Tailwinds from the East: How has the rising share of imports from emerging markets affected import prices?

John Lewis[(1)] and Jumana Saleheen[(2)]

Abstract

This paper quantifies the effect of the rising share of imports from emerging market economies (EMEs) on import price inflation in the UK. It uses a panel regression approach that accounts for heterogeneity across industries. We find that the rise in China's import share between 1999 and 2011 is estimated to have lowered UK import price inflation by around 0.5 percentage points per year - we call this the 'tailwind'. Rising imports from other EME country groups are not found to have any significant impact. Our approach allows us to decompose this effect: two-thirds of the China tailwind arises from the direct impact of 'switching' to lower cost Chinese goods; the remaining third comes from other exporters lowering their prices in response to stronger competition from China. We find no evidence that higher inflation rates in EMEs have so far reduced or reversed the sign of the tailwind yet.

Key words: Low wage countries, import competition, globalisation, panel data

***JEL* classification**: C23, F40

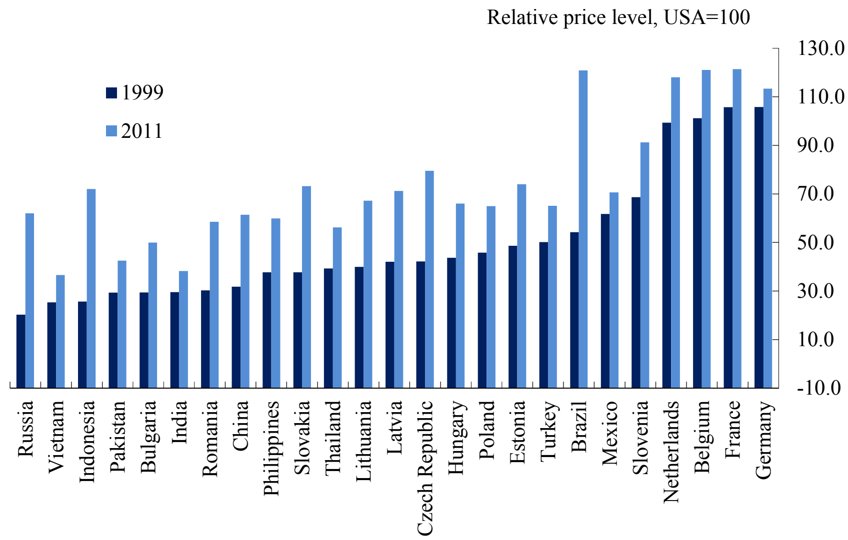
(1) Bank of England. Email: john.lewis@bankofengland.co.uk
(2) Bank of England. Email: Jumana.saleheen@bankofengland.co.uk

The views expressed in this paper are those of the authors, and not necessarily those of the Bank of England.
We are grateful to Hashem Pesaran, Jean Imbs, Giancarlo Corsetti and George Kapeytanios for useful comments.

1 Introduction

The process of globalisation has led to a rapid growth in trade between advanced and emerging market economies (EMEs) over the past 15 years. This has been facilitated by a number of factors such as the reduction in legal barriers to trade, transitions towards market-oriented policies and relatively low costs of production in EMEs. As Figure 1 shows, prices in EMEs are typically significantly lower than in advanced economies, but this differential has been diminishing over time.

Figure 1: Relative price levels of selected trading partners



Source: Penn World Tables, authors own calculations

Many policymakers have argued that the rising share of such cheap imports from EMEs, such as China and India, have acted as a positive terms of trade shock, or 'tailwind' by pushing down on import price inflation in the developed world (Greenspan, 2005; Dudley, 2011; ECB, 2008 and IMF, 2012). . More recently, as inflation and wages rates have increased in EMEs, policymakers have become concerned that this tailwind may be fading or even reversing in sign (Li et al, 2012; Feyzioğlu and Willard, 2006; Dale, 2011). The focus of this paper is to examine how big has the 'tailwind' from EME imports been on import price inflation in the UK.

There is a vast literature that considers the impact of globalisation on advanced economies. That literature can be broadly divided into two strands. A first strand explores the impact of globalisation on advanced economy labour markets - including the impact on wages, wage inequality and employment (Freeman, 2005; Feenstra et al,1997 and 2007; and Autor, et al, 2013).

A second strand analyses the impact that globalisation has on advanced economy goods markets, including its impact on import prices, firm behaviour and domestic and consumer prices.[1] This paper falls within this second strand, specifically quantifying the impact of rising EME imports on UK import prices. We build on the approach set out by Kamin et al. (2006) and McCoille (2008) but exploit the richer data that is now available. We do not analyse the influence that rising imports has on producer prices, an area covered by Auer and Fischer (2010) and Auer et al (2011). In a similar vein Melitz and Ottaviani (2008) and Bugamelli et al. (2010) use firm-level data to explore how pricing strategies change in response to increased competition from EMEs. Several papers have looked at how globalisation may have fed through to CPI inflation. Wheeler (2008) examines how the improvement in terms of trade from China may have UK goods prices. While Ball (2006) argues that there is no obvious theoretical reason why relative price shifts should have any connection with overall prices, some policymakers have argued that lower import prices may have an effect on inflation in the short-run (e.g. Bean, 2006; Mishkin, 2009; Rogoff, 2006). Elsewhere, other work has looked at the effect of EME growth on commodity prices (e.g. Millard and Lipínska, 2012) and the role of global slack in Phillips curve equations (Borrio and Filardo, 2006; Calza, 2009)

Kamin et al (2008) describe three distinct channels through which rising EMEs exports can affect the import prices of its trading partners. First, as EME exporters gain market share, they will tend to displace similar but more expensive goods from other countries with goods that have a lower price level. This shift in the composition of imports reduces the price level of the aggregate import basket. Second, faced with increased price competition from EMEs, there may be increased pressure on non-EME exporters to lower their prices. A third, potentially conuterveiling, channel is rising prices in EMEs. If the price of imports from EMEs is rising faster than those from advanced economies, then sectors with greater exposure to EMEs will see higher import price inflation.

We evaluate the size of each of these three channels on UK import prices over the period 1999-2011. We do so using a panel regression approach using highly disaggregated industry level data on a measure of import prices (unit values). EMEs are split into three distinct groups - China, the New EU Member States and other low cost producers. We find that only China has a statistically significant downward impact on UK import prices, with no significant effect from the two other EME country groups. Chinese imports are estimated to have lowered annual import price inflation by 0.5 percentage points on average each year of our sample. Of this, we estimate that two thirds arises from the direct switching channel and one-third from the indirect competition channel. We find no evidence of a significant “inflation effect” as yet.

Our estimates are in line with previous UK work based on an accounting approach (McCoille, 2008). But they are larger than Kamin et al. (2006) who report an average effect of -0.25pp for a sample of developed economies, but zero for the UK. Their smaller estimates can partly be explained by their earlier sample period (1993-2001) which predates the years in which China’s market share grew most rapidly in the UK.

[1] Auer and Fischer (2010) find that the distribution of price shocks has a strong negative skew, which may interact with menu costs to generate downward pressure on aggregate prices even if the mean of price shocks is zero.

