Disasters and Exchange Rates *

Yuen C. Lo [a] and Ulrich Volz [b]

Abstract

This paper investigates the impact of disasters on exchange rates and discusses risks to public debt sustainability and ways of mitigating these. The paper documents heterogeneous effects of disasters across country groups, with lesser developed economies being affected the worst in terms of capital outflows and exchange depreciation. Notably, International Development Association (IDA) eligible borrowers see portfolio and other investment outflows and a decline in their exchange rate after large disasters. A depreciation of the exchange rate implies higher import costs, rising inflation and higher debt service costs in cases where debt is denominated in foreign currency. Since climate change is expected to increase both the frequency and intensity of disasters, our analysis indicates that poor countries are going to face heightened exchange rate risk in the future. This not only heightens the imperative of investing in adaptation and resilience to reduce the vulnerability to disasters. It also reinforces the importance of reducing the dependency on foreign currency financing and the need of hedging exchange rate risk in public debt management.

Keywords: Disasters, Exchange rates, Debt, IDA, Capital flows

JEL Code: F31, F34, H63, Q54

* The authors gratefully acknowledge support from the German Federal Ministry for Economic Affairs and Climate Action via an IKI/SE4All grant. They are also very grateful to Harald Hirschhofer and participants of the 3rd Public Debt Management Conference in Washington, DC in October 2024 for very helpful exchanges and comments. The usual disclaimer applies.

[a] London Metropolitan University and SOAS University of London.

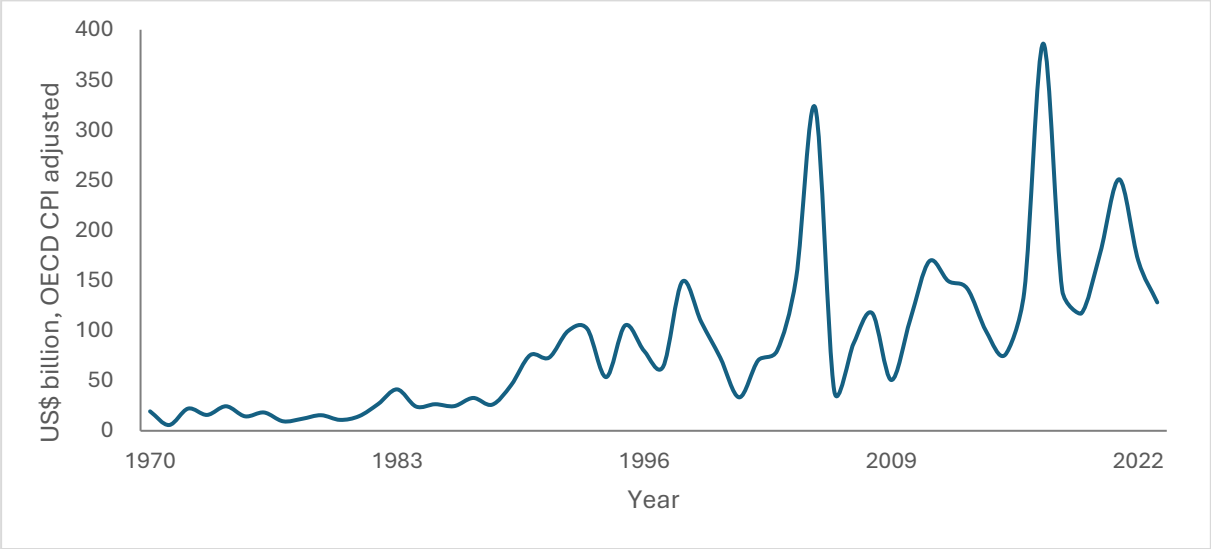
[b] SOAS University of London, German Institute of Development and Sustainability, London School of Economics and Political Science, and Centre for Economic Policy Research.

1. INTRODUCTION

The exchange rate is the single most important price in an open economy, with effects on all other prices. A decline in a country's exchange rate implies higher import costs, inflation, and higher debt service costs in cases where debt is denominated in foreign currency. A weaker exchange rate can benefit exports, but only in countries that have a meaningful export sector. An important question, and one that will be addresses in this paper, is what is the effect of major disasters on exchange rates?

In recent years, anthropogenic climate change has contributed to an increase in both the number and intensity of disasters (IPCC, 2023). As can be seen in Figure 1, global reported disaster damage losses have been rising over time.[1]

Figure 1. Global reported annual disaster damages, 1970-2023



Source: Compiled by authors with data from EM-DAT

Physical risks emanating from climate change have become a major driver of sovereign risk (Volz, et al., 2020), increasing the cost of capital of climate-vulnerable countries (Buhr, et al., 2018; Kling, Lo, Murinde, & Volz, 2018; Beirne, Renzhi, & Volz, 2021; Beirne, Renzhi, & Volz, 2021). Besides direct and indirect impacts on fiscal balances, climate disasters can also have profound impacts on exchange rates. Awareness has been growing of the significance of foreign exchange risk in international lending, thanks in part due to the Bridgetown Initiative and the Paris Summit (Persaud, 2023; Élysée Palace, 2023). Despite efforts to reduce vulnerabilities from borrowing in foreign currencies, developing countries are still exposed to foreign exchange risk (Eichengreen, Hausmann, & Panizza, 2023).

Notwithstanding the potentially significant impact that disasters can have on the exchange rate, there has been surprisingly little research on this matter. This paper, along with a sister paper (Lo and Volz (2025), is seeking to fill the gap and look into the impacts of large disasters on exchange rates. While Lo and Volz (2025) conduct an econometric analysis of the effects of disasters on financial flows, reserves and exchange rates, this paper provides case studies and data analysis of the identified disasters with a specific focus on nominal exchange rates. Building on this, we frame a policy debate and provide a set of policy recommendations.

[1] https://www.emdat.be/

The paper is structured as follows. Section 2 briefly reviews four cases of countries that suffered from large disasters, namely the Philippines, São Tomé and Príncipe, Madagascar, and Malawi. Section 3 analyses the impact of disasters on exchange rates in a cross-country analysis. This is followed by a discussion of policy implications in Section 4. Section 5 concludes.

2. COUNTRY CASE STUDIES ON EXCHANGE RATES AND DISASTERS

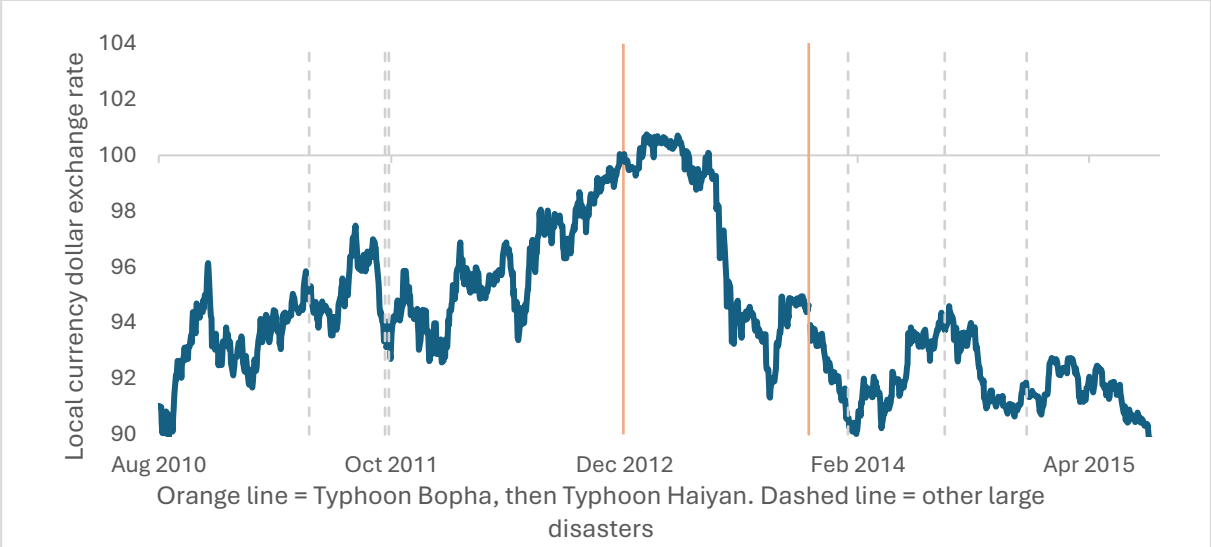
The exchange rate is arguably the single most important price in an open economy. It is hence a question of critical importance how the exchange rate is affected by large disasters. Major disasters are no rare events, and for many developing countries they happen with alarming regularity. This paper follows a sister paper, Lo and Volz (2025), and defines major disaster quarters as calendar quarters where disaster losses exceed 1% of GDP or numbers affected exceed 1% of population. There are many countries which suffer such major disasters every year. Between 2005 and 2021, this analysis identified 204 major disaster quarters, equivalent to an average of twelve per year.

