Monetary Regimes and Real Exchange Rates: Long-Run Evidence at the Product Level

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Abstract

Compiling a novel dataset of product prices in sixteen European countries starting in 1972, we establish three facts about monetary regimes and product-level real exchange rates. The law of one price is more likely to hold under peg regimes and for tradables. Monetary-regime breaks affect not only the volatility of nominal exchange rates, but also the volatility of product-level real exchange rates. The volatility of the real exchange rates of tradables responds less to monetary-regime breaks than that of nontradables, primarily because of a stronger negative correlation between the prices of tradables and nominal exchange rate fluctuations in floating regimes.

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1 Introduction

This paper establishes three facts about the relationship between nominal exchange rates, product-level prices, and monetary regimes, which is pivotal to understand the dynamics of the real exchange rate in general equilibrium models of exchange rate determination (Gabaix and Maggiori, 2015) and the role of the real exchange rate in the growth process (Eichengreen, 2008). First, the law of one price (LOP) is more likely to hold under peg regimes and for tradables. Second, monetary-regime breaks have an impact on the volatility of real exchange rates at the product level, leaving the volatility of the relative prices unchanged. Third, the volatility of the product-level real exchange rates of tradables responds less to monetary-regime breaks than the volatility of the product-level real exchange rate of nontradables, because of a stronger negative correlation between the prices of tradables and nominal exchange rate fluctuations in floating regimes.

One fundamental hypothesis connecting nominal exchange rates, domestic prices, and foreign prices of two countries is that of purchasing power parity (PPP). 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 real exchange rate, which is constructed using the two countries' aggregate price levels. Indeed, deviations in the absolute and relative version of the PPP over short- and long-run horizons are well documented both within a monetary regime—see, for instance, 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—see, for instance, Mussa (1986) and Petracchi (2022).

However, 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 indexes. Indeed, 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 by analyses relying on aggregate price levels. By working with product-level prices, our paper surmounts these limitations and uncovers meaningful heterogeneity between different types of products in the price responses to monetary-regime breaks and nominal exchange rate fluctuations. This approach leads to a different hypothesis, which has been studied for hundreds of years by economists, called the LOP.[1]

[1]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."

The LOP says that the prices of identical products in two countries should be equal when converted into a common currency. Similarly to the PPP hypotheses, the empirical literature documents deviations from the LOP, but only considering short-run horizons within a floating regime (Burstein and Jaimovich, 2009), short-run horizons within a same monetary regime (Cavallo et al., 2014, 2015), or medium-run horizons without distinguishing between different monetary regimes (Crucini and Telmer, 2020). Our contribution is to complement this body of research, studying how nominal exchange rates, domestic prices, and foreign prices behave over a long-run horizon of about fifty years, and when considering time periods across different monetary regimes.

Using the prices of twenty-five products for sixteen European countries—which include novel product-level prices for the period before the 1990—and taking nineteen monetary-regime breaks into account, we firstly document persistent deviations from the LOP, especially for nontradables under floating regimes when fluctuations of the nominal exchange rate are more pronounced. Subsequently, our analysis establishes that monetary-regime breaks affect both the volatility of the nominal exchange rates and the volatility of the product-level real exchange rates, without impacting on the volatility of relative prices significantly. This finding holds regardless of the type of the product we consider, tradables and nontradables. However, we show that real exchange rates of tradables react 1.1% less to breaks in the monetary regimes than real exchange rates of nontradables, as a result of a stronger negative correlation between the prices of tradables and nominal exchange rate fluctuations.

To the best of our knowledge, there is no work offering such a long-run evidence on product-level real exchange rates and studying the relationship between nominal exchange rates, domestic prices, and foreign prices across different monetary regimes. Indeed, product-level prices for a large variety of products are generally missing for time periods before the nineties. To overcome this lack of data availability, we introduce a novel price dataset of tradables and nontradables, which come from a booklet series published by the *Confederation of British Industry* (CBI) since January 1972. Combining this dataset with the one of the *Economist Intelligence Unit* (EIU) results in twenty-five consistent series of prices for sixteen European countries from 1972 to 2019. Figure 1 offers examples of three prices from the 1972 *Confederation of British Industry* (CBI) booklet *European Living Costs Compared.*

Our setting represents a convenient empirical framework to study product-level real exchange rates across different monetary regimes. Thanks to their history of economic integration starting with the *Treaty of Rome* in 1957, European countries have undeniably experienced reductions of barriers to arbitrage as no other countries in the world, culminating in the *European Single Market* in 1993, which guarantees the complete free movement of goods and the complete freedom to establish and provide services nowadays. In this context—very low or no barriers to arbitrage—product-level prices should be approximately equal when converted in a common currency.

Furthermore, considering a long-run horizon gives us the opportunity to understand how product-level prices adjust for monetary-regime breaks in the volatility of nominal exchange rates. Our results suggest that the annual volatility of the nominal exchange rates under floating regimes is 5.5% higher than under peg regimes on average.

Consequently, we are able to understand how firms reset their prices given such *larger* fluctuations in the nominal exchange rates which characterize floating regimes.

