Measurement and Identification of Capital Inflow Surges

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Context

This technical note was prepared in October 2018 by the OECD Secretariat as part of the discussions on the Review of the OECD Code of Liberalisation of Capital Movements ("the Code").

It presents a historical review of the use of the derogation clause of the Code, in particular in cases of large capital inflows, and outlines possible quantitative measures and identification techniques of the occurrence of capital inflow surges.

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Context and Historical Experience of Invocation of the Derogation Clause due to Capital Inflow Surges

Context:

As part of the Review of the OECD Codes of Liberalisation, the use of the derogation clause in periods of capital inflows surges was discussed. The derogation clause in Article 7b) of the Codes provides that if any measures of liberalisation taken or maintained in accordance with the provisions of Article 2(a) result in serious economic and financial disturbance in the Member State concerned, that Member may withdraw those measures.

Article 7b) has previously been invoked for serious economic and financial disturbances associated with capital inflow surges. The last such case dates from 1992. In order to facilitate assessments of similar invocations in the future, this short technical note outlines possible quantitative measures and identification techniques of the occurrence of capital inflow surges.

This framework could help provide important information to the Investment Committee in assessing invocation of the derogation clause in relation to inflow-related measures. This note is not intended to modify the interpretation of Article 7.

It first outlines the historical use of the derogation clause in times of capital inflow surges. It then analyses the technical discussion on measuring capital inflows and identifying surges. The final section considers possible complementary material that could be provided if a country invokes the derogation clause in periods of capital inflow surges, and provides some discussion on capital inflow surges in the context of early warning indicators (EWI).

Historical experience of derogation in times of capital inflow surges:

In the late 1960s and 1970s, the two oil price shocks, high inflation, high unemployment and large external imbalances led many countries to invoke the derogation clause. In many instances, countries imposed new restrictions because of measures designed to prevent capital outflows. This was followed in 1971-1973 by steps taken by another group of countries (Germany, Switzerland, Austria, Japan, Australia and Finland) to prevent undesired inflows of capital, mainly for inflationary concerns.

The most recent invocation of Article 7b) was by Portugal in 1992, citing "exceptionally large inward portfolio flows", "inflationary concerns" and "external competitiveness" as justification for the derogation. Table 1.1 details the historical instances of the use of the clause in response to capital inflow surges and the reasons cited for the invocation of the derogation clause.

Further reasons cited for the invocation of the derogation were: "Strong credit expansion", "sharp rise in producer prices", "render management of monetary policy very difficult", "abnormally rapid appreciation of the currency…", "important inflationary concerns", see Table 1.1

The points that guided past decisions may help the Committee assess future invocations of the derogation clause. While this technical note presents a quantitative framework to measure capital inflows and so identify surges, this needs to be seen in connection with the ability of the domestic economy to absorb these surges. It was suggested to include evidence that the surge in capital inflows is not being readily absorbed by the economy as part of the derogation application. Examples and discussion of such information are provided in Sections 3.1 and 3.2. In short, evidence of a surge in capital inflows is not in itself a justification for invoking derogation.

Table 1.1 Invocation of Article 7b) of the Capital Movements Code for Capital Inflows

