The Effect of Episodes of Large Capital Inflows on Domestic Credit

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THE EFFECT OF EPISODES OF LARGE CAPITAL INFLOWS ON DOMESTIC CREDIT

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ABSTRACT/RÉSUMÉ

The Effect of Episodes of Large Capital Inflows on Domestic Credit

This paper analyses the effect of capital inflow shocks on the evolution of domestic credit. Using a panel of developed and emerging economies from 1970 to 2007, it is shown that in the two years following the beginning of a capital inflow shock the credit-to-GDP ratio increases by about 2 percentage points. The effect is reversed in the medium-term with the credit-to-GDP ratio decreased by almost 4 percentage points seven years after the initial shock. The paper also finds that the effect is different depending on the type of flows characterising the episode (debt vs. portfolio equity vs. FDI), with large capital inflows that are debt-driven having the largest effect. The results of the paper also suggest that the short-term effect of capital inflow shocks on domestic credit depends on countries' macroeconomic policy stances. In particular, it is found that this effect is lower in countries with higher real exchange rate flexibility and fiscal policy counter-cyclicality.

JEL classification: F30; F32
Keywords: Capital inflows; domestic credit; credit booms

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L'effet des épisodes d'entrées massives de capitaux sur le crédit intérieur

Cette étude analyse l'effet des chocs d'entrées de capitaux sur l'évolution du crédit domestique. À l'aide d'un panel de pays développés et émergents de 1970 à 2007, il est montré que dans les deux années qui suivent le début d'un choc d'entrées de capitaux, le crédit rapporté au PIB augmente d'environ 2 points de pourcentage. L'effet est renversé à moyen terme, avec un rapport du crédit au PIB plus bas de près de 4 points de pourcentage, sept ans après le choc initial. Cette étude montre également que l'effet est différent selon le type de flux de capitaux qui caractérisent l'épisode (dette vs portefeuille en action vs IDE), avec un effet maximal pour les entrées dominées par la dette. Les résultats de l'étude suggèrent également que l'effet à court terme de chocs d'entrées de capitaux sur le crédit domestique dépend de l'orientation des politiques macroéconomiques des pays. En particulier, cet effet est plus faible dans les pays où la flexibilité du taux de change réel est plus élevée et la politique fiscale plus contracyclique.

Classification JEL : F30 ; F32
Mots-Clés : Entrées de capitaux, crédit intérieur, flambée du crédit

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THE EFFECT OF EPISODES OF LARGE CAPITAL INFLOWS ON DOMESTIC CREDIT

by

Davide Furceri, Stéphanie Guichard and Elena Rusticelli[1]

1.   Introduction

1.   The last two decades have witnessed a significant increase in capital flows. In particular, the size of annual gross cross-border flows increased considerably from about 5% of world GDP in the mid-1990s to about 20% in 2007,[2] with advanced countries playing a major role (Figure 1). After reaching historical highs in mid-2007, international capital flows collapsed during the financial crisis. From mid-2007 to September 2008, the contraction concerned mainly OECD countries' international banking flows (see Milesi-Ferretti and Tille, 2010 for more details). However, the bankruptcy of Lehman Brothers in September 2008 precipitated a broader reversal of international capital flows. Capital flows have partially rebounded since spring 2009, but in a very heterogeneous way. They have mainly been driven by a bounce back in portfolio investment from advanced to emerging countries, which have proven quite resilient to the global crisis and have been seen as underweighted in international portfolios (see especially Suttle *et al.*, 2010). As a result in 2010, although overall cross-border flows remained well below pre-crisis levels,

2.   Cross-border flows series used in this paper are from the financial account of the IMF Balance of Payments Statistics (BOPS). Strictly speaking, according to the IMF Balance of Payments manual what are referred to throughout the paper as capital flows should instead be referred to as financial flows. Cross-border flows are measured by the acquisition of assets abroad [foreign purchases of equity and debt securities, cross-border lending and deposits, and foreign direct investment (FDI)] where transactions are recorded in net terms and shown separately for financial assets and liabilities (*i.e.* net transactions in financial assets is acquisitions of assets less reductions of assets, not assets less liabilities). FDI is defined according to the *OECD Benchmark Definition of Foreign Direct Investment*. In this paper gross capital inflows or outflows refers to either the credit (gross inflows, *i.e.* net increase in liabilities) or debit (gross outflows, *i.e.* net purchase of assets) while "net" capital flows refers to the difference between gross inflows and gross outflows. Stocks of assets and liabilities used in this paper are from Lane and Milesi-Ferretti (2007) before 2004 and the IMF BOPS International Investment Positions after 2004. They reflect both the cumulated annual flows in assets and liabilities and valuation effects, including exchange rate movements.

several countries including Korea, Chile, Turkey and Mexico in the OECD and Brazil and other large emerging markets have faced large capital inflows.[3]

2.   While capital flows are likely to deliver economic benefits -- in terms of international allocation of saving and investment, international risk-sharing, financial development and growth[4]- they are also associated with macroeconomic and financial risks, especially since are often driven by herd behaviours and thus result to be considerably large. From a macroeconomic management perspective, large capital inflows may be associated with large exchange rate appreciations (which may lead to *Dutch disease* situations) or higher inflation. From a financial perspectives large capital inflows shocks may cause lending and asset booms, and may increase the exposure of the economy to foreign currency liabilities.

3.   The literature has in general pointed out that episodes of capital inflow bonanza are often associated with increased macroeconomic (GDP growth, inflation, government balance and external account) volatility (Reinhart and Reinhart, 2009; Cardarelli *et al*. 2010), higher risk of financial and balance payment crises (Furceri *et al*. 2011a; Caballero, 2010; Reinhart and Reinhart, 2009; Edwards, 2007; Eichengreen 2003), and increased probability of credit and asset price booms (Mendoza and Torrones, 2008; Hernández and Landerretche, 2002).

4.   The purpose of this paper is to contribute further to the literature on the relation between large capital inflow episodes and financial vulnerabilities by analysing how such episodes affect domestic credit. Differently from previous studies (such as Mendoza and Torrones, 2008; Hernández and Landerretche, 2002), the paper does not look at the correlation between episodes of bonanza and subsequent episodes of credit booms, but it analyses the dynamic response of domestic credit to capital inflow shocks. This has two main advantages of allowing the analysis of the evolution of credit in each year after an initial capital inflow shock, and the assessment of whether short-term effects are reversed over the medium-term.

5.   The paper also analyses whether the effect of large capital inflow episodes is different whether the episodes consist of large inflows in FDI, equity portfolio investment or debt flows, and whether the response of domestic credit to capital inflow depends on countries' macroeconomic policy stances- in terms of real exchange rate flexibility and fiscal cyclicality.

6.   Estimating Impulse Response Functions (IRFs) of domestic credit to capital inflow shocks for a panel of developed and emerging economies from 1970 to 2007, it is shown that in the two years following the beginning of a capital inflow shock the credit-to-GDP ratio increases by about 2 percentage points. The effect is reversed in the medium-term with credit-to-GDP ratio decreased by almost 4 percentage points seven years after the initial shock. The paper also finds that the effect is different depending on the type of flows characterising the episode (debt vs. portfolio equity vs. FDI), with large capital inflows that are debt-driven having the largest effect. The results of the paper also suggest that the short-term effect of capital inflow shocks on domestic credit depends on countries' macroeconomic policy stances. In particular, it is found that this effect is lower in countries with higher real exchange rate flexibility and fiscal policy counter-cyclicality.

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3.   While consistent data is only available up to the third quarter of 2010, gross inflows seems to be back to, or above, their pre-crisis levels in several countries including Argentina, Brazil, Colombia, Indonesia, Mexico, South Africa, where they already represent around 5% of GDP and Turkey and Chile where they have reached close to 8-9% of GDP.

4.   See Kose *et al*. (2009) for a review of the literature of the economic benefits associated with financial integration.

7.   The rest of the paper is organised as follows. The next section describes the empirical methodology used to assess the relation between capital inflow shocks and changes in the credit-to-GDP ratio and details the construction of large capital inflow episodes. Section 3 presents the estimated effects of these episodes on credit, and it concludes by assessing the effect of policy on the link between capital inflow shocks and changes in the credit-to-GDP ratio. Section 4 concludes.

2.   Empirical methodology

8.   In order to estimate the dynamic impact of episodes of large capital inflows on domestic private credit the approach follows that proposed by Jorda (2005) and Teulings and Zubanov (2010) and used in Furceri and Zdzienicka (2010) which consists of estimating impulse response functions (IRFs) directly from local projections. More precisely, for each future period k the following equation has been estimated on annual data:

$$C_{i,t+k} - C_{i,t} = \alpha_i^k + \sum_{j=1}^l \gamma_j^k \Delta C_{i,t-j} + \beta_k D_{i,t} + \varepsilon_{i,t}^k \qquad (1)$$

with k= 1,..8. Where C indicates the domestic private credit-to-GDP ratio, D is a dummy taking the value 1 at the beginning of an inflow episode, α_i represent country fixed effects, γ_j captures the persistence in changes of the credit ratio, and β_k measures the impact of large inflow episodes on the change of the credit-to-GDP ratio for each future period k. Corrections for heteroskedasticity are applied using White robust standard errors, while the problem of autocorrelation in the errors is addressed by using two lags of the change in the domestic private credit-to GDP ratio as control variables.[5] Impulse response functions (IRFs) are then obtained by plotting the estimated coefficients β_k for k= 1,..8.

9.   An alternative way of estimating the dynamic impact of episodes of large capital inflows on credit is to estimate an ARDL equation of changes in the credit-to-GDP ratio and episode dummies and to compute IRFs from the estimated coefficients. However, since this empirical framework implicitly assumes an autoregressive process for the credit-to-GDP ratio, the IRFs derived using this approach tend to produce long-lasting effects from episodes of large capital inflows on private credit, which appear to be inconsistent with evidence that the ending of large capital inflow episodes is quite often followed by a crisis of one form or another (Furceri *et al.* 2011*a*).[6]

10.   Data for the domestic private credit-to-GDP ratio are taken from the World Bank Financial Structure database (2010) and defined as domestic bank and other financial institutions credit to the domestic private sector. Episodes of large capital inflows are determined as deviations of the capital inflows-to-GDP ratio from its historical trend. Four different types of episodes are constructed, based on: *i)* net capital inflows; *ii)* debt inflows (*i.e.* debt portfolio investments plus other investments); *iii)* portfolio inflows; and *iv)* FDI inflows.

