Box D: Exchange rate changes and the economy

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Sterling's recent weakness raises important questions about the impact on inflation and UK competitiveness. A crucial part of the answer is the extent of Exchange Rate Pass-Through (ERPT), the extent to which domestic prices respond to exchange rate shifts. A high ERPT would mean a substantial inflation impact and a low competitiveness effect. After the 1990s, ERPT decreased in most countries, including the UK. However, ERPT varies across episodes. Currently, higher and more variable inflation, foreign exchange weakness skewed towards the dollar, and damaged Bank of England credibility, implies a high ERPT. This higher ERPT argues for a firm monetary policy response.

ERPT and its evolution

Exchange rate pass-through can refer to the extent of pass-through to import prices or to consumer prices. Most published studies concentrate on the first of these. Ihrig et al. (2006), examine the pass-through of exchange rate changes to import prices for the G7, looking at the period 1975 to 2004 and splitting the sample in 1990. They find that the average G7 long-run pass-through coefficient from the exchange rate to import prices had fallen from 0.715 to 0.475 (Table D1), with the UK declining less than average, from 0.76 to 0.59.

Ihrig et al. (2006) also look at exchange rate pass-through to consumer prices, again finding a decline in ERPT between the two periods, though the decline in ERPT was not statistically significant except for Italy and France (Table D2). One of the issues with the study is choosing a common break point for the two sub-samples whereas Clarida et al. (1998) suggest policy regimes changed at different times in different countries.

Table D1   Long-run exchange rate pass-through into import prices

	1975-1989 (1)	1990-2004 (2)	Change (3) = (2) - (1)
United States	0.657 (0.109)	0.320 (0.104)	-0.337*
United Kingdom	0.763 (0.080)	0.590 (0.090)	-0.173
Japan	1.137 (0.133)	0.609 (0.109)	-0.528**
Italy	0.626 (0.155)	0.465 (0.179)	-0.161
Germany	0.384 (0.050)	0.291 (0.047)	-0.093
France	0.487 (0.065)	0.163 (0.048)	-0.324**
Canada	0.951 (0.197)	0.890 (0.101)	-0.061
Average	0.715	0.475	-0.239
Average (ex Canada)	0.676	0.406	-0.269

† Standard errors in parentheses.
*, ** Indicate that the decline in pass-through is statistically different from zero at the 10 per cent level and the 5 per cent level, respectively.
Source: Ihrig et al. (2006).

**Table D2**   Long-run estimates of exchange rate pass-through into consumer prices

	1975-1989 (1)	1990-2004 (2)	Change (3) = (2) - (1)
United States	0.014 (0.123)	-0.019 (0.031)	-0.033
United Kingdom	0.200 (0.115)	0.042 (0.087)	-0.157
Japan	0.031 (0.034)	0.005 (0.021)	-0.026
Italy	0.359 (0.083)	-0.018 (0.033)	-0.377**
Germany	0.010 (0.035)	0.023 (0.042)	0.013
France	0.275 (0.150)	-0.002 (0.063)	-0.277*
Canada	0.050 (0.042)	-0.083 (0.064)	-0.133
Average	0.134	-0.007	-0.142

[†] Standard errors in parentheses.

*, ** Indicate that the decline in pass-through is statistically different from zero at the 10 per cent level and the 5 per cent level, respectively.

Source: Ihrig et al. (2006).

For the UK, Charts D1 and D2 show Ihrig et al.'s estimates of ERPT for import and consumer prices using rolling regressions with a fifteen-year fixed window. The import price coefficient is consistent with other evidence, but the pass-through to consumer prices in later years is surprisingly low.

