Dissecting the Impact of Imports from Low-Wage Countries on Inflation

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Abstract

Using micro data on import values and quantities by product and countries of origin, we quantify the effect of imports of consumption-goods from low-wage countries (LWCs) on inflation in France from 1994 to 2014. Imports of varieties produced in LWCs affect the cost-of-living price index through pure-price and taste-shift variations (which, conditional on prices, drive expenditure shares). The pure-price effect includes both the contribution of imported inflation (given the share of imports in consumption) and the effect of imports of intermediate goods from LWCs on domestic prices. The taste shock effect cannot be directly observed but is recovered from actual expenditure shares and relative prices. We derive an expression of inflation that allows us to disentangle the impact of imports of consumption goods from LWCs on cost-of-living versus CPI inflation – the latter abstracting for composition effects. Overall, we estimate that imports from LWCs lowered CPI inflation by 0.02 pp per year on average, and had a much larger effect on cost-of-living inflation (between 0.13 to 0.20 pp per year depending on how we measure unit values).

JEL codes: E31, F62
Keywords: inflation, low-wage countries, imports, globalization, price index, consumers

1 Introduction

During the past decades consumers in developed economies continuously switched expenditures towards goods produced in low-wage countries (LWCs). In France, the share of LWCs in total imports of consumer goods increased from 26% in 1994 to over 43% in 2014. The weight of goods imported from LWCs as a percentage of total consumption tripled, passing from 2.4% to 6.9%. How did this change in the structure of consumption affect inflation and welfare?

In this paper, we quantify the effect of imports from LWCs on French inflation and consumer welfare over the period 1994-2014. Our results show that imports from LWCs lowered Consumer Price Index (CPI) inflation by less than 0.05 *pp* per year on average, and had a much larger effect on welfare-relevant cost-of-living (COLI) inflation, estimated to lie between -0.13 and -0.2 *pp* per year depending on the assumption about consumer preferences and on our measure of unit values.

We develop a measure of the impact of imports on inflation and welfare using increasingly available trade data and publicly-available consumption expenditures data. We obtain our quantification from a theory-derived methodology to construct macro-level price indices from product-level import price indices and consumption expenditures. Starting from a general homothetic CES utility function for a representative consumer, we derive a simple expression for price dynamics of individual products that can be decomposed linearly into a "pure price" term, holding constant the composition of the consumption basket, and a "taste-shock" term, representing changes in relative consumption shares across varieties which, for given price levels, arise from shocks in the relative preferences over different varieties. Such product-level inflation rates aggregate-up to the level of sectors and then to the total economy, providing us with micro-founded measures of macro inflation that make apparent the contribution of imports through price and preferences' changes.

We then estimate empirically the contribution of these two terms on inflation. We use quasi-exhaustive firm-level data from the French Customs with information on quantities and values of imports by product and country of origin, from which we construct detailed import price indices based on unit values. We define a product variety as a combination of a product (at 8-digit level of the CN classification) and a country of origin. The use of detailed product-level data by origin country is key for our empirical exercise since it allows us to obtain measures of differences in price *levels*. We create a concordance table to assign each of the imported products to a consumption category in the French CPI, for which data on the value of consumption expenditures is publicly available.

We measure the overall effect of LWCs imports on inflation by quantifying separately the two effects of LWCs imports ("pure price" and "taste-shock" effects).

Pure price effects transit first via the contribution of LWCs import prices to the overall import inflation rate. Our estimates of imported inflation from LWCs show it was slightly lower than imported inflation from High-Wage Countries (HWCs), resulting in an overall small negative impact of imports from LWCs on CPI inflation (-0.01 pp). Second, raising imports from LWCs affect the prices set by domestic firms through the availability of imported intermediate inputs, thus affecting domestic inflation indirectly. We compute the impact of imported intermediate inputs on domestic inflation using data on inter-sectoral linkages from the Inter-Country Input-Output tables (ICIO, from the OECD). We follow recent literature which shows that, under the assumption of a roundabout production function for domestic intermediate goods, one can express domestic inflation as a function of inflation of imported inputs, which we can measure with the trade data. We obtain that LWC imports of intermediate goods have lowered domestic inflation by 0.06 pp in the manufacturing sector on average per year over the period 1994-2014, while the effect is close to zero for services, in which the share of LWC intermediate inputs is very small. Overall, the pure price effects are rather limited: they had reduced CPI inflation by about 0.02 pp per year over the sample period.

Taste shocks effects depend on the assumed form of the utility function of the representative consumer, contrary to *pure price* effects, which we show are the same independent of the value of the elasticity of substitution (i.e. be it Leontieff, Cobb-Douglas or general CES). We consider two types of taste shocks. First, we consider taste shocks leading French consumers to switch their expenditures of goods produced domestically towards goods imported from LWCs. Our estimations suggest that such substitution reduced French inflation by 0.04 pp per year on average. Second, we analyse changes in tastes within imports, with goods from LWCs replacing imports from HWCs. We estimate that such changes in the import basket reduced import inflation by about 0.6 pp and French CPI inflation by 0.09 pp per year on average. Overall, the taste shocks reduced CPI inflation by about 0.13 pp per year over the sample period.

The sum of *pure-price* and *taste-shock* contributions gives an overall effect of -0.15 pp per year on inflation. China, whose share in French consumption grew from 0.7% to 3.5% over the sample period, contributed to about half of the total.

One important issue we face is that of how to calculate unit values. The Customs data provide two measures of quantities. Data on weights (i.e. kilograms) of shipments is comprehensive. For a subset of products (about 40% of total imports in our period), data on units exists (i.e. number of pairs of shoes). Using the unit-based unit values reduced the sample but provides more accurate proxies for product-level prices. Re-assuringly, the effect obtained with both measures are of the same order of magnitude: using unit-based unit values, the pure price effects are about -0.04 pp per year on average and the contributions of taste shocks are -0.21 pp per year on average. The overall effect of LWC imports is thus estimated to be close to -0.25 pp per year on average. Thus, we are confident that the estimates we provide are robust to the use of quantity measures and sample selection.

Our methodological approach provides insights on how these effects are captured by official statistics. In particular, the estimation of the pure-price effect corresponds to the impact of imports from LWCs on CPI inflation, since CPI inflation as measured by National Statistical Offices is a pure-price index that holds the consumption basket constant (whereas composition effects arising from changes in relative preferences across goods are essential to cost-of-living measures). The taste-shock term has a different form depending on the elasticity of substitution. Measuring the contribution of taste-shocks under Cobb-Douglas preferences is straightforward because taste-shocks directly map into observable variety-level expenditure shares. However, in the general CES setup with higher-than-unity elasticity of substitution, taste-shocks are not directly observable but can be recovered from expenditure shares and relative prices, for any given value of the elasticity of substitution. We illustrate in a simple aggregate case that a higher elasticity of substitution does not affect much our aggregate results. When we allow product-specific elasticity of substitution for imported inflation (this is the only case for which disaggregate information on the elasticity of substitution is available), we find that the contribution of taste shocks in favour of LWCs to French inflation is lower in absolute values than in the Cobb-Douglas case (i.e. $\theta \to 1$) (-0.4 pp on average per year over the sample period vs. -0.6 pp in our baseline case). Overall, our measure of taste-shift effects could be somewhat overestimated especially if taste shocks are stronger for products with a higher elasticity.

Our approach encompasses micro and macro questions in one integrated framework, therefore contributing to literatures that evolve separately. On the one hand, there has been increasing interest in the recent macroeconomic literature on the link between globalization and inflation. Several mechanisms have been advanced (see e.g. Rogoff [2003] for an early survey), with one of them being that imports, especially from low-wage countries, were an important factor in determining the low levels of inflation observed in developed economies. However, empirical evidence is scarce, and statements on the role of imports on inflation have been rather conjectural.[1] We quantify the impact of imports from LWCs and show that, by construction, the CPI does not take into account most of the total effect.

Our approach is related to, and complement, recent works on price index measurement, such as We follow Baqaee and Farhi [2019], Baqaee and Burstein [2022], Lashkari and Jaravel [2022], and Redding and Weinstein [2020] by developing a macro price index based on theoretically consistent aggregation of price indices of individual goods, and by showing how to apply the decomposition using available data on trade and domestic expenditures. Using detailed scanner data on prices and quantities for food products, Braun and Lein [2021] apply the Redding and Weinstein [2020] decomposition in the context of the Swiss Franc 2015 devaluation, and they provide a quantification of biases in official statistics. We analyse the impact of the continuous increase in imports from LWCs during the long term and provide a quantification of how this affected the French CPI and compare it to a cost-of-living index. One interesting feature of our approach, not present in the cited works, is that we provide a cleaner link between our estimates and CPI, by decomposing inflation into a pure price effect (corresponding to the CPI) and a taste-shock contribution.

We also contribute to the extensive literature on the welfare gains from trade that followed upon the seminal contribution of Arkolakis et al. [2012]. While a very large amount of work has been devoted to understanding the labor market impact of imports from LWCs, and in

[1] See for instance a statement from ECB president Mario Draghi: "*Falling import prices partly explain the subdued performance of core inflation, too. This is because imported consumer products account for around 15% of industrial goods in the euro area*" Draghi [2017]. Baldwin [2022] labels this the "Globalisation of Inflation Hypothesis" and discusses how it relates to the role of imports of services.

particular, China, little is known so far about prices and welfare, which are key variables in virtually all trade models. Recent contributions include evidence on the impact of the "China shock" on prices using sector-level data (Amiti et al. [2020]) and US scanner data (Bai and Stumpner [2019]) or CPI data (Jaravel and Sager [2018]). Such works focus on pro-competitive effects and do not provide estimates of overall macroeconomic effect. Berlingieri et al. [2016] find that trade EU agreements increased consumer welfare by 0.24% over the period 1993-2013, with stronger effects for high-income countries. Like these works, our focus is on the direct impact of imports of consumption goods on French prices.[2] We contribute to this literature by shedding light on the relative magnitudes of the different mechanisms through which imports of consumption goods from LWCs affected prices in a developed country, for a period in which these imports surged. One key result of our paper is that substitution effects matter the most.

