The Impact of US Uncertainty Shocks on a Panel of Advanced and Emerging Market Economies

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Abstract

In this paper, we analyze the spillovers of uncertainty from the United States (US) on Gross Domestic Product (GDP) in a large panel of 50 advanced and emerging economies. We allow the response of GDP in each country to vary according to its exchange rate regime, trade openness, and a vulnerability index (based on current account, foreign reserves, inflation, and external debt). We observe large heterogeneity in the response of advanced and emerging economies to uncertainty surprises of the US. In response to an increase in US uncertainty, GDP in foreign economies drops slightly more, as it does in the US. In addition we find that, for advanced economies the exchange rate regime and financial vulnerability account for a large portion of the contraction in activity. In emerging economies, however, the responses do not depend on the exchange rate regime, but are larger when trade openness is high and weakness in the financial system is high.

JEL Codes: C32, C33, F4, G3

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1. Introduction

In the wake of the "Great Recession", a large (and burgeoning) literature has originated, which aims to measure uncertainty, an otherwise latent variable, and then quantify the impact of it on the macroeconomy based on various econometric models (see Castelnuovo (2017) and Gupta et al., (2018a) for a detailed reviews). However, barring a few exceptions, the majority of these studies have primarily looked at the impact of uncertainty of the United States (US) on its own macroeconomic variables, which in turn, is understandable, given that the main brunt of the recent crisis was felt in the US. Few studies that differ in this regard are those of Colombo (2013), Jones and Olson (2015), Cheng et al., (2016), Stockhammar and Österholm (2016), Choi (2018), Gupta et al., (2018b), and Trung (2018).[1] These studies confirm the importance of US uncertainty on economies like the Euro area, Japan, Sweden and the UK, as well as for group of emerging countries.

Against this backdrop of somewhat limited international evidence of the impact of US uncertainty on the macroeconomy,[2] we aim to investigate, for the first time, the role of US uncertainty on economic activity in a large panel of 50 advanced and emerging economies. We

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[1] Some related working papers in this regard are those of Kamber et al., (2016), Bhattarai et al., (2017), and Caggiano et al., (2017).

[2] There is however, a large literature that has analysed the impact of US uncertainty on financial markets of other economies (see for example, Christou et al., (2017) and Chuliá et al., (2017) for detailed reviews of this literature).

allow the response of GDP in each country to vary according to its exchange rate regime, trade openness, and a vulnerability index that includes current account, foreign reserves, inflation, and external debt. In the process, our goal is to gain some empirical understanding of the differential importance of exchange rate, trade and broad financial channels in response to changes in US uncertainty. Unlike previous studies that have focused on a few advanced or a group of emerging countries, and not necessarily discussed the relative importance of the channels through which US uncertainty can impact the foreign economy, we rely on a comprehensive dataset containing observations on quarterly GDP and time-varying country characteristics of 50 foreign advanced and economies for over 50 years, i.e., 1965-2016.

Note that, the importance of these three channels have been recently highlighted by Iacoviello and Navarro (2018), while analysing the impact of US interest rate shocks on the same data set that we use for our analysis, obtained from their study. The exchange rate channel is based on the idea of demand substitution between domestic and foreign-produced goods. In particular, increases in uncertainty, generally associated with a negative demand shock in the domestic economy, i.e., the US, would lower domestic investment relative to savings due to a 'wait and see' attitude among economic actors and shift the domestic aggregate demand curve leftward (Bloom, 2009). This would lower the equilibrium interest rate and cause the domestic currency to depreciate. With flexible exchange rates, GDP in foreign economies should fall, boosted by costlier exports. By contrast, a country that pegs its exchange rate to the dollar should experience a depreciation that increases its GDP. The trade channel rests on the idea that higher US uncertainty reduces domestic incomes and expenditures, thus leading to lower US demand for both domestically produced and imported goods, and reducing activity and GDP abroad. Overall, the strength of this channel should depend on the share of exports and imports in economic activity, i.e., the trade exposure with the US. Finally, the financial channel capture the idea that higher US uncertainty, would lead to an increased home bias, which in turn, would cause domestic investors and financial institutions to reduce their foreign lending, and thus decreasing net capital inflows into other advanced and emerging markets (Blanchard et al., 2010). Understandably, the decline in foreign lending from the US is likely to be magnified for economies that are more integrated with the world markets, i.e., for those countries that are financially less vulnerable (less weak in terms of their fundamentals), which had, in turn, initially led to them being more integrated with the US.