Figure D1   ERPT into core import prices   **Figure D2**   ERPT into consumer prices
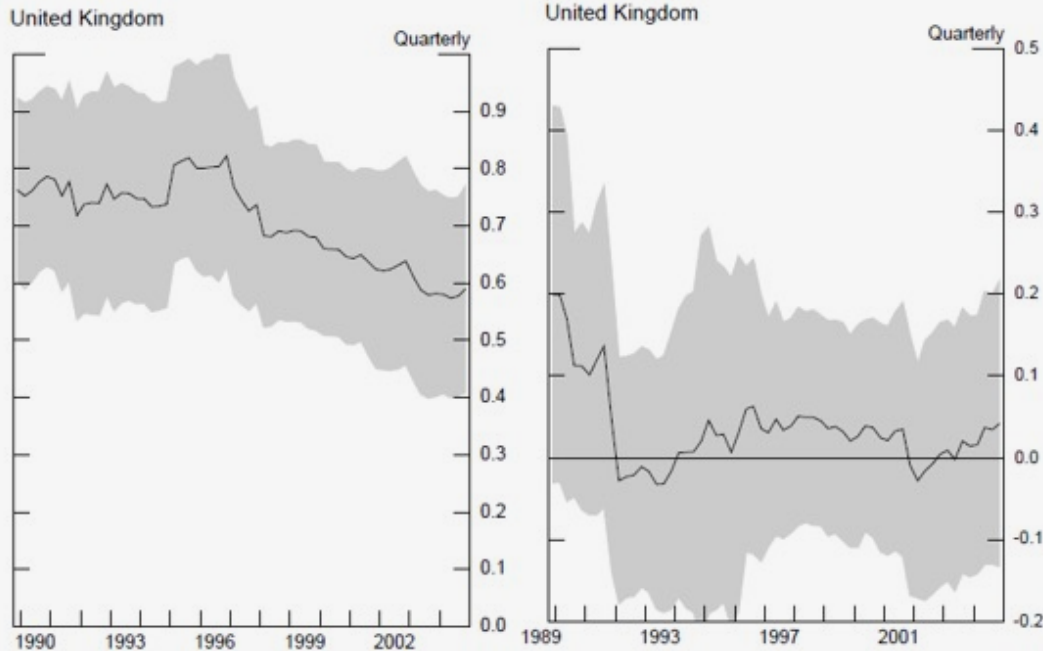
Source: Ihrig et al. (2006).

Why did ERPT decline?

Gagnon and Ihrig (2004) develop a model stressing a leading role in lowering ERPT for the adoption of inflation-stabilisation objectives by central banks. Supporting this, they find a statistically significant role for inflation variability in explaining the lower ERPTs in later periods. At least at the second stage (import price transmission into consumer prices), changes in monetary policy regimes appear to have been important.

Table D3 shows Gagnon and Ihrig's estimates of ERPT into consumer prices over the entire sample period, 1971Q1 to 2003Q4, and over two sub-samples, the break being at 1980 or 1981 for the US, UK, Germany, and Japan; 1984 for Canada, Austria, Finland, Ireland, Netherlands and Switzerland; 1987 for France, Belgium, Italy, Portugal and Spain; the early 1990s for Australia, New Zealand, and Sweden; and 1993 for Greece. Table 3 shows a pronounced downward shift in ERPT between the earlier and later sub-samples. The ERPT coefficient for consumer prices in the UK is broadly consistent with an ERPT into import prices in the range of 0.6 to 0.75 and a pass-through from import prices to consumer prices of around 20 per cent (import volumes being equivalent to 24 per cent of GDP from 1975 to 2004). However, relying on such rules of thumb may lead to errors if circumstances change.

Table D3   Long-run rates of ERPT to consumer prices

	Entire Sample	First Sample	Second Sample
Australia	0.14 (0.07)	0.09 (0.08)	0.01 (0.04)
Austria	0.11 (0.07)	0.06 (0.10)	0.04 (0.02)
Belgium	0.20 (0.08)	0.21 (0.09)	0.02 (0.02)
Canada	0.37 (0.11)	0.30 (0.14)	0.04 (0.06)
Finland	0.01 (0.14)	-0.11 (0.21)	0.00 (0.03)
France	0.23 (0.12)	0.17 (0.07)	0.01 (0.03)
Germany	0.11 (0.04)	-0.13 (0.11)	0.12 (0.03)
Greece	0.52 (0.11)	0.28 (0.12)	0.27 (0.21)
Ireland	0.29 (0.09)	0.18 (0.11)	0.06 (0.04)
Italy	0.37 (0.12)	0.33 (0.09)	0.08 (0.06)
Japan	0.21 (0.09)	0.26 (0.12)	0.02 (0.02)
Netherlands	0.16 (0.07)	0.08 (0.11)	0.06 (0.03)
New Zealand	0.42 (0.10)	0.29 (0.09)	0.01 (0.05)
Norway	0.28 (0.15)	0.11 (0.17)	-0.05 (0.06)
Portugal	0.43 (0.08)	0.37 (0.08)	0.17 (0.16)
Spain	0.18 (0.09)	0.14 (0.07)	0.03 (0.03)
Sweden	0.02 (0.07)	0.05 (0.05)	0.02 (0.02)
Switzerland	0.15 (0.09)	0.18 (0.14)	0.07 (0.08)
United Kingdom	0.15 (0.05)	0.18 (0.08)	0.08 (0.05)
United States	0.27 (0.12)	0.19 (0.36)	0.03 (0.06)
Average	0.23	0.16	0.05
Inflation targeters	0.22	0.18	0.03
Non-targeters	0.23	0.15	0.06

Standard errors in parenthesis

Source: Gagnon and Ihrig (2004).