The rest of the paper is organized as follows. Section 2 presents the data sources, and documents some key stylised facts on LWCs import prices and quantities. Section 3 provides a simple analytical framework that develops an expression for the impact of imports from LWCs on inflation. Section 4 presents the results of the contribution of pure-price effects from LWC imports to inflation whereas Section 5 presents the results of the contribution of taste shocks from LWC imports to inflation. Section 6 discusses the aggregate effect of imports from LWCs on French CPI and cost-of-living inflation.

2 Prices and expenditure shares by origin in French Imports

In this section, we present our data sources and document three stylized facts about the evolution of French imports that provide the motivation for the quantification developed in the rest of the paper.

[2]Our paper also relates to a previous literature studying the impact of import penetration on other price indices, either *import prices* or *producer prices*. A first group of works focuses on the evolution of *import prices* (Kamin et al. [2006] for the United States, Glatzer et al. [2006] for Austria, Mac Coille [2008] and Nickell [2005] for the United Kingdom, Pain et al. [2008] for the Euro Area and the United States). The general conclusion is that the rapid increase in LWCs imports depressed import prices in these countries because of the lower prices of imported goods. Interestingly, the magnitude of the effects reported by these works is very close to what we find.

2.1 Data

Our empirical analysis combines detailed administrative trade data with publicly available data for household consumption spanning the 1994-2014 period. We now briefly introduce the main features of the data and refer to sections A).1 and A).2 of the Appendix for details.

Product-country level imports and exports We obtain trade data from a quasi-exhaustive administrative file collected by the French Customs Office. It provides the yearly values (in euros) and quantities of imports (by country of origin and product) and exports (by country of destination and product) for all trading firms over the period 1994-2014. Trade flows are classified at the CN 8-digit level (Combined Nomenclature of the EU). We use the Customs data to construct import and export unit values and calculate the share of imports on consumption by product and country.

Measuring prices Comprehensive data containing individual prices collected by detailed product categories does not exist. We use the Customs data to proxy product-level prices with unit values, calculated at the product(CN8)-country level, the most disaggregated level available, which minimizes measurement errors arising from heterogeneity at lower levels of disaggregation. For each variety, we define: $P_{ijt} = v_{ijt}/Q_{ijt}$ where v_{ijt} is the value (in euros) of the imports/exports of good i from country j in a given year t and Q_{ijt} are quantities. The Customs files report two distinct measures for physical quantities: one refers to the weight expressed in kilograms; the other refers to units (for example, number of cars, pairs of shoes...). The first measure is homogeneous and available for all goods but might suffer from measurement issues (see Bergounhon et al. [2018] for a full discussion) whereas the second measure is more accurate but is available only for a rather limited subset of products: the proportion of availability of units versus kilograms is about one to three (as shown in Appendix Table E and Figure C). This proportion is rather stable over time except between 2006 and 2010 where the weight of traded goods was not requested for products where quantities in units were reported (Figure C). Given that we are interested in the macro effect, we choose to use kilogram-based unit values as our baseline measure. We also report the main results using units-based unit values as robustness.

From individual unit values we construct price indices by origin country group, which we then aggregate to obtain a macro price index of imported inflation. To check for external validity, Appendix Figure A compares the evolution of our aggregate import price inflation with that of the official indices for 1995-2014. We obtain a correlation coefficient of 0.86 between our index and the official monthly import price index for the manufacturing industry, constructed by the French National Statistical Institute (INSEE) from survey data collected in individual firms. However, the Insee official series starts rather late (in 2005) and this correlation is calculated only with a few data points.[3]

Our decomposition shows that price differences across countries are an important object for our purposes. There is no comprehensive data with domestic prices available. We use two different proxies computed from the Customs data. First, we use French export unit values, as in Emlinger and Fontagné [2013], computed similarly to imports unit values.[4] Second, we use unit values of French imports from high-wage countries. Most of these imports come from euro area countries and we assume here that prices of French firms are not very different from the ones set by firms selling exactly the same goods in neighbouring countries. In this case, we will assume that the price differential between LWC imports and domestic prices is the same as the one between HWC imports and LWC imports. We provide results where we use both of these proxies for domestic prices.

Household consumption expenditures We use the yearly value of household consumption provided by INSEE at the 3-digit level of the COICOP classification (51 products) which is used to construct the official Consumer Price Index. This product classification is aimed at grouping goods and services which are homogeneous enough to serve the same consumption purpose (COICOP stands for Classification of Individual Consumption According to Purpose). Values of household consumption will allow us to measure the share of imported goods in

[3]We also obtain a rather high correlation, of 0.57, with the import deflator from the National Accounts, in spite of the fact that such index covers a wider range, including manufacturing, services and extractive industries (the latter increasing the volatility of import inflation). Comparing the aggregate import price inflation obtained using unit values computing with quantities in kilograms or in units, we find that the correlations are high in both cases but smaller when we use the measure of import inflation obtained with unit values computed with quantities in units (0.65) (see Figure C in the Appendix).

[4]Importantly, we compare prices by origin at the CN8 level and we assume that the definition of products is sufficiently precise so that varieties within each category i share the same "observed" quality. Hence we compare prices of goods that are observationally equivalent. However, to control for any systematic difference between price levels of French exports and prices of goods produced for the domestic market, we calculate the weighted average of the difference between French exports and imports from HWC of the same goods (this difference is on average positive) and we remove this average from the difference between export prices and LWC imports.

households'consumption and thus the share of expenditures devoted to imported goods in the CPI.

Expenditure shares by origin country A part of our analysis quantifies the *direct* contribution of imports to the evolution of French consumer prices. To measure such direct effect, we need to link imported goods to consumption categories in the CPI. We proceed as follows. First, we concord CN8 codes and COICOP sectors using a concordance table between CN8 codes and the COICOP classification that we construct as explained in Section A).1. Second, we augment import values with VAT and distribution margins, to approximate the price paid by consumers of such imported goods. Third, we compute the expenditure share of imported goods in a given COICOP sector as the ratio of imports (adjusted by VAT and distribution margins) to total expenditures in that sector. Matching the trade data with the expenditure data allow us to construct expenditure shares of imports by country. In particular, as it will become explicit in the theory section, we need to compute the share of imports from a country category in total imports of a specific good, the share of imports in a COICOP sector, the share of tradable goods in total consumption, and the share of imports in tradable goods. We provide more details in Section A).1.

We will label all CN8 products that map directly into a COICOP category as "consumption goods". Acknowledgedly, we do this with a bit of language abuse, as goods can have a dual use depending on the user (both being as consumption goods when used by household and capital good or intermediate good when used by firms, e.g. personal computers).[5]

Input-output sectoral linkages To compute the *indirect* contribution of imports from low-wage countries on domestic inflation via imports of intermediate goods, we use information on inter-sector linkages from the OECD Inter-Country Input-Output (ICIO), available for 1995-2014.[6] The ICIO tables provide information for 44 sectors of the French economy, based on the 2-digit version of the ISIC Rev.4 classification, covering intermediate goods, capital goods,

[5] Generally, it is not possible to distinguish between both uses with comprehensive economy-wide data. Thus, we cannot rule out that our measures of consumption goods include also some intermediate goods.

[6]https://www.oecd.org/sti/ind/inter-country-input-output-tables.htm. Both Blaum et al. [2018] use the same data to capture IO linkages in French sectors and Berlingieri et al. [2016] use it to measure IO linkages at the EU level. The data is also available until 2018, but we stop in 2014 for consistency with the rest of the analysis.

household consumption goods and services.[7] The ICIO tables provide the list of HS codes that map into each of the ISIC sectors in the tables. As can be seen in Appendix Tables C and D, 22 out of the 44 sectors in the ICIO tables have no HS codes that map to them. Most of these sectors can be safely classified as services.[8] By combining the import data with the IO coefficients we can estimate how imports in upstream sectors affect the evolution of domestic inflation on any given sector. Thus, the analysis on input trade allow us to provide a comprehensive assessment and include all sectors. This is important because, in the case of service sectors, we observe little influence of imported goods directly, but these sectors are likely to have benefited from the contribution of LWCs to lowering imported intermediate goods inflation.

At this stage, it is important to stress that the focus of the paper is on how *imports of goods* from LWCs contributed to French inflation, both in manufacturing and service sectors. The period under consideration also saw an increase in the imports of services (Baldwin [2022]). Whereas the role of imported services on inflation is a matter of much relevance, data limitations prevent us from treating imported services with the same detail as in the case of goods.[9] For simplicity, we will use the label "tradables" to refer to sectors in which we observe *positive imports of goods*, to avoid the more accurate but lengthy version "sectors with positive imports of goods". Most of the sectors with zero direct imports of goods are services, as we show in Section 4. We acknowledge that services are also tradables but, as just mentioned, data on imported services is scarce and the focus of this paper is on goods' imports.

2.2 Stylised Facts

Fact 1: Imports of consumer goods surged

The share of imports in total consumption surged during the period under analysis. In 1994, 10% of consumption expenditures was devoted to goods produced abroad, while that figure rose to close to 18% in 2014, a total 7.5% increase as shown in the solid curve of Figure 1 (left scale).

[7] We drop the ISIC sectors 97 and 98 because they do not have any inter-linkages with other sectors.

[8] Notice that such mapping between HS codes and ISIC codes is thus analogous to the matching procedure between HS codes and COICOP codes that we have just described.

[9] In France, as in most countries, service trade is computed for the purposes of the balance of payments' statistics. Such data on imported services is not broken down by country of origin and only includes values, without any information on prices. It is not possible to proxy prices with unit values as there is no data on quantities, which are of course much more difficult to define in the case of services. See Baldwin [2022] for a detailed discussion on these data limitations.

The bars in Figure 1 provide the year-on-year variations in both the share of tradables in overall consumption (light grey bars) and the share of imported goods among total consumption of tradables (black bars). The share of tradables in total consumption diminished continuously, starting from 43% in 1994 to 40% in 2014, reflecting the structural switch towards services that has been documented for most advanced economies – see e.g. Galesi and Rachedi [2019] and references therein. Therefore, and interestingly, the increase in the importance of imports in consumption comes exclusively from a shift in expenditure within tradables, favoring imported goods away from domestic ones (the dark bars are positive in most years) that was large enough to result in an overall higher share of imports in total consumption.

