

Exchange Rate Pass-Through in Industrialized Countries

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- *Although estimates of exchange rate pass-through vary both by industry and by country, it appears that the full effect of a depreciation or appreciation of the domestic currency is not passed through to local-currency import prices across industrialized countries.*
- *Many industrialized countries seem to have experienced a decline in exchange rate pass-through to consumer prices in the 1990s, despite large exchange rate depreciations in many of them.*
- *The fact that this documented decline in exchange rate pass-through has coincided with the low-inflation period that most industrialized countries entered a decade or so ago has popularized the view that these two phenomena could be linked.*
- *Assessing the extent of exchange rate pass-through, and whether it has indeed declined, has important implications for the conduct and design of monetary policy.*

The degree to which exchange rate movements are reflected in prices has long been a question of interest in international economics. Interest in this issue, however, was rekindled in the 1970s by a combination of rising inflation and the adoption of more flexible exchange rate regimes in many industrialized countries following the demise of the Bretton-Woods system of adjustable pegs.¹ In this high-inflation environment, concern increased among central bankers about the potential effects of movements in their currencies on inflation. In particular, there were concerns that a vicious cycle could emerge in which a large currency depreciation could fuel inflation and increase expectations of higher future inflation.

This fear that a currency depreciation could degenerate into an inflationary spiral subsided as industrialized countries began to reduce and stabilize their inflation rates in the 1980s and early 1990s (Chart 1). Although several factors may have contributed to this trend towards low and stable inflation, it is generally agreed that a shift towards more credible monetary policy regimes played an important role. In countries like Australia, Canada, and the United Kingdom, the increased credibility was supported by the adoption of an inflation-targeting framework for conducting monetary policy. In others, such as the United States, monetary policy credibility was boosted by a sustained commitment to maintaining low inflation.

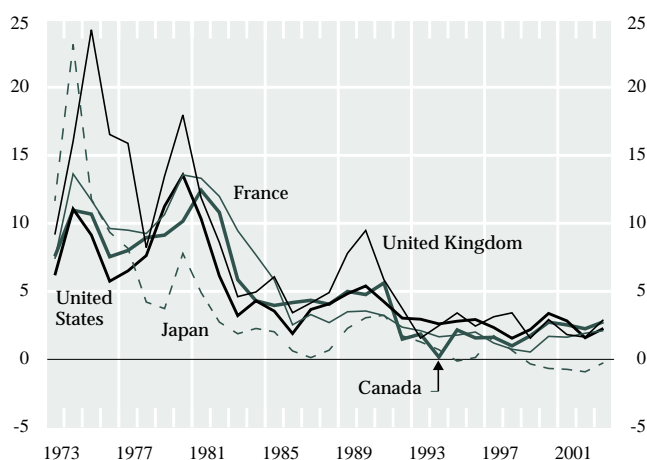
This low-inflation period, which most industrialized countries entered approximately a decade ago, also happened to coincide with significant exchange rate depreciations. However, these depreciations had much smaller effects on consumer prices than anticipated, based on historical experience. The response of

1. Inflation rose in the 1970s in part as a result of the oil-price shocks and the accommodative policy response to these shocks.

Chart 1

Inflation Rates in Selected Industrialized Countries

Year-over-year percentage change in total consumer price index



consumer prices to the large currency depreciations experienced by Canada, Sweden, and the United Kingdom in the 1990s, for example, was much smaller than expected. This common experience has led to the belief that the extent to which exchange rate movements are “passed-through” to consumer prices has declined.² Assessing this view has important implications for monetary policy. Indeed, a decline in pass-through would imply that movements in the exchange rate have smaller effects on consumer prices and, hence, on short-run inflation, than previously thought.³ This could influence central bankers’ forecasts of the future path of inflation, a key element in the conduct of monetary policy. Moreover, if nominal changes in the exchange rate have a smaller effect on the relative price of the domestic and foreign goods, this would translate into a dampening of “expenditure-switching” effects.⁴ Finally, a decline in exchange rate pass-through could have implications for the international transmission of monetary shocks and the

2. The change in domestic prices that results from a change in the exchange rate is referred to as *exchange rate pass-through*. This concept is traditionally defined in the literature as the percentage change in the domestic-currency price of an imported good resulting from a 1 per cent change in the nominal exchange rate between the exporting and importing countries. This definition has evolved over time to include other types of prices, notably consumer prices.