We begin our analysis with a brief review of four country cases – the Philippines, São Tomé and Príncipe, Madagascar, and Malawi – that suffered from large disasters and subsequently experienced significant movements of their exchange rate.

2.1. Philippines

The Philippines, a lower middle-income country, is among the countries that have been suffering regularly from large disasters. In Figure 2, the occurrence of major disaster quarters is marked on the local currency US dollar exchange rate for the Philippines. A total of eight disaster quarters between 2011 and 2015 are identified, two of which, typhoons Bopha and Haiyan, were particularly severe. After four of these major disaster quarters, the Philippines saw initial exchange rate appreciation. We note that the three major disaster quarters of 2011 in the empirical model reflect a seven-month series of tropical storms and floods, including the typhoons Aere, Songda, Nesat, Nalgae and tropical storms Meari, Nock-Ten and Washi. Subsequent to these disasters, the Philippine peso rose 6% before the particular severe Bopha Typhoon. After the latter, the exchange rate appreciated by a percent before falling almost ten percent. The next short lived upward move in the peso was bookended by the third most powerful tropical cyclone ever recorded in the Western Pacific, typhoon Haiyan. The Philippine National Disaster Risk Disaster and Management Center reported wind gusts of 275km/h and 6,300 dead (NDRRMC, 2013). The exchange rate subsequently fell by 4%. Three further calendar quarters in the two years following Haiyan reached the 1% of population affected or 1% of GDP impacted threshold for a major disaster.

Figure 2. Philippines, exchange rate following various disasters, 2010-2015. Normalized to 100 on 4 December 2012

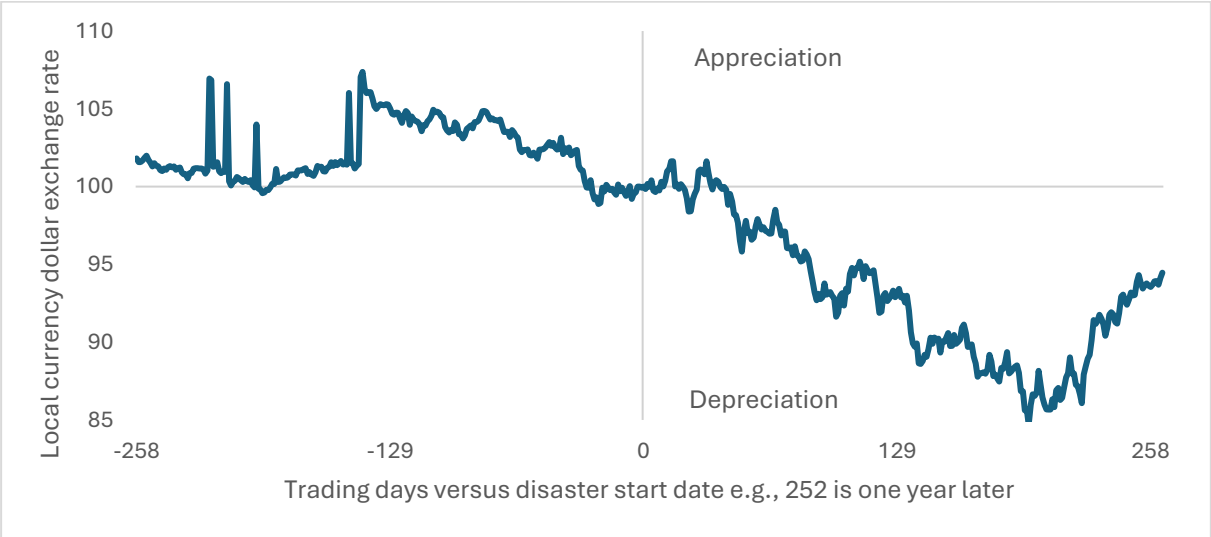


Source: Compiled by authors with data from EM-DAT and Refinitiv

2.2. São Tomé and Príncipe

Figure 3 highlights a major flooding event in São Tomé and Príncipe. Heavy rainfall peaked on 29 December 2021 and led to floods across the country. While the country was still responding to this, two further rounds of flooding occurred in March and May 2022 (IFRC, 2022). The chart shows the 15% nominal depreciation in the currency in 2022.

Figure 3. São Tomé and Príncipe, exchange rate following Dec 2021 floods. Normalized to 100 and day 0



Source: Compiled by authors with data from EM-DAT and Refinitiv

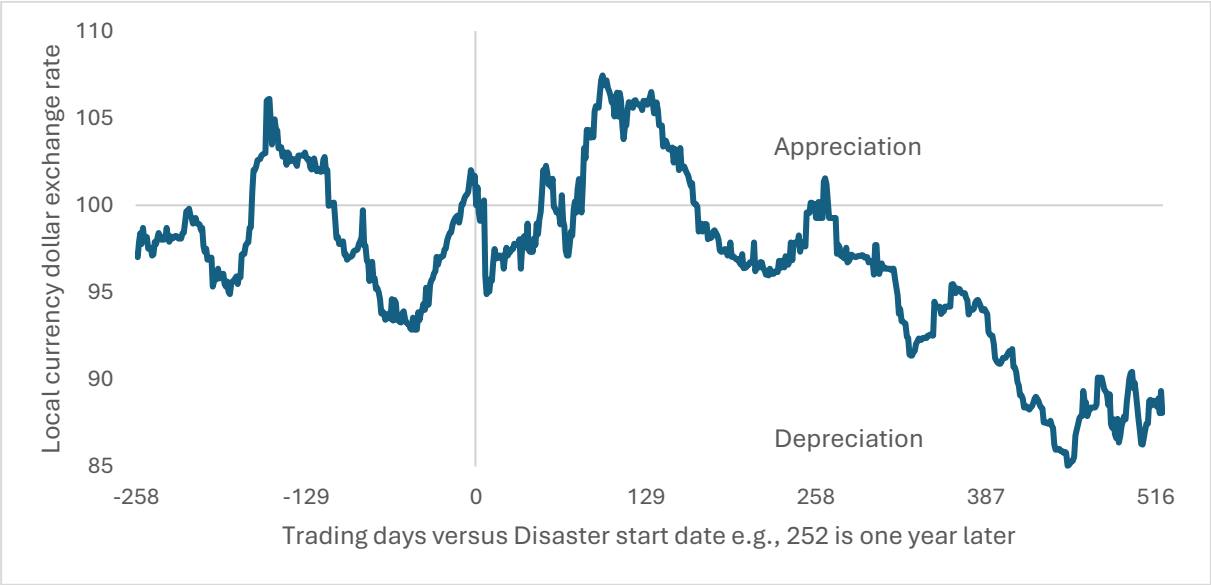
São Tomé is categorised by the World Bank as lower middle income and eligible to borrow from the International Development Association (IDA), the World Bank's concessional lending arm. The World Bank has produced an excellent story map of the flood risks it faces (World Bank, 2023). Its

complex challenges include climate change, the increasing cost of necessities, and limited land that is often rugged. The disaster highlighted came after Covid-19. The World Bank's flood hazard and risk assessments execute combined modelling of simultaneous coastal and rainfall flooding. They estimate average annual losses for the country of 3.06% of GDP in 2020 rising to 4.16% in 2050 and 6.17% in 2080. São Tomé requires large investments in climate adaptation and climate resilience.