Sekine (2006, p.23) sums up the general view by saying, "the timing of a decline in second-stage pass-through in the United States broadly coincides with a change in the Fed's monetary policy towards interest rate setting that is more reactive to expected inflation (Clarida et al., 2000). Second-stage pass-through shifted down at the time of adoption of a de facto fixed exchange rate regime (United Kingdom) and participation in the ERM (Italy)."

The nature of the exchange rate shock has an important bearing on ERPT. For example, small and transient exchange rate fluctuations will have trivial effects on prices, while a large persistent shock will have a substantial effect. Bonadio et al. (2018) analyse the 11 per cent appreciation of the Swiss franc on January 15, 2018, when the Swiss National Bank abandoned its policy of resisting a currency appreciation against the euro. For imports invoiced in euros, the import price response was complete beginning the day after the appreciation. For imports invoiced in Swiss francs, the adjustment began on the second day and was complete after two weeks.

Forbes et al. (2018) examine for the UK how ERPT varies according to what drives the exchange rate change. They argue for a low ERPT if the exchange rate move follows from a domestic demand shock, but a high pass-through if the driving force is a domestic monetary shock. Considering an appreciation, they propose that a positive demand shock leading to an exchange rate appreciation will also see increased firm price mark-ups in response to stronger demand, limiting the effect of the appreciation on domestic prices. In contrast, if the appreciation resulted from tighter domestic monetary policy, that would reduce domestic demand and therefore firm mark-ups. Thus, pass-through (in this case, a negative effect on the CPI) would be greater in the second case than in the first for the same appreciation. They also explore the effects of persistent and transitory global shocks and shifts in the exchange rate driven by risk attitude. Their finding of significantly different effects on UK import prices according to the source of the exchange rate shift explains different ERPTs across different appreciation episodes.

The literature suggests that pass-through varies according to the history of inflation in various economies, the inflation-targeting framework and the credibility of the authorities (eg, Karagoz et al., 2016). Takhtamanova (2008, p.23) suggests four influences on the degree of ERPT, "these are the degree of real exchange rate pass-through to the prices of individual firms (which in turn depends on the elasticities of the demand and cost functions faced by individual firms), the fraction of imports in the CPI basket, the fraction of flexible-price firms in the economy, and the credibility of the monetary authority." On this set of explanations, low inflation reduces the share of flex-price firms, while increased central bank credibility also reduces ERPT. As Gagnon and Ihrig (2004) argue, economic agents expect monetary tightening to be the response to an exchange rate depreciation by an inflation-targeting central bank.

The degree of competition in different industries affects their pass-through (Auer and Schoenle, 2016; Feenstra et al., 1996). Importers face different degrees of competition from domestic suppliers across the cycle, helping to explain low pass-through in the UK following sterling's exit from the ERM in 1992.

Pass-through in the United Kingdom

Figure D3 shows a strong relationship between annual import price inflation and the annual change in the effective exchange rate (with a depreciation being plotted as a positive number – that is, a rise in the price of foreign currency in terms of sterling). However, as a scatter plot of the same data in Figure D4 shows, pass-through varies.

Figure D3 Import price growth and sterling exchange rate changes
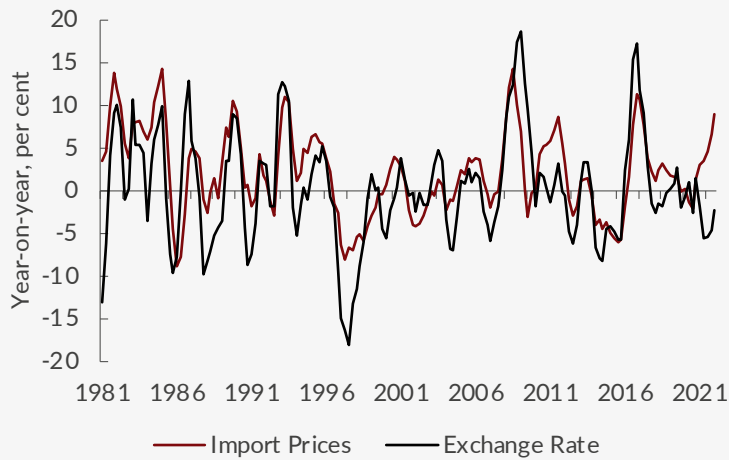
Source: ONS, Bank of England.

