25 Emerging market currency risk around 'global disasters': Evidence from the Global Financial Crisis and the COVID-19 crisis[1]

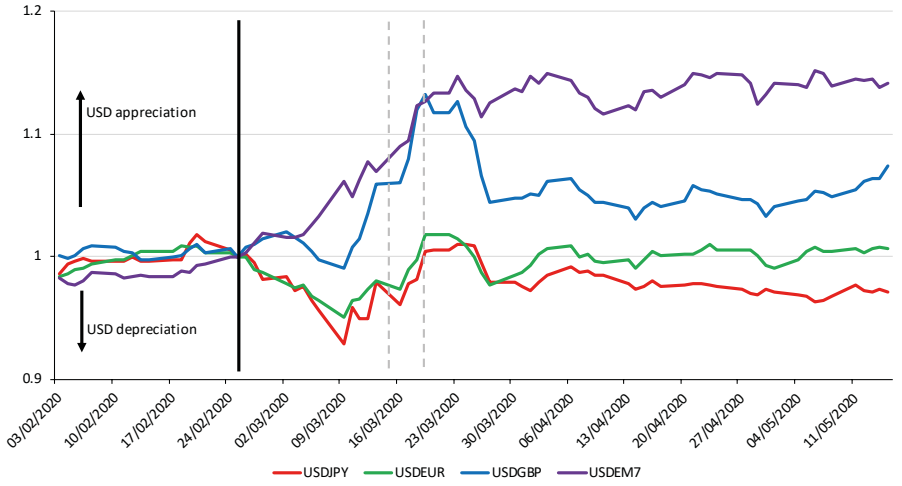
Giancarlo Corsetti, Simon Lloyd and Emile Marin
University of Cambridge and a CEPR; Bank of England; University of Cambridge

After reviewing the depreciation of emerging market currencies since the onset of the COVID-19 crisis, we document the similarities and differences relative to the Global Financial Crisis. In this chapter, we study the excess returns from holding a portfolio long in emerging market currency and short in US dollars around global crises, and interpret their dynamics through the lens of a theory of yield curves and exchange rates. The COVID crisis reminds us that, although the co-movement between exchange rates and capital outflows is low on average, it becomes strong during global crises.

A striking regularity of global economic crises is that the dollar tends to appreciate sharply against emerging market (EM) currencies. In this respect, the currency movements observed since the onset of the COVID pandemic are no exception. In Figure 1 we plot a PPP-weighted average of seven EM exchange rates (EM7) – the currencies of Brazil, India, Indonesia, Mexico, Russia, South Africa and Turkey – together with the exchange rates of the euro, sterling and Japanese yen vis-à-vis the US dollar. These series are all indexed relative to 25 February 2020 – marked by a vertical line in the figure. On this date, the US yield curve, measured using the difference between 10-year and 1-year US zero-coupon government bond yields, inverted. From this date on, the exchange rates for EMs and advanced economies (AEs) diverged, with much larger daily exchange rate moves relative to early-February. We will return to the significance of yield curve inversions later in this chapter. For now, we emphasise the striking EM7 depreciation, of around 13% relative to the US dollar, between the end of February and to 19 March.

1 The views expressed here are those of the authors, and not necessarily those of the Bank of England.

Figure 1 Exchange rate dynamics around the 25 February 2020 US yield curve inversion



Note: Vertical solid black line denotes date of the US yield curve inversion (25th February 2020), where yield curve slope defined as the 10 minus 1-year zero-coupon yield. Exchange rates normalised relative to this date. Vertical dashed grey lines denote dates of Fed announcements to (a) extend maturity of existing swap line agreements with the Banks of Canada, England, and Japan, ECB and SNB (15th March 2020) and (b) establish temporary swap line arrangements with central banks in Australia, Brazil, Denmark, Korea, Mexico, Norway, New Zealand, Singapore and Sweden (19th March 2020). USDEM7 a PPP-weighted average of seven EM currencies: Brazil, India, Indonesia, Mexico, Russia, South Africa, Turkey. Dates: 3rd February 2020 to 15th May 2020.

Data Source: Datastream.