3. In an economy where inflation expectations are well anchored, movements in the exchange rate should not have an impact on the trend rate of inflation.

4. Expenditure-switching effects are defined and discussed in more detail in the section on policy implications.

choice of exchange rate regime and monetary policy regime in industrialized countries.

This article examines exchange rate pass-through in industrialized countries. We first examine why pass-through might be expected to be less than complete, even in the long run, a premise that is consistent with findings in the empirical literature. We then review empirical estimates of pass-through across industrialized countries and investigate whether pass-through has indeed declined. Explanations for this decline are then reviewed, followed by a discussion of policy implications.

Why Is Exchange Rate Pass-Through Incomplete?

A depreciation of a country’s domestic currency is typically expected to result in an increase in the prices of imported goods.⁵ If the effect of the depreciation is fully reflected in import prices, then pass-through is said to be full, or complete. If only a portion of the depreciation is reflected in import prices, then pass-through is described as partial, or incomplete. The extent and speed of the pass-through to import prices will depend on several factors, including expectations as to the duration of the depreciation, the cost of adjusting prices, and demand conditions.

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The pass-through process consists of two stages. In the first stage, exchange rate movements are transmitted to import prices. In the second stage, changes in import prices are transmitted to consumer prices. The extent to which those changes are reflected in the consumer price index (CPI) depends on the share of imports

5. This applies to the prices of both intermediate and final imported goods. For intermediate goods, an increase in the price of imported inputs would translate into higher production costs.

in the consumption basket. Typically, however, a change in the exchange rate will affect consumer prices through an additional channel: a currency depreciation which leads to higher prices for imported goods will, in turn, increase the demand for domestically produced goods that compete with imports. As demand rises, there will be upward pressure on domestic prices and nominal wages. Rising wages will exert further upward pressure on domestic prices.⁶

Pass-through to import prices

The bulk of the literature on exchange rate pass-through is motivated by a common finding in empirical studies that import prices do not respond fully to changes in the exchange rate, even in the long run.⁷ Incomplete pass-through to import prices reflects departures from the law of one price (LOP) in traded goods. According to the LOP, in competitive markets free of transportation costs and official barriers to trade, homogeneous goods must sell for the same price when their prices are converted to a common currency, regardless of where those goods are sold. Violations of the LOP can occur either because of trade costs or pricing to market (PTM).

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Trade costs include all factors that drive a wedge between goods prices in the domestic and foreign markets, ranging from transport costs to tariffs and non-tariff barriers. It is important to emphasize, however, that pass-through will be complete if the marginal trade cost is constant. In that case, the LOP holds, up to a constant, and exchange rate movements are entirely transmitted to import prices. Non-constant marginal costs of transport, on the other hand, can lead to incomplete pass-through. Krugman (1987) illustrates this point using a simple example which assumes that the marginal cost of transport rises with the volume of imports. If the currency of the import-

ing country appreciates, import prices will fall, thereby causing an increase in the volume of imports. The rise in imports will trigger a rise in the marginal transport cost. As a result, import prices will not fall by as much as the currency appreciates.

PTM is the ability of monopolistically competitive firms to (intentionally) practise price discrimination, setting different prices for different destination markets.⁸ As microeconomic theory suggests, under certain conditions, such behaviour can be optimal from the firm's perspective. It is clear, however, that PTM is possible only if there are economic and/or institutional constraints that prevent agents from exploiting international arbitrage opportunities in the goods market. The automobile sector is a good example of an industry where firms engage in PTM. For example, retail prices (when converted to the same currency) for the same vehicles across automobile producers have been substantially lower in Canada than in the United States in recent years.⁹ Automobile producers discourage "cross-border shopping" using various means, such as limiting the validity of warranties to the country of purchase.

A crucial result in the literature is that the extent of PTM depends on the firm's markup over marginal cost.¹⁰ In particular, if the firm has a constant markup, there is no PTM, and import prices move in proportion to exchange rates. On the other hand, if the firm's markup decreases as its price increases, PTM occurs, and pass-through to import prices is less than complete.¹¹ To illustrate this point, consider a depreciation of the domestic currency. In this case, the domestic-currency price of a foreign good will increase, inducing the foreign exporting firm to lower its markup. As a result, the import price rises by less than the exchange rate depreciation.