11.   Following Cardarelli *et al.* (2010) episodes of large net capital inflows are determined as annual deviations of the net capital inflows-to-GDP ratio from its historical trend. Since volatility of net foreign capital inflows can differ across countries, the episodes are defined as sudden and large movements relative to the trend experienced by each specific country during that period, but also to the volatility that the country experiences in general. For this purpose a Hodrick-Prescott filter (with a smoothness parameter

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5.   Tests for autocorrelation of the residuals reject the hypothesis of serial correlation.

6.   At the same time it has to be recognised that the estimates of the medium term effect of inflow episodes on credit obtained from Equation 1 may be biased if other factors influencing the dynamic of the credit-to-GDP ratio are not controlled for. To address this issue and to check the robustness the results, Equation 1 has been re-estimated including several sets of control variables.

of 6.25) is applied to estimate the trend of the series for 112 countries over a sample period from 1970 to 2009.[7] The normalisation of net inflows by GDP is a way to take into account the relative magnitude of the inflow surge given the size of the country as well as the macroeconomic fluctuations it is likely to experience.

12.   Overall, an episode of large net capital inflow for a country i in year t is identified when E_{it} equals 1 according to the following rule:

$$E_{it} = \begin{cases} 1 \ if \ TDev_{it} > \sigma_{TDev_i} \ and \ \frac{NF_{it}}{GDP_{it}} > 1\% \\ 0 \ otherwise \end{cases} \tag{1}$$

where NF_{it} is the net capital inflow and $TDev_{it} = \dfrac{NF_{it}}{GDP_{it}} - trend_{it}$ is the deviation from the historical trend

and σ_{TDevi} is the standard deviation of detrended *net* capital inflows in country *i*. Therefore, each episode is identified as a sequence of years in which this criterion is met.

When between two episodes there is only one year in which E_{it} equals 0 and the corresponding net capital inflows-to-GDP ratio is positive, then the two episodes are combined together in one single episode.

13.   This approach identifies 268 episodes from 1970 to 2009 (see Table 1 for a detailed list of these episodes). The majority of episodes were very short and lasted just one year but one-quarter lasted for three years or more (Figure 2). One-quarter of episodes took place in countries that were member of the OECD. In one-fifth of the episodes, mostly in non OECD countries, additional net capital inflows amounted to more that 40% of GDP. The acceleration of financial globalisation in the 2000s was not marked by an increase in the number of episodes, likely reflecting a simultaneous increase in both global inflows and outflows not necessarily reflected in exceptional net inflows. It is only in the years just before the recent crisis that the number of episodes increased dramatically (and one-third were still ongoing in 2009) (Figure 3).

14.   In order to test whether the composition of large inflows affected the likelihood of a crisis, distinct episodes for debt (*i.e.* debt portfolio investments plus other investments), equity portfolio and FDI *gross* inflows have been defined in the following way:[8]

$$E_{it} = \begin{cases} 1 \ if \ TDev_{it} > \sigma_{TDev_i} \ and \ \frac{F_{it}}{GDP_{it}} > \overline{\frac{F_{it}}{GDP_{it}}} \\ 0 \ otherwise \end{cases} \tag{2}$$

where in this case F_{it} represents debt, equity portfolio or FDI gross inflows and $\overline{\dfrac{F_{it}}{GDP_{it}}}$ is the average across

countries and over time. Most of these episodes coincide with a large net capital inflow episode, but not necessarily as one component may be compensated by a weak or negative evolution of the other types of

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7.   Very low-income countries for which capital flows are mostly foreign aid and can be very large and volatile as a share of GDP are excluded from the sample. Countries reporting gaps in the series of capital inflows have not been included in the sample, in order to avoid arbitrary data interpolations.

8.   While the definition of large capital inflow episodes is based on net flows in line with existing literature, the definition of episodes by type of flows is based on gross inflows instead of net flows because the focus is on the composition of the inflows and the way they may affect the receiving economy.

inflows (Tables 2 to 4). The number of episodes identified for debt, equity portfolio and FDI gross inflows is 98, 101 and 164, respectively.

3.   Estimation results

3.1   Baseline

15.   The IRFs obtained from estimating the impact of net capital inflow episodes on the credit-to-GDP ratio using equation (1) show that in the two years following the beginning of an episode the credit-to-GDP ratio increases about 2 percentage points (Figure 4). The effect is, however, reversed in the medium-term, with the credit-to-GDP ratio decreasing by almost 4 percentage points seven years after the initial shock. This result is in line with the empirical evidence presented Furceri *et al.* (2011a) which suggests a strong correlation between the end of an episode and the occurrence of banking crises and/or a sudden reversal in capital inflows.

16.   To check the robustness of the results, equation (1) is re-estimated by alternatively including: *1)* time fixed effects to control for specific time shocks, such as those affecting world interest rates; *2)* a common time trend to control for common trends in the developments of credit-to-GDP ratios; *3)* a country-specific time trend to allow trends in the credit-to-GDP ratio to differ across countries; *4)* a set of control variables which may capture time varying movements in the credit-to-GDP ratio: GDP growth, initial credit-to-GDP ratio, trade openness, country size, inflation, bank net interest rate margin, bank concentration and a time trend. The results using these different controls remain broadly unchanged (Figures 5-8).

3.2   Different type of capital inflow episodes: debt versus portfolio versus FDI inflows

17.   To test which type of inflow (debt *versus* equity portfolio *versus* FDI) is associated with the largest increase in domestic credit, equation (1) is re-estimated for each different type of large inflow episode. Figure 9a-9c reports the IRFs obtained when each type of episode is estimated separately. Two years after an episode the credit-to-GDP ratio increases by about 4 percentage point for large debt and equity portfolio inflow episodes, while the effect is not statistically significant for FDI episodes. For all types of episode, the effect is not statistically significant in the medium-term (*i.e.* four years after the initial shock). The results are broadly unchanged when the responses of the three types of episodes are jointly estimated (Figure 10a-10c).

18.   However, since debt, FDI and portfolio inflows tend to occur simultaneously it is difficult to isolate the impact of each type of episode. To address this issue the analysis is restricted to only those episodes for which the other types of episodes did not occur in the two years before, during, or after the capital inflow. For example, the analysis focuses on episodes of large debt inflows for which episodes of large FDI and portfolio flows did not occur in the two years before, during, or after. The IRFs obtained using this approach (Figure 11a-11c) while broadly confirming the significant effect of debt inflow episodes on credit in the short-term, suggest that portfolio and FDI only inflow episodes have no a significant effect on domestic credit.[9]

3.3   The effect of episodes of large capital inflows and policy stances

19.   The short-term effect of episodes of large capital inflows on domestic credit may depend on countries' macroeconomic policy stances, in particular on exchange rate flexibility and fiscal policy. The

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9.   This gives a rationale to focus only on net capital and debt inflows episodes in the rest of the analysis.

results of the previous sections have shown that episodes of large inflows (net capital inflows and debt inflows) produce a significant increase in the credit-to-GDP ratio up to three years after the initial capital inflow shock and so this is also the horizon over which the sensitivity of the credit response to exchange rate flexibility and fiscal stance are considered.

20.   Real exchange rate flexibility may serve as an important buffer to inflow episodes. First, greater exchange rate flexibility could reduce inflow pressure in anticipation of eventual appreciation. Second, countries which let their exchange rate fluctuate in response to inflows may reduce the duration of a net inflow episode. Third, higher exchange rate flexibility may reduce credit growth by increasing risk premia and reducing foreign currency-denominated credit.

21.   To test the short-term effect of real exchange rate volatility on shaping the response of private credit to large capital inflows an interaction term is introduced in equation (1):

$$\beta_k = \gamma_k + \delta_k R_{it} \tag{2}$$

where R is a dummy variable that takes value equal to 1 when real exchange rate volatility (measured as the standard deviation of monthly real exchange rates)[10] has increased following an inflow episode and zero otherwise. With this amendment, the regression model becomes:

$$C_{i,t+k} - C_{i,t} = \alpha_i^k + \sum_{j=1}^l \gamma_j^k \Delta b_{i,t-j} + \gamma_k D_{i,t} + \delta_k D_{it} R_{it} + \varepsilon_{i,t}^k \tag{3}$$

22.   The results obtained from estimating equation (3) show that the short-term response of private credit to a capital inflow shock is generally lower in countries with a more flexible real exchange rate (Figure 12a and 12b), and that the different responses are statistically different (δ is statistically significant) in the third year.

23.   Counter-cyclical fiscal restraint during an episode of large capital inflows can also weaken the link between a shock to capital inflows and domestic credit by reducing domestic interest rates (and therefore the attractiveness of the country for foreign investors) while moderate demand pressures generated by the inflows. To test for this hypothesis equation (1) is re-estimated for two different groups of countries: *a)* countries with pro-cyclical fiscal policy (*i.e.* countries where the correlation over the entire period between change in government spending and output growth is positive); and *b)* countries with counter-cyclical fiscal policy (*i.e.* countries where the correlation over the entire period between change in government spending and output growth is negative). The results of this exercise reported in Figure 13a (for net capital inflows episodes) and Figure 13b (for debt inflows episodes), tend to confirm that the short-term increase in the credit-to-GDP ratio in response to an episode is considerably lower in countries with counter-cyclical fiscal policy. The responses associated with countries with pro-cyclical fiscal policy and countries with counter-cyclical fiscal policy, are statistically different after two years in the case of net capital inflow episodes, and after one year in the case of debt inflow episodes.

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10.   Standard deviation of monthly exchange rate and z-score measures (based on the standard deviation) are commonly used in the literature that assess the effect of exchange rate volatility (see for example, Ghosh *et al.* (2003); De Grauwe and Schnable, 2008; Arratibel *et al.* 2011). Other de facto indicators, such as the one constructed by Levy-Yeyati and Sturzenegger, (2005) have also been used. The shortcoming of these indicators is that have little variation over time (for some countries no variation at all), which implies that the interaction term between these indicators and the episode dummy would be extremely collinear with the episode dummy.

