Monetary Policy Credibility and Exchange Rate Pass-Through*

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A long-standing conjecture in macroeconomics is that declines in exchange rate pass-through over the past three decades are in part due to improved monetary policy performance. In a large sample of emerging and advanced economies, we find evidence that a relatively more credible monetary policy regime—measured by better-anchored inflation expectations—is associated with lower exchange rate pass-through to consumer prices. The results are robust to controlling for the level and variability of nominal variables and for the import content of the consumption basket.

JEL Codes: E31, E52, F41.

1. Introduction

The empirical literature has reported wide variation in the rate at which changes in the nominal exchange rate pass through to domestic prices, both across countries and over time. Many empirical papers document a generalized decline in pass-through rates over the past three decades (Campa and Goldberg 2005; Choudhri and

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Hakura 2006). Taylor (2000) conjectures that the pass-through rate is endogenous to the monetary policy framework and its credibility, such that improvements in the latter—reflected in stronger nominal anchors and a track record of price stability—could be responsible for falling exchange rate pass-through to consumer prices. The argument behind Taylor (2000)'s conjecture is that the extent to which a firm decides to pass along an increase in its costs is lower when their inflation expectations are better anchored.

This paper provides an empirical test of Taylor's hypothesis. We find evidence that greater monetary policy credibility, as measured by better-anchored inflation expectations, has significantly reduced the exchange rate pass-through to consumer prices.

We begin by estimating models of exchange rate pass-through to consumer prices in a sample of 62 emerging and advanced economies. In line with the existing literature, we confirm that the degree of exchange rate pass-through to consumer prices has fallen over the past few decades, with the largest decline registered among emerging economies. But we also document substantial heterogeneity in exchange rate pass-through coefficients across countries. We then estimate exchange rate pass-through to prices of imported goods at the border—or pure traded goods—and use input-output tables to compute the import content of domestic consumption as in Burstein, Eichenbaum, and Rebelo (2005) and Gopinath (2015).[1] We argue that heterogeneity in pass-through rates across countries and over time cannot be explained by differences in the response of import prices or in the composition of consumption baskets, but rather is related to changes in price-setting behavior for domestically produced goods and services.

We then focus on the role of monetary policy credibility—proxied by how well-anchored inflation expectations are—in explaining the

[1]Burstein, Eichenbaum, and Rebelo (2005) show that the usual decomposition of consumer prices into tradable and nontradable components that relies on retail prices can be misleading for pass-through analysis. The reason is that the retail price of tradable goods includes two sizable nontradable components: distribution costs—including wholesale and retail services, marketing, advertising, and local transportation services—and local goods that are produced only for the local market. These components reflect the pricing of locally produced goods and services that are unlikely to be arbitraged in international markets, while prices of imported goods at the border better capture the pricing behavior of "pure" traded goods.

heterogeneity in estimates of exchange rate pass-through to consumer prices. We find that the metrics used in earlier studies to test Taylor's hypothesis, such as the level and volatility of inflation (e.g., Gagnon and Ihrig 2004; Choudhri and Hakura 2006), continue to be related to the degree of exchange rate pass-through to consumer prices in our sample.[2] However, we argue that these proxies may be imperfect measures of monetary policy credibility, since their variation may also capture properties of underlying shocks over which central banks have little control (Devereux and Yetman 2010).

We argue that inflation forecasts offer relevant complementary information. As shown by Svensson (1997), the credibility of monetary policy is a forward-looking concept that should be reflected in the degree to which inflation expectations are anchored (see also Demertzis, Marcellino, and Viegi 2012). We exploit two empirical characteristics of inflation forecasts that are associated with well-anchored inflation expectations (Capistrán and Ramos-Francia 2010; Dovern, Fritsche, and Slacalek 2012; Ehrmann 2015; Kumar et al. 2015): average inflation forecasts should be relatively stable over time, and the dispersion of individual inflation forecasts should be small. All else equal, professional forecasters should tend to agree more on the future path of the price level relative to an economy where there is not enough clarity on the objectives and degree of commitment of the central bank to those objectives.

We estimate pass-through rates from country-specific rolling regressions, and regress these estimates on a set of metrics of monetary performance, including the variability of average inflation forecasts and the extent of disagreement across individual forecasters. We find that monetary regimes where inflation expectations are relatively better anchored exhibit lower exchange rate pass-through to consumer prices. The results are robust to conditioning on the level and volatility of inflation and the exchange rate, the import content of consumption, and time and country fixed effects.

[2]Theoretical work has also argued that as average inflation or inflation volatility increase, firms adjust prices more frequently and this leads to higher exchange rate pass-through to domestic prices (Devereux and Yetman 2010). Bouakez and Rebei (2008) estimate a dynamic general equilibrium model for the Canadian economy and conclude that the decline of consumer price pass-through can be largely attributed to the adoption of inflation targeting.

The rest of the paper is organized as follows. Section 2 presents some conceptual considerations underpinning our empirical analysis. Section 3 presents the empirical approach to estimate exchange rate pass-through to consumer prices, describes our data, and documents the extent of cross-country and time variation in pass-through estimates. Our main contribution is in section 4, where we explore the role of monetary policy performance and credibility in explaining exchange rate pass-through to consumer prices. Section 5 concludes.

2. Exchange Rate Pass-Through and Monetary Policy Credibility: Conceptual Considerations

The main hypothesis to be tested in this paper is that countries whose monetary policy is less credible exhibit a higher degree of exchange rate pass-through to consumer prices. To set the stage for our empirical analysis, we start with a discussion of two aspects that underpin our hypothesis and empirical approach. The first is an argument for why the extent of exchange rate pass-through is linked to monetary policy performance, and specifically to the credibility of monetary policy. The second is a discussion of empirical proxies for the degree of monetary policy credibility. Then we present a simple schematic model to motivate the empirical specification.

2.1 Conceptual Framework

We start from the simple framework presented by Devereux and Yetman (2010), which features nominal rigidities à la Calvo (1983). In their framework, forward-looking firms set their price as a function of the current and expected future exchange rates, such that the persistence of an underlying shock to the exchange rate influences prices. Since the price level is an aggregation of prices set by individual firms, this mechanism creates a link between the exchange rate and inflation.

How does monetary policy affect this link? For a given persistence of the underlying shock, monetary policy has no effect on exchange rate pass-through when the frequency at which firms adjust prices is assumed to be exogenous. Following a shock, tighter monetary policy can dampen the responses of prices and of the exchange rate, but does not affect the pass-through rate. In this setting, however, the pass-through rate does depend on the persistence of the underlying perturbation. Intuitively, the more protracted the shock is, the larger the response of inflation, which leads to a higher pass-through rate in the short run. Differences across countries and over time in the level and the volatility of inflation and the volatility of the exchange rate may thus reflect differences not only in monetary policy performance but also in the time-series properties of the underlying shocks.

However, when Devereux and Yetman (2010) extend the model to allow firms to choose how frequently to set prices, monetary policy can affect the degree of exchange rate pass-through. In this alternative setting, the volatility of inflation and the exchange rate would reflect not only the properties of the underlying shocks but also the influence of monetary policy via its effect on the frequency of price adjustments by firms (Devereux and Yetman 2002).

What does this mean for empirically testing the link between the degree of exchange rate pass-through and monetary policy credibility? It implies that controlling for cross-country differences in average inflation, the volatility of inflation, and the volatility of the exchange rate—as previous empirical studies have done (i.e., Gagnon and Ihrig 2004)—is correct but not sufficient. We go one step further and test the hypothesis by considering the role of monetary policy credibility while controlling for realized inflation and exchange rate volatility.