	Invocation of derogation	Cessation of invocation	Type of invocation	Inflows or Outflows	Narrow or broad derogation	Context	Surge
Austria	11/1972	08/1980	7b	Inflows	Broad	Huge expansion of the Central Bank money supply. Considerable upsurge in prices stemming from the inflows and very strong credit expansion. [DAF/INV/72/67]	***
Denmark	02/1979	03/1983	7b	Inflows	Narrow	Issuance of government bonds abroad to finance the current account deficit. Continuation of such large non-resident purchases of Treasury bonds could render the management of monetary policy very difficult. [C(79)124]	***
Finland	06/1985	01/1991	7b	Inflows	Narrow	Rapid growth in non-resident purchases of Finnish securities contributing to unduly rapid expansion of the money supply. Risk of disruption to the domestic capital market, and desire of the authorities to regain control of monetary policy. [DAF/INV(85)65]	1984Q3-1985Q1 1987Q1-1987Q4
Germany	06/1972 02/1973	01/1974 11/1980	7b	Inflows	Broad	Rapidly mounting exceptional capital inflows benefiting from interest rate differential, leading to sharp rise in producer prices and significant expansion of the money supply and credit to the domestic private sector. [DAF/INV/72/70]	*** ***
Japan	01/1972 03/1978	11/1973 02/1979	7b	Inflows Inflows	Narrow	Massive inflows of speculative capital leading to disturbance in the foreign exchange market, abnormally rapid appreciation of the yen, and likely to cause distortions in the domestic monetary market [C(78)151].	*** ***
Norway	11/1984	12/1989	7b	Inflows	Narrow	Rapidly increasing capital inflows partly on account of accelerating acquisitions of Norwegian bonds by non-residents due to wide interest rate differential, leading to overheating of the domestic economy [C(84)165]	1982Q3-1982Q4 1984Q3-1985Q3
Portugal	07/1991	11/1992	7b	Inflows		Especially large inward portfolio investment flows, reflecting high interest-rate differentials and limited exchange-rate risk leading to further appreciation of the exchange rate and weaker external competitiveness of domestic enterprises as well as inflationary concerns. [C(92)59]	Surge 1988Q4-1990Q2
Switzerland	03/1964 07/1972 02/1978	10/1966 02/1974 01/1979	7b 7b	Inflows Inflows	Broad Broad	Important inflationary concerns from pressures on the factors of production and avalanche of capital in the country. [DAF/INV/72/52] Willingness to stem a too rapid upward pressure on the Swiss Franc exchange rate [C(78)152]	***

Note: *** indicates data are not available for the period so the surge calculation cannot be computed.

Technical Discussion

This section analyses the technical issues associated with measuring capital inflows, and the identification of surges. The first sub-section considers the measurement of capital inflows; the identification of capital inflow surges is discussed in the second sub-section.

Measurement of capital inflows

In the context of the Codes, which are concerned with the liberalisation of capital movements between resident and non-resident investors, it is important to be able to identify surges associated with movements of foreign as opposed to domestic capital. In other words, it is important to be able to differentiate a surge driven by foreign inflows or investors, from an increase in residents bringing capital home or "retrenchment". This sub-section outlines the main issues to be considered when measuring capital inflows. Discussion is provided on the use of gross or net flows, the frequency of the flows, and the level of granularity of the flow to be analysed.

Net or Gross flows

To begin it is useful to clarify what is meant by gross and net capital flows in this note. Following the Sixth Edition of the Balance of Payments Manual (BPM6), "capital flows" refers to cross-border financial transactions recorded in economies' external financial accounts. Gross capital inflows arise when the economy incurs more external liabilities (inflows with a positive sign) or the economy reduces its external liabilities (inflows with a negative sign). Thus, gross inflows are net sales of domestic financial instruments to foreign residents. Gross capital outflows arise when the economy acquires more external assets (outflows with a positive sign) or the economy reduces its holdings of external assets i.e. retrenchment (outflows with a negative sign). Thus, gross outflows are net purchases of foreign financial instruments by domestic residents. Gross outflows can fall due to either a drop in residents acquiring assets abroad, or an increase in residents bringing capital home. Furthermore, net capital flows are the difference between gross inflows and outflows.

While both gross and net capital flows are important variables, they provide different insights when analysing an economy. The net flows of a country give information on the real economy and reflect the current account balance. They inform whether a country is running a current account deficit and is being financed by borrowing. In other words, net flows are the financial counterpart to the current account balance, and are an important factor in determining exchange rates, measuring the net lending or borrowing of the economy. Gross flows provide information on the international exposure of an economy, and provide important information from a financial stability perspective. Furthermore, valuation effects (Lane and Milesi-Ferretti, 2007) are notably related to financial valuation changes in gross positions (assets and liabilities).

Until the Global Financial Crisis (GFC), net flows were mainly used when analysing the capital flows to a country and research was focused on current account dynamics. Following the GFC, it was generally acknowledged that analysing only net capital flows conceals vulnerabilities in an economy. The post crisis literature has increased its attention to gross inflows to an economy, and the effects these inflows can have on the host country.

The decoupling of gross and net capital flows also points to the consideration of gross inflows rather than net flows. Prior the mid-1990s, the two series often closely tracked each other, however they since decoupled, especially for advanced countries. In many advanced countries, net flows remained broadly stable in the recent global boom and bust cycle but gross flows were volatile; while for emerging markets, the net flows tended to co-move with the gross flows. Figure 1.1 illustrates gross and net inflows for OECD countries for the period 1980 to 2014.

