Online Appendix: The Global Transmission of U.S. Monetary Policy

Riccardo Degasperi[*] Seokki Simon Hong[†]

Banca d'Italia Paris School of Economics

Giovanni Ricco[‡]

École Polytechnique, University of Warwick, CEPR, and OFCE-SciencesPo

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Abstract

The Online Appendix is structured as follows. Section A details a self-contained exposition of the model presented in Section 4 of the main text. Section B explains in greater detail the procedure we follow to aggregate impulse responses from bilateral VARs into median group responses. Section C contains a set of tables that detail the sources, sample availability, and transformations for the variables used in our empirical exercises. We also report details of the classifications we use in Section 6 of the main text, and list the specifications we adopt for each empirical exercise. Section D provides additional charts that complement the empirical results presented in the main text.

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[*]DG Economics, Statistics and Research; via Nazionale 91, 00184 Rome, Italy. Email: riccardo.degasperi@esterni.bancaditalia.it Web: www.riccardo-degasperi.com

[†]Paris School of Economics, 48 Boulevard Jourdan, 75014 Paris, France. Email: simon.hong@psemail.eu

[‡]CREST – École Polytechnique, 5 Avenue Le Chatelier, 91120 Palaiseau, France. Email: giovanni.ricco@polytechnique.edu Web: www.giovanni-ricco.com

A A Mundell-Fleming type Framework

This section derives the model presented in Section 4 of the main text. The model generalises the framework of Blanchard (2017) and Gourinchas (2018) by adding nominal variables and spillovers via commodity prices. This static old-style model provides an intuitive illustration of the international transmission channels of monetary policy discussed in the literature:

1. The *demand-augmenting* channel: a US monetary tightening depresses US demand, which reduces domestic exports, lowering domestic output.

2. The *expenditure-switching* channel: a US monetary tightening appreciates the dollar vis-à-vis the domestic currency, which increases domestic exports, reduces domestic imports, but also makes domestic imports more expensive. If the Marshall-Lerner condition holds, the appreciation of the dollar increases net exports, which stimulates domestic output.

3. The *financial* channel: the appreciation of the dollar tightens collateral constraints of domestic firms that borrow in dollars, lowering domestic output.

The model has two countries: the domestic economy (a small open economy) and the US (a large economy). In deviation from the steady state, domestic and foreign variables (with superscript US) are determined by the following system of equations:

$$Y = \underbrace{\xi - c\,(I - \Pi^e)}_{\text{domestic demand}} + \underbrace{a\left(Y^{US} - Y\right) + b\left(E + \Pi^{US} - \Pi\right)}_{\text{net export}} - \underbrace{f\left(E + \Pi^{US} - \Pi\right)}_{\text{financial spillovers}} \,, \tag{A.1}$$

$$Y^{US} = \xi^{US} - c\left(I^{US} - \Pi^{e,US}\right) \,, \tag{A.2}$$

$$E = \underbrace{d\left(I^{US} - I\right) + E^e}_{\text{UIP}} + \underbrace{gI^{US} + \chi}_{\text{risk premia}} \,, \tag{A.3}$$

$$\Pi = eY + mE + hC \,, \tag{A.4}$$

$$\Pi^{US} = eY^{US} + hC \,, \tag{A.5}$$

$$C = lY^{US} \,, \tag{A.6}$$

where lower case letters are the non-negative parameters of the model. We define the nominal exchange rate, E, such that an increase corresponds to a depreciation of the domestic currency. Domestic output Y is a function of domestic demand, net exports, and financial spillovers. Domestic demand,

$$A = \xi - c\,(I - \Pi^e) \,,$$

depends positively on a demand shifter, ξ, and negatively on the domestic real interest rate, $I - \Pi^e$. We adopt a log-linearised Fisher equation, $R = I - \Pi^e$, where R is the real domestic interest rate, I is the nominal interest rate, and Π^e is expected future inflation. Net export,

$$NX = a\left(Y^{US} - Y\right) + b\left(E + \Pi^{US} - \Pi\right) \,,$$

is increasing both in US output, Y^{US}, and in the real exchange rate, $E + \Pi^{US} - \Pi$, and it is decreasing in domestic output, Y. The log-linearised definition of the real exchange rate is

$$\epsilon = E + \Pi^{US} - \Pi \ ,$$

where E is the nominal exchange rate and Π^{US} and Π represent inflation in the US and in the domestic economy respectively.[1] Financial spillovers impact domestic absorption, and depend negatively on the real exchange rate, as in Gourinchas (2018). This term captures different mechanisms, through which an appreciation of the US dollar could affect the domestic economy via financial links. For example, the reduction of domestic assets as priced in US dollars would cause a deterioration of credit conditions via a tightening of the collateral constraints. The parameter f gauges the strength of these channels, with $f = 0$ being the standard Mundell-Fleming model.

US output, Y^{US}, only depends positively on a demand shifter, ξ^{US}, and negatively on the real interest rate, $I^{US} - \Pi^{e,US}$. The exchange rate E depends on the interest rate differential and the expected exchange rate E^e – the uncovered interest rate parity (UIP) determinants –, and a risk premia term

$$\chi(I^{US}) = gI^{US} + \chi \ ,$$

that is a function of interest rates in the US and an independent shock χ. This term also captures deviation from UIP due to risk premia and financial spillovers via changes to risk appetite.

We assume that domestic inflation, Π, is a function of domestic output, the exchange rate, and the price of commodities. This relationship can be interpreted as a static Phillips curve. The effect of changes in the nominal exchange rate, E, on inflation is given by m and depends on the pricing paradigm:

1. Under *producer-currency pricing* there is full pass-through to the import prices faced by the domestic economy, as these are defined in dollars (i.e. an appreciation of the dollar leads to higher domestic prices as imports are more expensive).

2. Under *local-currency pricing* there is no pass-through, as domestic import prices are defined in the domestic currency (i.e. no effect of E on Π).

3. Under *dominant-currency pricing* (with the dollar as dominant currency) there is again full pass-through, as both import and export prices for the domestic economy are now defined in dollars (i.e. an appreciation of the dollar leads to higher domestic prices as imports and exports are more expensive).

The last term in Eq. (A.4) captures direct spillovers to domestic inflation via commodities and oil prices. A reduction in US demand induces an adjustment in commodity prices (in Eq. A.6) that in turn transmits to headline inflation via energy prices. This is the 'commodity prices' channel that we discuss in the main text. Under the assumptions of dominant-currency pricing, US inflation Π is a function of US output, but does not depend on the exchange rate.

[1] In a static model, a deviation of prices from steady state and inflation are substitutable concepts. We use Π in the model for convenience.

The Phillips curve for the US, Eq. (A.5), can be simplified under the assumption of dominant-currency pricing. Hence, US inflation is a function of the US output gap, but does not depend on the exchange rate. Finally, Eq. (A.6) relates the price of commodities, C, to US output, that in this case acts as a proxy for global demand.

To solve the model, we assume that Π^e, $\Pi^{e,US}$ and E^e are known constant that we set to zero. Combining Equations (A.1) to (A.3) we obtain an expression for domestic output as a function of the demand shifters, the risk premium, domestic and US policy rates, and inflation in the two countries:

$$\begin{aligned} Y = \frac{1}{1+a} \Big[\left(\xi + a\xi^{US}\right) + (b-f)\,\chi + ((f-b)\,d - c)\,I \\ + ((b-f)\,(d+g) - ac)\,I^{US} + (b-f)\left(\Pi^{US} - \Pi\right) \Big] \ . \end{aligned} \tag{A.7}$$

It is important to observe that when $f = g = \chi = 0$, and when any effect on domestic output coming from movements in prices is ruled out, one obtains the standard Mundell-Fleming. In this case, the effect of a US tightening on domestic output is given by $bd - ac$, which are respectively the expenditure-switching and demand-augmenting channels of international transmission.

Substituting in Π and Π^{US} and solving for Y gives

$$\begin{aligned} Y = \frac{1}{\psi} \Big\{ \left[\xi + (a + (b-f)\,e)\,\xi^{US}\right] + (1-m)\,(b-f)\,\chi \\ - \left[(1-m)\,(b-f)\,d + c\right] I \\ + \left[(1-m)\,(b-f)\,(d+g) - (a + (b-f)\,e)\,c\right] I^{US} \Big\} \ , \end{aligned} \tag{A.8}$$

where $\psi = 1 + a + (b-f)\,e$.

Looking at Eq. (A.8), it is clear that if ψ was negative then the model would imply that a positive demand shock, either domestic or from the US, would reduce domestic output. We rule out this possibility by making the following assumption.

Assumption 1. *Positive demand shocks increase domestic output, i.e.*

$$\psi = 1 + a + (b-f)\,e > 0 \ .$$

This assumption translates to a requirement in terms of the strength of the financial channel, i.e.

$$f < b + \frac{1+a}{e} \equiv \widehat{f} \ , \tag{A.9}$$

which sets an upper bound $\widehat{f}$ to the maximum strength of financial spillovers.

Combining Equations (A.1) to (A.4), the real exchange rate can be expressed as follows:

$$E + \Pi^{US} - \Pi = e\xi^{US} + \left[(1-m)\,(d+g) - ce\right] I^{US} - d\,(1-m)\,I - eY \ . \tag{A.10}$$

The term $(1-m)(d+g)-ce$ is the direct response of the real exchange rate to a US tightening. We add the following assumption to the model.

Assumption 2. *The direct response of the real exchange rate to a US tightening is positive (the dollar appreciates), i.e.*

$$(1-m)(d+g)-ce>0 \ .$$

This implies $m<1$. The scenario when $m \to 1$ corresponds to dominant currency pricing.

A.1 Monetary Policy Transmission and Financial Spillovers

We now discuss how the effects of foreign and domestic monetary policy depend on the strength of the financial channel. The response of domestic production to a change in US monetary policy is given by

$$\frac{\partial Y}{\partial I^{US}} = \frac{1}{\psi}\left[(1-m)(bd-fd+(b-f)g)-ac-ce(b-f)\right] \ . \tag{A.11}$$

Eq. (A.11) reflects the various channels of transmission of US monetary policy on domestic output: bd captures the domestic trade balance improvement that follows the appreciation of the dollar. This is the expenditure-switching effect. ac is the contractionary effect on domestic output of lower US demand via lower domestic exports. This is the demand-augmenting effect. In the standard Mundell-Fleming, the effect of a US tightening on domestic output is given by $bd-ac$, which are respectively the expenditure-switching and demand-augmenting channels of international transmission. The sign of this term determines the baseline 'classic' transmission – i.e. whether absent other channels a tightening in the US is expansionary or contractionary for the domestic economy.

The financial channels are represented by fd, which captures the negative effect of a dollar appreciation on domestic output via financial spillovers, and by $(b-f)g$, which represents the effect of risk premia. Specifically, bg captures the stimulative effect of risk premia on domestic output via the trade balance, and fg the negative effect via financial spillovers. Finally, the terms ceb and cef represent the effects of lower US prices via the exchange rate and financial spillovers respectively.

While the denominator in Eq. (A.11) is always positive by Assumption 1, the numerator is negative, and therefore a US tightening causes a decline in domestic output, if

$$f > b - \frac{ac}{(1-m)(d+g)-ce} \equiv \bar{f} \ , \tag{A.12}$$

where the second term on the right hand side is positive by Assumption 2. $\bar{f}$ is the threshold below which a US tightening has an expansionary effect on domestic output. Comparing the upper bound $\widehat{f}$ with the threshold $\bar{f}$ it is immediately seen that $\widehat{f} > \bar{f}$.