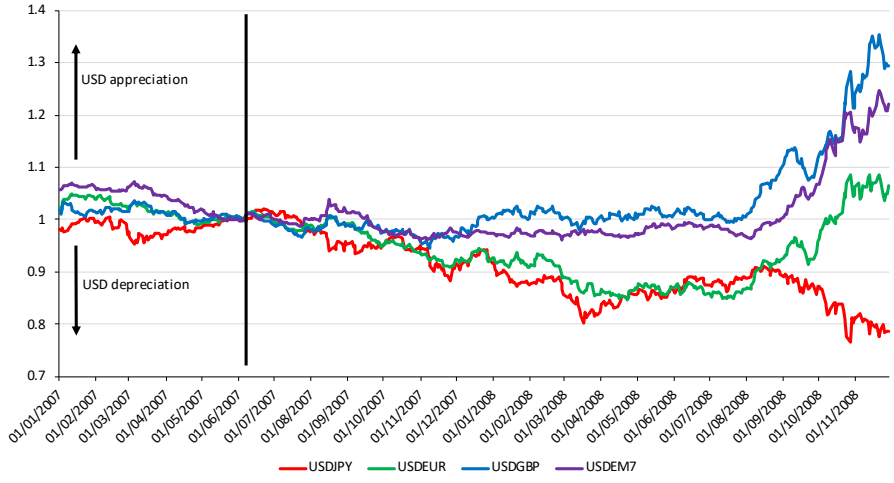
As shown in Figure 1, for a couple of weeks after the US yield curve inversion, the US dollar lost value against the euro and the yen, while sterling remained broadly stable. As of around the second week of March, when the scale of the potential economic downturn caused by the COVID crisis became apparent, the dollar started to strengthen against all three AE currencies. On 15 March, the Federal Reserve (Fed) extended pre-existing swap line arrangements with central banks and, on 19 March, announced temporary swap lines with a range of central banks, including some EMs (Bahaj and Reis 2020). By early-April, all three AE currencies had recovered (at least part of) the ground lost to the US dollar in the first half of March. They have remained comparatively stable thereafter, with sterling remaining somewhat weaker and the yen somewhat stronger relative to February. The EM7 index of currencies had also stabilised, but without any gain – the index still remains around 14% weaker relative to its end-February level.

There is a considerable degree of heterogeneity in the extent of depreciation across the EM currencies included in our EM7 index. As of 19 March, the currencies of Brazil, Mexico and Russia – major oil exporters – had depreciated the most, by around 16-26%, while the currencies of India and Indonesia the least, the former by around 4%.

The Fed swap lines announced on 19 March were made available to only two of the seven EMs in our index, Brazil and Mexico. However, one can argue that, by their effect on the global excess demand for dollars (Du et al. 2018), the swap lines have likely played a broader role in EM exchange rate markets, indirectly stabilising currencies not covered by the Fed initiative too.

For comparison, in Figure 2 we plot the evolution of the same exchange rates around the Global Financial Crisis (GFC), over the 2007-2008 period. The exchange rates in these figures are indexed relative to the end of the protracted US yield curve inversion, which began in June 2006 and concluded in June 2007. In the months following the end of the yield curve inversion, AE currencies (shown in Figure 2) followed a pattern that, qualitatively, is similar to Figure 1 – although stretched over a longer period.[2] After the (end of the) US yield curve inversion, the euro, the yen and, to a lesser extent, sterling at first strengthened relative to the dollar. Then, in the last quarter of 2008, following the collapse of Lehman Brothers in September, the euro and sterling lost ground to a strongly appreciating dollar.

Figure 2 Exchange rate dynamics around the end of the 2006-2007 US yield curve inversion



Note: Vertical solid black line denotes the end date of the 2006-2007 US yield curve inversion on the 5th June 2007, where yield curve slope defined as the 10 minus 1-year yield zero-coupon yield. Exchange rates normalised relative to this date. USDEM7 a PPP-weighted average of 7 EM currencies: Brazil, India, Indonesia, Mexico, Russia, South Africa, Turkey. Dates: 1st January 2007 to 30th November 2008.

Data Source: Datastream.

Similarly, following a period of relative stability from June 2007 to late-summer 2008, EM currencies depreciated and, by November 2008, were all at a lower value relative to the US dollar – this is just before the Fed announced its Large-Scale Asset Purchase programme. By this date, the EM7 index had depreciated by around 20% since the end of the US yield curve inversion, much larger than, say, the 7% depreciation of the euro.