2.3. Madagascar

In March 2017, cyclone Enawo made landfall in north-eastern Madagascar with 145mph winds, and then moved southward across central and south parts of the country. Ten days after landfall, the National Office for Risk and Disaster Management (BNGRC) reported 433,000 people affected by the cyclone, including 247,000 displaced and 81 dead (OCHA, 2017). Losses of food and cash crops were widespread, and over 1,300 water wells were flooded and polluted. A key point is that this damage compounded pre-existing problems: agriculture had already been facing water shortages and coincided with a "lean season" where households struggle to meet their needs. Furthermore, a loss of access to clean water generates conditions likely to negatively impact health and the spread of diseases. With respect to the longer term exchange rate trend, the Malagasy ariary depreciated considerably over the years 2014-2015, and then saw a relative period of stability August 2015 to May 2018, which ends approximately a year after cyclone Enawo and is visible in the 15% depreciation shown in Figure 4.

Figure 4. Madagascar, exchange rate Mar 2017 tropical cyclone Enawo. Normalized to 100 and day 0



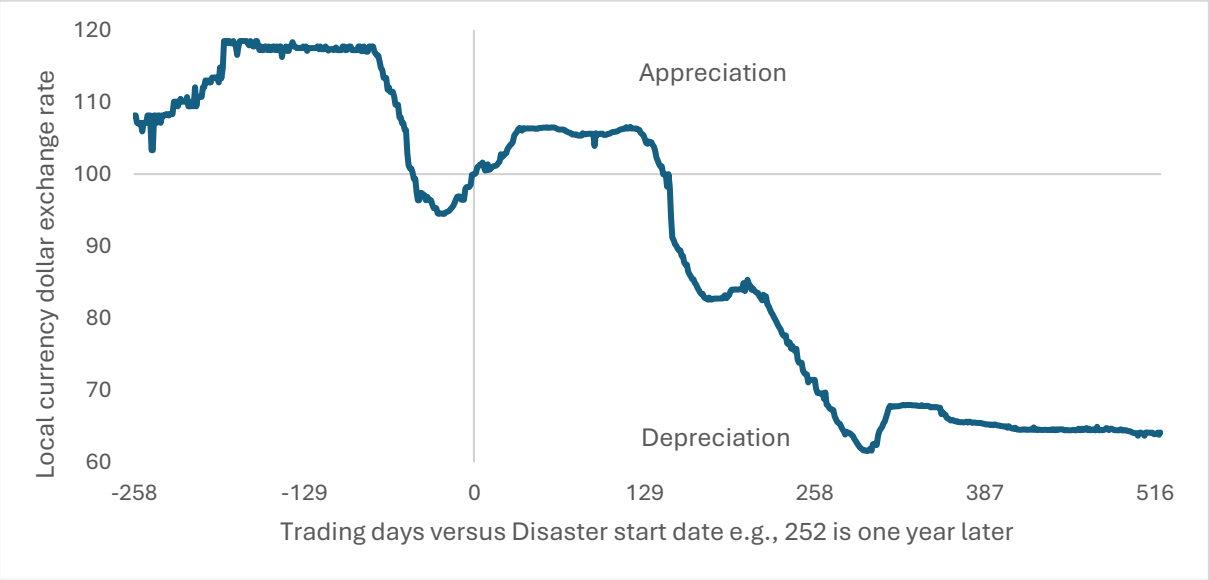
Source: Compiled by authors with data from EM-DAT and Refinitiv

2.4. Malawi

In 2015, Malawi suffered its highest January rainfall, and second highest reported death toll from flooding, in its history. An estimated 1.1 million people were affected, including 230,000 displaced and 106 dead. 500,000 houses, 89,000 hectares of crop land and 3,500 boreholes and shallow wells were destroyed or damaged. The Government of Malawi (2015) estimated the disaster effect across 12 affected sectors to be approximately 5% of GDP. Reconstruction costs were estimated to be significantly

higher. The Reserve Bank of Malawi (2015) noted that these floods, and the drought of the same year, resulted in an estimated 30% decline in the maize harvest, creating a major challenge to monetary policy. Prior to these floods, the Malawian kwacha had been depreciating since 2012, and half a year after suffered a further drop of almost 40% (Figure 5). Subsequent to this, between 2016 and 2020, the kwacha was relatively stable in the absence of further disasters. More recently it is depreciating, potentially influenced by Covid and its after effects.

Figure 5. Malawi, exchange rate Aug 2015 floods. Normalized to 100 and day 0



Source: Compiled by authors with data from EM-DAT and Refinitiv

A central theme that emerges are the multiplicative effects of pre-existing monetary, fiscal and social challenges exacerbated by one or more major disasters. On the monetary side, in 2014 inflation in Malawi averaged 24%, was declining but started to rise again by the second half of 2015. Part of the latter was food inflation related to the floods and drought. The Reserve Bank of Malawi continued its tight monetary policy stance by raising its policy rate by 2% to 27% in November 2015. The Government of Malawi possessed limited fiscal space and depended on domestic borrowing to finance its deficit. On the social side half of Malawian households were living below the poverty line. We not ascribe even the majority of any given depreciation to a specific crisis, but to how disasters compound existing challenges.

Overall, these four country examples illustrate that disasters may in some cases be followed by significant exchange rate depreciation. Nevertheless, it raises a wider question of how strong is the evidence of disaster effects on exchange rates across countries?

3. DISASTERS & DEBT RESTRUCTURINGS

There has been relatively little research into this topic compared to the literature on the effect of disasters on economic growth and inflation (e.g., Noy (2009) and Cavallo et al. (2013)). Additionally, the empirical research published on exchange rates have found in favor of both appreciation and depreciation following a disaster. Strobl and Kablan (2017) focus their analysis of the impacts of tropical cyclones on the exchange rate of small island developing states, and find that under flexible exchange rate regimes

there is a real exchange rate appreciation in the months after the storm. On the other hand, Zhou et al. (2021) examine the impact of COVID-19 on nominal exchange rates, finding significant depreciation effects on exchange rates of emerging markets, but not on those of advanced countries. These somewhat divergent results are to an extent in line with theoretical research on the subject. Farhi and Gabaix (2015) develop a disaster model to explain a variety of phenomena such as how the riskiest currencies have a positive correlation with world stock market returns. Hale's (2022) disaster model builds on this and predicts disasters to cause a real depreciation for risky countries, and a real appreciation for safe countries. These theoretical frameworks put forward predictions that are of particular interest – perhaps less developed countries should see depreciation and more developed countries appreciation?

Lo and Volz (2025) provide empirical evidence consistent with this thesis. They find no statistically significant real effective exchange rate effects for high income countries. For the entire sample of emerging and developing economies (EMDEs), they find evidence in favor of (temporary) appreciation. However, for a subsample of nine IDA eligible borrowers, they find evidence in favor of real effective exchange rate depreciation – a result of statistically significant portfolio and other investment outflows. The analysis by Lo and Volz (2025) – a non-technical summary of which is provided in Box 1 – goes beyond exchange rates to also include portfolio investment flows, other investment flows (e.g., bank loans and deposits) and international reserves. This enables a more holistic view of each country groupings results.