[Insert Figure 1 here]

Fact 2: Imports from low-wage countries explain the bulk of the import surge

The surge in imports was characterized by a marked increase in the share of goods originating in low-wage countries. We follow Bernard et al. [2006] and Auer and Fischer [2010] and group countries according to their GDP per capita relative to that of France: "High-wage countries" are those with GDPpc higher than 75% of the French GDPpc, "Low-wage countries (LWCs)" are those for which the GDPpc lies between 25% and 75% of the French GDPpc, "Very low-wage countries (VLWCs)" includes countries with GDPpc lower than 25% of France's. We look separately at the cases of China and the New European Union member states (NEUMS), grouping countries that joined the EU after 2004.[10] GDPpc ratios are averaged over 1994-2014 and the composition of groups is fixed over time. Table A in the Appendix reports a detailed list of countries by category.

Figure 2 plots the share of each country group in total imports and shows that import basket of consumer goods continuously switched towards goods from LWCs and away from those from HWCs. In 1994, high-wage countries accounted for around 77% of total French imports of consumer goods, a figure that declined steadily to reach 60% in 2014 (right scale). Within LWCs, the most dynamic evolution is that of China, that accounted for 7% of total imports in 1994 to reach 20% in 2014 and became the most important origin low-wage country in French

[10] Bulgaria, Croatia, Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia, Slovenia

imports. The period also saw a threefold increase in the share of the new members of the European Union (NEUMS) in total French imports, passing from 2% to 6% of total consumer goods' imports. Overall, out of the extra 7.5% share of imports on consumption reported above, LWCs explain 4.6 percentage points and HWCs the remaining 2.9 percentage points.

[Insert Figure 2 here]

Fact 3: The (unadjusted) price differentials between domestic, LWCs and HWCs goods were large and stayed roughly constant during 1994-2014

Figure 3 plots the average ratio of LWC import prices to our two proxies of domestic prices, the solid lines correspond to the ratios calculated with the proxy using HWC import unit values whereas the dashed lines correspond to the ratios calculated with the proxy using unit values exports to high-wage countries (see above for a discussion). In the Appendix, Figure E plots the same series computed using quantities in units instead of kilograms.

Average ratios calculated across all origins are shown in the grey lines, for LWCs in the dark lines. The average price differential between import and our proxies of domestic prices is of little more than -10% for our both proxies of domestic prices (-20% if we use quantities measured in units). Nevertheless, by construction, all of the differential comes from the low price levels for imports originating in LWCs. These goods are on average (over time and across products) 33% cheaper than domestic goods (40 to 45% when using units as measure of quantities). Importantly, and interestingly, the differences in price levels are almost constant throughout the period, reflecting little differences in domestic and imported inflation in French consumption.

[Insert Figure 3 here]

Figure 3 reports unadjusted price levels that do not take into account quality differences or product-specific consumer preferences. Such unobserved characteristics are likely to have played a non-negligible role for explaining the strong movements in consumption shares documented as Facts 1 and 2 above, especially in the light of the small movements in unadjusted prices that are documented in Fact 3. Moreover, such unobserved characteristics have important consequences for the measurement of inflation and the interpretation of inflation measures as we discuss in the rest of the paper. In the next section we lay out an analytical framework that will allow to quantify the evolution of French inflation distinguishing between changes in unadjusted prices and changes in unobserved taste shocks.

3 Theoretical Framework

This section presents the inflation decomposition upon which we base our empirical exercise. We first derive expressions for price changes of individual tradable goods (indexed by i) that make explicit the role of imports from LWCs and then show how to aggregate them into an economy-wide inflation rate.

3.1 Product-level Inflation Decomposition

A representative French consumer obtains utility from the consumption of a bundle of N products in quantity Q_i: $U(Q_1, ...Q_i, ...Q_N)$. For each product i there is a set Ω_i^J available varieties, each variety is indexed by j, differentiated by country of origin, and including one French variety.[11] The words "product" or "good" are used interchangeably as a shortcut, as the definition includes also services.[12]

Each product i is a CES aggregation of the varieties with constant elasticity of substitution θ. At each time t:

$$Q_{it}^{\frac{\theta-1}{\theta}} = \sum_{j \in \Omega_i^J} \alpha_{ijt}^{\frac{1}{\theta}} Q_{ijt}^{\frac{\theta-1}{\theta}}, \text{ with } \sum_{j \in \Omega_i^J} \alpha_{ijt} = 1. \tag{1}$$

where Ω_i^J represents the set of all available varieties of product i.

The parameter α_{ijt} is a demand shifter which captures consumer tastes for variety j of good i. Variation over time in the appeal parameters capture *taste "shocks"*: conditional on prices, changes in α_{ijt} lead the French consumer to switch expenditures across varieties of different origins. The assumption $\sum_{j \in \Omega_i^J} \alpha_{ijt} = 1$ implies that taste shocks represent changes in relative

[11] In this paper the number of varieties is assumed to be fixed over time, with LWCs representing a origin "country". In some case we will form broad groups of LWCs, as explained in Section2.1), but considering their number (and thus of varieties) fixed.

[12] In the case of services we assume that there are only domestic varieties. For those sectors, we observe no direct imports of goods, as discussed in Section 2.1.

preferences across varieties, and ensures that the price index associated with (1) can be given a welfare interpretation.[13]

It is important to notice that α_{ijt} is unobservable and represents any product attribute that affects its relative demand, conditional on observed prices. Thus, such parameters might also capture quality differences (see for example Khandelwal [2010]). Hottman et al. [2016] choose the term "appeal" in order to encompass both interpretations. Throughout the rest of the paper we will refer to these parameters are *taste shocks* for simplicity but the reader should bear in mind that the interpretation of these should be wider.

The price index of product i in period t is $P_{it} = \left[\sum_{j\in\Omega_i^J} \alpha_{ijt} P_{ijt}^{1-\theta}\right]^{\frac{1}{1-\theta}}$. Grouping varieties by origin with superscripts D and F referring respectively to domestic and foreign varieties, P_{it} can be expressed as:

$$P_{it} = \left[\alpha_{it}^D {P_{it}^D}^{1-\theta} + \alpha_{it}^F {P_{it}^F}^{1-\theta}\right]^{\frac{1}{1-\theta}} \tag{2}$$

with $\alpha_{it}^F = \sum_{j\in\Omega_i^F} \alpha_{ijt}$. Ω_i^F denotes the set of foreign varieties for good i and $P_{it}^F = \left[\sum_{j\in\Omega_i^F} \frac{\alpha_{ijt}}{\alpha_{it}^F} P_{ijt}^{1-\theta}\right]^{\frac{1}{1-\theta}}$ the price index of imports of good i. Notice that $\alpha_{it}^D + \alpha_{it}^F = 1$, following from the assumption that $\sum_{j\in\Omega_i^J} \alpha_{ijt} = 1$.

We follow Baqaee and Farhi [2019], Baqaee and Burstein [2022] and Lashkari and Jaravel [2022] and treat prices and quantities as continuous functions of time. The rate of change of P_{it}, expressed as $\pi_{it} = \frac{\mathrm{d}\log(P_{it})}{\mathrm{d}t} = \frac{\frac{\mathrm{d}P_{it}}{\mathrm{d}t}}{P_{it}}$ is the *Divisia* index. Applying it to equation (2) and rearranging we obtain:

$$\pi_{it} = \underbrace{(1-\eta_{it})\pi_{it}^D + \eta_{it}\pi_{it}^F}_{\text{pure price}} + \underbrace{\frac{1}{1-\theta}\left[\left(\frac{P_{it}^F}{P_{it}}\right)^{1-\theta} - \left(\frac{P_{it}^D}{P_{it}}\right)^{1-\theta}\right]\frac{\mathrm{d}\alpha_{it}^F}{\mathrm{d}t}}_{\text{taste shock}} \tag{3}$$

where $\eta_{it} = \alpha_{it}^F \left(\frac{P_{it}^F}{P_{it}}\right)^{1-\theta}$ is the share of foreign varieties in domestic consumption of product i, which equals the sum of the expenditure shares of varieties $j \in \Omega_i^F$ (see Appendix (B).1) for a full derivation).

The first term in equation (3) is a *pure price* component, defined as the expenditure share-weighted average of price changes across origins. The second term, labeled *taste shock*, captures

[13] See Hottman et al. [2016] or Redding and Weinstein [2020] for a thorough discussion of such taste-shock normalization.

the contribution of taste or appeal changes: a taste shock in favor of foreign varieties, given by $\frac{\mathrm{d}\alpha_{it}^F}{\mathrm{d}t} > 0$, will affect inflation depending on relative prices of domestic and foreign varieties, $\left(\frac{P_{it}^D}{P_{it}}, \frac{P_{it}^F}{P_{it}}\right)$, to an extent mediated by the elasticity of substitution θ. One important implication is that the cost of product i (as perceived by the representative consumer) can change even if prices of varieties do not change (i.e. even when $\pi_{it}^D = \pi_{it}^F = 0$).

3.2 Distinguishing the Contribution of Low- and High-Wage Countries

We express the price index of imported varieties as the combination of prices of varieties originated in low-wage and high-wage countries (respectively denoted with superscripts L and H):

$$P_{it}^F = \left[\tilde{\alpha}_{it}^L P_{it}^{L\,1-\theta} + \tilde{\alpha}_{it}^H P_{it}^{H\,1-\theta}\right]^{\frac{1}{1-\theta}} \tag{4}$$

where $\tilde{\alpha}_{it}^L = \frac{\alpha_{it}^L}{\alpha_{it}^F}$ and $\tilde{\alpha}_{it}^H = \frac{\alpha_{it}^H}{\alpha_{it}^F}$. In turn, $\alpha_{it}^L = \sum_{j\in\Omega_i^L} \alpha_{ijt}$ and Ω_i^L are the subset of imported varieties of good i originated in low-wage countries and $P_{it}^L = \left[\sum_{j\in\Omega_i^L} \frac{\alpha_{ijt}}{\alpha_{it}^L} P_{ijt}^{1-\theta}\right]^{\frac{1}{1-\theta}}$. α_{it}^H and P_{it}^H have an analogous definition, which apply to goods indexed with superscript H, originated in high-wage countries. By definition, $\alpha_{it}^F = \alpha_{it}^H + \alpha_{it}^L$ and $\tilde{\alpha}_{it}^H + \tilde{\alpha}_{it}^L = 1$. The expenditure share of LWCs varieties in *total imports* of good i is $\gamma_{it}^L = \alpha_{it}^L \left(\frac{P_{it}^L}{P_{it}^F}\right)^{1-\theta}$.