How can we measure the credibility of monetary policy in practice? Our rationale for using metrics from surveys of inflation expectations is based on Svensson (1997). He argues that the central bank does not have perfect control over inflation, since unexpected shocks hit the economy all the time. Given the lag in the transmission of monetary policy, these shocks will inevitably move inflation temporarily away from the target. Therefore, deviations of inflation from target or inflation volatility do not necessarily reflect the credibility (or lack thereof) of monetary policy, as they include the effect of unexpected shocks. Rather, the credibility of the central bank is given by how well inflation expectations remain anchored at the central bank's policy horizon, given the available information set. In fact, Svensson (1997) states that "the central bank should be held accountable for the forecast deviations from the target rather than the realized inflation deviations . . . Adjusting the instrument so that the inflation forecast equals the target is the best the central bank can do.” Applying Svensson’s criteria literally would mean focusing only on inflation targeters. Instead, we will proxy monetary policy credibility with measures of the stability and coordination of inflation forecasts, which the literature has associated with well-anchored inflation expectations (Capistrán and Ramos-Francia 2010; Dovern, Fritsche, and Slacalek 2012; Ehrmann 2015; Kumar et al. 2015). These measures are strongly correlated with Svensson’s proposed metric in a sample of inflation targeters. We present the empirical strategy based on the above theoretical considerations in the following section.

2.2 Rationale for the Econometric Specification

The domestic price level of any country i reflects an aggregation of prices of tradable ($P_t^{T,i}$) and nontradable ($P_t^{NT,i}$) goods and services. Using, for simplicity, a Cobb-Douglas aggregator with σ denoting the weight of tradable goods and services in the domestic consumption basket, the domestic price level is given by

$$P_t^i = (P_t^{T,i})^\sigma (P_t^{NT,i})^{1-\sigma}, \tag{1}$$

where $P_t^{T,i} = E_t^i P_t^{x,i}, E_t^i$ is the nominal exchange rate expressed as units of domestic currency per U.S. dollar, and $P_t^{x,i}$ denotes the export prices of country i’s trading partners expressed in U.S. dollars. For simplicity, this two-country setting assumes that all tradable consumption is imported.

We further consider that there is a fraction γ of tradable goods in the consumption basket for which importers and exporters are price takers (i.e., international commodities). Denoting natural logarithms with lowercase letters, the price of these commodities, $p_t^{com,i}$, which include oil and food, are determined in global markets and are denominated in U.S. dollars:

$$p_t^{x,i} = \gamma p_t^{com,i} + (1-\gamma)\, p_t^{non-com,i} \tag{2}$$

$$p_t^{com,i} = d_1 oil_t + d_2 food_t. \tag{3}$$

As in Campa and Goldberg (2005), we posit that most export prices are a markup ($mkup_t^x$) over the exporter’s marginal cost (mc_t^x).

Thus, we assume that the export price of noncommodity tradable goods and services is given by

$$p_t^{non-com,i} = mkup_t^x + mc_t^x. \tag{4}$$

We proxy marginal costs of country i's trading partners with producer price indexes, $ppi_t^{x,USD}$ (expressed in U.S. dollars). We posit that markups are sensitive to demand conditions in the destination market, which are proxied by the output gap, gap_t:

$$p_t^{non-com,i} = b_1 gap_t + b_2 ppi_t^{x,USD}. \tag{5}$$

As the producer price index of country x in U.S. dollars, $ppi_t^{x,USD}$, is a function of the producer price index in country x's domestic currency and its bilateral exchange rate with respect to the U.S. dollar, e_t^x, the export price of noncommodity tradable goods and services can be expressed as

$$p_t^{non-com,i} = b_1 gap_t - b_2 e_t^x + b_2 ppi_t^{x,LC}. \tag{6}$$

Finally, we assume that domestic prices of nontradable goods are a markup over domestic marginal costs, mc_t^i, which are themselves a function of domestic demand conditions, gap_t:

$$p_t^{NT,i} = mkup_t^i + mc_t^i = a_1 gap_t. \tag{7}$$

Thus, the domestic price level (equation (1)) expressed in natural logarithms becomes

$$\begin{aligned} p_t^i = (1-\sigma)\, p_t^{NT,i} + \sigma \Big[\gamma \left(e_t^i + p_t^{comm,i} \right) \\ + (1-\gamma) \left(e_t^i + p_t^{non-com,i} \right) \Big]. \end{aligned} \tag{8}$$

Substituting for $p_t^{NT,i}$, $p_t^{comm,i}$, and $p_t^{non-com,i}$ using equations (3), (6), and (7) into (8) gives

$$\begin{aligned} p_t^i = (1-\sigma)\, a_1 gap_t + \sigma\gamma \left(e_t^i + d_1 oil_t + d_2 food_t \right) \\ + \sigma (1-\gamma) \left(e_t^i + b_1 gap_t - b_2 e_t^x + b_2 ppi_t^{x,LC} \right). \end{aligned}$$

Rearranging terms yields

$$p_t^i = \sigma e_t^i - [\sigma (1-\gamma) b_2] e_t^x + (\sigma\gamma d_1)\, oil_t + (\sigma\gamma d_2)\, food_t \\ + [\sigma (1-\gamma) b_2]\, ppi_t^{x,LC} \\ + [(1-\sigma) a_1 + \sigma (1-\gamma) b_1]\, gap_t, \tag{9}$$

which can be simplified to the following expression:

$$p_t^i = \beta_1 e_t^i - \beta_2 e_t^x + \rho oil_t + \delta food_t + \varphi ppi_t^{x,LC} + \vartheta gap_t. \tag{10}$$

3. Exchange Rates and Consumer Prices: Empirical Strategy

We begin our empirical analysis with an estimation of the overall impact of a currency movement on consumer prices in a sample of 32 advanced and 30 emerging market economies using data from January 1995 to June 2019. The reduced-form specification is a variant of standard empirical models (Campa and Goldberg 2005; Gopinath 2015), along the lines described in the previous section (equation (10)) when generalized to N trading partners. We estimate cumulative response functions in country-specific and panel settings using Jordà's (2005) local projection method.

In line with the above model, the panel specification is given by

$$p_{i,t+h-1} - p_{i,t-1} = \alpha^h + \sum_{j=0}^{J} (\beta_j^h \Delta neer_{i,t-j} + \gamma_j^h \Delta oil_{i,t-j} \\ + \delta_j^h \Delta food_{i,t-j} + \vartheta_j^h gap_{i,t-j} + \varphi_j^h \Delta mPPI_{i,t-j}) \\ + \sum_{j=1}^{J} \rho_j^h \Delta p_{i,t-j} + \mu_i^h + \varepsilon_{i,t}^h, \tag{11}$$

where $p_{i,t}$ denotes the natural logarithm of the price level in country i during period t (such that the dependent variable measures cumulative inflation between $t-1$ and $t+h$); *neer* is the natural logarithm of the import-weighted nominal effective exchange rate, as in Gopinath (2015) (see below for details); *oil* and *food* are the natural logarithm of international oil and food prices in U.S. dollars; *gap*, is the output gap, proxied by the cyclical component of industrial production;

and $mPPI$ is the natural logarithm of the import-weighted producer price index of countries from which country i imports, which proxies for the cost of production in trading partners (see below for details). The Δ operator denotes a first difference; μ_i are country fixed effects; and $\varepsilon_{i,t}$ is a random disturbance.

We include six lags in our specification, which is estimated by ordinary least squares using data at monthly frequency. It is worth noting, however, that there is considerable uncertainty surrounding the timing of the inflationary effects from depreciation, due to differences in microstructures across sectors and countries, including different degrees and nature of nominal rigidities. This can be reflected in nonlinear responses of consumer prices to depreciations or in different lag structures across countries. Since we conduct panel and country-specific regressions, and for simplicity use the same specification, a flexible estimation method that is robust to misspecification is desirable. Thus, the choice of using Jordà's (2005) local projections method—rather than a vector autoregressive model, for instance—follows primarily from this objective.[3]

Since we have defined the dependent variable in our regression equation (11) in cumulative terms, the estimate of β_0^h is the cumulative impact of an innovation in the nominal effective exchange rate on the consumer price index.[4] We do not take a stand on the underlying source of variation in the exchange rate. Therefore, the responses we report should be interpreted as conditional on the average constellation of shocks that moved the exchange rate during the sample period. Identification of the structural shock behind the currency depreciation is critical for questions related to the optimal policy response to the shock (e.g., Albagli, Naudon, and Vergara 2015; Forbes, Hjortsoe, and Nenova 2018). Our focus, instead, is on the role of monetary policy credibility in explaining cross-country and time differences in average pass-through coefficients.

[3] Jordà (2005) and Teulings and Zubanov (2014) present Monte Carlo simulations showing that the local projections method is more robust to misspecification than autoregressive models.

