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The Changing Role of the Exchange Rate for Macroeconomic Adjustment

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By Patrice Ollivaud, Elena Rusticelli and Cyrille Schwellnus

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ABSTRACT/RÉSUMÉ

The changing role of the exchange rate for macroeconomic adjustment

Recent episodes of large exchange rate movements, such as for Japan or the United Kingdom, have typically not been associated with large changes in trade balances and despite the polarisation of international investment positions large currency fluctuations during the global crisis of 2008-09 did not cause significant financial dislocations. This paper presents empirical evidence that for a number of OECD countries firms' increasing participation in global value chains may have contributed to reducing exchange rate pass-through to the terms of trade, which may in turn have contributed to reducing the response of trade balances to exchange rate changes. Further empirical evidence suggests that over the past two decades large net external debtor countries, including emerging market economies, have reduced net aggregate foreign currency exposures, thereby limiting direct financial effects of exchange rate fluctuations through the valuation of external assets and liabilities. However, sizable increases in foreign currency borrowing for a number of emerging market economies in the wake of the global crisis of 2008-09, including by non-financial corporations, suggest that large exchange rate movements may nonetheless cause financial stress for exposed sectors and entities that may percolate through the financial system despite limited aggregate exposures.

JEL classification codes: F31; F32; F40
Keywords: Exchange rates, current account, financial account, currency mismatches

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Changement du rôle du taux de change pour l'ajustement macroéconomique

Les épisodes récents de mouvements importants du taux de change, comme pour le Japon ou le Royaume-Uni, n'ont pas été associés à des évolutions importantes des balances commerciales ; et malgré la polarisation des positions extérieures globales, les fluctuations importantes des monnaies durant la crise mondiale de 2008-2009 n'ont pas généré de perturbations financières significatives. Ce papier présente des éléments empiriques qui permettent de mettre en évidence que pour un certain nombre de pays de l'OCDE, la participation grandissante des entreprises aux chaines de valeurs mondiales semble avoir contribué à réduire le degré de transmission des taux de change aux termes de l'échange, ce qui pourrait avoir dans un second temps contribué à réduire la réponse des balances commerciales aux évolutions du taux de change. Les données empiriques suggèrent également que sur les deux dernières décennies, les pays avec une dette extérieure importante, y compris les économies de marché émergentes, ont réduit leurs expositions agrégées nettes aux monnaies étrangères, ce qui a par conséquent limité l'effet direct financier des fluctuations de taux de change qui passe par la valorisation des créances et engagements extérieurs. Cependant, des augmentations significatives des emprunts en monnaie étrangère pour un certain nombre d'économies de marché émergentes à la suite de la crise mondiale de 2008-2009, y compris de la part d'entreprises non financières, suggèrent que des mouvements importants de taux de change peuvent néanmoins provoquer des tensions financières pour des secteurs et des entités exposés, qui peuvent ensuite se propager à travers le système financier malgré une exposition totale limitée.

Classification JEL: F31; F32; F40
Mots-Clés: Taux de change, compte courant, compte financier, asymétrie des devises

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THE CHANGING ROLE OF THE EXCHANGE RATE FOR MACROECONOMIC ADJUSTMENT

By Patrice Ollivaud, Elena Rusticelli and Cyrille Schwellnus[1]

1. Introduction

1. In the wake of the global financial crisis there has been a narrowing of global current account imbalances, driven mainly by adjustments in domestic demand rather than exchange rate movements, while at the same time there has been an increasing divergence in net external asset positions. In the light of these developments, this paper examines the reasons for the apparent weak response of current balances to the exchange rate and the implications of future exchange rate movements given the increased polarisation of net external asset positions.

2. The main conclusions from the empirical analysis can be summarised as follows:

- Exchange rate movements have not been the main driver of post-crisis current account adjustments, including for countries which experienced large currency depreciations such as Japan and the United Kingdom. Nevertheless, a comparison of euro area and other European countries with large pre-crisis deficits, suggests that a flexible nominal exchange rate can ease external adjustment by speeding up necessary changes in relative unit labour costs.

- There is some evidence for OECD countries that firms' increasing participation in global value chains may have been a factor in reducing exchange rate pass-through to the terms of trade as changes in the costs of imported intermediate inputs partly offset changes in export price competitiveness.

- All else equal, the decline in pass-through to the terms of trade implies that larger exchange rate changes than in the past would be needed to rebalance global demand. For instance, the 10% depreciation of the euro on a trade-weighted basis between mid-March 2014 and mid-February 2015 may by itself be insufficient to significantly shift global demand toward the euro area, suggesting that other available tools would have to be used to support demand in the euro area.

- The effect of the exchange rate on the current balance also operates through the financial channel. Macroeconometric model simulations suggest that for countries with positive net external assets denominated in foreign currency, such effects are likely to be modest. On the other hand, for countries with large foreign currency liabilities, the financial effects of exchange rate changes can be discontinuous and non-linear, with the potential to dominate the trade channel and be highly disruptive.

- The aggregate exposure of the major emerging market economies to currency depreciations operating through the financial channel appears to be lower than on the eve of the emerging

1 . The authors are members of the Economics Department of the OECD. They would like to thank Jean-Luc Schneider and Dave Turner for helpful comments and suggestions, Jérôme Olympie for excellent research assistance and Ines Gomez Palacio for assistance in preparing the document. OECD Working Papers should not be reported as representing the official views of the OECD or of its member countries. The opinions expressed and arguments employed in this paper are those of the authors.

market crises of the 1980s and 1990s, as the composition of liabilities has shifted from debt, which is typically denominated in foreign currency, to equity, typically denominated in domestic currency.

- Sizable increases in foreign currency borrowing, including by non-financial corporations, for a number of emerging market economies in the wake of the global crisis of 2008-09, nevertheless suggest that large exchange rate movements may cause financial stress for exposed sectors and entities despite limited aggregate exposure. Therefore the channel through which financial distress percolates through the domestic economy may be different from previous episodes where bank exposure was the key vulnerability.

- In the event of large exchange rate movements, emerging market economies' central banks may therefore need to use large foreign currency reserves to try to offset excessive exchange rate volatility and to provide foreign currency liquidity to the private sector.

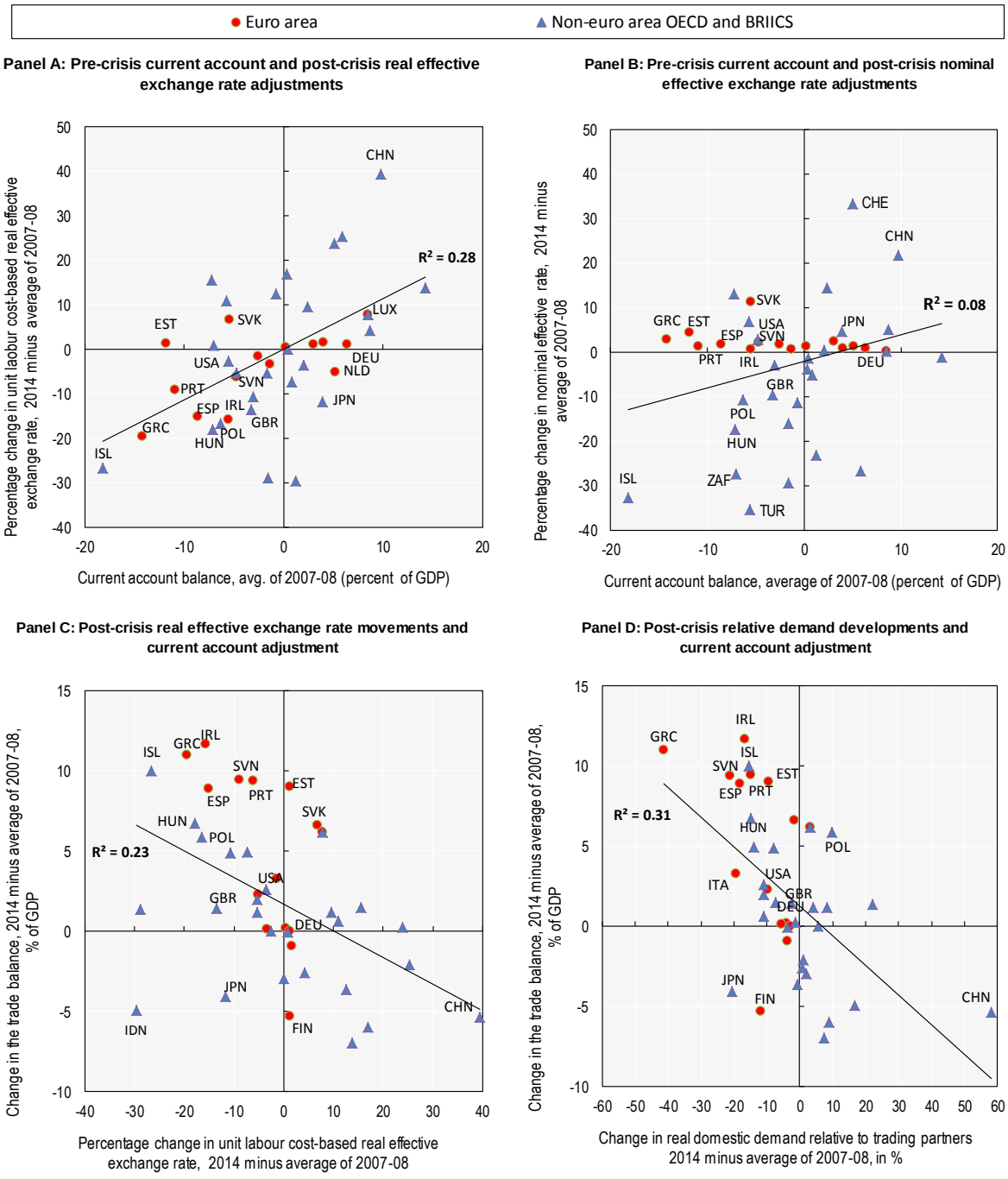
3. The remainder of the paper is structured as follows. Section 2 briefly describes current account and exchange rate developments in the wake of the global financial crisis, including case studies of the apparent weak response of the current account balance of both Japan and the United Kingdom to recent large currency depreciations. Section 3 considers alternative hypotheses for a changing response of the trade balance to exchange rate changes, with an emphasis on the role of the expansion of global value chains. Section 4 considers the implications of exchange rate changes given the increased polarisation of net external asset positions, particularly the risk that it exposes vulnerabilities for countries with net external debt and foreign currency liabilities. Finally, section 5 draws together the policy implications of the preceding analysis.

2. Post-crisis current account and exchange rate developments

4. Exchange rate developments in the wake of the global crisis have been broadly consistent with external adjustment in the sense that real exchange rate depreciations were larger for countries with larger pre-crisis current account deficits (Figure 1, Panel A). However, most of the adjustment in real effective exchange rates reflects adjustments in unit labour costs rather than nominal exchange rates, particularly for euro area countries (Figure 1, Panel B).

5. Post-crisis external adjustment appears to be only weakly related to real exchange rate movements, suggesting that expenditure switching – changes in the composition of expenditure across domestic and foreign goods – appears to have played a limited role in post-crisis trade balance adjustment (Figure 1, Panel C). Instead, trade balance adjustments appear to have been associated more with changes in aggregate expenditure as domestic demand in current account deficit countries declined relative to that in current account surplus countries, thereby compressing imports and raising net exports in these countries (Figure 1, Panel D).

