Monetary Regimes and Real Exchange Rates: Product-Level Evidence over Five Decades

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Abstract

We construct a new dataset of tradable and nontradable prices for sixteen European countries from 1972 onward and document three facts. First, we find deviations from the law of one price, particularly for nontradables under floating exchange-rate regimes. Second, monetary-regime breaks—shifts between pegged and floating exchange-rate regimes—change the volatility of product-level real exchange rates while leaving the volatility of relative prices unchanged. Finally, the volatility of the real exchange rates of tradables responds less to monetary-regime breaks than that of nontradables, reflecting a stronger response of the relative prices of tradables to nominal exchange-rate fluctuations under floating regimes.

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1 Introduction

This paper constructs a new dataset of product-level retail prices for sixteen European countries from 1972 onward. Using these data, we document three empirical facts about how monetary regimes affect product-level prices. This evidence has implications for models of exchange rate determination (Gabaix and Maggiori, 2015) and for the role of the real exchange rate in economic growth (Eichengreen, 2008). Pegged and floating exchange-rate regimes differ sharply in the volatility of nominal and real exchange rates (Mussa, 1986); the question is how product-level prices behave under each regime.

Evidence on this question has been limited because product-level price data before the 1990s are scarce. This gap is costly: earlier decades experienced more frequent shifts in monetary regimes, which are essential for identifying price responses. We fill the gap by constructing a dataset from the price booklets of the *Confederation of British Industry* (CBI) starting in January 1972 and by merging these series with price data from the *Economist Intelligence Unit* (EIU). The resulting dataset is a consistent panel of twenty-five products—eighteen tradables and seven nontradables—covering sixteen European countries over the period 1972–2019.

First, our setting offers a useful framework for studying deviations from the law of one price (LOP) across different monetary regimes. Barriers to arbitrage in Europe have declined over several decades, from the *Treaty of Rome* in 1957 to the establishment of the *European Single Market* in 1993, which provides for the free movement of goods and the freedom to establish and provide services. Under these conditions, the LOP should hold once product-level prices are expressed in a common currency. It does not. We find persistent deviations, particularly for nontradables under floating regimes.

Second, we move the focus from LOP deviations to studying how product-level prices and real exchange rates adjust following monetary-regime breaks—shifts between pegged and floating exchange-rate regimes—associated with changes in nominal exchange-rate volatility, which is on average 5.5% higher under floating than under pegged regimes. Our main contribution is to establish that monetary-regime breaks change the volatility of product-level real exchange rates without significantly affecting the volatility of relative prices. In this sense, our findings highlight that monetary-regime breaks do not significantly affect the volatility of relative prices in local currency.

Lastly, we show that the volatility of the real exchange rates of tradables responds 1.1% less to breaks in the monetary regimes than that of real exchange rates of nontradables, reflecting a stronger negative correlation between the prices of tradables and nominal exchange-rate fluctuations. Our results indicate that most of the heterogeneity across tradables and nontradables arises during periods of floating exchange-rate regimes, when the changes in prices of tradables exhibit a negative and significant correlation with nominal exchange-rate fluctuations; under pegged regimes, the relative price responses of both tradables and nontradables are statistically indistinguishable from zero.

By incorporating novel product-level price data for the pre-1990 period, our dataset also allows us to test two important mechanisms of our findings: (i) the results are robust to controlling for EU-related integration efforts implemented since 1999, including the adoption of the euro; (ii) rather, they reflect price adjustments that do not fully offset current and past changes in nominal exchange rates, even in the medium and long run, when firms should in principle be able to reset prices optimally without being constrained by long-term contracts, nominal rigidities, or other frictions.

Related literature. Our work is closely related to purchasing power parity (PPP), a fundamental hypothesis in international economics concerning the relationship between prices across countries. In its absolute version, the PPP hypothesis argues that the aggregate price levels of the two countries should be equal when converted into a common currency. In its relative version, the PPP hypothesis states that changes in the aggregate price levels between the two countries should be equal when converted into a common currency. Both versions of the PPP can be empirically tested. Once a nominal exchange rate between the two countries is observed on the financial markets, it is always possible to compare the relative prices of a basket of products through the consumer-price-index-based real exchange rate, which is constructed using the aggregate price levels of the two countries.

As a matter of fact, deviations in the absolute and relative version of the PPP over short and long time periods are well documented both within a monetary regime (Froot and Rogoff 1995, Engel 1999, Burstein et al. 2005, 2006, Berka and Devereux 2010, Bache et al. 2013, and Burstein and Gopinath 2014) and across monetary regimes (Mussa 1986 and Petracchi 2022). Specifically, Mussa (1986) and Petracchi (2022) show that monetary-regime breaks change the volatility of both the nominal and real exchange rates. In contrast to these studies, our paper uses a dataset of eighteen tradable and seven nontradable price series, *rather than relying on aggregate price indices*, and contributes to the literature by establishing that monetary-regime breaks affect the volatility of product-level real exchange rates while leaving the volatility of relative prices unchanged.

Indeed, a deeper understanding of the relationship between nominal exchange rates, domestic prices, and foreign prices requires to look at cross-country product-level prices, rather than aggregate price levels. Comparing aggregate price levels across countries can be in fact uninformative, due to both the different composition of the underlying baskets of products and the cyclical turnover of products used to compute aggregate price indices. Two distinct products may be subject to shocks of different nature—for instance, tradables may be more exposed to international shocks than nontradables—which affect product-level prices, and hence product-level real exchange rates, to an extent that cannot be identified when relying on aggregate price levels. By working with product-level prices, our paper overcomes these limitations and uncovers meaningful heterogeneity across product types in their responses to monetary-regime breaks and nominal exchange-rate fluctuations: the volatility of real exchange rates of tradables generally responds less to monetary-regime breaks than that of nontradables, reflecting a stronger contemporaneous response of the relative prices of tradables to nominal exchange-rate fluctuations under floating regimes.

Our work is also related to another long-standing hypothesis in international economics: the LOP hypothesis, which has been studied for centuries.[1] Similarly to the PPP hypotheses, the literature documents deviations from the LOP, but typically only considers time periods within a floating regime (Burstein and Jaimovich, 2009), within the same monetary regime (Cavallo et al., 2014, 2015), or without distinguishing between different monetary regimes (Crucini and Telmer, 2020). Our paper differs from these studies by examining LOP deviations *across monetary regimes over nearly five decades* and by analyzing how product-level real exchange rates and local-currency prices respond to shifts between pegged and floating exchange-rate regimes. Extending the sample back to 1972 allows us to exploit a rich set of monetary-regime breaks that are not captured by price datasets beginning in the 1990s.

2 Data

In our analysis, we use data covering sixteen European countries—Austria, Belgium, Denmark, Finland, France, Germany (West Germany before October 1990), Greece, Ireland, Italy, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, and the United Kingdom—from 1972 to 2019. We combine four different sources of information to examine how nominal exchange rates, domestic prices, and foreign prices behave over time periods that include different monetary regimes. The first source is the Exchange Rates Portal of the Bank of Italy, from which we obtain the bilateral nominal exchange rates. Second, we adopt the classification of monetary regimes from Petracchi (2022) to pose the monetary regimes—pegged (fixed) exchange-rate regime or floating (flexible) exchange-rate regime–for each year and country in our sample. Third, we take the product-level prices before the 1990 from the booklet series published by the *Confederation of British Industry* (CBI). The fourth data source is the *Economist Intelligence Unit* (EIU), which provides us with the product-level prices for the period from 1990 to 2019.[2]

2.1 Nominal Exchange Rates

We use annual bilateral nominal exchange rates, obtained by averaging monthly bilateral nominal exchange rates, in order to match the annual frequency of product prices. We download the monthly bilateral nominal exchange rates from the Exchange Rates Portal of the Bank of Italy. To obtain the bilateral nominal exchange rates for each European country f (foreign country) against Germany, which is our reference country (home country), we combine the US-dollar/Deutsche-Mark time series, and the US-dollar/euro time series after December 2001, with the various US-dollar/country-f-currency time series.

[1] The LOP says that the prices of identical products in two countries should be equal when converted into a common currency. Karl G. Persson, from "The Law of One Price" in the EH.Net Encyclopedia: "The intellectual history of the concept can be traced back to economists active in France in the 1760-70's, which applied the "law" to markets involved in international trade."

[2] Rogers (2007) proposes a detailed comparison between the product-level prices of the *Economist Intelligence Unit* (EIU) and data used by national statistical agencies to construct consumer price indices. On the one hand, the *Eurostat* started to systematically harmonize its data on a annual basis at the middle of the nineties, whereas the earlier surveys of *Eurostat* were at five-year intervals (see, for instance, Crucini et al. 2005). On the other hand, product-level prices from *NielsenIQ* started to be used only after the 2000.

2.2 Monetary Regimes

For all the sixteen European countries in our analysis, Petracchi (2022) establishes a classification where the reference country is Germany and the monetary regimes—pegged or floating exchange-rate regime—are defined for the nominal exchange rates between Germany and each of the other fifteen European countries.[3] We summarize the nineteen monetary-regime breaks used in our analysis in Table A1 of the Appendix, while Figures A1-A15 present the monthly nominal exchange-rate series used to calculate the annual nominal exchange rates.

2.3 Prices from the *Confederation of British Industry* (CBI)

The *Confederation of British Industry* (CBI) published booklets to compare the living costs in sixteen European countries yearly, from 1972 to 1984 and from 1986 to 1987. These booklets reported the retail prices of tradables and nontradables, inclusive of value-added taxes (VAT) and excise taxes, aimed at filling "an information gap for those preparing to establish industrial or sales operations in the countries surveyed."[4] The prices were surveyed annually in national capital cities with some notable exceptions: in the case of Germany, the surveyed cities were Bonn from 1972 to 1978 and Cologne from 1979 to 1987; in the case of Italy, the surveyed city was Milan for the entire sample period; in the case of the Netherlands, the surveyed cities were Amsterdam from 1972 to 1976 and Hauge from 1977 to 1987; in the case of Switzerland, the surveyed city was Zurich for the entire sample period. We extract the only twenty-five price series from the booklets, eighteen tradables and seven nontradables, which are consistent over time and across cities in terms of units of measurement. Whenever prices are reported as an interval range, we take the mid point as reference price. The overall number of price records from the *Confederation of British Industry* (CBI) used in the analysis is 5,001. Figure A16 presents the prices of three representative goods from the 1972 booklet.

2.4 Prices from the *Economist Intelligence Unit* (EIU)

Since 1990, the *Economist Intelligence Unit* (EIU) has surveyed the retail prices of tradables and nontradables in different cities to compare the cost of living worldwide. The *Economist Intelligence Unit* (EIU) collects the prices through a twice-yearly ongoing survey, however the vast majority of the authors use a version of the survey where the prices are annually averaged (see, for instance, Parsley and Wei 2007 and Crucini and Telmer 2020). From this annual version, we use the prices of the same products we have from the the *Confederation of British Industry* (CBI) to construct twenty-five consistent price series from 1972 to 2019 for the sixteen European countries in our analysis.[5]

[3]The classification is obtained by combining two approaches: a narrative approach and an econometric approach. The narrative approach is based on several historical sources, whereas the econometric approach is based on two structural-break tests and a generalized autoregressive conditional heteroskedasticity (GARCH) model. Pegged exchange-rate regimes are characterized by low (or zero) volatility of nominal exchange rates, whereas floating exchange-rate regimes are characterized by high volatility of nominal exchange rates.

[4]The quote is from the Introduction of the 1987 *Confederation of British Industry* (CBI) booklet *West European Living Costs*.

[5]Given the features of the two price datasets, the combined time series of twenty-five product prices present two time gaps, one between 1984 and 1986—due to the non-existing 1985 *Confederation of British Industry* (CBI) booklet—and one between 1987 and 1990, when there are no prices available from neither the *Confederation of British Industry* (CBI) nor the *Economist Intelligence Unit* (EIU).

For all the European countries, we use the prices from the capital cities with the exception of Italy (Milan) and Switzerland (Zurich) for consistency with the *Confederation of British Industry* (CBI). For the countries in our sample which introduced the euro in 1999—namely, Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, the Netherlands, Portugal and Spain—the *Economist Intelligence Unit* (EIU) reports the product prices in European Currency Unit (ECU), which was a unit of account used by the European Economic Community before the introduction of the euro, from 1990 to 1998. We covert such prices for these countries from the ECU to the currency of the local country. Overall, the number of price records from the *Economist Intelligence Unit* (EIU) used in the analysis for our twenty-five products of interest is 10,976.

Notably, several studies on international price dynamics have already used the *Economist Intelligence Unit* (EIU) as data source—see, among the others, Rogers (2007), Crucini and Shintani (2008), Crucini et al. (2010), Crucini and Yilmazkuday (2014), Engel and Rogers (2014), Crucini and Landry (2019)—since its prices are reported in absolute terms and consistently collected by a single agency over time. A paper specifically related to ours is Crucini and Telmer (2020), which proposes a series of variance decompositions of LOP deviations—across time and goods for bilateral city pairs—without explicitly distinguishing between different monetary regimes.

To show that the data are up to the task of our work and that the *Confederation of British Industry* (CBI) prices are comparable to those from the *Economist Intelligence Unit* (EIU), Figure 1 displays the mean of the twenty-five product-level prices (in local currency) from 1972 to 2019. Most of the time series are well-behaved, with little to no discontinuity after 1987 when the product-level prices come from the *Economist Intelligence Unit* (EIU) rather than the *Confederation of British Industry* (CBI). Only Belgium, the Netherlands, and Switzerland clearly present significantly higher prices on average as a result of the transition from the *Confederation of British Industry* (CBI) to the *Economist Intelligence Unit* (EIU). In the empirical analysis, we explicitly account for this feature of the data by including dataset-specific country fixed effects, namely country indicators interacted with a dummy for the post-1987 period.

Figure A17 reports the corresponding time series for the variance of the twenty-five product-level prices (in local currency). Again, the time series generally present little or no discontinuity between the two sample periods. As confirmation of this, Figure A18 also proposes a comparison between the average volatility of the *Confederation of British Industry* (CBI) and *Economist Intelligence Unit* (EIU) prices.[6] The price volatility for all the twenty-five products is comparable across the two respective sample periods, validating the quality of our product-level prices.

[6]We formally define the volatility of product-level prices in subsection 3.2.