[4] We follow Jordà's (2005) suggestion and include the residual from the estimation corresponding to horizon $h-1$ as an additional regressor in the estimation for horizon h to improve the efficiency of the estimator. Adding the residual from the regression for horizon $h-1$ also addresses a potential bias identified in Teulings and Zubanov (2014).

Table 1. Economies in Sample

Emerging		Advanced	
Argentina	Malaysia	Australia	Korea
Bolivia	Mexico	Austria	Latvia
Brazil	Pakistan	Belgium	Lithuania
Bulgaria	Panama	Canada	Luxembourg
Chile	Paraguay	Czech Republic	New Zealand
China	Peru	Denmark	Norway
Colombia	Philippines	Estonia	Portugal
Costa Rica	Poland	Finland	Singapore
Ecuador	Romania	France	Slovak Republic
El Salvador	Russia	Germany	Slovenia
Guatemala	South Africa	Greece	Spain
Honduras	Thailand	Hong Kong S.A.R.	Sweden
Hungary	Turkey	Ireland	Switzerland
India	Ukraine	Israel	The Netherlands
Indonesia	Uruguay	Italy	United Kingdom
		Japan	United States

3.1 Data Description

Tables 1 and 2 report the sample coverage and summary statistics, respectively. The dependent variable in most of the analysis corresponds to the headline consumer price index, as reported in the International Monetary Fund's (IMF's) International Financial Statistics and by Haver Analytics.[5] In estimations of pass-through at the border, the dependent variable is import prices expressed in local currency.[6]

[5]The sample for Argentina uses data from January 1995 to December 2010, before a gap between the official and the parallel exchange rate emerged. Consumer price index (CPI) data after December 2006 corresponds to private analysts' estimates.

[6]Import price series are less widely available than consumer price indexes, and their comparability across countries and over time is fraught with difficulties due to important methodological differences (Burstein and Gopinath 2014). Moreover, commonly used data sources do not always indicate the currency of denomination requiring careful inspection and manipulation. The sample of countries with available import price data, the data sources, and the currency in which the original data is reported are documented in table A.1 in the appendix.

Table 2. Summary Statistics: January 1995–June 2017

Variables	Emerging Economies				Advanced Economies			
	N	Mean	Std. Dev.	Quartiles	N	Mean	Std. Dev.	Quartiles
$\Delta p_{i,t}$	8,075	0.7	2.0	$(0.1, 0.9)$	8,616	0.2	0.5	$(-0.1, 0.4)$
$\Delta NEER_{i,t}$	8,052	0.3	3.4	$(-0.8, 0.9)$	8,568	–0.1	1.4	$(-0.7, 0.5)$
$gap_{i,t}$	7,557	0.1	4.5	$(-1.9, 2.1)$	8,587	0.0	4.4	$(-2.0, 2.2)$
$\Delta mPPI_{i,t}$	8,052	0.3	0.6	$(0.0, 0.5)$	8,568	0.2	0.5	$(-0.0, 0.5)$

Source: Authors' calculations.

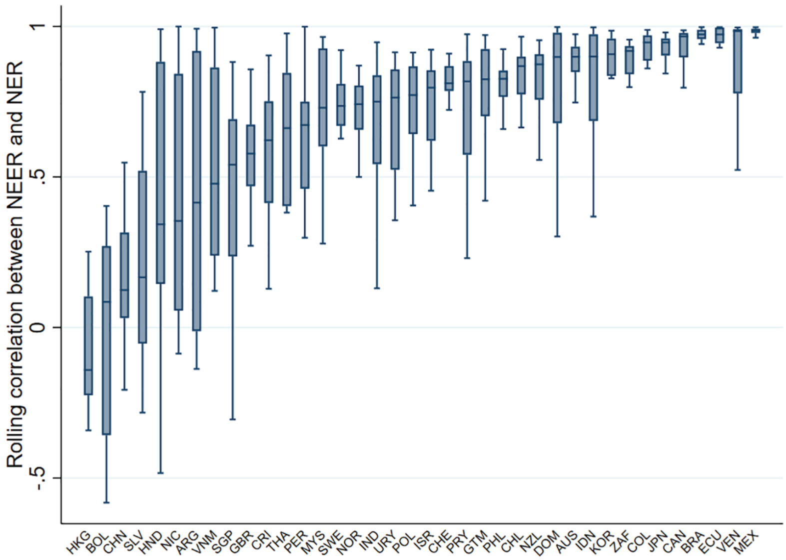
International oil and food prices correspond to composite indexes in U.S. dollars reported in the IMF's *World Economic Outlook*. The output gap is approximated by the cyclical component of industrial production when available, and to an interpolated quarterly GDP (gross domestic product) series otherwise. The cyclical component of industrial production is computed using a Hodrick-Prescott (HP) filter with smoothing coefficient equal to 129,600 on monthly data. We mitigate the endpoint bias in our filter because the estimations include data for control variables through June 2017, despite the data set extending to June 2019.[7]

We estimate the pass-through from changes in the nominal effective exchange rate (*neer*), rather than the bilateral exchange rate against the U.S. dollar. As argued by Caselli and Roitman (2019), the *neer* summarizes more closely the complete set of relative price adjustments that can be expected to affect the consumer price index. This choice is not innocuous, since bilateral exchange rate dynamics often diverge significantly from those of the nominal effective exchange rate, and their degree of co-movement varies a great deal over time and across countries. Figure 1 shows the distribution of country-specific pairwise correlations between monthly changes in the nominal effective exchange rate and the bilateral exchange rate against the U.S. dollar over three-year rolling windows starting in 1993. These correlations have frequently been far from unity in several economies, with the median correlation being smaller than 0.5 in many cases.

Following Gopinath (2015), the multilateral nominal effective exchange rate ($neer_{i,t}$) is constructed as a weighted average of the bilateral exchange rate of each trading partner vis-à-vis the U.S. dollar, weighted by their import shares. This approach is more appropriate than using total trade as weights, as it better captures the impact of a currency depreciation on domestic prices, since the composition of exports by destination can differ substantially from the composition of imports by origin. More precisely, the monthly percentage change for country i at time t is given by

[7]This is done to ensure that estimations at all horizons up to 24 months reflect the same underlying data.

Figure 1. Correlation between Bilateral and Multilateral Nominal Effective Exchange Rates



Sources: Bloomberg, L.P.; Haver Analytics; and authors' calculations.
Notes: The figure shows the distribution of rolling correlations between the multilateral nominal effective exchange rate (NEER) and the bilateral exchange rate against the U.S. dollar (NER) for each country over three-year rolling windows starting in 1993. The rectangles and the central marker denote the interquartile range and the median of its distribution, respectively.

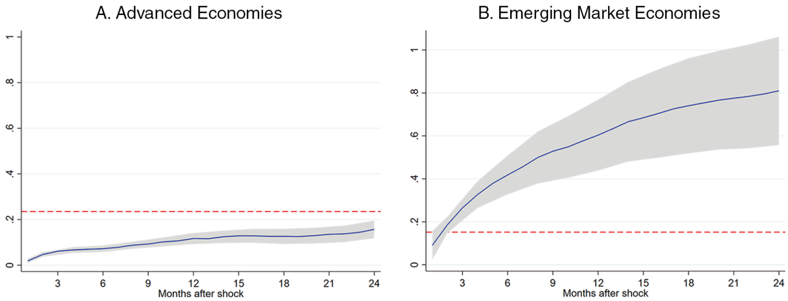
$$\Delta neer_{i,t} = \sum_{j=1}^{J} \omega_{ij,t} \left(\Delta e_{i,t} - \Delta e_{j,t}\right), \quad i \neq j, \tag{12}$$

where $e_{i,t}$ is the natural logarithm of country i's bilateral exchange rate (in local currency per U.S. dollar); Δ is the first-difference operator; and $\omega_{ij,t}$ is the share of exports from country j to country i in country i's total imports, as reported in the IMF's Direction of Trade Statistics. Weights have been lagged one year and are measured at annual frequency.