24.   These results on the role of exchange rates and fiscal policy are notably consistent with the previous finding in the literature. For example, Bakker and Gulde (2010) find that in Eastern European countries exchange rate and fiscal policy management has significantly moderated the response of private credit to the large capital inflows that these countries received in the five years before the financial crisis.

4.   Conclusions and policy implications

25.   Understanding the macroeconomic and financial effects of large capital inflows is of key policy relevance. If surges in capital inflows increase the risk of financial distress, countries may have incentives to establish administrative controls to certain types of inflows (Ostry *et al.* 2010, 2011). In this context, identifying the mechanisms through which episodes of large capital inflows increase financial vulnerabilities and the role policies can play in moderating associated vulnerabilities, would help countries in choosing the appropriate policy options.

26.   This paper contributes to the literature on the relation between large capital inflow episodes and financial vulnerabilities by analysing how such episodes affect the evolution of domestic credit. Estimating IRFs of domestic credit to capital inflows shocks from local projection, for a panel of developed and emerging economies from 1970 to 2007, the results of the paper show that in the two years following the beginning of a capital inflow shock the credit-to-GDP ratio increases by about 2 percentage points. The effect is then reversed in the medium-term with credit-to-GDP ratio decreased by almost 4 percentage points seven years after the initial shock.

27.   The paper also shows that while capital inflow shocks in FDI and portfolio equity have a little and not statistically significant effect on domestic credit, debt capital inflow shocks have a sizeable and statistically significant effect. This result is relevant from a policy point of view given that particular structural settings are likely to affect the composition of these flows. For example, it is found in the literature that more competition-friendly product market regulation, less stringent job protection, higher institutional quality and greater capital account openness are associated with a larger component of FDI inflows and a smaller share of debt (Furceri *et al.* 2011*b*). This suggests that structural and growth enhancing policies may serve as a complement to macro-prudential policies and financial reforms aimed at reducing banking sector vulnerabilities

28.   Still, the benefits of structural and financial reforms generally take time to materialise and so may need to be supplemented with macroeconomic policies which have a more immediate effect on large capital inflows and their consequences. In this respect, the results of the paper also suggest that the short-term effect of capital inflow shocks on domestic credit depends on countries' macroeconomic policy stances, with a lower effect generally found in countries with higher real exchange rate flexibility and fiscal policy counter-cyclicality.

Table 1. List of net capital inflow episodes

Country	Years	Size (% GDP)	Country	Years	Size (% GDP)	Country	Years	Size (% GDP)	Country	Years	Size (% GDP)
Algeria	1978	13.2	Czech Rep.	1995	14.9	Italy	1976	2.6	Philippines	1994-1997	36.7
Antigua & Barbuda	1986-1987	82.3	Czech Rep.	2002	14.1	Italy	1980	2.6	Poland	1995	6.7
Antigua & Barbuda	2006-007	20.8	Denmark	1985-1987	17.7	Italy	1989-1990	6.5	Poland	1998	7.7
Argentina	1993	8.9	Denmark	1997	5.0	Italy	2008	3.5	Portugal	1981-1982	20.1
Argentina	1997-1999	17.5	Denmark	1999	4.3	Jamaica	1984-1985	33.6	Portugal	1989	6.9
Aruba	1991	26.2	Denmark	2009	8.4	Jamaica	1987	10.9	Portugal	2000-2001	20.5
Aruba	1999	26.5	Djibouti	1992	10.0	Jamaica	2001	18.2	Romania	1990-1992	10.8
Aruba	2002	18.2	Djibouti	2007-2008	36.1	Jamaica	2008	20.7	Romania	2004-2007	61.4
Australia	1971	4.3	Dominica	1989-1992	64.2	Japan	1980	1.8	Russian Federation	2007	7.3
Australia	1982	6.5	Dominica	1995	10.5	Japan	2003	1.7	Seychelles	1982	23.0
Australia	1986-1988	17.5	Dominica	1999	7.9	Jordan	1978	16.7	Seychelles	1986	16.1
Australia	1999	7.1	Dominican Rep.	1974	8.2	Jordan	1991	50.0	Seychelles	1989	14.4
Australia	2003-2005	20.6	Dominican Rep.	1980-1981	15.1	Jordan	2006	22.4	Seychelles	2007-2009	89.5
Austria	1975-1977	8.2	Dominican Rep.	1999-2001	18.4	Kazakhstan	2006	20.0	Singapore	1981-1983	44.8
Austria	1980	3.5	Dominican Rep.	2008	8.9	Korea	1979-1980	17.4	Singapore	1990-1991	16.1
Austria	1995	3.1	Egypt	1981	8.7	Korea	1996	4.3	Slovenia	1997	5.7
Austria	1998-2000	8.5	Egypt	2005	6.2	Kuwait	1991	352.1	Slovenia	2001-2002	14.5
Azerbaijan	2003-2004	65.4	El Salvador	1978	10.9	Latvia	2006-2007	55.3	Slovenia	2008	6.9
Bahrain	1990	27.3	El Salvador	1981	5.5	Lesotho	1995-1998	153.5	South Africa	1995-1997	9.8
Bahrain	1993-1994	32.6	El Salvador	1997-1998	14.5	Lithuania	1998	12.8	South Africa	2006-2007	13.1
Belarus	1997	5.2	El Salvador	2003	7.0	Lithuania	2006-2007	31.5	Spain	1987-1991	23.3
Belarus	2007-2009	28.8	Equatorial Guinea	1996	121.1	Macedonia	1998	9.6	Spain	2006-2008	27.9
Belgium	2008	2.3	Estonia	1997	15.9	Macedonia	2008	12.5	Sri Lanka	1980-1983	37.8
Belize	1988	8.7	Estonia	2006	18.2	Malaysia	1982-1983	26.3	Sri Lanka	1993-1994	18.1
Belize	2000-2003	80.4	Fiji	1981	11.3	Malaysia	1991-1996	62.1	Sri Lanka	2006	2.4
Bolivia	1978	9.3	Fiji	1990	6.1	Malaysia	2004	4.1	St. Kitts & Nevis	1983	25.9
Bolivia	1997-1999	35.6	Fiji	2004-2007	37.8	Maldives	1980-1982	122.2	St. Kitts & Nevis	1989-1990	67.9
Bosnia & Herzeg.	2001	17.3	Finland	1975	7.4	Maldives	2005-2007	108.9	St. Kitts & Nevis	2001	16.9
Bosnia & Herzeg.	2005	16.8	Finland	1987	7.9	Malta	1972	16.8	St. Kitts & Nevis	2008	10.8
Botswana	1976	19.8	Finland	1990	8.9	Malta	1983	8.4	St. Vincent & Grenad.	1997-1998	30.3
Botswana	1985	11.0	Finland	1994	4.1	Malta	1994	17.7	St. Vincent & Grenad.	2006	3.4
Botswana	1992	6.7	Finland	2008-2009	11.9	Malta	1999	11.9	St. Vincent & Grenad.	2008	5.8
Botswana	2005	4.2	France	1982-1983	3.2	Mauritius	1979-1980	9.8	Sudan	1979	2.1
Botswana	2008	7.5	France	1989-1990	3.0	Mauritius	1988-1990	13.2	Sudan	1981	2.4
Brazil	1978	5.7	France	2006	1.8	Mauritius	2000	5.6	Sudan	1991-1992	9.6
Brazil	1981	4.9	France	2009	3.5	Mauritius	2008-2009	18.6	Sudan	2005-2006	23.6
Brazil	1995-1997	7.8	Gabon	1986-1988	56.6	Mexico	1981	10.6	Swaziland	1978-1979	47.9
Brazil	2000	4.6	Georgia	2006-2007	41.1	Mexico	1991-1993	23.8	Swaziland	1998	8.9
Brazil	2007	6.5	Germany	1992-1995	6.3	Moldova	1994	12.4	Swaziland	2007-2009	46.5
Bulgaria	2007-2008	86.0	Germany	2000	1.5	Moldova	2007-2008	43.8	Sweden	1989-1990	12.7
Cameroon	1983-1987	26.4	Grenada	1982	17.9	Mongolia	1986-1989	143.9	Sweden	1992-1993	9.5
Cameroon	2001-2002	8.9	Grenada	2002-2003	60.9	Mongolia	2008	21.8	Sweden	2008-2009	6.5
Cameroon	2009	7.5	Guatemala	1978	6.2	Morocco	1976-1977	52.4	Syrian Arab Rep.	1994-1996	21.7
Canada	1976	5.3	Guatemala	1991-1993	20.8	Morocco	1990	7.3	Thailand	1990-1991	22.6
Canada	1981	5.5	Guatemala	2000-2002	16.2	Netherlands	1980	1.3	Thailand	1995-1996	23.8
Canada	1987-1989	11.1	Honduras	1977	11.1	New Zealand	1982-1986	51.8	Trinidad & Tobago	1997-2002	29.0
Canada	1993	3.5	Honduras	1980	9.2	New Zealand	2005-2006	21.7	Tunisia	1976-1977	20.5
Canada	2009	4.0	Honduras	1984	8.6	Nicaragua	1981-1982	31.9	Tunisia	1982-1984	20.9
Cape Verde	1999	21.9	Honduras	2004	11.1	Nicaragua	1985	13.5	Tunisia	1993-1994	16.0
Cape Verde	2007	20.9	Honduras	2007	10.4	Nicaragua	1988	9.2	Tunisia	2006-2008	20.3
Chile	1978-1981	49.5	Hong Kong	2000	2.5	Nicaragua	1999	14.0	Turkey	1993	5.0
Chile	1990	9.1	Hungary	1993-1995	36.7	Norway	1977	11.0	Turkey	2005-2007	24.4
Chile	1994	9.6	Hungary	1999	13.5	Norway	1987-1988	10.6	Ukraine	2005-2007	23.7
China	1993-1996	21.1	Iceland	2006-2008	131.3	Norway	1993	5.6	United Kingdom	1974	1.6
China	2004	5.7	India	1994	3.3	Oman	1976	15.2	United Kingdom	1977	2.3
Colombia	1981-1982	11.3	India	2007	7.7	Oman	1986	13.9	United Kingdom	1987-1989	12.1
Colombia	1985	6.4	Indonesia	1995-1996	9.8	Oman	1998	10.6	United States	1971	1.0
Colombia	1993-1997	27.0	Iran	1991-1993	17.6	Oman	2007	6.6	United States	1984-1988	13.5
Colombia	2007	5.0	Ireland	1980-1982	36.2	Panama	1979	25.0	United States	2000-2002	13.8
Congo, Rep.	1994	34.2	Ireland	1998	5.3	Panama	1997-1999	37.1	United States	2005-2006	11.5
Congo, Rep.	2007	33.3	Ireland	2000	8.2	Paraguay	1978-1980	31.0	Uruguay	1982	11.8
Costa Rica	1977-1980	39.2	Ireland	2007-2008	16.0	Paraguay	1997	4.7	Uruguay	2006-2008	30.1
Croatia	1996-1999	44.5	Israel	1975	14.0	Paraguay	2007	5.9	Vanuatu	1986-1989	49.1
Cyprus	1982	34.6	Israel	1982	12.8	Peru	1977	4.7	Vanuatu	1999	20.3
Cyprus	1989	9.9	Israel	1997-1999	12.9	Peru	1982	7.3	Venezuela	1978-1979	12.7
Cyprus	2001	10.0	Israel	2008-2009	9.6	Peru	1994-1997	32.0	Venezuela	1991-1993	14.6
Cyprus	2006-2008	39.6	Italy	1974	3.7	Philippines	1980-1982	21.6	Venezuela	1997-1998	4.0