Once financial effects are understood and accepted as second order wider effects targetable by policy makers, Lo and Volz's (2025) results become particularly relevant. For high income countries, the notion that disasters appear to have no wider financial and macroeconomic effects is coherent with a set of countries that have sufficient domestic resources to absorb or address the indirect financial effects of disasters. For EMDEs, that disasters appear to lead to rises in international reserves, and real effective exchange rates, is consistent with a set of countries that, following a disaster, choose to guide future resources into disaster resilience. For IDA eligible borrowers, that disasters appear to drive portfolio and other account outflows, and real effective exchange rate depreciation, is consistent with a set of countries that do not have and do not receive sufficient resources to ameliorate the wider financial effects of disasters

Box 1: Non-technical summary of Lo and **Volz** (2025)

Empirical results. For the full sample of up to 66 countries, major disaster quarters cause statistically significant portfolio inflows and reserve increases. For the EMDE sample of up to 43 countries, disasters cause statistically significant reserve increases and appreciation of the real effective exchange rate (REER). For the sample of 9-12 IDA eligible countries, disasters cause statistically significant portfolio and other investment outflows, and REER depreciation. Drilling deeper into the IDA eligible results, portfolio investment flows see a statistically significant negative marginal effect from a disaster over three calendar quarters. Other investment flows (including cross-border bank lending) see a statistically significant negative effect in the second quarter after the disaster quarter. This presents us with a loss of short-term private capital coincident with real currency depreciation, yet no statistically significant reserves increase for countries that need it most. This arguably highlights the importance and role of other offsetting flows, for instance through multilateral support.

Definition of major disasters. Data from EM-DAT is used to evaluate disasters on the basis of losses as a percent of GDP and as numbers affected as a percent of population. Major disaster quarters are defined as calendar quarters where disaster losses exceed either 1% of GDP or where numbers affected exceed 1% of population. The included disasters are flood, storm, earthquake and wildfire. Major

disaster quarters are then incorporated as a statistical dummy to test empirically for changes in the variables of interest.

Variables of interest (dependent variables regressed on major disaster quarter dummy and controls). These include portfolio investment flows, other investment flows (e.g., loans and deposits), international reserves and real effective exchange rates. Net portfolio investment, net other investment flows and net foreign direct investment are the three main components of the financial account of the balance of payments, and are therefore important measures of capital flows. For 2021, the International Monetary Fund (IMF) reported global portfolio asset flows of USD 3.4 trillion, other asset flows of USD 2.8 trillion, and FDI asset flows of USD 2.3 trillion.[2] These figures reflect acquisitions and disposals of assets by non-residents only. Note that the empirical analysis is country specific and therefore net of both residents and non-residents. FDI has not been included in the empirical analysis due to problems with the quarterly data. International reserves and REERs may be impacted in their own right by disasters, as well as acting as mediators between financial flows and wider economic effects.

Controls are lagged first difference in log quarterly local consumer price index, lagged first difference in four quarter rolling log of comparable GDP in US dollars, first difference in log euro US dollar exchange rate (increase is euro appreciation, dollar depreciation), net FDI flows in US dollars, foreign exchange regime (Harms & Knaze, 2021) and an index of financial openness (Chinn & Ito, 2006).

Robustness checks. The core results are shown for each variable of interest split by country groupings. In order to test the validity of the results, multiple robustness checks are carried out. Each statistically significant country group result is tested with alternative lag specifications, and for floating foreign exchange regimes only. At the full sample level, additional robustness checks include alternative disaster thresholds (e.g., 3%, 5%, 10%). The core empirical methodology used is generalized least squares with panel random effects. Testing is carried out to show that this methodology is appropriate. Nevertheless, a further robustness check is carried out with pooled ordinary least squares. Although the robustness checks at times change the statistical significance on some lags of the major disaster dummy, the broad findings appear robust.

To complement the points made above, we present a graphical analysis of the disaster data. On average, countries see nominal exchange rate depreciation following a disaster. Figure 6 charts the average US dollar exchange rate before and after 195 major disaster episodes. This is for all the countries sampled, including high income, EMDEs and IDA eligible borrowers. It excludes countries in currency unions and some disasters where the exchange rate date is truncated by time period. The typical path sees less than half a percent of depreciation in the year prior to the disaster, some appreciation effects in the nine months after, followed by a 4% decline. The temporary appreciation is consistent with Strobl and Kablan (2017), and may be due to the international community's disaster response. The spread of individual exchange rate paths following major disasters are charted in Figure 7. The average blue line in Figure 7 is identical to the line from Figure 6.

The average US dollar exchange rate for 67 major disaster episodes for IDA eligible borrowers is shown in Figure 8. One natural observation from this chart is that there is a clear depreciation trend prior to the disaster. There are three responses to this valid critique. Firstly, the nominal depreciation in the year before is approximately 2.5%. The depreciation in the two years after are 3.5% per year (7% over two years), and would be even higher if measured from the post disaster high. This suggests major disasters may drive an acceleration in exchange rate depreciation. Secondly, the econometric modeling from Lo and Volz's (2025) is on real effective exchange rates, and no trend depreciation is found after adjusting for inflation and trade weights. Thirdly, the existence of trend nominal depreciation effects

[2] https://data.imf.org/regular.aspx?key=60961513

supports the key policy recommendations of this paper – the critical importance of exchange rate matched, or hedged, borrowing and lending.

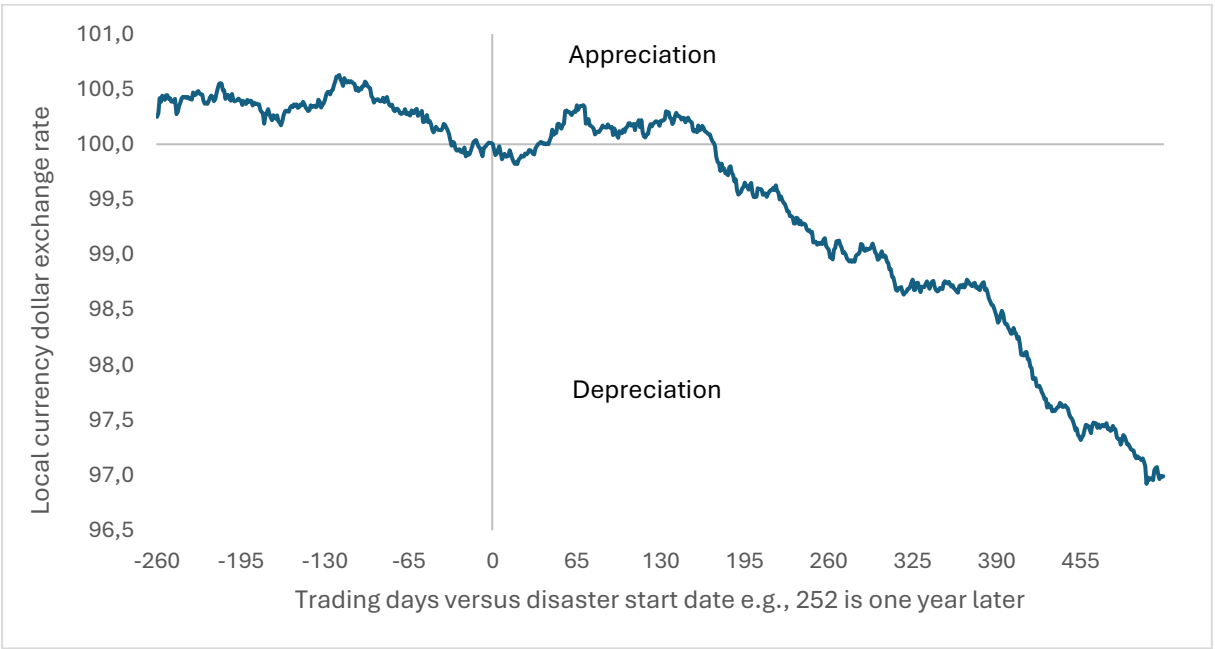
Figure 9 presents the spread of individual exchange rate paths for IDA eligible borrowers. A year after a major disaster, 3 out of 5 disasters have led to a depreciation in the local currency US dollar exchange rate.