Figure D4 Import price growth and sterling exchange rate changes
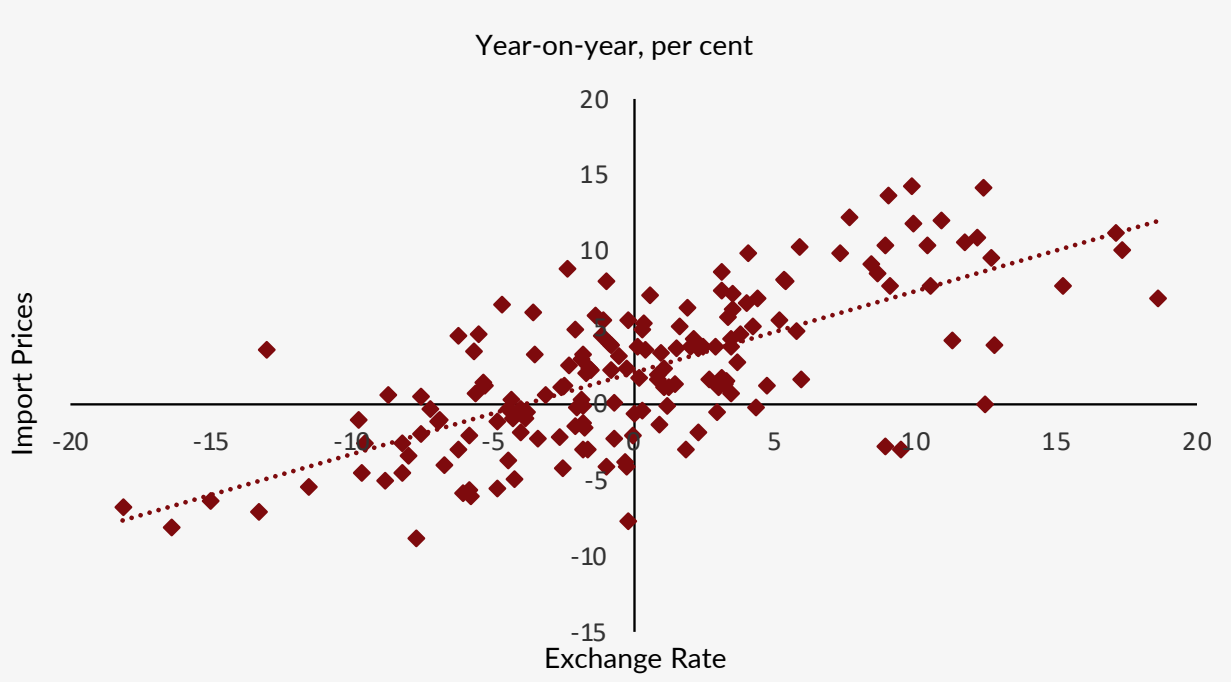
Source: Bank of England, ONS.

Forbes et al. (2018) show different UK ERPT responses for different forms of domestic and global shocks. The pass-through is large when the impetus for an exchange rate shift is domestic monetary policy – 85 per cent after six quarters. Pass-through is smallest when the exchange rate change is the result of a domestic demand shock – only around 40 per cent after five quarters.

Another striking feature is a large pass-through to domestic import prices from global shocks. This is important when global shocks are a significant cause of exchange rate movements, as was the case in 2007-2009 and 2013-2015, and is currently the case because of the strong US dollar. A given amount of weakness in a

country's effective exchange rate has a larger impact on pass-through if the weakness is against the dollar rather than against all currencies equally, reflecting widespread dollar invoicing. When the dollar appreciates or depreciates, dollar prices do not change equally in the opposite direction, meaning that prices change when expressed in a basket of all global currencies. Countries with higher shares of dollar invoicing in imports experience higher ERPT (Boz et al., 2017).