Computing the rate of change of P_{it}^F, introducing it in (3) and rearranging we obtain an expression for inflation of product i that makes explicit the role of imports across origins:

$$\begin{aligned}
\pi_{it} = {} & \underbrace{(1-\eta_{it})\pi_{it}^D + \eta_{it}\gamma_{it}^L\pi_{it}^L + \eta_{it}(1-\gamma_{it}^L)\pi_{it}^H}_{\text{pure price}} \\
& + \frac{1}{1-\theta}\Bigg[\underbrace{\alpha_{it}^F \frac{d\tilde{\alpha}_{it}^L}{dt}\left(\left(\frac{P_{it}^L}{P_{it}}\right)^{1-\theta} - \left(\frac{P_{it}^H}{P_{it}}\right)^{1-\theta}\right) + \frac{d\alpha_{it}^F}{dt}\tilde{\alpha}_{it}^L\left(\left(\frac{P_{it}^L}{P_{it}}\right)^{1-\theta} - \left(\frac{P_{it}^D}{P_{it}}\right)^{1-\theta}\right)}_{\text{taste shocks involving LWCs}}\Bigg] \\
& + \frac{1}{1-\theta}\underbrace{\frac{d\alpha_{it}^F}{dt}(1-\tilde{\alpha}_{it}^L)\left(\left(\frac{P_{it}^H}{P_{it}}\right)^{1-\theta} - \left(\frac{P_{it}^D}{P_{it}}\right)^{1-\theta}\right)}_{\text{taste shocks between HWCs and Domestic Goods}}
\end{aligned} \tag{5}$$

Equation (5) guides our empirical work. Notice that in practice, the Divisia index cannot be computed directly since data are collected in discrete time intervals. Statistical agencies measure inflation with an approximation of the Divisia index with chained indices –in which indices measuring the changes between consecutive periods are linked together.[14] We will measure the pure price terms with the Laspeyres chained index, in order to maximise comparability between our results and publicly available inflation indices. Appendix B).2 develops a comparison between our approach with an alternative method relying on Sato-Vartia price indices (which are exact for CES demand in discrete time).

3.3 Aggregation to Macro Inflation

We now aggregate the product-specific inflation rates to an expression for macro inflation. We assume that the economy is composed of a fixed number S of sectors indexed by s, where each product i belongs to only one sector. Each sector can include either "tradable" or " non-tradable goods" (i.e. the latter being those for which we observe positive imports of goods, and the former those with no direct imports of goods, but can be nonetheless affected by imports of inputs).

Inflation in any sector s can be expressed as the weighted average of price changes of individual products, using their expenditure shares as weights: $\forall i \in s$: $\pi_{st} = \sum_{i \in s} \frac{v_{it}}{v_{st}} \pi_{it}$, with π_{it} the inflation of product i, v_{it} the expenditure share of good i in total consumption and $v_{st} = \sum_{i \in s} v_{it}$.

Denoting β_t the share of tradable goods in total consumption, π_t^T and π_t^{NT} the inflation rates of tradable and non-tradable goods respectively, aggregate inflation is $\pi_t = \beta_t \pi_t^T + (1-\beta_t)\pi_t^{NT}$.[15] Hence, macro inflation can be measured as the simple weighted average of the contributions computed at the product level, in turn constructed with micro data on prices and quantities.

The product-level inflation rates are derived from the minimization of expenditures by the representative consumer. Therefore, the expression for aggregate inflation should be interpreted as a theoretically-consistent measure of the cost of living, or a COLI index. The particular form of the COLI index depends on the assumption about the value of θ, which in the case of $\theta \to 1$ corresponds to the Cobb-Douglas case, and in the case of $\theta > 1$ to the general CES preferences'

[14] See the discussion of Baqaee and Burstein [2022] and Chapters 15 in the UNs System of National Accounts Manual, United Nations 2009, and Chapters 15 and 17 in the CPI Manual, as cited by Baqaee and Burstein [2022].

[15] Tradable goods' inflation is $\pi_t^T = \sum_{s \in T} \frac{v_{st}}{v_t^T} \pi_{st}$, $v_t^T = \sum_{s \in T} v_{st}$ is the expenditure share of tradable sector and T is the set of tradable sectors. Non-tradable goods' inflation is $\pi_t^{NT} = \sum_{s \in NT} \frac{v_{st}}{v_t^{NT}} \pi_{st}$, where $v_t^{NT} = \sum_{s \in NT} v_{st}$. This formula is general and does not hinge on a particular form of aggregation across sectors.

case.

4 The Impact of Imports From Low-Wage Countries on French Inflation: Pure-Price Effects

In this section we provide quantitative estimations of the impact of LWCs imports on French consumer prices, through variations in the inflation rates of imported goods and in domestically-produced goods. Our estimation is based on the first line in expression (5). Pure-price effects hold the structure of consumption constant between any two given periods. We study the contribution of expenditure shifts in the next section.

4.1 Imported Inflation Differential: LWCs versus HWCs

We slightly rearrange the first line of (5) to compute the *inflation differential*, that is, the contribution arising from differences in the growth rate of prices between LWCs imports and HWCs imports, affecting π_{it} in proportion to the share of LWCs varieties in good i's consumption:[16]

$$\eta_{it}\gamma_{it}^{L}\left(\pi_{it}^{L}-\pi_{it}^{H}\right) \tag{6}$$

During our sample period, the inflation rate of LWCs imports was close to the inflation rate of HWCs imports and the average difference was small (-0.13 pp on average per year). Figure 4 plots both inflation rates, showing that the difference is quite small, both overall and for most years individually. This finding is consistent with the relative stability over time of price differential between LWCs and HWCs imports (see previous *Fact 3*).

[Insert Figure 4 here]

For each product i, we compute the contribution of the inflation differential to the overall import inflation rate. Then, at a more aggregate level of product definition (COICOP 3-digit), we use the share of imports in consumption (η_{st}) to calculate the contribution of import inflation differential to the consumer price inflation of tradables. Finally, multiplying this term by the

[16] To better understand how the expression is constructed, notice that the pure price effects in equation (5) can be written as $\pi_{it}=\eta_{it}\gamma_{it}^{L}\left(\pi_{it}^{L}-\pi_{it}^{H}\right)+\eta_{it}\gamma_{it}^{L}\pi_{it}^{H}+\eta_{it}(1-\gamma_{it}^{L})\pi_{it}^{H}+(1-\eta_{it})\pi_{it}^{D}$.

share of tradables in the CPI inflation β, we obtain the overall effect of the import inflation differential to the aggregate inflation. This can be summarized by the following expression:

$$\beta_t \sum_{s \in T} \omega_{st} \eta_{st} E_s \left[\gamma_{it}^L \left(\pi_{it}^L - \pi_{it}^H \right) \right] \tag{7}$$

where $\omega_{st} = v_{st}/v_t^T$ is the weight of sector s in consumption of tradable goods (T), η_{st} is the share of imports in sector s, γ_{it}^L is the share of LWCs imports in total imports of consumption good i and $E_s(x_{it})$ denotes the expenditure-weighted mean operator across goods within sector s: $\forall x_i, E_s(x_i) = \sum_{i \in s} \frac{v_{it}}{v_{st}} x_{it}$ (recall that $v_{st} = \sum_{i \in s} v_{it}$).

The contribution of the inflation differential to the overall import inflation rate is slightly negative (-0.03 pp) when computed on average for the period 1994-2014. The average share of imports in total consumption being on average close to 15%, we find that the average contribution of this differential to overall inflation is between 0 and -0.01 pp on average over the period 1994-2014.[17] The contribution is unequal over time: it was negative during the early 2000's (-0.04 pp on average from 2001 to 2004), to become positive and especially large in 2010, reflecting variation over time of the contribution of the inflation differential to imported inflation (Figure 5). There are no significant differences between inflation of goods imported from China and those from HWCs, implying the overall contribution of China through inflation differences is close to 0 on average and also for most years of our sample taken individually.

Table 1 reports the results at level 2 of the COICOP classification. The contribution of the import inflation differential to inflation is rather homogeneous across products and close to 0 for most products.

[Insert Table 1 here]

[17] When we use units as our measure of quantities, we find that the inflation differential between LWCs and HWCs reduced imported inflation by -0.06 pp per year on average, contributing to a reduction in overall inflation by -0.01 pp per year on average (Figure E and Table G in the Appendix).

4.2 Domestic Inflation: Contribution of Imported Inputs From LWCs

4.2.1 Theoretical Framework

We present a simple theoretical framework in which domestic inflation is a function of inflation of imported intermediate goods, in line with recent literature studying the role of inter-sectoral linkages in propagating shocks, such as Caliendo and Parro [2015], Blaum et al. [2018] and Berlingieri et al. [2016]. The presentation follows the later paper closely, adapting their approach to the current framework.[18] We present the main equations here and leave mathematical details to Appendix B).3.

Assume that domestic production of good i in France requires combining labor and intermediate goods. All goods i that belong to sector s have an identical sector-specific production function, $q_s = A_s l_s^{a_s} x_s^{1-a_s}$, with A_s a productivity parameter, l_s the amount of labor and x_s a bundle of intermediate goods. $(1-a_s)$ is the share of intermediate goods in total output (and a_s is the share of value added). The associated cost function is $c_s = Cw^{a_s} p_{Is}^{1-a_s}$, with p_{Is} the price of intermediate goods for firms in sector s and C a constant. To focus the analysis, we make some simplifying assumptions. We consider that the production function and its parameters for a sector s are identical for all products i that belong to sector s. Firms producing good i in sector s are identical, markups are constant, and productivity A_s and factor costs w are exogenous and invariant over time. Our approach is akin to a partial equilibrium approach (in which imports do not affect factor costs).

Domestic inflation in sector s, π_{st}^D, is a function of inflation of intermediate goods used in the sector, π_{Ist}:

$$\pi_{st}^D = (1 - a_s)\pi_{Ist} \tag{8}$$

Firms in sector s use a bundle of intermediate goods differentiated by country of origin and including one French variety. As in the main framework of Section 3, we group all varieties into a domestic one, x_{st}^D, and a bundle of imported varieties x_{st}^F. Inflation in intermediate goods is:[19]

$$\pi_{Ist} = (1 - \eta_{Ist})\pi_{Ist}^D + \eta_{Ist}\pi_{Ist}^F \tag{9}$$

[18] We are much grateful to an anonymous referee for suggesting this approach.