Let us focus on the effects of a change to the domestic policy rate. The response of domestic output to the domestic interest rate is given by

$$\frac{\partial Y}{\partial I} = \frac{1}{\psi}\left[(1-m)(f-b)\,d - c\right] \ .$$

The numerator is negative, and therefore a domestic tightening contracts domestic output, if

$$f < b + \frac{c}{(1-m)\,d} \equiv \bar{\bar{f}} \ . \tag{A.13}$$

This gives us a threshold $\bar{\bar{f}}$ above which a domestic monetary policy tightening has the perverse effect of expanding domestic output. Comparing $\bar{\bar{f}}$ with the threshold $\bar{f}$, it is easily seen that $\bar{\bar{f}} > \bar{f}$.

The presence of the two thresholds $\bar{f}$ and $\bar{\bar{f}}$, in the space $[0, \widehat{f}]$ depends on the parameters of the model. The condition $\bar{\bar{f}} < \widehat{f}$ has to hold to have an interval of values of f for which (i) a US tightening contracts domestic output and domestic tightening has the perverse effect of expanding domestic output; (ii) but demand shocks still have conventional and not 'perverse' effects. This implies the condition:

$$\frac{c}{(1-m)\,d} < \frac{1+a}{e} \ . \tag{A.14}$$

When this condition is not satisfied, a domestic tightening is always contractionary on the space $[0, \widehat{f}]$. Moreover, from conditions (A.9) and (A.12), there will be an interval of values $0 < f < \bar{f}$ such that a US tightening has an expansionary effect on domestic output only if

$$b > \frac{ac}{(1-m)(d+g) - ce} \ , \tag{A.15}$$

otherwise a US tightening is always contractionary.[2] If both conditions are satisfied, the two thresholds $\bar{f}$ and $\bar{\bar{f}}$ can be represented by the diagram in Figure A.1.

The diagram reports the two thresholds on f defining the following three regions:

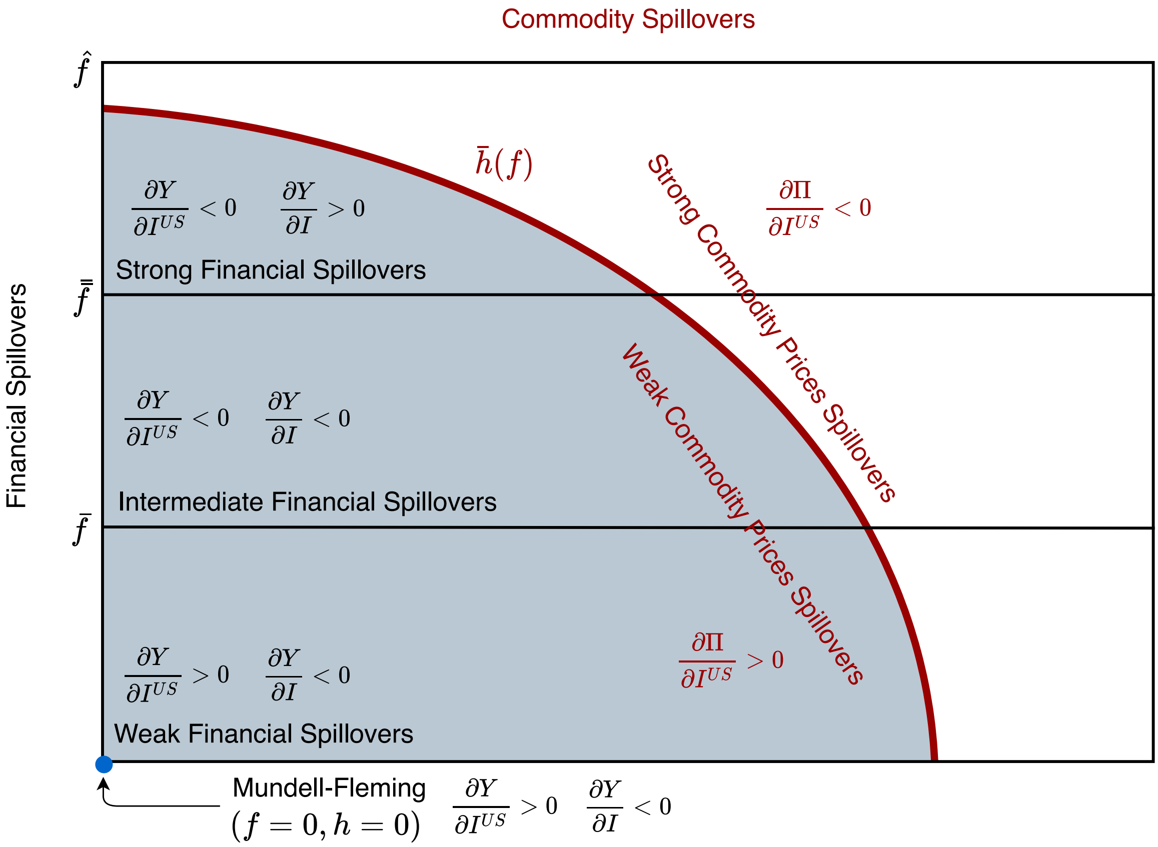
(i) **Weak financial spillovers** ($f < \bar{f}$) – a tightening in the US is expansionary abroad, while domestic monetary policy has conventional effects. The low right corner is the Mundell-Fleming model (for $f = 0$ and $h = 0$, under the assumption $bd > ac$).

(ii) **Intermediate financial spillovers** ($\bar{\bar{f}} > f > \bar{f}$) – a tightening in the US is contractionary abroad, while domestic monetary policy has conventional effects.

(iii) **Strong financial spillovers** ($f > \bar{\bar{f}}$) – a tightening in the US is contractionary abroad, but domestic monetary policy has perverse effects. A domestic tightening expands output.

[2] In the classic Mundell-Fleming model (i.e. $f = g = \xi = 0$ and $e = m = h = 0$), condition (A.15) simplifies to $bd > ac$, which requires the expenditure-switching channel to be greater than the demand-augmenting one.

Figure A.1: A Graphical Representation of the Model



If condition (A.14) is not satisfied, then the region of intermediate financial spillovers would extend to $\widehat{f}$ and the region of strong financial spillovers would disappear. In this scenario, domestic monetary policy is never 'perverse': a domestic tightening never has a stimulative effect on the domestic economy. If condition (A.15) is not satisfied, then the region of intermediate financial spillovers would extend to $f = 0$ and the region of weak financial spillovers would disappear. In this scenario, US monetary policy never has an expansionary effect on domestic output. If neither condition is satisfied, then only the region of intermediate financial spillovers remains. Both domestic and US monetary policies always have a contractionary effect on domestic output.

A.2 Monetary Policy Transmission and Commodity Prices

How does domestic inflation respond to a US tightening?

$$\frac{\partial \Pi}{\partial I^{US}} = e\frac{\partial Y}{\partial I^{US}} + m\,(d+g) - hlc\ . \tag{A.16}$$

The first term on the right-hand side of Eq. (A.16) reflects the overall effect of the three channels of transmission on domestic output. The second term, $m\,(d+g)$, captures the direct effect of the appreciation of the dollar on import prices coming from the interest rate differential (md) and higher risk premia (mg). The third term is the effect on domestic inflation of lower commodity prices.

Conditional on a positive (or not too negative) response of output, the effect of a US tightening on domestic prices is inflationary if commodity price spillovers, h, are not too strong. In particular, a US tightening increases domestic inflation if

$$h < \frac{e}{lc}\left(\frac{\partial Y}{\partial I^{US}}\right) + \frac{m}{lc}\left(d+g\right) \equiv \bar{h} \; . \tag{A.17}$$

This gives us a threshold $\bar{h}$ above which a US monetary tightening has a contractionary effect on domestic inflation. Observe that as $m \to 1$, the threshold $\bar{h}$ gets larger. In other words, the stronger the pass-through, the larger the region where a US tightening increases domestic inflation.[3]

Intuitively, as financial spillovers get stronger, the threshold $\bar{h}$ becomes smaller. In fact, it is possible to show that the threshold $\partial Y/\partial I^{US}$ is monotonically decreasing in f. The first derivative of $\partial Y/\partial I^{US}$ (see Eq. A.11) with respect to f is

$$\frac{\partial^2 Y}{\partial I^{US}\partial f} = -\frac{\left(a+1\right)\left(1-m\right)\left(d+g\right)-ce}{\left(1+a+\left(b-f\right)e\right)^2} \; . \tag{A.18}$$

Consider the numerator. Given that $\left(1-m\right)\left(d+g\right)-ce > 0$ by assumption 2, also $\left(a+1\right)\left(1-m\right)\left(d+g\right)-ce$ must be positive, hence Eq. (A.18) is always negative. The downward sloping relationship $\bar{h}$ is depicted as a function of f as the red negatively sloped curve in Figure A.1, where h is the variable on the horizontal axis. This threshold defines two regions:

(a) **Weak commodity spillovers** ($h < \bar{h}$) – a tightening in the US puts inflationary pressure on prices abroad;

(b) **Strong commodity spillovers** ($h > \bar{h}$) – a tightening in the US is deflationary abroad.

The intersection of $\bar{h}$ with the x-axis of Figure A.1 (where f is on the vertical axis) is given by

$$\bar{h}\left(0\right) = \frac{e}{lc\left(1+a+be\right)}\left\{b\left[\left(1-m\right)\left(d+g\right)-ce\right]-ac\right\} + \frac{m}{lc}\left(d+g\right) \;\; ,$$

which is always positive if

$$b > \frac{ac}{\left(1-m\right)\left(d+g\right)-ce} \; .$$

This implies that $\bar{h}\left(0\right) > 0$ as long as $\bar{f}$ exists (see condition A.15), but it could be negative otherwise. In other words, when $\bar{f}$ does not exist, there are combinations

[3]Notice, however, that as m increases it gets more difficult to satisfy condition Eq. (A.14) for which $\bar{\bar{f}} < \hat{f}$.

of parameters for which $\partial\Pi/\partial I^{US}$ is *always* negative. Given that $\bar{h}$ is monotonically decreasing, for $\bar{h}(0) > 0$, the intersection with the y-axis lies always in the positive quadrant. It is easy to show that there are two asymptotes:

$$\lim_{f \to \widehat{f}} \bar{h} = -\infty \ ,$$
$$\lim_{f \to -\infty} \bar{h} = \frac{c}{l}\left[(1-m)(d+g) - ce\right] + \frac{m}{cl}(d+g) \ .$$

By Assumption 2, the second asymptote is always a positive number.

How does domestic inflation react to domestic monetary policy?

$$\frac{\partial \Pi}{\partial I} = e\frac{\partial Y}{\partial I} - md \ . \tag{A.19}$$

The first term on the right-hand side of Eq. (A.19) reflects the effect on inflation of the change in domestic demand. The second term is the effect on inflation via the appreciation of the domestic currency. Whenever domestic monetary policy is 'well-behaved' (i.e. a domestic tightening contracts domestic output) the effect of a domestic tightening on inflation is unambiguously negative. However, when the domestic transmission is 'perverse', a domestic tightening has a deflationary effect only if

$$\frac{\partial Y}{\partial I} < \frac{md}{e} \ ,$$

otherwise it has a perverse effect also on inflation.