Figure 1.1 Gross and Net Inflows OECD Countries 1980-2017
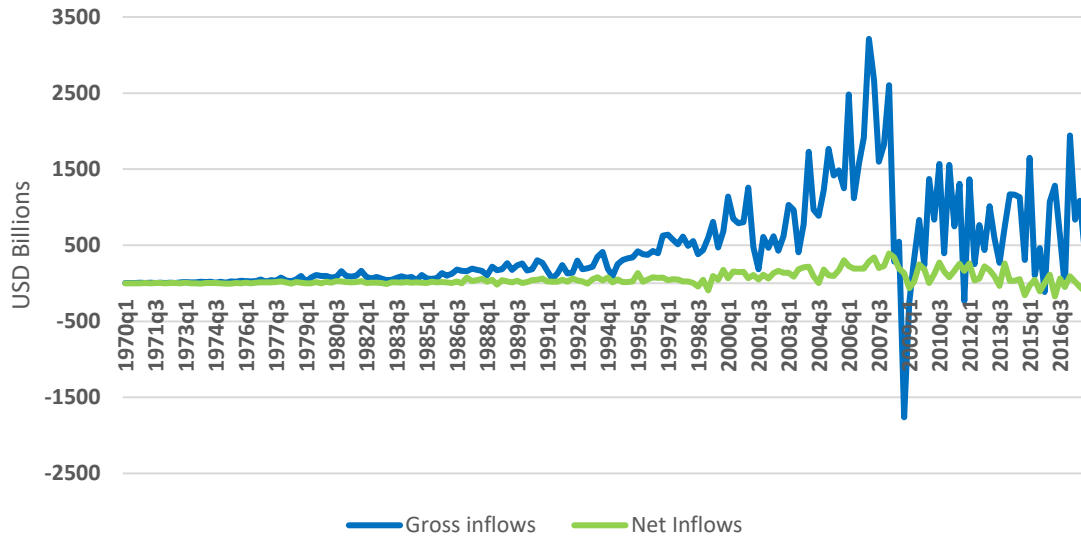
Note: Data sourced from IMF BOP, (OECD countries excluding BEL, LUX, CHE)

Finally, an example from Forbes & Warnock (2012) can illustrate that the use of net flows can identify surges, when in fact gross data do not provide evidence of an inflow surge. During the height of the GFC (Q4 2008-Q1 2009) it would be unexpected to find surges of foreign capital. However, when the authors use net flows, they identify surge episodes in 13 countries for the period, while using gross inflows only one country is identified to have experienced a surge episode. The difference is the retrenchment of capital by domestic investors which is included in the net figure, while gross inflows only refer to capital movements by non-residents. This example illustrates the different motivations of shifting capital between domestic and foreign investors, and shows the importance of using gross flows when the analysis is focused on foreign investment.

In the context of the Code, which is concerned with capital transactions between residents and non-residents, it is appropriate that gross inflows are used, while net details can provide complementary information. Gross inflows indicate the inward behaviour of foreign investors, while net flows also reflect the retrenchment behaviour of domestic investors through the netting of gross outflows. If a country is having difficulty with surges of capital inflows from non-resident investors, the possibility of invoking the derogation clause provides countries with the flexibility to temporarily re-introduce restrictions on operations covered under List A, which limit inflows from non-residents. It follows that surges of foreign capital as reflected in gross flows are used for measuring inflows.

Frequency of flows

The data frequency of flow measurement is another consideration. Historically much of the academic literature identifying capital flow surges referred to annual data of net capital inflows (Reinhart and Reinhart, 2009; Cardarelli et al. 2010; Sula, 2010; Ghosh et al.2014), while quarterly data is increasingly used (Forbes & Warnock 2012 a,b, Calderón and Kubota, 2012; Bluedorn, 2013). The move to quarterly data also reflects the increased availability of quarterly flow data across countries. Indeed, while higher frequency[1] data could be more useful from a policy perspective, the use of quarterly information in the context of derogation and the Codes is appropriate. The quarterly frequency is long enough to show that the disturbance due to the surge is substantial and not fleeting. Furthermore quarterly BOP data is widely produced by Code's Adherents.

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[1] Monthly identification is possible using a capital flow proxy that subtracts the change in international reserves from the trade balance. However, such data availability is limited on gross flows for a large set of countries and a long time period. For further discussion see Calderón and Kubota, (2013)

Quarterly data are however only available with a lag. Therefore, identifying a surge using quarterly BOP data will not be possible instantaneously. Some countries report monthly capital flow data, these could be used to provide more timely measurement of surges.