Lastly, our dataset at annual frequency spans over a particularly long time horizon, from 1972 to 2019, which allows us to investigate two important dimensions about monetary-regime breaks in Europe: (i) our findings are not driven by the EU-related integration efforts that have been implemented since 1999, over and above the introduction of the euro; (ii) rather, they stem from price adjustments which do not compensate current and past changes in the nominal exchange rates, even in the medium and long run when firms should be able to reset prices optimally at will, without being constrained by long-term contracts, nominal rigidities, or other time frictions.

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 a long-run horizon that includes time periods across 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—peg (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. In what follows, we discuss each data source more in detail.

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. If a currency was renominated—for example, the French franc in 1960—we normalize the series accordingly, in order to remove the ensuing jump.

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

2.2 Monetary Regimes

For all the sixteen European countries in our analysis, Petracchi (2022) establishes a classification of monetary regimes where the reference country is Germany and the monetary regimes—peg or floating exchange-rate regime—are defined for the nominal exchange rates between Germany and each of the other fifteen European countries.[2] We report the nineteen monetary-regime breaks we use in our analysis in Table A1 in the Appendix.

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 surveyed prices of tradables and nontradables in national capital cities, aimed at filling "an information gap for those preparing to establish industrial or sales operations in the countries surveyed".[3] From the booklets, we extract twenty-five series of prices—eighteen tradables and seven nontradables—which we use in our analysis. Whenever the 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.

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

Since 1990, the *Economist Intelligence Unit* (EIU) has surveyed the prices of tradables and nontradables in different cities to compare the cost of living worldwide. From this dataset, 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.[4] 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. In addition, we rely on the *Economist Intelligence Unit* (EIU) price time series for 272 products—202 tradables and 70 nontradables—from 1990 to 2019 only, in order to validate our results with a larger variety of products. For this additional analysis, the overall number of price records from the *Economist Intelligence Unit* (EIU) used in the analysis is 126,142.

[2] The classification is obtained using 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.

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

[4] 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 local country's currency. 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).

Notably, several studies on international price dynamics have already used the *Economist Intelligence Unit* (EIU) as data source, since its prices are reported in absolute terms and consistently collected by a single agency over time. For instance, a paper 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.[5]

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 A2 in the Appendix, we report the summary statistics of the product-level 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 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 A2 also shows that the means of $Q_{f,k,t}$, for both tradables and nontradables, under peg regimes are smaller than under floating regimes, with these differences being statistically significant, as formally tested by Table A3. Finally, Table A4 suggests that the real exchange rates are on average significantly higher for nontradables. Overall, these patterns indicate that the LOP is more likely to hold under peg regimes and for tradables.

[5] See also Parsley and Wei (2007), Rogers (2007), Crucini and Shintani (2008), Crucini et al. (2010), Crucini and Yilmazkuday (2014), Engel and Rogers (2014), and Crucini and Landry (2019).

These results complement the findings 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 peg. They also complement the findings of Crucini and Telmer (2020), which documents persistent LOP deviations, for both tradables and nontradables, without distinguishing between different monetary regimes.

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

Taking the natural logarithm of both sides of Equation (1), we obtain the following:

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

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.

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

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

This equation is crucial to our analysis as it establishes, for product k, a relation 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.[6]

We are then able to investigate how monetary-regime breaks impact on the product-level exchange rates, using the following specification:

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

The main covariate of our model is $FLOATING_{f,t}$, which corresponds to a dummy variable taking the value of one if country f had a floating monetary regime in year t. Thus, our focus of interest will be the parameter β, measuring whether and to what extent passing from a peg to a floating monetary regime affects the volatility of the product-level real exchange rates.

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

$\lambda_{k,t}$ 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 volatility of the prices of product k, but also for its evolution over time. More specifically, $\lambda_{k,t}$ controls for all possible product-specific yearly shocks to price 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) dataset rather than the *Confederation of British Industry* (CBI) dataset. By doing so, we account for all the unobservable country traits that separately influence the volatility of the product-level real exchange rates 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. Finally, $\varepsilon_{f,k,t}$ denotes the error term, which absorbs all the residual factors explaining the volatility of the product-level real exchange rates.

We estimate Equation (4) by ordinary-least squares (OLS) and by clustering the standard errors at the country level, which provides us with the source of variation in our variable of interest $FLOATING_{f,t}$. However, because our panel sample comprises only 15 countries besides Germany (the reference country), we also validate our main findings via a series of wild bootstrap tests (Roodman et al. 2019).