Note: The size is the cumulated amount of inflows as share of GDP over the episode. *Source*: OECD calculations.

Table 2. List of debt inflow episodes

Country	Years	Size (% GDP)	Country	Years	Size (% GDP)	Country	Years	Size (% GDP)	Country	Years	Size (% GDP)
Algeria	1979	8.1	Finland	2000	17.2	Lithuania	2006-2007	34.4	St. Vincent & Grenad.	1980	10.5
Australia	1988	6.8	Finland	2009	23.2	Luxembourg	2005-2006	957.2	St. Vincent & Grenad.	1987	11.2
Australia	2003-2006	42.5	France	1990	8.9	Macedonia	2005	8.2	Swaziland	1978	13.9
Austria	1999-2000	42.2	France	2005-2007	65.6	Macedonia	2009	7.6	Swaziland	1982-1983	23.3
Austria	2005-2006	49.5	Georgia	2007	7.2	Maldives	1992	7.8	Swaziland	1996	6.2
Belgium	2007	46.8	Germany	1998-1999	24.4	Maldives	2005-2007	85.6	Swaziland	2008	6.2
Bolivia	1977-1978	22.0	Germany	2007	15.0	Malta	1998	62.6	Sweden	1989-1990	32.2
Bosnia & Herzeg.	1999	17.0	Grenada	1981-1983	30.1	Malta	2007	127.7	Sweden	1998	13.6
Botswana	1975	37.3	Hong Kong	2007	86.3	Mauritius	2007	43.0	Sweden	2007	20.4
Cameroon	1980	9.0	Hungary	1985	7.2	Moldova	1994	16.5	Switzerland	1999-2000	84.9
Cameroon	1983-1984	15.8	Hungary	1993	7.3	Moldova	2007-2008	18.7	Switzerland	2007	68.2
Canada	1976	7.0	Hungary	2006-2008	42.5	Netherlands	1998	26.3	Syrian Arab Rep.	1992-1994	34.1
Canada	1981	11.6	Iceland	2005-2007	432.2	Netherlands	2001	29.6	Thailand	1991-1996	53.2
Canada	2009	7.0	Indonesia	1983	6.7	Netherlands	2006-2007	68.8	Trinidad & Tobago	1979	8.0
Chile	1978-1981	45.8	Iran	1993	7.2	Norway	2000-2002	35.0	Tunisia	1977-1978	18.3
Croatia	1997	10.5	Ireland	2004-2007	454.7	Norway	2006-2007	55.4	Tunisia	1994-1996	18.6
Croatia	2003	14.4	Israel	1978-1982	78.5	Portugal	1982	8.0	Ukraine	2007	19.7
Czech Rep.	1994-1995	27.1	Italy	1973	6.7	Portugal	1997	15.8	United Kingdom	2004-2007	198.0
Djibouti	1992	7.7	Italy	1981	6.1	Portugal	2000-2001	45.9	United States	2004-2007	43.2
Dominica	1982-1984	23.5	Italy	1998-1999	21.2	Romania	2007	12.2	Uruguay	2001	10.5
Equatorial Guinea	1989	8.2	Italy	2005-2006	26.1	Russian Federation	2007	10.5	Uruguay	2003	11.5
Estonia	1997	20.7	Kazakhstan	2006	29.6	Spain	1993	13.3	Vanuatu	1985	66.3
Estonia	2004-2007	77.6	Korea	1995-1996	13.4	Spain	2000	15.5	Venezuela	1976-1979	29.2
Fiji	1981	7.2	Korea	2006-2007	19.1	Spain	2005-2006	48.3			
Finland	1990	10.1	Latvia	2006-2007	74.1	St. Kitts & Nevis	1983	24.2			

Note: The size is the cumulated amount of inflows as share of GDP over the episode.

Source: OECD calculations.

Table 3. List of FDI inflow episodes

Country	Years	Size (% GDP)	Country	Years	Size (% GDP)	Country	Years	Size (% GDP)	Country	Years	Size (% GDP)
Antigua & Barbuda	1980-1982	52.5	Czech Rep.	2005	9.3	Latvia	2006-2007	16.4	Poland	2004-2007	19.8
Antigua & Barbuda	2005-2007	90.3	Denmark	1999-2000	32.2	Lesotho	1995-1998	125.6	Portugal	2000-2003	17.3
Argentina	1999	8.5	Djibouti	2007-2008	46.2	Libya	2007	6.5	Portugal	2006	5.6
Aruba	1991	21.2	Dominica	1987-1989	30.3	Lithuania	1998	8.2	Romania	1998	4.8
Aruba	1999	26.9	Dominica	1995	24.1	Lithuania	2006	6.1	Romania	2004-2006	24.4
Australia	2002-2004	12.0	Dominica	2008	15.1	Luxembourg	2002	524.9	Russian Federation	2007-2008	8.7
Australia	2007	4.8	Dominican Rep.	1970	4.8	Luxembourg	2009	371.5	Seychelles	1976	12.9
Austria	2005-2007	45.0	Dominican Rep.	1999-2001	14.5	Macedonia	2001	13.0	Seychelles	2007-2009	82.9
Azerbaijan	2003-2004	86.1	Dominican Rep.	2008	6.3	Malaysia	1974	5.7	Singapore	1988-1990	39.1
Bahrain	1991-1992	31.7	Egypt	1979	6.7	Malaysia	1991-1993	24.4	Singapore	1999-2001	55.5
Bahrain	1996	33.6	Egypt	2005-2007	24.2	Maldives	2007-2008	19.3	Singapore	2004-2007	71.8
Bahrain	2006	18.4	El Salvador	1998	9.2	Malta	1999-2000	38.9	Slovenia	2002	7.2
Belgium	2007-2008	42.1	El Salvador	2007	7.4	Malta	2003	20.1	South Africa	2001	6.1
Belize	1989	5.1	Equatorial Guinea	1996	145.2	Malta	2006	29.3	Spain	2000-2002	17.1
Belize	2004-2005	21.9	Estonia	1998	10.4	Mauritius	2000	5.8	Spain	2007-2008	9.3
Belize	2008	14.0	Estonia	2005	21.2	Mauritius	2007	4.5	St. Kitts & Nevis	1983	22.5
Bolivia	1997-2002	58.6	Fiji	1990-1992	14.0	Mexico	2001	4.8	St. Kitts & Nevis	1989-1990	59.2
Bosnia & Herzeg.	2007	13.6	Fiji	2004-2007	37.6	Moldova	2000	9.9	St. Kitts & Nevis	2000	29.5
Botswana	1979-1980	26.1	Finland	1998-2002	29.4	Moldova	2007-2008	23.9	St. Vincent & the Grenad.	1994	19.3
Botswana	2002-2003	21.5	Finland	2007	5.2	Mongolia	2008-2009	30.9	St. Vincent & the Grenad.	1997-1998	59.5
Brazil	1999-2000	10.0	Gabon	2004	4.5	Morocco	2003	4.6	St. Vincent & the Grenad.	2008	27.4
Bulgaria	2006-2007	57.9	Georgia	2006-2007	32.3	Namibia	1991	4.8	Swaziland	1979	13.5
Cameroon	2002	5.5	Germany	2000	11.1	Namibia	1995	4.4	Swaziland	1987-1989	26.5
Canada	2000	9.1	Grenada	1987-1988	16.9	Namibia	2008-2009	9.8	Swaziland	1998	9.8
Canada	2007	8.3	Grenada	1998	14.3	Netherlands	1998-2001	48.7	Swaziland	2002	7.8
Cape Verde	1999	9.1	Grenada	2003	18.6	Netherlands	2007	16.0	Sweden	1999-2000	32.1
Cape Verde	2006-2008	40.1	Grenada	2007-2008	45.8	New Zealand	1984-1985	11.3	Switzerland	2000	7.9
Chile	1987	4.3	Guatemala	1988	4.2	New Zealand	1993-1995	15.3	Switzerland	2006-2007	18.5
Chile	1999	12.0	Honduras	1999-2000	9.8	New Zealand	2000	7.5	Thailand	1998-2001	18.6
China	1993-1997	26.5	Honduras	2004-2007	25.9	New Zealand	2006-2008	11.6	Trinidad & Tobago	1976	5.3
Colombia	1997	5.2	Hong Kong	2000	36.6	Nicaragua	1997-2000	27.9	Trinidad & Tobago	1994	10.4
Colombia	2005	7.1	Hungary	2007-2008	93.1	Nicaragua	2008	9.8	Trinidad & Tobago	1997-1998	29.5
Congo, Rep.	1999	22.9	Iceland	2005-2007	73.0	Norway	1999	4.3	Tunisia	1982	4.2
Congo, Rep.	2007	34.5	Ireland	1999-2003	92.8	Oman	1975	5.1	Tunisia	2006-2008	21.3
Costa Rica	1998	4.3	Israel	2000	6.5	Oman	2005-2007	17.3	Ukraine	2005-2007	21.2
Costa Rica	2006-2008	20.7	Israel	2006	10.5	Panama	1980-1982	20.5	United Kingdom	1998-2000	19.3
Croatia	1999-2001	18.4	Jamaica	1999-2003	30.5	Panama	1997-1998	23.9	United Kingdom	2005-2007	21.3
Croatia	2007	8.5	Jamaica	2008	9.8	Panama	2006	14.9	Uruguay	2005-2008	23.8
Cyprus	1999-2002	37.7	Jordan	2000	10.8	Paraguay	1998	4.3	Vanuatu	1991-1996	81.0
Cyprus	2008	15.5	Jordan	2005-2007	55.0	Peru	1994-1996	18.3	Venezuela	1997-1998	12.7
Czech Rep.	1999-2002	39.7	Kazakhstan	2001	12.8	Poland	1999-2000	9.8			

Note: The size is the cumulated amount of inflows as share of GDP over the episode.