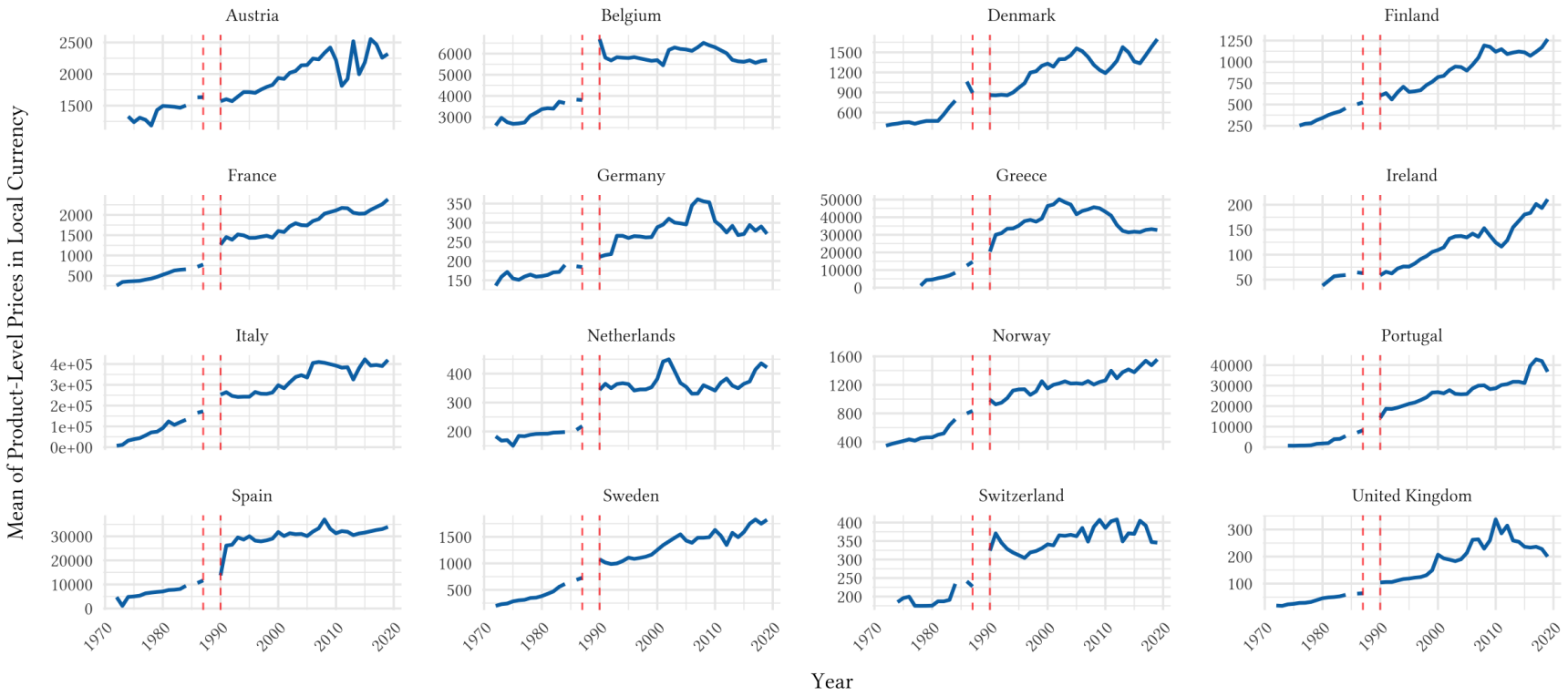


Figure 1: Mean of the twenty-five product-level prices in local currency from 1972 to 2019

Notes: Dashed red lines indicate the transition from the *Confederation of British Industry* (CBI) dataset to the *Economist Intelligence Unit* (EIU) dataset.

3 Empirical Evidence

3.1 The LOP across Monetary Regimes

We compute the product-level real exchange rates for a wide range of products using Germany as the reference (home) country, defining with $Q_{f,k,t}$ the product-level real exchange rate in year t between Germany (home country) and country f (foreign country), based on the prices of product k:

$$Q_{f,k,t} = E_{f,t}\frac{P^*_{f,k,t}}{P_{k,t}}. \tag{1}$$

Here, $Q_{f,k,t}$ is defined as the price of the foreign-country product k in terms of the home-country product k. $E_{f,t}$ is the nominal exchange rate, which is the amount of Deutsche marks bought by one unit of currency in country f. $P^*_{f,k,t}$ and $P_{k,t}$ denote the yearly prices in local currency of product k in country f and Germany at time t, respectively. Hence, our product-level real exchange rate is nothing but the product between the nominal exchange rate and the ratio of prices, in local currency, for product k between a given country f and Germany. We denote this ratio of prices by $\tilde{P}_{f,k,t}$, that is $\tilde{P}_{f,k,t} \equiv \frac{P^*_{f,k,t}}{P_{k,t}}$. In order for the LOP to hold for a product k at time t, between Germany and country f, the product-level real exchange rate should be equal to 1, that is $Q_{f,k,t} = 1$.

In Table 1, we report the summary statistics of the product-level real exchange rates, for each product and monetary regime, in our sample. The means of the product-level real exchange rates are concentrated around 1, validating further the quality of our product-level prices obtained by combining the time series of the *Confederation of British Industry* (CBI) with those of the *Economist Intelligence Unit* (EIU). Nevertheless, LOP deviations are remarkable, resulting in a rejection of the null hypothesis, $Q_k = 1$, at 1% significance level for the majority of the twenty-five products. Table 1 also shows that the means of $Q_{f,k,t}$, for both tradables and nontradables, under pegged regimes are smaller than under floating regimes, with these differences being statistically significant, as formally tested by Table A2. Finally, Table 1 suggests that the real exchange rates are on average significantly higher for nontradables, with these differences being statistically significant according to Table A3. Overall, these patterns suggest that the prices of same products display greater deviations from the LOP in floating regimes compared to pegged regimes, with the effect being more pronounced for nontradables.

This heterogeneity between tradables and nontradables also stems from Crucini and Shintani (2008) and Crucini and Landry (2019). Moreover, the statistics provided in Table 1 complement the results of Cavallo et al. (2014, 2015) which, using scraped internet prices of tradables from 2008 to 2014, documents important deviations from the LOP outside of a currency union (the euro area), even when the nominal exchange rate is pegged. Table 1 is also complementary to Crucini and Telmer (2020), which documents persistent LOP deviations, for both tradables and nontradables, without distinguishing between different monetary regimes.

	Full Sample			Peg Regime			Floating Regime		
	Mean	SD	t-test (H_0: $Q_k = 1$)	Mean	SD	t-test (H_0: $Q_k = 1$)	Mean	SD	t-test (H_0: $Q_k = 1$)
Tradables	1.11	(0.52)	21.97***	1.08	(0.48)	14.33***	1.15	(0.58)	16.87***
Nontradables	1.32	(0.74)	28.06***	1.24	(0.56)	22.08***	1.44	(0.94)	18.78***
Tradables									
Butter	1.20	(0.44)	11.47***	1.21	(0.45)	9.50***	1.18	(0.43)	6.45***
Chicken	1.12	(0.50)	6.08***	1.13	(0.50)	5.03***	1.11	(0.49)	3.42***
Cigarettes	1.11	(0.41)	6.73***	1.03	(0.32)	1.91*	1.23	(0.50)	7.40***
Cooking Oil	0.99	(0.54)	-0.39	0.96	(0.54)	-1.48	1.04	(0.55)	1.22
Eggs	1.15	(0.53)	7.07***	1.09	(0.55)	3.45***	1.23	(0.50)	7.42***
Flour	1.41	(0.85)	12.35***	1.40	(0.79)	10.10***	1.43	(0.94)	7.28***
Milk	1.14	(0.36)	10.09***	1.14	(0.34)	8.29***	1.15	(0.39)	5.87***
Petrol	1.06	(0.16)	9.09***	1.05	(0.17)	6.50***	1.06	(0.16)	6.48***
Potatoes	0.88	(0.40)	-7.27***	0.86	(0.40)	-6.79***	0.92	(0.38)	-3.08***
Shirt	1.18	(0.48)	9.43***	1.18	(0.44)	8.12***	1.18	(0.54)	5.13***
Shoes	1.00	(0.35)	0.19	1.01	(0.35)	0.67	0.99	(0.35)	-0.53
Steak	1.22	(0.64)	8.71***	1.11	(0.45)	4.80***	1.39	(0.83)	7.53***
Sugar	1.11	(0.37)	7.15***	1.09	(0.37)	4.94***	1.13	(0.39)	5.25***
Suit	1.02	(0.43)	1.35	1.09	(0.41)	4.37***	0.92	(0.44)	-3.02***
Summer Dress	0.82	(0.37)	-12.14***	0.84	(0.39)	-8.36***	0.81	(0.32)	-9.45***
TV	1.18	(0.45)	10.01***	1.16	(0.44)	7.23***	1.21	(0.46)	6.98***
Tights	0.84	(0.43)	-9.23***	0.76	(0.40)	-12.02***	0.98	(0.44)	-0.61
Wine	1.47	(0.77)	15.40***	1.34	(0.57)	12.09***	1.66	(0.99)	10.61***
Nontradables									
Cinema Ticket	1.05	(0.38)	3.62***	0.99	(0.30)	-0.81	1.16	(0.47)	5.38***
Haircut (Man)	1.39	(0.69)	14.53***	1.23	(0.51)	8.82***	1.66	(0.84)	12.48***
Hotel Bedroom	1.26	(0.61)	10.77***	1.29	(0.59)	9.88***	1.20	(0.63)	5.00***
House Rent	1.26	(0.60)	10.72***	1.20	(0.53)	7.64***	1.34	(0.70)	7.60***
Office Rent	1.66	(1.50)	8.68***	1.38	(0.75)	7.77***	2.10	(2.13)	6.34***
Restaurant Dinner	1.35	(0.61)	14.73***	1.33	(0.64)	10.32***	1.39	(0.56)	10.97***
Shampoo and Set (Woman)	1.38	(0.60)	16.04***	1.33	(0.52)	12.70***	1.46	(0.71)	10.21***

Notes: The table reports the means, the standard deviations, and the t-tests of the product-level real exchange rates separately by product and monetary regime.

Table 1: Summary statistics for the product-level real exchange rates

3.2 Volatility of Product-Level Real Exchange Rates across Monetary Regimes

Once established these facts about the LOP, we investigate them further and study the volatility of product-level real exchange rates across monetary regimes by explicitly analyzing the relationship between nominal exchange rates, domestic prices, and foreign prices.[7]

Again, we start from Equation (1) and, taking the natural logarithm of both sides of it, we obtain the relationship:

$$q_{f,k,t} = e_{f,t} + \tilde{p}_{f,k,t}. \tag{2}$$

Here, $q_{f,k,t}$ is the natural logarithm of the product-level real exchange rate for product k, $e_{f,t}$ is the natural logarithm of the nominal exchange rate, and $\tilde{p}_{f,k,t}$ is the natural logarithm of the price ratio for product k at time t. Equation 2 posits a linear relationship between the product-level real exchange rate, the nominal exchange rate, and the price ratio for product k at time t.

[7]See Petracchi (2022) for a comparison with consumer-price-index-based real exchange rates and contrast idiosyncratic product-level results with systematic aggregate-level results.

Our dataset, which spans nearly fifty years, gives us the opportunity to examine this relationship across different monetary regimes, when the volatility of nominal exchange rates is low (pegged regime) or high (floating regime). We are interested to understand the effects of a policy change—a monetary-regime break—on the product-level real exchange rates that implies a change not only in the first, but also in the second moment of the generating process for the nominal exchange rate. Consequently, we focus on the absolute value of the logarithmic changes here, since it represents a standard measure of volatility in financial econometrics (see, for instance, Andreou and Ghysels 2002).

Computing the first-difference transformation ($\Delta x_t \equiv x_t - x_{t-1}$) of Equation (2), we can formally define the following relationship:

$$\Delta q_{f,k,t} = \Delta e_{f,t} + \Delta \tilde{p}_{f,k,t}. \tag{3}$$

This equation is, for product k, a relationship between the percentage change of the product-level real exchange rate and the percentage changes of the nominal exchange rate and the price ratio. Finally, we take the absolute value of $\Delta q_{f,k,t}$ in order to measure the volatility of the product-level real exchange rate. Importantly, to remove the influence of measurement errors, we discard from our analysis any value of $|\Delta q_{f,k,t}|$ (and $|\Delta \tilde{p}_{f,k,t}|$) obtained starting from an extremely high volatility in the price ratio, that is when $|\Delta \tilde{p}_{f,k,t}|$ is higher than the 99% percentile in the overall sample distribution.[8]

We first provide descriptive evidence on the average volatility of the product-level real exchange rates across monetary regimes, by pooling together all the observations in our sample. This information is summarized in Figure A19, which documents that the volatility of the real exchange rate for each product is in most instances higher under floating than under pegged regimes. Overall, the average volatility of the product-level real exchange rates in our sample is 13.4% under pegged and 15.3% under floating regimes, whereas the average volatility of the price ratios in our sample is 13.4% under pegged and 14.6% under floating regimes. These estimates are considerably higher than those associated with the nominal exchange rates, the average volatility of which stands at 1.1% under pegged and 6.6% under floating regimes in our sample. Remarkably, this finding—that is, product-level real exchange rates are on average more volatile than the nominal exchange rate—is in line with Burstein and Jaimovich (2009), which focuses on the US-dollar/Canadian-dollar exchange rate over the 2004-2006 period and on a single retailer only.

Although already highlighting a remarkable difference in the volatility of the exchange rates across monetary regimes, these annual averages do not account for neither country-specific heterogeneity in volatility rates, nor for shocks to prices in local currency. Ultimately, they risk of identifying the effects of monetary-regime breaks on the volatility of product-level exchange rates improperly. Indeed, these effects are better identified by Equation (4):

$$|\Delta q_{f,k,t}| = \beta FLOATING_{f,t} + \lambda_{k,t} + \alpha_f + \alpha_f * I(t \geq 1990) + \varepsilon_{f,k,t}. \tag{4}$$

[8]This removal implies a loss of 148 observations out of a total of 14,843.

The main covariate of our specification is $FLOATING_{f,t}$, which corresponds to a dummy variable taking the value of one if country f had a floating exchange-rate regime in year t. Thus, our focus of interest will be the parameter β, measuring whether and to what extent passing from a pegged to a floating exchange-rate regime changes the volatility of the product-level real exchange rates. $\lambda_{k,t}$ is a vector of dummy variables for each product-year pair. The inclusion of $\lambda_{k,t}$ is particularly important; not only it controls for the idiosyncratic shocks to the volatility of the product k's real exchange rate, but also for their evolution over time. For instance, $\lambda_{k,t}$ controls for all possible product-specific yearly shocks to volatility, such as the oil shocks in the seventies or the grain embargo of the 1980.

Similarly, α_f are country-level fixed effects, which we interact with a dummy variable for the 1990-2019 period—$I(t \geq 1990)$—when our price data come from the *Economist Intelligence Unit* (EIU) rather than the *Confederation of British Industry* (CBI). By doing so, we account for all the unobservable country traits that separately influence the volatility over our two time windows, thus also for any difference in the price collection process between the *Confederation of British Industry* (CBI) and *Economist Intelligence Unit* (EIU) datasets (see Figure 2 and Figure A1 in the Appendix). As a robustness check, we also experiment by replacing α_f and $\alpha_f * I(t \geq 1990)$ with their interactions with product-level indicators, in order to account for product-level differences across countries. We estimate Equation (4) by OLS and by clustering the standard errors at the country level, which provides us with the source of variation in our variable of interest $FLOATING_{f,t}$.

OLS estimates of Equation 4 are reported in Table 2. Column 1 of Table 2 focuses on the association between monetary-regime breaks and the volatility of the nominal exchange rates. To compute the volatility of the nominal exchange rates, we use the first difference of the natural logarithm of the nominal exchange rate in absolute value—that is, $|\Delta e_{f,t}|$—and, because this analysis does not involve any product price, it is performed at the country level only, relying on a total of 630 observations. For the same reason, the specification that we estimate to study the association between monetary-regime breaks and the volatility of the nominal exchange rates relies on a single vector of country dummy variables α_f, which does not get interacted with any dummy variable for the 1990-2019 period. The coefficient associated with floating regimes is positive and statistically significant at the 1% level, with the annual volatility of nominal exchange rates being 5.5% higher under floating regimes compared to pegged regimes.