8. Empirically, there seems to be strong evidence in favour of PTM. Using disaggregated Canadian and U.S. price data, Engel (1993) shows that the relative price variability of similar goods across countries is higher than that between differentiated goods within the same country. In addition, using CPI data for U.S. and Canadian cities, Engel and Rogers (1996) find that deviations from the LOP are much higher for two cities located in different countries than for two equidistant cities in the same country.

9. For example, in 2002, manufacturers' suggested retail prices ranged from 25 to 40 per cent lower in Canada for many small and mid-sized sedans and for minivans (see www.canadiandriver.com for Canadian prices and www.autotrader.com for U.S. prices).

10. This result has been shown by Dornbusch (1987), Krugman (1987), and Marston (1990), among others.

11. The rationale behind the idea that the firm's markup decreases when its price increases is the firm's desire to maintain its market share.

6. See Caramazza (1986) for further discussion.

7. Goldberg and Knetter (1997) provide a comprehensive review of this literature.

Initial work on PTM was carried out using a partial-equilibrium approach that treats exchange rate movements as an exogenous process. A drawback to this approach is that it obscures the mechanisms (and channels) through which the exchange rate is affected by other economic variables. More recently, PTM has been embedded in a general-equilibrium framework by Betts and Devereux (1996). They introduce PTM by assuming that prices are pre-set in the currency of the importing country, an assumption that has come to be known as local-currency pricing (LCP).¹² Hence, if a monetary shock hits the importing economy, and its currency appreciates, import prices will remain unchanged, resulting in a zero pass-through. To allow for limited but non-zero pass-through, subsequent studies that build on Betts and Devereux (1996) assume that import prices are sticky in local currency.¹³ That is, import prices are not completely predetermined but take time to adjust. Typically, this sluggishness in price adjustment is explained by assuming that firms change their prices infrequently and in a staggered fashion or that they face explicit costs of adjusting prices.¹⁴ Under these circumstances, the extent of pass-through will depend on the degree of stickiness in import prices: the more rigid those prices are in local currency, the lower will be the exchange rate pass-through.¹⁵

PTM is the ability of monopolistically competitive firms to (intentionally) practise price discrimination, setting different prices for different destination markets.

12. In contrast, producer-currency pricing (PCP) refers to the denomination of imported goods in the currency of the exporting country.

13. An alternative way to obtain incomplete but non-zero pass-through is to assume that there is a combination of LCP and PCP in the economy. That is, only a fraction of import prices are pre-set in domestic currency, while the remaining prices are pre-set in foreign currency. In this case, the degree of pass-through will depend on the prevalence of LCP: the higher the LCP, the lower the exchange rate pass-through, and vice-versa.

14. Price-adjustment costs include re-tagging goods, revising and reprinting catalogues, and advertising.

15. Note that, in models based on a general-equilibrium framework, prices are sticky in the short run but are fully flexible in the long run. Thus, exchange rate pass-through is complete in the long run.

Price-adjustment costs also explain why the degree of pass-through tends to be low when exchange rate appreciations or depreciations are not expected to be persistent. Indeed, a transitory variation in the exchange rate implies that a firm that expects to pass exchange rate movements through to its price will have to change its price twice in a short period of time. If the gain from doing so is not large enough to justify the costs of adjusting the price, import prices will remain unchanged, and pass-through will be zero.

Pass-through to consumer prices

Typically, the consumption basket used to compute the CPI in a given country consists of domestically produced and imported goods. The extent of pass-through to the CPI will therefore depend on the rate of pass-through to import prices, the share of imports in the consumption basket, and the response of domestically produced goods to movements in the exchange rate. Assuming for a moment that the prices of domestically produced goods do not respond to exchange rate changes, there are at least two reasons why pass-through to consumer prices might not equal the share of imports in the consumption basket even if pass-through to import prices is complete. First, local distribution costs, such as transportation costs, marketing, and services, will cause import and consumer prices to diverge, and the wedge between the two prices will fluctuate if distributors adjust their profit margins in response to movements in the exchange rate. Second, as discussed in Bacchetta and van Wincoop (2002), differences in the optimal pricing strategies of foreign wholesalers and domestic retailers can explain why pass-through to consumer prices is lower than the share of imports in the CPI even when pass-through to import prices is complete. Indeed, this discrepancy can occur if foreign exporting firms price their goods in the exporter's currency, while domestic retailers resell these goods priced in domestic currency.¹⁶