Comparing the current COVID crisis and the GFC, the recent 14% exchange rate depreciation of our EM7 index is smaller than the near-25% depreciation at the peak of the GFC from late-August to end-November 2008. However, there is a striking difference. The recent EM depreciation materialised over the three weeks following the US yield curve inversion in February, as opposed to over a time span exceeding a year in 2007-2008. The time scale for Figure 2 is in months, while it is days in Figure 1.

In the remainder of this chapter, we interpret these exchange rate dynamics through the lens of a no-arbitrage theory around rare global disasters. Furthermore, we study excess returns for a portfolio long in EM bonds around global and EM-specific crises and draw a link to movements in the US yield curve and capital flows.

Exchange rate dynamics after a US curve inversion: Insights from theory

Building on our research (Corsetti and Marin 2020, Corsetti et al. 2020), in this section we offer theoretical insight on the empirical patterns highlighted above, in Figures 1-4, through the lens of a model of exchange rate dynamics around rare (or economic) global disasters. Here, a 'global disaster' is defined, as in Farhi and Gabaix (2016), as a set of events that cause a large fall in consumption across a large number of countries and a sharp depreciation of their currencies – in practice vis-à-vis the US dollar (see also Barro 2006).

Our theoretical contribution consists of showing that global disasters are likely to be preceded by a yield curve inversion (or, at least, a yield curve flattening) in the US, consistent with evidence in Figures 1-4. The yield curve captures investors' expectations of future economic activity. Intuitively, when investors expect a downturn associated with a currency depreciation, they require higher yields at commensurate maturities to hold bonds denominated in that currency (Lloyd and Marin 2019). Higher yields at short maturities compensate investors for an elevated risk of a disaster in the short run. A yield curve inversion, due to the relatively higher short-term yields, can then reflect a higher probability of disaster in the short-run relative to the long-run. Importantly, it should be stressed that the US yield curve inversions around the GFC and COVID crisis preceded changes in monetary policy – i.e. they were not the result of changes

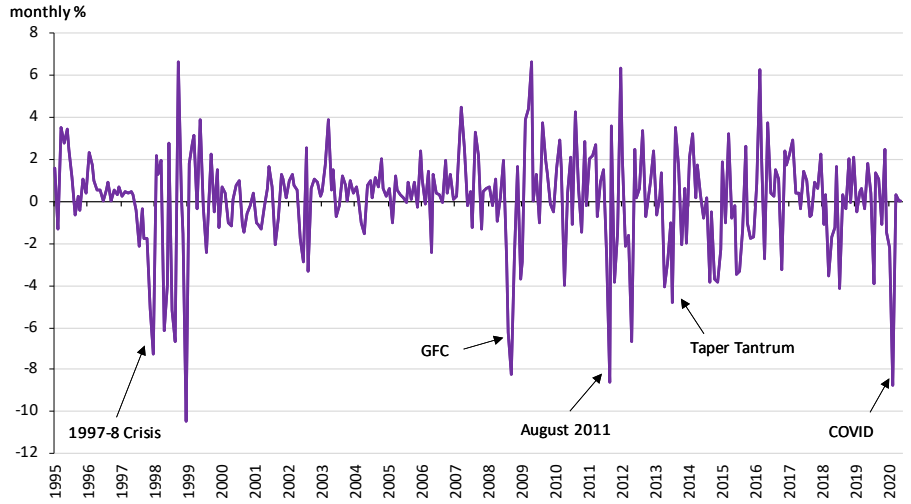
in the monetary stance, a point further explored using a century of data in Corsetti and Marin (2020). Furthermore, yield curve inversions can occur for reasons other than 'global disasters' (as defined above) and not all of them need precede a downturn or the exchange rate dynamics we describe here.

In addition to affecting domestic yields, expectations of an economic disaster give rise to exchange rate risk premia. In Lloyd and Marin (2019) and Corsetti et al. (2020), we characterise the exchange rate dynamics following a yield curve inversion linked to an economic disaster. Initially, bond yields and exchange rates reflect investors' expectation of the coming disaster. For investors to be willing to keep investing in the (relatively risky) high-yield currencies, they require positive excess returns to compensate for the possibility of a large depreciation, which would result in losses. Conversely, a portfolio long in (relatively safe) dollar bonds delivers negative returns outside of a disaster. When the disaster occurs, the portfolio long in bonds denominated in the risky currencies tends to suffer large ex post losses due to strong dollar appreciation.