3.2.1 Baseline Results

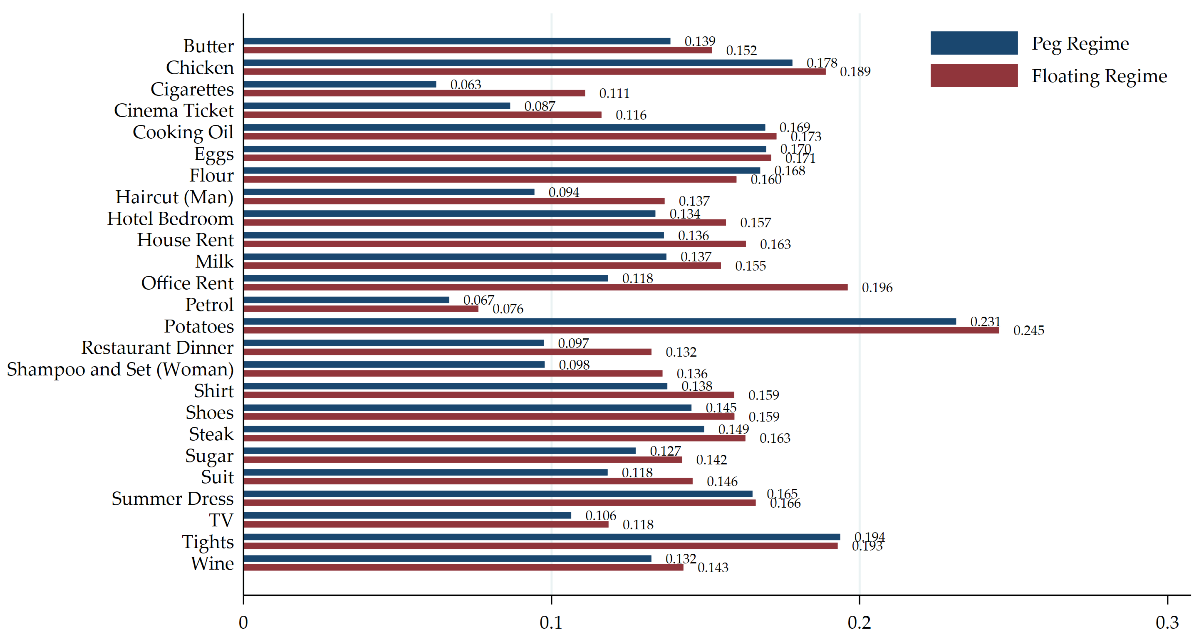

Figure 2: Average volatility of the product-level real exchange rates across monetary regimes

We begin by providing 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 2, which documents a volatility of the real exchange rate for each product that is in most instances higher under floating regimes than under peg regimes. Overall, the average volatility of the product-level real exchange rates in our sample is 13.4% under peg regimes and 15.3% 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 peg and 6.6% under floating 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 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 improperly. Indeed, these effects are better identified by Equation (4), the OLS estimates of which are provided in Table 1.

Column 1 of Table 1 focuses on the effects of monetary-regime breaks on 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 effect of monetary-regime breaks on 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.

	Volatility		
	Nominal Exchange Rate ($\|\Delta e_{f,t}\|$) (1)	Relative Prices ($\|\Delta \tilde{p}_{f,k,t}\|$) (2)	Real Exchange Rates ($\|\Delta q_{f,k,t}\|$) (3)
Floating Regime	0.055***	0.007	0.016**
	(0.009)	(0.006)	(0.006)
Asymptotic p-values	0.000	0.220	0.027
Wild boostrap p-values	0.000	0.256	0.023
Year-Product Fixed Effects	✓	✓	✓
Country Fixed Effects	✓	✓	✓
Observations	630	14,695	14,695

Notes: The table reports the OLS estimates of the effect of monetary-regime breaks (from peg to floating regimes or the other way around) on the volatility of the nominal exchange rates (Column 1), the relative prices (Column 2) and the 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. Asymptotic p-values and p-values computed following the wild bootstrap procedure of Roodman et al. (2019), using normal weights and 9999 replications, are reported at the bottom of the table. Significance levels: * 0.1; ** 0.05 *** 0.01.

Table 1: Results from Equation (4)

The coefficient associated with floating regimes is positive and statistically significant at the 1% level. This result indicates that the nominal exchange rates fluctuate much more under floating than peg regimes, a finding which is consistent with Petracchi (2022)'s classification of monetary regimes. More specifically, the annual volatility of the nominal exchange rates is 5.5% higher under floating regimes than under peg regimes.

Replicating the exercise for the volatility of the 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 1, is in fact positive but not statistically significant at any conventional level. Hence, monetary-regime breaks appear to affect the volatility of the nominal exchange rates, but not that of the relative prices $\tilde{P}_{f,k,t}$.

Finally, the coefficient displayed in Column 3 of Table 1 indicates that floating regimes are characterized by a higher volatility of the product-level real exchange rates. Specifically, the coefficient suggests that the volatility of the product-level real exchange rates is higher by 1.6% in floating regimes than in peg regimes. Although this effect is 71% smaller in magnitude than that on the nominal exchange rates, it is still positive and, importantly, statistically significant at the 5% level, regardless of whether we compute p-values using the wild bootstrap procedure of Roodman et al. (2019). Overall, the set of findings summarized by Table 1 suggests that firms only partially change prices to compensate for larger nominal fluctuations, induced by monetary-regime breaks, making the volatility of relative prices statistically indistinguishable across regimes.