Replicating the exercise for the volatility of relative prices, that is $|\Delta \tilde{p}_{f,k,t}|$, does not return the same result. The coefficient of the dummy variable $FLOATING_{f,t}$, reported in Column 2 of Table 2, is in fact positive but not statistically significant at any conventional level. Hence, monetary-regime breaks appear to change the volatility of the nominal exchange rates, but not that of relative prices $\tilde{P}_{f,k,t}$.

Finally, the coefficient displayed in Column 3 of Table 2 indicates that floating regimes are characterized by a higher volatility of the product-level real exchange rates. The coefficient suggests that the volatility of the product-level real exchange rates is higher by 1.6% under floating than pegged regimes. Although this effect is 71% smaller in magnitude than that on the nominal exchange rates, it is still positive and statistically significant at the 5% level.

	Volatility		
	Nominal Exchange Rate ($\lvert\Delta e_{f,t}\rvert$) (1)	Relative Prices ($\lvert\Delta \tilde{p}_{f,k,t}\rvert$) (2)	Real Exchange Rates ($\lvert\Delta q_{f,k,t}\rvert$) (3)
Floating Regime	0.055***	0.007	0.016**
	(0.009)	(0.006)	(0.006)
Year-Product Fixed Effects	✓	✓	✓
Country Fixed Effects	✓	✓	✓
Observations	630	14,695	14,695

Notes: The table reports the OLS estimates of the association between monetary-regime breaks (from pegged to floating regimes or the other way around) and the volatility of nominal exchange rates (Column 1), relative prices (Column 2), and product-level real exchange rates (Column 3). The analysis window goes from 1972 to 2019. Standard errors, clustered at the country level, are reported in parenthesis. Significance levels: * 0.1; ** 0.05 *** 0.01.

Table 2: Results from Equation (4)

Overall, the set of findings summarized by Table 2 suggests that firms only partially change prices to compensate for larger nominal exchange-rate fluctuations, induced by monetary-regime breaks, making the volatility of relative prices statistically indistinguishable across regimes. The same exact conclusions can be drawn from Table A4 in the Appendix, reporting the results of an augmented model specification with country-product fixed effects, interacted with an indicator for the 1990-2019 period, the inclusion of which have little to no impact on the estimates of interest.

Similar results are also displayed in Table A5, which replicates the analysis described above without the inclusion of the country-level fixed effects α_f (and their interactions with the 1990-2019 dummy variable) on the right-hand side of Equation (4). If anything, failing to control for cross-country heterogeneity makes the estimated association with the volatility of the nominal exchange rates smaller in magnitude. On the contrary, the exclusion of country fixed effects from Equation (4) makes the association with both the volatility of relative prices and that of the product-level real exchange rates higher in magnitude.[9]

As a robustness check, Table A6 reports the estimates of Equation (4) after removing one product at a time from the sample, in order to make sure that dropping even a small proportion of our sample, that is a product, does not change our results. Similarly, Table A7 experiments by removing one country at a time from the analysis sample. Again, the results are consistent with those provided in Table 2, with the association between monetary-regime breaks and the volatility of the product-level real exchange rates that ranges from 1.4% to 2.0% on average.

By interacting our coefficient of interest with an indicator variable for the 1999-2019 period, Table A8 finally shows that our findings hold both before and after January 1999, a landmark date for the European Union and a potentially confounding event in our analysis.[10]

[9] Furthermore, the association with the volatility of relative prices becomes statistically significant at the 10% level, thus suggesting that floating exchange-rate regimes might unconditionally present even slightly more volatile prices than pegged regimes.

[10] The euro area was formally introduced on January 1, 1999. The economic convergence of the European Union member countries could have in fact lowered the volatility of the product-level real exchange rates per se, independently of the monetary-regime breaks preceding the introduction of the euro (see Table A1).

3.2.1 Tradables and Nontradables

In this subsection, we investigate the implications of our empirical model for volatility—Equation (4)—separately for tradables and nontradables which, due to their different exposure to international markets, may uncover relevant heterogeneity reinforcing our previous results. For this reason, Columns 1 and 2 of Table 3 display the estimates of an augmented specification in which the dummy variable for floating regimes has been interacted with a dummy variable for tradable products. The results of this analysis suggest that the volatility of the product-level real exchange rates is higher in floating regimes than in pegged regimes, especially when the product-level real exchange rates are computed using the prices of nontradables.

Indeed, the coefficient in Column 2 of Table 3, associated with the interaction term introduced above, is negative and statistically significant at the 5% level. More specifically, the estimates provided in Table 3 suggest that, on average, under floating regimes the volatility of the product-level real exchange rates is 1.3% and 2.4% higher when the product-level real exchange rates are computed using the prices of tradables and nontradables, respectively. Instead, the results displayed in Column 1 of Table 3 do not document any significant relationship between monetary-regime breaks and the volatility of relative prices, which overall appear unaltered no matter whether we put the focus on tradables or nontradables.

By generally highlighting a stronger association between monetary-regime breaks and the volatility of the product-level real exchange rates of nontradables, the findings provided in Table 3 seem to suggest that the prices of tradables are likely to respond more to monetary-regime breaks than the prices of nontradables. However, this response in the prices of tradables is not strong enough to offset the larger fluctuations in nominal exchange rates that characterize floating regimes. We attempt to formally test this hypothesis, estimating the following specification in first differences using the entire sample and each monetary regime separately:

$$\Delta\tilde{p}_{f,k,t} = \theta_1(\Delta e_{f,t} * NT_k) + \theta_2(\Delta e_{f,t} * T_k) + \lambda_{k,t} + \alpha_f + \alpha_f * I(t \geq 1990) + u_{f,k,t}. \quad (5)$$

NT_k is a dummy variable for nontradables, T_k is a dummy for tradables, whereas $u_{f,k,t}$ is the error term. $\lambda_{k,t}$ and α_f are again vectors of product-year and country fixed effects, respectively.[11]

θ_1 and θ_2 are our parameters of interest, as they identify how relative prices respond to fluctuations in the nominal exchange rates, respectively for nontradables and tradables. If relative prices at least partially offset fluctuations in the nominal exchange rates, then θ_1 and θ_2 should be negatively signed. Moreover, there should be no significant difference between θ_1 and θ_2 across pegged and floating regimes if the monetary regime does not affect firms' pricing.

[11] By expressing Equation 5 in first differences, we ensure that both relative prices and nominal exchange rates are stationary processes, thereby eliminating the risk of identifying a spurious relationship between them.

	Volatility	
	Relative Prices ($\lvert\Delta\tilde{p}_{f,k,t}\rvert$) (1)	Real Exchange Rates ($\lvert\Delta q_{f,k,t}\rvert$) (2)
Floating Regime	0.010	0.024***
	(0.007)	(0.008)
Floating Regime * Tradable	-0.004	-0.011**
	(0.004)	(0.004)
Year-Product Fixed Effects	✓	✓
Country Fixed Effects	✓	✓
Observations	14,695	14,695

Notes: The table reports the OLS estimates of the association between monetary-regime breaks (from pegged to floating regime or the other way around) and the volatility of relative prices (Column 1) and product-level real exchange rates (Column 2), separately for tradable and nontradable products. The analysis includes 18 tradables and 7 nontradables and goes from 1972 to 2019. Standard errors, clustered at the country level, are reported in parenthesis. Significance levels: * 0.1; ** 0.05 *** 0.01.

Table 3: Tradables versus nontradables from 1972 to 2019

The values of θ_1 and θ_2, estimated using the full sample, are graphically summarized by the left panel of Figure 2, indicating that a 1% increase (decrease) in the nominal exchange-rate fluctuations is associated with a 0.11% decrease (increase) in the changes of relative prices for tradables. Instead, Figure 2 suggests that the relative prices of nontradables do not significantly respond to nominal-exchange rate fluctuations. These results highlight a stronger response of the relative prices of tradables than that of nontradables, a difference which is even statistically significant at the 10% level.[12] Our findings are further supported by the other panels of Figure 2, which display the OLS estimates of θ_1 and θ_2 when Equation (5) gets estimated using observations *within the same monetary regime* only. These results indicate that most of the heterogeneity mentioned above—between the magnitude of the price responses of tradables and nontradables—stems from periods under floating regimes, when the changes in prices of tradables present a negative and significant correlation with fluctuations in the nominal exchange rates; under pegged regimes, the relative price responses of both tradables and nontradables are statistically indistinguishable from zero.

Since the presence of long-term contracts, nominal rigidities, or other frictions might prevent prices from fully adjusting to contemporaneous nominal exchange-rate fluctuations, we exploit the long-time dimension of our 1972-2019 dataset even further and examine how relative prices dynamically respond to *past* nominal exchange-rate fluctuations. To investigate this mechanism, we replace $\Delta e_{f,t}$ in Equation (5) with alternative lag specifications. The results are reported in Table A9 for the full sample, in Table A10 for floating regimes, and in Table A11 for pegged regimes. When focusing on a specific monetary regime (floating or pegged), we restrict the sample so that all time periods between t and $t-l$, with l being the lag at which the nominal exchange rate gets measured, fall under the same monetary regime.

[12] A Wald test for $\theta_1 = \theta_2$ is in fact rejected with a p-value of 0.085.

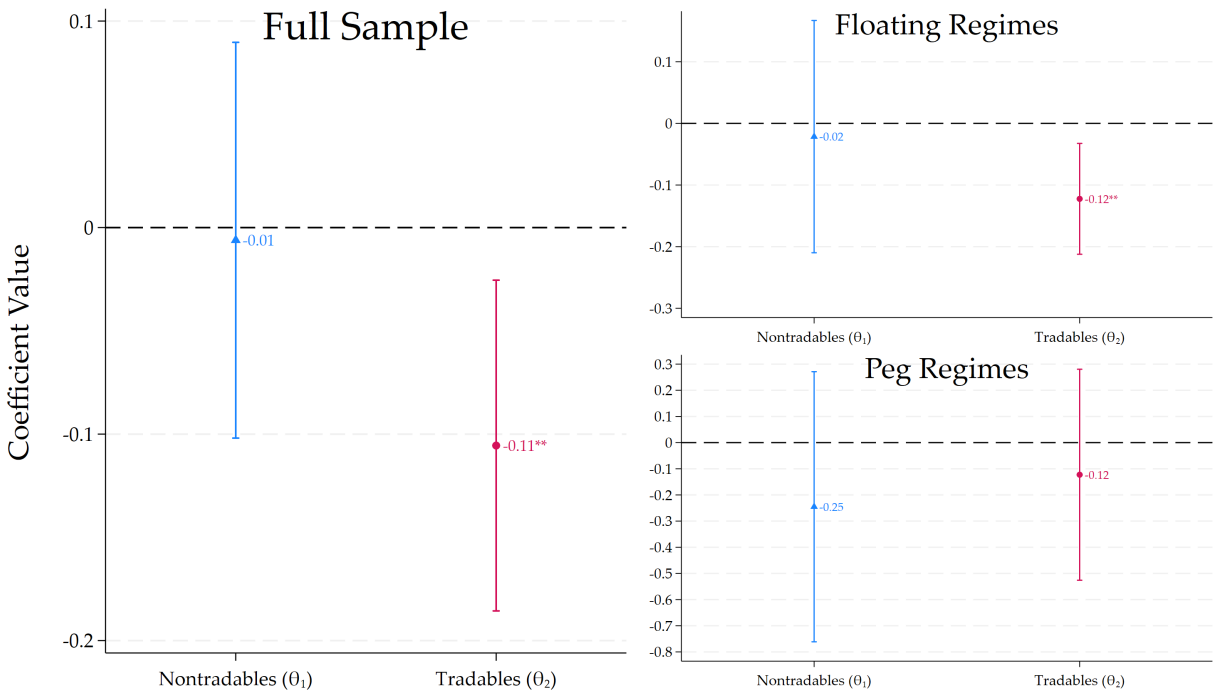


Figure 2: Estimates of θ_1 and θ_2 with 95% confidence intervals from Equation (5)

Even after accounting for delayed price adjustments, the results indicate that relative prices do not fully offset nominal exchange-rate fluctuations under either floating or pegged regimes. Moreover, unlike the case with contemporaneous responses in floating regimes, the price adjustments of tradables and nontradables do not seem to exhibit clearly distinct patterns anymore.

4 Conclusions

This paper uses a novel dataset of European product-level prices for the period from 1972 to 2019 to study how monetary-regime breaks change the volatility of the real exchange rates at the product level. We find that the annual volatility of the product-level real exchange rates under floating regimes is 1.6% higher than under pegged regimes and generally appears stronger when the product-level real exchange rates get computed using the prices of nontradables. Although these results might not be generalizable to other contexts outside Europe (for example, developing economies), they are consistent and complement the existing literature on monetary regimes and deviations from the LOP, which in our analysis fails to hold especially in floating regimes and for nontradables. Our set of results therefore provides insights on how we should model these phenomena in general equilibrium models of exchange rate determination and the role of the real exchange rate in the growth process.

Monetary-regime breaks leave the volatility of relative prices unchanged, but alter the volatility of product-level real exchange rates. What are the implications for the volatility of final consumers' allocations? The answer to this question must be at least consistent with the results of Baxter and Stockman (1989) and with the Backus and Smith (1993) puzzle, namely the zero (or negative) empirical comovement between the consumption difference across countries and the real exchange rate. This puzzle contradicts the prediction of complete-market models stating that, with full risk sharing, consumption difference across countries should perfectly correlate with the real exchange rate. For instance, two assumptions to replicate deviations from the LOP and the Backus and Smith (1993) puzzle in a theoretical model are pricing-to-market (PTM), following Kimball (1995) or Atkeson and Burstein (2008), and imperfect international financial markets à la Gabaix and Maggiori (2015).[13]

A natural conjecture moving behind this reasoning, if one assumes PTM and imperfect international financial markets, is that exporter firms are the model agents which absorb the nominal exchange-rate fluctuations coming from international financial markets under floating regimes. Indeed, Petracchi (2026) shows that PTM and the operational hedging of the exporter firms are two of three sufficient assumptions—together with imperfect international financial markets—which result crucial to match the dynamics of real macro variables across different monetary regimes, in a general equilibrium model of exchange rate determination. However, there is no empirical study quantifying the importance of these two channels across different monetary regimes, since such analysis requires firm-level data on price setting decisions over a long time period. We leave these considerations for future work.

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[13] Akinci et al. (2023) also emphasize intermediation frictions in the presence of long-lived financial intermediaries that face leverage constraints, whereas Minetti et al. (2025) provides a framework to understand the determinants and aggregate implications of international lending flows.