The GFC lends empirical support to the exchange rate dynamics described above. As shown in Figure 2, with the possible exception of the Indonesian rupiah, EM currencies all experienced some appreciation in the period following the yield curve inversion and before depreciation in late-2008. This interim appreciation is quite strong in some cases (20% for the Brazilian real), and moderate in others (3% for the Indian rupee and 9% for the Mexican peso). Eventually, in the last quarter of 2008, all EM currencies in our sample depreciated strongly against the dollar, coinciding with a sell-off of EM bonds and capital outflows. In Figure 3, a qualitatively similar pattern of appreciation and subsequent depreciation characterises the euro and, to a lesser extent, sterling.

The COVID crisis is arguably different from previous crises, reflecting the nature and size of the shock and its global spread, creating considerable uncertainty around its effects on the global economic and financial system. Yet, during the current COVID crisis, we still observe a sequence of appreciation and subsequent depreciation for the euro and the yen, although over a shorter period of about a month. In contrast, however, EM currencies started to depreciate immediately with the US yield curve inversion, as they concurrently faced sizeable capital outflows.

Figure 3 Monthly ex post exchange rate risk premia for emerging markets



Note: PPP-weighted average of 1-month ex post exchange rate risk premia vis-à -vis US dollar for 6 EMs (Brazil, India, Indonesia, Mexico, Russia, South Africa). Dates: January 1995 to March 2020.

Data Sources: Datastream, IMF International Financial Statistics.

Our interpretative framework is based on the idea that, outside episodes of monetary surprises, global economic disasters can be preceded by a US yield curve inversion when investors price-in a higher disaster probability – marking the starting point for large exchange rate swings and capital flows. The specific role of the US yield curve and dollar has been the focus of a large literature on the 'global financial cycle' (Rey 2013, Miranda-Agrippino and Rey forthcoming). Our contribution to this literature is to point out that, in light of the evidence on large crises, a primary driver of this cycle could be associated with a time-varying probability of economic disasters. The same model can of course be applied to country- or region-specific disasters too – such as the 1997-8 East Asian crisis – although in these cases the exchange rate dynamics we describe need not be preceded by global indicators, such as the US yield curve inversion.

Exchange rate risk premia around economic disasters

According to theory, in anticipation of a disaster, investors obtain positive excess returns from taking positions in risky currencies. Our model, with a time-varying probability of disaster risk, characterises the dynamics of excess returns conditional on a US yield curve inversion. In related work (Corsetti et al. 2020) we provide empirical support for

the model, showing evidence that, following a US yield curve inversion, returns on a portfolio long in AE bonds and short in US bonds rise during the interim period, before the dollar appreciation, and turn negative when the disaster materialises.[3]

Hereafter, we limit ourselves to descriptive, but informative, evidence on the excess returns from a portfolio in which investors take a long position in EM bonds and a short position in US bonds. In Figure 3 we plot the PPP-weighted average of exchange rate risk premia for our EM currencies over the period 1995:01 to 2020:03. There are a handful of strikingly negative values for λt that correspond to well-documented historical downturns in the global economy or EMs specifically. We highlight four such events. Two correspond to the global economic disasters discussed above: the GFC and current COVID crisis, both preceded by a US yield curve inversion. Two are EM-specific disasters: the 1997-1998 East Asian crisis and the 2013 Taper Tantrum. In addition, there is a large negative excess return in August 2011, which coincided with a sharp drop in global stock prices related to fears of a developing sovereign debt crisis in Europe.

For our set of EM currencies, despite substantially negative excess returns around disasters, the excess returns are positive on average. Over the sample period, the average excess return is 0.1% per month, indicating positive returns from holding EM bonds relative to US bonds. In line with our theory, unconditionally, this is consistent with risk-neutral no-arbitrage when investors attribute a positive probability to economic disasters at global or regional level – the latter associated with currency depreciation in EMs, but not AEs.