The remainder of the paper is organized as follows: Section 2 discusses the data and the methodology, while Section 3 presents the results, and Section 4 concludes.

2. Data and Methodology

We identify US uncertainty shocks by regressing the corporate bond spread on a set of controls and use the residuals as the identified (demand) shocks. In particular, we estimate shocks u_t as the residual in the following regression:

$$spread_t = \theta_0 + \theta_1 Z_t + u_t \qquad (1)$$

where $spread_t$ is the corporate spread. The set of controls Z_t includes lagged values of inflation, log US GDP, federal funds rate, log foreign GDP, the corporate spread and a quadratic time trend.[3] We use quarterly data from 1965:Q1 to 2016:Q2, and replace the federal funds rate with the Wu and Xia (2016) shadow rate from 2009 to 2015 to account for the zero lower bound, and

[3] Because we include lagged macroeconomic variables as controls, our shock identification is analogous to a Cholesky identification in a VAR that orders uncertainty first, as done by Jones and Olson (2015), and Gupta et al., (2018b).

the stimulus to the economy provided by unconventional monetary policy actions that followed the Great Recession.

Note that the data set used in our analysis corresponds to the one used by Iacoviello and Navarro (2018), and as in their original analysis, we use four lags for all variables. Further, inflation is measured as the four-quarter change in the GDP deflator. Corporate spreads correspond to the difference between the Moody's seasoned Baa corporate bond yield and the 10-Year Treasury note yield at constant maturity. Iacoviello and Navarra (2018) construct an index of foreign GDP by cumulating the average of quarter-on-quarter GDP growth for the countries in the sample. Each quarter, the weights are based on each country's GDP in constant US dollars from the World Bank World Development Indicators (if data for a country are not available, its weight is set at zero, and the weights of other countries are changed accordingly).

We measure uncertainty using the corporate spread following Gilchrist et al., (2014) and Jones and Olson (2015). It must be emphasized that there are multiple ways available to measure uncertainty (see Gupta et al., (2018a) for a detailed discussion), but we prefer to use the corporate spread as this measure is already available in the data set of Iacoviello and Navarra (2018).[4] With the uncertainty shocks identified, we compute the dynamic responses of foreign and U.S. GDP using the local projection method of Jorda (2005).

For computing the response of US GDP, we estimate the following equation:

$$y_{t+h} = \alpha_h + \beta_h u_t + A_h Z_t + \epsilon_{t+h} \qquad for\ h = 0,1,2,\dots,H \tag{2}$$

where y_{t+h} is US GDP in quarter $t+h$, u_t is the uncertainty shock, and Z_t is a set of controls. A plot of $\{\beta_h\}$ is the dynamic response of US output to an innovation in u_t.

For computing the foreign GDP response to the uncertainty shock, we estimate a panel data version of (2) as follows:

$$y_{i,t+h} = \alpha_{i,h} + \beta_h u_t + A_{h,i} Z_{i,t} + \epsilon_{i,t+h} \qquad for\ h = 0,1,2,\dots,H \tag{3}$$

where $y_{i,t+h}$ is the GDP of country i in quarter $t+h$, and $\alpha_{i,h}$ is a country-specific fixed effect. Notice that we project all countries on the same shock u_t. Accordingly, $\{\beta_h\}$ measures the average response of output across countries to an innovation in u_t, with controls $Z_{i,t}$ include four lags of country $i's$ GDP, as well as a linear and a quadratic trend.