Type of flows, Debt vs. Equity

When analysing surges, the literature typically used total inflows, while more recently surge measurement has been split along debt and equity lines. There are merits to each approach, and a "one size fits all" may not be appropriate in this case. Other considerations such as using total flows or only private flows are detailed below. Furthermore, the inclusion of reserves or International Monetary Fund (IMF) lending in the measurement of flows are other choices to be made.

Firstly, there are a number of points to clarify when measuring total inflows for surges. Total inflows typically contain FDI inflows, portfolio debt and equity inflows, and other investment inflows[2]. Often, IMF lending and reserve accumulation, which could be driven by external factors are excluded from the calculation of total inflows. For analysis, a split of total inflows into debt and equity is often made. Debt inflows refer to portfolio bonds and other investment, while equity inflows refer to FDI and portfolio equity inflows.

Further, a choice can be made on the use of private only or total inflows. The "other inflows" component can also include government financial transactions, although it mainly consists of loans and deposits, banking capital and trade credits. Following Bluedorn (2013), it is suggested to use only "private capital inflows" for the measurement of capital inflows[3], where private is defined from the point of view of the recipient sector. Once flows to the general government and monetary authorities within the "other investment" category are excluded, the other investment flows mainly comprise flows to and from the banking sector.

Referring to the literature on capital inflow surges, it is often found that they are debt rather than equity led (Gourinchas, 2011; Obstfeld, 2012; Agosín and Huaita, 2011, 2012; Mercado, 2017; Forbes & Warnock, 2012b; Calderón and Kubota, 2012; Lane and McQuade, 2014). This feature of surges should be considered when an individual country presents evidence of a surge to the Investment Committee; it might be more-appropriate to illustrate a debt inflow surge rather than a surge in total inflows. It is also possible that there could be a surge in banking inflows, or foreign credit that could be causing severe disruption in the local market, more specific evidence of such a surge could similarly be presented.

While it is clear there are many ways to measure capital inflows, this section has pointed to some key criteria that are relevant in the context of invoking a derogation clause under the Code in response to capital inflow surges. In order to account for the behaviour of foreign investors, gross are more appropriate than net flows, quarterly data are widely available, and private inflows rather than total inflows better reflect the motivations of foreign investors. In terms of the level of the flow considered, total private flows or subcomponents such as debt or equity could be useful depending on the country circumstances.

Identification of capital inflow surges

The identification of a capital inflow surge has generated much research and the strategies used have evolved over time. Following the guidance offered in the previous section on the measurement of capital inflows; this section proposes techniques for identifying surges of gross private capital inflows, on a quarterly frequency, looking at total flows.

One of the core decisions in the identification of surges is choosing an absolute or relative technique. Crystallin et al (2015) suggest that a surge should be large in both absolute and relative terms. While this can

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[2] Other investment is a residual category that includes positions and transactions other than those included in direct investment, portfolio investment, financial derivatives and employee stock options, and reserve assets. It encompasses a number of international financial transactions, including loans and deposits, banking capital, trade credits, and official government flows.

[3] The reason for excluding government loans and central bank borrowing is that they are often driven by factors different from those relevant for other capital flows. For example, they may capture the response of official institutions to sudden changes in private capital flows. Bluedorn also proposes that IMF lending and reserve asset accumulation, which could also be influenced by non-market-driven factors, are excluded from the computation of private flows.

be tricky in a cross-country comparison setting, it could be useful to agree on a relative framework, and then a country can also show that the surge period is absolutely large for their economy.

Absolute Identification Measures

The absolute approach requires the surge to be sufficiently large when scaled by a value such as Gross Domestic Product (GDP) or population. When comparing surges for one country through time this can be useful, as the appropriate threshold can be based on the country specific experience. However, this method is flawed for cross-country comparisons, i.e. applying a threshold of inflow greater than X% of GDP implies a surge. There is no clear theoretical guidance on choosing a threshold value of X, so the choice of what is large is likely to vary across countries.

The heterogeneity across countries in the size and development of financial systems, or, indeed, accounting for those countries that receive large inflows due to their nature as a financial centre, complicates an absolute identification for cross-country samples.

While the absolute approach is not well suited to choosing a threshold value that applies to all Code's adherents, it can provide complementary information. Whether a capital inflow is large in absolute terms for a country would be useful information for the Committee, when also presented with how it compares, relatively, to past values.