The value of a specific exchange rate is a focal dimension of a currency. Another important dimension is the associated volatility. Higher volatility is by definition an increase in uncertainty, and implies additional difficulties in planning, doing business, and higher hedging costs. The average annualized historical exchange rate volatility is charted in Figure 10. An increase in volatility appears the year after a major disaster prior to changes in the average historical exchange rate. The potential implications of this connects to Aghion et al. (2009) who find that increased foreign exchange volatility has negative impacts on productivity growth for less financially developed countries.

In Figure 11 exchange rate volatility is charted for IDA eligible borrowers. At the time of the disaster (day 0), exchange rate volatility is lower (3.9%) than for the full sample (4.77%). After the major disaster, the peak volatility for IDA eligible borrowers is less sustained but with higher peaks than for the full sample.

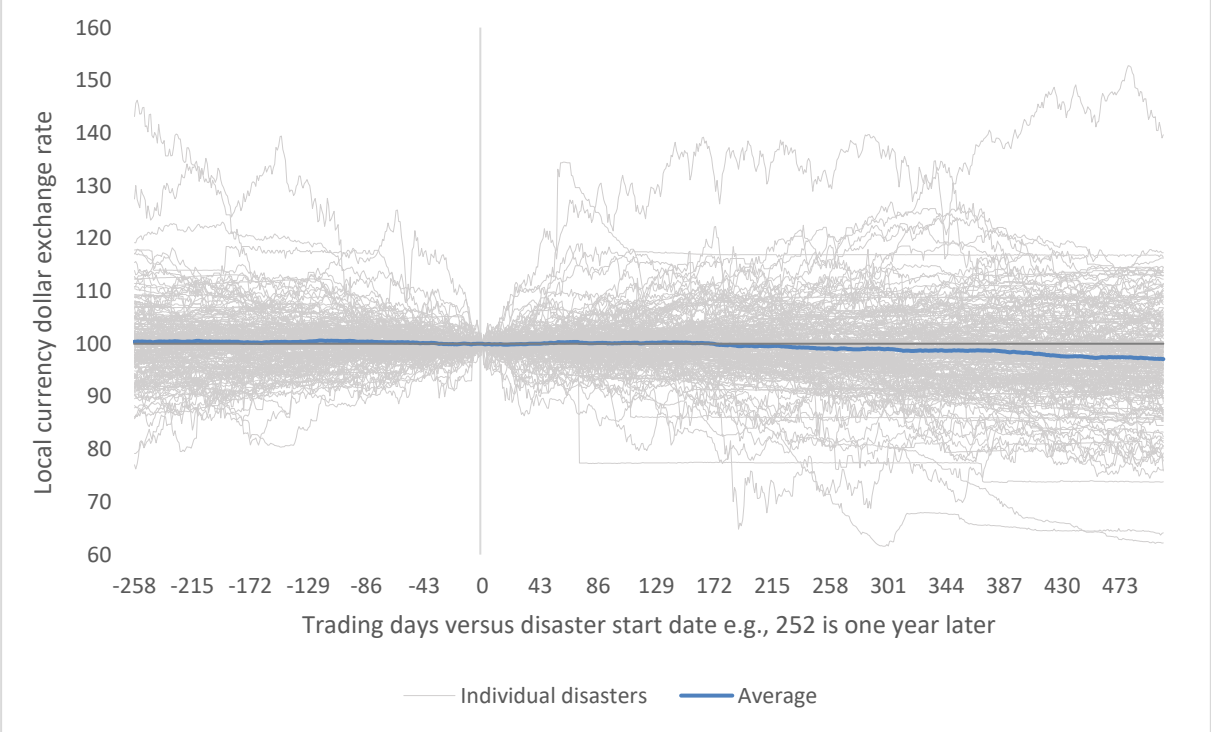
A conclusion of the empirical and graphical analysis includes the following disaster related observations. IDA eligible borrowers appear to face outflows of portfolio and other investment flows, coincident with a depreciation of their real effective exchange rate following major disasters. This finding fits into a wider picture of countries that on average sees their nominal US dollar exchange rate depreciate and FX volatility increase. Together this indicates that separate to the direct impacts, there are wider negative financial effects arising subsequent to disaster events. Arguably, these wider effects ought to be addressed by policymakers and institutions.

Figure 6. Average nominal local currency US dollar exchange rate path for 195 major disasters. Start value normalized to 100 and day 0 at the date of disaster



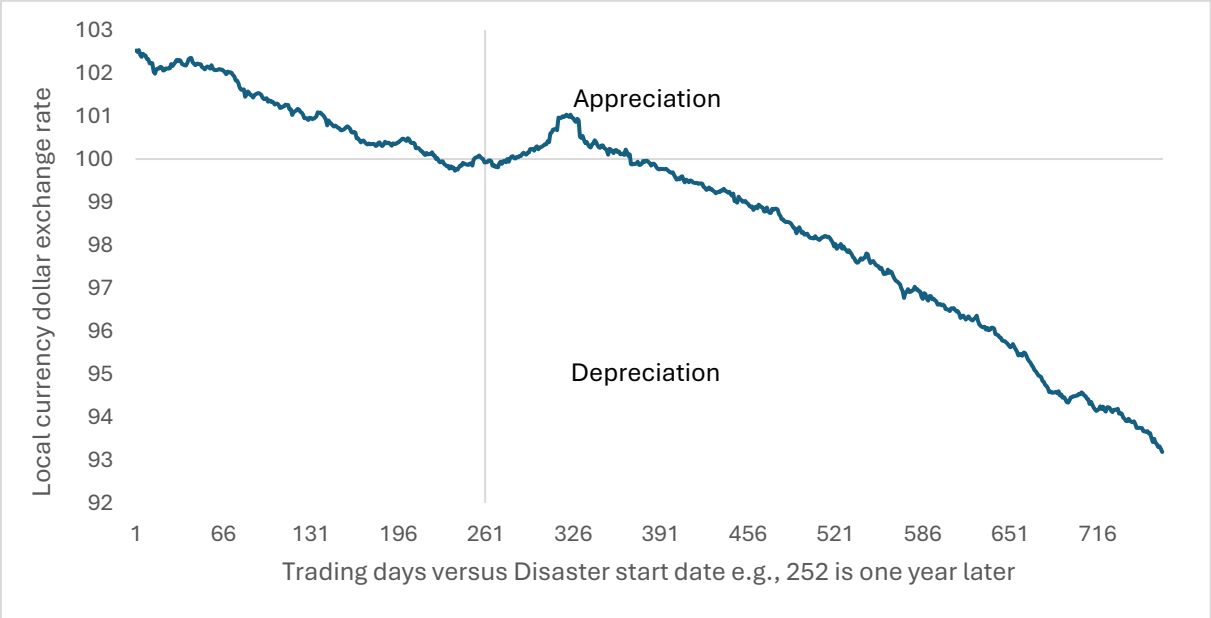
Source: Compiled by authors with data from EM-DAT and Refinitiv

Figure 7. Individual nominal local currency US dollar exchange rate paths for 195 major disasters. Full sample. Start value normalized to 100 and day 0 at the date of disaster