Figure 1. **Post-crisis current account and exchange rate adjustments**

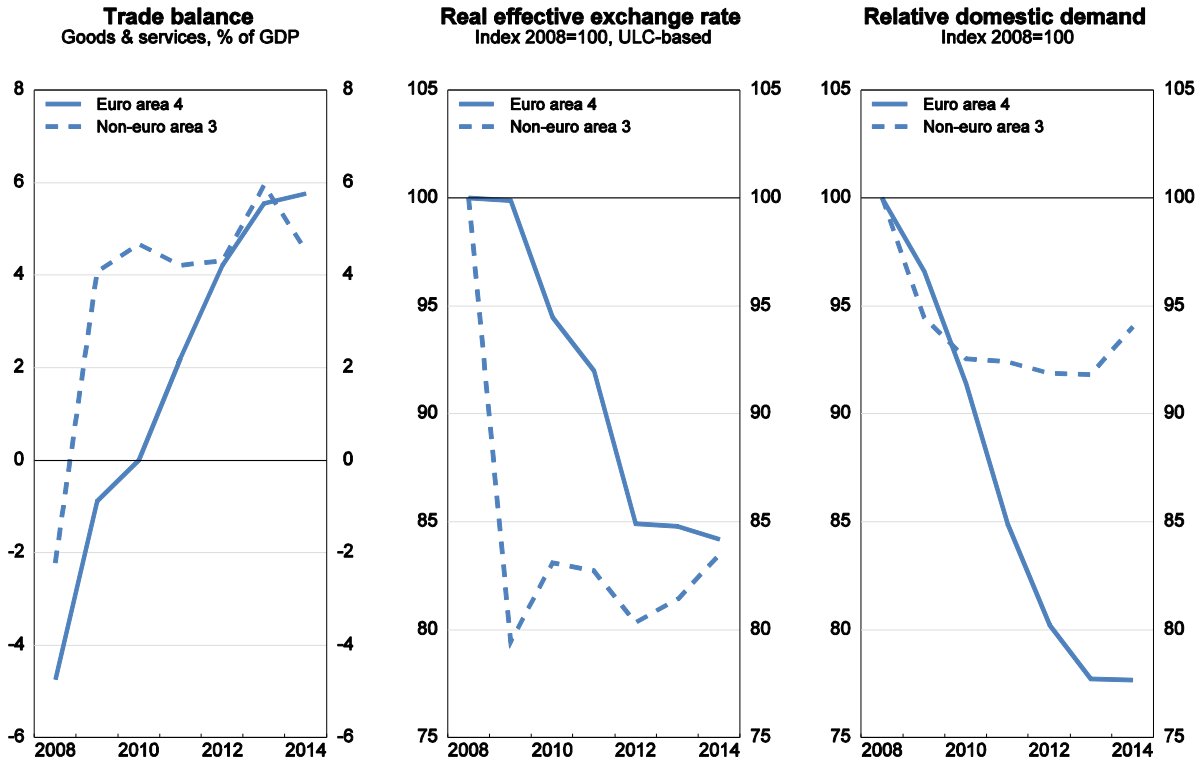


Note*:* The change in domestic demand relative to trading partners is computed as the cumulated growth of domestic demand over 2009-14 minus the trade-weighted cumulated growth of domestic demand in trading partners.

Source: OECD Economic Outlook 96 database.

6. Nominal exchange rate flexibility has nonetheless played a role in facilitating external adjustment, which can be illustrated by a more detailed comparison of selected euro area countries that had large pre-crisis current account deficits (Greece, Ireland, Portugal and Spain) with European countries that had similar pre-crisis current account deficits but flexible nominal exchange rates (Hungary, Iceland and Poland).[2] Whilst the overall trade balance adjustment has been similar across the two zones (Figure 2), for the non-euro area countries, the large nominal currency depreciation of 2009 triggered an immediate large fall of the real effective exchange rate allowing domestic demand to stabilise more quickly as expenditure shifted to domestically-produced goods and services and exports recovered. By contrast, the real effective exchange rate adjustment for the euro area countries was significantly more protracted and was primarily achieved through labour shedding, as also reflected in declining prices and in continual declines of domestic demand relative to trading partners over 2009-13 and stabilisation only in 2014.

Figure 2. **Current account reversals in selected euro area and non-euro area countries**



Note: Euro area 4 is a non-weighted average of Ireland, Greece, Portugal and Spain while non-euro area 3 is a non-weighted average of Hungary, Iceland, and Poland. The relative domestic demand index is based on the difference between domestic demand growth and the trade-weighted domestic demand growth of its trading partners.

Source: OECD Economic Outlook 96 database; and OECD calculations.

7. For Japan and the United Kingdom, there has been a striking disconnect between large currency depreciations and changes in current account balances. However, whilst these developments

2 . The comparison is based on non-weighted averages of macroeconomic aggregates for the two country groups. Using weighted averages would give undue weight to Spain for the euro area group and Poland for the non-euro area group but would not materially change the results.

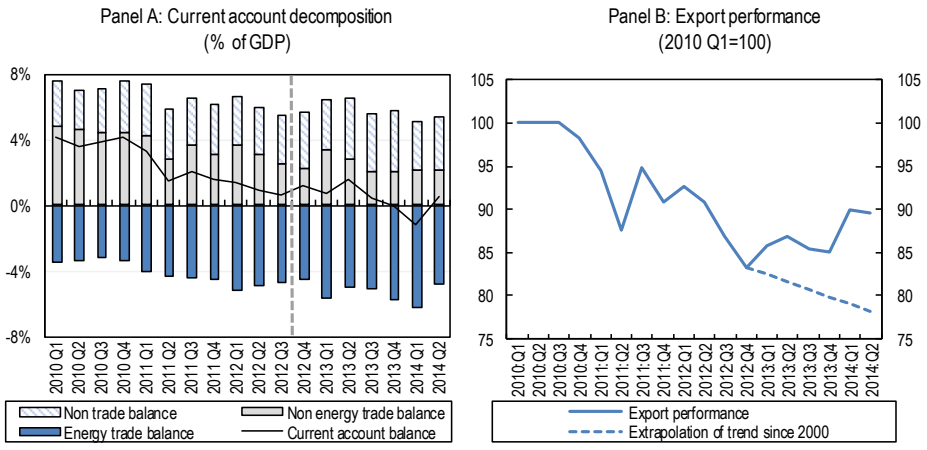
may partly be indicative of a declining response of price competitiveness and hence the trade balance to the exchange rate, an issue which is explored with a broader country coverage in the following section, they predominantly reflect country-specific factors as described in Box 1. Moreover, in both cases, there is clear evidence of a pass-through into domestic inflation: yen depreciation has contributed to the increase in consumer price inflation over the past two years and is expected to continue to do so in the near term (Bank of Japan, 2014); and sterling depreciation is considered to be an important factor in explaining why consumer price inflation persistently overshot the 2% target over much of the three years following the crisis (Bank of England, 2013).

Box 1. Current account adjustment to large currency depreciations in Japan and the United Kingdom

Japan: The yen depreciated by around 25% on a trade-weighted basis after the third quarter of 2012, but the current account declined from a surplus of around 1% of GDP in 2012 to close to balance in the year to the second quarter of 2014. The trade balance declined by 1½ percentage points of GDP, which was partly offset by an increase in the income balance (Box Figure 1, Panel A). There are a number of country-specific factors which contribute to explaining these developments:

- Unusually weak export market growth following the depreciation has limited any improvement in the trade balance; in the 2 years following the depreciation, Japan's export market growth has only averaged 3% per annum, compared to 5% per annum over the preceding two years and 6½ per cent per annum over the preceding decade. On the other hand, export performance, that is export volume growth normalised on export market growth, has shown tentative signs of an upswing over the past year, particularly relative to previous trends. In the year to the second quarter of 2014 export market shares had stabilised at their 2012 levels (Box Figure 1, Panel B), despite two previous decades of steady decline.
- The increase in net mineral fuel imports in the aftermath of the Fukushima disaster in 2011, which led to the closure of all nuclear power stations, directly contributed around ½ percentage point of GDP to the decline in the trade balance.
- Favourable external wealth effects from the yen depreciation may have raised consumption and imports, although simulation exercises on the National Institute's Global Economic Model (NIGEM) suggest the trade balance effects are modest, reducing the trade balance by at most 0.2% of GDP.

Box Figure 1**: Current account developments and export performance for Japan**



Note*:* The energy trade balance denotes net imports of mineral fuels (SITC category 3). Export performance is calculated by comparing export volumes to a measure of export markets, which are calculated as a weighted average of imports of trading partners.

Source: OECD Economic Outlook 96 database; Japanese Ministry of Finance.

United Kingdom: Sterling depreciated by around 25% on a trade-weighted basis between the second quarter of 2007 and the first quarter of 2009 and has only started to recover part of its losses after mid-2013. However, the current account deficit increased from around 2¾ per cent of GDP in the year preceding the depreciation to about 3½ per cent in the year to mid-2013. A number of factors contribute to explaining these developments:

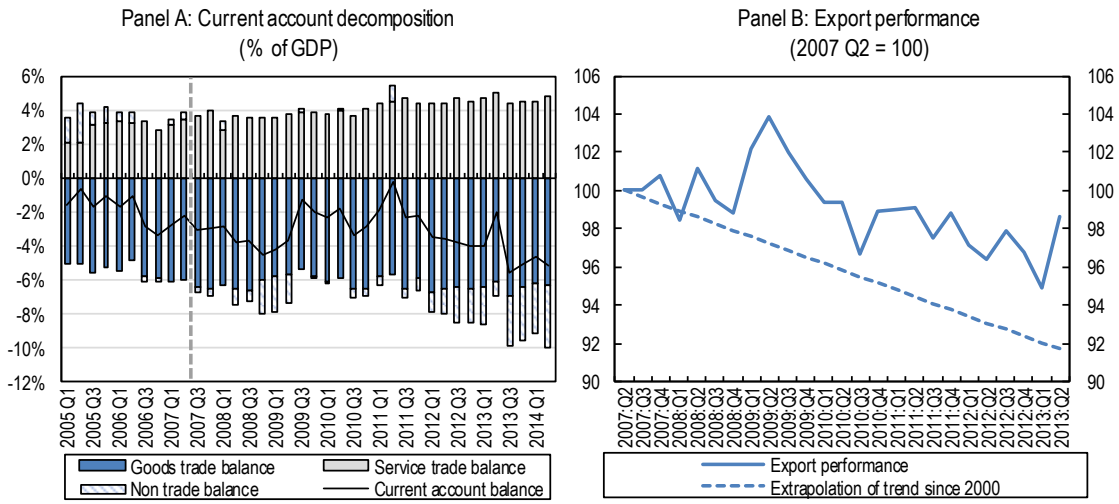
- There was an increase in the trade balance, albeit modest, from around -2¾ per cent of GDP in the year preceding the depreciation to -1½ per cent in mid-2013, but it was offset by a decline in the investment income balance of 1⅔ per cent of GDP over the same period (Box Figure 2, Panel A). The decline in the investment balance reflects the fall in returns earned on the United Kingdom's overseas investments in the wake of the global financial crisis.