Similar conclusions can be drawn from the results displayed in Table A5 in the Appendix, 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 effect on the volatility of the nominal exchange rates smaller in magnitude. On the contrary, the exclusion of country fixed effects from Equation (4) makes the effect on both the volatility of relative prices and that of the product-level real exchange rates higher in magnitude. Furthermore, the effect on the volatility of relative prices becomes statistically significant at the 10% level, thus suggesting that floating monetary regimes might present even slightly more volatile prices than peg regimes.

As a robustness check, Table A6 in the Appendix 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 1, with the effect of monetary-regime breaks on 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 its policies towards the economic convergence of the member countries, including the introduction of a currency union.[7]

[7] The euro area was in fact formally introduced on January 1, 1999.

These policies could have in fact lowered the volatility of the product-level real exchange rates per se, regardless of the monetary-regime breaks preceding the introduction of the euro (see Table A1) and contributing to the identification of the estimates reported in Table 1.

3.2.2 Tradables and Nontradables

In this section, we investigate the implications of our empirical model—Equation (4)—when separately estimated for tradables and nontradables which, due to their different exposure to international markets, may uncover relevant heterogeneity. For this reason, columns 1 and 2 of Table 2 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 peg regimes, especially when the product-level real exchange rates are computed using the prices of nontradables. Indeed, the coefficient in Column 2 of Table 2, associated with the interaction term introduced above, is negative and statistically significant at the 5% level. More specifically, the estimates provided in Table 2 suggest that, on average, 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 2 do not document any effect of monetary-regime breaks on the volatility of relative prices, which overall appear unaffected no matter whether we put the focus on tradables or nontradables.

	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 effect of monetary-regime breaks (from peg to floating regime or the other way around) on the volatility of the relative prices (Column 1) and the product-level real exchange rates (Column 2). 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 are based on asymptotic p-values and denoted as follows: * 0.1; ** 0.05 *** 0.01.

Table 2: Tradables versus nontradables from 1972 to 2019

Similar qualitative results are provided in Table A9 in the Appendix, which replicates the same heterogeneity analysis between tradables and nontradables, focusing on a period that goes from 1990 to 2019, therefore exclusively on the product prices from the *Economist Intelligence Unit* (EIU). Column 5 of Table A9 still indicates that the effect of monetary-regime breaks on the volatility of the product-level real exchange rates is more pronounced for nontradables, despite the larger number of 297 products included in the *Economist Intelligence Unit* (EIU) sample.

3.2.3 Price Responses to Nominal Exchange Rate Fluctuations

By highlighting a stronger effect of monetary-regime breaks on the volatility of the real exchange rates of nontradables, the results of Table 2 suggest that the prices of nontradables might respond less to nominal exchange rate fluctuations than the prices of tradables. Still, our conjecture is that even the price response of tradables is unlikely to fully compensate the larger fluctuations of the nominal exchange rates under floating regimes. In the following, we test this hypothesis, among others, exploring how prices respond to fluctuations in the nominal exchange rates.

Crucially, our dataset spanning over about fifty years gives us the possibility, precluded to previous works, to estimate cumulative price responses both across different monetary regimes and within a given monetary regime. Hence, we estimate the following specification using the entire sample and *each monetary regime separately*:

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

Again, $\tilde{p}_{f,k,t}$ and $e_{f,t}$ denote the relative prices and nominal exchange rate, respectively. NT_k is a dummy variable for nontradables, whereas T_k is a dummy for tradables. $\lambda_{k,t}$ and α_f are the year-product and country dummy variables defined by Equation (4). Finally, $u_{f,k,t}$ is the error term. θ_1 and θ_2 are our parameters of interest, as they identify how the relative prices respond to a change in the nominal exchange rate, respectively for nontradables and tradables. If relative prices completely offset any fluctuation in the nominal exchange rate, θ_1 and θ_2 should be negatively signed and close to one in magnitude.

The values of θ_1 and θ_2, estimated using the full sample, are graphically summarized by the left panel of Figure 3, whereas the complete set of estimates is provided in column 1 of Table A10. The left panel of Figure 3 suggests that a 1% increase in the nominal exchange rate is followed by a 0.81% and a 0.78% reduction in the prices of tradables and nontradables, respectively. Although this difference between tradables and nontradables is not statistically significant, the results highlight a slightly stronger response of the prices of tradables. This finding is further supported by the other panels of Figure 3, which display the OLS estimates of θ_1 and θ_2 when Equation (5) gets estimated using observations *within the same monetary regime* only.[8] The price response of tradables remains higher in magnitude than that of nontradables, especially under floating regimes.

[8] See columns 1 of Table A11 and Table A12 for a complete set of estimates for floating and peg regimes, respectively.

This finding is also consistent with the results provided in Table 2, indicating a milder effect of monetary-regime breaks on the volatility of the real exchange rates of tradables. Interestingly, the price response of any type of product is closer in magnitude to, and statistically indistinguishable from, one under peg regimes. Hence, our results suggest that the fluctuations in the nominal exchange rates are heavily transmitted to prices when firms operate in peg regimes.[9]

Similar conclusions can be drawn from Figure A1, which replicates the above exercise over the 1990-2019 period, namely using the *Economist Intelligence Unit* (EIU) price dataset only. However, Figure A1 shows less precisely estimated price responses than Figure 3, emphasizing therefore the importance of the 1972-2019 dataset to identify our relationships of interest. Since the presence of long-term contracts, nominal rigidities, or other time frictions might prevent prices from fully adjusting to contemporaneous nominal exchange rate fluctuations, we exploit the long-run dimension of our 1972-2019 dataset even further and examine how prices respond to *past* nominal exchange rate fluctuations. To investigate this aspect, we replace $e_{f,t}$ in Equation (5) with alternative lag specifications.