[19] Notice that we abstract from the equivalent of taste shocks between domestic and imported varieties in production. Berlingieri et al. [2016] make a similar assumption.

where η_{Ist} denotes the expenditure share of foreign intermediate good varieties in total input expenditures of sector s, π^D_{Ist} is the inflation rate of the domestically-produced intermediate good variety and π^F_{Ist} is the inflation rate of the bundle of foreign varieties. We now explain how we construct π^F_{Ist} and π^D_{Ist}.

We construct π^F_{Ist} by first calculating inflation rates at the product level and then aggregating them using the value share of imports of product i in total imports of sector s, labeled ω^{Fs}_{Iit}: $\pi^F_{Ist} = \sum_{i \in s} \omega^{Fs}_{Iit} \pi^F_{Iit}$. The price index of imported intermediate good i is:

$$P^F_{Iit} = \left[\alpha^L_{Iit} {P^L_{Iit}}^{1-\theta_I} + \alpha^H_{it} {P^H_{Iit}}^{1-\theta_I} \right]^{\frac{1}{1-\theta_I}} \tag{10}$$

where θ_I is the elasticity of substitution between imported varieties of intermediate goods, $(\alpha^L_{Iit}, \alpha^H_{Iit})$ are unobservable parameters that shift expenditures between varieties of inputs from LWCs and HWCs, and we assume $\alpha^L_{Iit} + \alpha^H_{Iit} = 1$. Detailed definitions of these parameters and of price indices P^L_{Iit}, P^H_{Iit} are provided in Appendix B).3. In line with the discussion in Section 3, their interpretation in this production function framework should be related to attributes of each variety that increase production at given prices (e.g. quality). We explain in detail how we measure π^F_{Iit} from the data in the next subsection.

Let us now move on to π^D_{Ist}. We assume a roundabout production process for the domestic intermediate variety. Firms in France use a sector-specific input that is produced using the output of all the other firms in the economy (Caliendo and Parro [2015], Blaum et al. [2018] and Berlingieri et al. [2016]). More specifically:

$$x^D_{st} = \prod_{k=1}^{S} X_{ks}^{\phi_{ks}} \tag{11}$$

where ϕ_{ks} is the share that firms in sector s spend on intermediate goods from sector k, and X_{ks} is the output produced in sector k that is sold to firms in sector s. Notice that (11) has an exact price index equal to $P^D_{Ist} = \prod_{k=1}^{S} p_{Iks}^{\phi_{ks}}$. Importantly, the I-O structure of production implies that imports from low-wage countries affect the inflation rate of domestic intermediate goods for firms in sector s both directly through their own imports, but also indirectly through the imports of intermediate goods of the other sectors of the economy.

The inflation rate of domestic intermediate goods depends on the inflation rates of goods produced in all sectors of the economy (including its own):

$$\pi_{Ist}^{D} = \sum_{k=1}^{S} \phi_{ks} \pi_{st}^{D} \tag{12}$$

We solve for π_{Ist}^{D} starting from expression (12) and introducing in it expressions (10) and (8). We obtain the following expression for the inflation rate of domestic intermediate goods in sector s:

$$\pi_{Ist}^{D} = \sum_{k=1}^{S} \phi_{ks}(1 - a_k) \left[(1 - \eta_{Ikt})\pi_{Ikt}^{D} + \eta_{Ikt}\pi_{Ikt}^{F}\right] \tag{13}$$

Given that π_{Ist}^{D} depends on intermediate goods' price inflation (both domestic and imported) of all sectors k of the economy, we obtain a system of S equations, one per sector, which are related to each other through input-output linkages, and governed by the sector-specific intermediate goods import shares η_{Ikt} and the expenditure share of intermediate goods $(1 - a_k)$. To solve the system, we write it in matrix form, obtaining a solution for π_{I}^{D}, a vector of S columns, each of which gives domestic inflation rates for each sector $s \in S$. The full derivation is provided in Appendix B).3.

4.2.2 Quantification

Price indices of imported intermediate goods

To construct inflation rates in imported intermediate goods, we use equation (10) and apply the rate of change over time, obtaining:

$$\pi_{Iit}^{F} = \gamma_{Iit}^{L}\left(\pi_{Iit}^{L} - \pi_{Iit}^{H}\right) + \frac{1}{1-\theta_I}\left[\frac{d\alpha_{Iit}^{L}}{dt}\left(\left(\frac{P_{Iit}^{L}}{P_{Iit}}\right)^{1-\theta_I} - \left(\frac{P_{Iit}^{H}}{P_{Iit}}\right)^{1-\theta_I}\right)\right] \tag{14}$$

where γ_{Iit}^{L} is the share of intermediate goods from LWCs in total expenditures on intermediate good i.

The first term measures the impact of inflation rates of intermediate goods originating in LWCs, while the second quantifies the contribution of substitution effects: how input costs are affected when firms substitute away from HWC inputs and in favor of LWC inputs. This term is the production equivalent of the taste shocks term introduced in Section 3 for consumers. The parameters α^L_{Iit} measures unobservable characteristics of imported inputs such as quality that impact French firms' relative demand between LWCs and HWCs. $\frac{d\alpha^L_{Iit}}{dt}$ measures the extent to which such substitution occurred for given prices (P^L_{Iit}, P^H_{Iit}). Since $\alpha^L_{Iit} + \alpha^H_{Iit} = 1$, we can write the unobservable parameter as a function of expenditure shares and relative (unadjusted) prices:

$$\alpha^L_{Iit} = \frac{\left(\frac{P^L_{Iit}}{P^H_{Iit}}\right)^{\theta_i - 1} \frac{\gamma_{Iit}}{1-\gamma_{Iit}}}{1 + \left(\frac{P^L_{Iit}}{P^H_{Iit}}\right)^{\theta_i - 1} \frac{\gamma_{Iit}}{1-\gamma_{Iit}}} \tag{15}$$

We use (15) to recover α^L_{Iit} from the data, which then allows us to compute (14) at the product level. Notice that α^L_{Iit} increases with the observed share of LWCs in imports, γ_{Iit}. Conditional on relative prices, a larger expenditure share implies a stronger taste parameter. Likewise, conditional on observed expenditure shares, a higher relative price of LWC varieties implies a larger taste parameter for LWCs.

We use data on trade elasticities at the HS6 level as provided by Fontagne et al. [2022] from variation in bilateral tariffs for the universe of country pairs over the 2001 to 2016 period.[20] In our sample, the median value of θ is 6.35, the mean is 7.10 and the standard deviation is 3.4. We measure (15) and (14) at the CN8 level, using the same HS6-level elasticity estimate for all CN8 codes within each HS6 product in our data. We then aggregate using the share of imports of each CN8 product in total imports of the sector to which the good belongs.

Inter-sectoral linkages and expenditure data

The ICIO tables provide us with the following information at the sector level: *i)* the value share of inputs that each sector s sources domestically from each given sector k, ϕ_{ks}, *ii)* the share of domestic and imported intermediate inputs $[\eta_{Ikt}, (1-\eta_{Ikt})]$ and *iii)* the share of inputs in total output $(1-a_s)$. Appendix Tables C and D provide the sample values of those parameters by each sector of the ICIO, for all types of sectors. The ICIO tables also provide a concordance between ISIC sectors and HS6 codes, that we use to map imports at the CN8 level to sectors (the first six digits of the CN8 nomenclature are identical to HS6 codes). Each HS6 code maps

[20]The data was downloaded from https://sites.google.com/view/product-level-trade-elasticity. Recent papers using these estimates include Chalendard et al. [2022] and Head et al. [2022].

into a single one ISIC sector. We use the value share of imports of each CN8 code that maps into any sector to weight CN8 inflation rates to sector-level inflation rates. There is no clear way of assigning all HS6 that map into a sector as intermediate or final goods.[21] We follow Berlingieri et al. [2016] and use all HS6 codes that have a mapping to a particular ISIC sector. Appendix Tables C and D show, for each sector, if we can assign direct imports, that is, whether HS codes that map directly into them or not.[22]

Results

Table 2 shows the results for the manufacturing and "Other" sectors, which includes mostly services. We calculate average effects by first aggregating the ISIC-level results at the year level by weighting with the share of each ISIC on total consumption and then take simple averages across years. It is noteworthy that the main effects are due to French firms substituting their input purchases towards LWC goods, which resulted in a lower input price index.

Overall, LWCs reduced French inflation by -0.022 percentage points per year on average. While the effects are substantially larger for the manufacturing sector (-0.06 pp), the smaller overall result is driven mostly by the low impact of imports in the "Other" sectors (mainly services, with no direct imports of goods), which have a strong weight in consumer expenditures.[23]

[Insert Table 2 here]

These results translate into an average contribution to total CPI inflation of -0.018 percentage points, taking into account that the share of domestically-produced goods is of 85% on average. That is, the contribution of LWCs to French inflation through the input channel is:

$$(1-\beta\eta)\sum_{s\in S}\omega_{st}\pi^{D}_{st} = 0.85 \times 0.022 = 0.018 \tag{16}$$

[21] One could argue that end-use classifications such as UN's BEC would serve this purpose, but recall that we are not interested in if the product is an intermediate good in general terms, but instead which products are inputs for each sector in question.

[22] Notice that this is the same method we have used to define "tradable" sectors in the previous section.

[23] Blaum et al. [2018] estimate the impact of shutting down all intermediate trade for French firms and report that the effect is ten times larger for the manufacturing sector than for the service sector. Berlingieri et al. [2016] find that the cumulative reduction for the period 1993-2013 in an EU-wide consumer price index is 0.24%, of which half is due to imports of intermediate goods.

where $(1-\beta\eta)$ is the share of domestic production in total CPI consumption, calculated on average over the sample period.

5 The Impact of Imports From Low-Wage Countries on French Inflation: Taste Shocks

We now turn to the quantification of taste shocks, focusing on the contribution of imports from LWCs. Computing the taste parameters α_{ijt} and their variation over time is necessary to quantify equation (5). For this, we need three types of data at the product-level: unadjusted prices, elasticities of substitution across origins, and expenditure shares of each variety including the domestic ones. We are able to construct unadjusted prices at the CN8 level from the trade data and we can use estimates of θ at the HS6 level from the literature as we did in the previous section. However, detailed data on consumption expenditures does not exist: comprehensive consumption expenditure data comes at a more aggregate level, the 3-digit level of the COICOP classification.