Forbes et al. (2018) decompose movements in the UK exchange rate according to the shocks that caused them and use this decomposition to calculate how pass-through to import prices varied by episode for large exchange-rate movements (Table D4).

Table D4   UK pass-through coefficients to import prices by episode

| Shocks	1996-7 appreciation	2007-9 depreciation	2013-2015q1 appreciation	Full sample FEVD(b)
Supply	10%	21%	14%	10%
Demand	33%	20%	22%	25%
Monetary policy	19%	11%	17%	17%
Exchange rate	24%	13%	0%	21%
Persistant global shock	6%	18%	25%	14%
Transitory global shock	8%	17%	23%	13%
Unadjusted pass-through to import prices (not controlling for foreign export prices)	-0.67	-0.86	-0.99	-0.79

Source: Forbes et al. (2018).

Forbes et al. (2018) also look at the pass-through of exchange rate shocks to consumer prices, where the effect is much smaller, reflecting the share of imports in GDP, and the lags are longer -- four quarters for the full effect to be felt with import prices but eight quarters with consumer prices. They estimate that pass-through to consumer prices varied widely according to different episodes, from 8 per cent in the 1996/97 appreciation to 18 per cent in the 2013-2015 appreciation.

The Bank of England's credibility has diminished because it dragged its feet on rate hikes and inflation is so high. Also, the proportion of prices changing month by month has increased significantly, to 28 per cent in September 2022 (Bejarano Carbo and Patel, 2022). These factors strongly suggest that ERPT in the UK has risen. To offset this, the Bank should show that it has limited tolerance for deviations from its inflation target and make it clear that it will respond to a softer exchange rate, because this increases inflation.

Implications for UK competitiveness of a higher ERPT

Figure D5 shows that since 1995, UK competitiveness changed significantly when there have been large moves in the exchange rate, as in 2008, from 2014 to 2016, and after the Brexit referendum vote in 2016. The main change unrelated to exchange rate moves was the rise in relative UK manufacturing unit labour costs during the pandemic. Changes in competitiveness since 1995 brought about by exchange rate movements were persistent and were not unwound by offsetting moves in domestic costs and prices. However, in these earlier periods, the economy had considerable slack, so exchange rate changes resulted mostly in shifts in relative prices. With limited slack at present, the effect of a weak exchange rate may be felt more on the aggregate price level with a more limited effect on relative prices and therefore a reduced benefit to competitiveness.

Figure D5 Sterling and competitiveness
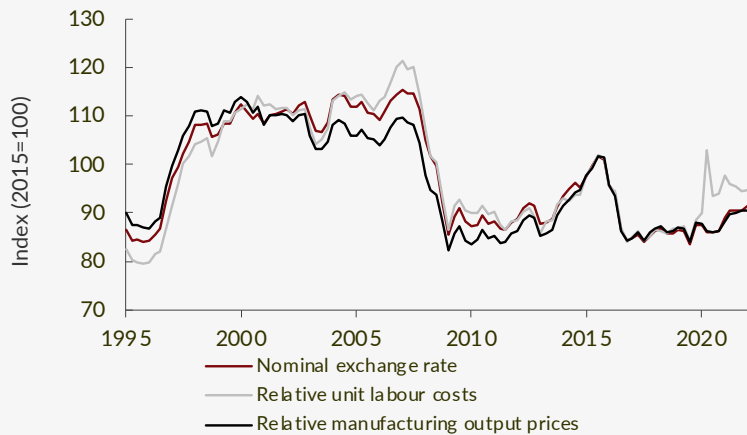
Source: FRED.

Conclusions

- The extent of ERPT to import prices varies from country to country, across episodes, and according to what prompts the exchange rate move.

- ERPT to consumer prices moves in the same direction as for import prices, but is smaller and takes longer than for import prices. Again, it varies according to time and place.

- Rules of thumb suggest that on average UK import prices move by 60 per cent to 80 per cent of the exchange shift and that consumer prices move by 20 per cent of the change in import prices. But this varies across episodes. It is probably higher now than in earlier years.

- Exchange rate depreciation brought through by slack domestic monetary policy will have a large ERPT, as will shifts caused by global factors, as at present.

- UK policymakers should set policy on the assumption that ERPT in the UK is higher than in previous years because recent movements in sterling reflect a global shock, the frequency of price changes has increased, there is little slack in the economy and the credibility of monetary policy has decreased. This argues for more substantial Bank of England rate hikes than otherwise.

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