However, as discussed earlier, the prices of domestically produced goods typically do respond to movements in the exchange rate, and this provides an additional reason why the rate of pass-through to consumer prices need not be equal to the share of imports in the consumption basket even if pass-through to import prices is complete. It is worth emphasizing

16. Moreover, major retailers may have house brands which they source from overseas or domestically depending on relative prices. Another type of import substitution effect can occur when major retailers stop stocking foreign products when their price becomes too high. In both cases, movements in the nominal exchange rate would not be passed-through to consumer prices.

that the responsiveness of prices of domestically produced goods to exchange rate changes is a function of several factors, including substitutability with imports, adjustment costs of domestic prices, and nominal wage stickiness.¹⁷

Empirical Estimates of Exchange Rate Pass-Through

As discussed earlier, much of the work discussed in the previous section—which seeks a theoretical rationale for why pass-through is incomplete—was motivated by a common finding in the empirical literature that import prices do not respond fully to exchange rate changes. Although estimates of exchange rate pass-through vary both by industry and by country, it appears that the full effect of a depreciation/appreciation of the domestic currency is not passed-through to local-currency import prices across industrialized countries.¹⁸ For example, in their study of import prices in a sample of industrialized countries in the post Bretton-Woods period, Campa and Goldberg (2002) find average pass-through elasticities of about 60 per cent in the short run, and 75 per cent in the long run.^{19,20} Across countries, pass-through was found to be higher in industries that produce more homogeneous goods such as energy and raw materials, but was estimated to be lower for sectors that produce more differentiated manufactured goods. Estimates for Canada were roughly consistent with the sample average, with pass-through elasticities of 65 per cent in the short run and 68 per cent in the long run. These figures, however, should be interpreted with caution because they are subject to an important caveat. In fact, a number of Canadian import prices are constructed by multiplying the foreign-currency price by the nominal exchange rate.²¹ Because the

degree of pass-through is, by construction, equal to 1 for those prices, the empirical estimates of pass-through for Canada are likely to be biased upward.

The United States is a notable outlier with a much lower degree of exchange rate pass-through (25 and 40 per cent in the short and long runs, respectively) than other countries in the sample.²² The lower pass-through in the United States could be because firms exporting to the United States will likely be concerned with gaining or maintaining market share in this large competitive market and may therefore be reluctant to pass exchange rate changes through to prices. This is consistent with anecdotal evidence suggesting that the majority of firms exporting to the United States follow LCP.²³

Empirical evidence supports the view that the rate of pass-through to consumer prices is less than the share of imports in the consumption basket. Gagnon and Ihrig (2002) estimate that the long-run average rate of pass-through in a sample of industrialized countries over the period 1972 to 2000 was roughly equal to 20 per cent, although this figure decreased to about 5 per cent in the latter part of the sample. Moreover, this decline occurred over a period in which international trade (and hence imports) grew dramatically (implying that the average import share in the consumption basket must have risen as well).²⁴ This is consistent with the Canadian experience. It has traditionally been estimated that about 20 per cent of a persistent change in the Canadian dollar is reflected in the core CPI.²⁵ This corresponds roughly to the import content of the 1986 core CPI basket of goods and services (Bank of Canada 2000). However, paralleling the experience of other industrialized countries, the share of

17. See Ambler, Dib, and Rebei (2003) for a discussion of the role of nominal wage rigidities in generating lower exchange rate pass-through to consumer prices.

18. Empirical evidence suggests that a significant proportion of this muted price response is the result of adjustments in markups. See Goldberg and Knetter (1997) and Anderton (2003) for more details.

19. As is typical in this literature, Campa and Goldberg define the short run as one quarter and the long run as one year.

20. These figures are consistent with estimates in Anderton (2003). Indeed, he finds that, in the long run, 50 to 70 per cent of changes in the euro's effective exchange rate are passed-through to manufactured imports from outside the euro area.