- Any improvement in the trade balance has been restrained by the ongoing and extreme weakness in the euro area which is the UK's main trading partner; while the output gap is nearly closed in the UK, the current output gap for the euro area is estimated to be wider than in the immediate aftermath of the financial crisis. On the other hand, whilst export performance (only) broadly stabilised between the initial depreciation and mid-2013, this represented an improvement relative to previous negative trends (Box Figure 2, Panel B).

- The increase in the trade balance is fully accounted for by services whereas the goods trade balance remained broadly stable. This is consistent with the fact that the pass-through of the currency depreciation to the terms of trade has been stronger for services than for goods, which may reflect the fact that the services sector is less integrated into global value chains than goods; as the currency depreciation is partly passed through to import prices, exporters of goods need to raise prices to maintain profit margins, thereby limiting gains in export price competitiveness.

- A complementary explanation may be that the expansion of goods exports in response to the currency depreciation may require larger fixed investment than the expansion of services exports, which are typically more labour intensive. Reflecting impaired credit provision, fixed business investment has been subdued in the wake of the crisis of 2008-09. Desai et al. (2008) show that financing constraints explain a large part of cross-firm differences in the adjustment of investment and exports to exchange rate depreciations.

Box Figure 2**: Current account developments and export performance for the United Kingdom**



Note: Export performance is calculated by comparing export volumes to a measure of export markets, which are calculated as a weighted average of imports of trading partners.

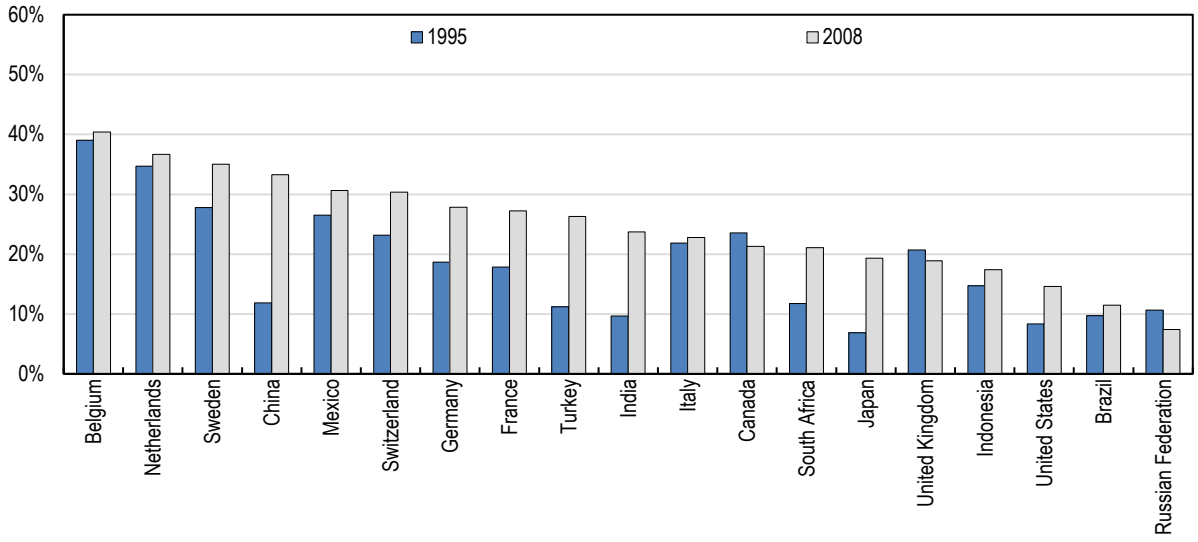
Source: OECD Economic Outlook 96 database.

8. Previous OECD empirical analysis suggests that while the exchange rate is associated with the trade balance, the magnitude of the association is moderate (Ollivaud and Schwellnus, 2013). Bearing in mind the caveat that the exchange rate is determined endogenously by macroeconomic developments rather than being a exogenous driver of macroeconomic developments, reduced form estimation for the major trading areas (China, euro area surplus and deficit countries, Japan, oil exporters and United States) suggests that a 10% fall in the real exchange rate (with an unchanged output gap relative to trading partners) is associated with an increase in the non-oil trade balance by 0.4 to 0.8 percentage points of GDP. These results imply that exchange rate changes have only contributed about one-sixth of the observed contraction of post-crisis global current account imbalances, while about two thirds of the contraction is explained by relative business and housing cycle conditions.

3. Changes in exchange rate effects operating through the trade channel

9. A weak response of the trade balance to the exchange rate can either result from a low responsiveness of trade volumes to changes in international relative prices or a low pass-through of exchange rate changes into international prices. There is a large academic literature on the incomplete pass-through of exchange rate changes into international prices. Empirical studies typically find that there is a sizable degree of pricing to market; rather than setting prices in domestic currency, exporters set prices in the destination market's currency and adjust prices only partially in response to exchange rate movements (Goldberg and Campa, 2010). Distribution margins, which for a number of industrialised countries are in the order of 50-70% (Berger et al., 2009), further insulate consumer prices from exchange rate movements. A further explanation for low pass-through of the exchange rate into the terms of trade is the high share of intermediate inputs in exports; so that while currency depreciations raise the price of imported intermediate inputs in domestic currency, they also raise the marginal cost to exporters, which in turn need to raise export prices to maintain profit margins (Amiti et al., 2014). The latter explanation is examined in greater detail below, particularly given its ability to not only explain why the exchange rate pass-through might be weak, but why it might now be weaker than in the past, reflecting the expansion of global value chains, which has resulted in a rising share of imported intermediate inputs in exports (Figure 3).

Figure 3. **Foreign value added content of gross exports**

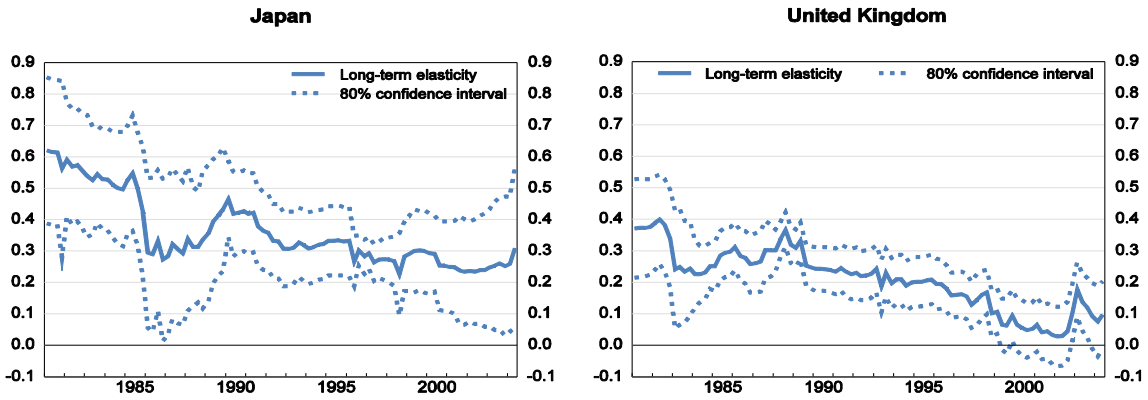


Source: OECD-WTO Trade in Value Added database.

Reduced-form empirical analysis suggests that across OECD countries the pass-through of exchange rate movements to the terms of trade has weakened over the past two decades. For nine out of the eleven OECD countries analysed, the estimated elasticity of the terms trade to the exchange rate was lower over the period 1993-2014 than over 1970-1992 (Annex, Table A1.1). Rolling regressions confirm that for most countries analysed pass-through of exchange rate movements to the terms of trade has been trending down over the past two decades, including for Japan and the United Kingdom (Figure 4 and Annex, Figure A1.1).[3]

Figure 4. **Rolling pass-through elasticities to the terms of trade for Japan and the United Kingdom**

20-year estimation window



Note: The pass-through elasticities are obtained from the following reduced-form regression estimated at the quarterly frequency:

$$\Delta \ln tt_{k,t} = c_k + \sum_{i=1}^{4} \theta_{k,i} \Delta \ln tt_{k,t-i} + \sum_{i=0}^{4} \alpha_{k,i} \Delta \ln e_{k,t-i} + \sum_{i=0}^{4} \beta_{k,i} \Delta \ln rpc_{k,t-i} + \sum_{i=0}^{4} \gamma_{k,i} \Delta \ln rdd_{k,t-i} + \sum_{i=0}^{4} \delta_{k,i} \Delta \ln pcom_{k,t-i} + \varepsilon_{k,t}$$

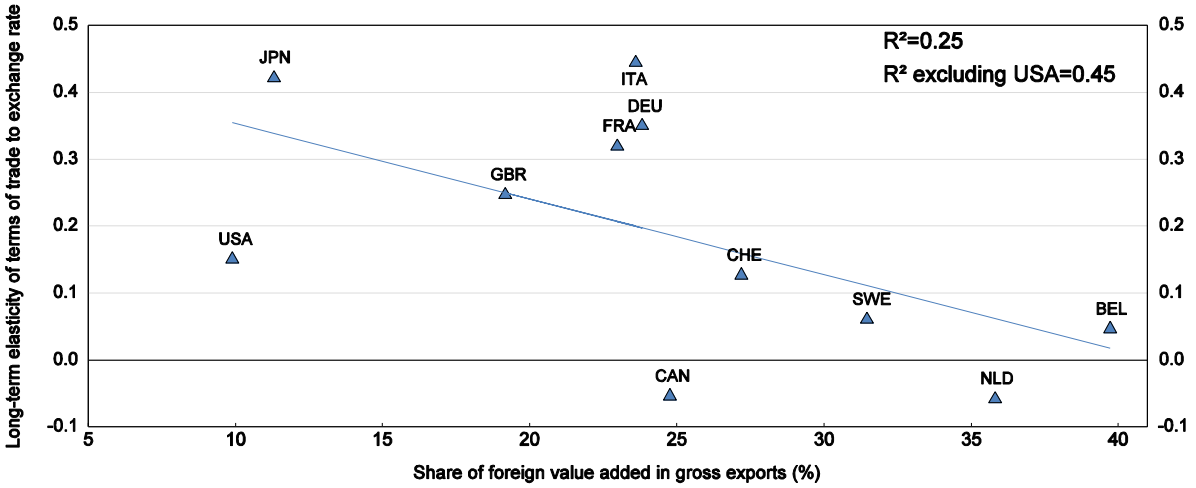
where $tt_{k,t}$ denotes the terms of trade for country *k* at period *t*; $e_{k,t}$ denotes the nominal effective exchange rate; $f_{k,t}$ is a proxy for production cost in k's trading partners; $p_{k,t}$ is the total domestic demand deflator; $pc_{k,t}$ is a relevant commodity deflator; and $\varepsilon_{k,t}$ is the error term (see Annex). The date on the horizontal axis denotes the mid-point of the estimation sample.

Source: OECD Economic Outlook 96 database.