Relative Identification Measures

Relative measures compare the actual capital inflows with inflows during previous periods. For example, comparisons with sample means or standard deviations from a long run trend. These techniques are well suited for cross-country comparisons.

In their seminal paper on the measurement of capital flow episodes, Forbes & Warnock (2012) (FW) provide guidance on the issue. A capital inflow surge is defined as a period when gross inflows are one standard deviation above their mean, provided they reach two standard deviations above at some point in the episode. The episode ends when gross inflows are no longer at least one standard deviation above its mean. The mean is calculated on the previous 20 quarters (or 5 years), and does not include the current quarter.

At this point, it is perhaps useful to recall what standard deviations from the mean refer to in a normal distribution. In a normal distribution, it is estimated that approximately 68% of values lie within one standard deviation above the mean, that 95% lie within 2 standard deviations from the mean and 99.7% lie within three standard deviations from the mean. The FW approach requires gross capital inflows to reach at least two standard deviations above the mean; implying that rare events are being captured.

More precisely, following FW, the cumulative sum of the last four quarters of gross capital inflows (GINFLOW) is calculated, (i.e. cumulative annual inflows in period t)C_t. Then the annual year over year changes in C_t are calculated:

$$C_t = \sum_{i=0}^{3} GINFLOW_{t-i,} \qquad \text{with } t = 1,2,\ldots N$$

$$\Delta\, C_t = C_t - C_{t-4}, \qquad \text{with } t = 5,6,..N$$

The identification requires the calculation of rolling means and standard deviations of $\Delta\, C_t$ for the past 5 years. A surge is identified starting the first quarter t that $\Delta\, C_t$ increases more than one standard deviation above its rolling mean, conditional that for one quarter during the episode it rises at least two standard deviations above its mean. The surge episode ends once $\Delta\, C_t$ falls below one standard above its mean. To provide context, Table 3.1 in the Annex lists the countries and corresponding time periods that are identified as experiencing surges according to the FW method for 2000-2014.

A second consideration is the use of the past 5 years of data or to use a longer historical period. The use of five years allows the evolution of a "new normal" in the cycle. For example, a country that experiences

sustained increases in inflows, will initially exhibit a surge, but this will fade away as the moving five year period adjusts to the "new mean", or the higher level of inflows. In contrast, a method using a longer time horizon will signal a surge of longer duration. This distinction could be particularly relevant for countries going through periods of financial development or liberalisation.

The FW approach can be extended in numerous ways. One such consideration is provided by Cowan et al 2008, where the gross flows are scaled by a linear trend of dollar GDP. The authors argue this facilitates their disentangling of the capital account volatility from the volatility of real output and the real exchange rate. This approach will better account for price and valuation effects in the measurement of the flows.

The FW approach uses the rolling mean; however there are indeed many other and more complex techniques for determining trends. The Hodrick-Prescott (HP) filter4 is widely employed by economists, particularly when identifying business cycles. In determining the trend, it is important to keep in mind that the technique is robust to only past data being considered. Given countries likely use a variety of methods in different scenarios, they would be best suited to deciding the method to calculate the trend.

While there is no single answer on the identification of a capital inflow surge, this section presents guidance that can be used by the IC when assessing the invocation of the derogation clause in response to a capital inflow surge. A relative approach facilitates cross country comparison and, following a framework similar to FW, looking at standard deviations from a trend or rolling mean is a suitable starting point.

This technical section presented a quantitative framework to measure capital inflows and so identify surges, however it also needs to be seen in connection with the ability of the domestic economy to absorb these surges. Examples and discussion of evidence that the surge in capital inflows is not being readily absorbed by the economy is provided in the next Section.

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[4] To calculate the permanent component, there are a variety of trend-cycle decomposition techniques —such as Beveridge and Nelson (1981) and the band-pass filter (Baxter and King, 1999).

Complementary Information

Possible Complementary Information

During discussion in the ATFC meeting of 18 October 2017, it was suggested that complementary information be provided to the Committee when a country invokes the derogation clause in response to capital inflow surges. In previous uses of the derogation clause under 7b) of the Code, due to capital inflow surges, evidence of the disruption caused by the surges was cited, as illustrated in Table 1.1 (Section 1.1).