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Online Appendix

Country	Breaks	Country	Breaks
Austria	No Break *Pegged Exchange Rate Regime*	Netherlands	No Break *Pegged Exchange Rate Regime*
Belgium	No Break *Pegged Exchange Rate Regime*	Norway	December 12, 1978 *Exit from the Snake*
Denmark	No Break *Pegged Exchange Rate Regime*	Portugal	February 12, 1973 *Breakdown of the Bretton Woods System*
Finland	February 12, 1973 *Breakdown of the Bretton Woods System*		November 10, 1987 *Accession to the Exchange Rate Mechanism*
	January 1, 1999 *Introduction of the Euro*	Spain	February 12, 1973 *Breakdown of the Bretton Woods System*
France	November 20, 1978 *Introduction of the Exchange Rate Mechanism*		January 1, 1999 *Introduction of the Euro*
Greece	February 12, 1973 *Breakdown of the Bretton Woods System*	Sweden	August 28, 1977 *Exit from the Snake*
	July 1, 1985 *Accession to the Exchange Rate Mechanism*	Switzerland	February 12, 1973 *Breakdown of the Bretton Woods System*
Ireland	November 20, 1978 *Introduction of the Exchange Rate Mechanism*	United Kingdom	No Break *Floating Exchange Rate Regime*
	August 2, 1993 *Loosening of the Exchange Rate Mechanism*		
	January 1, 1999 *Introduction of the Euro*		
Italy	February 13, 1973 *Exit from the Snake*		
	November 20, 1978 *Introduction of the Exchange Rate Mechanism*		
	September 17, 1992 *Exit from the Exchange Rate Mechanism*		
	November 25, 1996 *Re-accession the Exchange Rate Mechanism*		

Table A1: Monetary-Regime breaks

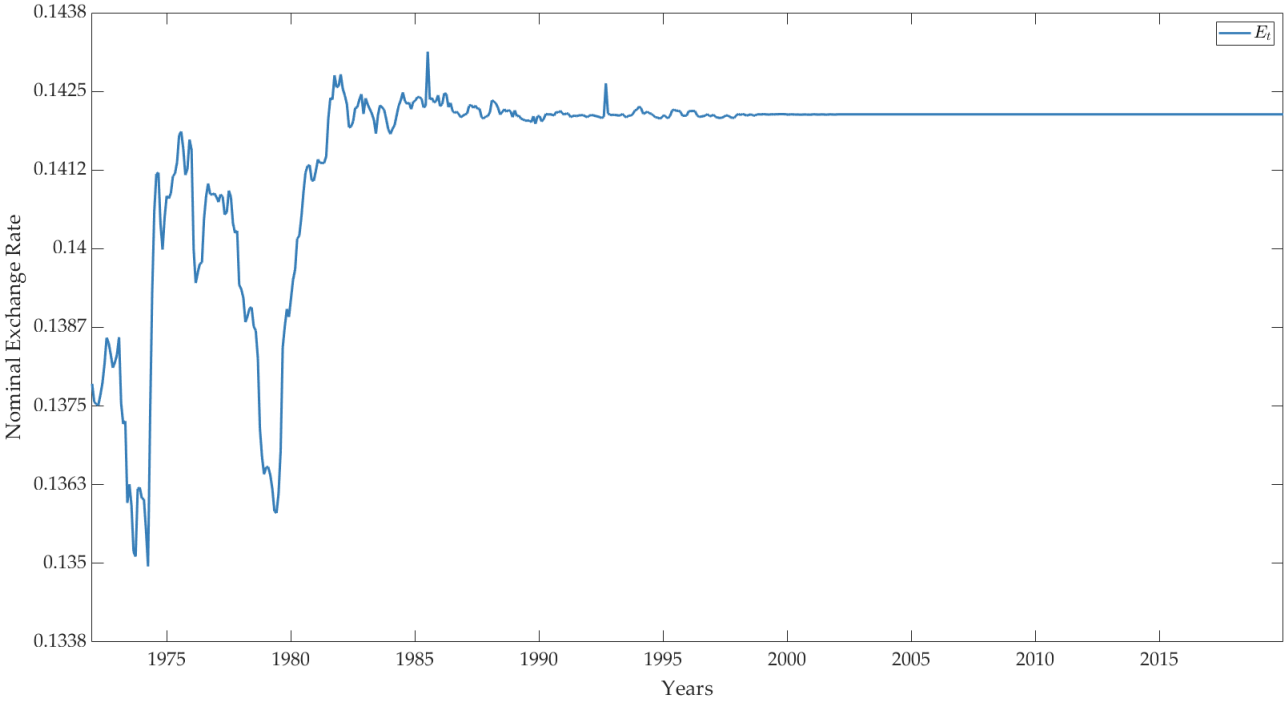


Figure A1: Nominal exchange rate between Austria (Foreign Country) and Germany (Home Country)

Notes: The monthly nominal exchange-rate series is in levels and represents the amount of Deutsche marks bought by one unit of Austrian schilling. Non-shaded (white) areas represent periods with pegged exchange-rate regimes, shaded (gray) areas represent periods with floating exchange-rate regimes, and vertical lines represent monetary-regime breaks. Monetary-regime breaks are identified by Petracchi (2022) by combing two approaches: a narrative approach and an econometric approach. The narrative approach is based on several historical sources, whereas the econometric approach is based on two structural-break tests and a generalized autoregressive conditional heteroskedasticity (GARCH) model applied to the monthly logarithmic changes of exchange rates.
Source: The Exchange Rates Portal of the Bank of Italy.

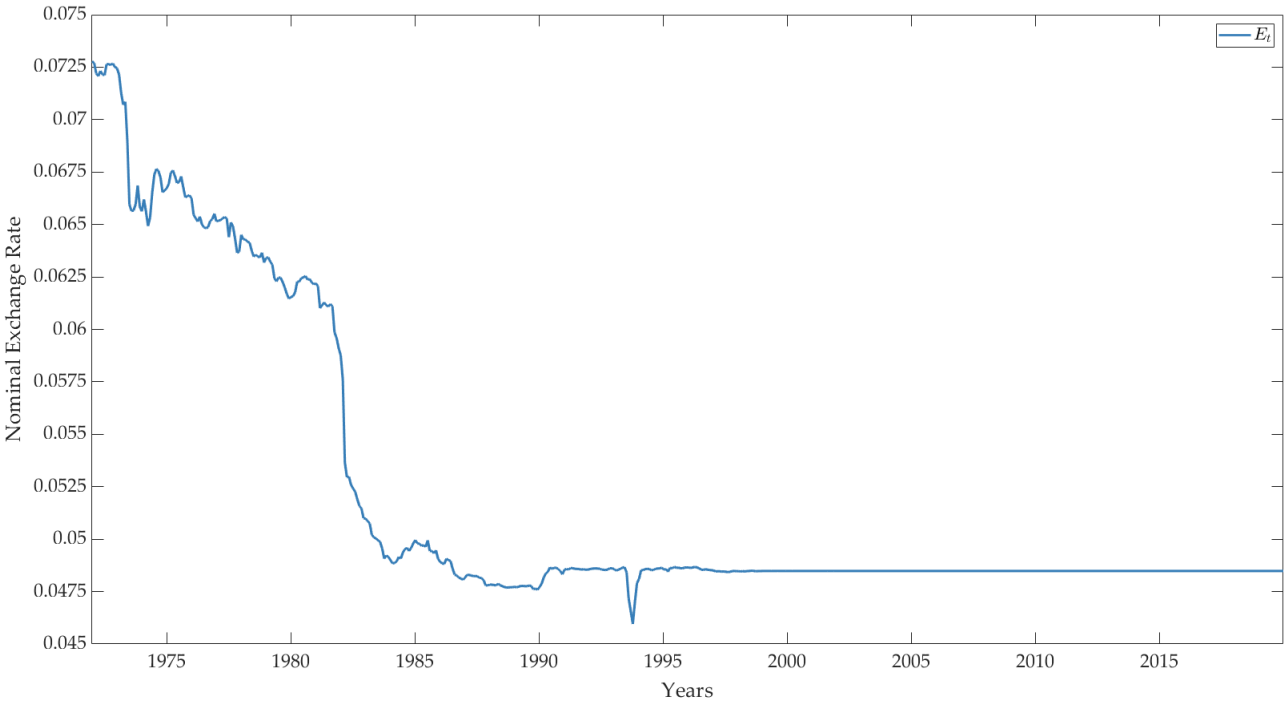


Figure A2: Nominal exchange rate between Belgium (Foreign Country) and Germany (Home Country)

Notes: The monthly nominal exchange-rate series is in levels and represents the amount of Deutsche marks bought by one unit of Belgian franc. Non-shaded (white) areas represent periods with pegged exchange-rate regimes, shaded (gray) areas represent periods with floating exchange-rate regimes, and vertical lines represent monetary-regime breaks. Monetary-regime breaks are identified by Petracchi (2022) by combing two approaches: a narrative approach and an econometric approach. The narrative approach is based on several historical sources, whereas the econometric approach is based on two structural-break tests and a generalized autoregressive conditional heteroskedasticity (GARCH) model applied to the monthly logarithmic changes of exchange rates.
Source: The Exchange Rates Portal of the Bank of Italy.

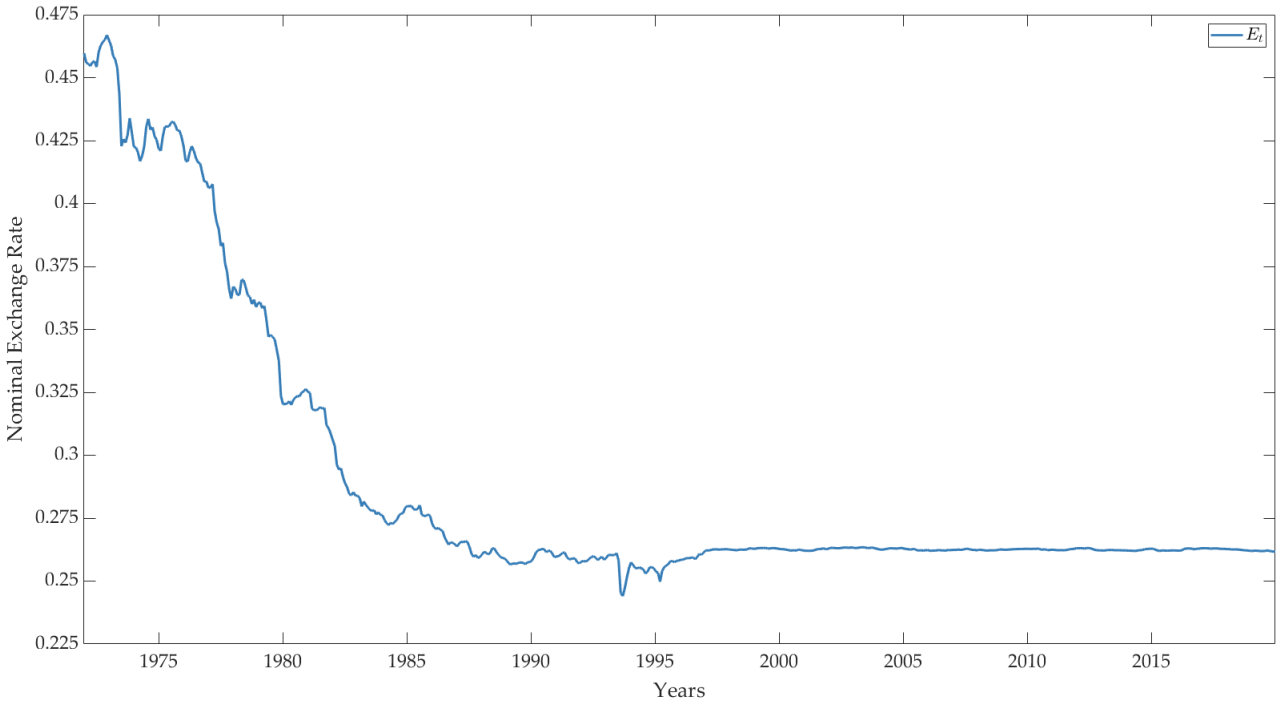


Figure A3: Nominal exchange rate between Denmark (Foreign Country) and Germany (Home Country)

Notes: The monthly nominal exchange-rate series is in levels and represents the amount of Deutsche marks bought by one unit of Danish krone. Non-shaded (white) areas represent periods with pegged exchange-rate regimes, shaded (gray) areas represent periods with floating exchange-rate regimes, and vertical lines represent monetary-regime breaks. Monetary-regime breaks are identified by Petracchi (2022) by combing two approaches: a narrative approach and an econometric approach. The narrative approach is based on several historical sources, whereas the econometric approach is based on two structural-break tests and a generalized autoregressive conditional heteroskedasticity (GARCH) model applied to the monthly logarithmic changes of exchange rates.
Source: The Exchange Rates Portal of the Bank of Italy.

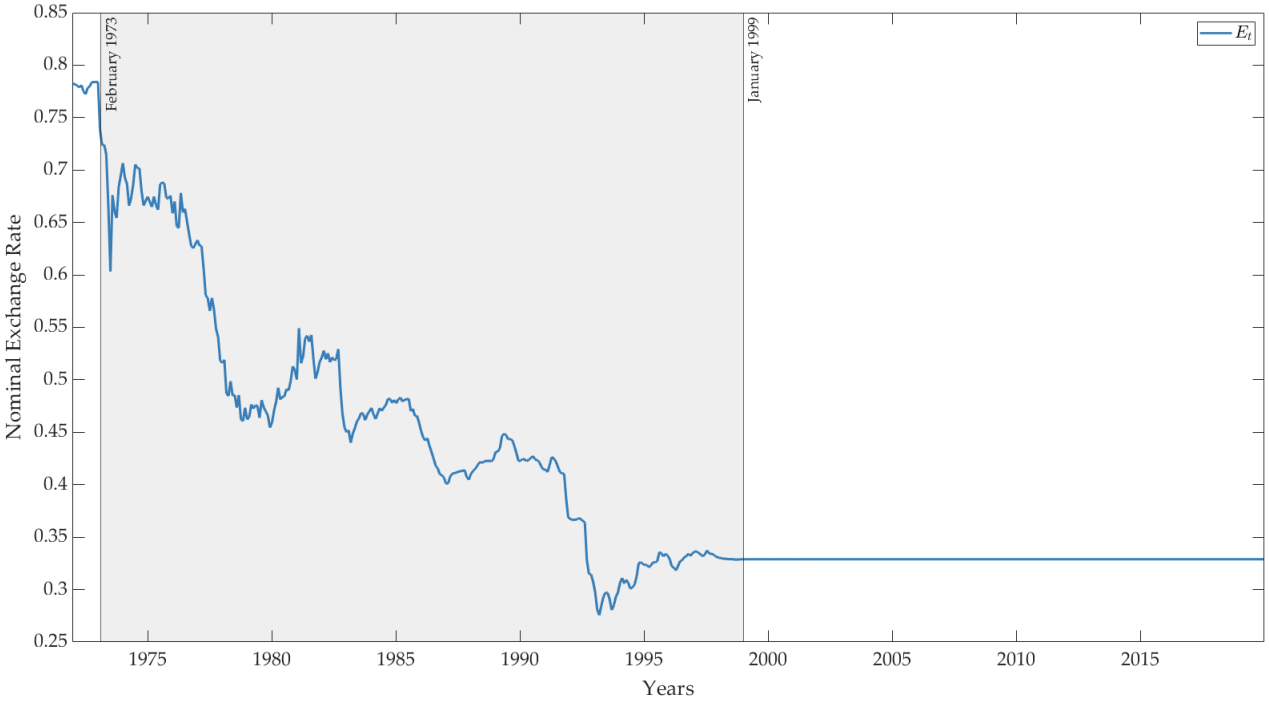


Figure A4: Nominal exchange rate between Finland (Foreign Country) and Germany (Home Country)

Notes: The monthly nominal exchange-rate series is in levels and represents the amount of Deutsche marks bought by one unit of Finnish markka. Non-shaded (white) areas represent periods with pegged exchange-rate regimes, shaded (gray) areas represent periods with floating exchange-rate regimes, and vertical lines represent monetary-regime breaks. Monetary-regime breaks are identified by Petracchi (2022) by combing two approaches: a narrative approach and an econometric approach. The narrative approach is based on several historical sources, whereas the econometric approach is based on two structural-break tests and a generalized autoregressive conditional heteroskedasticity (GARCH) model applied to the monthly logarithmic changes of exchange rates.
Source: The Exchange Rates Portal of the Bank of Italy.