We contribute to the existing literature in three ways. First, while previous studies assume the tailwind - or impact of EME exports on import price inflation - is homogeneous across industry, we allow for heterogeneity and find it to be important. We show that failure to account for heterogeneity generates biased (and smaller) estimates of the size of the tailwind. Second, our panel regression approach allows us to compute bootstrap standard errors that help us assess if our estimate of the China 'tailwind' is statistically significant – this has not been done before. Third, while the previous literature had either estimated the *combined* impact of the switching and competition effects, or just captured the switching effect, the disaggregated nature of our data allows us to devise a method of estimating each of these two effects separately; we are the first to do this.

The remainder of this paper is set out as follows. Section 2 describes the dataset we use, noting the key features of our data that have not been exploited in the literature before. Section 3 sets out our empirical approach. Section 4 sets out main empirical results including robustness checks. The final section concludes.

2 Dataset

We use annual data on imports from the *Tradeinfo* database, published by the UK's customs authority, Her Majesty's Revenue and Customs (HMRC). This records both the value and volume of imports to the UK by trading partner and at industry level according to the Standard International Trade Classification (SITC) system. The key advantage of these data is that they are available at a detailed industry level. In its most disaggregated form this data covers 3000 distinct industries, with around 2000 in manufacturing.

The SITC system denotes each industry by a 5-digit code. The first digit corresponds to the broadest sectoral classification; subsequent digits give finer degrees of sectoral disaggregation. In what follows, we refer to a group of industries whose 5-digit codes share the same initial N digits as being in the same "N-digit industry".[2] The hierarchical nature of the SITC becomes important later on in the paper when we discuss the role of heterogeneity in our estimations.

To keep our dataset computationally manageable and to avoid possible missing data issues for country specific control variables, we restrict our attention to 45 of the UK's largest trading partners.[3] Collectively, these countries account for around 90% of total UK imports in each year of our sample and represent around 1.5 million data points. We then aggregate this country specific

[2] For example, "Corks and Stoppers of Natural Cork" has the 5-digit code "63311". Its 1-digit industry (6) is "Manufactured articles classified chiefly by material"; its 2-digit industry (63) is "Cork and wood manufactures"; its 3-digit industry (633) is "Cork manufactures"; and its 4 digit industry (6331) is "Articles of natural cork".

[3] The 45 countries are: All EU and OECD members, plus Argentina, Brazil, China, Hong Kong, India, Indonesia, Malaysia, Pakistan, Philippines, Qatar, Russia, Saudi Arabia, South Korea, Taiwan, Thailand and Vietnam. Collectively they account for over 90% of UK imports. The ratio of imports from these countries to total imports from all trading partners is broadly constant over the sample period, and so our country choice does not result in the exclusion of groups of countries which have also seen a significant rise in their overall market share.

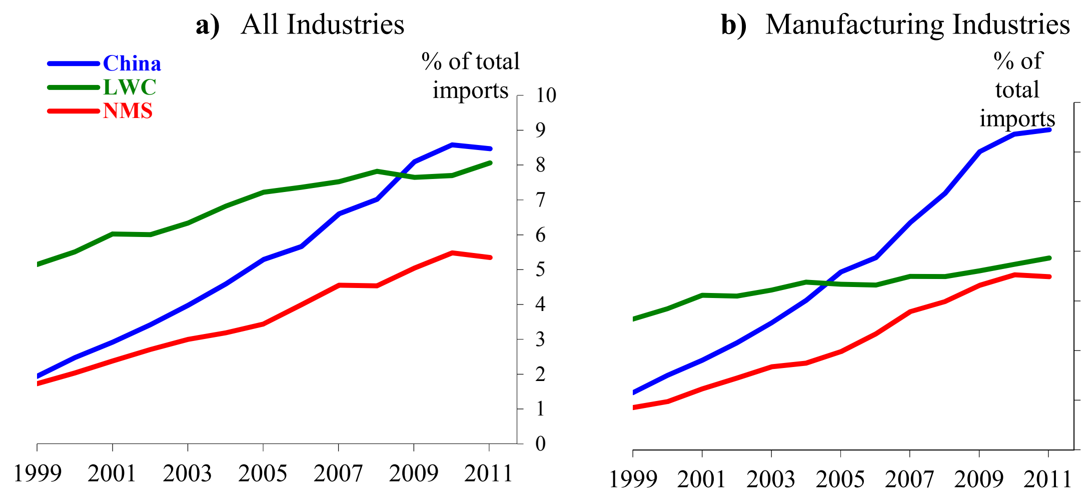
data to build a panel dataset without a country dimension, but where the cross-sectional unit is the (5-digit) industry. Details of the construction of our variables are outlined briefly below. For more detail and additional descriptive statistics see Appendix A.

We split the EMEs into three groups: China, which has by far the largest share of UK imports of any EME; the New Member States of the EU from Central and Eastern Europe ("NMS") who represent a geographically proximate and economically broadly similar group of low cost producers, with whom the UK has been steadily integrating.[4] Our final group of "other" Low Wage countries, consists of Brazil, India, Indonesia, Mexico, Russia, Turkey, Thailand, Philippines, Pakistan and Vietnam, denoted LWC.[5]

[4] The New EU Member States (NMS) group of countries includes Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia, Slovenia and Romania.

[5] All these countries have lower relative price levels than the UK's main advanced economy trading partners (see Appendix D).

Figure 2: UK imports from Emerging Market Economies



Over our sample period, imports from China have increased rapidly, from 2% of all imports in 1999 to just under 9% by 2011 (**Figure 2a**), with China now the second largest single importer to the UK, after Germany. Imports from the New EU Member States and other low wage cost countries, have also increased, but at a less rapid pace. **Figure 2b** shows that the rising EME market shares have been most noticeable in the manufacturing sector, where China accounts for 13% of imports, and EMEs collectively for around a quarter.

Our dependent variable is the log difference in the unit value of imports for a given industry in a given year, where the unit value is calculated by dividing the total value of imports (across all producers) by the total volume of imports. Import share is defined as the ratio of the value of imports from each EME group divided by the total value of imports.[6]

To control for the influence of exchange rate fluctuations we construct an industry specific exchange rate index. This is defined as the weighted average of bilateral nominal exchange rate changes between year *t-1* and *t*, where the weights are given by each countries share of imports in year *t* in a particular industry. Since the weights of each country differ across industries, this index will vary along both the time and industry dimensions. Exchange rates are expressed in the European style, with a rise in the index denoting an appreciation of sterling.

3 Empirical Approach

Our empirical approach distinguishes between three distinct channels through which EMEs may affect aggregate import prices. Aggregate import prices in each industry *i* and at time *t*, P can be written as a weighted average of the price of imports from EMEs (P^{EME}) and the price of imports from non-EMEs (P^{NE}). To see this consider the following analytical expression:

[6] Throughout the paper we use the term "total" to refer to summing across the 45 major countries we import from.

$$P \quad = S^{EME}P^{EME} + (1 - S^{EME})P^{NE} \qquad [1]$$

To keep things simple, we do not add the industry and time subscripts in this notation. The relevant weight then is the share of share of imports from EMEs in industry *i* and at time *t* –S^{EME}. Totally differentiating the above equation and expressing it in percentage changes we get the following three terms:

$$\dot{P} = \Delta S^{EME}\left(P^{EME} - P^{NE}\right)/P$$

$$+ S^{EME}(\dot{P}^{EME}.P^{EME}/P \quad -\dot{P}^{NE}.P^{NE}/P \quad)$$

$$+ \dot{P}^{NE}.P^{NE}/P \qquad [2]$$

The first term in the above equation captures the impact of a change in EME market share (ΔS^{EME}) on import prices; as noted above, given imports from EMEs are typically cheaper than other countries this term will be larger the faster the pace at which EME's gain market share and the larger the price differential between emerging and non-emerging economies. This is the "switching effect".