The historical reasons cited for the disturbance to the economy often referred to increased credit in the domestic economy, exchange rate appreciation, inflationary concerns and the effectiveness of monetary policy. When a country experiences a capital inflow surge that is not being readily absorbed by the local economy, there can also be issues of asset price bubbles, which can be reflected in house prices or equity markets. While the list of potential indicators is lengthy, this section outlines a few main areas to provide guidance.

Evidence of increased credit in the local market could be useful information in connection with the invocation of article 7b). The role of credit booms preceding crises is well documented in the literature. Associated indicators such as rising house prices or increases in credit to the non-financial private sector may be relevant.

Past invocations of the derogation clause in response to capital inflow surges often cited exchange rate pressures and sharp currency appreciations. Such evidence would likely continue to be useful to the Committee in its deliberations. Sharp exchange rate appreciations can often be seen as a direct effect of a capital inflow surge, particularly in times of substantial interest rate differentials between domestic and more global rates.

While many of these indicators are interlinked, substantial price pressures can be another signal of difficulties absorbing inflows. This raises challenges associated with the transmission of monetary policy, a reason cited in the past for similar derogation invocations.

> **Box 1: Case Study of Complementary Material Provided with the Derogation Clause:**
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> *Switzerland* *invoked derogation clause 7b) in 1978; the Swiss authorities "considered that serious financial and economic disturbances were present at the time when they were obliged to strengthen measures to check the inflow of foreign funds". This was to the backdrop of the "emergence of floating exchange rates, countries with floating exchange rates, and Switzerland in particular attracted large capital inflows." At the time, the authorities noted that they had used many other polices to reduce the inflows, but, without success they finally resorted to a ban on purchases of securities by foreigners.*
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> *The Swiss authorities provided thorough evidence of the challenges facing their economy in the face of inflows of foreign capital. They documented that the real exchange rate had appreciated 25% v/v the USD in 9 months. They noted the exchange rate trend v/v the USD for the previous four years, and compared it with the appreciation of other member countries v/v the USD. Finally, the Swiss presented evidence that as a weighted average, the appreciation of the Swiss Franc in terms of the currencies of 15 main export markets was over 8% for a three month period. The authorities also indicated the extent of the exchange rate market interventions by the Swiss National Bank; the adjusted monetary base had expanded approximately 20% on an annual basis over the previous five months.*

Early warning indicators

Although this technical note is focused on the measurement and identification of capital inflow surges, it would be remiss not to also place it in context of the work on early warning indicators (EWI). The EWI field

grew exponentially following the global financial crisis, with central banks, international organisations, policy institutions and academics investigating and developing indicators that can be used to gauge the financial stability (or perhaps sustainability) of an economy. The field had originally developed following the emerging economy crises of the 1990s.

It has been well documented that capital inflow surges can result in financial stability crises, however, when we think of EWIs, cross border inflow surges are but one source of risk to the financial system. EWIs capture a range of risk sources, fiscal risk, systemic risk, macroeconomic risk, credit risk, liquidity and funding risk, market risk, and solvency and profitability risk.

For example, the OECD recommends that economic resilience can be strengthened by implementing policies aimed at mitigating both the risks and consequences of severe crises. In the case of risks, this implies being able to monitor home-grown vulnerabilities; coping with the consequences means identifying policy settings and mechanisms that can be put in place ex ante so as to help absorbing the impact of a severe downturn. The ESRB provides a set of quantitative and qualitative indicators of systemic risk in the EU financial system. The IMF-FSB early warning exercise (EWE) assesses low-probability but high-impact risks to the global economy and identifies policies to mitigate them. It integrates macroeconomic and financial perspectives on systemic risks, drawing on a range of quantitative tools and broad-based consultations.

Reflecting its mandate, the BIS focused on the stability of the banking system. Its initial EWI indicators were developed to "capture financial overheating and signal potential banking distress over medium term horizons". The indicators were: the gap between the credit-to-GDP ratio and its long-term trend, the gap between the residential property price index and its long-term trend and finally the difference between the debt service ratio (DSR) and its average over time. More recently, the BIS expanded its EWI coverage to household and international debt (cross border and currency exposure). Recent research has shown that cross border banking debt can be useful for predicting future banking system distress.

While capital inflow surges can result in a normal period[5], some end up in destabilising stops; this highlights the link between surges and EWIs. These capital inflow surges can be associated with sharp currency appreciations harming competitiveness and associated trade deficits, falls in interest rates and easing of credit conditions which could lead to risks of inflation and credit booms and asset price bubble risks. In that sense, a surge in capital inflows can signal an area of growing risk in the financial system. Indeed, shifts in variables such as exchange rates or credit growth form part of EWIs, a capital inflow surge would thus likely trigger EWIs in an economy that is having difficulty absorbing the surge.