Source: OECD calculations.

Table 4. List of equity portfolio inflow episodes

| Country	Years	Size (% GDP)	Country	Years	Size (% GDP)	Country	Years	Size (% GDP)	Country	Years	Size (% GDP)
Argentina	1993	2.4	Finland	1998-2000	22.3	Kazakhstan	2006	3.4	South Africa	2006	5.7
Australia	1971	1.9	France	1999-2000	7.2	Korea	1999-2000	5.2	Spain	1989	1.6
Australia	1993-1994	4.7	France	2005-2006	7.1	Korea	2003	2.2	Spain	1998-2000	6.6
Australia	1998-1999	5.5	Georgia	2006	1.8	Korea	2009	3.1	Swaziland	1985	0.5
Australia	2003	2.6	Germany	1998	2.6	Lithuania	2000	1.1	Swaziland	1988-1989	2.0
Austria	2000	1.8	Germany	2001	4.1	Lithuania	2005	0.5	Swaziland	2008	1.5
Austria	2004-2006	7.7	Germany	2007	1.8	Luxembourg	2005	731.8	Sweden	1993-1994	5.2
Belgium	2008	1.7	Hong Kong	1999-2000	64.8	Macedonia	2006-2007	3.5	Sweden	2000	7.3
Botswana	1978	0.7	Hong Kong	2007	21.1	Malta	2000	1.7	Switzerland	1985-1986	10.9
Botswana	1996	0.6	Hungary	1997-1999	5.8	Mauritius	1996-1997	1.6	Switzerland	1996	3.8
Brazil	1993-1994	2.8	Hungary	2004	1.5	Mauritius	2007	0.7	Switzerland	2000	3.5
Brazil	2007	1.9	Iceland	2004-2006	9.8	Mexico	1991-1993	6.0	Switzerland	2008	4.9
Brazil	2009	2.4	India	1994	1.7	Morocco	1994	0.8	Thailand	1989	2.0
Canada	1993	1.7	India	2007	2.7	Morocco	2004	1.0	Thailand	1993	2.1
Canada	2000	3.3	Indonesia	1993-1994	2.2	Namibia	1994-1996	3.9	Thailand	1997	2.6
Canada	2004	2.7	Irel&	1998-2002	312.7	Namibia	1999	1.2	Thailand	2005-2006	5.4
Canada	2009	1.7	Irel&	2006	72.5	Netherlands	1999	7.4	Tunisia	1981-1984	3.8
Chile	1990	1.2	Israel	1983	2.8	Netherlands	2005	13.0	Ukraine	1998	0.5
Chile	1993-1994	4.0	Israel	2000	3.2	Norway	2005-2006	6.3	Ukraine	2007	0.5
Chile	1997	2.1	Israel	2004-2006	7.5	Poland	1998	1.0	United Kingdom	1999-2000	19.9
Chile	2005	1.3	Italy	1996-1998	2.7	Poland	2004	0.7	United States	1999-2001	4.4
Chile	2008	1.1	Italy	2004-2006	1.9	Portugal	2003-2004	10.3	United States	2007	2.0
Croatia	2006-2007	1.6	Italy	2009	1.0	Romania	1997	0.6	Venezuela	1994-1997	5.0
Czech Rep.	1993	3.3	Japan	1991	1.4	Russian Federation	2002	0.8			
Czech Rep.	2003	1.2	Japan	1999	2.4	Russian Federation	2007	1.4			
Estonia	1999	4.1	Japan	2003-2005	7.1	South Africa	1997-1999	16.9			

Note: The size is the cumulated amount of inflows as share of GDP over the episode.

Source: OECD calculations.

Figure 1. Advanced countries drove international cross border flows

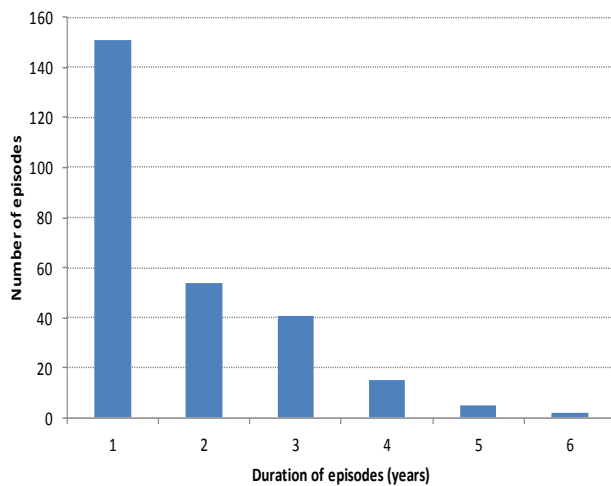Flows as a per cent of world GDP
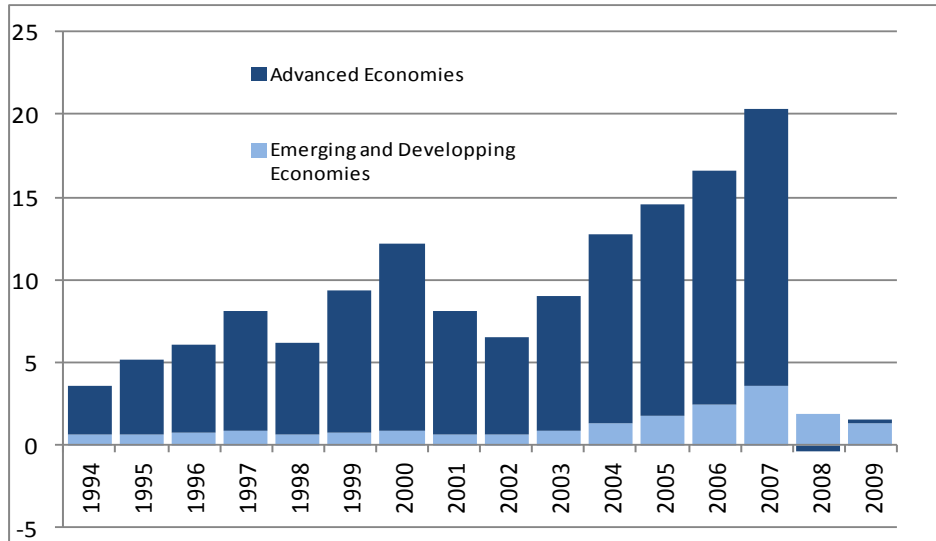
Note: Average of annual flows and flows in and out of each economy in each region, advanced countries are those defined as such by the IMF. See footnote 2 for more details on the capital flow data.
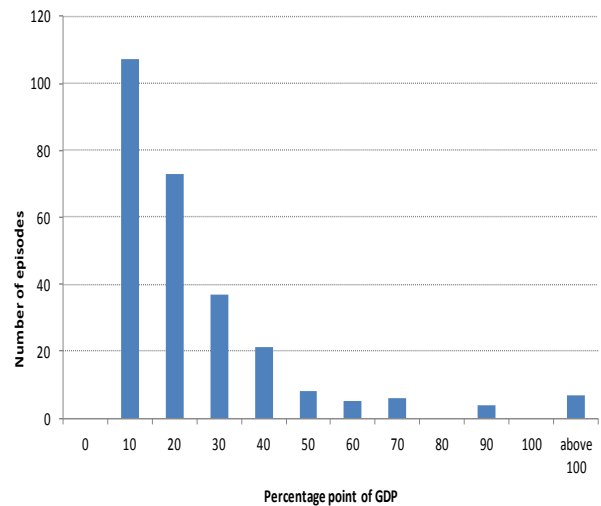*Source*: IMF-BOPS, OECD calculations.