21. For further discussion of this issue, see Statistics Canada (2003).

22. The authors noted that the ranking of elasticities was not tightly correlated with country size. This suggests that lower pass-through is a "U.S." effect rather than a "big-country" effect.

23. This anecdotal evidence is in line with data that suggest the prevalence of invoicing in U.S. dollars by foreign firms selling in the U.S. market. Indeed, according to the ECU Institute (1995), over 80 per cent of U.S. imports are invoiced in U.S. dollars.

24. Imports of goods and services grew by about 10 per cent on an average annual basis from 1988 to 2000 in countries belonging to the Organisation for Economic Co-operation and Development (OECD) (this figure is based on data obtained from the International Monetary Fund's *International Financial Statistics*).

25. The core measure of inflation excludes the eight most volatile components of the CPI and adjusts the remaining components to remove the effect of changes in indirect taxes. The eight most volatile components are fruit, vegetables, gasoline, fuel oil, natural gas, intercity transportation, tobacco, and mortgage-interest costs.

imports in the core CPI basket in Canada has risen, while the rate of pass-through appears to have declined.²⁶

Paralleling the experience of other industrialized countries, the share of imports in the core CPI basket in Canada has risen, while the rate of pass-through appears to have declined.

Indeed, many industrialized countries, and even some emerging-market countries, appear to have experienced a decline in exchange rate pass-through to consumer prices in the 1990s, despite large exchange rate depreciations. For example, the United Kingdom (1992), Sweden (1992), and Brazil (1999) experienced significant depreciations which had much smaller effects on consumer prices than had been expected, based on historical experience.²⁷ Similarly, the response of consumer prices in Canada to the sharp depreciation in the Canadian dollar in the first half of the 1990s was much smaller than expected. Several econometric studies have also found support for the view that exchange rate pass-through in industrialized countries declined in the 1990s.²⁸ In interpreting this evidence, however, one must bear in mind an important caveat: during periods when the exchange rate undergoes significant changes, other factors may be offsetting the effects of these changes on the cost of imported goods and the domestic price level, but these factors are difficult to capture econometrically. Lafèche (1996–97), for example, finds that special factors, including the restructuring of the retail market and the abolition of customs duties on trade between Canada and the

26. The import share of the core CPI for Canada rose from about 15 per cent in 1976 to about 27 per cent in 1997 (Bank of Canada 2000).

27. As discussed by Cunningham and Haldane (1999) in their event study, pass-through to consumer prices in all three cases was less than an amount proportional to the share of imported goods in the consumer basket.

28. For example, see Gagnon and Ihrig (2002) for consumer prices and Campa and Goldberg (2002) for import prices. In addition to these cross-country studies, individual-country studies have also found support for a decline in pass-through. For instance, Fillion and Léonard (1997) and Kichian (2001) both found evidence that the coefficient of the exchange rate pass-through in a Phillips curve model for Canada fell in the 1990s compared with previous decades.

United States, helped to explain the response of consumer prices in Canada to the currency depreciation in the first half of the 1990s.²⁹ Another special factor that affected inflation in industrialized countries in the 1990s was the rapid growth in the exports of manufactured goods among emerging markets, particularly in Asia. This caused the global supply of manufactured goods to increase and put downward pressure on prices in industrialized countries.³⁰

Explaining the Recent Decline in Exchange Rate Pass-Through

A plausible explanation for the decline in exchange rate pass-through is that the degree of market segmentation has increased because (i) more firms are engaging in PTM behaviour, and/or (ii) a larger proportion of goods are subjected to price discrimination across international markets. This implies that the degree of PTM is an endogenous process that depends on the state of the economy. Which factors, then, might have caused an increase in PTM and therefore a decline in the degree of pass-through?³¹

Monetary policy and the inflation environment

During the past decade, many industrialized countries reduced their inflation rates and entered a period of relative price stability. Although several factors may have contributed to this trend, it is generally agreed that a shift towards more credible monetary policy regimes played an important role. That this transition to a low-inflation environment coincided with the documented decline in exchange rate pass-through has popularized the view that these two phenomena could be linked. Taylor (2000) was one of the first to formally articulate the hypothesis that the low-inflation environment in many industrialized countries has successfully reduced the degree of exchange rate pass-through to domestic prices. He argued that exchange rate pass-through is primarily a function of the persistence of exchange rate and price shocks, which tend to be reduced in an environment where inflation is low and monetary policy is more credible.