Since, we are interested in documenting how responses to higher US uncertainty may differ across advanced and emerging economies, we estimate equation (3) separately for advanced and emerging economies. Our main focus is on the effects of changes in US uncertainty on foreign real GDP. For this purpose, we use the novel dataset of Iacoviello and Navarro (2018), which contains quarterly GDP data for 50 foreign economies (25 advanced and 25 emerging)[5] plus the

[4] However, our results are qualitatively similar, and are available upon request from the authors, when we use the popular economy-wide measure of US uncertainty developed by Jurado et al., (2015) based on a large-scale factor model. Specifically speaking, the uncertainty measure of Jurado et al., (2015) is the average time-varying variance in the unpredictable component of a large set of real and financial time-series, i.e., it attempts to capture the average volatility in the shocks to the factors that summarize real and financial conditions of the US economy. The similarity in results is not surprising given a statistically significant positive correlation at 1% level of significance with a correlation coefficient of above 45%.

[5] The countries in the sample are as follows: Argentina, Australia, Austria, Belgium, Botswana, Brazil, Canada, Chile, China, Colombia, Czech Republic, Denmark, Ecuador, El Salvador, Finland, France, Germany, Greece, Hong Kong, Hungary, Iceland, India, Indonesia, Ireland, Israel, Italy, Japan, Jordan, Korea, Luxembourg, Malaysia,

US. The coverage, which varies across countries, spans from as early as 1965:Q1 to as late as 2016:Q2.

We now turn to discussing briefly how we estimate a country's dynamic response to a US uncertainty shock depends on exchange rate, trade, and financial channels. Consider a set of variables $\nu \in V$ that measure the exposure of an economy to higher US uncertainty, and let higher values of ν represent higher exposure. To estimate how exposure affects the economy's response to an uncertainty shock, we extend the specification in equation (3) so that the identified shock interacts with the measures of exposure. In particular, we estimate the following equation:

$$y_{i,t+h} = \alpha_{i,h} + \beta_h u_t + \sum_{\nu \in V} \beta_h^{\nu} \left(e_{i,t-1}^{\nu} u_t\right)^{\perp} + A_{h,i} Z_{i,t} + \epsilon_{i,t+h} \qquad for\ h = 0,1,2,\dots,H, \quad (4)$$

where $e_{i,t}^{\nu}$ is the exposure index for variable ν. The interaction term $\left(e_{i,t-1}^{\nu} u_t\right)^{\perp}$ is constructed so that β_h captures the response to a shock when the exposure measures are at their median values (50^{th} percentile), and β_h^{ν} represents the marginal response to the shock when exposure $e_{i,t-1}^{\nu}$ is high (95*th* percentile). The reader is referred to Iacoviello and Navarro (2018) for the five steps followed by the authors in the construction of the interaction term $\left(e_{i,t-1}^{\nu} u_t\right)^{\perp}$.

Iacoviello and Navarro (2018) consider three measures of exposure that capture the three channels discussed in Section 1: (1) Exchange Rate Channel: The authors construct a variable measuring the degree to which a country's currency is pegged to the dollar. The variable equals 0 when a country has a flexible exchange rate against the dollar, 0.5 if the country pegs against the dollar within a somewhat large band (±5%), and 1 if the country is closely pegged to the dollar (including a ±2% band); (2) Trade Channel: The measure used here is the amount of trade with the US (exports plus imports) as a fraction of the country's GDP, and; (3) Financial Channel: A vulnerability index is constructed as an equally-weighted average of the current account deficit, foreign reserves (entering with a negative sign), inflation, and external debt.