A.3 Optimal Monetary Policy with Mercantilistic Motive

What is the optimal response for the domestic economy to a US tightening? Following Blanchard (2017), we first assume that domestic authorities care about deviations of output from steady state and trade deficits. This can be seen as a stylised representation of policy aiming at stabilising the exchange rate – hard and crawling pegs, possibly due to 'mercantilistic' motives. Let the loss function be

$$L = \frac{1}{2}\mathbb{E}Y^2 - \alpha\mathbb{E}NX \ .$$

Under perfect foresight, the optimal level of output is given by

$$Y^{opt} = -\alpha\left[a + be + \frac{(1-m)\,bd}{\frac{1}{\psi}\left[(1-m)\,(f-b)\,d - c\right]}\right] \ . \tag{A.20}$$

Combining Eq. (A.20) and Eq. (A.8) we obtain the optimal value of I,

$$I^{opt} = \frac{1}{\Phi_I}\left\{Y^{opt} - \frac{1}{\psi}\left[\xi + (a + (b-f)\,e)\,\xi^{US}\right] - \frac{1}{\psi}(1-m)(b-f)\,\chi - \Phi_{I^{US}} I^{US}\right\} \;,$$

where $\Phi_I = \partial Y/\partial I$ and $\Phi_{I^{US}} = \partial Y/\partial I^{US}$. The optimal pass-through from US to domestic policy rates is

$$\frac{\partial I^{opt}}{\partial I^{US}} = -\frac{\Phi_{I^{US}}}{\Phi_I} \;.$$

Assuming that $\bar{f}$, $\bar{\bar{f}}$, and $\bar{h}$ exist, we can distinguish three cases as in Gourinchas (2018). The three regions and the relative optimal policy responses are represented on the vertical axis of Figure A.2.[4]

1. **Weak financial spillovers** ($f < \bar{f}$). When financial spillovers are weak, a US monetary tightening is expansionary abroad, while a domestic tightening is contractionary. It follows from condition (A.3) that the optimal response to a US tightening is a domestic tightening. When $f = 0$ the financial channel is shut down and we get back the traditional Mundell-Fleming.

2. **Intermediate financial spillovers** ($\bar{f} < f < \bar{\bar{f}}$). In this case, both a US and a domestic monetary policy tightening are contractionary for the domestic output. The optimal response to a US tightening in this case is a domestic loosening.

3. **Strong financial spillovers** ($f > \bar{\bar{f}}$). With strong spillovers, domestic monetary policy has a perverse effect on domestic output. A domestic monetary tightening has a stimulative effect rather than a contractionary effect on output. The optimal response to a US tightening in this case is a domestic tightening.

A.4 Optimal Monetary with Inflation Targeting

Monetary authorities in advanced economies usually have a price stability mandate. This can be represented by the following loss function where monetary authorities care about output gap and inflation:

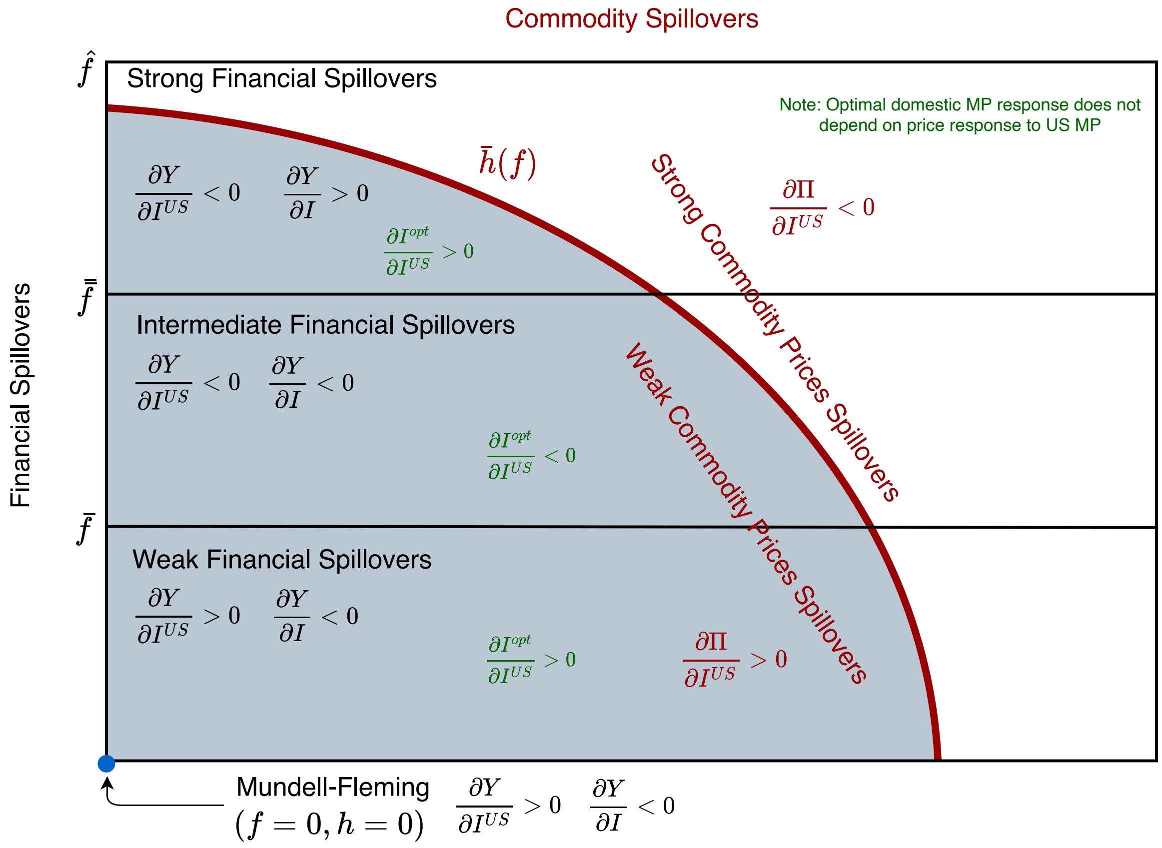
$$L = \frac{1}{2}\mathbb{E}Y^2 + \frac{\beta}{2}\mathbb{E}\Pi^2 \;.$$

Under perfect foresight, the domestic economy sets the nominal interest rate to minimise the loss function. The optimal level of output is given by:

$$Y^{opt} = -\beta\Pi\frac{\Theta_I}{\Phi_I} \;, \tag{A.21}$$

[4] As the optimal pass-through does not depend on inflation, the optimal monetary response does not change if we are above or below the threshold $\bar{h}$.

Figure A.2: Optimal Monetary Policy (Mercantilistic Motive)



where $\Theta_I = \partial \Pi / \partial I$. Optimal output depends on the policy weight on inflation in the loss function of the central bank, β, on domestic inflation, Π, and on the relative importance of the response of output and inflation to a domestic tightening, Θ_I / Φ_I. Combining Eq. (A.21) and Eq. (A.8) we obtain the optimal value of I,

$$I^{opt} = -\frac{1}{\Phi_I} \left[\left[\xi + (a + (b - f) e) \xi^{US} \right] + (1 - m)(b - f) \chi + \Phi_{I^{US}} I^{US} + \psi \beta \Pi \frac{\Theta_I}{\Phi_I} \right] ,$$

where $\Phi_{I^{US}} = \partial Y / \partial I^{US}$. The optimal pass-through from US to domestic policy rates is

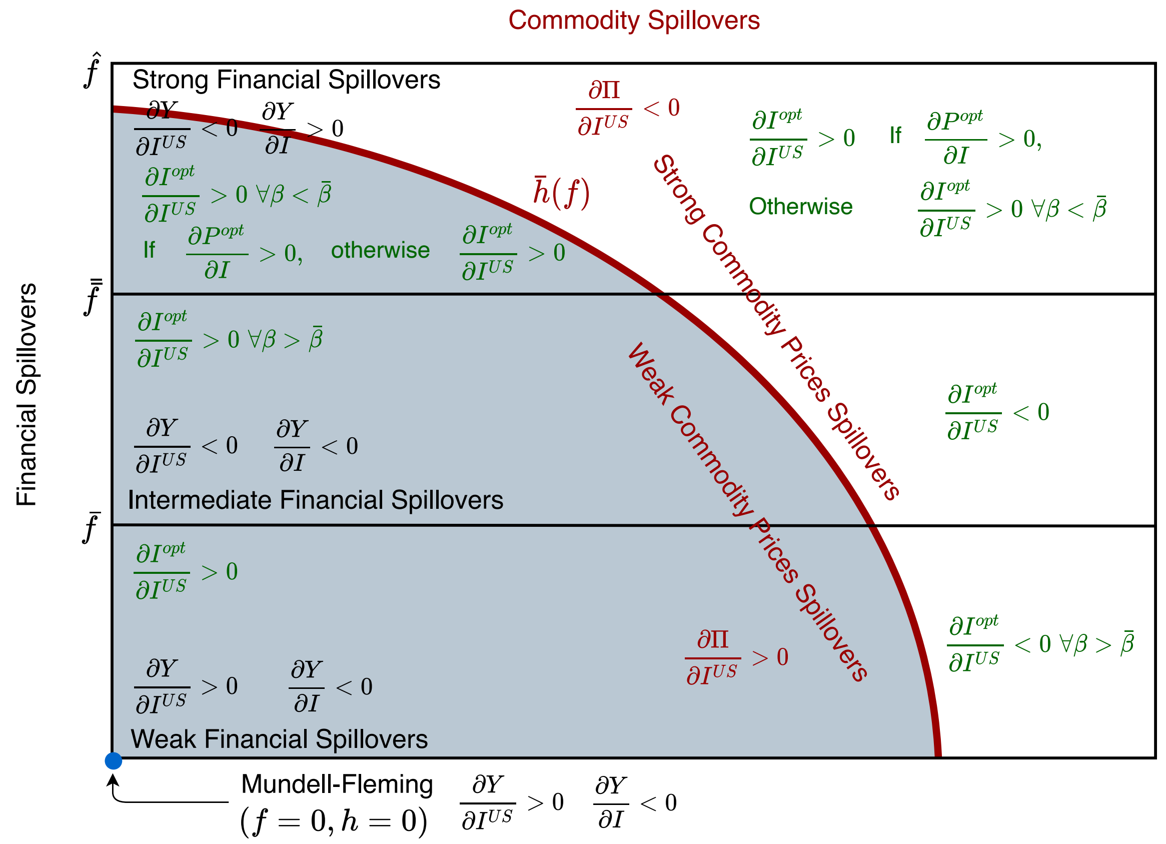
$$\frac{\partial I^{opt}}{\partial I^{US}} = -\frac{1}{\Phi_I} \left[\Phi_{I^{US}} + \psi \beta \frac{\Theta_{I^{US}} \Theta_I}{\Phi_I} \right] ,$$

which we can rewrite as

$$\frac{\partial I^{opt}}{\partial I^{US}} = -\frac{\psi \Theta_{I^{US}} \Theta_I}{\Phi_I^2} \left[\beta + \frac{\Phi_{I^{US}} \Phi_I}{\psi \Theta_{I^{US}} \Theta_I} \right] .$$

Assuming that $\bar{f}$, $\bar{\bar{f}}$, and $\bar{h}$ exist, we can distinguish six cases, that are depicted in Figure A.3. For each region, we indicate the sign of $\Theta_{I^{US}}$, Θ_I, $\Phi_{I^{US}}$, and Φ_I with the

Figure A.3: Optimal Monetary Policy (Output and Price Stabilisation)



superscript $(+)$, $(-)$, or $(\pm)$ (when the sign is not determined).