10. Exchange rate pass-through to the terms of trade is typically lowest for the countries with the highest import content of exports, such as Belgium, Netherlands and Sweden (Figure 5) suggesting that exchange rate pass-through and international production fragmentation are related. However, the fact that for the United Kingdom exchange rate pass-through declined over the past two decades despite a broadly constant share of foreign value added in gross exports suggests that other factors, such as shifts in the composition of traded goods (Campa and Goldberg, 2005), may also be important determinants of exchange rate pass-through. Moreover, the United States is a clear outlier, with a relatively low exchange rate pass-through to the terms of trade, despite a low import content of exports. Empirical estimates of exchange rate elasticities for the United States are generally lower than for other OECD countries (Bussière et al. 2014), which, on the export side, may reflect the US dollar's dominance as an invoicing currency in international trade and, on the import side, may reflect exporters' decision to price to the large US market in order to maintain competitive positions.

3. Chow tests of parameter stability detect statistically significant changes across the first and the second sample periods for only 6 out of the 11 analysed countries. This may reflect the fact that according to the rolling regression estimates reported in the Annex Figure A1.1 the timing of declines in exchange rate pass-through has differed across countries, which makes the identification of a statistically significant change using a common break date difficult.

Figure 5. **Pass-through to the terms of trade appears to be related to import content of exports**



Notes*:* The reported exchange rate pass-through coefficients denote elasticities estimated over the full sample period 1970-2014 (see Annex). The share of foreign value added in gross exports is the average for 1995, 2000, 2005, and 2009.

Source: OECD Economic Outlook 96 database; and OECD-WTO Trade in Value Added database.

11. A complementary explanation for a growing exchange rate disconnect could be that the elasticity of trade volumes to trade prices has decreased. This may, for instance, reflect a shift in the composition of trade from undifferentiated and highly price-elastic goods and services to more differentiated and less price-elastic goods and services. However, empirical analysis reported in the Annex suggests that evidence for declines in price elasticities is mixed; for five of the eleven OECD countries analysed, price elasticities declined over time, while they increased or remained stable for six.[4]

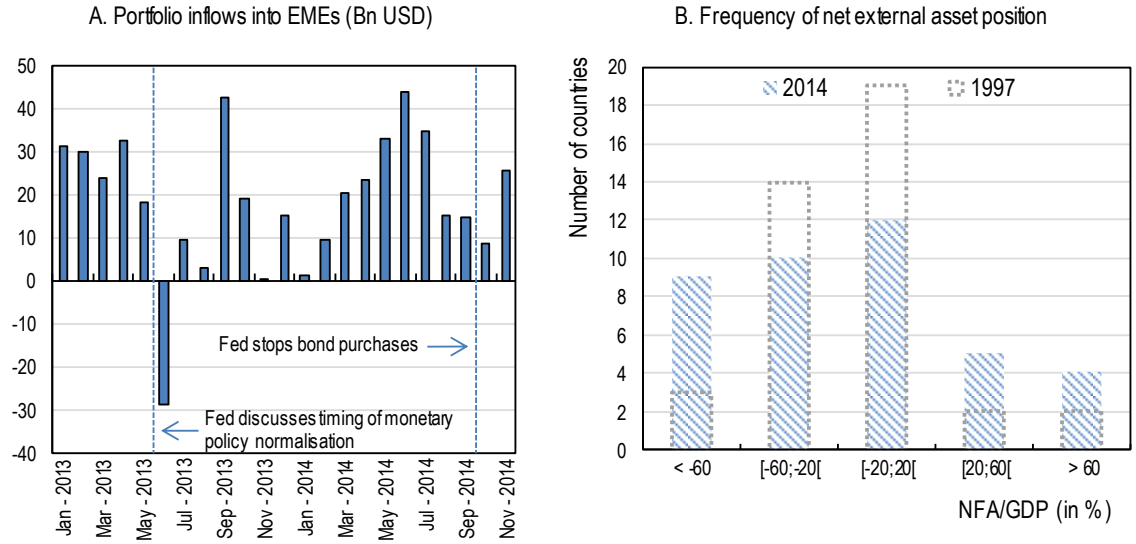
4. Changes in exchange rate effects operating through the financial channel

12. Gross capital inflows remain elevated, especially for emerging market economies, but even small changes in expectations about monetary policy have the potential to trigger large capital flow reversals which, in turn, may cause large exchange rate re-alignments. For instance, portfolio flows to emerging market economies reversed in June 2013 in response to the discussion on the timing of monetary policy normalisation at the US Federal Reserve in May 2013 (Figure 6, Panel A).

13. Given the polarisation of external positions, especially on the net debtor side, such exchange rate re-alignments may imply large changes in external wealth. Since 1997 the number of countries with net external debt above 60% of GDP increased from three to nine (out of a total of 40 OECD and BRIICS countries analysed) while the number of countries with broadly balanced international investment positions declined from 19 to 12 (Figure 6, Panel B), with further implications for current account investment income flows, wealth effects on domestic expenditures as well as the possibility of exposing financial vulnerabilities.

4 . These results are based on estimated export volume equations.

Figure 6. **Gross capital flows are volatile, especially for EMEs, and net external positions have polarised**



Note: Panel B includes OECD countries and the BRIICS.

Source: Institute of International Finance Portfolio Flows Tracker; IMF Balance of Payments Statistics.

14. Macroeconomic model simulations suggest that for countries with limited foreign currency liabilities – as for most OECD countries – the direct effect of changes in external wealth attributable to currency movements on the trade and investment income balances is modest. Taking Japan as an illustrative example, chosen because at 60% of GDP net external assets are among the highest for OECD countries,[5] simulations on the National Institute's Global Economic Model (NIGEM) suggest that increased imports resulting from higher consumption in response to the higher domestic currency value of net external wealth, offset only about 10% of the competitiveness-induced increase in exports following yen depreciation,[6] while the improvement in the investment income balance for a 10% depreciation of the yen is only about 0.1-0.2 percentage points of GDP.

15. Experience from past balance of payments crises suggests that the financial channel may be more relevant for countries with large net external liabilities, especially for those for which external liabilities are mainly denominated in foreign currency. For instance, large currency depreciations during the Asian emerging market crises of the 1990s implied large adverse external wealth effects and declines in income balances. The fact that declines in net external wealth and in income balances were roughly proportional to net external debt denominated in foreign currency, suggests that external wealth and income effects were in large part driven by exchange rate movements rather than movements in returns on external assets and liabilities in local currency.[7]

16. A more accurate measure of aggregate foreign currency exposure than net external liabilities is the difference between external assets denominated in foreign currency and external liabilities

5 . Net external assets excluding foreign currency reserves are around 40% of GDP.

6. The estimated consumption equation of NIGEM for Japan has an estimated elasticity of about one-tenth between consumption and total wealth.

7 . All else being equal, an exchange rate depreciation raises the domestic currency value of net external debt denominated in foreign currency and of the associated income payment.

denominated in foreign currency, which can be approximated under the stylised assumption that all external assets and external bank and portfolio debt liabilities are denominated in foreign currency, while portfolio equity and foreign direct investment liabilities are denominated in domestic currency. For those countries that issue a significant share of external debt in domestic currency, including Mexico and South Africa, foreign currency exposure computed under the stylised assumption that all external debt liabilities are denominated in foreign currency is likely to be an overestimate.[8] On the other hand, for some countries a significant share of FDI liabilities may be equivalent to debt liabilities denominated in foreign currency; intra-firm lending and borrowing of foreign affiliates is classified as direct investment in official balance of payments statistics although it may in part reflect offshore bond issuance of foreign affiliates without foreign currency revenues which may lend on the proceeds to the parent company (Avdjiev et al., 2014).

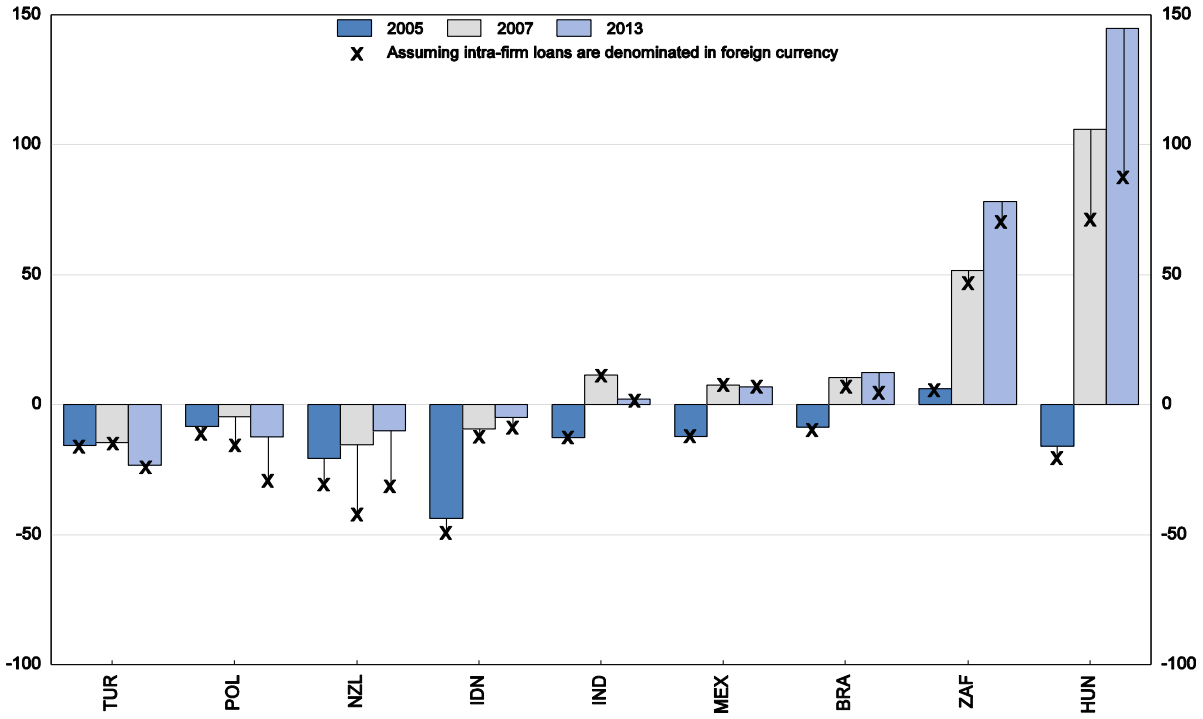
17. For most large external debtors, as well as for selected emerging market economies with net external liabilities, aggregate foreign currency exposures as measured by the difference between external assets and liabilities denominated in foreign currency are limited. Out of the nine countries with net external debt above 60% of GDP at the end of 2013, five were euro area countries (Greece, Ireland, Portugal, Slovak Republic and Spain) with both external assets and liabilities predominantly denominated in their own currency. Abstracting from the special case of Iceland,[9] for the remaining countries with net external debt above 60% of GDP (Hungary, New Zealand and Poland) as well as for all large emerging market economies with net external debt, foreign currency exposure is low, with the exception of Turkey (Figure 7). For most countries analysed, this mainly reflects a shift in the composition of external liabilities from debt to equity, while declines in total net external liabilities played a role for Indonesia, New Zealand and South Africa. Even if intra-firm loans are assumed to be entirely denominated in foreign currency and not to be matched by revenues in foreign currency, which likely overstates foreign currency exposures, net external debt denominated in foreign currency remains well below levels observed in the 1990s, except for New Zealand, Poland and Turkey.