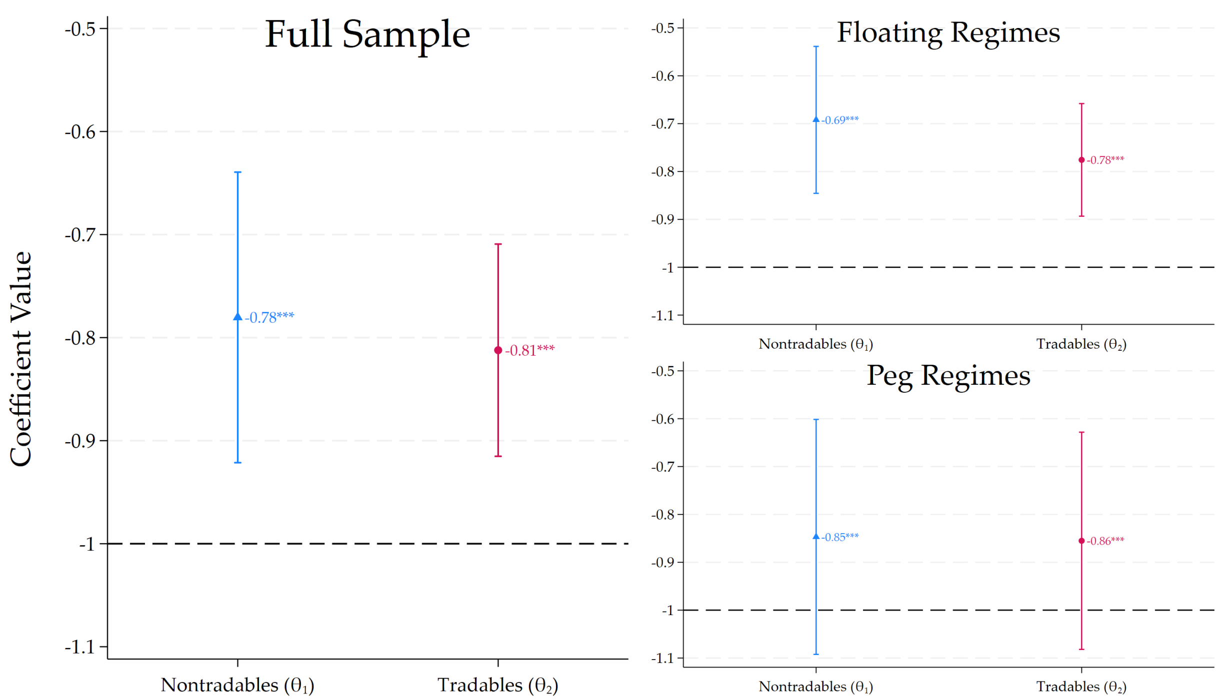

Figure 3: Estimates of θ_1 and θ_2 with 95% confidence intervals from Equation (5)

[9]This result seems to corroborate a "credibility channel" under peg regimes. If firms believe that the peg regime implemented by the central bank is fully credible, their price setting decisions are somehow tied to the nominal exchange rate target of the central bank, which is public information among agents, and in case of *small* fluctuations in the nominal exchange rate are willing to adjust relative prices accordingly.

The results are reported in columns (2)-(7) of Table A10 for the full sample, in columns (2)-(7) of Table A11 for floating regimes, and in columns (2)-(7) of Table A12 for peg regimes. When focusing on a specific monetary regime (floating or peg), 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.

Even when accounting for a delayed price response, our results indicate that prices do not fully compensate for nominal exchange rate fluctuations. The price response of both tradables and nontradables appears to decrease in magnitude the longer is the lag of the nominal exchange rate. Lastly, a formal test for the cumulative price response of tradables or nontradables is reported at the bottom of the tables, where it is tested against the benchmark value of minus one. This null hypothesis is generally rejected at the 5% level. The only exception is the cumulative price response of tradables under floating, which is different from minus one at a 10% statistical level only (see column 7 of Table A11). Again, this finding highlights a somehow stronger price response for tradables to nominal exchange rate fluctuations in floating regimes.

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 affect 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 regime is 1.6% higher than under peg regimes. This result appears stronger when the product-level real exchange rates get computed using the prices of nontradables. Although these findings 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. 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 that leave the volatility of relative prices unchanged also imply, ceteris paribus, constant volatility of the allocations of final consumers. This conclusion is at least in line with the results in Baxter and Stockman (1989) and the Backus and Smith (1993) puzzle, that is 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 Atkeson and Burstein (2008), and imperfect international financial markets à la Gabaix and Maggiori (2015).[10]

[10] Akinci et al. (2023) also emphasize intermediation frictions in the presence of long-lived financial intermediaries that face leverage constraints.