Using the same import weights $\omega_{ij,t}$, the monthly change in the cost of production in country i's import partners is proxied by

$$\Delta mPPI_{i,t} = \sum_{j=1}^{J} \omega_{ij,t} \Delta PPI_{j,t}, \quad i \neq j, \tag{13}$$

Figure 2. Cumulative Impulse Response of Consumer Prices Following a Nominal Effective Depreciation of 1 Percent (in percentage points)



Notes: Cumulative impulse response of headline consumer prices (in percentage points) to a 1 percent innovation in the nominal effective exchange rate estimated using local projection methods. Shaded bands correspond to 95 percent confidence intervals. Dashed lines denote the share of household final consumption that is imported (including direct imports and the import content of domestically produced goods) averaged over the sample period and across countries in each group.

where $PPI_{j,t}$ is the natural logarithm of country j's producer price index.

3.2 Estimation Results

Figure 2 reports the cumulative impulse responses of headline consumer prices to a 1 percent innovation in the nominal effective exchange rate and the corresponding 95 percent confidence bands, under the baseline sample that uses data from January 1995 to June 2019. We start by reporting panel estimates with countries pooled according to their income-based designation of advanced versus emerging market economies. We focus our discussion on pass-through coefficients corresponding to the cumulative percentage increase in the headline CPI one and two years after each percentage-point increase in the nominal effective exchange rate. There are important differences between estimates when countries are pooled by income group. In line with earlier studies (e.g., Choudhri and Hakura 2006), we find that the pass-through rate is lower for advanced economies than for emerging markets, with the cumulative impact after two years reaching 0.16 for the former and 0.81 for the latter (table 3).

A first step to shed light on the difference in pass-through rates to consumer prices among countries is to explore whether there are also important differences in the response of prices of imported goods at the border—which can be interpreted as the response of pure traded goods.[8] Under perfectly competitive markets, it is generally the case that the exchange rate pass-through to import prices is complete. However, empirical studies have documented evidence of incomplete pass-through to import prices (e.g., Campa and Goldberg 2005 and Gopinath 2015), and many mechanisms have been proposed to support this possibility. For instance, under imperfect competition, market power allows exporting firms to "price to market" by adjusting their profit margins in response to the wealth and substitution effects triggered by the currency movement. Alternatively, firms may choose the currency of invoicing to minimize costs incurred from price adjustment.[9]

Figure 3 shows the pooled estimates of pass-through to import prices for advanced economies and emerging markets. A key observation is that pass-through to import prices is close to complete both in advanced and emerging markets, though slightly higher for emerging markets.[10]

The higher pass-through rate to consumer prices in emerging markets despite a more similar response of import prices could reflect differences in their consumption baskets. In particular, there may be differences in the import content in households' consumption between the two country groups. We use data from the Eora multi-region input-output tables (Lenzen et al. 2012, 2013) and compute

[8]The literature has documented that the prices of locally produced goods and services and those of purely traded goods (e.g., import prices at the border) respond differently following a change in the exchange rate (Burstein, Eichenbaum, and Rebelo 2005).

[9]Devereux, Engel, and Storgaard (2004) argue that agents will choose to price their goods in the currency that most reliably holds its value. Accordingly, delivering price stability could lead to an endogenous fall in the pass-through of the exchange rate to import prices.

[10]This finding is supported by results from individual economy regressions similar to equation (2) not reported here but available upon request.

Table 3. Local Projections Panel Estimation Results (1995–2019)

Horizon	NEER	P_oil	P_food	Output Gap	mPPI	Residual_{h–1}	N	Countries	R^2 (within)
A. Exchange Rate Pass-Through to Consumer Prices									
Advanced Economies									
6	0.07*** (0.007)	0.01*** (0.003)	0.06*** (0.009)	0.02*** (0.004)	0.39*** (0.07)	1.02*** (0.05)	8,410	32	0.62
12	0.12*** (0.012)	0.02*** (0.04)	0.06*** (0.014)	0.03*** (0.01)	0.5*** (0.09)	1.02*** (0.059)	8,398	32	0.65
18	0.13*** (0.017)	0.02*** (0.007)	0.08*** (0.016)	0.03*** (0.01)	0.529*** (0.12)	1*** (0.07)	8,386	32	0.61
24	0.16*** (0.02)	0.03*** (0.007)	0.06*** (0.018)	0.03** (0.01)	0.65*** (0.15)	1.01*** (0.07)	8,374	32	0.61
Emerging Economies									
6	0.42*** (0.05)	0 (0.009)	0.04** (0.02)	0.01 (0.019)	1.01*** (0.13)	1.13*** (0.09)	7,376	30	0.76
12	0.6*** (0.08)	0.01 (0.01)	0.04 (0.03)	0.09** (0.041)	1.44*** (0.29)	1.07*** (0.09)	7,376	30	0.75
18	0.74*** (0.113)	0.02 (0.02)	0.03 (0.04)	0.16** (0.06)	1.5*** (0.41)	1.05*** (0.1)	7,376	30	0.71
24	0.81*** (0.129)	0.03 (0.03)	0.02 (0.046)	0.23*** (0.08)	1.94*** (0.54)	1.03*** (0.12)	7,341	30	0.71

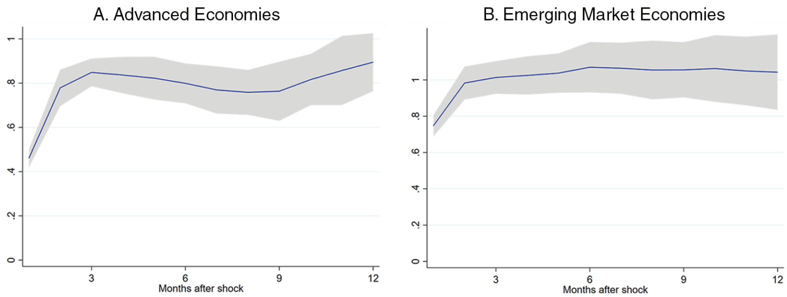
(*continued*)

Table 3. (Continued)

Horizon	NEER	P_oil	P_food	Output Gap	mPPI	Residual_{h–1}	N	Countries	R^2 (within)
B. Exchange Rate Pass-Through to Import Prices									
Advanced Economies									
6	0.8***	0.04***	0.23***	0.05***	1.89***	1.05***	6,283	28	0.61
	(0.05)	(0.01)	(0.05)	(0.02)	(0.23)	(0.08)			
12	0.89***	0.1***	0.03	0.02	1.29***	1.03***	6,277	28	0.58
	(0.07)	(0.02)	(0.05)	(0.03)	(0.33)	(0.06)			
18	0.71***	0.09***	0.2***	−0.06**	0.75*	1.01***	6,271	28	0.56
	(0.07)	(0.02)	(0.04)	(0.03)	(0.39)	(0.06)			
24	0.74***	0.04**	0.17***	−0.12***	2.24***	1.01***	6,257	28	0.56
	(0.08)	(0.02)	(0.04)	(0.03)	(0.47)	(0.07)			
Emerging Economies									
6	1.07***	0.03*	0.01	0.07	2.62***	1.08***	3,163	15	0.57
	(0.071)	(0.02)	(0.04)	(0.05)	(0.41)	(0.07)			
12	1.04***	0.01	0.03	0.2***	3.42***	1.03***	3,145	15	0.54
	(0.106)	(0.03)	(0.06)	(0.07)	(0.77)	(0.06)			
18	1.13***	0.03	0.01	0.22***	1.97**	1.02***	3,127	15	0.53
	(0.092)	(0.03)	(0.06)	(0.08)	(0.91)	(0.07)			
24	1.3***	0.06	−0.01	0.26***	2.49**	1.03***	3,109	15	0.54
	(0.117)	(0.04)	(0.08)	(0.1)	(0.99)	(0.07)			

Source: Authors' calculations.
Notes: The table shows estimation results based on equation (11) but, for brevity, the coefficients on the additional lags of the dependent variable and regressors are omitted. The results are available upon request.