Many studies on EWIs show that the identification of unsustainable booms can be done reasonably well by analysing deviations from trends. This is similar to the approach presented in this paper for the identification of capital inflow surges.

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[5] Considering surge episodes from 1982-2014, Mercado (2017) finds that although 60% of surges ended in a normal period one year after the last quarter of the surge, and 50% after two years, the remainder entered "stops".

Annex

Quantitative Measure of Gross Capital Inflow Surges

Country	Start	Stop	Country	Start	Stop
Australia	2002q3	2002q4	Korea	2006q2	2007q2
Australia	2003q4	2004q3	Korea	2009q3	2010q2
Australia	2006q1	2007q1	Latvia	2003q3	2005q1
Austria	2003Q4	2005Q4	Latvia	2006q2	2007q4
Brazil	2006q3	2007q4	Lithuania	2004q2	2004q3
Canada	2000q1	2001q1	Lithuania	2005q4	2008q1
Canada	2006q2	2007q1	Mexico	2007q3	2008q2
Chile	2005q4	2006q3	Moldova	2006q4	2008q3
Chile	2007q4	2008q3	Netherlands	2005q2	2006q2
Chinese Taipei	2003q3	2004q2	New Zealand	2000q2	2001q1
Chinese Taipei	2009q3	2010q3	New Zealand	2006q3	2007q3
Colombia	2005q4	2006q3	Norway	2000q3	2000q4
Colombia	2010q4	2011q2	Norway	2002q4	2003q2
Croatia	2002q4	2003q4	Norway	2005q4	2007q1
Czech Republic	2002q3	2003q1	Peru	2006q4	2008q2
Denmark	2005q1	2005q4	Philippines	2005q2	2005q4
Estonia	2003q1	2005q1	Philippines	2006q4	2007q3
Estonia	2007q1	2007q4	Poland	2003q4	2004q4
Finland	2004q3	2004q4	Poland	2007q1	2008q2
Finland	2010q2	2010q3	Portugal	2000q1	2000q4
Finland	2011q3	2011q4	Portugal	2003q4	2004q2
France	2001q1	2001q2	Portugal	2009q4	2010q2
Germany	2005q1	2005q4	Romania	2000q4	2001q2
Germany	2007q2	2008q1	Romania	2004q1	2005q3
Greece	2002q2	2003q1	Romania	2006q4	2007q4
Greece	2005q1	2005q3	Russia	2007q1	2008q1
Greece	2007q1	2007q4	Singapore	2006q4	2007q4
Hungary	2002q4	2003q4	Slovakia	2004q3	2005q2
Hungary	2005q1	2005q3	Slovakia	2013q2	2014q1
Hungary	2006q3	2008q1	Slovenia	2002q3	2003q3
Iceland	2003q3	2006q1	Slovenia	2007q1	2007q4
India	2003q3	2005q3	South Africa	2003q4	2006q2
India	2006q4	2008q1	Spain	2000q3	2001q1
Indonesia	2005q4	2006q1	Spain	2014q3	2014q4
Indonesia	2009q4	2010q4	Sweden	2004q4	2005q3
Ireland	2003q3	2004q2	Thailand	2004q3	2006q1
Ireland	2006q3	2007q3	Turkey	2000q1	2000q3
Ireland	2014q2	2014q4	Ukraine	2004q1	2008q2

Israel	2006q1	2006q4	United Kingdom	2000q3	2000q4
Israel	2012q4	2013q4	United Kingdom	2007q2	2007q4
Italy	2005q2	2006q1	United States	1999q4	2000q3
Italy	2010q4	2011q3	United States	2006q4	2007q2
Japan	2009q4	2011q1			

Source: Capital inflow surges according to Mercado (2017) following Forbes & Warnock (2012).

Note: A capital inflow surge is defined as a period when gross inflows are one standard deviation above their mean, provided they reach two standard deviations above at some point in the period. The episode ends when gross inflows are no longer at least one standard deviation above its mean. The mean is calculated on the previous 20 quarters or 5 years, and does not include the current quarter. Total capital inflows are defined as the sum of debt and equity inflows where debt is the sum of portfolio debt and other investment, and equity is the sum of portfolio equity and foreign investment inflows.

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