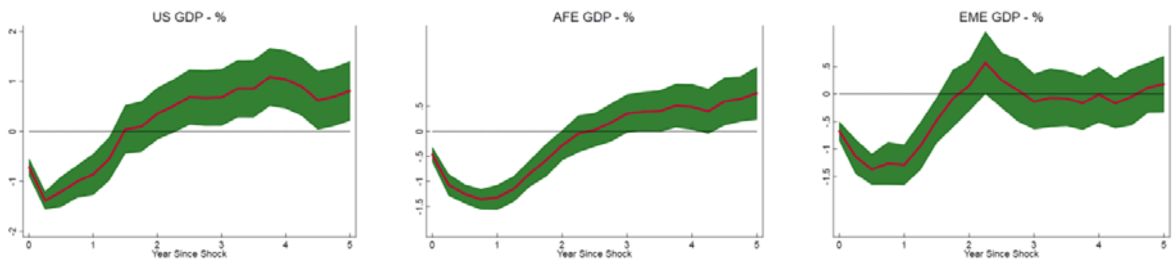
3. Empirical Results

Figure 1 shows the response of U.S. GDP, the corporate spread, and foreign GDP to an uncertainty (*spread*) shock. The shaded areas denote 68 percent confidence intervals and are based on robust standard errors that account for serial correlation (in the case of the U.S. responses) and for clusters by time and country (in the case of the foreign responses). A shock that increases the corporate spread by 1 percentage point induces a lasting decline in U.S. GDP, which contracts output by 1.5 percent after one quarter and recovers thereafter. The magnitude and duration of the U.S. output response to a monetary shock is largely in line with the findings of Jurado et al., (2015), and Piffer and Podstawski (2017). The dynamic response of GDP in advanced foreign economies (AFEs) follows a similar profile to the U.S. one, but is more delayed, with GDP dropping by about 1.5 percent three quarters after the shock. The GDP response of emerging market economies (EMEs) is relatively less delayed as that of the advanced economies, but eventually as large as the one in the US and developed economies, with GDP also falling by 1.5 percent two quarters after the shock. In sum, the results highlight that both advanced and emerging economies are equally exposed to higher levels of US uncertainty.

Mexico, Netherlands, New Zealand, Norway, Peru, Philippines, Poland, Portugal, Singapore, South Africa, Spain, Sweden, Switzerland, Taiwan, Thailand, Turkey, United Kingdom, and Venezuela.

[Insert Figure 1]

Figure 1. Response to Uncertainty Shock (100 Basis Points) in the US, Advanced Foreign Economies (AFEs) and Emerging Market Economies (EMEs)

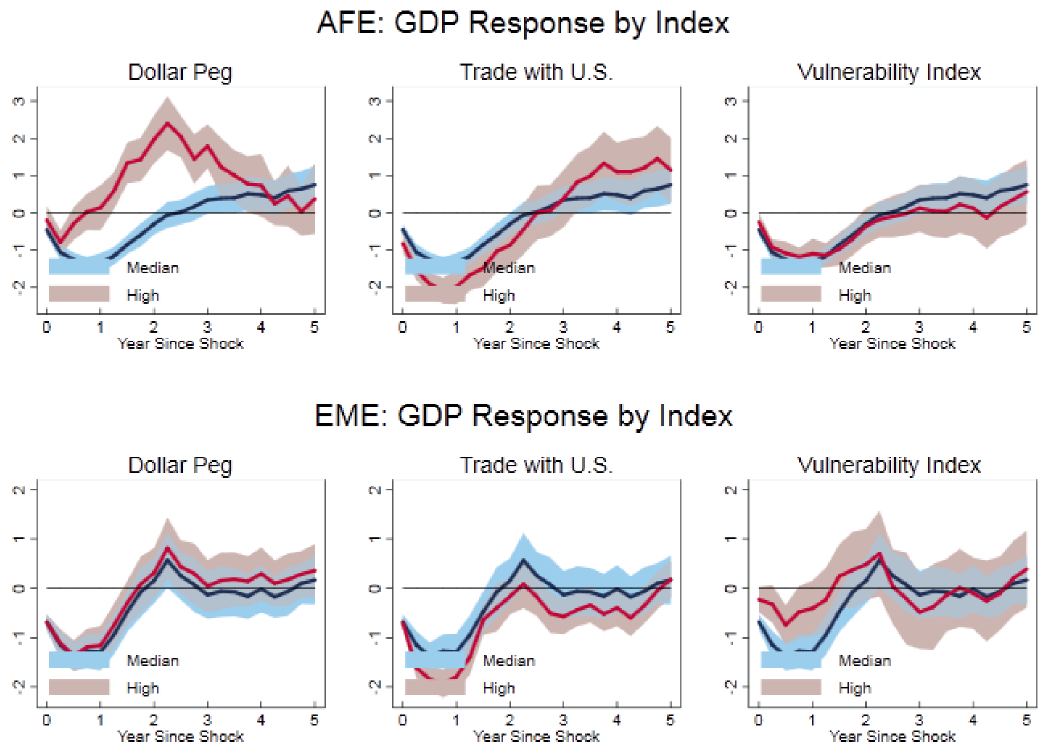


Note: AFE denotes advanced foreign economies, EME denotes emerging market economies. GDP is in percent deviation from baseline. The shaded areas denote 68% confidence intervals.