The second term illustrates that the rate at which prices change in EMEs, relative to other countries, will also influence import prices. Relatively higher EME inflation will tend to push up on import prices.[7] And the extent of this upward pressure will depend on the existing exposure to EMEs, i.e. the EME import share (S_i^{EME}). This is the "inflation" effect.

The final term captures the extent to which import prices from non-EMEs rise. If there is greater competition from EMEs, one would expect these inflation rates to be lower than they would be absent competition. This is the "competition" effect.

Building on this analytical expression, our panel regression includes two key terms: the change in the EME import share and the lagged share of EME imports. The coefficient on the change variables will pick up the combined effect of the switching and inflation effects. This combined effect has been referred to as the "price level" effect in the literature, reflecting the fact that both channels stem from the typically lower price level of EMEs which push down on aggregate import prices either directly (via a composition shifting effect) or indirectly (via competition). We decompose this price level effect into the switching and competition affects and later we explain how we do so.

The key equation we estimate is a panel regression of the form:

[7] That is when $\%\Delta P_i^{EME} > \%\Delta P_i^{NE}$

$$\pi_{it} = \alpha + \beta_1 S_{it-1}^{CHINA} + \beta_2 \Delta S_{it}^{CHINA} + \gamma_1 S_{it-1}^{NMS} + \gamma_2 \Delta S_{it}^{NMS} + \phi_1 S_{it-1}^{LWC} + \phi_2 \Delta S_{it}^{LWC} + \theta exch_{it} + \mu_i + \lambda_t + \boldsymbol{\psi}' \mathbf{X_{it}} + \varepsilon_{it} \quad [3]$$

where the dependent variable, π_{it} is log difference in the sterling value of import prices (measured as unit values) in each period *t* and for each industry *i*. S_{it-1} denotes the market share of each EME group – China, EU New Member States (NMS) and other low wage cost economies (LWC). We also include an exchange rate term, *exch* defined as the log difference of an industry specific exchange rate index. Adding this term allows us to capture the average rate of exchange rate pass-through to import prices; importantly we remain agnostic about whether exporters use local or producer currency pricing.[8] As is standard in a panel regression, we add time and industry fixed effects, but we also follow Kapetanios et al. (2011) by including the within period averages of each of the regressors and the dependent variables (by 4-digit industry), denoted in the equation in matrix form as $\boldsymbol{\psi}' \mathbf{X_{it}}$. Econometrically, these terms allow common correlated effects that are not picked up by other terms in our equation. For example, an industry specific positive productivity shock that hits domestic producers in manufacturing may induce foreign importers to alter the price of imports.

Auer and Fischer (2010), who investigate the effect of import competition on domestic producer price inflation (PPI) argue that it is necessary to instrument the change in EMEs market share, and failure to do so could substantially bias estimates. That is because, any positive demand shock is likely to increase both producer prices and the share of goods imported from EMEs as a percentage of the domestic market. However, the regression equation estimated in this paper is unlikely to suffer from this same endogeneity problem for three reasons. First, our research question embodies a different independent variable – we consider imports as a share of total imports, rather than as a share of domestic production plus imports. A cyclical demand shock that increases the demand for imports of a particular good is likely to increase demand so from all countries proportionately. This would leave the former measure of market share unchanged, but not the latter[9]. Second, our independent variable is the rate of change of the sterling price of imports to the UK— as opposed to the price of domestically produced goods — which is also less likely to be related to cyclical conditions in the domestic economy than domestic producers would be. Third, the impact of any potential demand side factors that could bias our regression coefficient estimates should be mitigated by the inclusion of the 4-digit industry averages of our dependent and explanatory variables, which seek to capture the effects of any industry specific shocks (including demand shocks).

3.1 Quantifying the "price level" (or combined switching and competition) effect

---

[8] We use the contemporaneous rather than lagged exchange rate because the literature (e.g. Gopinath et al 2010) finds that pass-through from the exchange rate to import prices usually take place within one year. That said in the results section we investigate how sensitive our results are to different assumptions and find that it is not.

[9] This shock, with a proportional increase in demand for imports from all countries would result in a rise in the ratio of EME or Chinese Imports to the overall size of the domestic market.

Central to our research question is computing the size of the price level effect on import prices, as opposed to merely providing estimates of the coefficient of the *change in the China share* which picks up this effect in the regressions above. To compute this, we use the expression below:

$$\text{Price level effect} = \sum_{i=1}^{I} w_{it} \cdot \hat{\beta}_{2i} \cdot \Delta S_{it}^{CHINA} \qquad [4]$$

where ΔS_{it}^{CHINA} is the actual change in market share in industry *i* that is observed in the data, $\hat{\beta}_{2i}$ is the estimated coefficient of the change in China share[10], described above, and w_{it} is the weight of sector *i* in total imports at time *t.*

3.2 Quantifying the "inflation effect"

Similarly, the inflation effect is picked up the coefficient on the lagged China share in the regressions. The overall size is given by:

$$\text{Inflation effect} = \sum_{i=0}^{I} w_{it} \cdot \hat{\beta}_{1i} \cdot S_{it-1}^{CHINA} \qquad [5]$$

3.3 Splitting the price level effect into its two components: switching and competition effects

The competition effect captures the response of non-Chinese producers to a change in China's market share. To isolate this effect we run a regression where the dependent variable is the log change in the unit value of inflation from all countries excluding China.[11]

$$\pi_{it}^{EXC} = \alpha + \beta_1' S_{it-1}^{CHINA} + \beta_2' \Delta S_{it}^{CHINA} + \gamma_1' S_{it-1}^{NMS} + \gamma_2' \Delta S_{it}^{NMS} + \phi_1' S_{it-1}^{LWC} + \phi_2' \Delta S_{it}^{LWC} + \theta' exch_{it} + \mu'_i + \lambda'_t + X'_{it} + \varepsilon_{it} \qquad [6]$$

The coefficient β'_2 captures the response of non-Chinese producers to a 1pp rise in China's market share. If this coefficient is zero, this indicates no pricing response to China gaining market share, if this is significant (and negative), it indicates that other producers do respond to Chinese entry.

The total size of the competition effect is given by:[12]

$$\text{Competition effect} = \sum_{i=1}^{I} w_{it} \cdot \hat{\beta}'_{2i} \cdot \Delta S_{it}^{CHINA} \cdot (1 - S_{it}^{CHINA}) \qquad [7]$$

4 Results

4.1 Heterogeneity across industry

---

[10] In what follows, we also run regressions into samples split by one and two digit industry. That means our estimated coefficient used in equation (4) can differ across industry groups. We therefore include an *i* subscript on $\hat{\beta}$ in equation (4).

[11] This is calculated as the aggregate value of non-Chinese imports in industry *i* at time *t* to the aggregate volume of non-Chinese imports in industry *i* at time *t*.