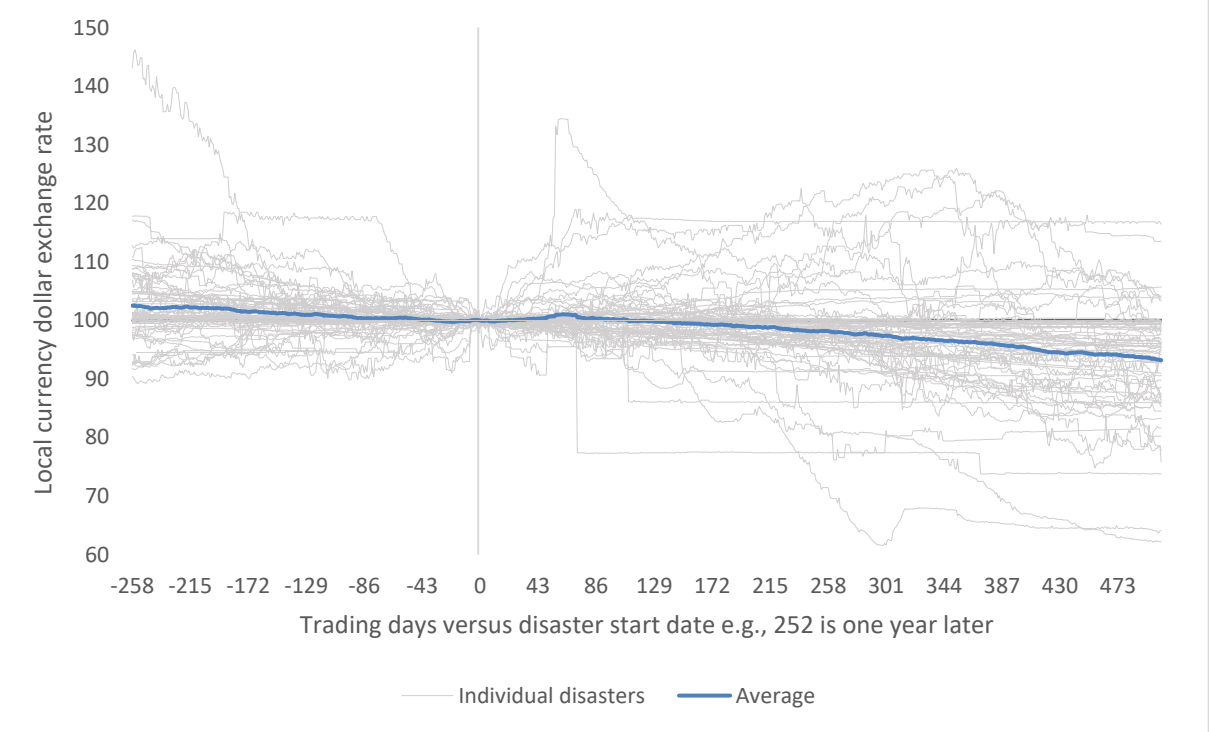
Source: Compiled by authors with data from EM-DAT and Refinitiv

Figure 8. Average nominal local currency US dollar exchange rate path for 67 major disasters. IDA eligible borrowers only. Start value normalized to 100 and day 0 at the date of disaster



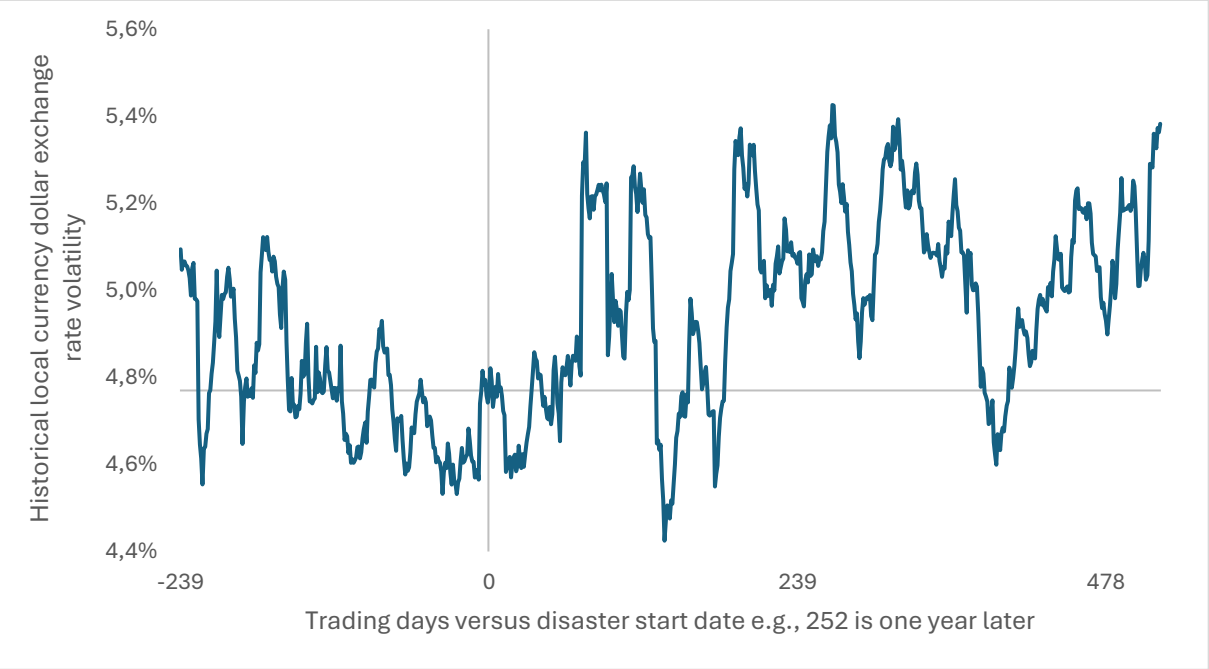
Source: Compiled by authors with data from EM-DAT and Refinitiv

Figure 9. Individual nominal local currency US dollar exchange rate paths for 67 major disasters. IDA eligible borrowers only. Start value normalized to 100 and day 0 at the date of disaster



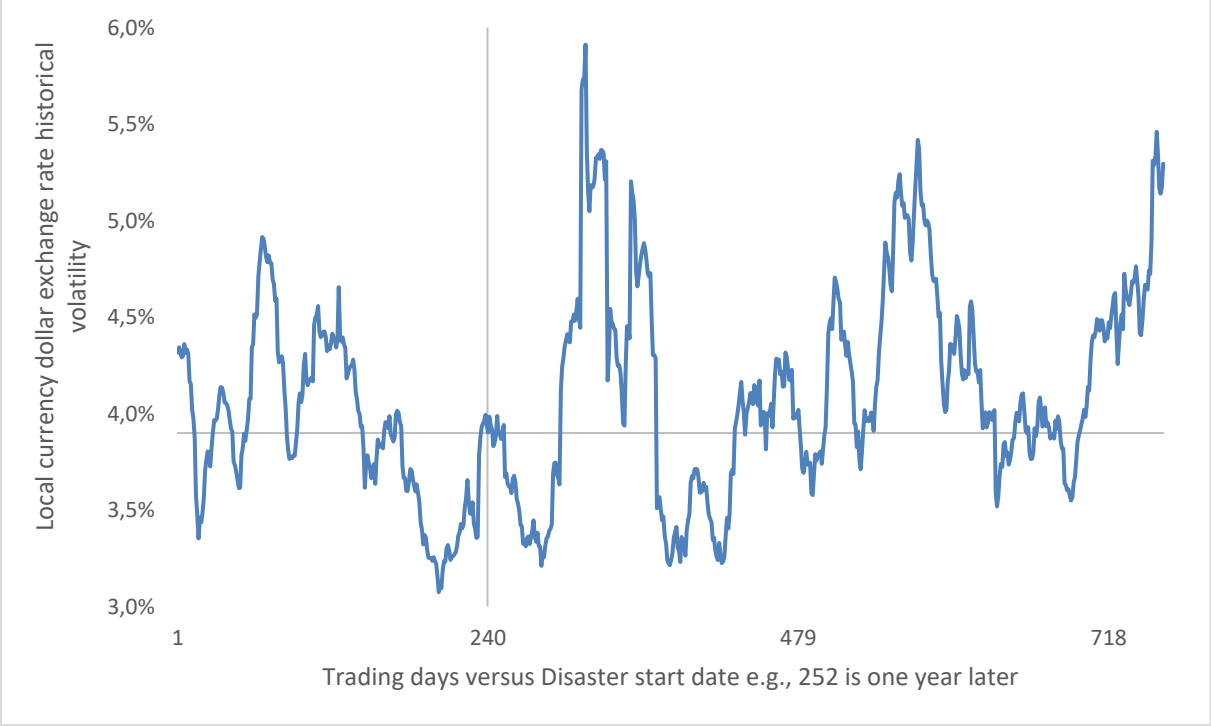
Source: Compiled by authors with data from EM-DAT and Refinitiv