Next, Figure 2 shows the foreign GDP response to an US uncertainty shock, as well as the marginal effects of varying each exposure measure from its median value to its value at the 95th percentile. The left column shows how the exchange rate channel affects the responses of foreign economies. For advanced economies (upper panel), moving from the median—corresponding to a flexible exchange rate regime vis-à-vis the dollar—to the high end of the distribution—corresponding to a dollar peg—reduces the drop in GDP following an adverse US uncertainty shock, with the effect becoming positive after a year.[6] By contrast, as seen from the bottom left panel of Figure 2, the response of emerging economies is less sensitive to whether they peg to the dollar or not. Note that, for emerging economies, median and high responses both identify countries that are anchored to the dollar. The middle column shows the role of the trade channel. For both advanced and emerging economies, trade intensity with the US is an important determinant of the spillovers of US uncertainty shocks. The right column shows the importance of the financial channel. In both advanced and emerging economies, a high value of the vulnerability index decreases the spillovers, with this effect being particularly pronounced for emerging economies, where moving from a median to a high level of vulnerability more than halves the GDP response. In sum, trade exposure to the US and financial vulnerability matter massively in determining the responses of emerging markets to the US uncertainty shocks. While for the advanced economies, the exchange rate and the trade channels are of more importance relative to the financial channel. But across the three channels, trade intensity with the US plays the most prominent role in transmitting the US uncertainty shocks to both advanced and emerging market economies.

[6] It must be noted that the response among the "high-peg" countries is mostly representative of the early part of the sample, when a large fraction of advanced economies were de facto pegged to the dollar.

Figure 2. Channels-based Response to Uncertainty Shock (100 Basis Points) in Advanced Foreign Economies (AFEs) and Emerging Market Economies (EMEs):



Note: The "median" response (black line) is the GDP response (in percent) of an economy with values for each index equal to the median value. The "high" response (red line) is the response of an economy with values for each index equal to the 95th percentile. The shaded areas denote 68% confidence intervals.

4. Conclusions

Our paper investigates the role of US uncertainty on economic activity in a large panel of 50 advanced and emerging economies. We allow the response of GDP in each country to vary according to its exchange rate regime, trade openness, and a vulnerability index that includes current account, foreign reserves, inflation, and external debt. In the process, our analysis aims to shed light on the relative importance of the exchange rate, trade, and financial channels in propagating the effects of US uncertainty shocks around the world. We make the following observations: (a) The foreign spillovers of higher US uncertainty are large, and on average nearly as large as the US effects. An uncertainty-induced rise in US corporate spreads of 100 basis points reduces GDP in advanced economies and in emerging economies by 1.5% within one year after the shock, with the strongest negative effect on the latter taking place slightly earlier. These magnitudes are similar as the domestic effects of a US uncertainty shock, which reduce U.S. GDP by about 1.5% as well, but relatively faster within a quarter of the shock; (b) In advanced economies, higher U.S. uncertainties are transmitted through exchange rate and trade channels. In particular, the responses within advanced economies are larger when a country's currency is flexible, or when its trade volume with the US is high, and; (c) In emerging economies, exchange rate channel explain little of the differential GDP responses within economies. Instead, the vulnerability index (financial fragility), along with trade openness explains sizable components of differences across economies, with GDP in less vulnerable and more open economies falling much more in response to an increase in US uncertainty levels. In general, our results tend to suggest that policymakers, in both advanced and emerging economies with high trading intensity with the US, flexible exchange rate regime relative to the US dollar in developed countries, and high levels of financially integrated developing economies with the US, would have to take stronger policy stance (i.e., reduction in the interest rate) to nullify the negative impact on their domestic economic activity, following heightened US uncertainties.

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