[12] We multiply by ($(1 - S_{it}^{CHINA})$) ,because we estimate our competition effect only over non-Chinese imports, but wish to calculate the effect on the price of all imports in a given industry.

Table 1: Baseline Regression Results

	[I]	[II]	[III]	[V]	[V]	[VI]	[VIII]
Sample (1-digit industries)	1-9	1-4	5	6-8	6	7	8
	All	Food, beverage, fuel, commodities, oils	Chemicals	Manufacturing	Materials	Machinery	Manufactured articles
Lagged China share	-0.030	-0.015	-0.211	-0.002	-0.036	0.100	-0.089
	(0.056)	(0.120)	*(0.177)*	*(0.066)*	*(0.110)*	*(0.168)*	*(0.095)*
Change in China share	**-0.474*** **	0.003	**-0.848*** **	**-0.550*** **	**-0.393*** **	**-0.780*** **	**-0.588*** **
	(0.076)	*(0.117)*	*(0.297)*	*(0.093)*	*(0.136)*	*(0.179)*	*(0.183)*
Lagged NMS share	-0.010	-0.151	-0.051	0.019	-0.011	-0.125	**-0.453** **
	(0.065)	*(0.161)*	*(0.180)*	*(0.075)*	*(0.091)*	*(0.127)*	*(0.195)*
Change in NMS share	**-0.184* **	**-0.349* **	0.054*	-0.173	-0.011	-0.300	**-0.948** **
	(0.094)	*(0.209)*	*(0.182)*	*(0.117)*	*(0.140)*	*(0.186)*	*(0.421)*
Lagged Other LWC share	-0.025	0.114	-0.094	-0.072	-0.011	-0.105	-0.083
	(0.045)	*(0.084)*	*(0.101)*	*(0.060)*	*(0.073)*	*(0.091)*	*(0.182)*
Change in Other LWC share	**-0.212*** **	-0.039	**-0.352** **	**-0.264*** **	**-0.185** **	**-0.646*** **	-0.051
	(0.061)	*(0.138)*	*(0.146)*	*(0.080)*	*(0.089)*	*(0.181)*	*(0.240)*
Exchange Rate	**-0.282*** **	-0.121	-0.076	**-0.472*** **	-0.230	-0.565	**-0.797** **
	(0.105)	*(0.134)*	*(0.328)*	***(0.165)***	*(0.206)*	*(0.377)*	*(0.361)*
N (no. of obs)	35351	7983	5462	21902	9408	7435	5059
I (no. of industries)	3152	724	480	1947	836	668	443
R2 (overall)	0.278	0.343	0.218	0.273	0.261	0.296	0.257

Note: Coefficients for variables in the vector **X** are not reported here for space reasons. *,**,*** denote significance at the 10,5 and 1% levels respectively. Standard errors are in parentheses

Our results are presented in Table 1. The first column of the table shows that when we pool over all industries (regression I), the change in the market share of China, NMS and other LWCs are for the most part both significant and negative; although the size of the coefficient is two to three times larger for China. The lagged market share variables are insignificant, suggesting that higher inflation in EMEs has not fed through to UK import prices.

However, these results mask considerable variation across industry groups. For food and commodity based products (regression II), none of the coefficients on changes in market share is significant. By contrast, in chemicals (regression III) and manufacturing (regression IV), both
China and other LWCs do appear to exert a significant downward effect on prices via gaining market share. That said, while the EME group market shares in the chemicals sector have been relatively constant over our sample period, the shares for manufacturing have risen rapidly. Therefore, and in keeping with previous studies we restrict the focus of this paper to the manufacturing sector.

Splitting the manufacturing sector into its three separate 1-digit industries also reveals considerable differences. For machinery, our estimates suggest that ceteris paribus a 1% rise in Chinese market share is associated with a fall in prices of 0.82% (regression VII); compared to a fall of only 0.47% in materials (regression VI). The downward pressure exerted by NMS is only significant in manufactured articles, whereas other LWCs are significant in materials and machinery. Again, the lagged market share for all EME groups is generally insignificant.

This analysis at finer levels of disaggregation raises the important question of what is the appropriate level of disaggregation. To explore this we go further and estimate regressions at the 2-digit level, where we continue to find variation across the 26 industry groups (see Appendix C.[13] Testing the implied restriction of pooling across1- and 2- digit industry, we find a clear rejection of the hypothesis of homogeneous effect (equal coefficients) at either the 1 or the 2-digit industry levels. This can be seen by the near zero p-values in **Table 2**.

[13] If we go down to the 3-digit level, we run into the problem that some 3-digit industries contain only a single 5-digit industry and hence panel estimation cannot be used.

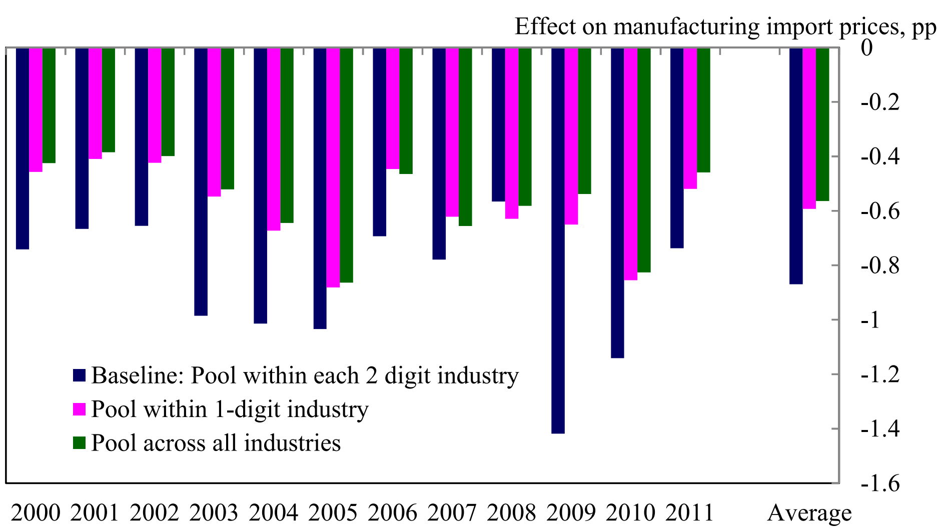
Table 2: Tests for Pooling

Restricted Model	Unrestricted Model	p-value
Full pooling	Separate regressions for each 1-digit industry	*0.000*
Full Pooling	Separate regressions for each 2-digit industry	*0.000*
Separate regressions for each 1-digit industry	Separate regressions for each 2-digit industry	*0.000*

We compute the estimated total China price level effect under three different specifications using the methodology set out in equation (4). The results from this exercise are shown in **Figure 3**. It shows that the estimated China effect is much larger when the equations are estimated at the 2-digit industry level. In other words, failure to account for coefficient heterogeneity reduces the estimated size of the China effect by around a third.

Figure 3: Price level effects of China under different pooling assumptions

Given both the economic and statistical significance of coefficient heterogeneity, our preferred specification is to estimate separate regressions for each 2-digit industry. This baseline suggests that the tailwind from China is around -0.72pp per annum over our sample period. Since manufacturing accounts for around two-thirds of all UK imports, this is equivalent to a stand-alone effect on all import prices of around -0.49pp.



Looking at the profile of this effect over time, there is no obvious sign of a trend, suggesting that the price level effect of China has not waned over time.