8 . The share of external debt denominated in domestic currency is around 10% for Turkey; 25% for Hungary and India; 40% for Mexico; and 55% for South Africa (IMF-OECD-World Bank Joint External Debt Hub Database). For the remaining countries analysed in this section, data on the currency denomination of external debt is not available in the IMF-OECD-World Bank Joint External Debt Hub Database.

9 . The central bank of Iceland estimates that correcting for external assets and liabilities of failed banks reduces net external debt to around 60% of GDP (Sedlabanki, 2012).

Figure 7. **Net external assets denominated in foreign currency**

In per cent of GDP



Note: Bars denote net external assets denominated in foreign currency computed as the difference between total external assets and external liabilities excluding portfolio equity and foreign direct investment liabilities. Crosses denote external assets denominated in foreign currency computed as the difference between total external assets and external liabilities excluding portfolio equity and foreign direct investment liabilities after removing intra-firm loans from direct investment liabilities. As data on intra-firm loans for 1997 are not available for Brazil, Indonesia, South Africa and Turkey, intra-firm loans for 1997 for these countries are based on the share in 2001 of intra-firm loans in total of foreign direct investment liabilities. No data on intra-firm loans are available for Mexico.

Source: IMF, Balance of Payments database; updated and extended version of dataset constructed by Lane and Milesi-Ferretti (2007); and OECD Economic Outlook 96 database.

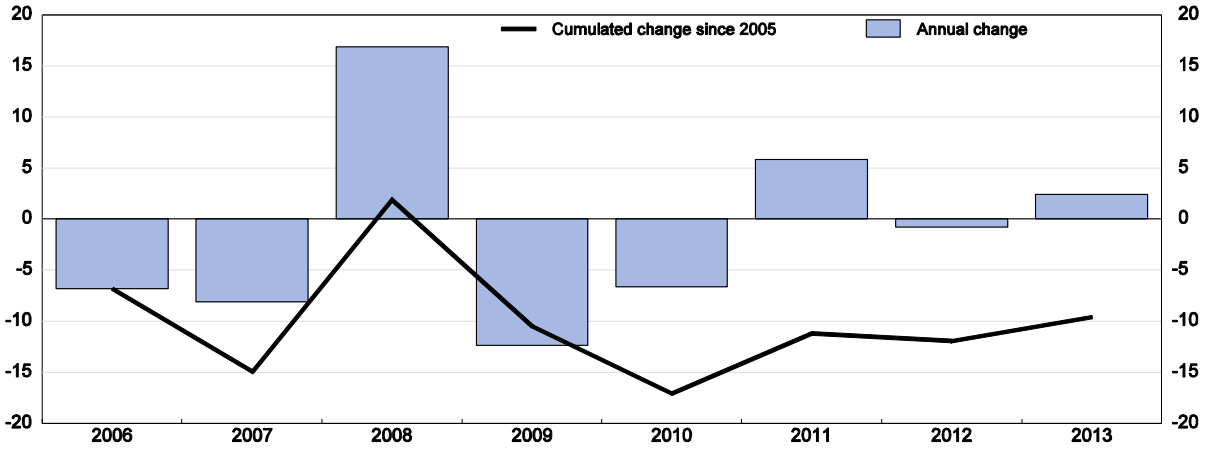
18. Despite sizable movements in exchange rates for emerging market economies over the past years, valuation effects on net external assets and changes in income balances have been modest (Figure 8), suggesting that for these countries the impact of exchange rate fluctuations through the financial channel may be less pronounced than in the past. Valuation effects were large only during the global financial crisis of 2008-09 when asset prices in local currency fluctuated significantly. In stark contrast to the Asian financial crises of 1997-98 during which valuation effects were substantially negative, the large currency depreciations of 2008 were associated with positive valuation effects on net external assets;[10] lower currency exposures implied that declines in liabilities denominated in local currency dominated effects from exchange movements.[11]

10 . Reflecting the fact that external assets and liabilities are evaluated at end-of-period values, the relevant measures are end-of-period exchange rates.

11 . The large currency depreciations of mid-2013 for a number of emerging market economies were associated with marginal changes in income balances, except for Turkey for which the balance declined by ¾ percentage point of GDP during the second quarter of 2013. The large decline for

Figure 8. **Valuation effects on net external assets for selected emerging market economies**

BRIICS excluding China, in per cent of GDP



Note: Cumulated valuation effects are computed as the difference between observed net external assets and an alternative measure computed using the cumulated financial account balance.

Source: IMF, Balance of Payment database; and OECD Economic Outlook 96 database.

19. Although direct adverse wealth effects and changes in income balances from currency movements may be less of a concern than in the past, large capital outflows associated with currency depreciations may nonetheless be highly disruptive. For instance, large equity outflows may cause declines in the domestic stock market which may dwarf the direct wealth effects from the initial currency depreciation. This was the case for emerging market economies in 2008 when large declines in net external portfolio liabilities predominantly reflected large declines in domestic stock and bond markets rather than net capital outflows (Annex, Figure A1.2). Large outflows of portfolio and bank debt may cause increases in domestic interest rates, thereby causing funding problems for banks and the private sector at large. Large capital outflows associated with currency depreciations may cause particularly large macroeconomic disruptions for net external debtor countries with current account deficits such as Brazil, Indonesia, India, Mexico, New Zealand and Turkey; for these countries the unavailability of external finance would require rapid current account adjustments, which would likely be achieved, at least in part, by declines in domestic absorption.

20. The decline of net external debtors' foreign currency exposure at the aggregate level may, however, conceal large financial derivatives positions that are not fully captured in financial account data as well as currency mismatches at a more disaggregated level. For a number of emerging markets, large external assets denominated in foreign currency reflect in large part foreign currency reserve accumulation by the official sector. Foreign currency exposure for the private sector may therefore be substantially higher than suggested by the aggregate figures.

Turkey is consistent with high foreign currency exposure relative to other emerging market economies (see Figure 7). It is, however, significantly smaller than the decline of more than 5 percentage points of GDP for Indonesia in 1998, which is consistent with the fact that the ratio of net external debt denominated in foreign currency to GDP for Turkey in 2013 was only around ¼ of the ratio for Indonesia in 1997 (see Figure 7).

21. Moreover, even if foreign currency assets match liabilities for the private sector as a whole, there may be currency mismatches within the private sector as the sectors or entities with gross foreign currency debt may not be those holding gross foreign currency assets or earning foreign currency revenues. Experience from past financial crises, especially in emerging market economies, suggests that currency mismatches in one sector can rapidly spill over to other sectors, thereby triggering a financial crisis despite the absence of currency mismatches at the aggregate level (Rosenberg et al., 2005).

22. For a number of net external debtors, including India, Poland and Turkey, the trend to declining foreign currency exposure over the past two decades has partly been reversed in the wake of the global crisis of 2008-09. These countries appear to have financed sizable post-crisis current account deficits mainly through foreign debt issuance rather than increases in equity liabilities (see Figure 7). Although foreign currency exposure remains below the levels of the mid-1990s, India, Poland and Turkey may therefore be more vulnerable now to large exchange rate fluctuations than on the eve of the global crisis of 2008-09.

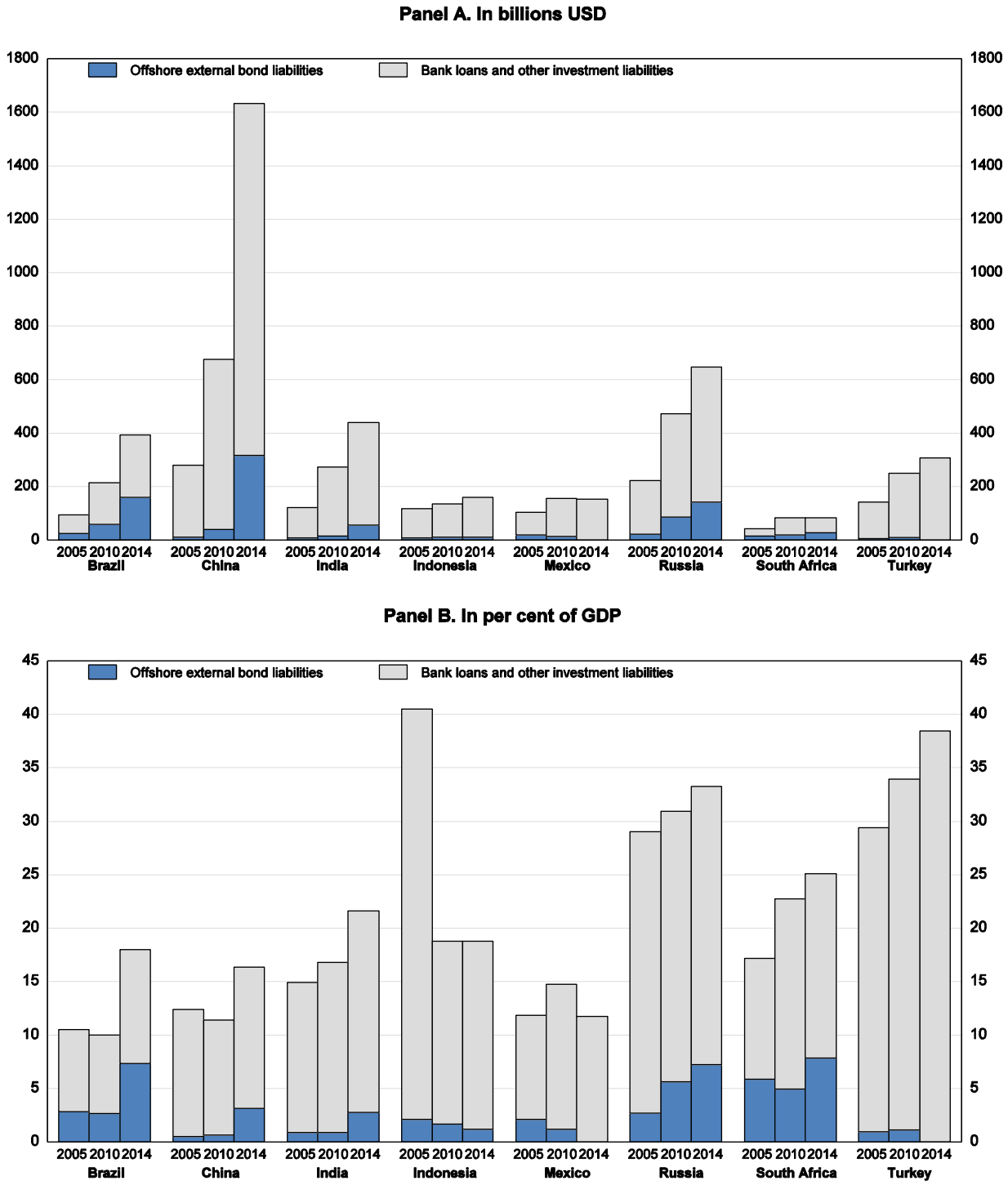
23. For some emerging market economies, including net external creditors, there has been a sizable increase in foreign currency borrowing over the past few years (Figure 9, Panel A). In US dollar terms, the increase in cross-border loans and offshore external bond liabilities, which reflects in large part borrowing by non-financial corporations and is mainly conducted in foreign currency (Chui et al., 2014), has been particularly pronounced for China and the Russian Federation.[12] The increase in foreign currency borrowing is less pronounced for these countries when expressed as a share of GDP (Figure 9, Panel B) and has to be seen in the context of large foreign currency accumulation over the same period.[13] However, it may nonetheless cause financial stress for specific firms or sectors with possible implications at the aggregate level; firms without foreign revenues, such as property and real estate companies, may be unable to service their foreign and domestic debt in case of large currency depreciations, with knock-on effects for the domestic financial sector.[14] Even firms or sectors with foreign currency revenues may be exposed to currency movements; for instance, the recent decline in oil prices may impair oil exporters' ability to service their foreign currency debt, which may in particular be the case for the Russian Federation.