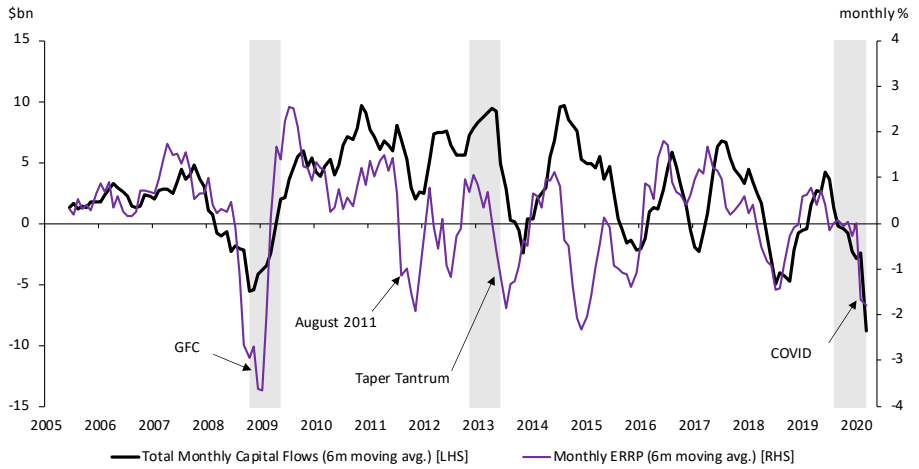
Capital flows and currency movements

The currency dynamics around the COVID crisis have been accompanied by substantial international portfolio adjustment. In the week following the 25 February US yield curve inversion, when the depreciation of the EM7 currency index began to pick-up pace (Figure 1), capital outflows from EMs markedly accelerated. According to Institute of International Finance (IIF) estimates, non-resident portfolio outflows from EMs summed to nearly $100 billion over a period of 45 days starting in late-February 2020 (IIF, 2020). Like exchange rates, capital outflows from EMs have been comparatively stable since late-March, but have not reversed.

3 We use 6-month maturity bonds for the sample 1980-2017 and find that this relationship is statistically significant and robust to the exclusion of the GFC.

Figure 4 plots EM capital flows and exchange rate risk premia – as 6-month moving averages. Remarkably, while the correlation of these two variables is close to zero when calculated over the whole period, it becomes strongly positive around economic disasters. Over a 2005:01 to 2020:03 sample, the correlation between non-resident portfolio flows to EMs and the EM PPP-weighted exchange rate risk premium, at monthly frequency, is just 0.08. This result is often highlighted by the literature on the 'exchange rate disconnect', stressing the apparent weak relationship between currency valuation and economic fundamentals, including capital flows. However, the result is quite different if we calculate a rolling correlation between these series over a 6-month window, to allow for the possibility of time-varying fluctuations. In Figure 6, shaded areas highlight periods in which the correlation rises to above 0.75. As shown in the figure, this occurs on three separate occasions, corresponding to the GFC, 2013 Taper Tantrum and the recent COVID crisis – all of which are characterised by large capital movements.

Figure 4 Capital flows and ex post exchange rate risk premia for emerging markets



Note: 6-month moving average of: non-resident portfolio flows to EMs, and 1-month ex post EM exchange rate risk premia vis-à-vis US dollar (PPP-weighted). Capital flows cumulated over each calendar month, with negative value implying an outflow from EMs. Moving averages plotted at end-date of period. Shaded areas denote periods in which 6-month rolling correlation of raw capital flows and exchange rate risk premia exceed 0.75. Unconditional correlation of raw series equal to 0.08 over the sample. Dates: January 2005 to March 2020. Data Sources: Datastream, IIF, IMF International Financial Statistics.

A similar connection between capital flows and exchange rate dynamics is discussed by Lilley et al. (2019) in relation to the GFC specifically, using a security-level database recording US purchases of foreign bonds. As such, our results in Figure 6 contribute to growing evidence that, while the link between currencies and capital flows may be weak on average ('disconnect'), it can be strong during periods of global distress ('reconnect').

Discussion

The disruptive consequences of capital outflows from EMs have long raised questions about which policies and institutions can reduce vulnerabilities ex ante and the social and economic costs ex post. According to our model, the exchange rate appreciation – which delivers positive excess returns on risky portfolios when the probability of a global disaster is priced-in – and subsequent depreciation – when the disaster materialises – belong to an integrated cycle in international financial markets. While, unconditionally, the link between EM exchange rates and capital flows is weak on average, we highlight a strong comovement between the two at times of global distress, with specific implications for macroeconomic policy.

Focusing first on ex ante policies, a well-established literature suggests caution in allowing unrestricted capital inflows to EMs (see Ma and Rebucci 2018 for a survey). Capital flow management measures, international reserve policy or, most appropriately, targeted macroprudential policy, could help to internalise the possible economic costs of these flows. These policies are increasingly seen with favour when used to address excessive market volatility, although should not be used as a substitute for warranted macroeconomic adjustment (IMF 2020).

