DOMINANT CURRENCY AND THE IMPACT OF MONETARY POLICY

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

Can monetary policy help stabilise the economy in a world of dollar dominance?
Motivation
Motivation

1. Most international trade is invoiced in a few currencies. Large US dollar role.

2. New dominant currency paradigm (DCP) has emerged, shifting policy views.
   ▶ Makes exports unresponsive to exchange rates.
   ▶ Reduces the value of flexible exchange rates as automatic stabilisers.
   ▶ Limits the gains from independent monetary policy.

3. Key DCP assumptions: 1) exporters have monopoly power; 2) dollar prices are sticky. Much less likely to hold outside the US.
   ▶ Many developing-country producers are price takers. They export commodities or similar products with little market power.
   ▶ Commodities often quoted in US dollars, but prices are completely flexible.
   ▶ Even advanced-economy producers often face very elastic demands in global markets.
Motivation - Dollar invoicing dominates trade

Source: Gopinath (2016) and IMF
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Exchange rate flexibility may need to be supported with other policies...exchange rate changes have muted effects on the trade balance in the short term, including because of the limited response of export volumes.

IMF (2019)
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Dollar dominance in trade: the monopolist with sticky price

Depreciation with sticky dollar prices: monopolist

- With sticky dollar prices, export quantities do not change
Dollar commodity prices do not change, but export quantities increase
Dollar dominance: the producer in competitive markets

Depreciation with elastic demand

- For a producer facing an elastic demand, flexible prices may appear sticky in equilibrium
- Export quantities increase a lot, as for the commodity exporter
Implications for monetary policy (the ER channel)

- With monopolists and sticky USD prices, an ER depreciation does not affect export prices or quantities. Monetary policy has a small effect.

- With commodity (or commodity-like) producers and flexible USD prices, an ER depreciation does not affect export prices but causes a large increase in export quantities. Monetary policy has a large effect.
  - Effect depends on supply capacity.
Some remarks

▶ Most trade is invoiced in a few currencies: dominant currency literature has pushed the frontier in the field.

▶ But using dominant invoicing currency does not need to entail sticky prices or monopoly power.
  ▶ Empirical evidence suggests the opposite: the more competitive the market, the more likely a producer would invoice in a dominant currency. (E.g., commodities).

▶ Very different implications for monetary-policy effectiveness and the role of exchange rates as automatic stabilisers.
Outline

1. Motivation
2. Model
3. Simulations
4. Empirical evidence
5. Conclusion
Model
Model summary

▶ Use benchmark dominant currency pricing model of Gopinath et al. (2020)
  ▶ Standard New Keynesian model
  ▶ Focus on small open economy version of the model, (arguments extend to three-country model). Financial markets are incomplete.

▶ Production and competition:
  ▶ Strategic complementarities, imply variable elasticity and markups.
  ▶ Imported intermediates used in production.
  ▶ Gopinath et al. (2020): low substitution elasticity across varieties.
  ▶ This paper: higher substitution elasticity across varieties (consistent with more homogeneous products in Broda and Weinstein, 2006)

▶ Wage and price-setting
  ▶ Sticky wages (Calvo).
  ▶ Compare sticky prices in USD to flexible prices (makes invoicing currency irrelevant).
Open economy setup and exchange rate

- Home (H) is small open economy.

- Trades goods and assets with rest of the world (R).
  - Rest of the world dynamics are assumed exogenous.
  - Includes US and also third countries where exports may be priced in dollars.

- $E_H^S$ – price of a dollar in home currency
  - $E_H^S \uparrow \implies$ depreciation of home currency against the dollar.

- $E_{jH}$ – price of third currency $j$ in home currency.
Household preferences

- Households in H maximise expected lifetime utility

\[
E_0 \sum_{t=0}^{\infty} \beta^t \left( \frac{C_{H,t}^{1-\sigma_c}}{1-\sigma_c} - \frac{N_{H,t}^{1+\varphi}}{1+\varphi} \right)
\]

- Consumption basket of varieties \( \omega \in \Omega_j \), for \( j = H, U \). Defined using Klenow and Willis (2016) preferences, which induce variable markups. Leads to consumption demand:

\[
C_{H,t}(\omega) \equiv \gamma_H \left( 1 + \epsilon \ln \sigma - \frac{1}{\sigma} - \epsilon \ln \frac{P_{H,t}(\omega)D_{H,t}}{P_t} \right)^{\frac{\sigma}{\epsilon}} C_t,
\]

where \( D_{H,t} \) is a demand aggregator \( D_{H,t} = \sum_{j=H,R} \int_{\Omega_{[H,R]}} \gamma' \left( \frac{C_{j,t}(\omega)}{\gamma_j C_t} \right) \frac{C_{j,t}(\omega)}{C_t} d\omega \)