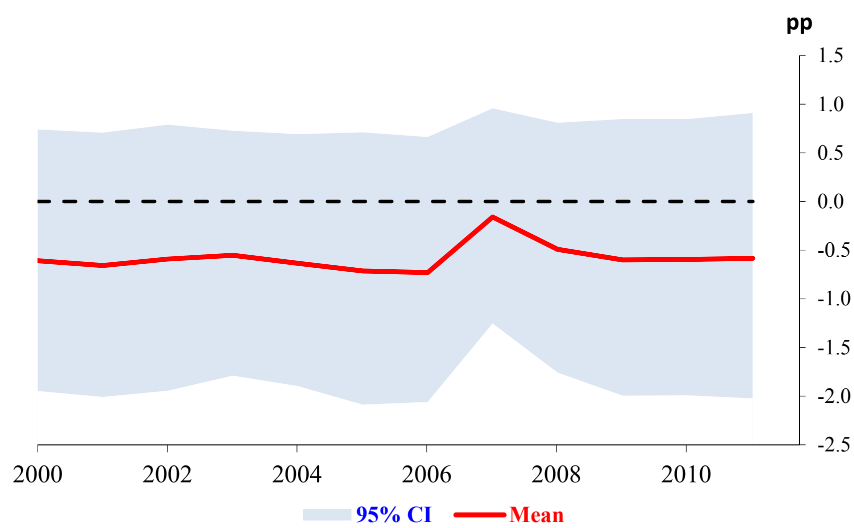
To check for sensitivity of our results to different specifications we did a variety of robustness checks. Frist we computed the China price level effect for alternative specifications. Given that the NMS and LWC market share variables were insignificant, we dropped them to see how they would change the specification. There was little difference (see Appendix C). To check for autocorrelation we included a lagged dependent variable. And to check for the importance of common correlated effects we also dropped the 4-digit industry averages of all variables. But our estimated China price level effect was very similar to our baseline case. We also checked if the results were driven by insignificant coefficients – that is we repeated the calculations by re-coding the 12 insignificant industry coefficients (out of 26) to zero. They produce a very similar estimate of the China price level effect.

4.2 Computing confidence intervals

Whilst the regression coefficients on the China share are statistically significant for most industries, the above estimate of the total China effect do not give any indication as to whether the estimated effect of China and other EMEs is statistically significantly different from zero. To assess this we used Monte Carlo methods to estimate a confidence interval.

Specifically we take 10,000 draws from the estimated parameter distribution of each β_i, and used each draw to compute the China effect based on the drawn values of β_i. From this we compute the 95% confidence interval by discarding the top and bottom 2.5% of the distribution. This confidence interval is shown in **Figure 4**.[14] As a robustness check we also constructed a confidence interval using a bootstrapping technique based on re-sampling residuals across industry, which unlike the Monte Carlo approach allows for any correlation in residuals across equations[15]. This yields very similar results.

Figure 4: China Price Level Effect



[14] The mean estimate from this exercise is almost identical to our estimate of the tailwind reported in Figure 3.
[15] Specifically, we decomposed the data into fitted values and residuals. Taking the residuals by year we obtain 11 sets of residuals, which formed our sampling population. We then generated a synthetic dataset by adding the fitted values for each year to a randomly chosen residual vector (sampling with replacement). We then calculated the estimate China effect from this synthetic dataset, and repeated the whole procedure 10,000 times. The 95% confidence interval was then given by discarding the upper and lower 2.5% of estimates. See appendix for charts.

Over the full sample period, 1999-2011, the 95% confidence interval never crosses the y-axis, and hence we conclude that China's impact is significant at the 5% level in each year. A similar exercise for estimating the mean impact and confidence intervals for LWC and NMS shows that their impacts are not statistically different from zero.[16]

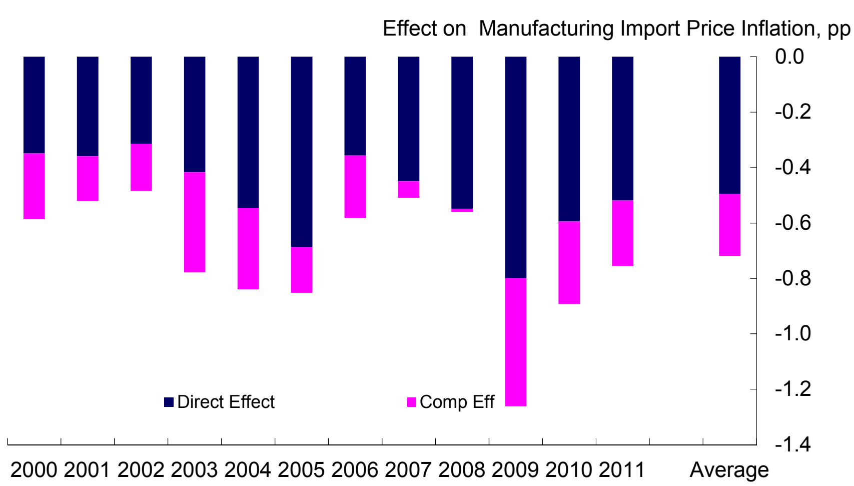
The mean inflation effect and 95% confidence intervals are shown in **Figure 5.** They straddle the zero line implying that rising inflation in China is not having any statistically significant effect on UK import prices. A similar exercise was carried out to compute the inflation effect of NMS and LWC, the confidence intervals for the inflation channel in these country groups were also very wide and no different from zero (see Figures in Appendix D).

Figure 5: Estimates of the China Inflation Effect

4.3 Decomposing the price level effect into the switching and competition effects

We now move on to decomposing the China price level effect into its two parts: the switching effect and the inflation effect. We first estimate the competition channel by plugging an estimate an estimate of that effect on non-Chinese producers using equation (7). The switching effect is then calculated as the gap between the total price level effect and the competition effect. **Figure 6** below shows the resulting decomposition. It indicates that roughly two-thirds of the estimated combined price level effect from China occurs via the direct switching channel, with the more indirect competition effect accounting for the remaining third.

Figure 6: Decomposing the China combined Price Level effect



[16] See Figure D2 and D3 in Appendix D.

5 Conclusions

In this paper, we seek to quantify the effect of rising import penetration from emerging market economies on UK import prices using a richer dataset, which unlike previous studies has information on both the value and volume of imports by country of origin and by detailed industry groupings. This highly disaggregated industry data allow us to account for heterogeneity across industries and across the emerging market economies that export to the UK.

We find robust evidence that the rise in China's share of the markets has acted as a tailwind, lowering manufacturing import price inflation by an estimated 0.7pp on average a year over the period 1999-2011; this is equivalent to a standalone effect of -0.5pp on overall import prices.

Constructing confidence interval of the tailwind by Monte Carlo methods we find that the China tailwind is indeed statistically significant, but there is no evidence of a significant tailwind from the EU New Member States or other low wage cost economies (including India and Brazil).

Finally, this paper finds that around two-thirds of the China tailwind comes via a change in the composition of the import basket, to reflect a greater share of cheaper goods from China. The remaining one-third arises via competition effects, as non-Chinese exporters to the UK lower their prices in response to the increased competition from China.

References

Auer, R. and Fischer, A., (2010), 'The Effect of Low-wage Import Competition on U.S. Inflationary Pressure', Journal of Monetary Economics, Vol. 57, pages 491-503.