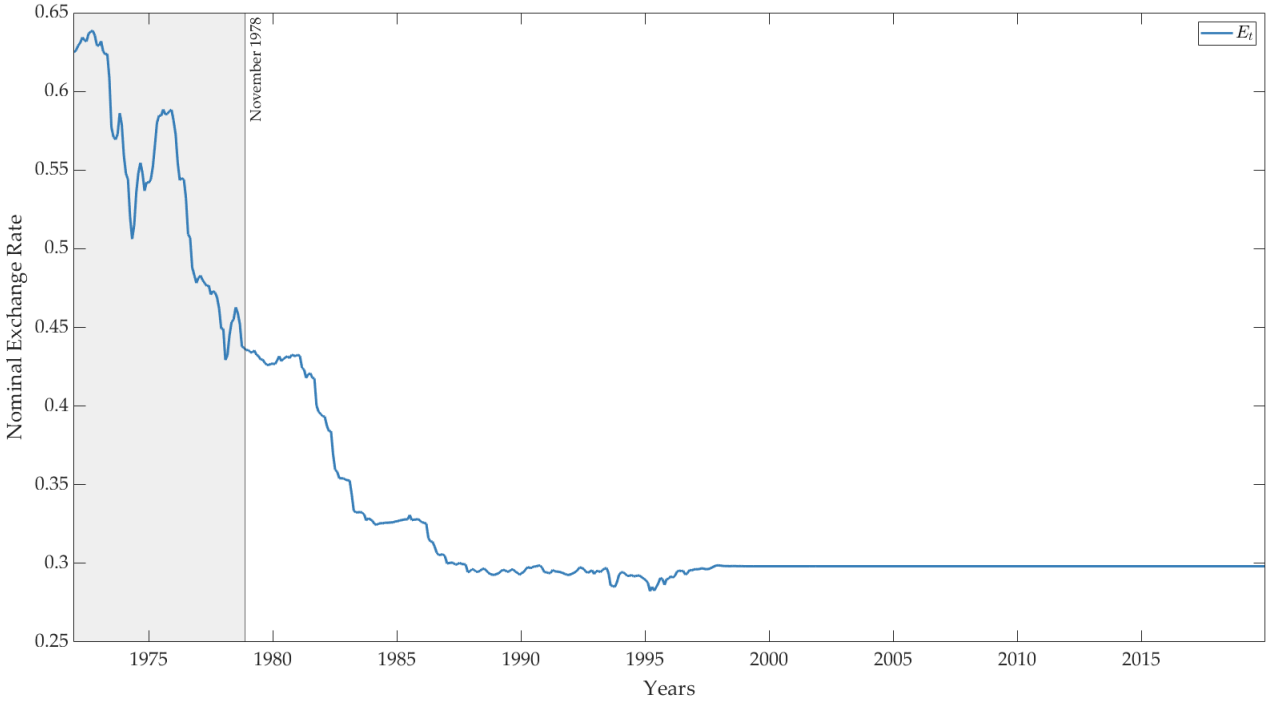


Figure A5: Nominal exchange rate between France (Foreign Country) and Germany (Home Country)

Notes: The monthly nominal exchange-rate series is in levels and represents the amount of Deutsche marks bought by one unit of French franc. Non-shaded (white) areas represent periods with pegged exchange-rate regimes, shaded (gray) areas represent periods with floating exchange-rate regimes, and vertical lines represent monetary-regime breaks. Monetary-regime breaks are identified by Petracchi (2022) by combing two approaches: a narrative approach and an econometric approach. The narrative approach is based on several historical sources, whereas the econometric approach is based on two structural-break tests and a generalized autoregressive conditional heteroskedasticity (GARCH) model applied to the monthly logarithmic changes of exchange rates.
Source: The Exchange Rates Portal of the Bank of Italy.

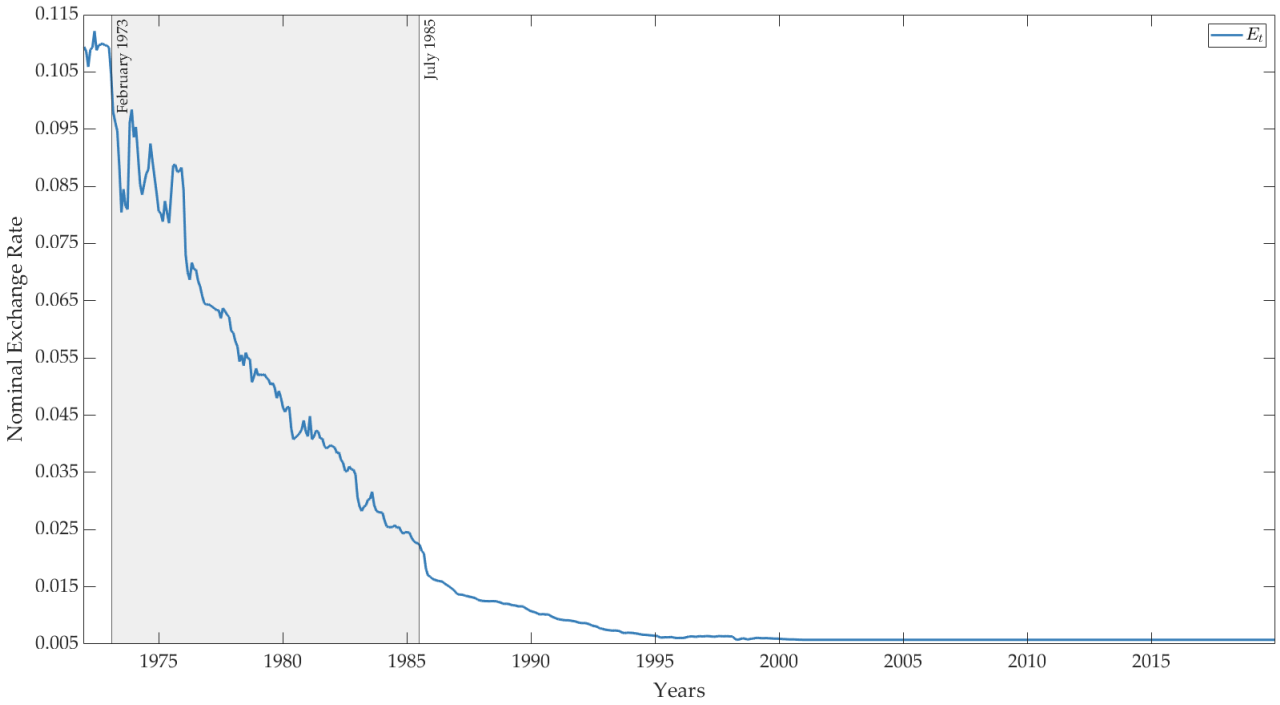


Figure A6: Nominal exchange rate between Greece (Foreign Country) and Germany (Home Country)

Notes: The monthly nominal exchange-rate series is in levels and represents the amount of Deutsche marks bought by one unit of Greek drachma. Non-shaded (white) areas represent periods with pegged exchange-rate regimes, shaded (gray) areas represent periods with floating exchange-rate regimes, and vertical lines represent monetary-regime breaks. Monetary-regime breaks are identified by Petracchi (2022) by combing two approaches: a narrative approach and an econometric approach. The narrative approach is based on several historical sources, whereas the econometric approach is based on two structural-break tests and a generalized autoregressive conditional heteroskedasticity (GARCH) model applied to the monthly logarithmic changes of exchange rates.
Source: The Exchange Rates Portal of the Bank of Italy.

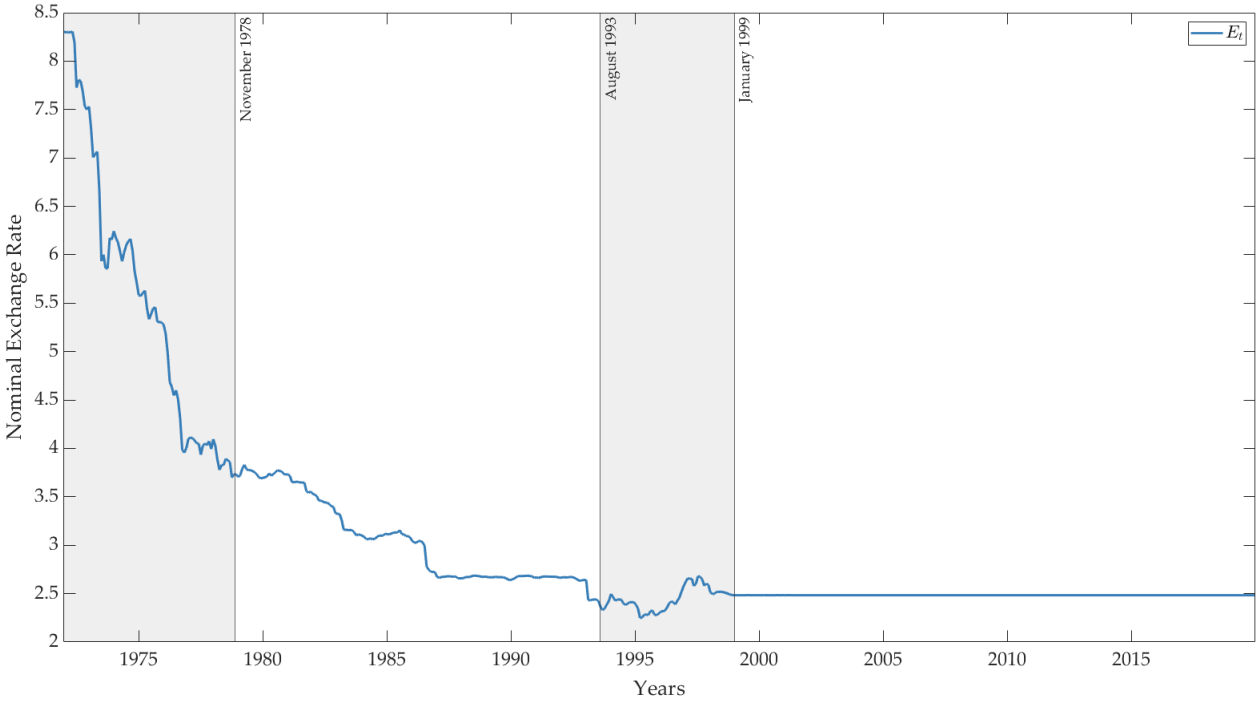


Figure A7: Nominal exchange rate between Ireland (Foreign Country) and Germany (Home Country)

Notes: The monthly nominal exchange-rate series is in levels and represents the amount of Deutsche marks bought by one unit of Irish pound. Non-shaded (white) areas represent periods with pegged exchange-rate regimes, shaded (gray) areas represent periods with floating exchange-rate regimes, and vertical lines represent monetary-regime breaks. Monetary-regime breaks are identified by Petracchi (2022) by combing two approaches: a narrative approach and an econometric approach. The narrative approach is based on several historical sources, whereas the econometric approach is based on two structural-break tests and a generalized autoregressive conditional heteroskedasticity (GARCH) model applied to the monthly logarithmic changes of exchange rates.
Source: The Exchange Rates Portal of the Bank of Italy.

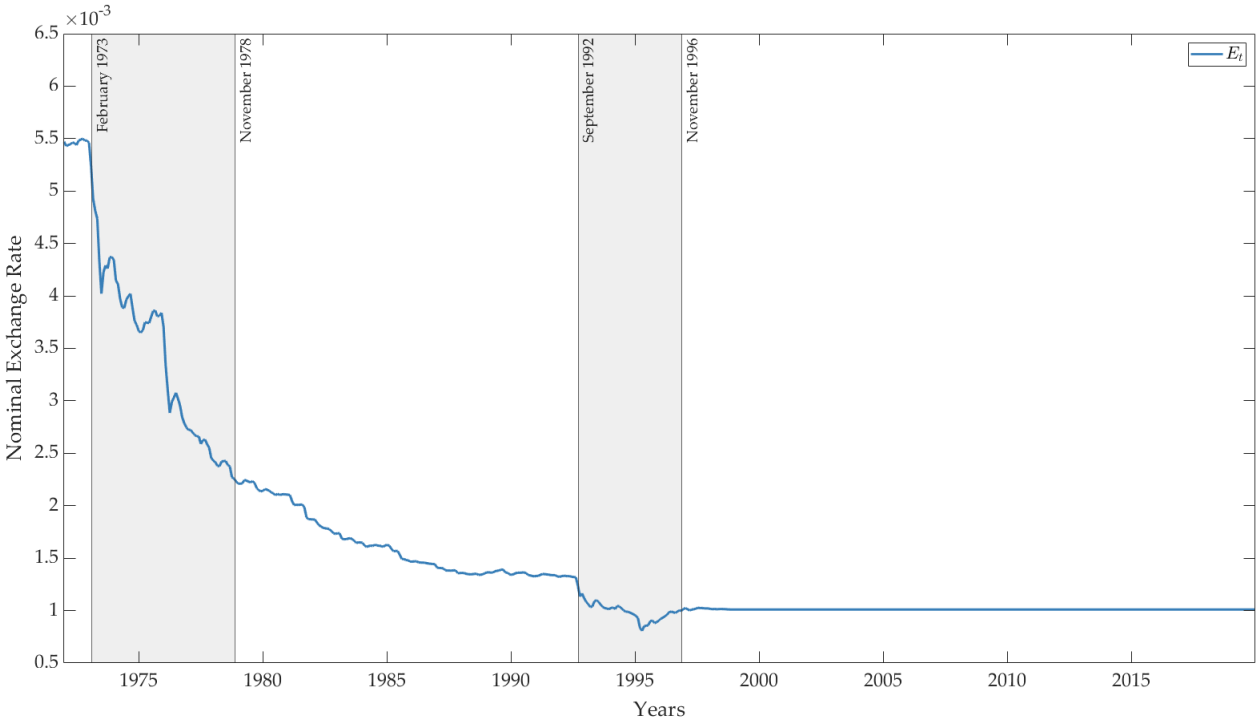


Figure A8: Nominal exchange rate between Italy (Foreign Country) and Germany (Home Country)

Notes: The monthly nominal exchange-rate series is in levels and represents the amount of Deutsche marks bought by one unit of Italian lira. Non-shaded (white) areas represent periods with pegged exchange-rate regimes, shaded (gray) areas represent periods with floating exchange-rate regimes, and vertical lines represent monetary-regime breaks. Monetary-regime breaks are identified by Petracchi (2022) by combing two approaches: a narrative approach and an econometric approach. The narrative approach is based on several historical sources, whereas the econometric approach is based on two structural-break tests and a generalized autoregressive conditional heteroskedasticity (GARCH) model applied to the monthly logarithmic changes of exchange rates.
Source: The Exchange Rates Portal of the Bank of Italy.