First, let us focus on the region $h < \bar{h}$, where $\Theta_{I^{US}} \equiv \frac{\partial \Pi}{\partial I^{US}} > 0$.

1. **Weak financial spillovers** ($f < \bar{f}$). In this region domestic inflation and output move in the same direction both following a US tightening (inflation and output increase) and a domestic tightening (inflation and output decrease). Therefore it is always optimal to tighten in response to a US tightening.

$$\frac{\partial I^{opt}}{\partial I^{US}} = -\frac{\psi \Theta_{I^{US}}^{(+)} \Theta_I^{(-)}}{\Phi_I^2} \left[\beta + \frac{\Phi_{I^{US}}^{(+)} \Phi_I^{(-)}}{\psi \Theta_{I^{US}}^{(+)} \Theta_I^{(-)}} \right] > 0 \ .$$

2. **Intermediate financial spillovers** ($\bar{f} < f < \bar{\bar{f}}$). In this region, following a US tightening, domestic inflation and output move in opposite directions.

$$\frac{\partial I^{opt}}{\partial I^{US}} = -\frac{\psi \Theta_{I^{US}}^{(+)} \Theta_I^{(-)}}{\Phi_I^2} \left[\beta + \frac{\Phi_{I^{US}}^{(-)} \Phi_I^{(-)}}{\psi \Theta_{I^{US}}^{(+)} \Theta_I^{(-)}} \right] \ .$$

Therefore, the sign of the optimal domestic monetary response depends on the weight on inflation in the loss function, β. The optimal response to a US tightening is a domestic tightening if:

$$\beta > -\frac{1}{\psi}\frac{\Phi^{(-)}_{I^{US}}\Phi^{(-)}_{I}}{\Theta^{(+)}_{I^{US}}\Theta^{(-)}_{I}} \equiv \bar{\beta} \ . \tag{A.22}$$

3. **Strong financial spillovers** ($f > \bar{\bar{f}}$). As in the previous region also here, following a US tightening, domestic inflation and output move in opposite directions. The important difference is that here inflation and output might move in opposite directions also following a *domestic* tightening.

$$\frac{\partial I^{opt}}{\partial I^{US}} = -\frac{\psi\Theta^{(+)}_{I^{US}}\Theta^{(\pm)}_{I}}{\Phi^2_I}\left[\beta + \frac{\Phi^{(-)}_{I^{US}}\Phi^{(+)}_{I}}{\psi\Theta^{(+)}_{I^{US}}\Theta^{(\pm)}_{I}}\right] \ .$$

We have two scenarios.[5] If $\Theta_I > 0$ (domestic monetary policy has a perverse effect on both output and inflation) then a domestic tightening would stabilise output but exacerbate inflation, while a domestic loosening would achieve the opposite. As a consequence, the sign of the optimal domestic monetary response depends on the weight on inflation in the loss function, β. It will be optimal to tighten if $\beta < \bar{\beta}$. If $\Theta_I < 0$ (domestic monetary policy has a perverse effect on output but not on inflation) then a domestic tightening would stabilise output and inflation at the same time. In this case the optimal response to a tightening in the US is always a domestic tightening.

Second, let us focus on the region $h > \bar{h}$, where $\Theta_{I^{US}} \equiv \frac{\partial \Pi}{\partial I^{US}} < 0$.

1. **Weak financial spillovers** ($f < \bar{f}$). In this region domestic inflation and output move in the opposite directions following a US tightening (inflation contracts and output increase).

$$\frac{\partial I^{opt}}{\partial I^{US}} = -\frac{\psi\Theta^{(-)}_{I^{US}}\Theta^{(-)}_{I}}{\Phi^2_I}\left[\beta + \frac{\Phi^{(+)}_{I^{US}}\Phi^{(-)}_{I}}{\psi\Theta^{(-)}_{I^{US}}\Theta^{(-)}_{I}}\right] \ .$$

The sign of the optimal domestic monetary response depends on the weight on inflation in the loss function, β. The optimal response to a US tightening is a domestic tightening if $\beta < \bar{\beta}$.

2. **Intermediate financial spillovers** ($\bar{f} < f < \bar{\bar{f}}$). Here, following a US tightening, domestic inflation and output comove. It is always optimal to loosen in response to a US tightening.

$$\frac{\partial I^{opt}}{\partial I^{US}} = -\frac{\psi\Theta^{(-)}_{I^{US}}\Theta^{(-)}_{I}}{\Phi^2_I}\left[\beta + \frac{\Phi^{(-)}_{I^{US}}\Phi^{(-)}_{I}}{\psi\Theta^{(-)}_{I^{US}}\Theta^{(-)}_{I}}\right] \ .$$

[5] See Eq. (A.19) and discussion thereof.

3. **Strong financial spillovers** ($f > \bar{\bar{f}}$). As in the previous region also here, following a US tightening, domestic inflation and output comove. The important difference is that here inflation and output might move in opposite directions following a domestic tightening.

$$\frac{\partial I^{opt}}{\partial I^{US}} = -\frac{\psi \Theta_{I^{US}}^{(-)} \Theta_I^{(\pm)}}{\Phi_I^2} \left[\beta + \frac{\Phi_{I^{US}}^{(-)} \Phi_I^{(+)}}{\psi \Theta_{I^{US}}^{(-)} \Theta_I^{(\pm)}} \right] .$$

We have two scenarios.[6] If $\Theta_I > 0$ (domestic monetary policy has a perverse effect on both output and inflation) then a domestic tightening would stabilise output and inflation at the same time. In this case the optimal response to a US tightening is always a domestic tightening. If $\Theta_I < 0$ (domestic monetary policy has a perverse effect on output but not on inflation) then a domestic tightening would stabilise output but exacerbate inflation, while a domestic loosening would achieve the opposite. As a consequence, the sign of the optimal domestic monetary response depends on the weight on inflation in the loss function, β. It will be optimal to tighten if $\beta < \bar{\beta}$.

To summarise: the domestic economy has one policy lever to stabilise both output and inflation. Whenever a domestic policy action can stabilise both objectives contemporaneously, then the direction of the optimal monetary policy is unambiguous. However, when there is a trade-off between inflation and output stabilisation, what matters for the optimal decision is the weight on price relative to output stabilisation in the loss function of the domestic monetary authority, β. We showed that there exists a threshold $\bar{\beta}$ above which the domestic monetary authority chooses price over output stabilisation. We also showed that, when financial spillovers are strong, there are two sub-regimes in the case of perverse domestic monetary policy. One in which a tightening stimulates output but contracts inflation, and another where it stimulates both output and inflation.

[6] See Eq. (A.19) and discussion thereof.

B Estimation of Median Group Responses

In several exercises we estimate median group dynamic responses for selected groups of countries to US monetary policy shocks. The goal is to provide an indication about how a synthetic 'median' economy would be affected by the shock. We aggregate the country responses into 'median' economy IRFs by taking sequentially each Gibbs sampler draw of the impulse responses for each country and obtaining the median response across countries at each horizon. We take draws sequentially starting from the firsts one, but this is equivalent to drawing each draw without replacement from the set of draws we have available for each country, and taking at each horizon the median value across countries. We proceed sequentially purely because of coding convenience. This procedure delivers a set of draws that can be interpreted as the response of the 'median' economy to the shock. The aggregation algorithm is the following:

1. For each Gibbs sampler iteration, stack the impulse responses of all countries in the group and compute the median across countries at each horizon.

2. Repeat the procedure for each Gibbs sampler iteration and store all median values obtained.

3. Sort these values and pick the median and corresponding bands at each horizon.

4. Repeat the above steps for all the variables in the endogenous set.

For US indicators and global controls we do not obtain the median across bilateral country-pair models, as we would be taking the median across several instances of the same country. We just stack all IRFs coming from the various bilateral models.

C Data Appendix

Table C.1: Model Specifications

Variable	Source	Transformations: Logs	Transformations: RW Prior	Models: (1)	Models: (2)	Models: (3)	Models: (4)	Models: (5)
Industrial Production Index	OECD	•	•	✓	✓	✓	✓	✓
CPI	OECD	•	•	✓	✓	✓	✓	✓
Core CPI	OECD	•	•	✓	✓			
Nominal Stock Price Index	Datastream	•	•	✓	✓	✓	✓	✓
Export/Import Ratio	OECD		•	✓	✓	✓	✓	
Trade Volume	OECD	•	•	✓	✓	✓	✓	
Nominal USD Exchange Rate	BIS	•	•	✓	✓	✓	✓	✓
Policy Rate	BIS			✓	✓	✓	✓	✓
Short-term Interest Rate	OECD			✓	✓	✓	✓	✓
Long-term Interest Rate	IMF			✓	✓	✓	✓	
Financial Conditions Index, CBC	CBC	•		✓	✓	✓	✓	
Risk Appetite, CBC	CBC			✓	✓	✓	✓	
Capital Inflow	IMF, GFD		•		✓		✓	
Capital Outflow	IMF, GFD		•		✓		✓	
Cross-Border Flows Index, CBC	CBC	•		✓		✓		
Fixed Income Holdings, CBC	CBC	•	•	✓	✓			
Equity Holdings, CBC	CBC	•	•	✓	✓			
Real Global Price of Brent Crude	FRED	•	•	✓	✓	✓	✓	✓
Real CRB Commodity Price Index	Datastream	•	•	✓	✓		✓	✓
Global Economic Activity Index	Kilian (2019)			✓	✓	✓	✓	✓
US Industrial Production Index	OECD	•	•	✓	✓	✓	✓	✓
US CPI	OECD	•	•	✓	✓	✓	✓	✓
US Core CPI	OECD	•	•	✓	✓			✓
US Nominal Stock Price Index	Datastream	•	•	✓	✓	✓	✓	✓
US Export/Import Ratio	OECD		•	✓	✓	✓	✓	✓
US Trade Volume	OECD	•	•	✓	✓	✓	✓	✓
US Nominal Effective Exchange Rate	BIS	•	•	✓	✓	✓	✓	✓
US 10-Year Treasury Constant Maturity Rate	FRED			✓	✓	✓	✓	✓
US Financial Conditions Index, CBC	CBC	•		✓	✓	✓	✓	✓
US Risk Appetite, CBC	CBC			✓	✓	✓	✓	✓
US Capital Inflow	IMF, GFD		•		✓		✓	
US Capital Outflow	IMF, GFD		•		✓		✓	
US Cross-Border Flows Index, CBC	CBC	•		✓		✓		✓
US Fixed Income Holdings, CBC	CBC	•	•	✓	✓			✓
US Equity Holdings, CBC	CBC	•	•	✓	✓			✓
US Excess Bond Premium	FRED			✓	✓	✓	✓	✓
CBOE VIX	FRED	•		✓	✓	✓	✓	✓
US 1-Year Treasury Constant Maturity Rate	FRED			✓	✓	✓	✓	✓

Models: (1) Bilateral BVAR specification for AEs in Section 3, Figure 2a; (2) specification for AE groups in Section 6, Figure 10; (3) specification for EMs in Section 3, Figure 2b and group exercises based on capital flow management in Section 6, Figure 9; (4) specification for group exercises based on exchange rate regimes in Section 6, Figure 8; (5) specification for the analysis of asymmetric effects of 'Fragile Five' EMs in Section 5, Figure 7.