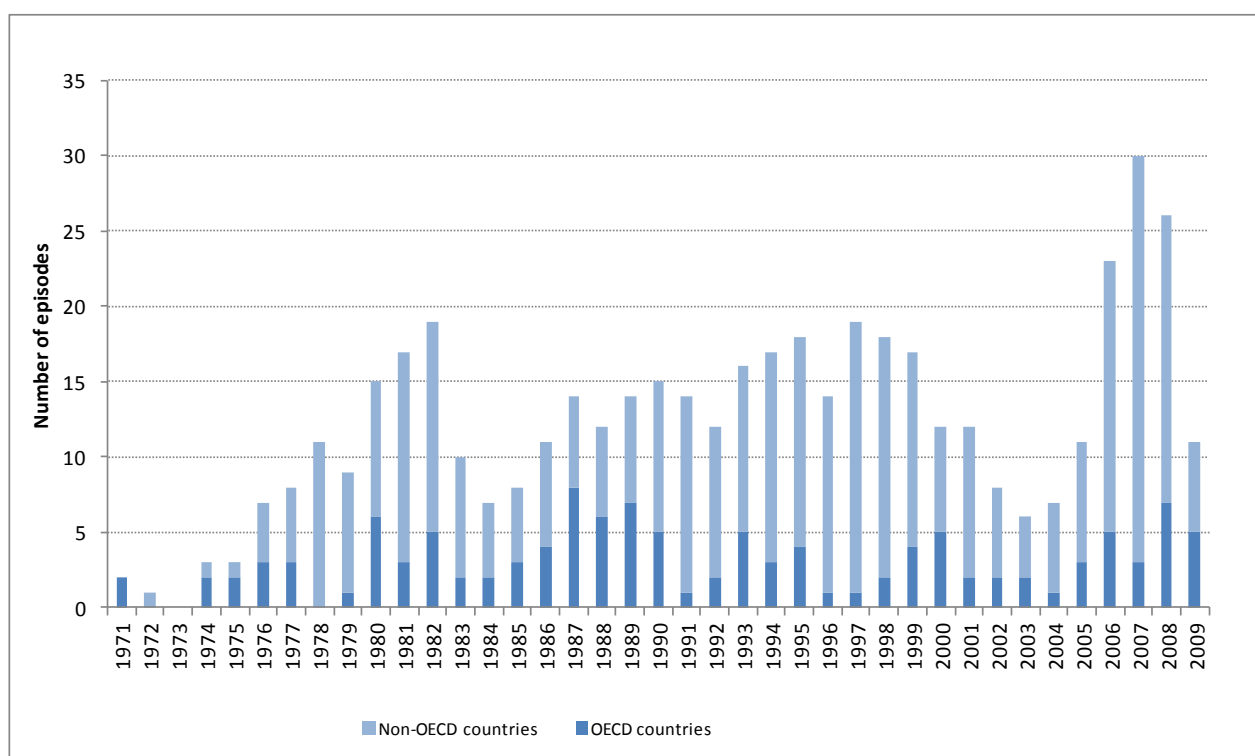**Figure 2. Main characteristics of episodes of large capital inflows**
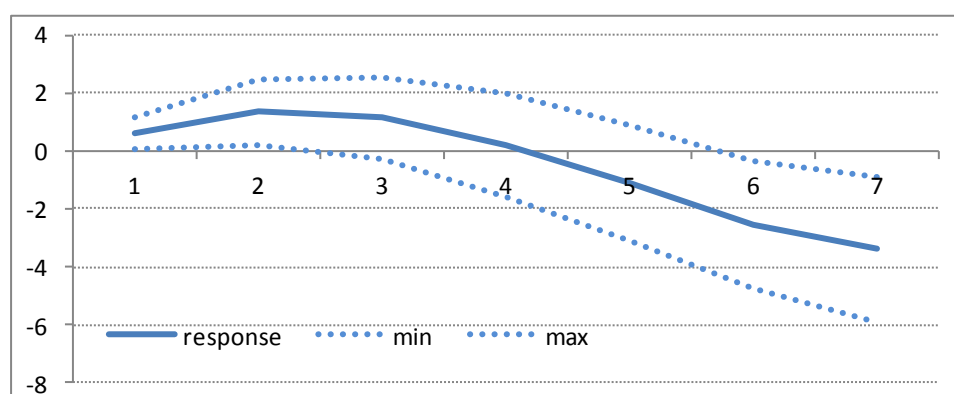
a) Duration of episodes

b) Cumulative capital inflow during episodes

Source: OECD calculations.

Figure 3. Evolution of number on ongoing episodes of large capital inflows

Source: OECD calculations.

Figure 4. The baseline response of the credit-to-GDP ratio to net-capital inflows episodes

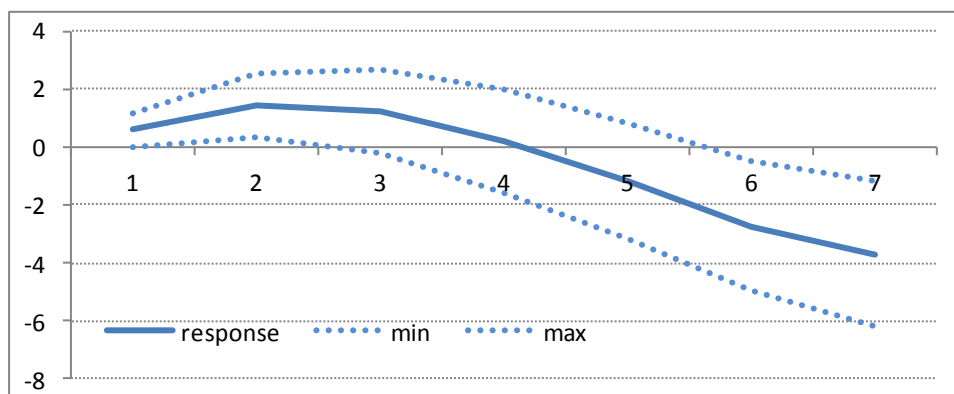*Note*:   Dotted lines represent 95% confidence bands.
Source: OECD calculations.

Figure 5. The response of the credit-to-GDP ratio to net-capital inflows episodes, sensitivity to common time trends
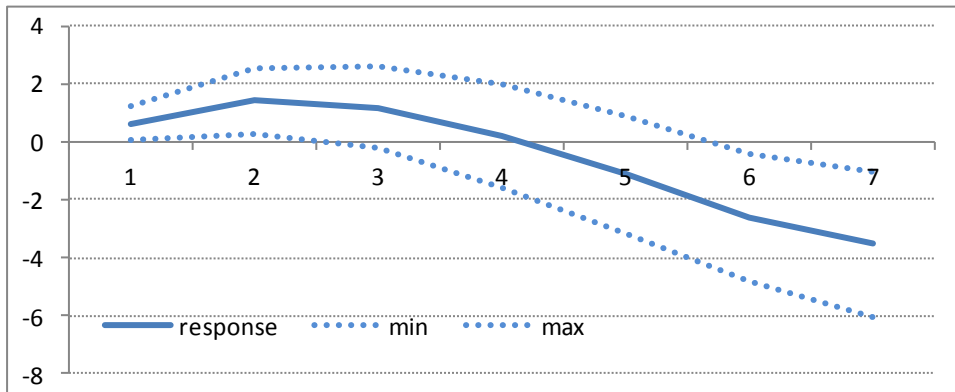
Note: Dotted lines represent 95% confidence bands.

Source: OECD calculations.

Figure 6. The response of the credit-to-GDP ratio to net-capital inflows episodes, sensitivity to country-specific time trends
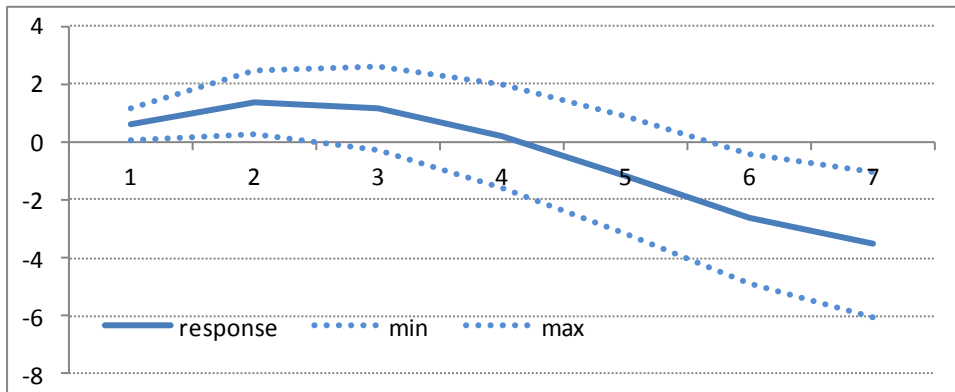
Note: Dotted lines represent 95% confidence bands.
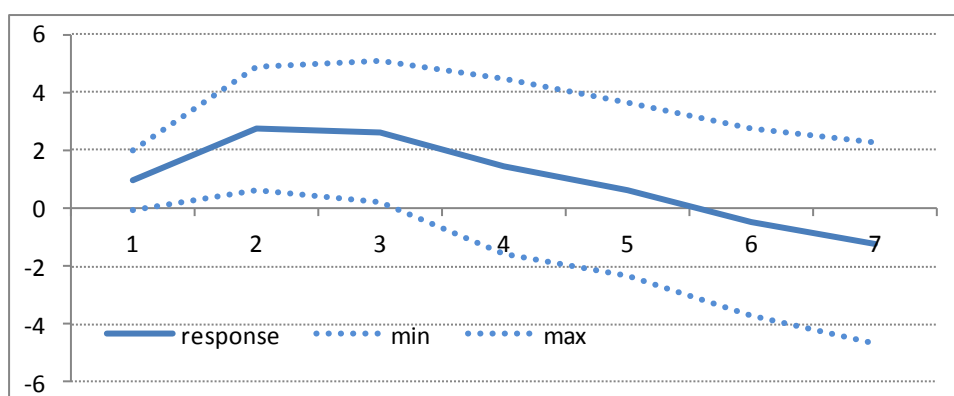
Source: OECD calculations.