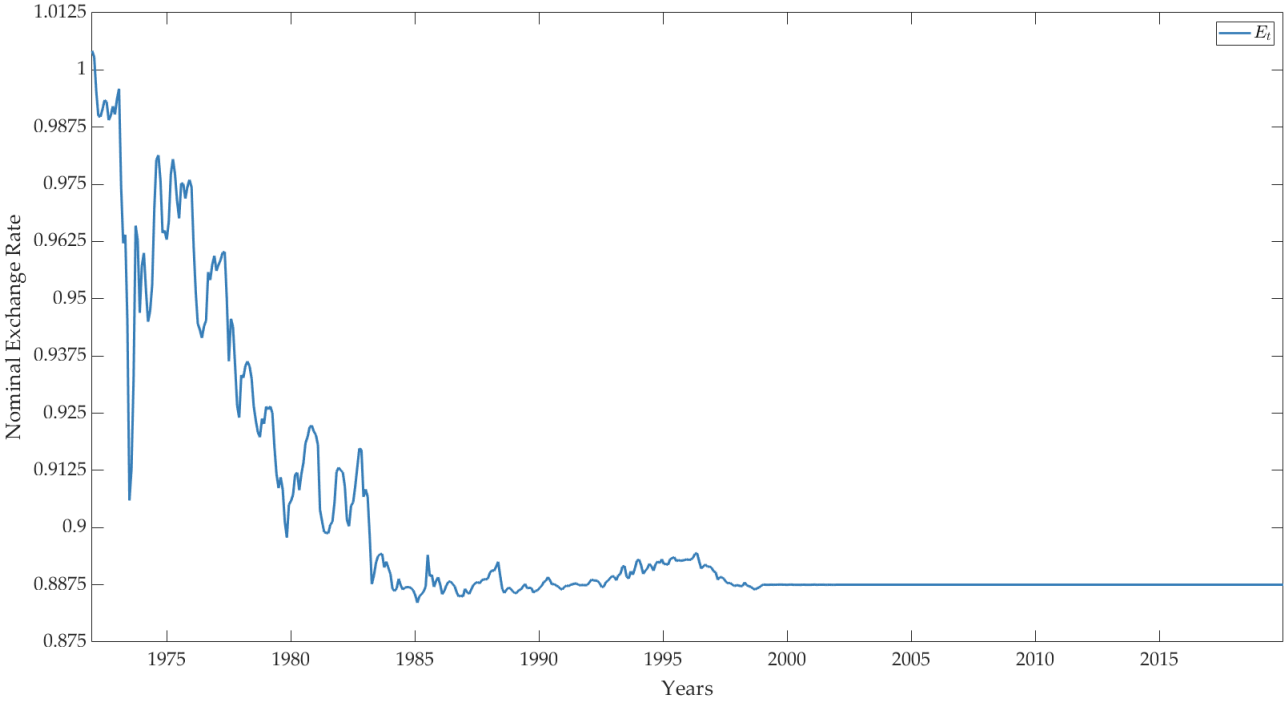


Figure A9: Nominal exchange rate between Netherlands (Foreign Country) and Germany (Home Country)

Notes: The monthly nominal exchange-rate series is in levels and represents the amount of Deutsche marks bought by one unit of Dutch guilder. Non-shaded (white) areas represent periods with pegged exchange-rate regimes, shaded (gray) areas represent periods with floating exchange-rate regimes, and vertical lines represent monetary-regime breaks. Monetary-regime breaks are identified by Petracchi (2022) by combing two approaches: a narrative approach and an econometric approach. The narrative approach is based on several historical sources, whereas the econometric approach is based on two structural-break tests and a generalized autoregressive conditional heteroskedasticity (GARCH) model applied to the monthly logarithmic changes of exchange rates.
Source: The Exchange Rates Portal of the Bank of Italy.



Figure A10: Nominal exchange rate between Norway (Foreign Country) and Germany (Home Country)

Notes: The monthly nominal exchange-rate series is in levels and represents the amount of Deutsche marks bought by one unit of Norwegian krone. Non-shaded (white) areas represent periods with pegged exchange-rate regimes, shaded (gray) areas represent periods with floating exchange-rate regimes, and vertical lines represent monetary-regime breaks. Monetary-regime breaks are identified by Petracchi (2022) by combing two approaches: a narrative approach and an econometric approach. The narrative approach is based on several historical sources, whereas the econometric approach is based on two structural-break tests and a generalized autoregressive conditional heteroskedasticity (GARCH) model applied to the monthly logarithmic changes of exchange rates.
Source: The Exchange Rates Portal of the Bank of Italy.

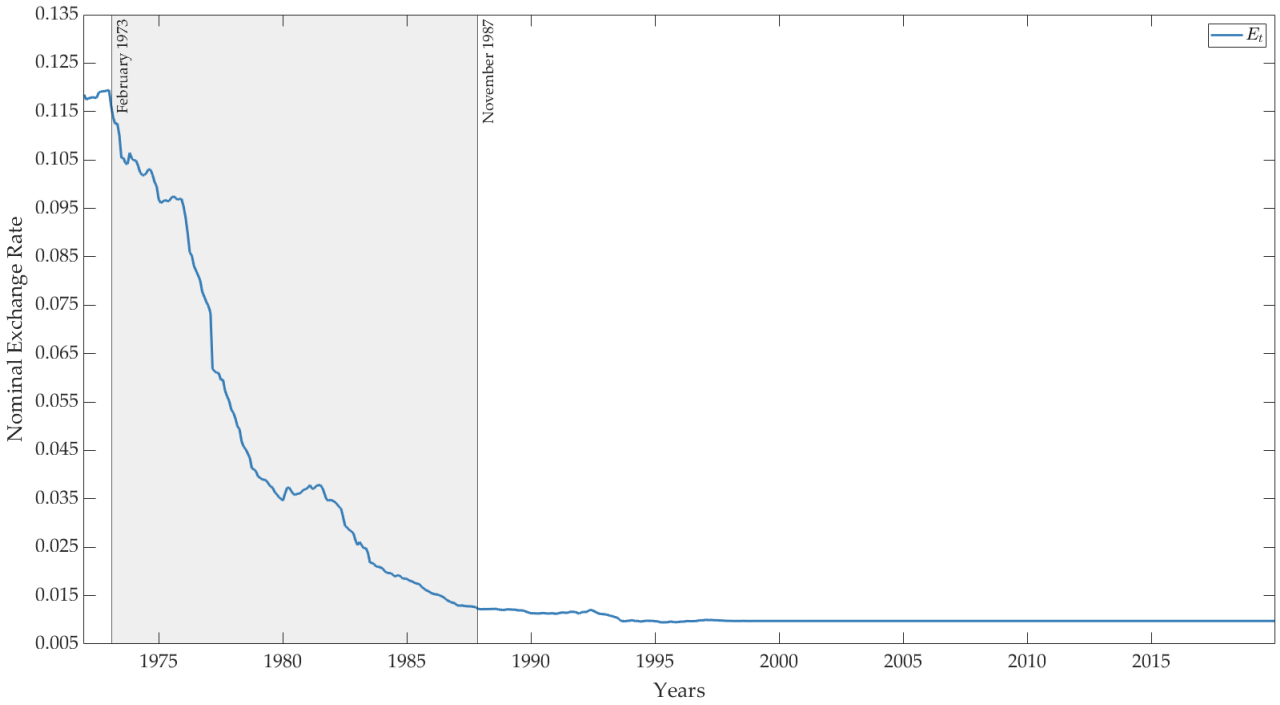


Figure A11: Nominal exchange rate between Portugal (Foreign Country) and Germany (Home Country)

Notes: The monthly nominal exchange-rate series is in levels and represents the amount of Deutsche marks bought by one unit of Portuguese escudo. Non-shaded (white) areas represent periods with pegged exchange-rate regimes, shaded (gray) areas represent periods with floating exchange-rate regimes, and vertical lines represent monetary-regime breaks. Monetary-regime breaks are identified by Petracchi (2022) by combing two approaches: a narrative approach and an econometric approach. The narrative approach is based on several historical sources, whereas the econometric approach is based on two structural-break tests and a generalized autoregressive conditional heteroskedasticity (GARCH) model applied to the monthly logarithmic changes of exchange rates.
Source: The Exchange Rates Portal of the Bank of Italy.

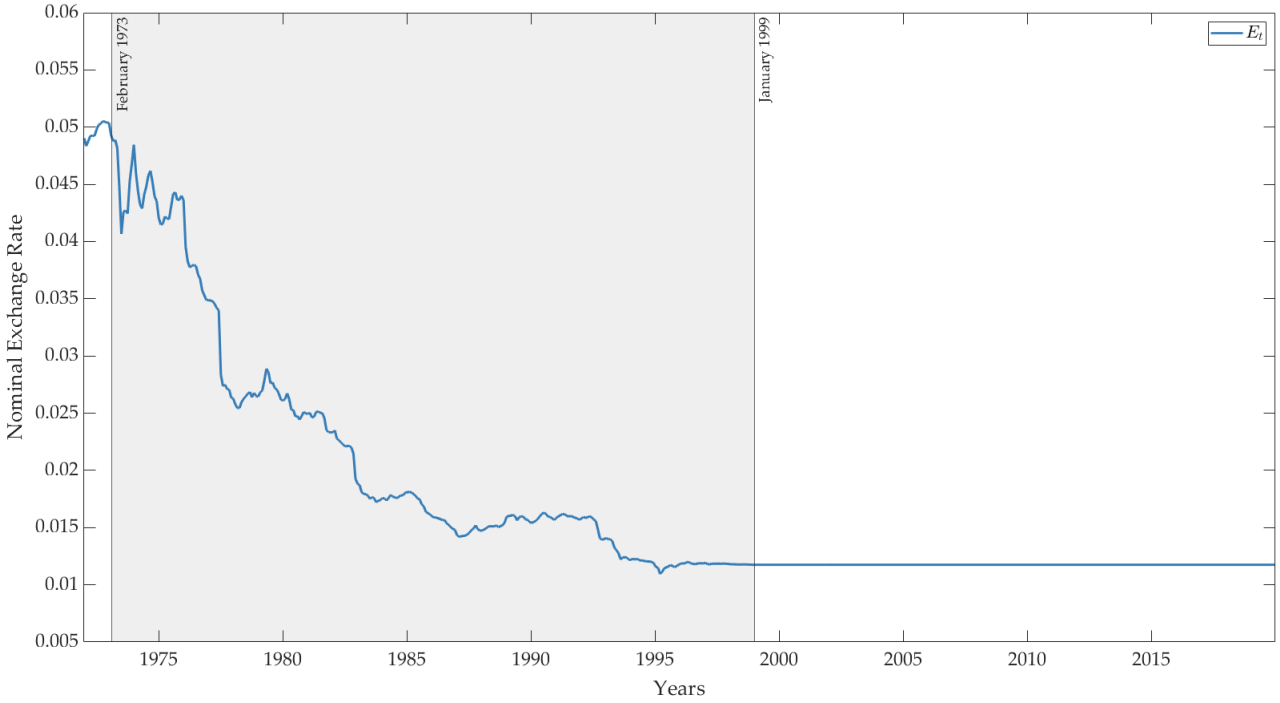


Figure A12: Nominal exchange rate between Spain (Foreign Country) and Germany (Home Country)

Notes: The monthly nominal exchange-rate series is in levels and represents the amount of Deutsche marks bought by one unit of Spanish peseta. Non-shaded (white) areas represent periods with pegged exchange-rate regimes, shaded (gray) areas represent periods with floating exchange-rate regimes, and vertical lines represent monetary-regime breaks. Monetary-regime breaks are identified by Petracchi (2022) by combing two approaches: a narrative approach and an econometric approach. The narrative approach is based on several historical sources, whereas the econometric approach is based on two structural-break tests and a generalized autoregressive conditional heteroskedasticity (GARCH) model applied to the monthly logarithmic changes of exchange rates.
Source: The Exchange Rates Portal of the Bank of Italy.

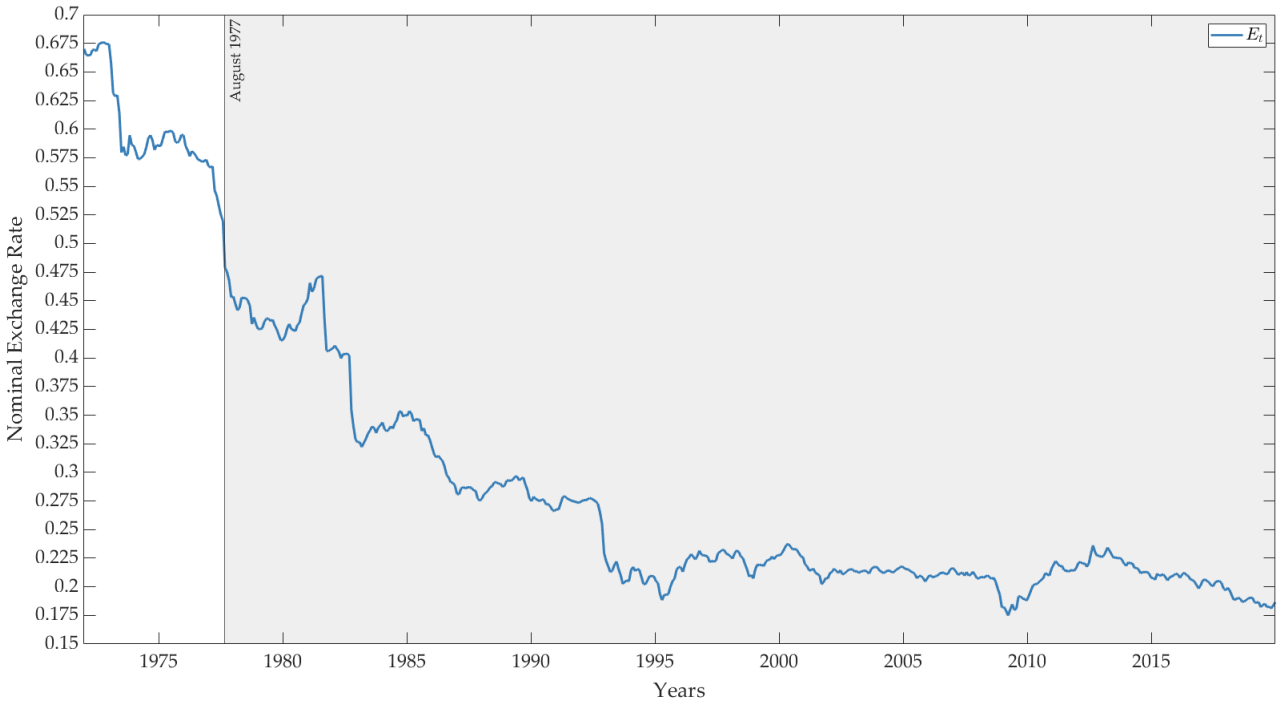


Figure A13: Nominal exchange rate between Sweden (Foreign Country) and Germany (Home Country)

Notes: The monthly nominal exchange-rate series is in levels and represents the amount of Deutsche marks bought by one unit of Swedish krona. Non-shaded (white) areas represent periods with pegged exchange-rate regimes, shaded (gray) areas represent periods with floating exchange-rate regimes, and vertical lines represent monetary-regime breaks. Monetary-regime breaks are identified by Petracchi (2022) by combing two approaches: a narrative approach and an econometric approach. The narrative approach is based on several historical sources, whereas the econometric approach is based on two structural-break tests and a generalized autoregressive conditional heteroskedasticity (GARCH) model applied to the monthly logarithmic changes of exchange rates.
Source: The Exchange Rates Portal of the Bank of Italy.