TABLE C.2: Global variables

Variable Name	Description	Source	Code	Start date	End date	Logs	RW
OECD Production	OECD production, total industry excl. construction, SA	Datastream	OCOPRI35G	1975:01	2018:12	•	•
OECD CPI	OECD CPI, All items, NSA	Datastream	OCOCP009F	1975:01	2018:12	•	•
OECD Stock Price	OECD Stock price index (excl. North America), EoM	Datastream	TOTMKEF(PI)	1975:01	2018:12	•	•
Interest Rate Differential	Average of 15 advanced economies minus US, short term	IMF, OECD, FRED		1989:06	2018:12		
Euro per USD	Exchange rate, National currency per US dollar, EoM	BIS		1975:01	2018:12	•	
GBP per USD	Exchange rate, National currency per US dollar, EoM	IMF		1975:01	2018:12	•	
JPY per USD	Exchange rate, National currency per US dollar, EoM	IMF		1975:01	2018:12	•	
Global Financial Conditions Index	Short-term credit spreads, weighted average	CrossBorder Capital	CBCFCI	1975:01	2018:12	•	
Global Risk Appetite	Composite index, Equity minus Bond exposure index, weighted average	CrossBorder Capital	CBCRA	1978:05	2018:12		
Global Fixed Income Holdings	Holdings of government and corporate fixed income, weighted average	CrossBorder Capital	CBCFIHUSD	1975:01	2018:12	•	•
Global Equity Holdings	Holdings of listed equities, weighted average	CrossBorder Capital	CBCEHUSD	1975:01	2018:12	•	•
EM Inflow	Gross capital inflows to 15 EMs, percentage of GDP, Interpolated	IMF, GFD		1980:01	2018:12		•
EM Outflow	Gross capital outflows from 15 EMs, percentage of GDP, Interpolated	IMF, GFD		1980:01	2018:12		•
Global Economic Activity	Kilian (2019) Global Economic Activity Index	Lutz Kilian		1975:01	2018:12		
Real Commodity Price	CRB commodity price index divided by U.S. CPI (CPIAUCSL)	Datastream, Fred	T80440	1975:01	2018:12	•	•
Real Oil Price	Crude oil dated Brent U$/BBL, EoM, divided by U.S. CPI (CPIAUCSL)	Datastream, Fred	S219FD	1975:01	2018:12	•	•
US Production	Production of total industry, SA	OECD MEI		1975:01	2018:12	•	•
US CPI	US CPI, All items, NSA	OECD		1975:01	2018:12	•	•
US Stock Price	US Stock price index, EoM	Datastream	TOTMKUS(PI)	1975:01	2018:12	•	•
US Export-Import ratio	US Exports as a percentage of imports	OECD		1975:01	2018:12		•
US Trade Volume	US Exports plus imports	OECD		1975:01	2018:12	•	•
US Nominal Effective Exchange Rate	BIS Nominal effective exchange rate, narrow basket	BIS		1975:01	2018:12	•	•
US 10Y Treasury Rate	US 10-year treasury constant maturity rate, EoM	FRED	DGS10	1975:01	2018:12		
US Financial Conditions Index	Short-term credit spreads	CrossBorder Capital	CBCFCI	1975:01	2018:12	•	
US Risk Appetite	Composite index, Equity exposure index minus Bond exposure index	CrossBorder Capital	CBCRA	1978:05	2018:12		
US Fixed Income Holdings	Holdings of government and corporate fixed income	CrossBorder Capital	CBCFIHUSD	1975:01	2018:12	•	•
US Equity Holdings	Holdings of listed equities	CrossBorder Capital	CBCEHUSD	1975:01	2018:12	•	•
US Inflow	Gross capital inflows to US, percentage of GDP, Interpolated	IMF, GFD		1980:01	2018:12		•
US Outflow	Gross capital outflows from US, percentage of GDP, Interpolated	IMF, GFD		1980:01	2018:12		•
Excess Bond Premium	Gilchrist and Zakrajšek excess bond premium	FRED		1975:01	2018:12		
VIX	Chicago Board Options Exchange, CBOE volatility index	FRED	VIXCLS	1990:01	2018:12	•	
1Y Treasury Rate	US 1-year treasury constant maturity rate, EoM	FRED	DGS1	1975:01	2018:12		

Notes: The table lists all variables included in the analysis of the response of global aggregates to a US monetary policy shock (Section 3, Figure 1 of the main text). The first part of the table contains the global aggregates, and the second part contains the US variables included. *Logs* indicates logarithmic transformations. *RW Prior* indicates shrinkage towards a random walk prior vis-à-vis a white noise. The monetary policy variable used is the US one-year treasury constant maturity rate. Estimation sample: 1990:01 – 2018:12.

Table C.3: Endogenous set for the 'median economy' exercises

Foreign set	Logs	RW Prior	U.S. set	Logs	RW Prior
Industrial Production Index	•	•	US Industrial Production Index	•	•
Consumer Price Index	•	•	US Consumer Price Index	•	•
Core CPI Index	•	•	US Core CPI Index	•	•
Nominal Stock Price Index	•	•	US Nominal Stock Price Index	•	•
Export/Import ratio		•	US Export/Import ratio		•
Trade Volume	•	•	US Trade Volume	•	•
Nominal USD Exchange Rate	•	•	US Nominal Effective Exchange Rate	•	•
Policy Rate			US 10-Year Treasury Constant Maturity Rate		
Short-term Interest Rate			US Financial Conditions Index, CBC	•	
Long-term Interest Rate			US Risk Appetite, CBC		
Financial Conditions Index, CBC	•		US Cross-Border Flows Index, CBC	•	
Risk Appetite, CBC			US Fixed Income Holdings, CBC	•	•
Cross-Border Flows Index, CBC	•		US Equity Holdings, CBC	•	•
Fixed Income Holdings, CBC	•	•	US Excess Bond Premium		
Equity Holdings, CBC	•	•	CBOE VIX	•	
			US 1-year Treasury constant maturity rate		
Real Global Price of Brent Crude	•	•			
Real CRB Commodity Price Index	•	•			
Kilian (2019) Global Economic Activity Index					

Notes: The table lists all variables used in the 'median country' exercises (Section 3, Figure 2 of the main text). Due to data availability, Core CPI, Fixed Income and Equity Holdings are used only in the endogenous set of AEs. The left part of the table displays the endogenous variables of the foreign economy, while the right part contains US endogenous variables. The bottom contains global controls that are part of the endogenous set. The CRB commodity price index is not included in the endogenous set of EMs. *Logs* indicates logarithmic transformations. *RW Prior* indicates shrinkage towards a random walk prior vis-à-vis a white noise prior. The monetary policy variable used is the US one-year treasury constant maturity rate.

Table C.4: Sources of short term interest rates

	Short-term interest rate	Source
Australia	Interbank 3 Month	OECD MEI
Austria	VIBOR 3 month	OECD MEI
Belgium	T-bill Rate (3 months)	Datastream
Brazil	Deposit Rate (90 day)	IMF IFS
Canada	T-bill Rate (3 months)	IMF IFS
Chile	Deposit Rate (90 day)	IMF IFS
China	Deposit Rate (90 day)	Datastream
Colombia	Deposit Rate (90 day)	OECD MEI
Czech Rep.	PRIBOR 3 Month	OECD MEI
Denmark	CIBOR 3 Month	OECD MEI
Finland	HELIBOR 3 Month	IMF IFS
France	T-bill Rate (3 months)	IMF IFS
Germany	FIBOR 3 Month	OECD MEI
Hungary	T-bill Rate (3 months)	IMF IFS
India	Lending Rate	Datastream
Italy	T-bill Rate (3 months)	OECD MEI
Japan	T-bill Rate (3 months)	IMF IFS
Malaysia	T-bill Rate (3 months)	IMF IFS
Mexico	T-bill Rate (3 months)	OECD MEI
Netherlands	AIBOR 3 month	OECD MEI
Norway	NIBOR 3 month	OECD MEI
Philippines	Deposit Rate (90 day)	IMF IFS
Poland	WIBOR 3 month	OECD MEI
Russia	Interbank 1-3 Month	OECD MEI
South Africa	T-bill Rate (3 months)	IMF IFS
Spain	Interbank 3 Month	OECD MEI
Sweden	T-bill Rate (3 months)	IMF IFS
Thailand	Interbank 1 Month	Datastream
Turkey	Deposit Rate (90 day)	IMF IFS
UK	T-bill Rate (3 months)	Bank of England

Table C.5: Classification of countries by Financial Market Openness

Chinn-Ito Index, the Sample Average					
ADVANCED	Australia	0.828	EMERGING	Brazil	0.369
	Austria	0.968		Chile	0.635
	Belgium	0.968		China	0.166
	Canada	1		Colombia	0.403
	Denmark	0.994		Czech Rep.	0.951
	Finland	0.968		Hungary	0.907
	France	0.948		India	0.166
	Germany	1		Malaysia	0.411
	Italy	0.948		Mexico	0.674
	Japan	0.989		Philippines	0.389
	Netherlands	0.990		Poland	0.476
	Norway	0.895		Russia	0.465
	Spain	0.905		South Africa	0.169
	Sweden	0.946		Thailand	0.284
	UK	1		Turkey	0.323
ADVANCED	MEDIAN	0.968	EMERGING	MEDIAN	0.403
	TOP 33%	0.989		TOP 33%	0.469
	BOTTOM 33%	0.948		BOTTOM 33%	0.354
	ST.DEV	0.048		ST.DEV	0.245

	Advanced		Emerging	
	Open (Top 33%)	Less Open (Bottom 33%)	Open (Top 33%)	Less Open (Bottom 33%)
	Canada	Australia	Chile	China
	Denmark	France	Czech Rep.	India
	Germany	Italy	Hungary	South Africa
	Netherlands	Norway	Mexico	Thailand
	UK	Spain	Poland	Turkey
		Sweden		
Sample Average	0.997	0.912	0.729	0.222

Notes: The measure of financial openness is the arithmetic mean of the *ka_ open* index from Chinn and Ito (2006), which ranges from 0 (mostly closed) to 1 (mostly open). The Chinn-Ito index is available at yearly frequency up until 2017. It covers the sample from 1990 until 2017 for AEs. The coverage varies across EMs according to their sample availability (see Table 1).

Table C.6: Classification of EMs by Trade Invoicing in Dollars

	Exports			Imports		
Country	Avg. shares	High	Low	Avg. shares	Top 1/3	Bottom 1/3
Brazil	0.943	•		0.844	•	
Chile	NA			NA		
China	NA			NA		
Colombia	0.990	•		0.990	•	
Czech Rep.	0.136		•	0.192		•
Hungary	0.181		•	0.265		•
India	0.864	•		0.855	•	
Malaysia	0.9	•		0.9*	•	
Mexico	NA			NA		
Philippines	NA			NA		
Poland	0.305		•	0.303		•
Russia	NA			NA		
South Africa	0.52			0.52*		•
Thailand	0.821			0.789		
Turkey	0.461		•	0.591		
MEDIAN	0.670			0.690		
TOP 33%	0.864			0.844		
BOTTOM 33%	0.461			0.52		

Notes: Data from Gopinath (2015). Numbers in the second and fourth columns represent the average share of exports/imports into a country invoiced in US dollars, averaged across all years starting from 1999. We calculate the average, top and bottom tertile values excluding 5 countries with no data available (indicated as 'NA'). A country belongs to the 'High' group if its share of exports/imports invoiced in the USD corresponds to the top tertile and to the 'Low' group if it falls below the bottom tertile among 10 EMs listed above.
* Only exports invoicing data are available for Malaysia and South Africa. We assume that import USD invoicing shares are roughly the same as the export ones for these two countries.