Auer, R. Degen, K. and Fischer, A. (2011) 'Low-wage Import Competition, Inflationary Pressure and Industry Dynamics in Europe', European Economic Review, Vol. 59(C), pages 141-166.

Autor, D. Dorn, D. Hanson, H and Song, J. (2013), 'The China Syndrome: Local Labour Market Effects of Import Competition in the United States', American Economic Review, 103(6), pages 2121-68

Ball, L. (2006), 'Has Globalization Changed Inflation', NBER Working Papers 12687

Bean C. (2006), 'Globalisation and Inflation', Bank of England Quarterly Bulletin, 2006 Q4, pages 468-475.

Borrio, C. and Filardo, A., (2006), 'Globalisation and inflation: New Cross Country Evidence on the Global Determinants of Domestic Inflation', BIS Working Paper 227.

Broda, C. and Romalis, J. (2009), 'The Welfare Implications of Rising Price Dispersion', mimeo, Chicago Booth University.

Bugamelli, M., Fabiani, S., and Sette, E. (2010). 'The pro-competitive effect of imports from China: an analysis of firm-level price data'**,** Bank of Italy, Working Paper No. 737.

Calza, A. (2009), 'Globalization, Domestic Inflation and Global Output Gaps: Evidence from the Euro Area', International Finance, Vol. 12:3, pages 301-320.

Dale, S. (2011), 'MPC in the Dock', Speech at the National Asset-Liability Management Global Conference, 24 March.

Dudley, W. (2011), 'US Economic Policy in a Global Context', Remarks at the Foreign Policy Association Corporate Dinner, New York.
http://www.newyorkfed.org/newsevents/speeches/2011/dud110607.html

European Central Bank (2008) , 'Globalisation, Trade and the Euro Area Macroeconomy', Monthly Bulletin, January, pages 75-88.

Feenstra, R. (2007) 'Globalization and Its Impact on Labour', The Vienna Institute for International Economic Studies Working Paper, No.44.

Feenstra, R, and Kendall, D. (1997), 'Pass-through of exchange rates and purchasing power parity', Journal of International Economics, Vol. 43, pages 237-261.

Feyzioğlu, T. and Willard, L. (2006), 'Does Inflation in China Affect the United States and Japan?', IMF Working Paper no. 06/36.

Financial Times, (2011), 'Global Economy: An Inflated Outlook', 8 April, http://www.ft.com/cms/s/0/335141d6-6210-11e0-8ee4-00144feab49a.html?ftcamp=traffic/email/regsnl//memmkt/#axzz1JgdxFmUG

Freeman, R. (2005) 'Are your wages set in Beijing?', Journal of Economic Perspectives, Vol 9, page 15-32

Friedman, M. (1975), 'There's No Such Thing as a Free Lunch', Open Court, pages 113-115.

Gopinath, G. Itskohiki, O. and Rigobon, R. (2010) "Currency Choice and Exchange Rate Pass-through", American Economic Review, Vol. 100, pages 304-336.

Greenspan, A. (2005), 'Globalization: Remarks to the Council on Foreign Relations', 10 March http://www.federalreserve.gov/boarddocs/speeches/2005/20050310/default.htm

Hicks, B. and Kilian, L. (forthcoming) 'Did Unexpectedly Strong Economic Growth Cause the Oil Price Shock of 2003-2008', Journal of Forecasting.

Hummels, D. (2010), 'Hedging Price Volatility Using Fast Transport', Journal of International Economics, Vol. 82:1, pages 15-25.

Ihrig, J., Kamin, S., Lindner, D. and Marquez, J., (2010), ' Some Simple Tests of the Globalization and Inflation Hypothesis', International Finance, Vol. 13:3, pages 343-375.

IMF (2012), 'World Economic Outlook'.

Kamin, S., Marazzi, M. and Schindler, J. (2006), 'The Impact of Chinese exports on global import prices', Review of International Economics, Vol. 14:2, pages 179-201.

Kapetanios, G., Pesaran, H. and Yamagata, T. (2011), Panels with Non-stationary Multifactor Error Structures, Journal of Econometrics, Vol. 160, pages 326-348.

Koske, I., Pain, N. and Sollie, M. (2008), 'Globalisation and OECD Consumer Price Inflation', OECD Economic Studies 44.

Li, H. Li, L. Wu, B. and Xiong, Y. (2012), 'The End of Cheap Chinese Labour', The Journal of Economic Perspectives, Vol. 26:4, pages 57-74.

McCoille, C. (2008), 'The Impact of Low-Cost Economies on UK Import Prices', Bank of England Quarterly Bulletin, 2008 Q1, pages 58-63.

Melitz, J. and Ottaviani, P (2008), 'Market Size, Trade, and Productivity', Review of Economic Studies, Vol. 75(1), pages 295-316.

Millard, S. and Lipinska, A (2012), 'Tailwinds and Headwinds: How Does Growth in the BRICs Affect Inflation in the G-7?', International Journal of Central Banking, Vol. 8, pages 227-66.

Mishkin, F. (2009), 'Globalization, Macroeconomic Performance and Monetary Policy', Journal of Money, Credit and Banking, Vol. 41:S1 pages 187-196.

Rogoff, K. (2006), 'Impact of Globalization on Monetary Policy', paper prepared for symposium on "The New Economic Geography: Effects and Policy Implications" http://kansascityfed.org/publicat/sympos/2006/pdf/19Rogoff.pdf

The Economist, (2008), Inflated Claims: Why China is not to blame for the surge in Global Inflation, http://www.economist.com/node/11920640 .

Wheeler, T. (2008), 'Has Trade with China Affected UK Inflation?', External MPC Unit Discussion Paper 22, Bank of England.

Appendix A: Data

Exchange Rate Data

Let V denote the value of imports of country *j* in industry *i* at time *t*. The weight of each country is given by:

$$w_{ijt} = \frac{V_{ijt}}{\sum_{j=0}^{I} V_{ijt}}$$

The exchange rate, *e*, is the average annual bilateral nominal exchange rate, extracted from Thompson datastream. Our index of exchange rate changes is defined as:

$$exch_{it} = \sum_{j=0}^{I} w_{ijt}\left(\frac{e_{jt}}{e_{jt-1}} - 1\right)$$

Exchange rates are defined in the European style, so a positive value of *exch* corresponds to an appreciation in sterling. For countries which adopted the euro during our sample period, we use the exchange rate between sterling and the legacy country, which during the post-euro adoption period is calculated by multiplying the official conversion rate with the sterling euro exchange rate.

The figure below shows the mean, maximum, minimum and inter-quartile range of the exchange rate across all 5-digit industries in each year of the sample period.

Global Wage and Inflationary Pressure Indices

Let *p* denote the Consumer Price Index is measured as the annual rate of CPI inflation, as reported in the IMF's World Economic Outlook. The Global inflationary pressure index is given by:

$$Inf_{it} = \sum_{j=0}^{I} w_{ijt}\left(\frac{p_{jt}}{p_{jt-1}} - 1\right)$$

Similarly, denoting nominal wages with W, the global wage index is given by:

$$Wages_{it} = \sum_{j=0}^{I} w_{ijt}\left(\frac{W_{jt}}{W_{jt-1}} - 1\right)$$

Market share of low cost producers

We calculate the market share of a subset of K countries, as follows:

$$S_{ikt} = \frac{\sum_{j\in K} V_{ijt}}{\sum_{j\in J} V_{ijt}}$$

For the three variables, K is defined as follows:

China: China
New Member States (NMS): Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia, Slovenia, Romania
Low Wage Cost (LWC): Brazil, Mexico, Russia, Turkey, Thailand, Indonesia, India, Philippines, Pakistan and Vietnam.