- \( \gamma_H \) governs home bias.
- \( \epsilon \) determines the markup elasticity, with CES equal to \( \sigma \) as \( \epsilon \to 0 \).
BUDGET CONSTRAINT AND ASSET MARKET

- Home household budget constraint for each differentiated labour type $h$

\[
P_{H,t}C_{H,t} + \mathcal{E}_{H,t}^H(1 + i_{H,t-1}^H)B_{H,t}^H + B_{H,t} =
\]

\[
W_{H,t}(h)N_{H,t}(h) + \Pi_{H,t} + \mathcal{E}_{H,t}^H B_{H,t+1}^H + \sum_{s \in S} Q_{H,t+1}(s) B_{H,t+1}(s),
\]

- $\Pi_{H,t}$ are lump-sum profits.
- $B_{H,t}$ full set of domestic state-contingent debt.
- $B_{H,t}^H$ USD risk-free debt - no risk sharing across countries.

- Euler equations imply UIP condition:

\[
(1 + i_{H,t}) = (1 + i_{H,t}^H)\mathbb{E}_t \left( \frac{\mathcal{E}_{H,t+1}^H}{\mathcal{E}_{H,t}^H} \right)
\]
For each home variety, identical Cobb-Douglas production function using labor and domestic and imported intermediates \( (X_{H,t}) \), with aggregate productivity \( A_{H,t} \)

\[
Y_{H,t} = A_{H,t} N_{H,t}^{1-\alpha} X_{H,t}^\alpha
\]

Intermediate inputs aggregated in the same way as consumption varieties, which gives demand for each home variety:

\[
Y_{H,t}(\omega) = X_{H,t}(\omega) + C_{H,t}(\omega)
\]

\[
= \gamma_H \left( 1 + \epsilon \ln \frac{\sigma - 1}{\sigma} - \epsilon \ln \frac{P_{H,t}(\omega) D_{H,t}}{P_t} \right)^{\frac{\sigma}{\epsilon}} (C_t + X_t)
\]
Wage setting

- Each producer uses a CES bundle of differentiated labour inputs.

\[ N_{H,t} = \left( \int_0^1 N_{H,t}(h) \frac{\varphi-1}{\varphi} dh \right)^{\frac{\varphi}{\varphi-1}} \]

- Optimal hiring condition for each type

\[ N_{H,t}(h) = \left( \frac{W_{H,t}(h)}{W_{H,t}} \right)^{-\varphi} N_{H,t} \]

- Wage setting subject to Calvo (1983) friction
Price setting

- We compare flexible prices, to Calvo sticky price setting.
  - Export and import prices are either set in dollars or in the producer currency, and can be set differently in each country.

- For sticky-price firms that cannot adjust, depreciation \((E_{H,t}^{\$} \uparrow)\) increases profits.

- With flexible prices, or for firms that adjust dollar prices, prices fall and exports increase.
  - Flexible price optimal dollar reset price given by
    \[
    \bar{P}^\$_{H,t}(\omega) = \frac{\sigma_{H,t}(\omega)}{\sigma_{H,t}(\omega) - 1} \frac{MC_{H,t}}{E_{H,t}^\$}
    \]
Monetary policy

- Close the model with a simple inflation targeting Taylor rule with smoothing

\[ i_{H,t} - i^* = \rho(i_{H,t-1} - i^*) + (1 - \rho)\phi\pi_{H,t} + \nu_{H,t} \]

- \( \nu_{H,t} \) is a monetary policy shock in the home economy
Simulations
**Calibration**