12. Offshore bond issuance implies that residence-based balance of payments statistics may underestimate aggregate foreign currency exposures although it is worth noting that at least a part of offshore bond issuance is captured as intra-firm loans and other investment in the balance of payments.

13 . The increase in foreign borrowing as a share of GDP is slightly more pronounced when accounting for total international bond issuance by nationals (Figure A1.3). However, onshore international bond issuance may, at least partly, be denominated in local currency.

14. According to BIS (2013), about ⅓ of Chinese cumulative offshore bond issuance between July 2012 and June 2013 was by firms in the property and real estate sectors.

Figure 9. **EMEs' foreign currency borrowing has increased in the wake of the crisis**



Note: Offshore liabilities are computed as the difference between debt securities by nationality of the issuer and by residence of the issuer and are set to zero when the difference is negative (Mexico and Turkey in 2014). Data for the full year 2014 for "bank loans and other investment liabilities" is not available for China (2014Q1) and South Africa (2013).

Source: BIS, Debt securities statistics; IMF Balance of Payment database and OECD calculations.

5. Policy implications

24. Weaker exchange rate pass-through to the terms of trade suggests that in the short term exchange rate re-alignments may have weaker effects on rebalancing global demand than in the past. For instance, the recent depreciation of the euro may by itself be insufficient to address persistent demand shortfalls, given an output gap estimated to be about 3½ per cent for the end of 2014. Based on the results reported above, trade balances are likely to adjust only moderately to the euro depreciation of around 10% on a trade-weighted basis between mid-March 2014 and mid-February 2015 so that other instruments, such as the available flexibility in the fiscal rules and further monetary policy tools, should be used to support demand. An important caveat to this conclusion is that in the medium term exchange rate movements may lead to the relocation of entire production stages across countries, given that companies appear to increasingly fragment the value chain to take advantage of cost differences across countries. Moreover, reduced exchange rate pass-through notwithstanding, exchange rate movements impact firms' profit margins, thereby impacting investment in the medium term.

25. Although the polarisation of net external positions has typically been associated with declines in currency mismatches for net debtor countries, large exchange rate movements may nonetheless cause financial dislocations. A number of emerging market economies for which aggregate currency mismatches are large, such as Turkey, or for which foreign currency borrowing increased significantly over the past few years, such as Brazil, appear to be particularly exposed to such currency risk. As a first line of defence, these countries may need to strengthen macro-prudential regulation while global liquidity remains abundant, e.g. by tightening bank regulations on foreign currency borrowing. Countries with limited aggregate currency mismatches but large current account deficits, such as South Africa, may be particularly vulnerable to sudden stops in capital inflows, which are typically the trigger of large currency depreciations; for these countries reining in current account deficits by tightening fiscal and monetary policies should be a priority. In the event of extreme exchange rate movements, central banks may need to use foreign currency reserves – which for most emerging countries analysed are large – to try to offset excessive exchange rate volatility and provide foreign currency liquidity to the private sector in order to limit spillovers from exposed sectors and entities.

26. While the focus of this paper is on direct effects of exchange rate movements on trade and external balance sheets, indirect effects from capital flows associated with exchange rate movements may have large macroeconomic effects, especially for net external debtor countries or emerging market countries that have increased external borrowing over the past few years (Rawdanowicz et al., 2014). These countries' central banks may have only limited room to offset the contractionary effects from declines in local stock markets or from large increases in bond yields that may be triggered by large portfolio outflows, as reductions in policy rates may trigger further rounds of capital outflows. For these countries, shifting the composition of external liabilities towards longer maturities while external financing conditions remain favourable should be a priority (Ahrend et al., 2013). In the event of extreme capital movements and as a measure of last resort, countries may need to use targeted and temporary capital outflow controls to avoid a sharp tightening in local financial conditions.

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ANNEX 1: SUPPORTING TECHNICAL MATERIAL

Estimation of exchange rate pass-through to the terms of trade

Methodology and data

27. The aim of the regression analysis is to estimate the elasticity of the terms of trade to the nominal effective exchange rate and to assess whether the estimated elasticity has changed over time. The regression analysis is conducted for 11 OECD countries and 8 selected emerging-market economies (EMEs). While exchange rate pass-through is typically estimated separately for export and import prices (e.g. Bussière et al., 2014; Campa and Goldberg, 2005; Morin and Schwellnus, 2014), this paper estimates exchange rate pass-through to the terms of trade, *i.e.* to the ratio of export and import prices.

28. Exchange rate pass-through to the terms of trade is estimated using a reduced-form equation based on the academic literature on estimating exchange rate pass-through to export and import prices, which abstracts from the causes of exchange rate fluctuations and treats the exchange rate as an exogenous variable. The baseline specification is:

$$\Delta \ln tt_{k,t} = c_k + \sum_{i=1}^{4} \theta_{k,i} \Delta \ln tt_{k,t-i} + \sum_{i=0}^{4} \alpha_{k,i} \Delta \ln e_{k,t-i} + \sum_{i=0}^{4} \beta_{k,i} \Delta \ln rpc_{k,t-i} + \sum_{i=0}^{4} \gamma_{k,i} \Delta \ln rdd_{k,t-i} + \sum_{i=0}^{4} \delta_{k,i} \Delta \ln pcom_{k,t-i} + \varepsilon_{k,t} \qquad (1)$$

where $tt_{k,t}$ are the terms of trade at time *t* for country *k*; $e_{k,t}$ is the nominal effective exchange rate; $\Delta \ln rpc_{k,t-i}$ is the growth rate of the domestic demand deflator relative to the trade-weighted growth rate of the domestic demand deflator in trading partners; $\Delta \ln rdd_{k,t-i}$ is domestic demand growth relative to trading partners; $pcom_{k,t}$ is a commodity deflator (in US dollars) and $\varepsilon_{k,t}$ is the error term. Explanatory variables are typically not statistically significant beyond the fourth lag so that no higher-order lags are included in equation (1). The remainder of the paper focuses on the long-term exchange rate pass-through, *i.e.* $\sum_{i=0}^{4} \propto_{k,i} / (1 - \sum_{i=1}^{4} \theta_{k,i})$, with most of the convergence to the long-term achieved after one year for all countries.

29. The terms of trade are defined as the ratio of export to import prices based on national accounts. For the 11 high-income OECD countries, Mexico and Turkey, quarterly trade prices are available from the beginning of the 1970s, whereas for the BRIICS trade prices are typically not available before the mid-1990s. The nominal effective exchange rate is an index of trade-weighted bilateral exchange rates. Relative growth of production costs is measured as the growth rate of the domestic demand deflator minus the trade-weighted growth rate of the domestic demand deflator in trading partners while relative demand growth is measured as domestic demand growth minus the trade-weighted domestic demand growth in trading partners. The included commodity deflator is the Brent oil price in US dollars except for Canada, for which the deflator is based on minerals, ores & metals (in US dollars).

Estimation results

30. For the high-income OECD countries analysed, the estimated elasticity of the terms of trade to the exchange rate is positive and appears to be smaller for countries that are highly integrated into global value chains (Table A1.1). For countries with higher import content of exports as measured by the share of foreign value added embodied in gross exports – such as Belgium, the Netherlands or Sweden – exchange rate pass-through to the terms of trade is weak and statistically not significant, whereas it is positive and statistically significant at the 10% level for countries with lower import content of exports such as Japan or the United Kingdom.

31. For the majority of the selected OECD countries, exchange rate pass-through to the terms of trade has declined over time. When splitting the sample and comparing an estimation over 1970-92 with an estimation over 1993-2014, the estimated elasticity after one year of the exchange rate with respect to the terms of trade is lower for the second sub-sample for nine out of eleven countries (Table A1.1).[15] Rolling regressions using a window of 20 years also suggest that exchange rate pass through after one year has trended down for the majority of OECD countries analysed (Figure A1.1).

32. For the selected emerging economies, the estimated elasticity of the terms of trade to the exchange rate is statistically significant (at the 10% level) only for Brazil and South Africa (Table A1.1). This is consistent with estimates in Bussière et al. (2014) that for emerging market economies export and import price elasticities tend to be similar.

33. A complementary explanation for exchange rate disconnect could be a decline in the price elasticities of trade volumes, but evidence based on estimated export volume equations for this hypothesis is mixed. The estimated equation is:

$$\Delta \ln xv_{k,t} = c_k + \sum_{i=1}^{4} \theta_{k,i} \Delta \ln xv_{k,t-i} + \sum_{i=0}^{4} \alpha_{k,i} \Delta \ln rpx_{k,t-i} + \sum_{i=0}^{4} \delta_{k,i} \Delta \ln xmkt_{k,t-i} + \varepsilon_{k,t} \qquad (2)$$

where $xv_{k,t}$ is exports of goods and services in volumes of country *k* at time *t*; $rpx_{k,t}$ is the relative export price (the ratio of the export deflator to the trade-weighted export deflator of *k*'s partners); and $xmkt_{k,t}$ is export market size (computed as the trade-weighted average of imports in *k*'s trading partners). The results suggest that price elasticities of exports have increased in absolute terms for five countries (Belgium, Canada, France, Japan and Sweden) and decreased or remained stable for six (Germany, Italy, the Netherlands, Switzerland, United Kingdom and United States) (Table A1.2).

Valuation effects on net external portfolio liabilities

34. For emerging market economies, cumulated valuation effects on net external portfolio liabilities over the period 2006-14 have been small, but annual valuation effects for portfolio equity liabilities amounted to several percentage points of GDP in 2008-09. Cumulated valuation effects can be approximated by the difference between observed net external liabilities and an alternative measure using cumulated inflows (Figure A1.2). The substantially larger decline for observed net external liabilities than for the alternative measure using cumulated flows implies that in 2008 emerging market economies experienced a favourable external valuation effect, which mainly reflected large declines in these countries' equity markets.

15. A Chow breakpoint test points to a statistically significant break in the estimated coefficients for 6 countries (at the 10% significance level).

Total external borrowing of emerging market economies

35. For all emerging markets analysed in this paper, external borrowing increased in the wake of the global crisis of 2008-09. For some of these countries, the increase in external borrowing as a share of GDP is slightly more pronounced when accounting for total international bond issuance by nationals rather than offshore bond issuance (Figure A1.3). However, onshore international bond issuance may, at least partly, be denominated in local currencies.