Appendix B: Comparison with ONS Data

Our analysis of import prices is based on unit value data, which does not adjust for product varieties or quality differences of goods within each 5-digit industry. This might be particularly relevant when looking at EMEs, as Broda and Romalis (2009) show Chinese imports tend to be concentrated in lower quality varieties of the same product class. To check for this source of bias in our results, we compare results obtained from our data with official import price indices (quality adjusted) published by the Office for National Statistics. But since the ONS data are only available for a selection of 2-digit industries, a side-by-side comparison of regression results for all available industries and is presented in **Table 1**.

Table B1: HMRC vs. ONS Data

	[I]	[II]	[III]	[IV]
Dependent variable	Unit value (HMRC)	Import Prices (ONS)	Unit value (HMRC)	Import Prices (ONS)
Industry level	All available	All available	Manufacturing	Manufacturing
Lagged China share	-0.030	0.025	-0.002	0.051
	(0.056)	*(0.104)*	*(0.066)*	*(0.171)*
Change in China share	**-0.474*****	-0.071	**-0.550*****	**-0.714*****
	(0.076)	*(0.231)*	*(0.093)*	*(0.160)*
Lagged NMS share	-0.010	-0.079	0.019	-0.457
	(0.065)	*(0.139)*	*(0.075)*	*(0.020)*
Change in NMS share	**-0.184***	0.115	-0.173	0.232
	(0.094)	*(0.252)*	*(0.117)*	*(0.300)*
Lagged LWC share	-0.025	-0.080	-0.072	**0.553*****
	(0.045)	*(0.139)*	*(0.060)*	***(0.119)***
Change in LWC share	**-0.212*****	0.115	**-0.264*****	0.241
	(0.061)	*(0.509)*	*(0.080)*	*(0.154)*
Exchange Rate	**-0.282*****	-0.170	**-0.472*****	**-0.859*****
	(0.105)	*(0.290)*	***(0.165)***	*(0.773)*
N (no. of obs)	35351	564	21902	144
I (no. of industries)	3152	50	1947	12
R2 (overall)	0.278	0.052	0.273	0.081

When the regression is run over all sectors, the ONS data doesn't yield a significant coefficient on the change in China's market share, or that of NMS; but the LWC share is significant, albeit with the "wrong" sign. However, the ONS import price indices predominantly cover non-manufacturing industries. Restricting the sample to manufacturing industries, we find that the coefficient on the change in China's market share is very similar for both measure of import price inflation. The change in NMS share is insignificant in both, and the change in LWC share is significant only when unit value data is used, which may reflect the lack of quality adjustment in these economies.

Appendix C: Regression coefficients at the 2-digit level

2-digit SITC Code	**Industry description**	**Coefficient on *lagged level* of China share**	**Coefficient on *change* in China share**	**N**	**Average share of manuf imports, %**	**Average annual gain in China market share, pp**
61	Leather, leather manufactures, N.E.S., and dressed fur skins	-0.448	**-1.442****	246	0.1	0.8
62	Rubber Manufactures, N.E.S.	0.083	-0.525	371	1.2	1.3
63	Cork and wood manufactures, other than furniture	0.305	**-0.741****	363	0.9	1.6
64	Paper, paperboard and articles of paper pulp, paper or paper board	0.040	0.498	805	3.0	0.3
65	Textile yarn, fabrics, made-up articles, N.E.S., and related products	0.053	**-0.541****	2645	2.4	1.2
66	Non-metallic mineral manufactures, N.E.S.	0.063	-0.057	1133	2.8	0.7
67	Iron and steel	-0.157	-0.521	1685	2.4	0.4
68	Copper	-0.244	0.088	810	2.7	0.3
69	Manufactures of metals, N.E.S.	0.082	-0.841	1411	3.2	1.2
71	Power generating machinery and equipment	-0.569	**-4.279****	512	5.1	0.0
72	Machinery specialised for particular industries	**1.241****	-0.551	1387	2.7	0.4
73	Metalworking machinery	-0.147	**-1.164*****	829	0.6	0.4
74	General industrial machinery and equipment, N.E.S., and machine parts N.E.S.	0.041	**-0.553***	1805	5.1	0.6
75	Office machines and automatic data processing machines	-0.852	**-2.216****	308	8.8	1.9
76	Telecommunications, sound and recording and reproducing apparatus and equipment	-0.070	**-1.479*****	408	8.2	1.4
77	Electrical machinery, apparatus and appliances, N.E.S., and electrical parts thereof ...	**0.575****	**-0.660****	1515	8.7	1.1
78	Road vehicles (including air-cushion vehicles)	0.113	**-1.326*****	475	17.7	0.1
79	Transport equipment, N.E.S.	**1.595***	**1.656*****	262	0.5	0.2
81	Prefabricated buildings; sanitary, plumbing, heating and lighting fixtures and fittings	-0.098	-0.208	204	0.8	1.4
82	Furniture and parts thereof; bedding mattresses, mattress supports, cushions and similar stuffed furnishings	-0.075	**-1.427***	276	2.1	2.3
83	Travel goods, handbags and similar containers	-0.472	-4.887	108	0.6	1.0
84	Articles of apparel and clothing accessories	**-0.520***	0.147	1144	5.6	2.0
85	Footwear	-0.137	**-0.928****	218	1.5	2.3
87	Professional , scientific and controlling instruments and apparatus	-0.075	**-1.931*****	775	3.2	0.3
88	Photographic apparatus, equipment	-0.446	**-2.247*****	715	1.3	0.3
89	Miscellaneous manufactured articles, N.E.S.	-0.349	-1.069	1666	0.1	0.9

N.E.S: "not elsewhere specified"; *,**,*** denote significance at the 10,5, and 1% levels respectively.