Figure 3. Cumulative Impulse Response of Import Prices Following a Nominal Effective Depreciation of 1 Percent (in percentage points)



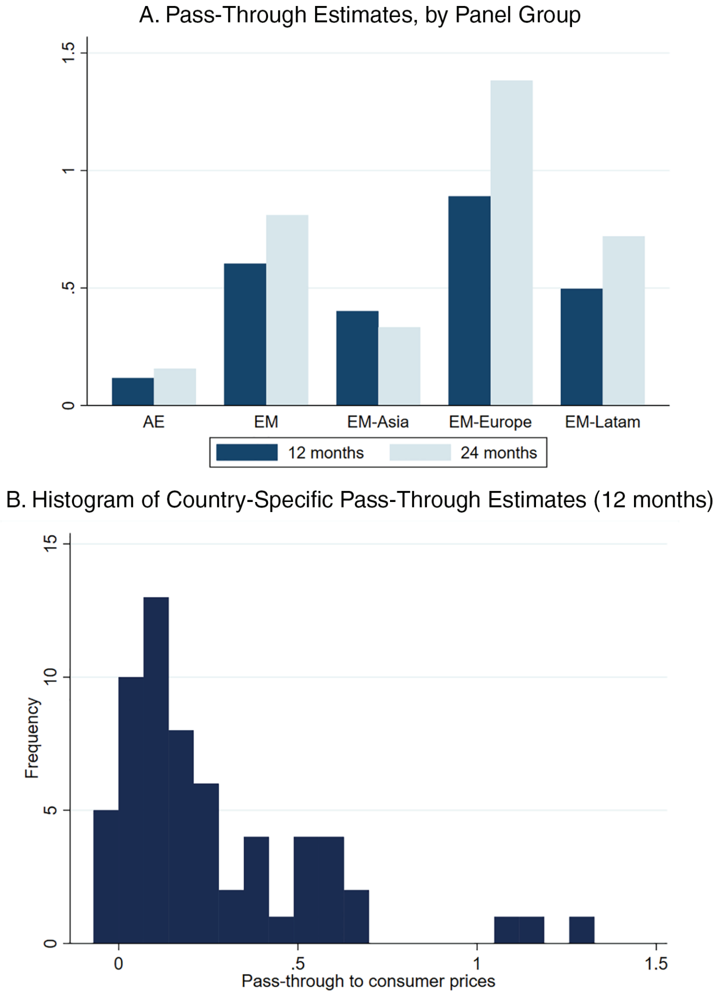
Notes: Cumulative impulse response of import prices in local currency (in percentage points) to a 1 percent innovation in the nominal effective exchange rate estimated using local projection methods. Shaded bands correspond to 95 percent confidence intervals.

the import content of final consumption as in Gopinath (2015).[11] The horizontal dashed lines in figure 2 show that the import content of consumption is larger in advanced economies; therefore, it cannot explain a higher pass-through rate in emerging markets. Hence, the explanation for the latter result must lie within the price-setting behavior for domestically produced goods and services (including the distribution and retail margins on imported goods).

Before turning to what may explain such differences in pass-through rates to consumer prices, we explore the extent of heterogeneity across income groups, individual countries, and over time. In figure 4, panel A reports exchange rate pass-through estimates for emerging market economies by region, including Asia, Europe, and Latin America, and for advanced economies as a reference. We

[11]The import content of households' consumptions is constructed as the sum of two components: (i) a *direct* component that corresponds to imports of final consumption goods, and (ii) an *indirect* component that accounts for the value of imported inputs used in the production of domestic goods absorbed by local households (computed as the product of the value of output in each domestic sector that is absorbed by resident households and the share of imported inputs in that sector's output value).

Figure 4. Exchange Rate Pass-Through to Consumer Prices, Cross-Country Heterogeneity



Sources: Authors' calculations.
Notes: Cumulative response of headline consumer prices (in percentage points) to a 1 percent innovation in the nominal effective exchange rate after one and two years. AE = advanced economies. EM = emerging market economies.

estimate impulse response functions using equation (11) separately for each panel of these country groups. There is regional variation across emerging markets, with the pass-through rate after one year being lower in Asia (0.4) and Latin America (0.5) than in Eastern Europe (0.9). There are also differences in the speed of adjustment of consumer prices, with notably strong marginal effects in the second year among emerging markets in Eastern Europe.

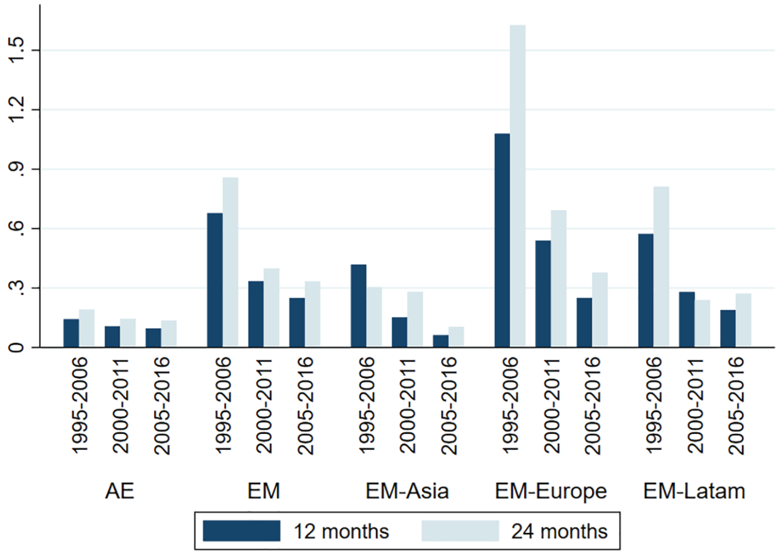
To explore the heterogeneity in pass-through rates across individual economies, we estimate country-specific versions of equation (11) over the same baseline sample period (1995–2019):

$$p_{t+h-1} - p_{t-1} = \alpha^h + \sum_{j=0}^{J} (\beta_j^h \Delta neer_{t-j} + \gamma_j^h \Delta oil_{t-j} + \delta_j^h \Delta food_{t-j} + \vartheta_j^h gap_{t-j} + \varphi_j^h \Delta mPPI_{t-j}) + \sum_{j=1}^{J} \rho_j^h \Delta p_{t-j} + \varepsilon_t^h. \quad (14)$$

Figure 4, panel B, reports the histogram of the estimated one-year cumulative exchange rate pass-through to consumer prices for the economies in our sample. In line with the literature, we find substantial heterogeneity in the magnitude of the estimated exchange rate pass-through coefficients across countries: point estimates at a one-year horizon range from negative (although not statistically significant) to larger than unity for a handful of emerging economies.

To put our results in context, in their extensive review of the literature, Goldberg and Knetter (1997) have documented an exchange rate pass-through to import prices around 0.6 for advanced economies with flexible exchange rate regimes, and somewhat lower for the United States. Campa and Goldberg (2005) find that exchange rate pass-through to aggregate import prices averages close to 0.5 in the short run and about 0.64 in the long run, also focusing on advanced economies—with a wide range of variation from 0.16 (Ireland) to 0.79 (Netherlands). Disaggregating across goods, they find a pass-through to import prices ranging from 0.62 in the manufacturing sector to 0.85 for raw materials. For nonmanufactured goods, the pass-through is 0.78. Our results are somewhat higher. For advanced economies, our estimates of exchange rate

Figure 5. Exchange Rate Pass-Through Coefficients over Time



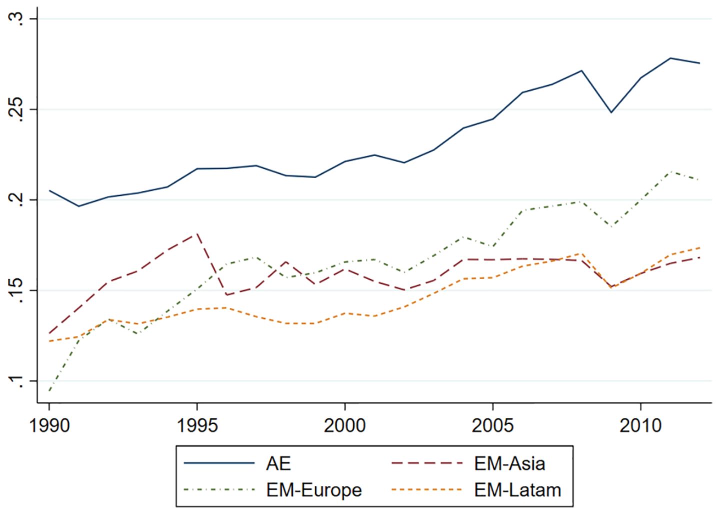
Sources: Authors' calculations.
Notes: Cumulative response of headline consumer prices (in percentage points) to a 1 percent innovation in the nominal effective exchange rate after one and two years. AE = advanced economies. EM = emerging market economies.

pass-through to import prices are about 0.5 on impact, but rise to around 0.8 in the medium term.