Annex Tables and Figures

Table A1.1. **Exchange rate pass-through to the terms of trade**

	full sample	1970-1992	1993-2014
Selected OECD countries			
Belgium	0.05	0.08	-0.02
Canada	-0.02	-0.34	0.11
France	0.32***	0.44**	0.08
Germany	0.35***	0.44**	0.35***
Italy	0.45***	0.50***	0.41***
Japan	0.42***	0.74***	0.30**
Netherlands	-0.05	0.00	-0.04
Sweden	0.06	0.02	0.09
Switzerland	0.13*	0.19*	0.07
United Kingdom	0.25***	0.37***	0.06
United States	0.15*	0.24**	0.02
Emerging-Market Economies			
Brazil	0.42***	-	-
China	0.09	-	-
India	0.05	-	-
Indonesia	-0.13	-	-
Mexico	0.08	-	-
Russian Federation	-0.06	-	-
South Africa	0.15**	-	-
Turkey	0.01	-	-

Note: Full sample corresponds to the period 1970-2014 for the selected OECD countries and to 1990-2014 for emerging-market economies (starting date depending on data availability). Statistical significance at 1, 5 and 10 per cent level is denoted by ***, ** and *, respectively.

Source: OECD Economic Outlook 96 database.

Table A1.2. **Price elasticity of exports**

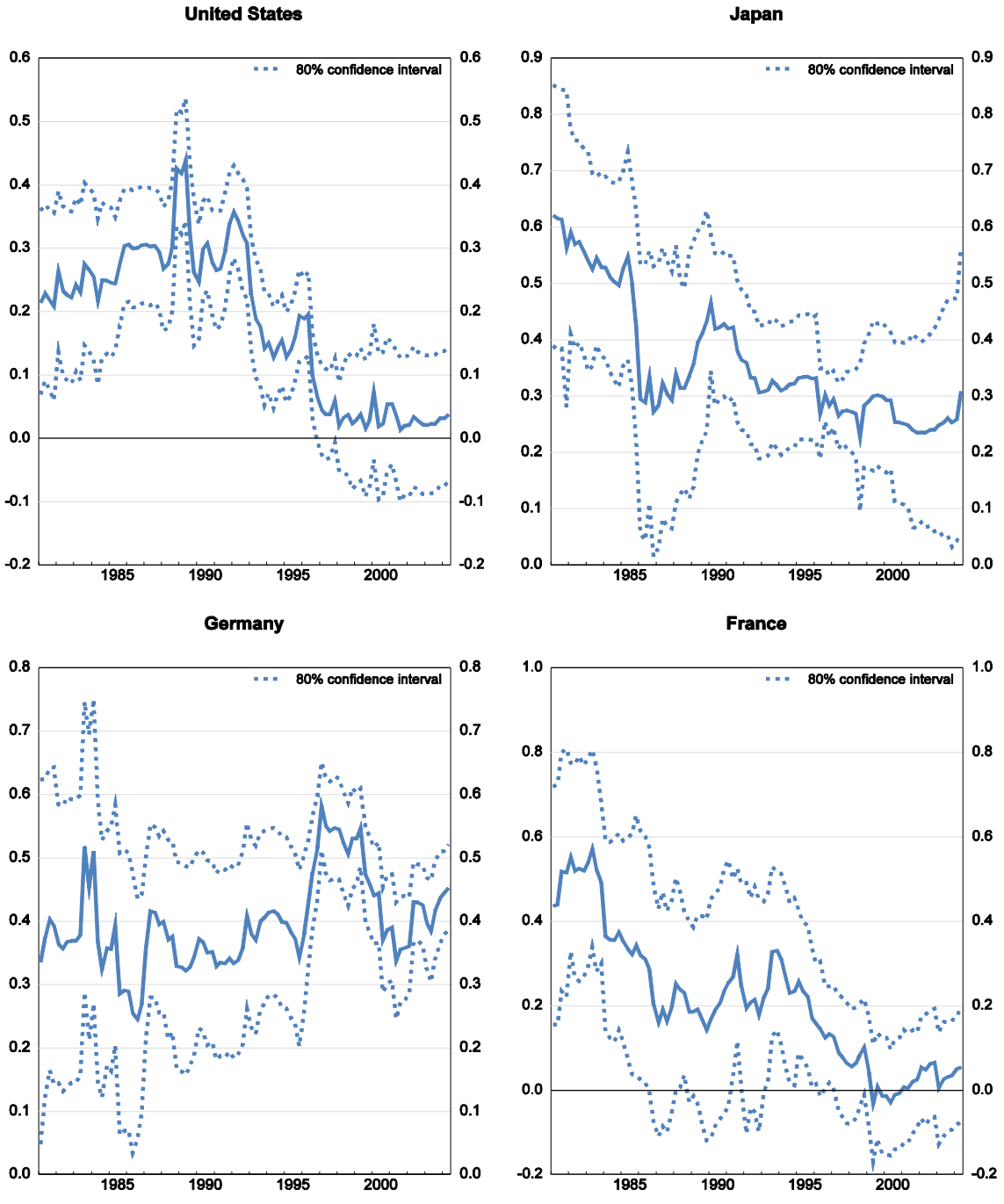
	full sample	1970-1992	1993-2014
Selected OECD countries			
Belgium	-0.19*	-0.02	-0.40**
Canada	-0.33*	-0.35	-0.39
France	-0.25**	-0.22	-0.45***
Germany	-0.37***	-0.44**	-0.44***
Italy	-0.58***	-0.73**	-0.68***
Japan	-0.43***	-0.37**	-0.89***
Netherlands	-0.48***	-0.69***	-0.31
Sweden	-0.25**	-0.07*	-0.37*
Switzerland	-0.82***	-0.86***	-0.72
United Kingdom	-0.47***	-0.59***	-0.56
United States	-0.38***	-0.75***	-0.35**

Note: Full sample corresponds to the period 1970-2014. Statistical significance at 1, 5 and 10 per cent level is denoted by ***, ** and *, respectively.

Source: OECD Economic Outlook 96 database.

Figure A1.1. **Exchange rate pass-through to terms of trade**

Estimated with a 20-year moving window

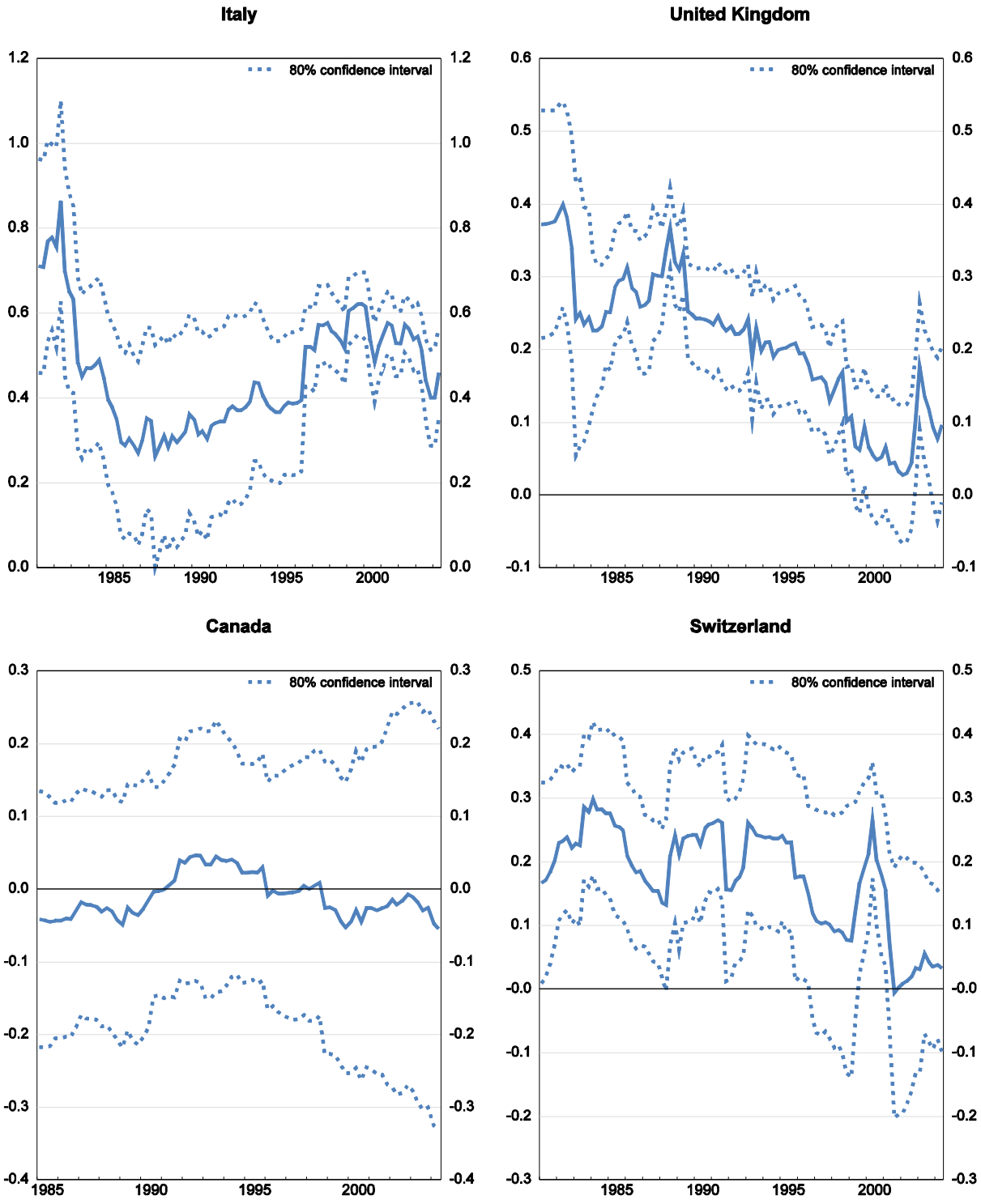


Note: The date denotes the mid-point of the estimation sample.

Source: OECD Economic Outlook 96 database; and OECD calculations.