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 larger nominal exchange rate fluctuations coming from international financial markets under floating regimes. Indeed, Petracchi (2024) 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-run horizon. We leave these considerations for future work.

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Appendix

Country	Breaks	Country	Breaks
Austria	No Break *Peg Exchange Rate Regime*	Netherlands	No Break *Peg Exchange Rate Regime*
Belgium	No Break *Peg Exchange Rate Regime*	Norway	December 12, 1978 *Exit from the Snake*
Denmark	No Break *Peg 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 *Exit from the Snake*	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

	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 A2: Summary statistics for the product-level real exchange rates

	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 A3: Differences in the product-level real exchange rates across monetary regimes

	ΔQ = 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 A4: Differences in the product-level real exchange rates between tradables and nontradables

	Volatility		
	Nominal Exchange Rate ($\|\Delta e_{f,t}\|$) (1)	Relative Prices ($\|\Delta \tilde{p}_{f,k,t}\|$) (2)	Real Exchange Rates ($\|\Delta q_{f,k,t}\|$) (3)
Floating Regime	0.043***	0.011*	0.018***
	(0.006)	(0.006)	(0.006)
Asymptotic p-values	0.000	0.072	0.010
Wild boostrap p-values	0.000	0.064	0.003
Year-Product Fixed Effects	✓	✓	✓
Country Fixed Effects	✗	✗	✗
Observations	630	14,695	14,695

Notes: The table reports the OLS estimates of the effect of monetary-regime breaks (from peg to floating regimes or the other way around) on the volatility of the nominal exchange rates (Column 1), the relative prices (Column 2) and the 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. Asymptotic p-values and p-values computed following the wild bootstrap procedure of Roodman et al. (2019), using normal weights and 9999 replications, are reported at the bottom of the table. Significance levels: * 0.1; ** 0.05 *** 0.01.

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

	Volatility			
	Relative Prices ($\|\Delta\tilde{p}_{f,k,t}\|$) (1)		Real Exchange Rates ($\|\Delta q_{f,k,t}\|$) (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 effect of monetary-regime breaks (from peg to floating regimes or the other way around) on the volatility of the relative prices (Column 1) and the 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 are based on asymptotic p-values and denoted as follows: * 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 effect of monetary-regime breaks (from peg to floating regimes or the other way around) on the volatility of the relative prices (Column 1) and the 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 are based on asymptotic p-values and denoted as follows: * 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 effect of monetary-regime breaks (from peg to floating regimes or the other way around) on the volatility of the nominal exchange rates (Column 1), the relative prices (Column 2) and the 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 are based on asymptotic p-values and denoted as follows: * 0.1; ** 0.05 *** 0.01.

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

	Volatility				
	Results from Equation (4)			Tradables versus Nontradables	
	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)	Relative Prices ($\lvert\Delta \tilde{p}_{f,k,t}\rvert$) (4)	Real Exchange Rates ($\lvert\Delta q_{f,k,t}\rvert$) (5)
Floating Regime	0.051***	0.008	0.023**	0.008	0.028***
	(0.012)	(0.006)	(0.008)	(0.006)	(0.009)
Floating Regime * Tradable				0.000	-0.006**
				(0.002)	(0.002)
Year-Product Fixed Effects	✓	✓	✓	✓	✓
Country Fixed Effects	✓	✓	✓	✓	✓
Observations	435	119,964	119,964	119,964	119,964

Notes: The table reports the OLS estimates of the effect of monetary-regime breaks (from peg to floating regimes or the other way around) on the volatility of the nominal exchange rates (Column 1), the relative prices (Column 2) and the product-level real exchange rates (Columns 3-5). The analysis window goes from 1990 to 2019. Standard errors, clustered at the country level, are reported in parenthesis. Significance levels are based on asymptotic p-values and denoted as follows: * 0.1; ** 0.05 *** 0.01.

Table A9: Results using 297 products from the *Economist Intelligence Unit* (EIU) over the time window 1990-2019