In order to overcome such data limitations, we proceed as follows. We first present the simplest case of Cobb-Douglas preferences that corresponds to $\theta_i \to 1 \; \forall \; i$ (Appendix B).4 provides details of the calculation). The interest of this benchmark case is twofold. First, it allows us to aggregate the product-level results sector-level using only observed expenditure shares, that we can construct matching CN8 product to COICOP sectors as in Section 4 (and, as a by-product, it allows us to provide the contribution of different countries separately in a very transparent way). Second, assuming Cobb-Douglas preferences leads to a *Geometric mean index*, which is a good approximation to the way in which the official CPI is constructed by statistical agencies, allowing us to quantify the contribution of LWCs to *measured inflation.*

Nonetheless, the Cobb-Douglas results suppress product-level variation in elasticities of substitution and can overestimate taste shocks because such preferences allows for too little substitution (unity). In this sense, such estimates are likely to provide upper bounds of the true effect driven by heterogeneity in the elasticity of substitution. To provide robustness and benchmark the Cobb-Douglas results we perform an additional exercise where we compare the estimation of the contribution of taste shocks in an import price index at the CN8 level, for which we have all the necessary data to properly treat both the Cobb-Douglas and the general CES case.

5.1 Taste Shocks Between Domestic Goods and LWCs Imports

In the Cobb-Douglas case (i.e. $\theta \to 1$), the contribution to inflation of *Taste Shocks* between LWCs and domestic goods is:

$$\frac{d\eta_{it}}{dt}\gamma_{it}^{L}\left(p_{it}^{L}-p_{it}^{D}\right) \tag{17}$$

where prices are expressed in logs (denoted by small letters). As already mentioned, γ_{it}^{L} is the share of LWCs imports in overall imports and η_{it} the share of imports in consumption. As can be seen in (17), when $\theta \to 1$ expenditure shares variations reflect changes in tastes only and they are invariant to changes in relative prices. Since all variation in expenditure shares is attributed to demand shocks, the Cobb-Douglas formulation provides us with an upper bound of the contribution of taste shocks.

Each year, the contribution of taste shocks between LWCs import goods and domestic goods is given by the empirical counterpart of the first term in expression (17):

$$\beta_t \sum_{s\in T} \underbrace{\omega_{st}}_{\text{sector s weight}} \underbrace{\frac{d\eta_{st}}{dt} E_s[\gamma_{it}^{L}(p_{it}^{L}-p_{it}^{D})]}_{\text{effect in sector } s} \tag{18}$$

The share of imports from LWCs in consumption increased quickly over the period 1994-2014 (Fact 2) while LWCs imports are much cheaper than domestic goods on average (Fact 3). The contribution to inflation is of -0.04 pp per year on average over the sample period.[24] Computing unadjusted prices using units-based unit values give a contribution which is a little larger in absolute value (-0.07 pp). Among LWCs, about 75% of the effect comes from Chinese imports.

The overall effect masks strong heterogeneity across sectors. Table 3 provides an estimation of the contribution of taste shocks by broad consumption category (Column (4)). The largest effects are obtained for *Clothing* and *Furnishings*, being of -0.50 and -0.10 pp respectively. The last column reports the contribution of each product category to the aggregate contribution

[24] The estimations use the price of HWC imports to proxy for domestic prices. Using the alternative proxy, the unit values of French exports (see the Section 2.1 for the detailed discussion) we find very similar result: an overall contribution to inflation that ranges between -0.04 pp and -0.05 pp per year on average.

of taste shocks (i.e. taking into account the share of each product category in the CPI): a large majority of the overall effect is due to *Clothing* and *Furnishings* (-0.028 pp out of -0.037 pp for the overall effect).

[Insert Table 3 here]

5.2 Taste Shocks Between Imported Goods

When $\theta \to 1$, the contribution to inflation of *Taste Shocks* between LWCs and HWCs is:

$$\eta_{it}\left[\frac{d\gamma_{it}^{L}}{dt}(p_{it}^{L}-p_{it}^{H})\right] \tag{19}$$

We quantify (19) with its empirical counterpart:

$$\beta_t \sum_{s\in T}\omega_{st}\eta_{st}E_s\left[\frac{d\gamma_{it}^{L}}{dt}(p_{it}^{L}-p_{it}^{H})\right] \tag{20}$$

The expenditure shift from HWCs to LWCs imports contributed negatively and strongly to reducing imported inflation, given the persistent price-level differential shown in *Fact 3* of Section 2. Figure 5, plots the contribution of taste shocks on imported inflation by year, comparing it with the inflation differential effect. Taste shocks reduced the overall import price index by -0.62 pp on average over 1994-2014, being strongest during 2000-2009 (-0.87 pp). Using unit-based unit values leads to a larger effect in absolute values (-0.92 pp on average over the period 1994-2014, see also Figure F in the Appendix).

[Insert Figure 5 here]

The data displays heterogeneity across origin countries, with China standing out. Figure 6 plots the contribution of each country category and shows that almost all of variation is due to imports from China: -0.47 pp out of -0.62 pp per year on average. In particular, the highest values for the effects are around the year 2000, a time when China entered the WTO and the effects of market-oriented reforms that started some years before started to kick in (see Autor et al. [2016]).

On average, taste shocks within imports reduced French inflation by about -0.1 pp. The overall effect of imported inflation of consumer goods is almost fully driven by Chinese imports (a little less than -0.07 pp) while the contribution of NEUMS is about -0.02 pp and that of very low-wage countries and intermediate low-wage countries less than -0.01 pp.

[Insert Figure 6 here]

The imported inflation channel is at play in almost all COICOP categories except *Food, Alcohol* & *Tobacco* (and by construction in product categories with only services like *Restaurants* & *Hotels*) as shown in Table 4.

[Insert Table 4 here]

Allowing for product-specific elasticities of substitution

We now calculate the contribution of taste shocks when allowing for heterogenous elasticities of substitution at the product level (using data on trade elasticities at the HS6 level provided by Fontagne et al. [2022]). As explained in the beginning of this section, we can only do a proper calculation for the import price index, where we observe, for each origin country, the share of expenditure in total imports. We follow the same method than in Section 4.2.2, quantifying inflation for each product i using the equivalent of equations (14) and (15) using data on relative prices and import expenditure shares. The relevant equations are provided in Appendix B).5.

Accounting for heterogeneous elasticities reduces the contribution of taste shocks in favour of LWCs to French inflation to -0.4 percentage points on average over the sample period (from -0.6 percentage points in the Cobb-Douglas case). We plot on Figure 7 the contribution allowing for heterogeneity across products in θ and the results obtained when $\theta = 1$ for all products. For most years, the contribution of taste-shift effects to imported inflation is smaller in absolute values when we account for heterogeneity in θ. Overall, this smaller effect of taste shifts on imported inflation would lower (in absolute values) the contribution of these taste shifts to inflation from -0.09 pp to about -0.06 pp on average per year.

[Insert Figure 7 here]

These results highlight the idea that the Cobb-Douglas results should be taken with caution, as they are likely upper bounds to the contributions of LWCs when preferences are CES.[25]

[25] Another layer of bias can be due to heterogeneity in price elasticities across products, that is, departing from CES, as recently shown by Errico and Lashkari [2022].

6 Prices and Taste Shocks in Measures of Inflation

The Consumer Price Index (CPI) is the measure of macro inflation produced by statistical agencies and used commonly by economic agents to base their consumption and saving choices as well as policy-makers (e.g. monetary policy decisions in the euro area), playing also an important role in wage negotiations. It is thus of interest to quantify the impact of imports from LWCs on the CPI and highlight any potential differences with the effects of LWCs on cost of living indices.

6.1 Overall Contribution of LWC Imports to Inflation

The CPI is constructed by most statistical agencies using a *geometric Laspeyres* formula, defined as the geometric weighted average of prices of a *Fixed-Basket-of-Goods* (FBG) index that holds constant the structure of consumption, with the weights being the expenditure shares calculated in a reference period, most commonly computed following the "chain-linking method", in which the reference period at t is $t-1$ and weights are updated every year. (see Braun and Lein [2021] for a discussion). Thus, the CPI is, by construction, a *pure price* index.[26]

Therefore, an interesting feature of formula (3) is that we can use it to approximate the contribution of imports by origin to CPI inflation, which is given by the pure price terms. We can also contrast it with the contribution of imports by origin to consumer welfare under CES preferences, which are the object of study of a large literature on international trade and macroeconomics.

Table 5 provides more results on these estimations. The contribution of *Pure Price* effects can be decomposed into a small negative contribution of the effect coming from imported prices (close to -0.01 pp) whereas the contribution on domestic prices is about -0.02 pp. Similarly, we find that the taste-shift contribution can be decomposed into a -0.09 pp effect coming from

[26] Note that in practice contemporaneous expenditure shares are typically unavailable at the time of price collection. At the most disaggregated level, elementary prices indices combine prices of a same good collected in different location or type of store. Statistical agencies compute unweighted geometric means of prices when a product is not perfectly homogeneous, arithmetic mean otherwise. Compared to the arithmetic mean, the geometric one assigns lower weights to relatively larger price increases. Such *Jevons indices* are then aggregated at higher levels using *weighted geometric (Laspeyres) means* of the type derived in this section. In the empirical exercise we use unit values calculated at the 8-digit level of the European Combined Nomenclature. The 8-digit level is close to a level of aggregation at which statistical agencies use weighted geometric means and at which the dispersion of unit values tends to be rather high. *Jevons* is a special case of the geometric Laspeyres in which the taste parameters are supposed symmetric across goods and the weights are equal to 1/J.

imported inflation and -0.04 pp from domestic prices. If we focus more closely on the impact of Chinese imports, we find that they explain most the overall taste-shift effect (-0.10 pp of the total effect of -0.13 pp). Overall, LWCs imports have reduced inflation by -0.15 pp per year on average. In the robustness exercise where we compute unit values using quantities in units, we find that LWCs imports have reduced inflation by -0.24 pp per year on average (see Table G in the Appendix); the stronger effects come taste shocks.