29. Cyclical factors most likely played a role as well. Indeed, Canada was in a position of excess supply throughout most of this period, and in such an environment, it may have been difficult for firms to increase their prices.

30. See Gagnon, Sabourin, and Lavoie (2003–2004) for more details.

31. By extension, the reasons why pass-through to import prices has declined would also account for the decline in pass-through to consumer prices. However, the latter could also be explained by a stronger degree of nominal wage stickiness in the final-goods sector.

In addition to being intuitively appealing and consistent with anecdotal evidence, Taylor's hypothesis is also consistent with recent macroeconomic theory and is supported by empirical evidence. Indeed, theoretical models explicitly linking exchange rate pass-through and the inflation environment have recently emerged as part of the new open-economy macroeconomics (NOEM) literature.³²

Choudhri and Hakura (2001), for example, emphasize a channel similar to the one in Taylor (2000) in the context of a more elaborate DGE model with imperfect competition and staggered contracts. In their model, a low-inflation regime reduces pass-through because the latter reflects the expected effect of monetary shocks on current and future costs, which, in turn, are reduced by a low-inflation regime. Devereux and Yetman (2002) also explore the link between pass-through and monetary policy in the context of a DGE framework. In their model, pass-through is determined by the frequency of price changes among importing firms, and this frequency is a function of the monetary policy regime. Firms in countries where monetary policy is more credible (and, hence, where the mean inflation rate is lower) will tend to change their prices relatively less frequently, leading to a lower degree of pass-through in the short run but not in the long run. Finally, Devereux, Engel, and Storgaard (2003) also develop a DGE model linking pass-through to monetary policy. In their framework, the aggregate degree of pass-through is determined by the currency in which the price of imported goods is pre-set. Unlike earlier studies, however, where the choice of currency of denomination is exogenous, the authors show that countries with relatively stable monetary policies will tend to have a prevalence of LCP in the economy. This implies that a more stable monetary policy is associated with a lower degree of pass-through.

The relationship between exchange rate pass-through and the inflation environment has also been examined empirically in a handful of studies. The majority of these studies are cross-sectional and focus on cross-country variations in pass-through elasticities. Choudhri and Hakura (2001) and Devereux and Yetman (2002), for example, investigate the role of inflation variables in accounting for cross-country differences in exchange rate pass-through in a large

sample of countries and find that these variables do have explanatory power. Gagnon and Ihrig (2002) and Bailliu and Fujii (2004) take a different approach and examine whether exchange rate pass-through has declined in industrialized countries in response to a shift to a more credible monetary policy regime. Both studies find evidence of such a decline.

Changes in the composition of the imported goods index

Thus far, we have focused on the reasons that might explain a decline in the degree of pass-through to the import prices of individual goods. However, many empirical studies use import price indexes rather than highly disaggregated data. An alternative explanation of the recent decline in pass-through among industrialized countries could therefore be that the composition of imports has shifted towards sectors that have lower degrees of exchange rate pass-through. Campa and Goldberg (2002) find support for this hypothesis in their study. Indeed, their results suggest that exchange rate pass-through to import prices in industrialized countries has declined because the composition of their imports has shifted towards sectors with lower degrees of exchange rate pass-through, such as the manufacturing sector (where more differentiated goods are produced and hence where PTM is likely to be more prevalent).

Policy Implications of a Decline in Exchange Rate Pass-Through

Important policy implications could follow from a decline in exchange rate pass-through. First, a decline in the pass-through to consumer prices could influence central bankers' forecasts of the future path of inflation, a key element in the conduct of monetary policy. Indeed, the successful implementation of monetary policy presupposes that central bankers have not only a good understanding of inflation dynamics, but that they are also relatively successful at predicting the future path of inflation.³³ If inflation forecasts are based on estimates of exchange rate pass-through that do not take into account such a decline, these forecasts could be overestimating the effects of changes in the exchange rate on inflation.³⁴

32. In the NOEM literature, based on work by Obstfeld and Rogoff (1995), nominal rigidities and market imperfections are introduced into a dynamic general-equilibrium (DGE) open-economy model with well-specified micro-foundations.