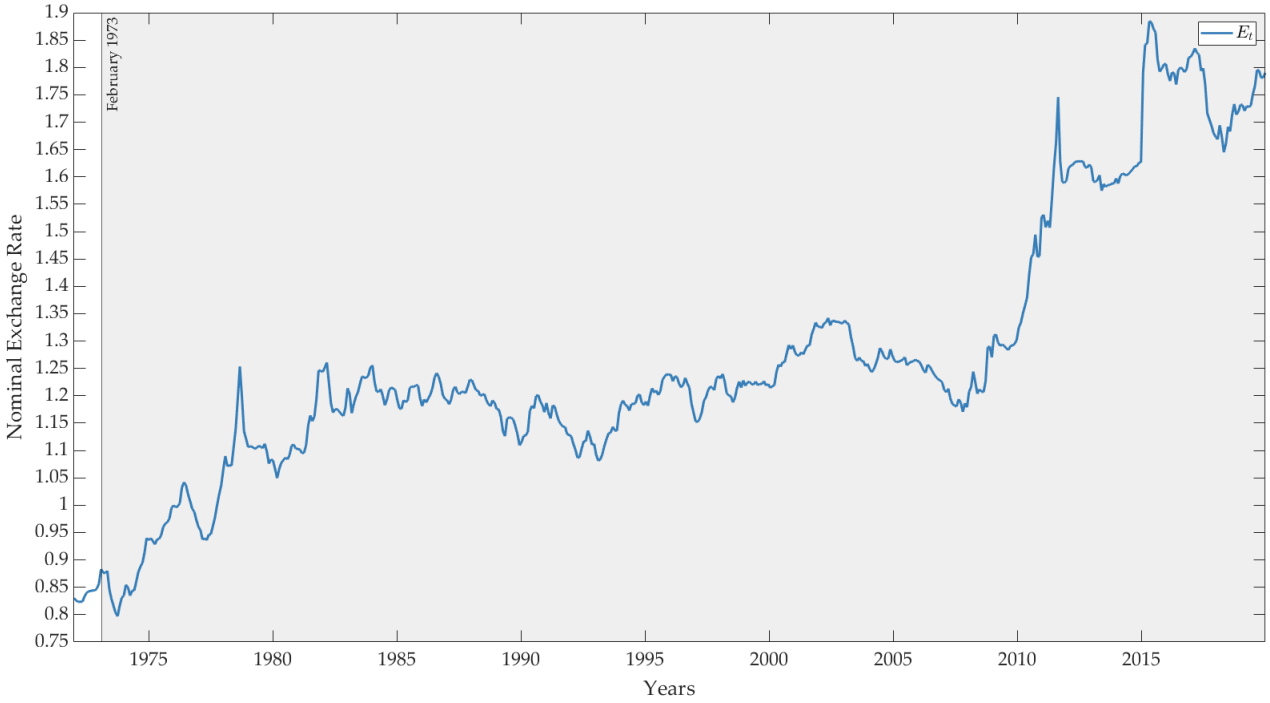


Figure A14: Nominal exchange rate between Switzerland (Foreign Country) and Germany (Home Country)

Notes: The monthly nominal exchange-rate series is in levels and represents the amount of Deutsche marks bought by one unit of Swiss franc. Non-shaded (white) areas represent periods with pegged exchange-rate regimes, shaded (gray) areas represent periods with floating exchange-rate regimes, and vertical lines represent monetary-regime breaks. Monetary-regime breaks are identified by Petracchi (2022) by combing two approaches: a narrative approach and an econometric approach. The narrative approach is based on several historical sources, whereas the econometric approach is based on two structural-break tests and a generalized autoregressive conditional heteroskedasticity (GARCH) model applied to the monthly logarithmic changes of exchange rates.
Source: The Exchange Rates Portal of the Bank of Italy.

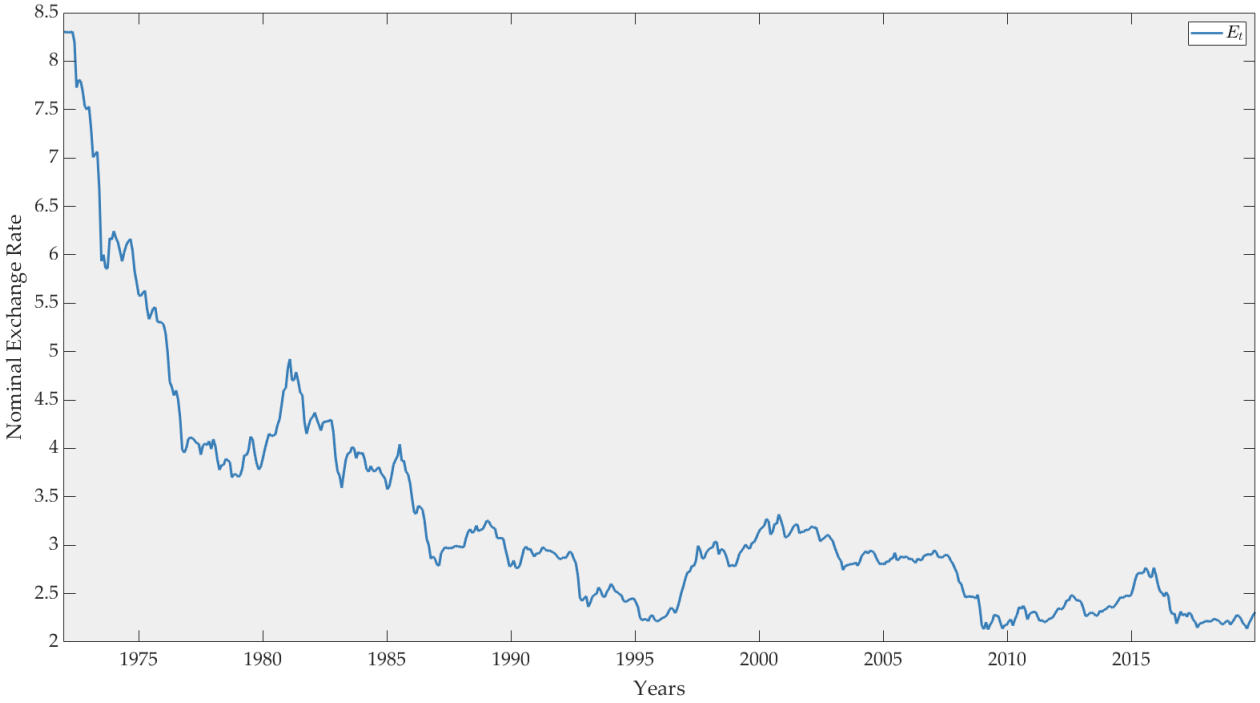


Figure A15: Nominal exchange rate between United Kingdom (Foreign Country) and Germany (Home Country)

Notes: The monthly nominal exchange-rate series is in levels and represents the amount of Deutsche marks bought by one unit of British pound. Non-shaded (white) areas represent periods with pegged exchange-rate regimes, shaded (gray) areas represent periods with floating exchange-rate regimes, and vertical lines represent monetary-regime breaks. Monetary-regime breaks are identified by Petracchi (2022) by combing two approaches: a narrative approach and an econometric approach. The narrative approach is based on several historical sources, whereas the econometric approach is based on two structural-break tests and a generalized autoregressive conditional heteroskedasticity (GARCH) model applied to the monthly logarithmic changes of exchange rates.
Source: The Exchange Rates Portal of the Bank of Italy.

FOOD

	1 kg flour	1 kg butter	1 litre cooking oil (best quality)
BELGIUM B. Fr	25.20	112	41
DENMARK D.Kr	1.60	13.60	5.10
FRANCE Fr	1.70	12.50	4.00
GERMANY (WEST) D.M.	0.70/1.00	3.80	4.50
HOLLAND F	1.60	9.60	6.0
ITALY L	180	1800	seed 600/700 olive 800/1000
NORWAY N.Kr	1.25	12.30	21.40
SPAIN Ptas	16	150	45
SWEDEN S.Kr	1.90	10.38	9.40
U.K. £	0.13	0.66	0.38

Figure A16: Prices from the *Confederation of British Industry* (CBI) booklet *European Living Costs Compared* of 1972

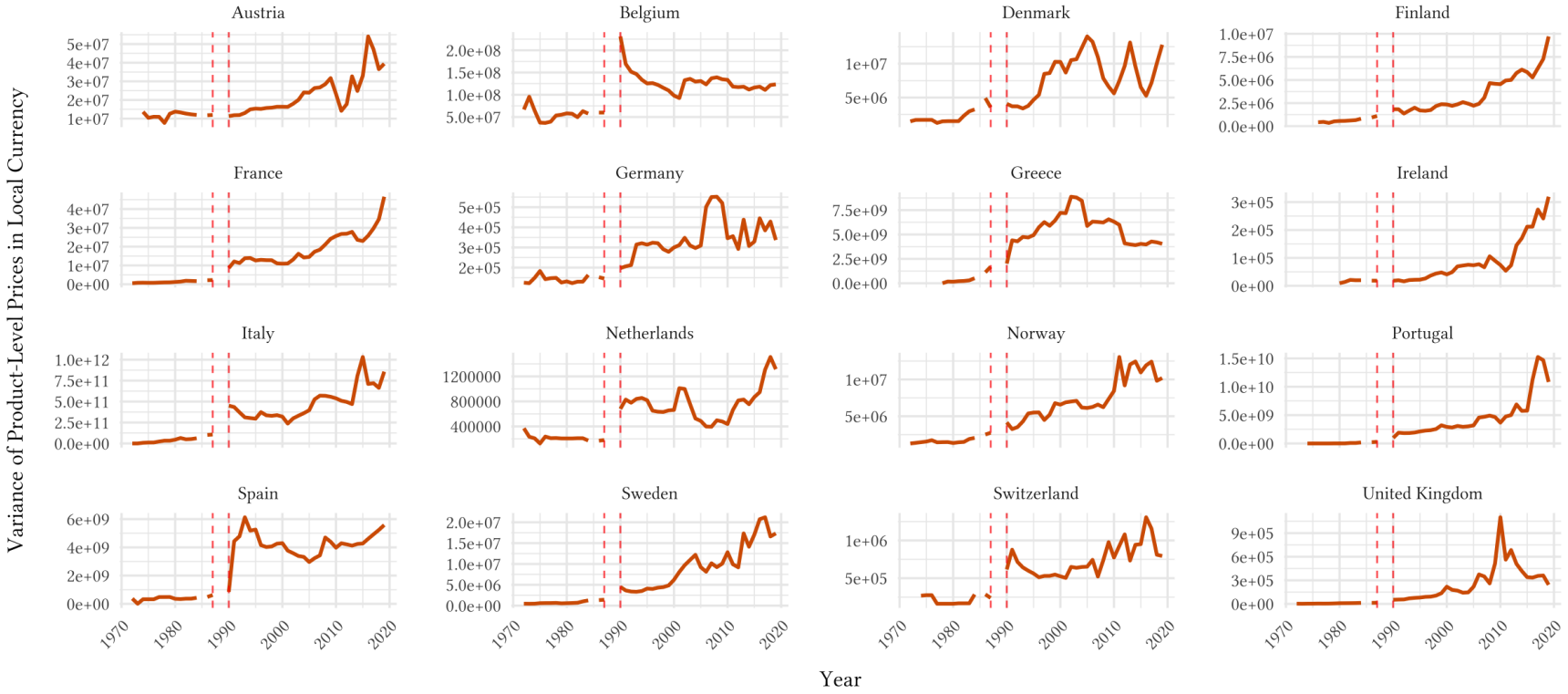


Figure A17: Variance of the twenty-five product-level prices in local currency from 1972 to 2019

Notes: Dashed red lines indicate the transition from the *Confederation of British Industry* (CBI) dataset to the *Economist Intelligence Unit* (EIU) dataset.

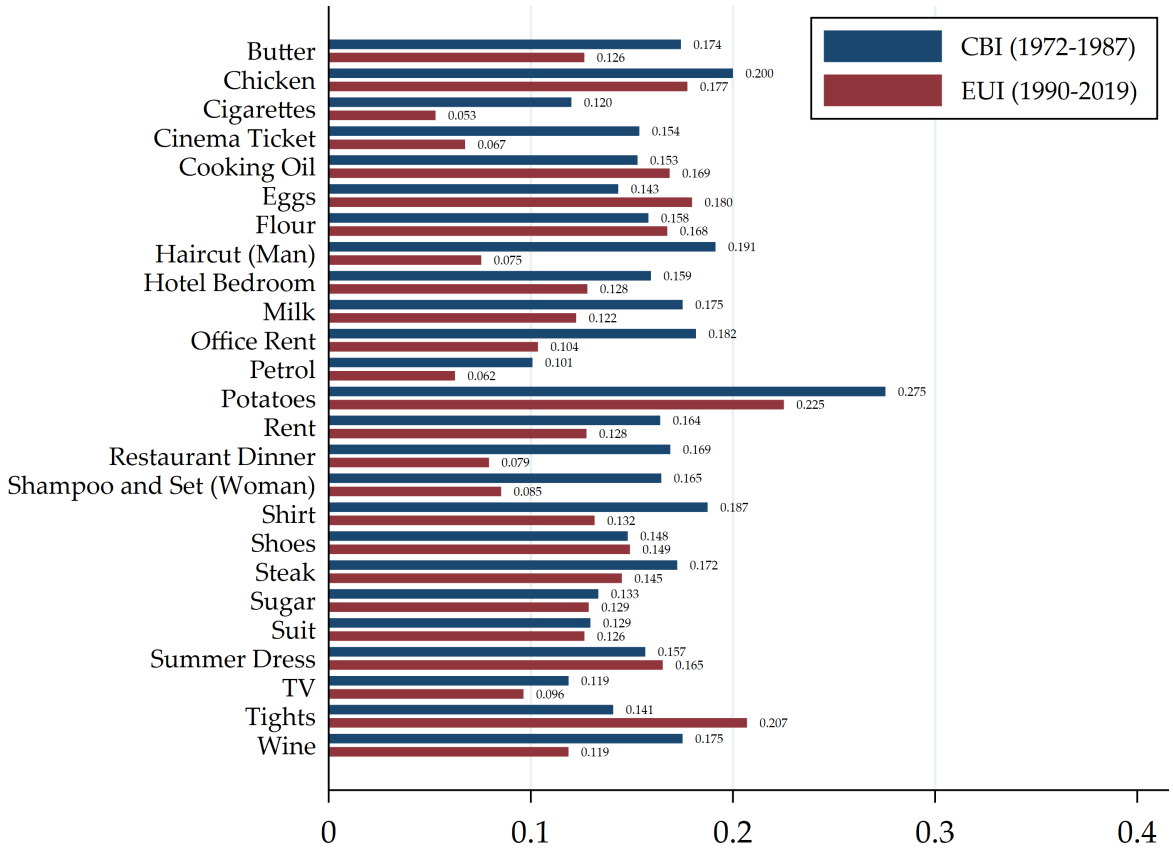


Figure A18: Average volatility of the product-level price ratios ($|\Delta \tilde{p}_k|$) by sample period

	ΔQ_k = $Q_{k,PEG}$ - $Q_{k,FLOAT}$	t-test (H_0: $\Delta Q_k = 0$)
Tradables	-0.07	-6.58***
Nontradables	-0.19	-8.44***
Tradables		
Butter	0.04	1.06
Chicken	0.02	0.51
Cigarettes	-0.20	-6.29***
Cooking Oil	-0.08	-1.87*
Eggs	-0.14	-3.24***
Flour	-0.03	-0.49
Milk	0.00	-0.16
Petrol	-0.01	-0.83
Potatoes	-0.06	-1.89*
Shirt	0.01	0.14
Shoes	0.02	0.84
Steak	-0.29	-5.69***
Sugar	-0.04	-1.28
Suit	0.18	5.11***
Summer Dress	0.03	0.97
TV	-0.05	-1.40
Tights	-0.22	-6.68***
Wine	-0.32	-5.20***
Nontradables:		
Cinema Ticket	-0.17	-5.72***
Haircut (Man)	-0.44	-8.23***
Hotel Bedroom	0.09	1.90*
House Rent	-0.14	-2.80***
Office Rent	-0.72	-4.73***
Restaurant Dinner	-0.06	-1.19
Shampoo and Set (Woman)	-0.13	-2.75***

Notes: The table tests whether the difference in the product-level real exchange rates across monetary regimes are statistically significant.