- Follow Gopinath et al. (2020), except where highlighted in red.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\beta$</td>
<td>Discount factor</td>
<td>0.99</td>
</tr>
<tr>
<td>$\sigma_c$</td>
<td>Risk aversion</td>
<td>2</td>
</tr>
<tr>
<td>$\varphi$</td>
<td>Frisch elasticity</td>
<td>2</td>
</tr>
<tr>
<td>$\kappa$</td>
<td>Labour disutility</td>
<td>1</td>
</tr>
<tr>
<td>$\vartheta$</td>
<td>Labour demand elasticity</td>
<td>4</td>
</tr>
<tr>
<td>$\sigma$</td>
<td>Demand elasticity</td>
<td>2 and 17</td>
</tr>
<tr>
<td>$\epsilon$</td>
<td>Super-elasticity</td>
<td>1</td>
</tr>
<tr>
<td>$\gamma$</td>
<td>Home bias</td>
<td>0.7</td>
</tr>
<tr>
<td>$\alpha$</td>
<td>Intermediate share</td>
<td>2/3</td>
</tr>
<tr>
<td>$\delta_w$</td>
<td>Wage rigidity</td>
<td>0.85</td>
</tr>
<tr>
<td>$\delta_p$</td>
<td>Price rigidity</td>
<td>0 and 0.75</td>
</tr>
<tr>
<td>$\rho$</td>
<td>Monetary smoothing</td>
<td>0.5</td>
</tr>
<tr>
<td>$\phi$</td>
<td>Taylor rule inflation weight</td>
<td>1.5</td>
</tr>
</tbody>
</table>

- $\sigma = 2$ and $\sigma = 17$ taken from Broda and Weinstein (2006), with the larger elasticity corresponding to homogeneous goods.
**Home monetary policy shock, differentiated goods**

**Impulse responses to a home monetary policy shock, σ = 2**

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**Graphs showing impulse responses for different variables: MP shock, Inflation, Home-Dollar ER, Terms of Trade, Dollar export price, Dollar import price, Export quantity, Import quantity, Output, Wage inflation, Real wage, Interest rate.**

- **Dollar pricing** (blue line)
- **Producer pricing** (red dashed line)
- **Flexible prices** (green line)

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Home monetary policy shock, homogeneous goods

Impulse responses to a home monetary policy shock, $\sigma = 17$

- MP shock
- Inflation
- Home-Dollar ER
- Terms of Trade
- Dollar export price
- Dollar import price
- Export quantity
- Import quantity
- Output
- Wage inflation
- Real wage
- Interest rate

Dollar pricing — Producer pricing — Flexible prices
If $P_R$ is the price charged in the rest of the world, and prices are fully fixed/flexible, then:

- Under dollar pricing:
  \[ \Delta P_R = -\Delta \varepsilon_{SR} = 0 \]

- Under producer pricing:
  \[ \Delta P_R = -\Delta \varepsilon_{SH} \]

- Under flexible pricing:
  \[ \Delta P_R = \mu(-\Delta \varepsilon_{SH} + \Delta MC_H) \]

- Under dollar pricing, prices are unchanged.
- Under flexible prices, producer adjusts prices to reflect lower dollar costs.
- But domestic marginal costs rise as exports increase, so for low markups, pass-through to price is limited.
In all pricing frameworks, if $Y_R$ are exports to the rest of the world, then:

$\Delta Y_R = -\sigma_H \Delta P_R$

$\Delta MC_H = f(\Delta Y_R)$

- When elasticity is high, flexible price export volumes adjust a lot.
- Large quantity adjustment means domestic marginal costs are higher and hence pass-through is limited.
- At the competitive limit, pass-through to price is zero.
In reality, there is a mix of fully fixed and flexible extremes.

Some exporters adjust prices more frequently than others.

Some face more or less elastic demand curves.

Key empirical question is which conditions are faced by dollar-pricing exporters.

The cost of sticky dollar prices will be higher if the demand elasticity is high.
Empirical evidence
### Assumptions and Testable Hypotheses

<table>
<thead>
<tr>
<th></th>
<th>DCP (Gopinath et al, 2020)</th>
<th>Our model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exporters’ market power</td>
<td>High/inelastic</td>
<td>Low/elastic</td>
</tr>
<tr>
<td>Prices</td>
<td>Sticky</td>
<td>Flexible</td>
</tr>
<tr>
<td>Low export-price pass-through</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Large export quantity response</td>
<td>✗</td>
<td>✔️</td>
</tr>
</tbody>
</table>
Modelling by Bachetta and van Wincoop (2005) suggested lower market share, homogeneous goods associated with pricing in foreign currencies.
**Exporters’ market power: homogeneous products**

**Share of total exports that are either homogeneous products or that are exported to the US, versus dollar invoicing share**

![Graph showing the relationship between US dollar invoicing share in country exports and the share of country exports that are either homogeneous or exported to the US.](image)

