on assets and liabilities	… the lower is the co-movement between the exchange rate associated with liabilities and their returns relative to the co-movement between the exchange rate associated with assets and their returns	Correlation between exchange rate and foreign currency return on assets	-0.07	-0.17	0.26	0.29	0.04	0.37	0.45	0.19	0.34	0.12	**0.18**	**0.22**
		Correlation between exchange rate and foreign currency return on liabilities	-0.14	-0.14	0.28	0.29	-0.39	0.28	0.16	0.22	0.26	0.20	**0.10**	**0.21**

Note: The correlation between exchange rates and rates of return and capital gains are based on the contribution of rates of return to investment income and the contribution of rates of capital gains to NIIP respectively.