[Insert Table 5 here]

Figure 5 plots our baseline results year by year. The solid black line plots the overall contribution of LWCs imports to French inflation. This overall contribution is calculated as the sum of the contribution from *Pure Price* effects (blue bars) and *Taste-Shift* effects (grey bars), which are decomposed by country of imports' origin (China vs other LWCs). The overall effect of LWCs imports is much larger over the period 2001-2008 (-0.21 pp on average) mainly driven by Chinese imports while before 2001 the effect is about -0.13 pp on average mainly coming from other LWCs imports.

[Insert Figure 8 here]

6.2 CES Preferences

How would the magnitude of our estimates change with varying values for the elasticity of substitution θ? As discussed before, data limitations prevent us from re-doing all of our calculations using estimate of θ, mainly because disaggregated consumer expenditure is unavailable. We have already shown, in Section 5 that, for an import price index, departing from the Cobb-Douglas assumption leads to a lower contribution of taste shocks to imported inflation. We now seek to generalise those results to taste shocks involving domestic goods. To focus on the role of LWCs and simplify the exposition, we assume that domestic goods and goods originating in high-wage countries are equivalent for consumers. Pooling both types of goods seems a reasonable assumption given that empirically we observe $p_{it}^D \approx p_{it}^H$ across goods and in almost every year of the sample (e.g. *Fact 3* of Section 2). Moreover, most of the substitution observed during the period occurred in favor of goods from LWCs (e.g. *Fact 2* of Section 2).

Using R to denote the group of rich countries, equation (5) becomes:

$$\pi_t = \underbrace{\pi_t^R + \gamma_t \left(\pi_t^L - \pi_t^R\right)}_{\text{pure price}} + \underbrace{\frac{1}{1-\theta}\left[\left(\frac{P_t^L}{P_t}\right)^{1-\theta} - \left(\frac{P_t^R}{P_t}\right)^{1-\theta}\right]\frac{d\alpha_t^L}{dt}}_{\text{taste shift}} \tag{21}$$

where γ_{it} is the share of imports from LWCs in total consumption of good i and the price of good i is defined as $P_t^{1-\theta} = \alpha_t^R P_t^{R\,1-\theta} + \alpha_t^L P_t^{L\,1-\theta}$, with P^R the price index of goods originating in rich countries and P^L the price index of varieties from low-wage countries.[27]

α^L is the taste parameter that measures relative preferences of goods from LWCs and those originating in rich countries, and $\frac{d\alpha_t^L}{dt}$ is the taste shift favouring such goods. We are interested in how the estimate of $\frac{d\alpha_t^L}{dt}$ varies with different values of the elasticities of substitution θ.

In the general case α_t^L cannot be directly observed in the data but can be retrieved conditional on the estimate for θ. Noting that the expenditure share of variety j is $S_{jt} = \alpha_{jt}\left(\frac{P_{jt}}{P_t}\right)^{1-\theta}$, and given that $\alpha_t^L + \alpha_t^R = 1$ and $S_t^L + S_t^R = 1$, it follows that:

$$\alpha_t^L = \frac{\left(\frac{P_t^L}{P_t^R}\right)^{\theta-1}\frac{S_t^L}{1-S_t^L}}{1+\left(\frac{P_t^L}{P_t^R}\right)^{\theta-1}\frac{S_t^L}{1-S_t^L}} \tag{22}$$

With this information at hand, we compute the evolution of taste shocks $\left(\frac{d\alpha_t^L}{dt}\right)$ and measure its contribution to inflation. Figure 9 (left panel) plots the average contribution of the taste-shock term (the third term on the right side in equation (21) to COLI inflation for different values of θ. We find a value of about -0.09 pp per year for $\theta = 1$ which is close to our benchmark case discussed previously in the paper where we differentiated domestic and high-wage goods (-0.13 pp), therefore showing that pooling both type of origins together provides with a rather good approximation.

Interestingly, as the elasticity of substitution θ increases, the estimated contribution of taste shift is rather the same. For θ between 4 and 6, the contribution of taste shift lies between -0.09 and -0.08 pp per year. However, this contribution continuously decreases for θ larger than 6.

[27] $P_t^{R\,1-\theta} = \frac{\alpha_t^d}{\alpha_t^R}P_t^{d\,1-\theta} + \frac{\alpha_t^H}{\alpha_t^R}P_t^{H\,1-\theta}$, with $\alpha^R = \alpha^d + \alpha^{HWC}$.

How does the estimated contribution of taste shocks to welfare gain move with θ? First, remember that $S_t^L = \alpha_t^L \left(\frac{P_t^L}{P_t}\right)^{1-\theta}$. Thus, the variation of α_t^L over time is related to the change in the expenditure share of LWCs in the following way:

$$\frac{d\alpha_t^L}{dt} = \frac{dS_t^L}{dt}\left(\frac{P_t^L}{P_t}\right)^{\theta-1} + (\theta-1)S_t^L\left(\frac{P_t^L}{P_t}\right)^{\theta-1}(\pi_t^L - \pi_t) \quad (23)$$

Figure 9 (right panel) plots the two terms of this decomposition for different values of θ. Focusing on the contribution stemming from observed variations in market shares (i.e. the first term in equation (23)), we can easily show that $\frac{d\alpha_t^L}{dS_t^L} \approx \left(\frac{P_t^L}{P_t}\right)^{\theta-1}$ is decreasing in θ since $\frac{P_t^L}{P_t} = \exp(-0.35) < 1$. Conditional on relative unadjusted prices $\left(\frac{P_t^L}{P_t}\right)$ a larger observed change in market shares implies, ceteris paribus, a larger shift in relative preferences. This relationship is mediated by θ. A higher value for θ implies that, when faced with a lower relative unadjusted price of LWCs goods, consumers substitute more towards those goods. Therefore, a larger share of observed changes in expenditure shares is due to price substitution and less of that variation can be attributed to unobserved changes in consumer preferences. Notice that this is equivalent to say that, in cases where the elasticity of substitution is higher, *preference-adjusted prices* implied by the data are lower.

[Insert Figure 9 here]

The second term shows how the estimation for taste shifts varies with differences in inflation rates, holding price levels and expenditure shares fixed at their initial levels. Conditional on observed expenditures shares S_t^L, a higher inflation rate for LWCs goods (leading to a lower unadjusted relative price of those goods) implies a positive taste shift (that is, an increase in α_t^L is required to deliver the observed market shares) and therefore a higher contribution of preference changes to inflation. The relationship is governed by θ: for any given inflation differential $(\pi_t^L - \pi_t)$, the model implies a larger value of α_t^L to accommodate the expenditure shares observed in the data. Intuitively, when the price increase is larger, a higher preference shock is required to deliver adjusted prices that are compatible with observed expenditure shares.

Using our data to calibrate these two terms, both terms offset each other for values of θ

below 6 then the second term is stronger and the taste-shift contribution to inflation becomes larger in absolute values and reaches -0.1 pp for θ equal to 10.

With this exercise, we illustrate how an elasticity of substitution higher than unity could affect our estimates of the contribution of taste shocks to inflation. We however assume an homogenous value for θ and we make several simplifying assumptions to be able to provide some simple measures of the effect. If θ is heterogenous across products and in particular, if θ is higher for products with larger price differential, we might overestimate the contribution of taste shocks. Since a precise measure of the elasticity of substitution is not available for detailed consumption products, we leave this evaluation for further research.

7 Conclusion

In this paper, we assess empirically how LWCs imports of consumption goods have affected inflation in France over the period 1994-2014. Our key contribution is to decompose the inflation of an exact price index into two different effects of LWCs imports and quantify separately each of them.

First, "pure-price" effects of LWCs imports only slightly reduced CPI inflation, by -0.02 pp to -0.04 pp per year on average. Most of this effect comes from the effect of LWCs on domestic prices while the differential between LWCs and HWCs imports was to small to contribute significantly to consumer inflation. Second, the contribution of "taste shocks" is much larger: under Cobb Douglas preferences, their contribution to inflation lies between -0.13 pp and -0.21 pp, depending on how we measure quantities to compute unit values. We can decompose this overall effect between the effect of taste shocks between domestic goods and LWCs imports and taste shocks between HWCs imports and LWCs. The rise in the proportion of LWCs goods in total imports reduced French inflation by -0.09 pp to -0.14 pp whereas import penetration of consumption goods led to a reduction of -0.04 pp to -0.07 pp of inflation. Overall, we find that inflation for French consumers would have been between 0.15 pp and 0.24 pp higher on average each year if the share of LWCs had remained at its 1994 level. Chinese imports alone explain about half of this overall effect.

This exercise allows us to disentangle the impact of LWCs on cost-of-living versus CPI inflation - the latter abstracting for taste shocks. Assuming Cobb-Douglas preferences leads to a lower bound of the LWCs effect on the cost of living. When we assume that the elasticity of substitution is larger, closer to more standard values (between 4 and 6) and product-specific when possible, the effect of LWC imports is found to be a little lower. One of our main result is still that most of the disinflationary effect on the cost of living is stemming from the reallocation of consumption towards goods produced in LWCs, that is largely driven by taste shocks. CPI inflation does not account for such changes in the structure of consumption and captures pure-price effects only.

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Table 1: Imported inflation differential - Decomposition by COICOP Product Categories (average, 1994-2014)

COICOP	% of CPI	Imports pen. $\beta\eta$	Product impact Infl. diff. $\gamma\,(\pi^{LWC} - \pi^{HWC})$	Product-level CPI infl. in pp	Contrib. to CPI infl. in pp
1- Food and non-alcohol. beverages	0.15	0.11	-0.02	0.00	0.000
2- Alcoholic beverages and tobacco	0.04	0.14	-0.02	0.00	0.000
3- Clothing and footwear	0.04	0.57	-0.12	-0.07	-0.003
4- Housing, water, elect., gas...	0.14	0.37	0.02	0.01	0.001
5- Furnishings, house services	0.06	0.53	0.03	0.02	0.001
6- Health	0.10	0.15	-0.01	0.00	0.000
7- Transport	0.16	0.23	0.03	0.01	0.001
8- Communication	0.03	0.56	0.38	0.21	0.006
9- Recreation and culture	0.08	0.40	-0.13	-0.05	-0.004
11- Restaurants and hotels	0.08	0.00	-	-	0.000
12- Miscellaneous goods and services	0.13	0.24	0.00	0.00	0.000
Total	1.00	0.15	-0.03	-	-0.005

Note: The first column "% CPI" reports the average weight of the COICOP 2 product in the French CPI. The second column "Import pen." reports import penetration by COICOP aggregate category as the share of total imports (source: Customs) in the product category consumption (source: Insee, national accounts) (including VAT and distribution margins). Third column reports the contribution of the inflation differential between HWC and LWC imports to the product-level import inflation (following the decomposition presented in equation 20) (i.e. HWC import prices growing more or less quickly than LWC import prices). Column 4 reports the estimation of the contribution of LWC import to CPI product-level inflation (at COICOP-2 level) coming from the pure price effect, calculated as $col.(2) \times col.(3)$. Column 5 reports the estimation of the contribution of LWC import to the overall CPI inflation (for each COICOP-2 product) coming from the pure price effect, calculated as $col.(4)$ multiplied by the share of the COICOP in CPI consumption (col. (1)).