Appendix C: Robustness Checks

Figure C1: China Market Share Effect under different specifications

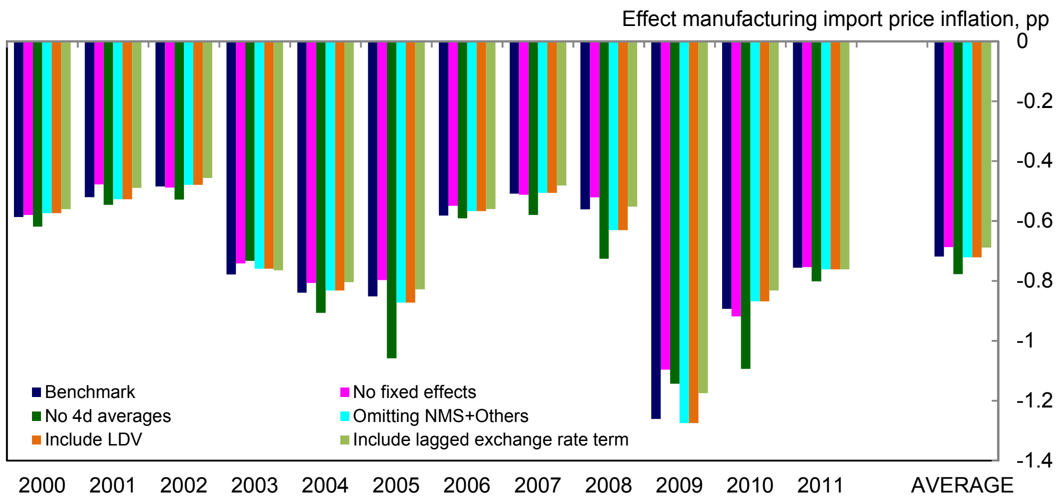
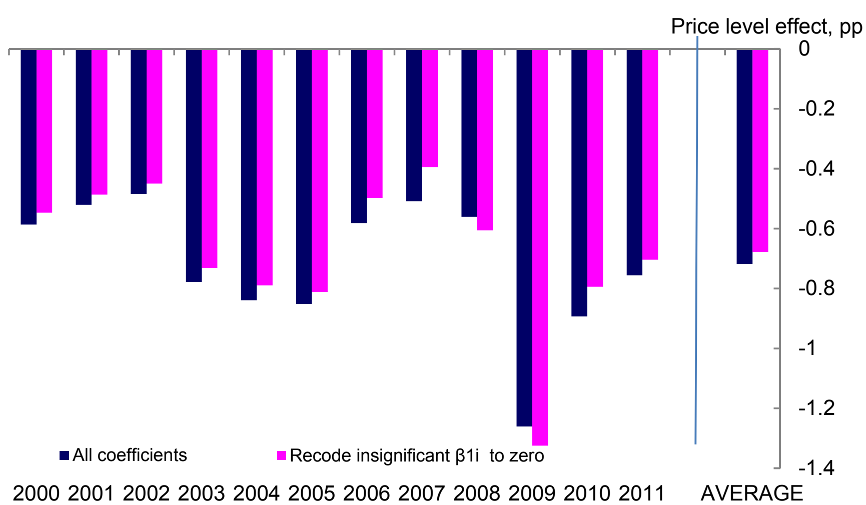


Figure C2: China Price Level Effect



Appendix D: Additional Charts

Figure D1: Relative Price Levels

Note: “Advanced” depicts the five OECD members with the largest shares in UK goods imports in 2011

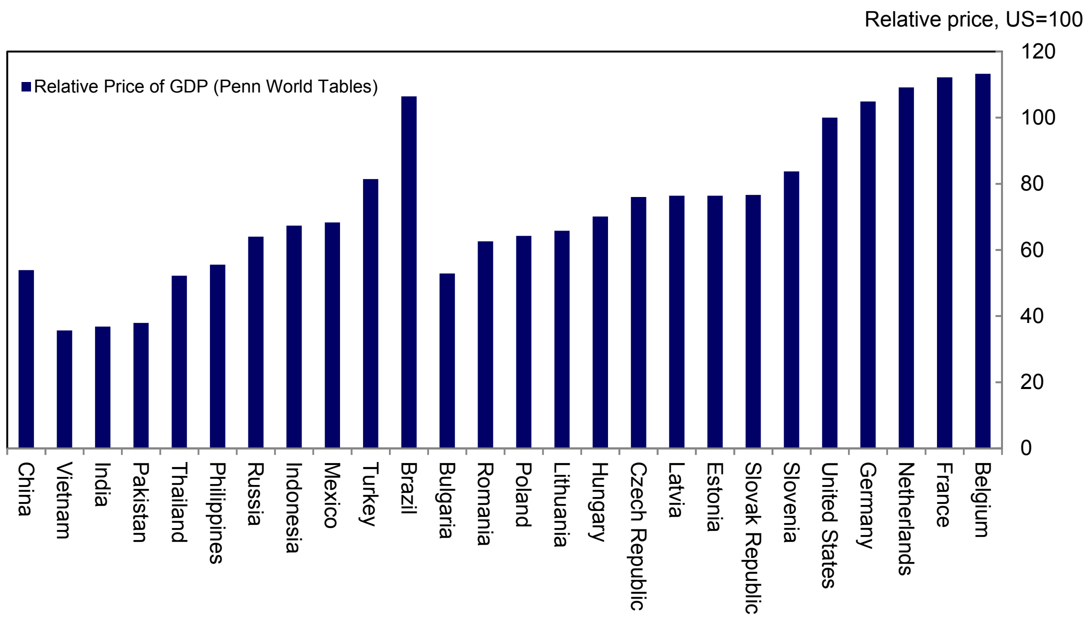
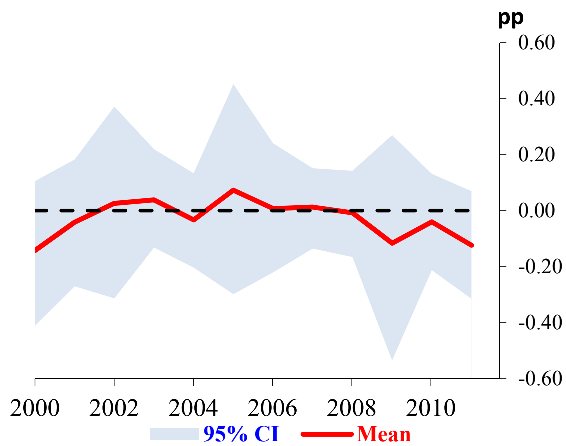


Figure D2: The combined “price level” effect and 95% confidence interval

Other Low Wage Cost countries



EU New Member States

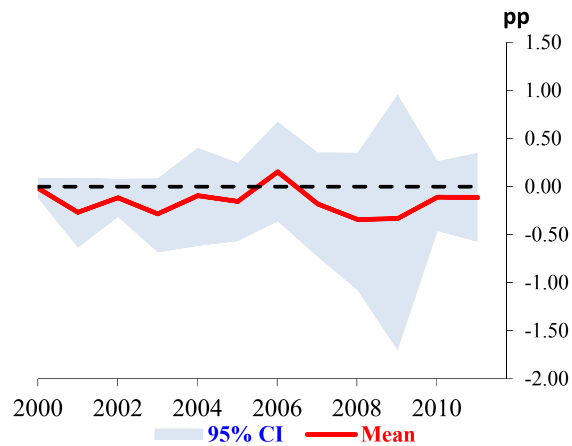
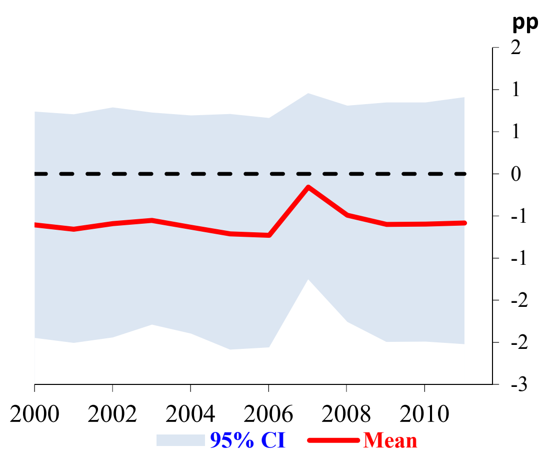


Figure D3: The “inflation” effect and 95% confidence interval

Other Low Wage Cost countries



EU New Member States