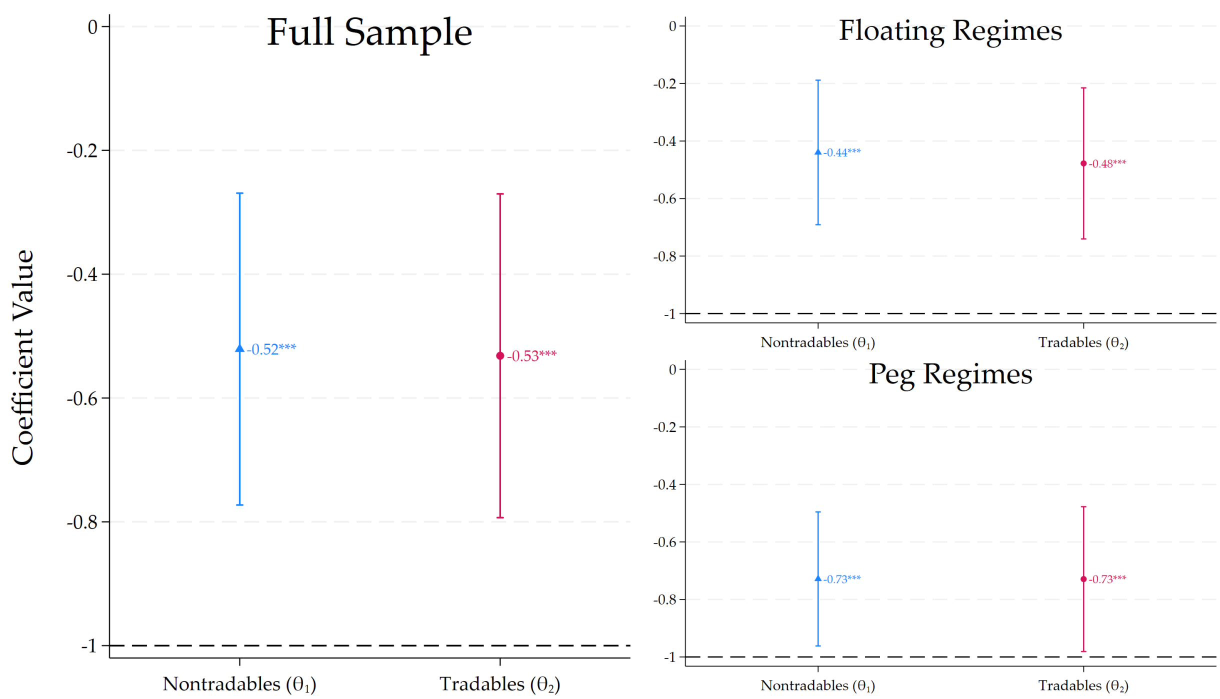

Figure A1: Estimates of θ_1 and θ_2 with 95% confidence intervals from Equation (5) using 297 products from the *Economist Intelligence Unit* (EIU) over the time window 1990-2019

	Relative Prices ($\tilde{p}_{f,k,t}$)						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Nominal Exchange Rate * Nontradable	-0.780***						-0.027
	(0.066)						(0.225)
Nominal Exchange Rate * Tradable	-0.812***						-0.400***
	(0.048)						(0.114)
Nominal Exchange Rate (t-1) * Nontradable		-0.752***					-0.360**
		(0.064)					(0.155)
Nominal Exchange Rate (t-1) * Tradable		-0.784***					-0.081
		(0.047)					(0.092)
Nominal Exchange Rate (t-2) * Nontradable			-0.734***				-0.118
			(0.066)				(0.133)
Nominal Exchange Rate (t-2) * Tradable			-0.766***				-0.121
			(0.051)				(0.135)
Nominal Exchange Rate (t-3) * Nontradable				-0.701***			-0.000
				(0.071)			(0.121)
Nominal Exchange Rate (t-3) * Tradable				-0.732***			-0.100
				(0.062)			(0.067)
Nominal Exchange Rate (t-4) * Nontradable					-0.637***		-0.174
					(0.087)		(0.156)
Nominal Exchange Rate (t-4) * Tradable					-0.669***		-0.176*
					(0.080)		(0.089)
Nominal Exchange Rate (t-5) * Nontradable						-0.569***	-0.108
						(0.109)	(0.211)
Nominal Exchange Rate (t-5) * Tradable						-0.601***	0.060
						(0.103)	(0.147)
Wald test (H_0: $\sum$ Nontradable coefficients = -1)							
F-statistic	11.16	15.12	16.12	17.68	17.46	15.54	8.18
P-value	0.005	0.002	0.001	0.000	0.001	0.002	0.013
Wald test (H_0: $\sum$ Tradable coefficients = -1)							
F-statistic	15.30	21.14	20.93	18.44	16.95	15.01	9.78
P-value	0.002	0.000	0.000	0.000	0.001	0.002	0.007
Year-Product Fixed Effects	✓	✓	✓	✓	✓	✓	✓
Country Fixed Effects	✓	✓	✓	✓	✓	✓	✓
Observations	15,977	15,031	14,453	14,526	14,228	13,550	12,083

Notes: The table reports the OLS estimates of θ_1 and θ_2 in Equation 5 (and alternative lag specifications), measuring the response of the relative prices to a 1% increase in the current (or past) nominal exchange rate for nontradables and tradables, respectively. The analysis window goes from 1972 to 2019. The country fixed effects are interacted with a dummy variable for the period from 1990 to 2019. Standard errors, clustered at the country level, are reported in parenthesis. Significance levels are based on asymptotic p-values and denoted as follows: * 0.1; ** 0.05 *** 0.01.