Table A2: Differences in the product-level real exchange rates across monetary regimes

	$\Delta Q = Q_{NT} - Q_T$	t-test (ΔQ=0)
Full Sample	0.21	19.94***
Peg Regimes	0.16	13.95***
Floating Regimes	0.29	14.35***

Notes: The table tests whether the difference in the product-level real exchange rates over the full sample and within each monetary regimes significantly differs between tradables and nontradables. Q_{NT} = mean of the product-level real exchange rates, computed using nontradables only. Q_T = mean of the product-level real exchange rates, computed using tradables only.

Table A3: Differences in the product-level real exchange rates between tradables and nontradables

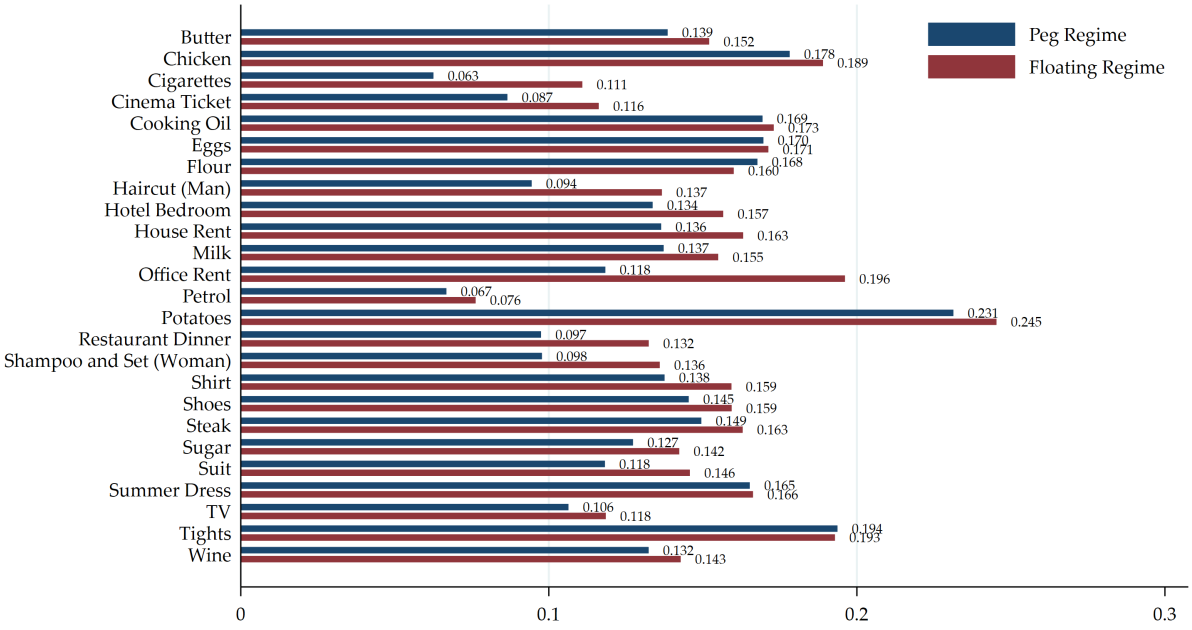


Figure A19: Average volatility of the product-level real exchange rates across monetary regimes

	Volatility	
	Prices Ratio ($\lvert\Delta\tilde{p}_{f,k,t}\rvert$)	Real Exchange Rate ($\lvert\Delta q_{f,k,t}\rvert$)
	(1)	(2)
Floating Regime	0.007	0.016**
	(0.006)	(0.007)
Year-Product Fixed Effects	✓	✓
Country-Product Fixed Effects	✓	✓
Observations	14,695	14,695

Notes: The table reports the OLS estimates of the association between monetary-regime breaks (from pegged to floating regimes or the other way around) and the volatility of relative prices (Column 1) and product-level real exchange rates (Column 2). The analysis window goes from 1972 to 2019. Standard errors, clustered at the country level, are reported in parenthesis. Significance levels: * 0.1; ** 0.05 *** 0.01.

Table A4: Results from Equation (4) with the inclusion of country-good fixed effects

	Volatility		
	Nominal Exchange Rate ($\lvert\Delta e_{f,t}\rvert$)	Relative Prices ($\lvert\Delta\tilde{p}_{f,k,t}\rvert$)	Real Exchange Rates ($\lvert\Delta q_{f,k,t}\rvert$)
	(1)	(2)	(3)
Floating Regime	0.043***	0.011*	0.018***
	(0.006)	(0.006)	(0.006)
Year-Product Fixed Effects	✓	✓	✓
Country Fixed Effects	✗	✗	✗
Observations	630	14,695	14,695

Notes: The table reports the OLS estimates of the association between monetary-regime breaks (from pegged to floating regimes or the other way around) and the volatility of nominal exchange rates (Column 1), relative prices (Column 2), and product-level real exchange rates (Column 3). The analysis window goes from 1972 to 2019. All the specifications do not include country fixed effects among the set of control variables. Standard errors, clustered at the country level, are reported in parenthesis. Significance levels: * 0.1; ** 0.05 *** 0.01.

Table A5: Results from Equation (4) without country fixed effects

	Volatility			
	Relative Prices ($\lvert\Delta\tilde{p}_{f,k,t}\rvert$) (1)		Real Exchange Rates ($\lvert\Delta q_{f,k,t}\rvert$) (2)	
Excluded Product:				
Butter	0.008	(0.006)	0.016**	(0.007)
Chicken	0.007	(0.006)	0.016**	(0.007)
Cigarettes	0.006	(0.006)	0.015**	(0.007)
Cinema Ticket	0.008	(0.006)	0.016**	(0.006)
Cooking Oil	0.009	(0.006)	0.017**	(0.007)
Eggs	0.007	(0.006)	0.015**	(0.007)
Flour	0.008	(0.006)	0.017**	(0.006)
Haircut (Man)	0.007	(0.006)	0.015**	(0.007)
Hotel Bedroom	0.008	(0.006)	0.017**	(0.006)
House Rent	0.008	(0.006)	0.016**	(0.006)
Milk	0.007	(0.006)	0.016**	(0.007)
Office Rent	0.007	(0.006)	0.016**	(0.007)
Petrol	0.008	(0.006)	0.017**	(0.007)
Potatoes	0.007	(0.006)	0.015**	(0.007)
Restaurant Dinner	0.008	(0.005)	0.017**	(0.006)
Shampoo and Set (Woman)	0.008	(0.006)	0.015**	(0.007)
Shirt	0.007	(0.006)	0.015**	(0.006)
Shoes	0.007	(0.006)	0.016**	(0.006)
Steak	0.006	(0.006)	0.016**	(0.007)
Sugar	0.009	(0.006)	0.017**	(0.007)
Suit	0.007	(0.006)	0.016**	(0.007)
Summer Dress	0.007	(0.006)	0.016**	(0.006)
TV	0.007	(0.006)	0.015**	(0.006)
Tights	0.008	(0.006)	0.017**	(0.007)
Wine	0.006	(0.006)	0.014**	(0.006)
Year-Product Fixed Effects	✓		✓	
Country Fixed Effects	✓		✓	

Notes: The table reports the OLS estimates of the association between monetary-regime breaks (from pegged to floating regimes or the other way around) and the volatility of relative prices (Column 1) and product-level real exchange rates (Column 2) after excluding one product at a time from the analysis. The analysis window goes from 1972 to 2019. Standard errors, clustered at the country level, are reported in parenthesis. Significance levels: * 0.1; ** 0.05 *** 0.01.

Table A6: Results from Equation (4) removing one product at a time

	Volatility					
	Nominal Exchange Rate ($\lvert\Delta e_{f,k,t}\rvert$) (1)		Relative Prices ($\lvert\Delta \tilde{p}_{f,k,t}\rvert$) (2)		Real Exchange Rates ($\lvert\Delta q_{f,k,t}\rvert$) (3)	
Excluded Country:						
Austria	0.053***	(0.009)	0.006	(0.006)	0.015**	(0.006)
Belgium	0.054***	(0.009)	0.008	(0.006)	0.017**	(0.007)
Denmark	0.055***	(0.009)	0.006	(0.006)	0.015**	(0.007)
Finland	0.058***	(0.010)	0.007	(0.006)	0.011**	(0.005)
France	0.057***	(0.009)	0.009	(0.006)	0.017**	(0.007)
Greece	0.056***	(0.010)	0.011*	(0.005)	0.020***	(0.006)
Ireland	0.055***	(0.010)	0.011*	(0.005)	0.018**	(0.007)
Italy	0.052***	(0.009)	0.005	(0.006)	0.014*	(0.008)
Netherlands	0.054***	(0.009)	0.007	(0.006)	0.016**	(0.007)
Norway	0.057***	(0.011)	0.006	(0.007)	0.015*	(0.008)
Portugal	0.048***	(0.006)	0.008	(0.006)	0.016**	(0.007)
Spain	0.057***	(0.010)	0.007	(0.006)	0.018**	(0.007)
Sweden	0.059***	(0.010)	0.006	(0.007)	0.017*	(0.008)
Switzerland	0.053***	(0.009)	0.008	(0.006)	0.016**	(0.007)
United Kingdom	0.055***	(0.009)	0.007	(0.006)	0.016**	(0.007)

Notes: The table reports the OLS estimates of the association between monetary-regime breaks (from pegged to floating regimes or the other way around) and the volatility of relative prices (Column 1) and product-level real exchange rates (Column 2) after excluding one country at a time from the analysis. The analysis window goes from 1972 to 2019. Standard errors, clustered at the country level, are reported in parenthesis. Significance levels: * 0.1; ** 0.05 *** 0.01.

Table A7: Results from Equation (4) removing one country at a time

	Volatility		
	Nominal Exchange Rate ($\lvert\Delta e_{f,t}\rvert$) (1)	Relative Prices ($\lvert\Delta \tilde{p}_{f,k,t}\rvert$) (2)	Real Exchange Rates ($\lvert\Delta q_{f,k,t}\rvert$) (3)
Floating Regime * Pre January 1999	0.052***	0.006	0.016**
	(0.010)	(0.007)	(0.007)
Floating Regime * Post January 1999	0.063***	0.013	0.016**
	(0.014)	(0.007)	(0.007)
Year-Product Fixed Effects	✓	✓	✓
Country Fixed Effects	✓	✓	✓
Observations	630	14,695	14,695

Notes: The table reports the OLS estimates of the association between monetary-regime breaks (from pegged to floating regimes or the other way around) and the volatility of nominal exchange rates (Column 1), relative prices (Column 2), and product-level real exchange rates (Column 3), separately for the periods before and after January 1999. The analysis window goes from 1972 to 2019. Standard errors, clustered at the country level, are reported in parenthesis. Significance levels: * 0.1; ** 0.05 *** 0.01.

Table A8: Results from Equation (4) distinguishing between before and after January 1999

	Relative Prices ($\Delta \tilde{p}_{f,k,t}$)			
	(1)	(2)	(3)	(4)
Nominal Exchange Rate * NonTradable				-0.025
				(0.068)
Nominal Exchange Rate * Tradable				-0.084*
				(0.043)
Nominal Exchange Rate (t-1) * NonTradable	-0.170***			-0.173**
	(0.056)			(0.076)
Nominal Exchange Rate (t-1) * Tradable	-0.175***			-0.155**
	(0.054)			(0.063)
Nominal Exchange Rate (t-2) * NonTradable		-0.138**		-0.070
		(0.050)		(0.048)
Nominal Exchange Rate (t-2) * Tradable		-0.127**		-0.075
		(0.045)		(0.057)
Nominal Exchange Rate (t-3) * NonTradable			-0.115	-0.124
			(0.076)	(0.071)
Nominal Exchange Rate (t-3) * Tradable			-0.076	-0.076
			(0.059)	(0.052)
Year-Product Fixed Effects	✓	✓	✓	✓
Country Fixed Effects	✓	✓	✓	✓
Observations	13,799	13,250	12,990	12,626

Notes: The table reports the OLS estimates of alternative lag specifications of Equation 5, measuring the dynamic response of relative prices to fluctuations in the current (or past) nominal exchange rate for nontradables and tradables, respectively. Standard errors, clustered at the country level, are reported in parenthesis. Significance levels: * 0.1; ** 0.05 *** 0.01.

Table A9: Results for alternative lag specifications of Equation (5)

	Relative Prices ($\Delta \tilde{p}_{f,k,t}$)			
	(1)	(2)	(3)	(4)
Nominal Exchange Rate * NonTradable				-0.116
				(0.112)
Nominal Exchange Rate * Tradable				-0.104**
				(0.045)
Nominal Exchange Rate (t-1) * NonTradable	-0.136			-0.143
	(0.094)			(0.097)
Nominal Exchange Rate (t-1) * Tradable	-0.136			-0.125
	(0.076)			(0.082)
Nominal Exchange Rate (t-2) * NonTradable		-0.047		-0.037
		(0.067)		(0.059)
Nominal Exchange Rate (t-2) * Tradable		-0.125***		-0.096
		(0.039)		(0.054)
Nominal Exchange Rate (t-3) * NonTradable			0.020	-0.012
			(0.056)	(0.065)
Nominal Exchange Rate (t-3) * Tradable			-0.058	-0.073
			(0.079)	(0.069)
Year-Product Fixed Effects	✓	✓	✓	✓
Country Fixed Effects	✓	✓	✓	✓
Observations	5,105	4,781	4,404	4,404

Notes: The table reports the OLS estimates of alternative lag specifications of Equation 5, measuring the dynamic response of relative prices to fluctuations in the current (or past) nominal exchange rate for non-tradables and tradables, respectively, within floating regimes. Standard errors, clustered at the country level, are reported in parenthesis. Significance levels: * 0.1; ** 0.05 *** 0.01.

Table A10: Results for alternative lag specifications of Equation (5) within floating regimes only

	Relative Prices ($\Delta\tilde{p}_{f,k,t}$)			
	(1)	(2)	(3)	(4)
Nominal Exchange Rate * NonTradable				-0.110
				(0.199)
Nominal Exchange Rate * Tradable				0.055
				(0.226)
Nominal Exchange Rate (t-1) * NonTradable	-0.496			-0.218
	(0.318)			(0.308)
Nominal Exchange Rate (t-1) * Tradable	-0.295*			-0.436*
	(0.156)			(0.208)
Nominal Exchange Rate (t-2) * NonTradable		-0.522		-0.155
		(0.312)		(0.268)
Nominal Exchange Rate (t-2) * Tradable		-0.204		0.031
		(0.223)		(0.294)
Nominal Exchange Rate (t-3) * NonTradable			-0.497***	-0.325
			(0.142)	(0.198)
Nominal Exchange Rate (t-3) * Tradable			-0.157*	-0.059
			(0.075)	(0.138)
Year-Product Fixed Effects	✓	✓	✓	✓
Country Fixed Effects	✓	✓	✓	✓
Observations	8,451	7,983	7,488	7,488

Notes: The table reports the OLS estimates of alternative lag specifications of Equation 5, measuring the dynamic response of relative prices to fluctuations in the current (or past) nominal exchange rate for non-tradables and tradables, respectively, within pegged regimes. Standard errors, clustered at the country level, are reported in parenthesis. Significance levels: * 0.1; ** 0.05 *** 0.01.

Table A11: Results for alternative lag specifications of Equation (5) within pegged regimes only