Table C.7: Classification of EMs by Gross Dollar Exposure

Country	Total USD Assets + Liabilities	High Exposure	Low Exposure
Brazil	35.443		
Chile	80.519	•	
China	38.887		
Colombia	44.310		
Czech Rep.	30.494		•
Hungary	28.121		•
India	24.684		•
Malaysia	78.865	•	
Mexico	45.227		
Philippines	55.743	•	
Poland	20.216		•
Russia	61.570	•	
South Africa	30.956		•
Thailand	47.550	•	
Turkey	38.548		
MEDIAN	38.887		
TOP 33%	46.001		
BOTTOM 33%	33.947		

Notes: We construct a measure of gross dollar exposure for each country by taking the sum of total USD assets and liabilities as a share of domestic GDP, from the dataset of Bénétrix et al. (2015). Numbers in the second column represent the average of this measure over the sample, which varies from 1990:01 – 2019:09 for the longest (South Africa) to 2002:09 – 2018:09 for the shortest (Colombia). A country belongs to the 'High exposure' group if its gross dollar exposure corresponds to the top tertile and the 'Low exposure' group if it falls below the bottom tertile among 15 EMs listed above.

Table C.8: Classification of countries by Exchange Rate Regimes

Ilzetzki et al. (2019) Fine Classification				
Floats	Managed floats	Median IRR	Crawling pegs	Median IRR
14 AEs*	Brazil	12	China	5
Czech Republic	Canada	12	India	7
Hungary	Chile	12	Malaysia	11
Poland	Colombia	12	Philippines	10
	Mexico	12	Russia	8
	South Africa	12	Thailand	11
	Turkey	12		

Notes: Medians across sample period of each country. 12: +/- 5% de facto moving band, managed floating; 11: +/- 2% moving band; 10: de facto crawling band, +/- 5%; 8: de facto crawling band, +/- 2%; 7: de facto crawling peg; 5: pre-announced crawling peg. Czech Republic, Hungary, and Poland are classified as floaters relative to the US dollar, since their currencies are anchored to Euro. * 14 AEs are all of the AEs in our sample minus Canada. The median value of all 14 countries is 13, which corresponds to a freely floating regime in the Ilzetzki et al. (2019) classification.

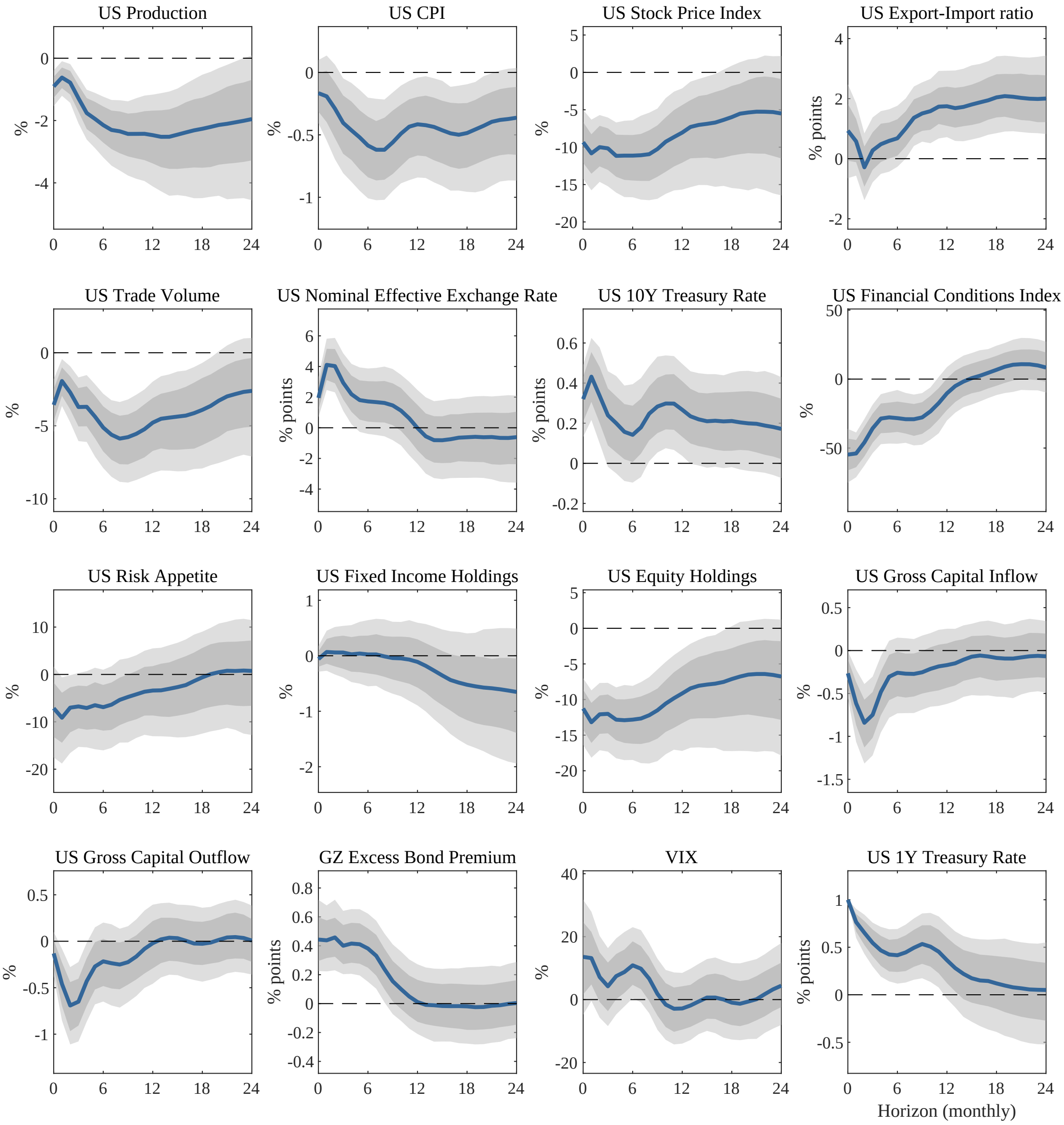
Table C.9: Sample coverage for 'Fragile Five'

Countries	Estimation Sample
Turkey	1990:01 – 2018:10
Brazil	1990:01 – 2018:11
South Africa	1990:01 – 2018:12
Chile	1991:01 – 2018:06
Mexico	1990:01 – 2018:02

Notes: The set of endogenous variables includes five main local indicators: industrial production, CPI, stock prices, exchange rate, and short-term interest rate. It also includes all US variables detailed in Table C.3, the global controls and the CRB commodity price index. For Brazil, the end-of-month stock price series is interpolated backwards from 1994:07 to 1990:01 by regressing it on the monthly average stock prices (from OECD MEI) in a simple linear regression estimated by OLS. For Brazil, we also replace industrial production by monthly GDP (from FRED, BRALORSGPNOSTSAM). We interpolate GDP backwards from 1996:01 to 1990:01 by linear regression on the year-on-year growth rate of IP, using OLS. The results we obtain by using industrial production are qualitatively similar.