Unlike Goldberg and Knetter (1997) and Campa and Goldberg (2005), we also provide estimates of exchange rate pass-through to import prices for emerging markets. We find that pass-through to import prices in these countries is higher, starting around 0.75 on impact and rising above 1.0 in the medium term. Although our point estimates for advanced economies are slightly higher than the other papers mentioned, our sample of countries and the time period of estimation differ substantially. We consider our results to be in line with the literature, in the sense that previous estimates lie within the confidence intervals of our estimations at most horizons.

We finally explore whether there is evidence of declining exchange rate pass-through over time by running panel regressions in three subsamples of 12 years starting in 1995, 2000,

Figure 6. Import Content of Private Consumption (percent of total household consumption)



Sources: Eora MRIO; and authors' calculations.

and 2005. Figure 5 reports the results for the one- and two-year cumulative exchange rate pass-through to consumer prices of a 1 percent innovation in the nominal effective exchange rate. Consistent with other studies (e.g., Choudhri and Hakura 2006), we find that the exchange rate pass-through to consumer prices has systematically decreased in all country groups over the past two decades. This has been the case in both advanced and emerging economies, though the decline has been more pronounced among the latter. It is also true across regions, with important reductions in pass-through rates for emerging Asia, Europe, and Latin America. In Latin America, for example, the average pass-through rate over 2005–16 had fallen to one-third of its 1995–2006 level.

Note that the differences in pass-through rates over time do not seem related to changes in the share of imports in final consumption. Figure 6 shows that the import content of consumption expenditure has steadily increased in these economies over the past 20 years.

4. Exchange Rate Pass-Through and Monetary Policy Credibility

In the previous sections, we documented a substantial amount of cross-country and time variation in exchange rate pass-through coefficients which does not appear related to differences in the response of prices at the border or to differences in the share of imports in final consumption expenditure. In this section, we explore the role of monetary policy credibility in determining exchange rate pass-through coefficients. The conceptual support for the following estimations has been presented in section 2.

Previous studies have shown that a lower level and volatility of inflation are associated with lower exchange rate pass-through (Gagnon and Ihrig 2004; Choudhri and Hakura 2006). As discussed in section 2, these metrics may reflect increased performance of monetary policy but could also capture the variability in the time-series properties of the underlying shocks. The specific hypothesis we test here is whether a more credible monetary framework, as captured by more stable and better-coordinated inflation expectations, can lead to a reduction in exchange rate pass-through to consumer prices, in the spirit of Svensson (1997) and Taylor (2000).

To test this hypothesis, methodologically, we follow a two-stage procedure along the lines of Campa and Goldberg (2005). In a first stage, we gather our time-varying estimates of exchange rate pass-through for each economy, generated by estimating equation (14) in rolling 12-year windows starting in January of each year since 1995. In a second stage, we explore whether these estimates are related to proxies of monetary policy performance. To this end, we regress $\hat{\beta}^{12}_{0,i,\tau}$ on two alternative metrics for monetary policy credibility (**Cred**) and a set of control variables (X), measured as the average for the corresponding window τ and country i:[12]

$$\hat{\beta}^{12}_{0,i,\tau} = \gamma \mathbf{Cred}_{i,\tau} + \theta \boldsymbol{X}_{i,\tau} + \delta_i + \varsigma_\tau + \varepsilon_{i,\tau}. \tag{15}$$

[12]We use the inverse of the variance of the estimated pass-through coefficient as weights to give more weight to those coefficients estimated more precisely in the first-stage regressions. We restrict the sample to those countries that have data for all variables in $X_{i,\tau}$.

The vector $\boldsymbol{X}$ includes average inflation ($\bar{\pi}$), inflation volatility ($\sigma(\pi)$), average depreciation ($\overline{\Delta neer}$), and exchange rate volatility ($\sigma(neer)$). Beyond these factors, there are likely to be many others that affect the degree of exchange rate pass-through, including structural characteristics of local markets, such as the degree of competition among importers and domestic producers, and common external factors. Their exclusion from the specification could give rise to omitted-variable bias if these factors are correlated with monetary policy performance. To address these concerns, we include country fixed effects (δ_i) and time fixed effects (ς_τ) in all specifications.[13]

Table 4 reports the estimation results for the determinants of cumulative pass-through rates to consumer prices after 12 months. Columns 1–4 show the role of the level and volatility of key nominal variables when these are introduced sequentially. Standard measures of price stability such as the mean and standard deviation of the inflation rate are positively related to our estimates of exchange rate pass-through, in line with the findings of Gagnon and Ihrig (2004) and Choudhri and Hakura (2006). The coefficients are statistically significant and economically important: a 1 percentage point increase in the mean rate of inflation is associated with a pass-through coefficient that is higher by 0.42. Following Campa and Goldberg (2005), we also consider the average rate of depreciation and standard deviation of the multilateral exchange rate, finding that both are associated with higher exchange rate pass-through.

As noted in section 2, variables such as the average depreciation, inflation, and the volatility of inflation and the exchange rate may be affected by monetary policy but may also reflect cross-country and time differences in the time-series properties of the underlying shocks that triggered the depreciation. Therefore, we do not interpret the statistical significance of these variables as sufficient evidence of the role of monetary policy credibility in explaining exchange rate pass-through coefficients. Instead, we focus on the extent of inflation expectations' anchoring as a proxy for credibility. Better-anchored inflation expectations could make firms less likely to

[13]Given the dimensionality of the data, the within-group estimator is quite conservative: country fixed effects account for a large share of overall variation in the data, as there are only nine estimation windows for each country in the sample and these windows overlap substantially.

Table 4. Determinants of Exchange Rate Pass-Through

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Mean Inflation	0.42***						0.15	0.19*
	(0.05)						(0.11)	(0.11)
Inflation Volatility		0.26***					−0.01	0.00
		(0.03)					(0.06)	(0.06)
Mean Depreciation			0.17***				0.05	0.04
			(0.03)				(0.03)	(0.03)
Volatility of Exchange Rate				0.00***			0.00	0.00
				(0.00)			(0.00)	(0.00)
Volatility of Near-Term					0.03***		0.01	0.00
Inflation Forecasts					(0.00)		(0.01)	(0.01)
Log of Mean Disagreement						0.18***	0.09***	0.09***
						(0.02)	(0.03)	(0.03)
Import Share of Consumption								1.05***
								(0.38)
Constant	0.05	0.04	0.15***	0.09**	0.11***	0.35***	0.21***	0.13**
	(0.04)	(0.04)	(0.04)	(0.04)	(0.03)	(0.04)	(0.06)	(0.06)
Observations	318	318	318	318	318	318	318	318
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Countries	40	40	40	40	40	40	40	40
Time Windows	11	11	11	11	11	11	11	11
Adjusted R^2	0.780	0.782	0.766	0.742	0.788	0.794	0.806	0.811

Source: Authors' calculations.

Notes: The dependent variable is the estimate of exchange rate pass-through to consumer prices for each country i and window τ at a 12-month horizon. The regressions are estimated by weighted least squares, with observations weighted by the inverse variance of the country-specific exchange rate pass-through estimates. Standard errors are in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

pass along movements in the exchange rate to domestic consumers—as is the case in the model of Devereux and Yetman (2010) as firms choose to update prices less frequently.