However, the current challenge is to design ex post policies for a large number of EMs who, in addition to capital outflows, are facing the health consequences of the pandemic, falling commodity prices, and a large contraction in remittances and international trade. Recognising the unprecedented and exogenous nature of the crisis, the G20 have agreed to work towards a 'debt service standstill' on bilateral loans for a group of 76 low-income countries. A recent piece by Bolton et al. (2020), discussed in the authors' chapter in this eBook, proposes an extension of the standstill, on a voluntary basis, to middle-income countries and, additionally, the coordination of private lenders. The authors estimate that a 12-month debt standstill from all creditors would free-up 4.7%

of annual income for EMs (ex-China). It is worth noting that the 'doctrine of necessity', on which the legal foundation for this scheme lies, is defined in relation to economic events where moral hazard considerations are muted, such as the COVID-19 crisis.[4]

In anticipation of a disaster, flexible exchange rates can help to complete local currency-denominated debt contracts ex ante, by supplementing portfolio returns and allowing EMs to maintain access to international investors. Indeed, Hofmann et al. (2020) attribute the rise in issuance of local currency-denominated bonds in EMs, following the GFC, to higher demand by (often, unhedged) international investors, driven by expectations that exchange rates can deliver positive excess returns to compensate for risk. Once the disaster materialises, the subsequent depreciation can be destabilising, but the prompt implementation of policy, including swap line agreements, has helped to mitigate this in the current COVID crisis. Additionally, the comparative exchange rate stability facilitated by international policy action can help to protect trade linkages, particularly on key goods (like food and medical supplies), and lay the groundwork for a prompt international economic recovery.

References

Bahaj, S and R Reis (2020), "Central bank swap lines during the Covid-19 pandemic", *Covid Economics* 2: 1-12.

Barro, R (2006), "Rare Disasters and Asset Markets in the Twentieth Century", The *Quarterly Journal of Economics* 121(3): 823-866.

Bolton, P, L Buchheit, P-O Gourinchas, M Gulati, C-T Hsieh, U Panizza, B Weder di Mauro (2020), "Necessity is the mother of invention: How to implement a comprehensive debt standstill for COVID-19 in low- and middle-income countries", VoxEU.org, 21 April.

Corsetti, G, S P Lloyd, and E A Marin (2020), "Uncovered Interest Parity, Yield Curve Inversions and Rare Disasters", mimeo.

Corsetti, G and E A Marin (2020), "A Century of Arbitrage and Disaster Risk Pricing in the Foreign Exchange Market", CEPR Discussion Paper No. 14497.

Du, W, J Im, and J Schreger (2018), "The U.S. Treasury Premium", *Journal of International Economics* 112: 167-181.

4 The doctrine applies in the narrow set of circumstances where nations – through no fault of their own – need to compromise certain legal obligations in order to divert resources to meet the urgent needs of their population, requiring, however the international community to certify the event.

Farhi, E and X Gabaix (2016), "Rare Disasters and Exchange Rates", *The Quarterly Journal of Economics* 131(1): 1-52.

Hofmann, B, I Shim, and H S Shin (2020), "Emerging market economy exchange rates and local currency bond markets amid the Covid-19 pandemic", BIS Bulletin No. 5.

IIF, Institute of International Finance (2020), "The COVID-19 Cliff", IIF Capital Flows Tracker, April.

IMF, International Monetary Fund (2020), *Global Financial Stability Report,* April.

Lilley, A, M Maggiori, B Neiman, and J Schreger, "Exchange Rate Reconnect", NBER Working No. 26046.

Lloyd, S P and E A Marin (2019), "Exchange Rate Risk and Business Cycles", Cambridge Working Papers in Economics No. 1996.

Ma, C and A Rebucci (2019), "Capital Controls: A Survey of the New Literature", NBER Working Paper No. 26558.

Miranda-Agrippino, S and H Rey (forthcoming), "US Monetary Policy and the Global Financial Cycle", *Review of Economic Studies.*

Rey, H (2013), "Dilemma not Trilemma: The Global Financial Cycle and Monetary Policy Independence", Federal Reserve Bank of Kansas City Economic Policy Symposium.

About the Authors

Giancarlo Corsetti is Professor of Macroeconomics at the University of Cambridge and a CEPR Research Fellow.

Simon Lloyd is a Research Economist at the Bank of England.

Emile Marin is a Ph.D. candidate at the University of Cambridge.