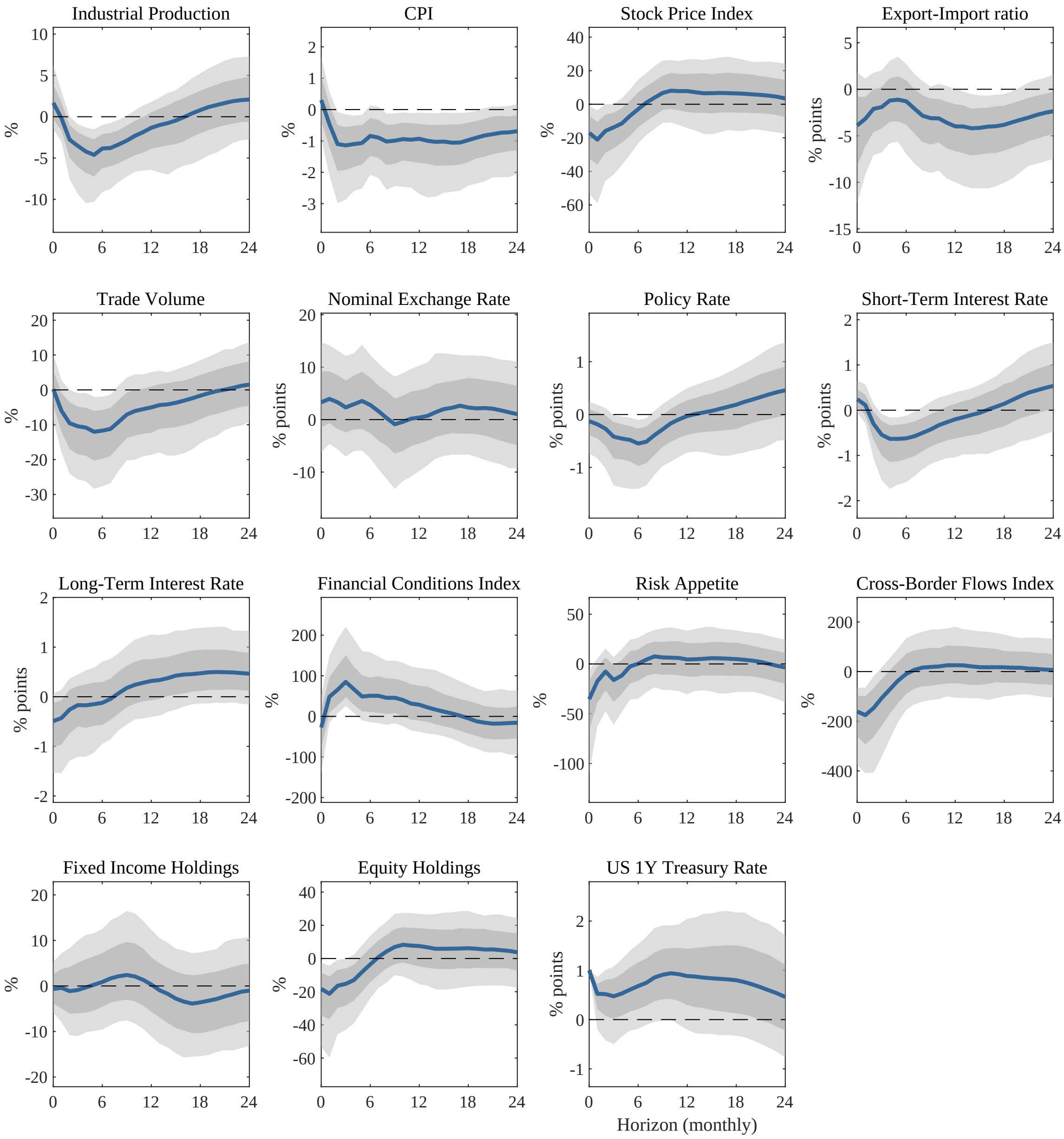
D Additional Charts

Figure D.1: Effects of Monetary Policy in the US



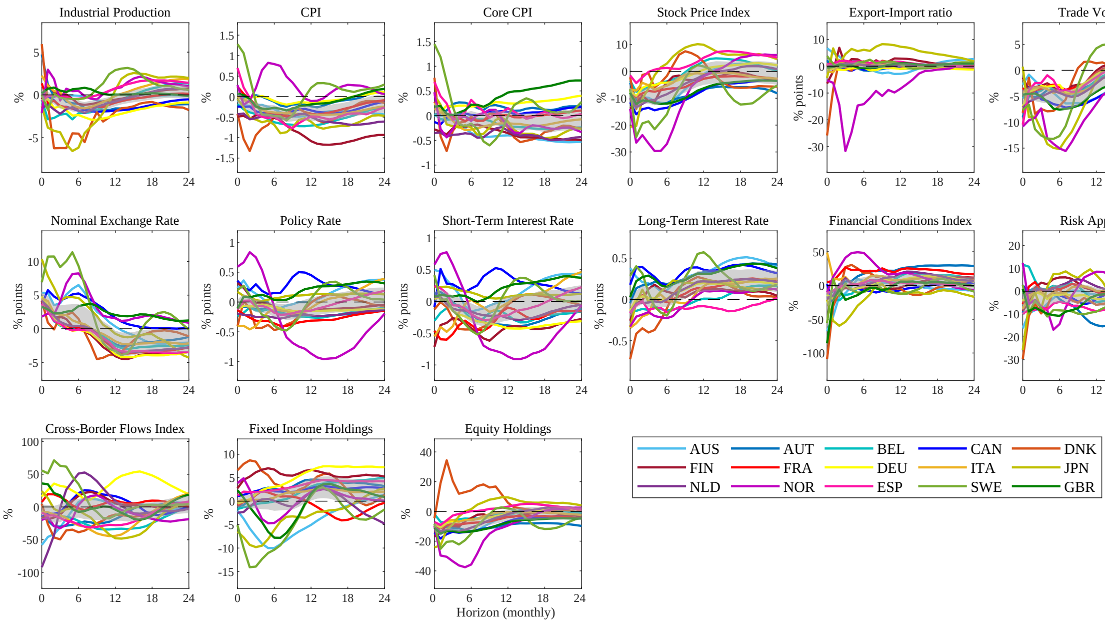
Note: Responses to a contractionary US monetary policy shock, normalised to induce a 100bp increase in the US 1-year treasury constant maturity rate. Informationally robust high-frequency identification. Sample 1990:01 – 2018:12. BVAR(12) with asymmetric conjugate priors. Shaded areas are 68% and 90% posterior coverage bands. These responses are estimated jointly to those reported in Figure 1, in the main text.

Figure D.2: Transmission to the Euro Area



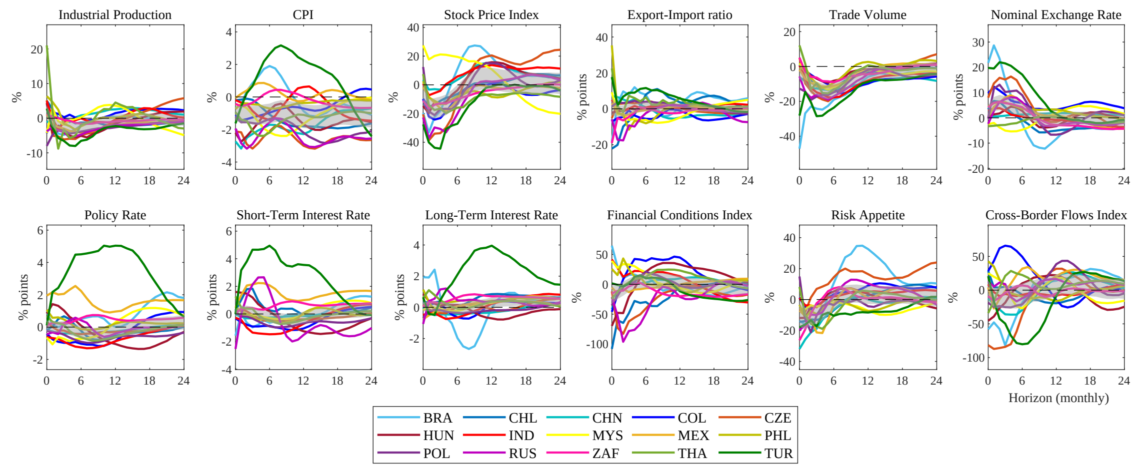
Note: Responses of Euro Area to a contractionary US monetary policy shock, normalised to induce a 100bp increase in the US 1-year treasury constant maturity rate. Informationally robust high-frequency identification. Sample 1999:01 – 2018:12. BVAR(12) with asymmetric conjugate priors. Shaded areas are 68% and 90% posterior coverage bands.

Figure D.3: Homogeneity in the Responses, Advanced Economies



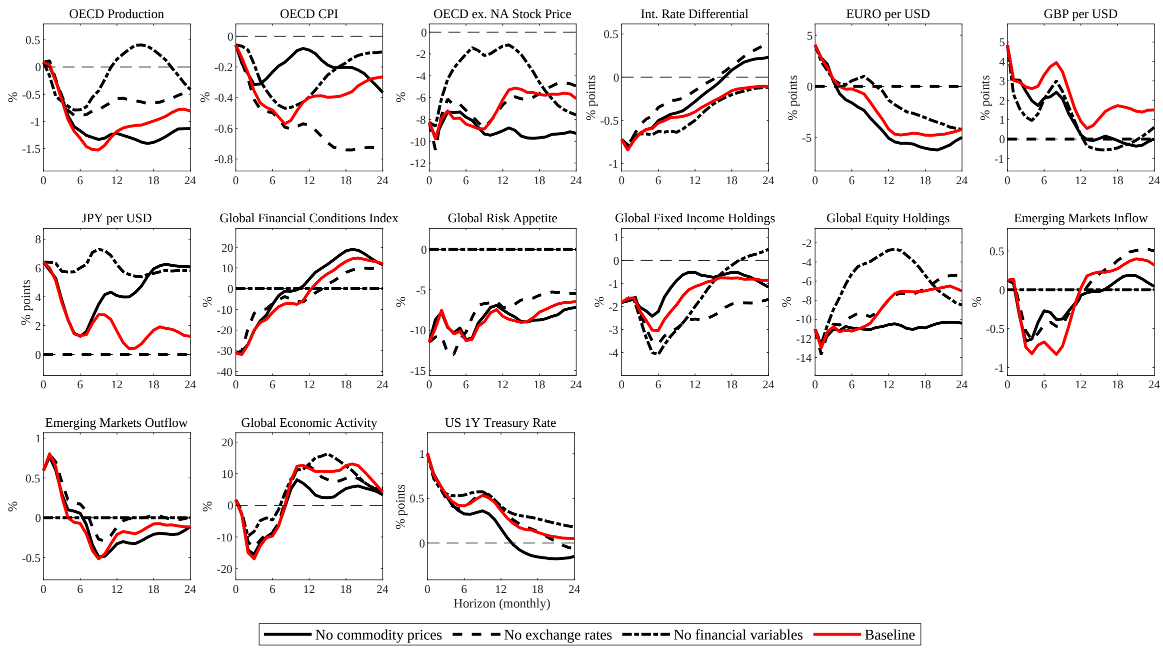
Note: Coloured lines: median responses of the 15 advanced economies. Shaded area: 90% confidence region for the responses of the median advanced economy. The shock is normalised to induce a 100bp increase in the US 1-year treasury constant maturity rate. Informationally robust high-frequency identification. Sample reported in Table 1, in the main text. BVAR(12) with asymmetric conjugate priors.

Figure D.4: Homogeneity in the Responses, Emerging Economies



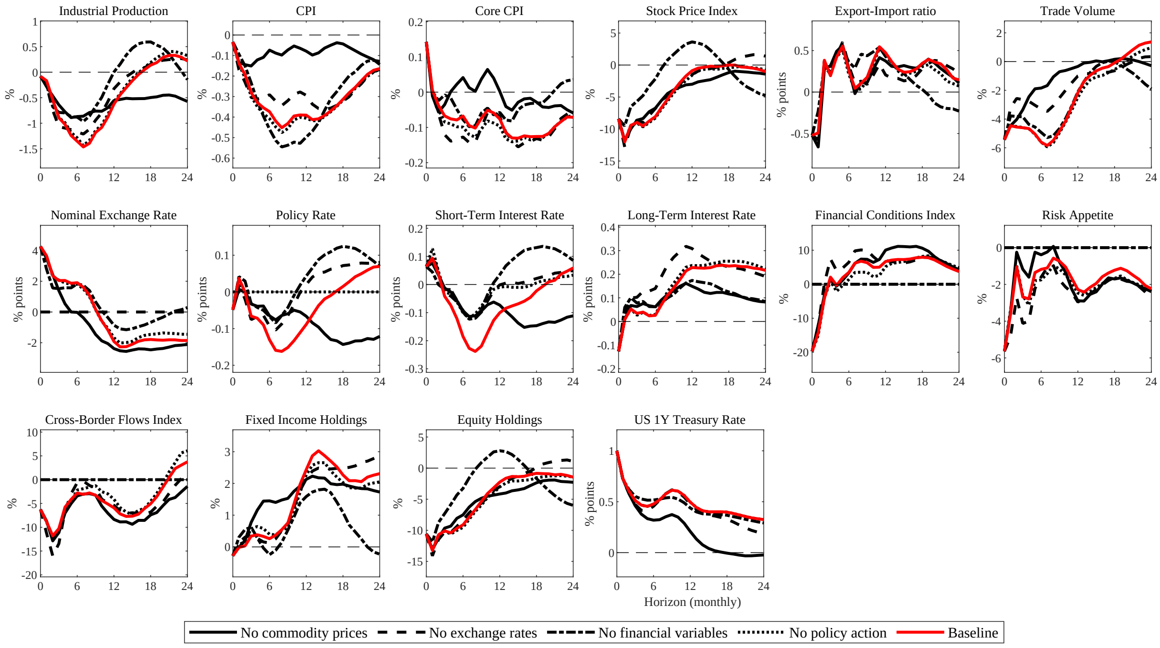
Note: Coloured lines: median responses of the 15 emerging economies. Shaded area: 90% confidence region for the responses of the median emerging economy. The shock is normalised to induce a 100bp increase in the US 1-year treasury constant maturity rate. Informationally robust high-frequency identification. Sample reported in Table 1, in the main text. BVAR(12) with asymmetric conjugate priors.