We measure inflation expectations with inflation forecasts of individual professional forecasters that are compiled monthly by Consensus Economics and are available for 40 countries in our sample. These forecasts are published as fixed-event forecasts for inflation in the current and upcoming calendar year. Since uncertainty about fixed-event forecasts decreases over the calendar year as the forecast horizon shrinks, we follow the common approach of combining these forecasts linearly into a synthetic 12-month fixed horizon.[14] The one-year-ahead synthetic fixed-horizon forecast is constructed as the weighted average of the forecasts for the current ($\hat{X}_{t+k|t}$) and next calendar year ($\hat{X}_{t+12+k|t}$), with weights that vary according to the date the forecast was produced:

$$\tilde{\hat{X}}_{t+12|t} = \frac{k}{12}\hat{X}_{t+k|t} + \frac{12-k}{12}\hat{X}_{t+12+k|t}, \tag{16}$$

where k is the months remaining in the year at the time the forecast was produced ($k \epsilon \{1, 2, \ldots, 12\}$) at period t.

Kumar et al. (2015) argue that if inflation expectations are well anchored, inflation forecasts by individual forecasters—and hence average forecasts—should be relatively stable over time. As a first anchoring measure, we consider the variability over time of the average inflation forecast at a synthetic 12-month horizon.[15] We find that, indeed, where forecasts of inflation are more volatile, exchange rate pass-through coefficients are significantly higher (column 5).

If the monetary framework is credible and inflation expectations are well anchored, the dispersion of individual inflation forecasts should also be small (Kumar et al. 2015). Dovern, Fritsche, and Slacalek (2012) propose that lower disagreement among professional forecasters of inflation reflects greater credibility of monetary policy,

[14]See, for instance, Mankiw, Reis, and Wolfers (2004) and Dovern, Fritsche, and Slacalek (2012).

[15]The variability of the average inflation forecast for country i and window τ is given by $\sqrt{\frac{1}{T-1}\sum_{t=1}^{T}\left(\pi_t^e - \overline{\pi^e}\right)^2}$ for $t \in \tau$, where π_t^e is the average (across forecasters) synthetic 12-month-ahead inflation forecast at time t and $\overline{\pi^e}$ denotes its average over all time t within τ.

and they find that it is related to measures of central bank independence among G-7 economies.[16] Relatedly, Capistrán and Ramos-Francia (2010) find that the adoption of inflation targeting reduces the degree of forecast disagreement among developing economies. They argue that this result reflects a more predictable monetary policy that is able to better coordinate expectations.

Following this literature, we measure disagreement as the standard deviation of inflation forecasts of individual professional forecasters at the synthetic 12-month fixed horizon. The results in table 4, column 6, show a strong and significant positive relationship between the log of mean disagreement and exchange rate pass-through coefficients, suggesting that better-anchored inflation expectations make firms less likely to pass along movements in the exchange rate to domestic prices.[17]

While a predictable and credible monetary policy should lead to closer coordination among forecasters regarding the future path for inflation, a valid concern is that the inverse is not necessarily true: agents could agree that the central bank will miss its target, such that there is low disagreement but also a lack of credibility. Promisingly, figure 7 shows a strong correlation between forecast disagreement and the average (squared) deviation of inflation from central bank targets.[18]

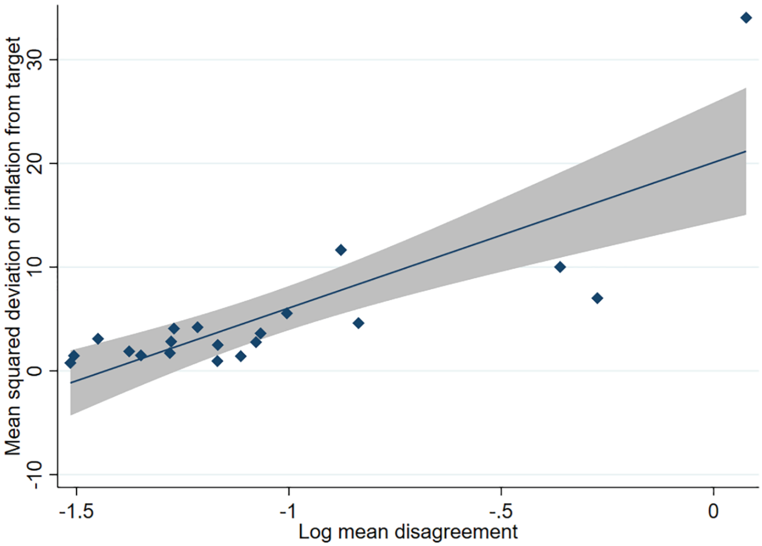
The alternative measures of monetary performance considered are correlated among themselves, since they capture related aspects of price stability. For instance, Mankiw, Reis, and Wolfers (2004) and Capistrán and Ramos-Francia (2010) document that forecast disagreement is increasing in the level of inflation. In column 7, we

[16]Disagreement among forecasters also captures factors besides monetary policy performance. The variability of shocks affecting the economy is also expected to increase disagreement among forecasters. However, Dovern, Fritsche, and Slacalek (2012) show that the relationship between disagreement and central bank independence is robust to controlling for macroeconomic volatility.

[17]The log of mean disagreement for country i in window τ is defined as the natural logarithm of $\frac{1}{T}\sum_{t=1}^{T}\left(\sqrt{\frac{1}{J-1}\sum_{j=1}^{J}\left(\pi_{j,t}^{e}-\pi_{t}^{e}\right)^{2}}\right)$ for $t \in \tau$, where $\pi_{j,t}^{e}$ denotes the synthetic 12-month-ahead inflation forecast of agent j at time t and π_t^e is the average across forecasters.

[18]Since only inflation-targeting central banks announce explicit targets for inflation, the sample used for figure 7 shrinks considerably.

Figure 7. Disagreement among Professional Forecasters of Inflation and Mean Deviation of Inflation from Target



Source: Authors' calculations.
Notes: The vertical axis shows mean squared deviations of inflation from inflation targets over 2000–19. The horizontal axis shows log mean disagreement among professional forecasters of inflation over the same sample. They gray area denotes a 95 percent confidence interval.

include all explanatory variables in the same specification. Interestingly, disagreement seems to act as a good summary measure for the role of price stability in the determination of pass-through. Conditional on the first and second moment of nominal variables, lower forecast disagreement remains associated with smaller exchange rate pass-through to consumer prices.[19] The coefficient on disagreement also remains economically meaningful: a decline in disagreement from the top to the bottom of the interquartile range would be associated with a decline in the pass-through rate of about 0.06—which is

[19]The inclusion of the volatility of actual and expected inflation in the specifications further mitigates reverse causality concerns, since difficulties with forecasting inflation would likely be associated with higher actual and expected inflation.

almost one-third of the average cumulative pass-through rate in the sample after 12 months. By including the variability of inflation and the exchange rate, we indirectly control for a variety of factors that determine these outcomes, which may include, for example, foreign exchange interventions by the central bank. As such, our findings stress that it is the credibility of the central bank that lowers the extent of exchange rate pass-through.

As discussed in section 3, a varying degree of exchange rate pass-through could also reflect changes in the composition of the consumption basket. Yet, after controlling for the import content of households' consumption, the results in column 8 show that the exchange rate pass-through remains positively related to the degree of forecast disagreement, with a coefficient that remains large and statistically significant.[20]

5. Concluding Remarks

We revisit a long-standing question in macroeconomics on the determinants of the response of consumer prices to currency depreciations. Using data for a broad sample of 62 emerging and advanced economies since 1995, we start by documenting a widespread decline in the degree of exchange rate pass-through despite an increase in the import content of domestic consumption. But we also document substantial heterogeneity in pass-through coefficients across countries.

We then explore the role of monetary policy performance and credibility in explaining cross-country and time variation in the extent of exchange rate pass-through. We first confirm earlier results

[20]Some studies in the literature have used more widely available metrics of import content such as measures of trade openness including the ratio of imports to GDP (e.g., Gagnon and Ihrig 2004; Choudhri and Hakura 2006) and find no statistical link between pass-through estimates and this import share. However, an aggregate openness metric such as the ratio of imports to GDP also includes imports of non-consumption goods, consumption goods that are absorbed by the government, and goods that are re-exported to other final destinations, thus providing an imprecise proxy for the assessment of exchange rate pass-through to consumer prices.

that pass-through coefficients are positively and significantly associated with the level and variability of inflation, i.e., enhanced performance of monetary policy. But because these variables could also be capturing the time-series properties of the underlying shock, we then study how the credibility of monetary policy—as captured by the degree of anchoring of inflation expectations—affects exchange rate pass-through coefficients.