Figure 10. Average historical exchange rate volatility around 195 major disasters. FX volatility calculated as 20-day sample standard deviation, annualised. Avererage at disaster date of 4.77%



Source: Compiled by authors with data from EM-DAT and Refinitiv

Figure 11. Average historical exchange rate volatility around 67 major disasters. IDA eligible borrowers only. FX volatility calculated as 20-day sample standard deviation, annualised. Average at disaster date of 3.9%



Source: Compiled by authors with data from EM-DAT and Refinitiv

4. POLICY DISCUSSION

While the impact of disasters on capital flows, reserves and exchange rates is not uniform across countries, depending on an economy's specific context and the international support it receives in response to the disaster, our analysis here and the econometric investigation by Lo and Volz (2025) provides clear indications that countries facing disaster risk confront heightened exchange rate risk. In particular, IDA-eligible countries tend to suffer from capital outflows, exchange rate depreciation, and greater exchange rate volatility. Moreover, a majority of EMDEs also suffers from nominal exchange rate depreciation effects and an increase in exchange rate volatility after a disaster. This poses serious challenges for the public sector with respect to public debt and financial risk management. It also raises important questions for development lenders.

Authorities of countries facing elevated exchange rate risk resulting from disasters have several options to mitigate this risk. A first step is to strengthen adaptation and resilience to reduce the impacts of disasters on the economy, the financial system, and public finances (Volz, et al., 2020). But this is of course easier said than done, not least because investment in adaptation will require large amounts of funding. Indeed, those countries that need to invest the most in adaptation to boost resilience against climate shocks are the ones that have the least fiscal space, and they also have to pay a higher cost of capital because of their vulnerability (Buhr, et al., 2018; Kling, Lo, Murinde, & Volz, 2018; Beirne, Renzhi, & Volz, p. 2021a; p. 2021b). Underinvestment in climate resilience is threatening both the economy and public debt sustainability.

Governments of disaster-prone countries must strengthen their disaster risk finance, i.e., develop financial protection strategies and instruments to address the fiscal impacts and economic losses caused by disasters and pre-arrange the release of rapid, predictable funding in the aftermath of a disaster so they can respond swiftly and support recovery and reconstruction. This includes the buildup of domestic disaster reserve funds, participation in sovereign catastrophe risk pools (Ciullo, et al. 2023), and arranging access to contingent credit facilities and parametric disaster insurance.

It is necessary to enhance public debt management to mitigate disaster related risks. One solution that has received a lot of attention recently are debt suspension or disaster risk clauses, which basically allow governments to postpone payments (e.g. Landers and Aboneaaj (2023)). While this can enhance fiscal space in the aftermath of a disaster, it does not address currency risk as such. The public debt service could be even larger at the time of repayment if the local currency devalues. Foreign currency risk emanates from foreign currency-denominated debt and unhedged debt servicing costs (Jonasson, Malik, Chung, & Papaioannou, 2024). To mitigate foreign exchange risk, governments essentially have two options.

Governments can either reduce foreign currency borrowing by strengthening domestic financial resource mobilisation, or they can hedge exchange risk. The former includes efforts to develop local currency bond markets and broaden the domestic investor base (Volz, Lo, & Mishra, 2024). For the time being, most developing countries are still suffering from original sin (Eichengreen, Hausmann, & Panizza, 2023) – the problem that they are unable to borrow in domestic currency, be it from abroad or long term, even domestically (Eichengreen & Hausmann, 1999). Concerted efforts are needed to foster the development of local currency bond markets and overcome original sin. This, however, is nothing that can be achieved in the short run. It is hence important that governments consider options for foreign currency hedging. The challenge here is that for many countries hedging opportunities are either not existing or very expensive.

Especially low and lower middle income countries – the countries that our analysis suggests may face the highest risk of a currency devaluation after a disaster – usually lack sufficiently developed currency risk markets which would allow them or their lenders to hedge currency risks associated with cross border lending. These countries are also most dependent on international development and climate finance, in large part from MDBs. MDBs have already endorsed the demand from the Bridgetown Initiative to include “climate resilient debt clauses” in lending contracts (e.g., World Bank (2024)). Yet, given the currency and associated sovereign debt sustainability risks, MDBs and other international public lenders still need to pay more attention to the currency risk that they pass on to governments. There are three issues that MDBs and other international public lenders could and should do.

First, MDBs and international public lenders should support governments in raising the domestic savings rate and strengthening domestic financial resource mobilization to reduce dependency on borrowing from abroad. To this end, Volz, Lo and Mishra (2024) highlight the potential of MDBs and international development finance institutions (DFIs) to work more closely with national development banks and bolster their capacity to issue local currency debt. They also highlight the opportunities of leveraging digital technologies for broadening the local investor base and developing sustainable investment opportunities for investors.

Second, MDBs and international DFIs should themselves lend more in local currency. They could either do this by raising local currency by issuing local currency bonds – eliminating foreign exchange risk altogether and the same time contributing to the development of local currency bond markets – or they could manage the exchange risk themselves.

Thirdly, if MDBs cannot raise local currency funding and lend in local currencies, they should make use of existing hedging markets or a cooperative hedging platform like TCX to reduce the overall

currency risk exposure of IDA borrowers. This has already been proposed in the Summers/Singh Triple Agenda Report Vol 2 (IEG, 2023). The scaling up of TCX could be an effective short-term measure to facilitate a significant reduction in the currency risk vulnerabilities of IDA lenders and borrowers alike. IDA countries in particular should be made aware of currency risks when borrowing and be offered a choice between traditional (hard currency) borrowing instruments and loans indexed in local currencies. This would effectively work as a form of disaster insurance, working anti-cyclically instead of the existing pro-cyclicality of FX debt. A further elaboration of this would be a systematic voluntary conversion of existing IDA and other concessional debt into local currency-indexed loans. This could go hand-in-hand with capacity building efforts and increase the resilience to shocks. Making climate donor funds available to cover (part) of the higher interest costs should become part of the policy discussions.

5. CONCLUSION AND RECOMMENDATIONS

Direct losses from disasters are rising over time. Climate change is likely to increase the frequency and severity of disasters, continuing this trend. Major disasters are occurring more often in regions where they were previously uncommon. Additionally, a small number of countries face major disasters every year. The size of this category is likely to grow. This may be further exacerbated by non-linear effects – at tipping points the effectiveness of presently adequate infrastructure and barriers goes from reliable to irrelevant.

Most discussions of the frequency and severity of disasters focus on direct impacts and second order economic impacts. Lo and Volz (2025) investigate the second order financial effects of disasters empirically, and provide new color on the impact of disasters on exchange rates. There are clear differences between country categories. High income countries see no detectable disaster impacts on exchange rates. EMDEs enjoy an appreciation, potentially due to the international disaster response. IDA eligible borrowers, however, tend to suffer a depreciation. A corollary of currency depreciation is higher import costs and higher debt service, just as a country is recovering and rebuilding from the physical effects of the disaster.

Building on the econometric results of Lo and Volz (2025), a global sample of 195 disasters reveals that a year after a major disaster three out of five see a depreciation in their nominal exchange rate. After two years the average depreciation is 4%, with many countries far below this average. Exchange rate volatility is markedly higher in the two years following major disasters for the full sample and for IDA eligible borrowers only.