Figure D.5: Channels of Transmission, Global Economy



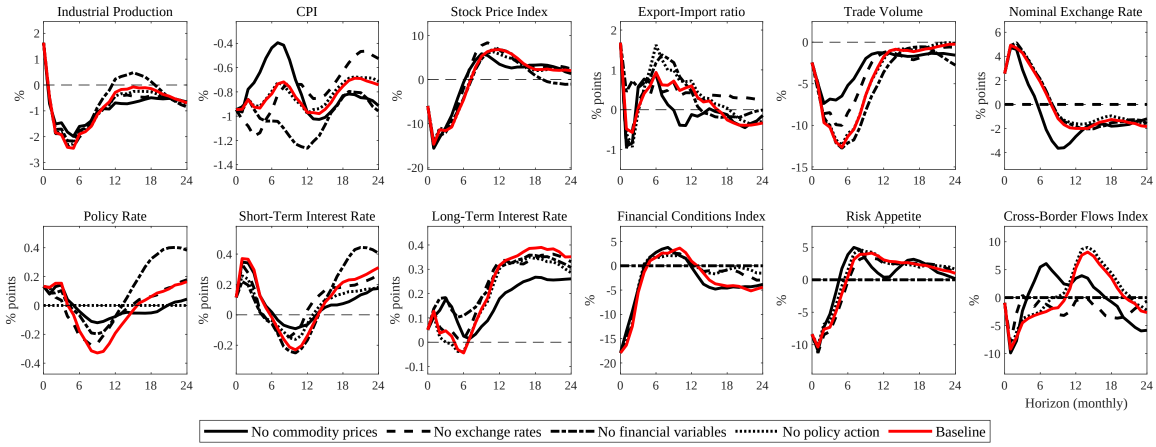
Note: Lines correspond to impulse responses obtained with the baseline specification (solid red); assuming the Brent crude and commodity prices do not react (solid black); assuming the nominal exchange rates do not react (dashed black); finally, assuming financial conditions, risk appetite cross-border flows, the excess bond premium, and VIX do not react (dash-dotted black). The shock is normalised to induce a 100bp increase in the US 1-year treasury constant maturity rate. Informationally robust high-frequency identification. Sample 1990:01 - 2018:12. BVAR(12) with asymmetric conjugate priors.

Figure D.6: Channels of Transmission, Advanced Economies



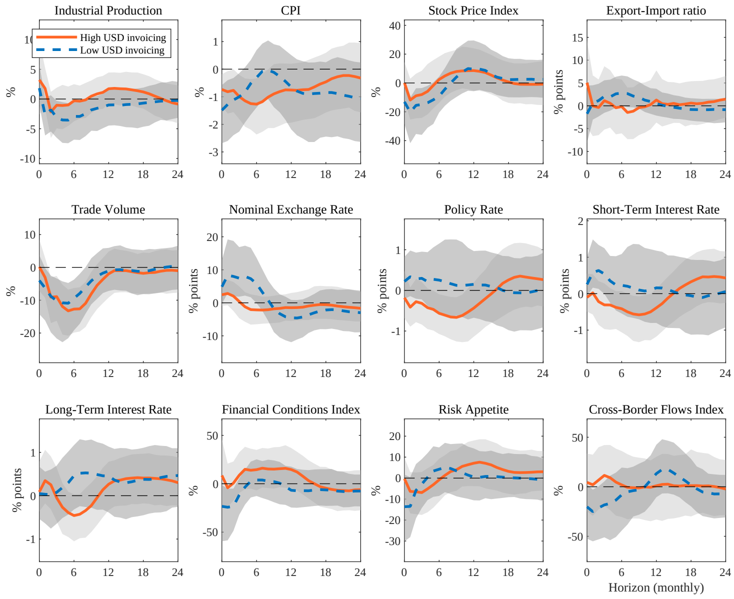
Note: Lines correspond to impulse responses obtained with the baseline specification (solid red); assuming the policy rate does not react (solid black); the Brent crude and commodity prices do not react (dashed black); exchange rates do not react (dashed-dotted black); financial conditions, risk appetite, cross-border flows, the excess bond premium, and VIX do not react (dotted black). The shock is normalised to induce a 100bp increase in the US 1-year treasury constant maturity rate. Informationally robust high-frequency identification. Sample reported in Table 1, in the main text. BVAR(12) with asymmetric conjugate priors.

Figure D.7: Channels of Transmission, Emerging Markets



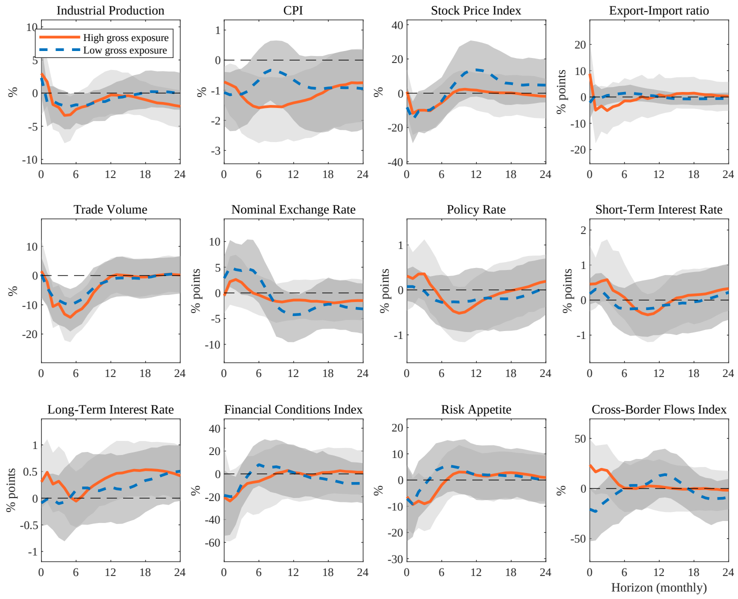
Note: Lines correspond to impulse responses obtained with the baseline specification (solid red); assuming the policy rate does not react (solid black); the Brent crude and commodity prices do not react (dashed black); exchange rates do not react (dashed-dotted black); financial conditions, risk appetite, cross-border flows, the excess bond premium, and VIX do not react (dotted black). The shock is normalised to induce a 100bp increase in the US 1-year treasury constant maturity rate. Informationally robust high-frequency identification. Sample reported in Table 1, in the main text. BVAR(12) with asymmetric conjugate priors.

Figure D.8: EMs by USD Trade Invoicing



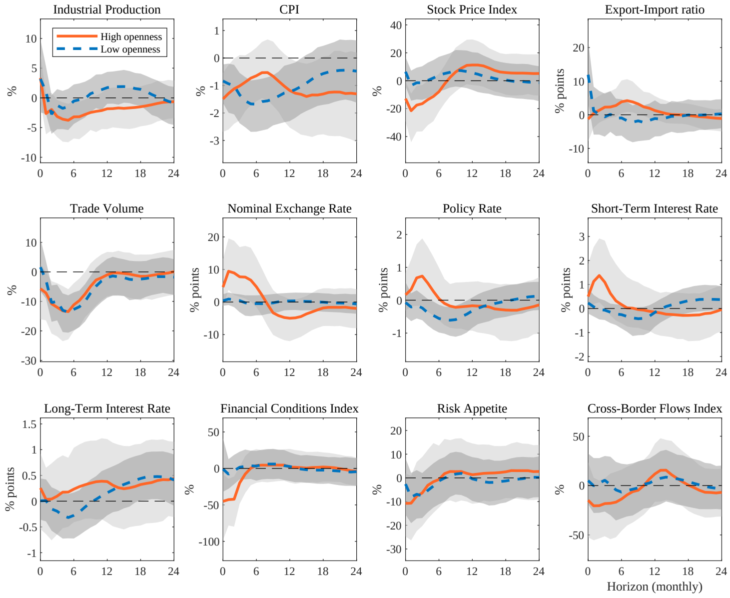
Note: Solid orange line – median responses of 5 emerging economies (Brazil, Colombia, Thailand, India, and Malaysia), whose USD trade invoicing both in terms of exports and imports corresponds to the top 1/3 among 15 EMs. Dashed blue line – median responses of 5 emerging economies (Czech Republic, Hungary, Poland, Turkey and South Africa), whose USD trade invoicing both in terms of exports and imports corresponds to the bottom 1/3. Data on trade invoice in USD are from Gopinath (2015). The shock is normalised to induce a 100bp increase in the US 1-year treasury constant maturity rate. Informationally robust high-frequency identification. BVAR(12) with asymmetric conjugate priors. Shaded areas are 90% posterior coverage bands.

Figure D.9: EMs by Gross USD Exposure



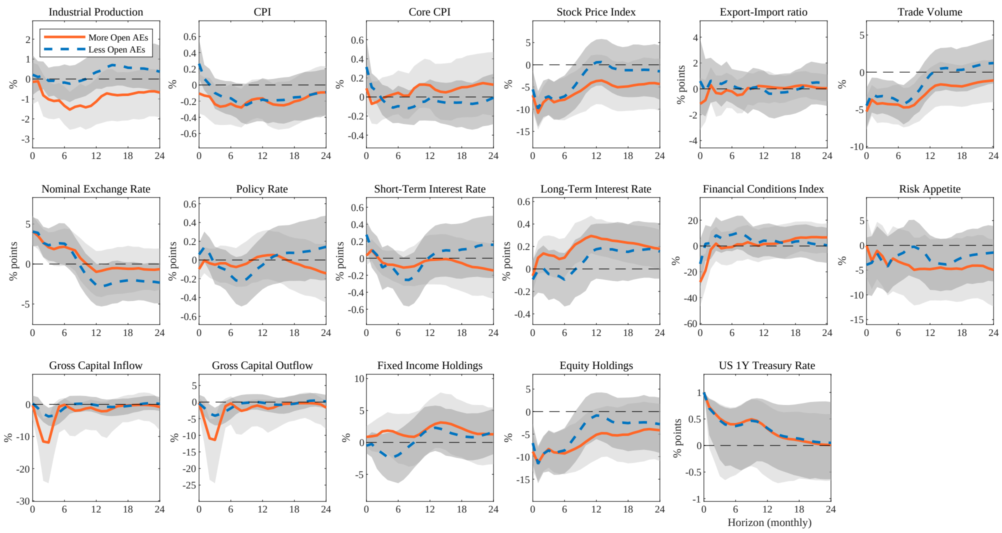
Note: Solid orange line – median responses of 5 emerging economies (Chile, Malaysia, Philippines, Russia, and Thailand), whose gross USD exposure corresponds to the top 1/3 among 15 EMs. Dashed blue line – median responses of 5 emerging economies (Czech Republic, Hungary, India, Poland, and South Africa), whose gross USD exposure corresponds to the bottom 1/3. Data on gross USD exposure are from Bénétrix et al. (2015). The shock is normalised to induce a 100bp increase in the US 1-year treasury constant maturity rate. Informationally robust high-frequency identification. BVAR(12) with asymmetric conjugate priors. Shaded areas are 90% posterior coverage bands.

FIGURE D.10: EMs BY OPENNESS TO CAPITAL, FERNÁNDEZ ET AL. (2016)



Note: Solid orange line – median responses of 5 emerging economies (Chile, Czech Republic, Hungary, Poland, and Turkey), whose overall degree of capital openness corresponds to the bottom 1/3 among 15 EMs. Dashed blue line – median responses of 5 emerging economies (China, India, Malaysia, Philippines, and Thailand), whose overall degree of capital openness corresponds to the top 1/3. Data on degree of capital openness are from Fernández et al. (2016). The shock is normalised to induce a 100bp increase in the US 1-year treasury constant maturity rate. Informationally robust high-frequency identification. BVAR(12) with asymmetric conjugate priors. Shaded areas are 90% posterior coverage bands.

Figure D.11: AEs by Openness to Capital



Note: Orange line – median responses of 5 AEs (Canada, Denmark, Germany, Netherlands, and UK), whose overall degree of capital openness corresponds to the top 1/3 among 15 advanced economies. Dotted blue line – median responses of 6 AEs (Australia, France, Italy, Norway, Spain, and Sweden), whose overall degree of capital openness corresponds to the bottom 1/3. Data on capital flow management are from Chinn and Ito (2006). The shock is normalised to induce a 100bp increase in the US 1-year treasury constant maturity rate. Informationally robust high-frequency identification. BVAR(12) with asymmetric conjugate priors. Shaded areas are 90% posterior coverage bands.