We find that more stable and better-coordinated inflation expectations of professional forecasters are associated with significantly lower exchange rate pass-through to consumer prices. Moreover, the extent of disagreement about future inflation across individual professional forecasters remains significant after controlling for the first and second moment of nominal variables and the import content of consumption. The effect is also economically important in explaining the degree of exchange rate pass-through. An increase in disagreement from the 25th to the 75th percentiles of our sample is associated with an increase in the estimated pass-through coefficient by 0.06. This is a sizable change, given that the average cumulative pass-through after 12 months is about 0.2 in the sample. This contribution provides novel evidence in support of the long-standing conjecture that the improvement of monetary policy frameworks—specifically, the credibility of monetary policy—has led to lower exchange rate pass-through to consumer prices by establishing stronger nominal anchors.

Appendix

Table A.1. Import Price Data Sources

Economy	Source	Local Currency
Austria	Haver Analytics/Eurostat	Yes
Belgium	Haver Analytics/Eurostat	Yes
Brazil	Haver Analytics/FUNCEX	No
Canada	Haver Analytics/StatCan	Yes
Colombia	Haver Analytics/BANREP	Yes
Czech Republic	Haver Analytics/CSO	Yes
Denmark	Haver Analytics/IFS	Yes
El Salvador	Haver Analytics/BCR	No
Estonia	Haver Analytics/Eurostat	Yes
Finland	Haver Analytics/Eurostat	Yes
France	Haver Analytics/Eurostat	Yes
Germany	Haver Analytics/Eurostat	Yes
Greece	Haver Analytics/Eurostat	Yes
Hong Kong SAR	Haver Analytics/HKCSD	Yes
Hungary	Haver Analytics/CSO	Yes
Indonesia	Haver Analytics/BPS	Yes
Ireland	Haver Analytics/Eurostat	Yes
Italy	Haver Analytics/Eurostat	Yes
Japan	Haver Analytics/JPCSD	Yes
Korea	Haver Analytics/NSO	Yes
Latvia	Haver Analytics/Eurostat	Yes
Lithuania	Haver Analytics/Eurostat	Yes
Luxembourg	Haver Analytics/Eurostat	Yes
Malaysia	Haver Analytics/DSM	No
Mexico	Haver Analytics/BMEX	No
Paraguay	Haver Analytics/BCP	Yes
Peru	Haver Analytics/BCRP	No
Poland	Haver Analytics/CSO	Yes
Portugal	Haver Analytics/Eurostat	Yes
Singapore	Haver Analytics/DoS	Yes
Slovak Republic	Haver Analytics/Eurostat	Yes
Slovenia	Haver Analytics/Eurostat	Yes
Spain	Haver Analytics/Eurostat	Yes
Sweden	Haver Analytics/SCB	Yes
Switzerland	Haver Analytics/SFSO	No
Thailand	Haver Analytics/MoC	Yes
The Netherlands	Haver Analytics/Eurostat	Yes
Turkey	Haver Analytics/TRSTAT	No
United Kingdom	Haver Analytics/IFS	Yes
United States	Haver Analytics/BLS	Yes

Source: Authors' compilation.
Note: Local currency denotes whether the import price data is directly reported in local currency by the source.

References

Albagli, E., A. Naudon, and R. Vergara. 2015. "Inflation Dynamics in LATAM: Comparison with Global Trends and Implications for Monetary Policy." Economic Policy Paper No. 58, Central Bank of Chile.

Bouakez, H., and N. Rebei. 2008. "Has Exchange Rate Pass-Through Really Declined? Evidence from Canada." *Journal of International Economics* 75 (2): 249–67.

Burstein, A., M. Eichenbaum, and S. Rebelo. 2005. "Large Devaluations and the Real Exchange Rate." *Journal of Political Economy* 113 (4): 742–84.

Burstein, A., and G. Gopinath. 2014. "International Prices and Exchange Rates." In *Handbook of International Economics*, Vol. 4, ed. G. Gopinath, E. Helpman, and K. Rogoff, 391–451 (chapter 7). Elsevier.

Calvo, G. 1983. "Staggered Prices in a Utility-Maximizing Framework." *Journal of Monetary Economics* 12 (3): 383–98.

Campa, J. M., and L. S. Goldberg. 2005. "Exchange Rate Pass-Through into Import Prices." *Review of Economics and Statistics* 87 (4): 679–90.

Capistrán, C., and M. Ramos-Francia. 2010. "Does Inflation Targeting Affect the Dispersion of Inflation Expectations?" *Journal of Money, Credit and Banking* 42 (1): 113–34.

Caselli, F., and A. Roitman. 2019. "Nonlinear Exchange-Rate Pass-Through in Emerging Markets." *International Finance* 22 (3): 279–306.

Choudhri, E. U., and D. S. Hakura. 2006. "Exchange Rate Pass-Through to Domestic Prices: Does the Inflationary Environment Matter?" *Journal of International Money and Finance* 25 (4): 614–39.

Demertzis, M., M. Marcellino, and N. Viegi, 2012. "A Credibility Proxy: Tracking US Monetary Developments." *B.E. Journal of Macroeconomics* 12 (1): Article 12.

Devereux, M. B., C. Engel, and P. E. Storgaard. 2004. "Endogenous Exchange Rate Pass-Through When Nominal Prices Are Set in Advance." *Journal of International Economics* 63 (2): 263–91.

Devereux, M. B., and J. Yetman. 2002. "Price-Setting and Exchange Rate Pass-Through: Theory and Evidence." HKIMR Working Paper No. 22/2002.

———. 2010. "Price Adjustment and Exchange Rate Pass-Through." *Journal of International Money and Finance* 29 (1): 181–200.

Dovern, J., U. Fritsche, and J. Slacalek. 2012. "Disagreement Among Forecasters in G7 Countries." *Review of Economics and Statistics* 94 (4): 1081–96.

Ehrmann, M. 2015. "Targeting Inflation from Below: How Do Inflation Expectations Behave?" *International Journal of Central Banking* 11 (Supplement 1, September): 213–49.

Forbes, K., I. Hjortsoe, and T. Nenova. 2018. "The Shocks Matter: Improving Our Estimates of Exchange Rate Pass-Through." *Journal of International Economics* 114 (September): 255–75.

Gagnon, J. E., and J. Ihrig. 2004. "Monetary Policy and Exchange Rate Pass-Through." *International Journal of Finance and Economics* 9 (4): 315–38.

Goldberg, P., and M. M. Knetter. 1997. "Goods Prices and Exchange Rates: What Have We Learned?" *Journal of Economic Literature* 35 (3): 1243–72.

Gopinath, G. 2015. "The International Price System." NBER Working Paper No. 21646.

Jordà, Ò. 2005. "Estimation and Inference of Impulse Responses by Local Projections." *American Economic Review* 95 (1): 161–82.

Kumar, S., H. Afrouzi, O. Coibion, and Y. Gorodnichenko. 2015. "Inflation Targeting Does Not Anchor Inflation Expectations: Evidence from Firms in New Zealand." *Brookings Papers on Economic Activity* 46 (Fall): 151–225.

Lenzen, M., K. Kanemoto, D. Moran, and A. Geschke. 2012. "Mapping the Structure of the World Economy." *Environmental Science and Technology* 46 (15): 8374–81.

———. 2013. "Building EORA: A Global Multi-Region Input–Output Database at High Country and Sector Resolution." *Economic Systems Research* 25 (1): 20–49.

Mankiw, G., R. Reis, and J. Wolfers. 2004. "Disagreement about Inflation Expectations." In *NBER Macroeconomics Annual 2003*, Vol. 18, eds. M. Gertler and K. Rogoff. Cambridge, MA: MIT Press.

Svensson, L. E. O. 1997. “Inflation Forecast Targeting: Implementing and Monitoring Inflation Targets.” *European Economic Review* 41 (6): 1111–46.

Taylor, J. B. 2000. “Low Inflation, Pass-Through, and the Pricing Power of Firms.” *European Economic Review* 44 (7): 1389–1408.

Teulings, C., and N. Zubanov. 2014. “Is Economic Recovery a Myth? Robust Estimation of Impulse Responses.” *Journal of Applied Econometrics* 29 (3): 497–514.