33. This is particularly important for central banks that have adopted an inflation-targeting framework within which to conduct monetary policy.

34. This bias would obviously be more substantial for open economies that have larger import shares in their consumption baskets.

Second, if import prices are less responsive to movements in the exchange rate, this could lead to a dampening of “expenditure-switching” effects. These refer to the change in the composition of demand resulting from a change in relative international prices induced by movements in the nominal exchange rate. For instance, a depreciation of the domestic currency (in the presence of exchange rate pass-through to import prices) would increase the price of foreign goods relative to domestic goods, which should—all else being equal—increase the worldwide demand for domestic goods relative to foreign goods. If there is a decline in exchange rate pass-through to import prices, the change in relative international prices will be smaller and so will the resulting effect on relative demand. In other words, if the adjustment in relative prices is dampened, then the incentive for consumers to switch expenditures from foreign to domestic goods will be reduced. It is important to note that expenditure-switching effects will not be dampened in the case where pass-through to consumer prices has declined but pass-through to import prices has not.

Third, a decline in exchange rate pass-through also has important implications for the international transmission of shocks. As shown by Betts and Devereux (2001), when pass-through is complete, monetary policy shocks produce a negative co-movement of output across countries. Intuitively, an exchange rate depreciation that is induced by a positive monetary shock generates an expenditure-switching effect which shifts world demand away from foreign goods towards domestic goods. Consequently, output rises in the country where the depreciation has occurred and falls abroad. As the degree of pass-through decreases, this result starts to be reversed. For a sufficiently low degree of pass-through, the cross-country correlation of output becomes positive.³⁵ This suggests that, to the extent that monetary policy shocks are important in explaining business cycles, the recent decline in pass-through would imply that those business cycles are becoming more synchronized.

Finally, an important theoretical result that has recently emerged in the NOEM literature is that optimal monetary policy depends on the degree of pass-through to import prices.³⁶ In particular, when pass-through to import prices is complete, a flexible exchange rate regime is desirable because it allows rel-

ative price adjustments to occur, thus enabling appropriate monetary policy to replicate the flexible-price allocations. In contrast, under zero pass-through (that results from full LCP), the optimal policy involves fixing the nominal exchange rate because in this case flexible exchange rates cannot achieve the optimal relative price adjustment. It is important to note, however, that neither one of these two extreme cases is likely to hold in practice, given that exchange rate pass-through to import prices in industrialized countries is neither zero nor complete. Although it has declined in recent years, empirical evidence suggests that pass-through is partial (and thus that industrialized countries are best characterized as economies where firms follow a combination of LCP and PCP). Thus, further research is needed to determine the optimal design of monetary policy in the case of partial exchange rate pass-through.

Empirical evidence also suggests that pass-through to imported goods is higher than pass-through to consumer prices. Indeed, as discussed in the section on empirical estimates, it appears as though pass-through to import prices, although not complete, is very high. On the other hand, pass-through to consumer prices since the early 1990s seems very low. A higher rate of pass-through to import prices might thus imply that there is scope for the exchange rate to act as a shock absorber, even if the pass-through to consumer prices is very low. As discussed by Engel (2002), once this assumption about different rates of pass-through to import and consumer prices is incorporated into macroeconomic models, the optimal monetary policy no longer involves fixing the exchange rate.

Conclusions

Evidence suggests that exchange rate pass-through to both import and consumer prices has declined in industrialized countries over the past decade. Several plausible explanations for this potential decline have been advanced in the literature, including the shift to a low-inflation environment in industrialized countries (brought about by a move towards more credible monetary policy regimes) and changes in the structure of imports towards sectors that have lower rates of exchange rate pass-through. Assessing both the extent and origin of such a decline is important, given potential policy implications such as its effects on central bankers’ inflation forecasts, expenditure-switching effects, the international transmission of monetary shocks, and the optimal choice of exchange rate regime and monetary policy regime.

35. With complete pass-through, monetary policy shocks produce a positive cross-country correlation of consumption, but the sign of this correlation is also reversed when pass-through becomes sufficiently low.

36. See Devereux and Engel (2003) for further discussion.

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