Figure A1.1. **Exchange rate pass-through to terms of trade (continued)**

Estimated with a 20-year moving window

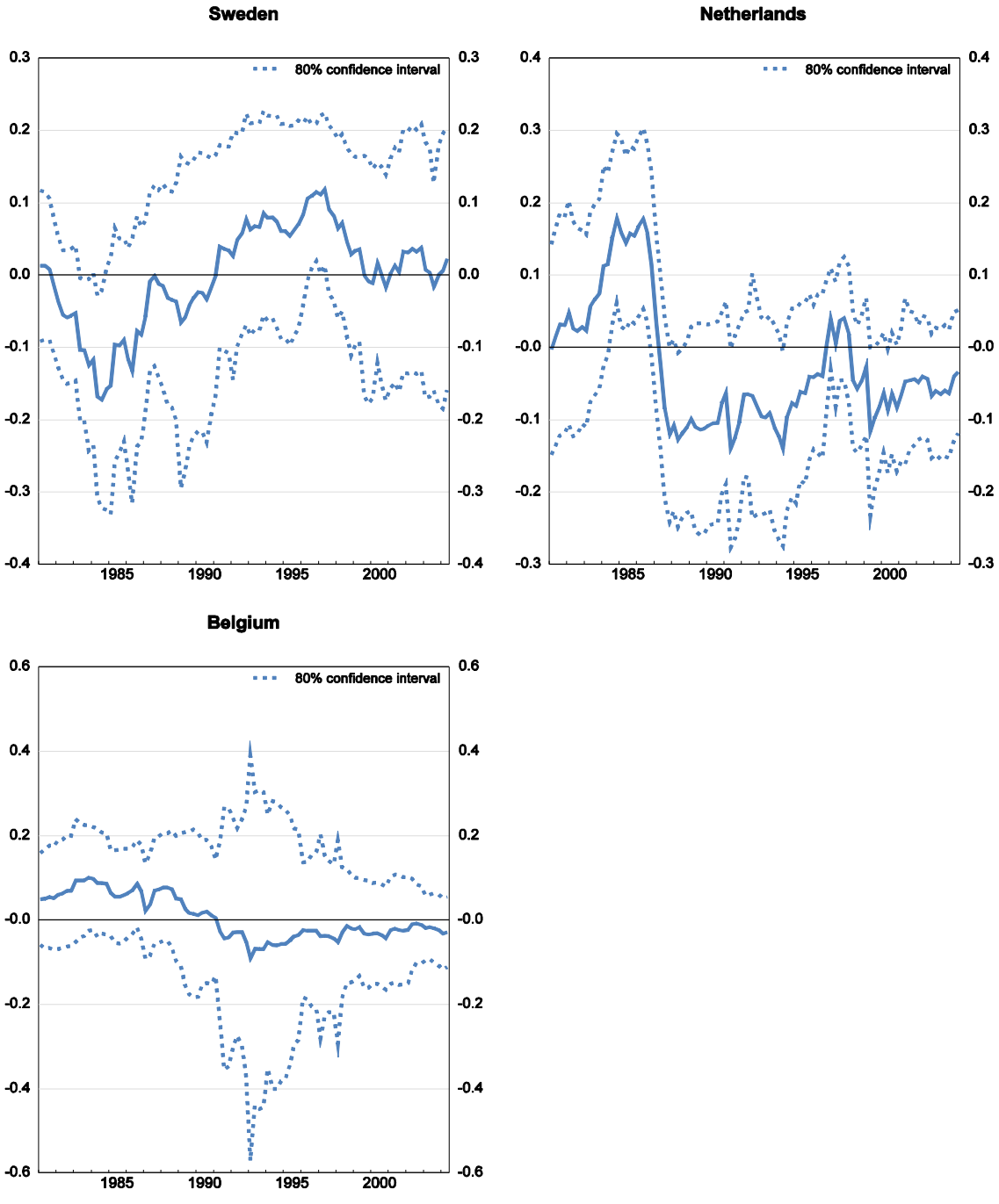


Note: The date denotes the mid-point of the estimation sample.

Source: OECD Economic Outlook 96 database; and OECD calculations.

Figure A1.1. **Exchange rate pass-through to terms of trade (continued)**

Estimated with a 20-year moving window

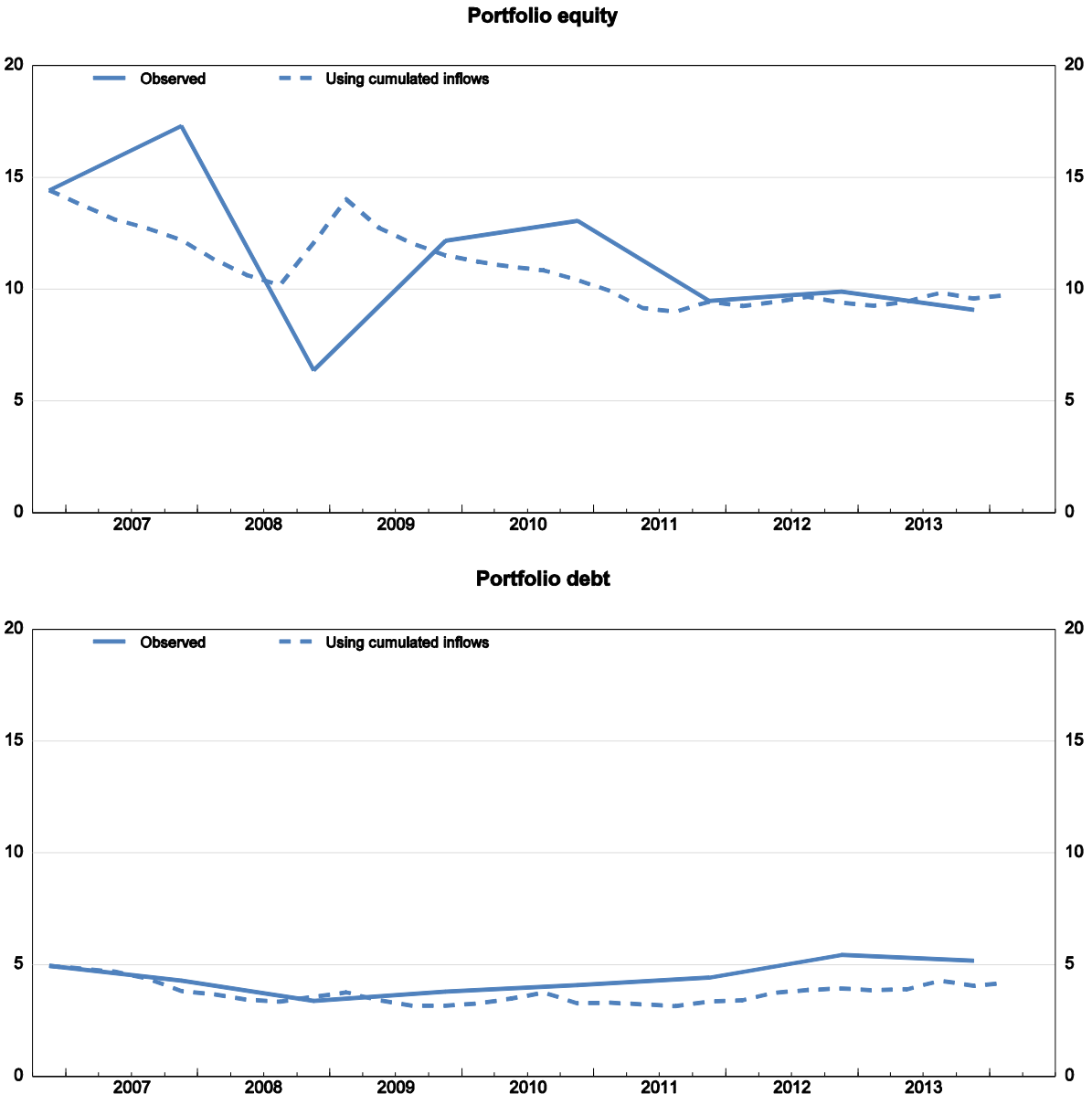


Note: The date denotes the mid-point of the estimation sample.

Source: OECD Economic Outlook 96 database; and OECD calculations.

Figure A1.2. **Net external liabilities for selected emerging market economies**

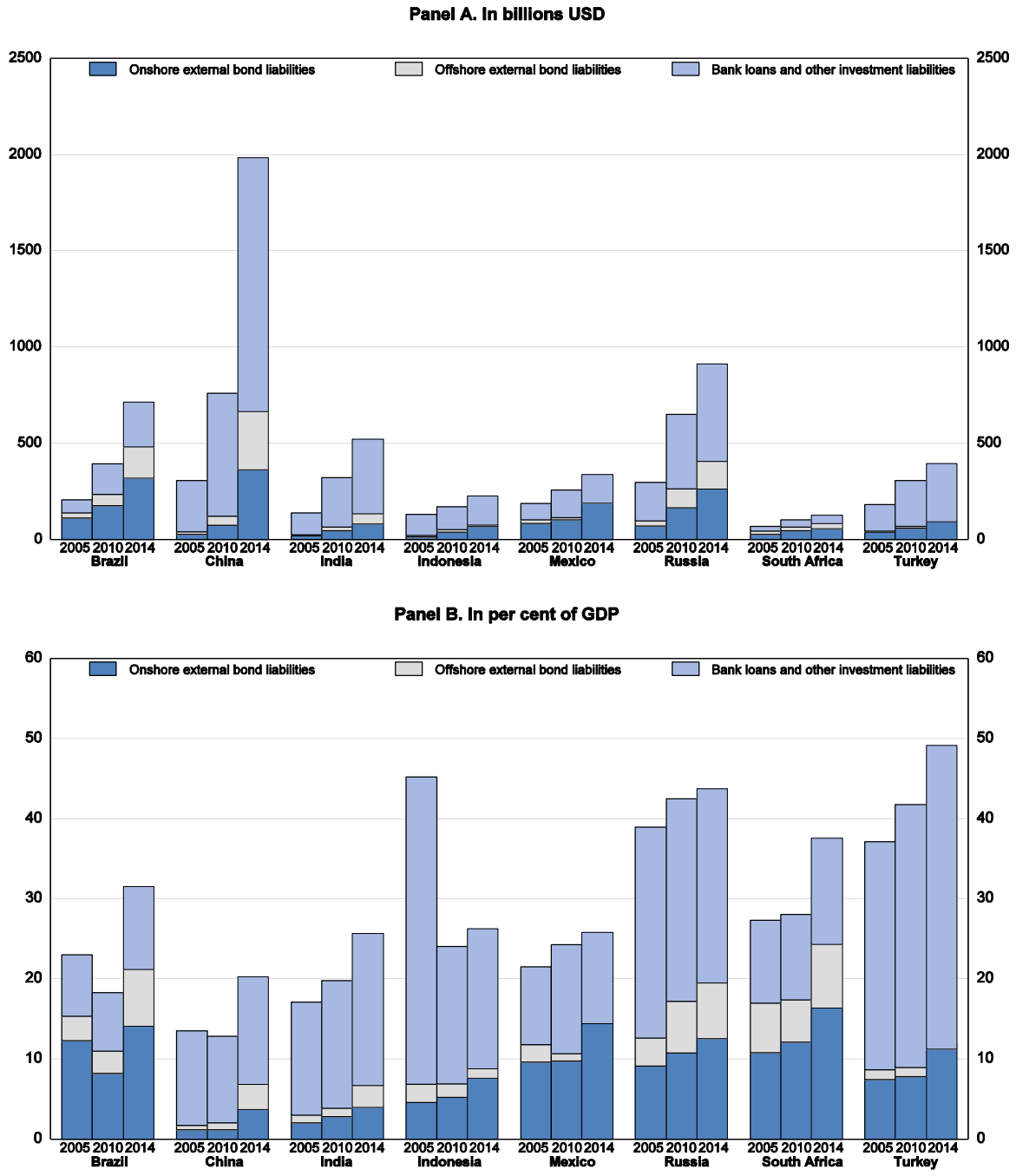
BRIICS excluding China, in per cent of GDP



Note: The difference between observed liabilities and a computation based on cumulated inflows reflects valuation effects.

Source: IMF, Balance of Payment database; and OECD Economic Outlook 96 database.

Figure A1.3. **Total external borrowing for selected emerging market economies**



Note: Offshore liabilities are computed as the difference between outstanding debt security liabilities by nationality of the issuer and by residence of the issuer. Data for 2014 refers to the latest available information which is 2014Q2 for most countries except China (2014Q1) and South Africa (2013).

Source: BIS, Debt securities statistics; IMF, Balance of Payment database (for bank loans and other investment liabilities); and OECD Economic Outlook 96 database.

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