Table A10: Results from Equation (5) and alternative lag specifications

	Relative Prices ($\tilde{p}_{f,k,t}$)						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Nominal Exchange Rate * Nontradable	-0.692***						-0.577
	(0.069)						(0.432)
Nominal Exchange Rate * Tradable	-0.776***						-0.373**
	(0.053)						(0.129)
Nominal Exchange Rate (t-1) * Nontradable		-0.670***					-0.112
		(0.070)					(0.237)
Nominal Exchange Rate (t-1) * Tradable		-0.760***					-0.065
		(0.054)					(0.144)
Nominal Exchange Rate (t-2) * Nontradable			-0.614***				-0.198
			(0.098)				(0.293)
Nominal Exchange Rate (t-2) * Tradable			-0.714***				-0.145
			(0.081)				(0.165)
Nominal Exchange Rate (t-3) * Nontradable				-0.556***			0.322
				(0.118)			(0.267)
Nominal Exchange Rate (t-3) * Tradable				-0.672***			-0.103
				(0.098)			(0.124)
Nominal Exchange Rate (t-4) * Nontradable					-0.484***		-0.270
					(0.144)		(0.168)
Nominal Exchange Rate (t-4) * Tradable					-0.620***		-0.159
					(0.122)		(0.150)
Nominal Exchange Rate (t-5) * Nontradable						-0.375*	0.198
						(0.191)	(0.173)
Nominal Exchange Rate (t-5) * Tradable						-0.527**	0.045
						(0.166)	(0.124)
Wald test (H_0: $\sum$ Nontradable coefficients = -1)							
F-statistic	19.98	22.14	15.44	14.15	12.85	10.69	7.61
P-value	0.001	0.000	0.003	0.004	0.005	0.010	0.022
Wald test (H_0: $\sum$ Tradable coefficients = -1)							
F-statistic	18.06	20.00	12.56	11.12	9.67	8.10	3.65
P-value	0.002	0.000	0.005	0.008	0.011	0.019	0.088
Year-Product Fixed Effects	✓	✓	✓	✓	✓	✓	✓
Country Fixed Effects	✓	✓	✓	✓	✓	✓	✓
Observations	6,128	5,620	5,058	4,669	4,254	3,863	3,863

Notes: The table reports the OLS estimates of θ_1 and θ_2 in Equation 5 (and alternative lag specifications), measuring the response of the relative prices to a 1% increase in the current (or past) nominal exchange rate for nontradables and tradables, respectively. The analysis window goes from 1972 to 2019. The country fixed effects are interacted with a dummy variable for the period from 1990 to 2019. Standard errors, clustered at the country level, are reported in parenthesis. Significance levels are based on asymptotic p-values and denoted as follows: * 0.1; ** 0.05 *** 0.01.

Table A11: Results from Equation (5) and alternative lag specifications within floating regimes only

	Relative Prices ($\tilde{p}_{f,k,t}$)						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Nominal Exchange Rate * Nontradable	-0.847***						-0.469
	(0.113)						(0.501)
Nominal Exchange Rate * Tradable	-0.855***						-0.400
	(0.104)						(0.317)
Nominal Exchange Rate (t-1) * Nontradable		-0.573***					0.542
		(0.109)					(0.830)
Nominal Exchange Rate (t-1) * Tradable		-0.583***					-0.297
		(0.108)					(0.528)
Nominal Exchange Rate (t-2) * Nontradable			-0.414***				-0.569
			(0.134)				(1.007)
Nominal Exchange Rate (t-2) * Tradable			-0.429***				0.054
			(0.131)				(0.616)
Nominal Exchange Rate (t-3) * Nontradable				-0.234			0.644
				(0.160)			(0.678)
Nominal Exchange Rate (t-3) * Tradable				-0.252			-0.083
				(0.156)			(0.458)
Nominal Exchange Rate (t-4) * Nontradable					-0.119		-0.501
					(0.149)		(0.717)
Nominal Exchange Rate (t-4) * Tradable					-0.139		-0.952*
					(0.145)		(0.463)
Nominal Exchange Rate (t-5) * Nontradable						0.008	-0.214
						(0.126)	(0.556)
Nominal Exchange Rate (t-5) * Tradable						-0.013	1.092**
						(0.125)	(0.492)
Wald test (H_0: $\sum$ Nontradable coefficients = -1)							
F-statistic	1.85	15.25	19.02	22.84	35.11	64.16	5.97
P-value	0.20	0.002	0.000	0.000	0.000	0.000	0.031
Wald test (H_0: $\sum$ Tradable coefficients = -1)							
F-statistic	1.94	14.82	18.98	23.00	35.26	61.94	5.58
P-value	0.19	0.002	0.000	0.000	0.000	0.000	0.036
Year-Product Fixed Effects	✓	✓	✓	✓	✓	✓	✓
Country Fixed Effects	✓	✓	✓	✓	✓	✓	✓
Observations	9,848	9,118	8,405	7,866	7,351	6,858	6,858

Notes: The table reports the OLS estimates of θ_1 and θ_2 in Equation 5 (and alternative lag specifications), measuring the response of the relative prices to a 1% increase in the current (or past) nominal exchange rate for nontradables and tradables, respectively. The analysis window goes from 1972 to 2019. The country fixed effects are interacted with a dummy variable for the period from 1990 to 2019. Standard errors, clustered at the country level, are reported in parenthesis. Significance levels are based on asymptotic p-values and denoted as follows: * 0.1; ** 0.05 *** 0.01.

Table A12: Results from Equation (5) and alternative lag specifications within peg regimes only