Figure 7. The response of the credit-to-GDP ratio to net-capital inflows episodes, sensitivity to time fixed effects

Note: Dotted lines represent 95% confidence bands.
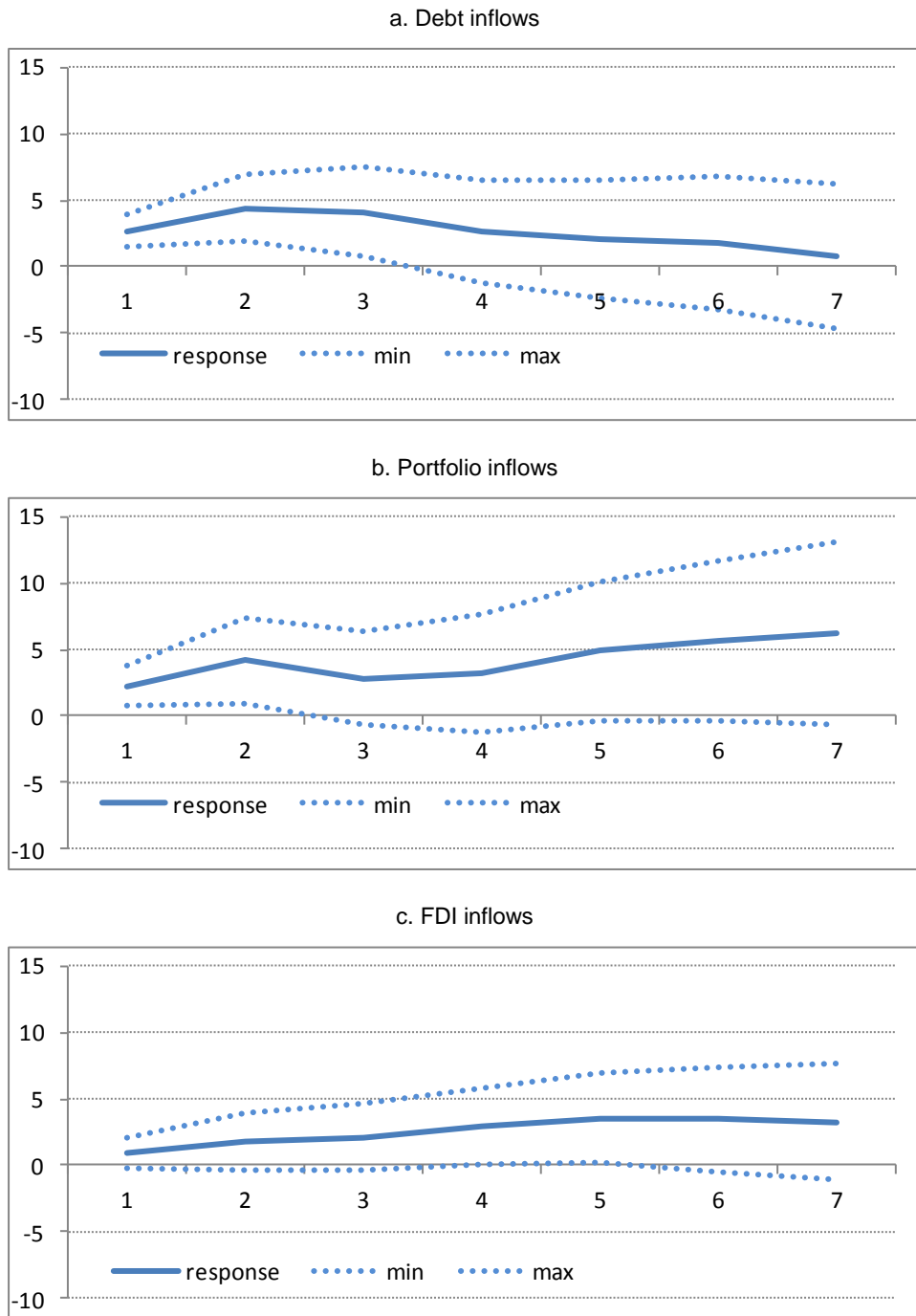
Source: OECD calculations.

Figure 8. The response of the credit-to-GDP ratio to net-capital inflows episodes, sensitivity to the inclusion of additional control variables

Note: Dotted lines represent 95% confidence bands.
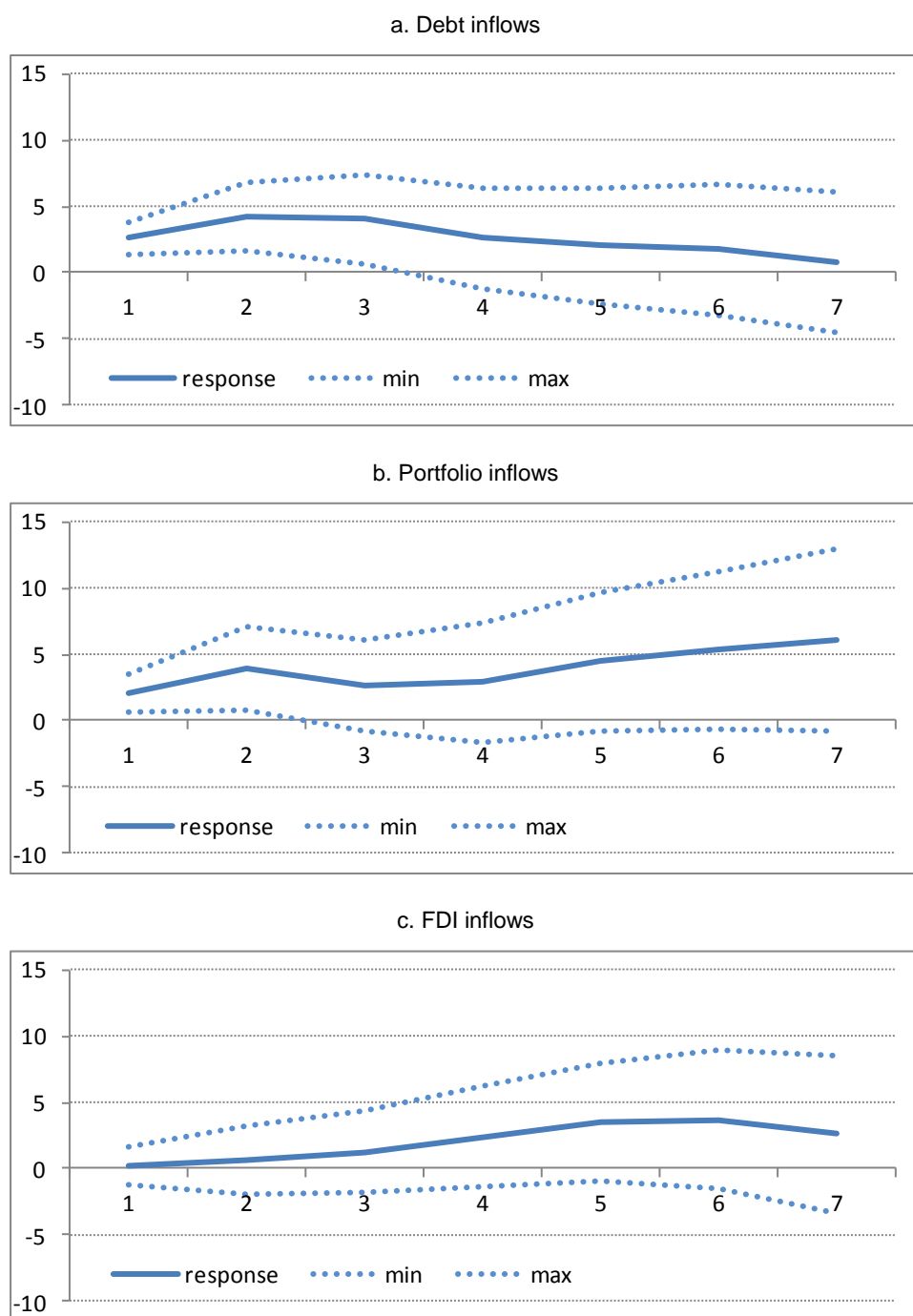
Source: OECD calculations.

Figure 9. The response of the credit-to-GDP ratio to types of inflows episodes, separate estimates

a. Debt inflows

b. Portfolio inflows

c. FDI inflows

Note: Dotted lines represent 95% confidence bands.

Source: OECD calculations.

Figure 10. The response of the credit-to-GDP ratio to types of inflows episodes, joint estimates

a. Debt inflows

b. Portfolio inflows

c. FDI inflows

Note: Dotted lines represent 95% confidence bands.

Source: OECD calculations.

Figure 11. The response of the credit-to-GDP ratio to types of inflows episodes, non-simultaneous episodes

a. Debt inflows

b. Portfolio inflows

c. FDI inflows
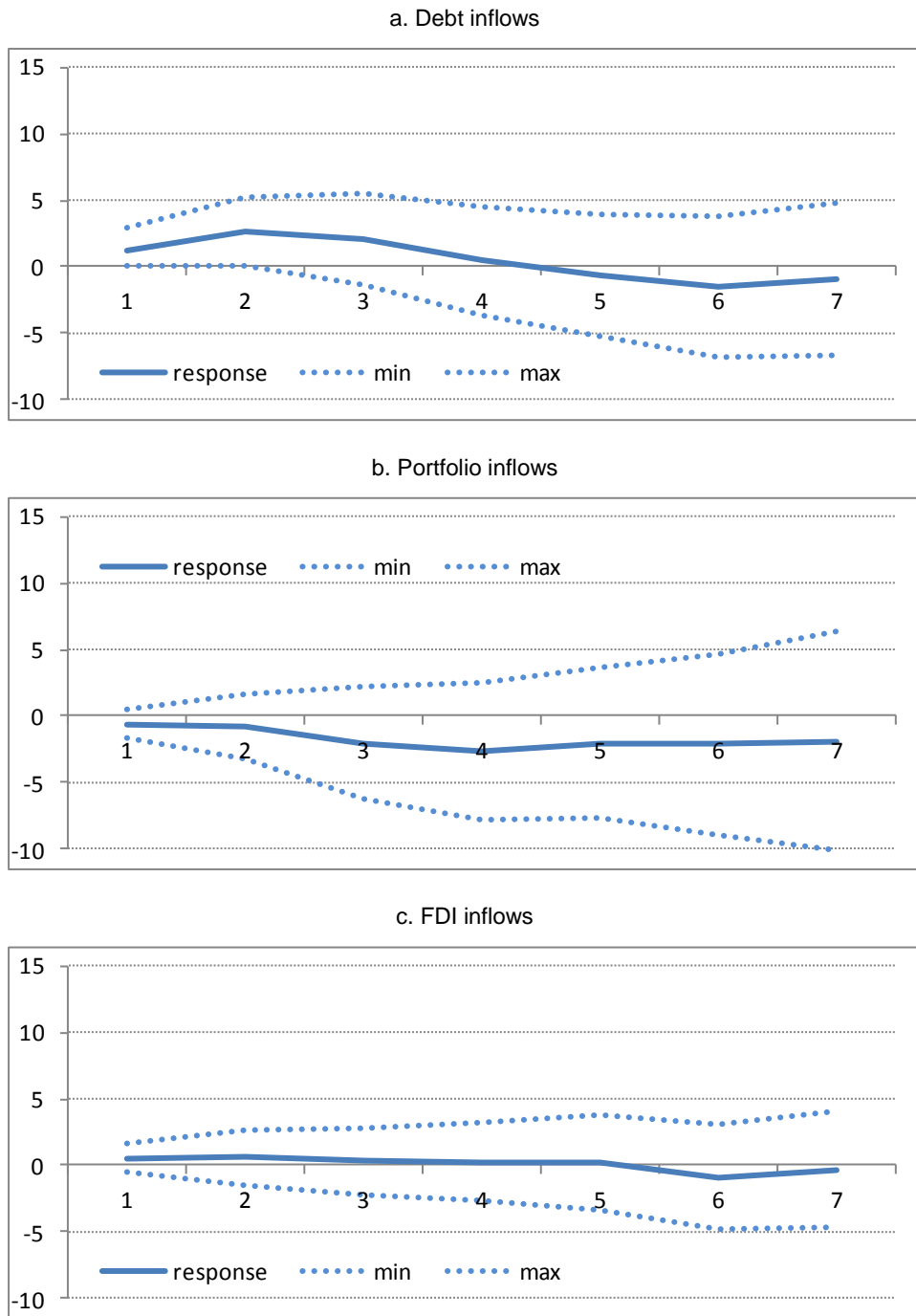
Note: Dotted lines represent 95% confidence bands.