Therefore, this paper puts forward three key recommendations with respect to disasters and exchange rates. The first is for MDBs to support governments in raising the domestic savings rate, potentially by bolstering the capacity of national development banks to issue local currency debt (Volz, Lo, & Mishra, 2024). Secondly, MDBs and DFIs should lend more in local currency, either by issuing local currency bonds or managing the exchange rate risk themselves. Thirdly, if MDBs cannot raise local currency funding and lend in local currencies, they should make use of existing hedging markets or a cooperative hedging platform like TCX to reduce the overall currency risk exposure of IDA borrowers. These three policies are proactive measures that help mitigate the negative impact of disasters on exchange rates for the most vulnerable countries. Failing to address exchange rate risks of poorer countries will result in greater debt sustainability problems as more and larger disasters wreak havoc on economies that are already highly vulnerable.

REFERENCES

Aghion, P., Bacchetta, P., Rancière, R. and Rogoff, K. (2009). Exchange rate volatility and productivity growth: The role of financial development. Journal of Monetary Economics 56: 494–513. doi:10.1016/j.jmoneco.2009.03.015.

Beirne, J., Renzhi, N. and Volz, U. (2021). Bracing for the typhoon: climate change and sovereign risk in Southeast Asia. Sustainable Development 29: 537–551. doi:10.1002/sd.2199.

Beirne, J., Renzhi, N. and Volz, U. (2021). Feeling the heat: climate risks and the cost of sovereign borrowing. International Review of Economics and Finance 76: 920–936. doi:10.1016/j.iref.2021.06.019.

Buhr, B., Volz, U., Donovan, C., Kling, G., Lo, Y., Murinde, V. and Pullin, N. (2018). Climate change and the cost of capital in developing countries. Tech. rep., London and Geneva: Imperial College London, SOAS University of London, and UN Environment. https://eprints.soas.ac.uk/26038/.

Cavallo, E. A., Galiani, S., Noy, I. and Pantano, J. (2013). Catastrophic natural disasters and economic growth. The Review of Economics and Statistics 95: 1549–1561. doi:10.18235/0010949.

Chinn, M. D., and Ito, H. (2006). What matters for financial development? Capital controls, institutions, and interactions. Journal of Development Economics 81: 163–192. doi:10.1016/j.jdeveco.2005.05.010.

Eichengreen, B., and Hausmann, R. (1999). Exchange rates and financial fragility. New challenges for monetary policy. Federal Reserve Bank of Kansas City. 319–367. doi:10.3386/w7418.

Eichengreen, B., Hausmann, R. and Panizza, U. (2023). Yet it endures: The persistence of original sin. Open Economies Review 34: 1–42. doi:10.1007/s11079-022-09704-3.

Élysée Palace. (2023). Chair's summary of discussions at the summit on a new global financing pact. Tech. rep.

Farhi, E., and Gabaix, X. (2015). Rare disasters and exchange rates. The Quarterly Journal of Economics 131: 1–52. doi:10.1093/qje/qjv040.

Hale, G. (2022). Climate risks and exchange rates. Climate risks and exchange rates. https://www.frbsf.org/economic-research/wp-content/uploads/sites/4/Hale-vsce-040623-paper.pdf.

Harms, P., and Knaze, J. (2021). Effect exchange rate regimes and inflation. Working paper, Gutenberg School of Management and Economics, Johannes Gutenberg-Universität Mainz. https://ideas.repec.org/p/jgu/wpaper/2102.html.

IEG. (2023). Strengthening multilateral development banks: The Triple Agenda, Volume 2. A roadmap for better, bolder and bigger MDBs. Tech. rep., Report of the Independent Experts Group. https://icrier.org/g20-ieg/pdf/The_Triple_Agenda_G20-IEG_Report_Volume2_2023.pdf.

IFRC. (2022). Sao Tome and Principe: floods and landslides - operations update no. 2. Tech. rep., International Federation of the Red Cross, Paris. https://reliefweb.int/report/sao-tome-and-principe/sao-tome-and-principe-floods-and-landslides-operations-update-no-2-dref-ndeg-mdrst001.

IPCC. (2023). Climate change 2022 – impacts, adaptation and vulnerability: working group II contribution to the sixth assessment report of the intergovernmental panel on climate change. Tech. rep., Intergovernmental Panel on Climate Change, Cambridge University Press. doi:10.1017/9781009325844.

Jonasson, T., Malik, S., Chung, K. and Papaioannou, M. G. (2024). Managing foreign exchange rate risk: capacity development for public debt managers in emerging market and low-income countries. IMF Working Papers (International Monetary Fund (IMF)). doi:10.5089/9798400287107.001.

Kling, G., Lo, Y. C., Murinde, V. and Volz U. (2018). Climate vulnerability and the cost of debt. Tech. rep., Centre for Global Finance, London: SOAS University of London. https://eprints.soas.ac.uk/26045/.

Landers, C., and Aboneaaj, R. (2023). Debt suspension clauses to the rescue? Debt suspension clauses to the rescue? https://www.cgdev.org/publication/debt-suspension-clauses-to-rescue.

Lo, Y. C., and Volz, U. (2025). The impacts of disasters on capital flows, international reserves and exchange rates: implications for public sector financial risk management and development lenders. SOAS Economics working paper, SOAS University of London.

Malawi Government. (2015). Malawi 2015 floods post disaster needs assessment report. Tech. rep. https://reliefweb.int/report/malawi/malawi-2015-floods-post-disaster-needs-assessment-report.

NDRRMC. (2013). Final report re effects of typhoon "YOLANDA" (HAIYAN). Tech. rep., National Disaster Risk Reduction and Management Center. https://ndrrmc.gov.ph/attachments/article/1329/FINAL_REPORT_re_Effects_of_Typhoon_YOLANDA_HAIYAN_06-09NOV2013.pdf.

Noy, I. (2009). The macroeconomic consequences of disasters. Journal of Development Economics 88: 221–231. doi:10.1016/j.jdeveco.2008.02.005.

OCHA. (2017). Flash appeal for Madagascar intense tropical cyclone Enawo. Tech. rep., UN Office for the Coordination of Humanitarian Affairs, Geneva. https://reliefweb.int/report/madagascar/flash-appeal-madagascar-intense-tropical-cyclone-enawo.

Persaud, A. (2023). Unblocking the green transformation in developing countries with a partial foreign exchange guarantee. Tech. rep., Climate Policy Initiative. https://www.climatepolicyinitiative.org/wp-content/uploads/2023/06/An-FX-Guarantee-Mechanism-for-the-Green-Transformation-in-Developing-Countries.pdf.

Reserve Bank of Malawi. (2015). Report and accounts for the year ending 31st December 2015. Tech. rep. https://www.rbm.mw/Home/GetContentFile/?ContentID=7859.

Strobl, E., and Kablan, S. (2017). How do natural disasters impact the exchange rate: an investigation through Small Island Developing States (SIDS)? Economics Bulletin 37: 2274–2281. https://EconPapers.repec.org/RePEc:ebl:ecbull:eb-17-00444.

Volz, U., Beirne, J., Ambrosio Preudhomme, N., Fenton, A., Mazzacurati, E., Renzhi, N. and Stampe, J. (2020). Climate change and sovereign risk. (SOAS University of London). doi:10.25501/SOAS.00033524.

Volz, U., Lo, Y. and Mishra, V. (2024). Scaling up green investment in the global south: strengthening domestic financial resource mobilisation and attracting patient international capital. Tech. rep., Centre for Global Finance, London: SOAS University of London. https://eprints.soas.ac.uk/41078/.

World Bank. (2024). Climate resilient debt clause (CRDC). Tech. rep. https://thedocs.worldbank.org/en/doc/6857abe91ef32973cfab7f689e9f00fe-0340012023/original/CRDC-Product-note-EN.pdf.

World Bank. (2023). Head above water. São Tomé and Príncipe's path to flood resilience. Head above water. São Tomé and Príncipe's path to flood resilience. https://storymaps.arcgis.com/stories/2b69b33c3c75482b86ec985e1dca6f49.

Zhou, H., Yu, M., Li, J. and Qin, Q. (2021). Rare disasters, exchange rates, and macroeconomic policy: evidence from COVID-19. Economics Letters 209: 110099. doi: 10.1016/j.econlet.2021.110099.