**Source:** Goldberg and Tille (2008)

- Goods priced in dominant (dollar) currency tend to be homogeneous (McKinnon, 1979; Goldberg and Tille, 2008; Gopinath, Itskhoki and Rigobon, 2011)
Exporters’ market power: vehicle currency determinant

Micro factors determining likelihood of local/vehicle currency pricing, Canadian (non-US) imports

<table>
<thead>
<tr>
<th>Factor</th>
<th>LCP likelihood v PCP</th>
<th>VCP likelihood v PCP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highly homogenous goods (Walrasian)</td>
<td>0.12</td>
<td>0.00</td>
</tr>
<tr>
<td>Intermediate homogeneity goods</td>
<td>0.50***</td>
<td>0.14***</td>
</tr>
<tr>
<td>Exporting country market share in industry</td>
<td>-5.63***</td>
<td>-0.62***</td>
</tr>
<tr>
<td>Commodity input intensity of industry</td>
<td>0.26</td>
<td>1.46***</td>
</tr>
<tr>
<td>Foreign ownership share by industry - US</td>
<td>1.71***</td>
<td>3.31***</td>
</tr>
<tr>
<td>Foreign ownership share by industry - EU</td>
<td>-4.26***</td>
<td>-2.27***</td>
</tr>
<tr>
<td>Foreign ownership share by industry - non US, ROW</td>
<td>5.61***</td>
<td>-4.07***</td>
</tr>
<tr>
<td>Importer concentration</td>
<td>1.61***</td>
<td>0.63***</td>
</tr>
</tbody>
</table>

Model fit statistic - (AIC) 18,118,586

Source: Goldberg and Tille (2016)

- Using microdata on Canadian imports, Goldberg and Tille (2016) show dollar pricing more likely for exporters a) selling homogeneous goods; b) intensive in commodity inputs; c) with low market share.

- Consistent with goods priced in dollars having high demand elasticities.
Pricing - commodities

Source: World Bank Pink Sheet (Nov 2020)

- For commodity exports, dollar prices change at high-frequency.
Pricing - other exports

Do other exports reprice as frequently as commodities?

Gopinath and Itskhoki (2010) find that for the 50% of dollar-invoiced US manufacturing imports that have the highest price frequency, 30% reprice each month, corresponding to a median price duration of around three months.

Price durations are shorter still for more homogeneous goods.
The test: pass through

- ER changes have small effect on export prices in USD. Implies stickiness!

- But for commodity producers with flexible prices, an ER depreciation does not change export prices either. Lack of pass-through does not imply stickiness.
  - Pass-through into prices cannot help distinguish the two models.
The test: export quantities

Two approaches

1. Regress bilateral trade flows on bilateral exchange-rates (Gopinath et al, 2020; IMF, 2019).
   - But identification difficult: exchange-rates move for a reason.
   - ER are automatic stabilisers: they adjust to counterbalance movements in exports.
   - If exports fall (e.g., negative productivity shock, increase in trade barriers), ER depreciate to counterbalance.
   - Reverse causality biases estimation in the opposite direction
   - Host of other endogenous variables in gravity equations biases estimates.

2. Use identified monetary policy shocks to examine movements in exchange rates orthogonal to other determinants of export volumes.
Export volumes - monetary policy shock (Canada)

Impulse response to a Canadian monetary policy shock

Source: Champagne and Sekkel (2018)

- Export volumes fall in response to a monetary policy tightening that leads to an initial exchange-rate appreciation.
Export volumes - monetary policy shock (UK)

Impulse response to a UK monetary policy shock

Source: Cesa-Bianchi, Thwaites and Vicondoa (2020)

- Export volumes (and import volumes) fall in response to a monetary policy tightening that leads to a persistent exchange-rate appreciation.
CONCLUSION
Conclusion

- Dominant currency paradigm has advanced the frontier; but the standard framework assumes monopolistic firms with sticky prices.

- Empirical evidence suggests exporters invoicing in dollars are more likely to be flexible price-takers (e.g., commodities).

- In both frameworks, pass-through of exchange-rates to prices is limited, but very different implications for export quantities.

- In flexible, competitive markets, monetary policy and the exchange rate can still stabilise the economy via trade channels, even with dollar dominance. This appears consistent with the evidence stemming from the effects of identified monetary policy shocks.
QUESTIONS?