Source: OECD calculations.

Figure 12. Sensitivity of the credit-to-GDP ratio response following an inflows episode to real exchange rate flexibility

a. Net inflows

a. Debt inflows
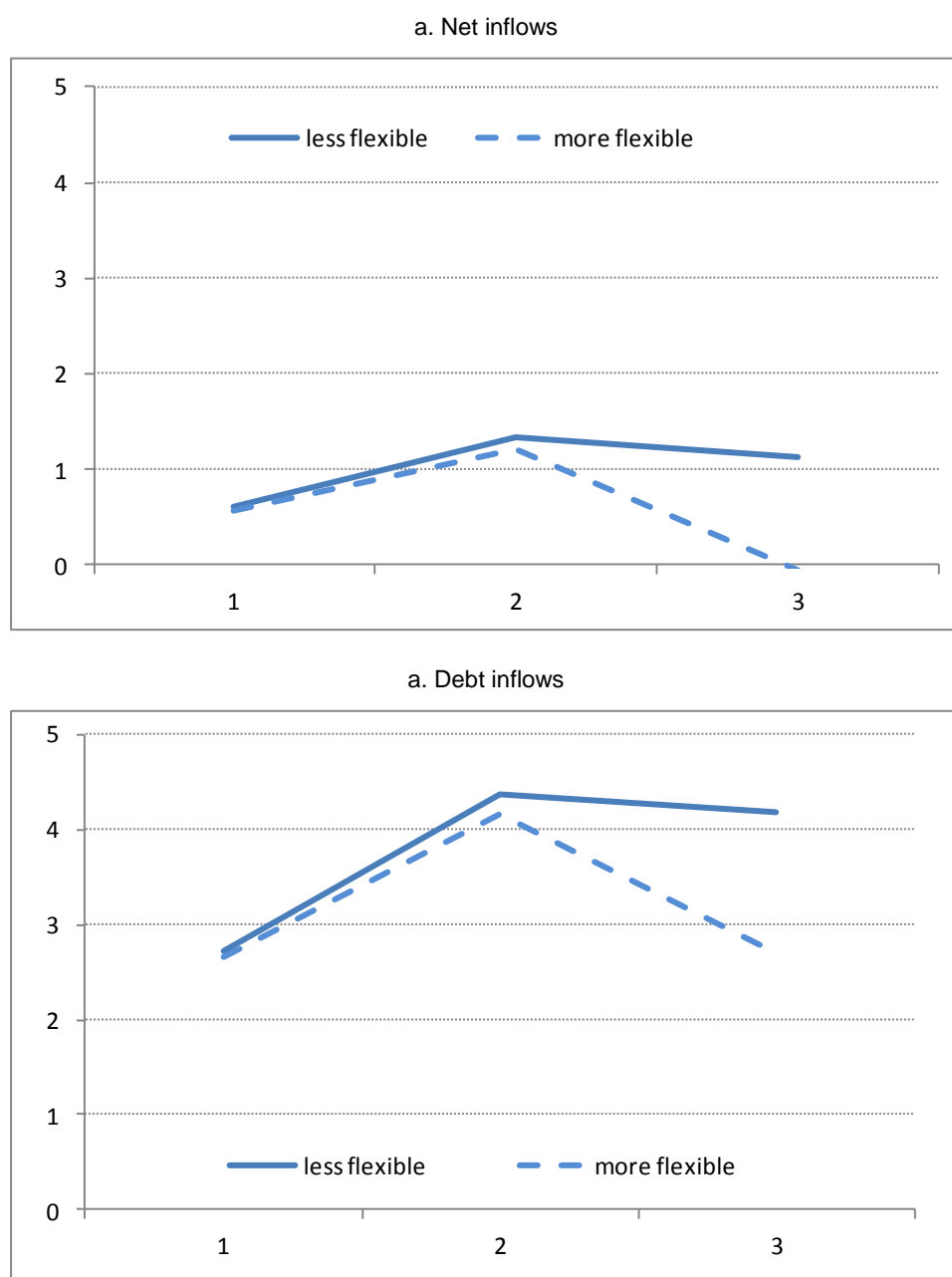
Note: Solid line R=0; dotted line R=1 where R is a dummy variable that takes value equal to 1 when real exchange rate volatility has increased following an inflow episode and zero otherwise. Exchange rate volatility is measured as the standard deviation of (monthly) real exchange rate.

Source: OECD calculations.

Figure 13. Sensitivity of the short-term response of the credit-to-GDP ratio following an inflows episode to fiscal policy stance

a. Net inflows

a. Debt inflows
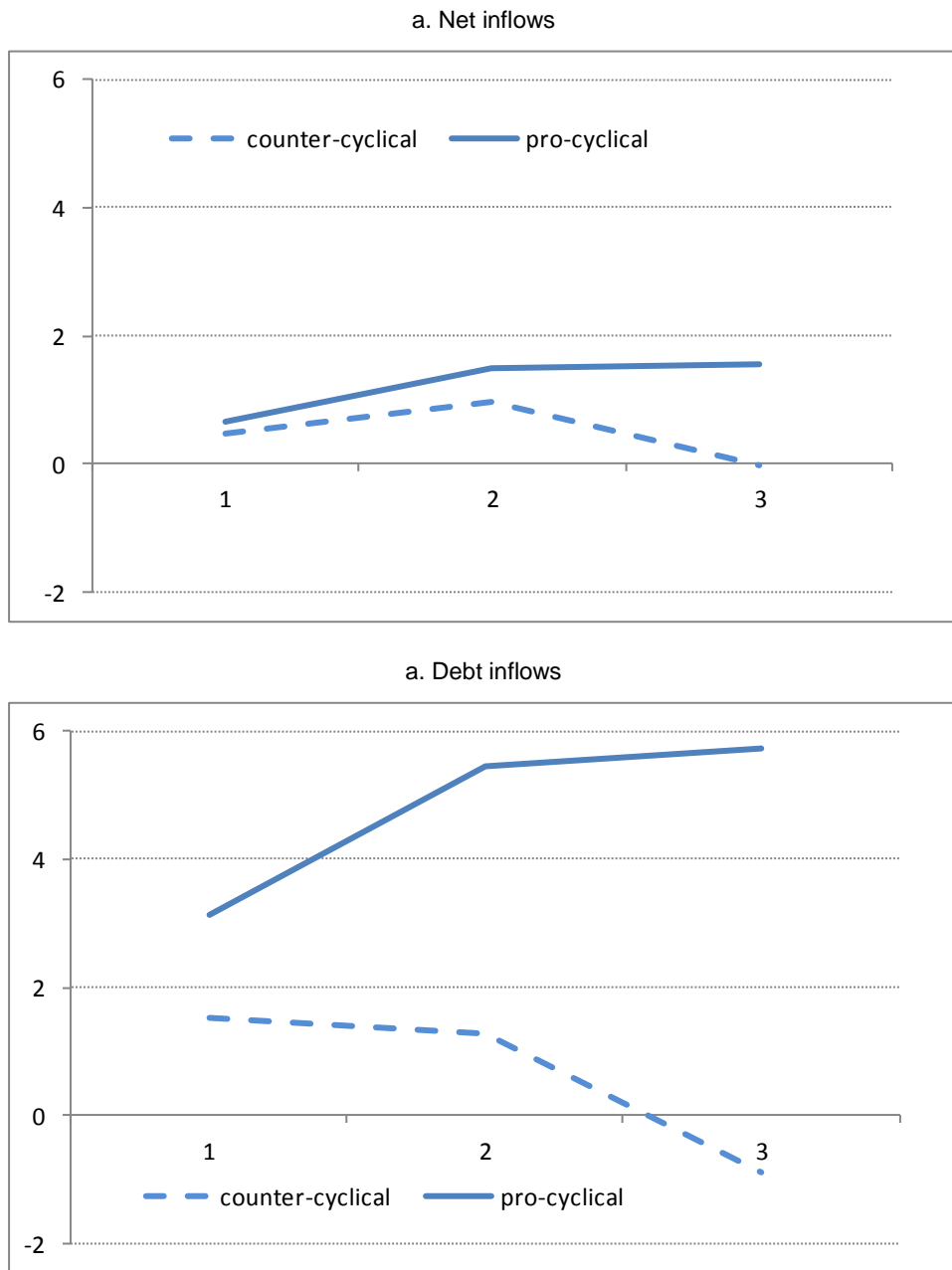
Note: Solid line pro-cyclical fiscal policy (measured as the correlation between change in government spending and output growth>0); dotted line counter-cyclical fiscal policy (correlation between change in government spending and output growth<0).

Source: OECD calculations.

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