Table 2: Contribution to domestic inflation of imported inputs from LWCs (percentage points)

	All	**Manufacturing**	**Other**
Total Contribution	-0.022	-0.060	-0.004
Pure Price	0.002	0.005	0.000
Substitution	-0.023	-0.065	-0.005
Weight (expenditure)		0.31	0.69

Note: The table presents the contribution of imports from LWCs to domestic inflation, expressed in percentage points, calculated using Equation (14). To aggregate the results, for each year, we first compute the weighted average across ISIC sectors using the share of each ISIC sector in total consumption from the ICIO tables. We then compute a simple average across years. "Total Contribution" provides the contribution as explicitly in Equation (14). "Pure Price" and " Substitution" measure respectively the values of the first and second terms in Equation (14).The column "Manufacturing" includes ISIC 2-digit industries 10 to 33. The column "Other" includes ISIC 2-digit industries 35 to 96 (see Appendix Tables C and D for more details).

Table 3: Taste shocks between LWC imports and domestic goods - Decomposition by COICOP Product Categories (average, 1994-2014)

COICOP (% of CPI)	Share of tradables β	Δ imp. pen. $\frac{\partial \eta_t}{\partial t}$	Share of LWC imp. γ	Price diff. $p^{LWC} - p^D$	Product-level CPI infl. in pp	Contrib. CPI infl. in pp
1- Food and non-alcohol. beverages (15%)	0.73	0.34	0.12	0.02	0.00	0.000
2- Alcoholic beverages and tobacco (4%)	1.00	0.10	0.06	0.09	0.00	0.000
3- Clothing and footwear (4%)	0.97	2.16	0.66	-0.39	-0.53	-0.021
4- Housing, water, elect., gas... (14%)	0.18	0.09	0.10	-0.28	0.00	0.000
5- Furnishings, house services (6%)	0.85	1.62	0.28	-0.32	-0.12	-0.007
6- Health (10%)	0.27	0.70	0.04	-0.43	0.00	0.000
7- Transport (16%)	0.43	0.09	0.11	-0.33	0.00	0.000
8- Communication (3%)	0.10	0.57	0.45	-0.60	-0.02	0.000
9- Recreation and culture (8%)	0.53	0.26	0.29	-0.25	-0.01	-0.001
11- Restaurants and hotels (8%)	0.00	-	-	-	-	0.000
12- Miscellaneous goods and services (13%)	0.29	0.23	0.20	-0.31	0.00	-0.001
Total	0.42	1.06	0.29	-0.33	-	-0.037

Note: The first column "share of tradables" reports for each COICOP aggregate category the ratio between total imports of a given product (source: Customs) and the total French consumption of tradable goods (source: Insee, national accounts), including VAT and distribution margins. "Δ in import pen." is the average year-on-year change in the share of imports in French tradables. "Share of LWC imports" reports the share of imports from low-wage countries in overall French imports. "Average price diff." is the average difference in the (log) level of prices of goods imported from LWCs and the ones produced in France (this latter price is proxied by French export prices) (we also take into account a wedge of 5% bewteen CIF imports an FOB exports). "Product-level CPI inflation" is calculated by COICOP 1 as the product of column (1), (2), (3) and (4) and is the impact on the product inflation of the substitution of domestically produced goods with LWC imports. "Contribution" is the substitution channel effect multiplied by the share of the COICOP in CPI consumption.

Table 4: Taste shocks between LWC imports and HWC imports - Decomposition by COICOP Product Categories (average, 1994-2014)

COICOP	% of CPI	Imports pen. $\beta\eta$	Product impact Infl. diff. $\gamma\left(\pi^{LWC}-\pi^{HWC}\right)$	Product-level CPI infl. in pp	Contrib. to CPI infl. in pp
1- Food and non-alcohol. beverages	0.15	0.11	-0.03	-0.01	-0.001
2- Alcoholic beverages and tobacco	0.04	0.14	-0.19	-0.01	-0.001
3- Clothing and footwear	0.04	0.57	-0.82	-0.36	-0.014
4- Housing, water, elect., gas...	0.14	0.37	-0.28	-0.10	-0.014
5- Furnishings, house services	0.06	0.53	-0.55	-0.29	-0.018
6- Health	0.10	0.15	-0.35	-0.05	-0.005
7- Transport	0.16	0.23	-0.74	-0.17	-0.027
8- Communication	0.03	0.56	-2.14	-1.19	-0.036
9- Recreation and culture	0.08	0.40	-0.64	-0.25	-0.022
11- Restaurants and hotels	0.08	0	-	0.00	0.000
12- Miscellaneous goods and services	0.13	0.24	-0.57	-0.14	-0.018
Total	1.00	0.15	-0.62	-	-0.094

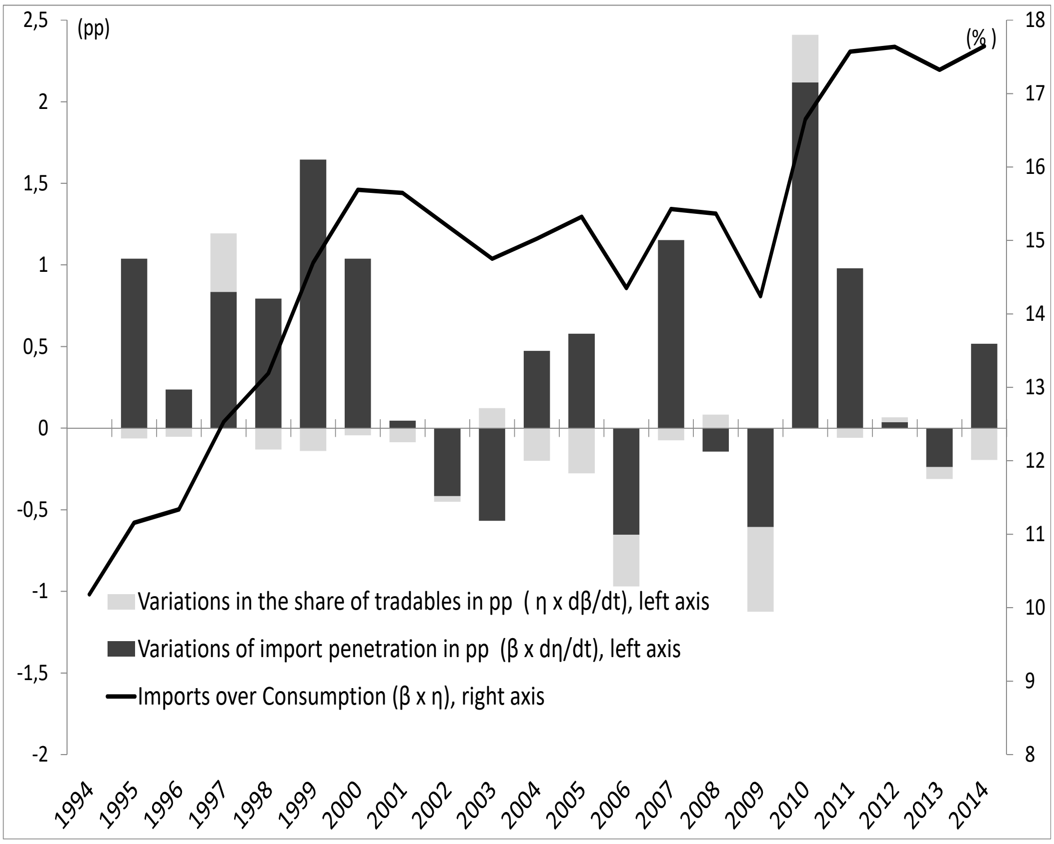
Note: The first column “% CPI” reports the average weight of the COICOP 2 product in the French CPI. The second column “Import pen.” reports import penetration by COICOP aggregate category as the share of total imports (source: Customs) in the product category consumption (source: Insee, national accounts) (including VAT and distribution margins). The third column reports the taste-shock effect (i.e consumers switching from HWC imports to LWC imports). Column 4 reports the estimation of the contribution of LWC import to CPI product-level inflation (at COICOP-2 level) coming from the taste-shock effect, calculated as $col.(2) \times col.(3)$. Column 5 reports the estimation of the contribution of LWC import to the overall CPI inflation (for each COICOP-2 product) coming from the taste shift effect, calculated as $col.(4)$ multiplied by the share of the COICOP in CPI consumption (col. (1)).

Table 5: Average Values of Main Variables (1994-2014) and Main Results

	Pure Price effects			
	Imported inflation			
	$\beta\eta$	$\gamma\,(\pi^{LWC} - \pi^{HWC})$		Contrib CPI
All LWC	0.15	-0.03		-0.005
China only	0.15	-0.00		-0.001
	Domestic inflation			
	$1 - \beta\eta$			Contrib CPI
All LWC	0.85	-0.022		-0.018
	Taste-shock effects			
	Imported Inflation			
	$\beta\eta$	$\frac{\partial\gamma_t}{\partial t}(p^{LWC} - p^{HWC})$		Contrib CPI
All LWC	0.15	-0.62		-0.094
China only	0.15	-0.42		-0.068
	Domestic inflation			
	β	$\frac{\partial\eta_t}{\partial t}$	$\gamma \times (p_t^{LWC} - p_t^{D})$	Contrib CPI
All LWC	0.42	1.06	0.29×-0.33	-0.037
China only	0.42	1.06	0.13×-0.50	-0.028

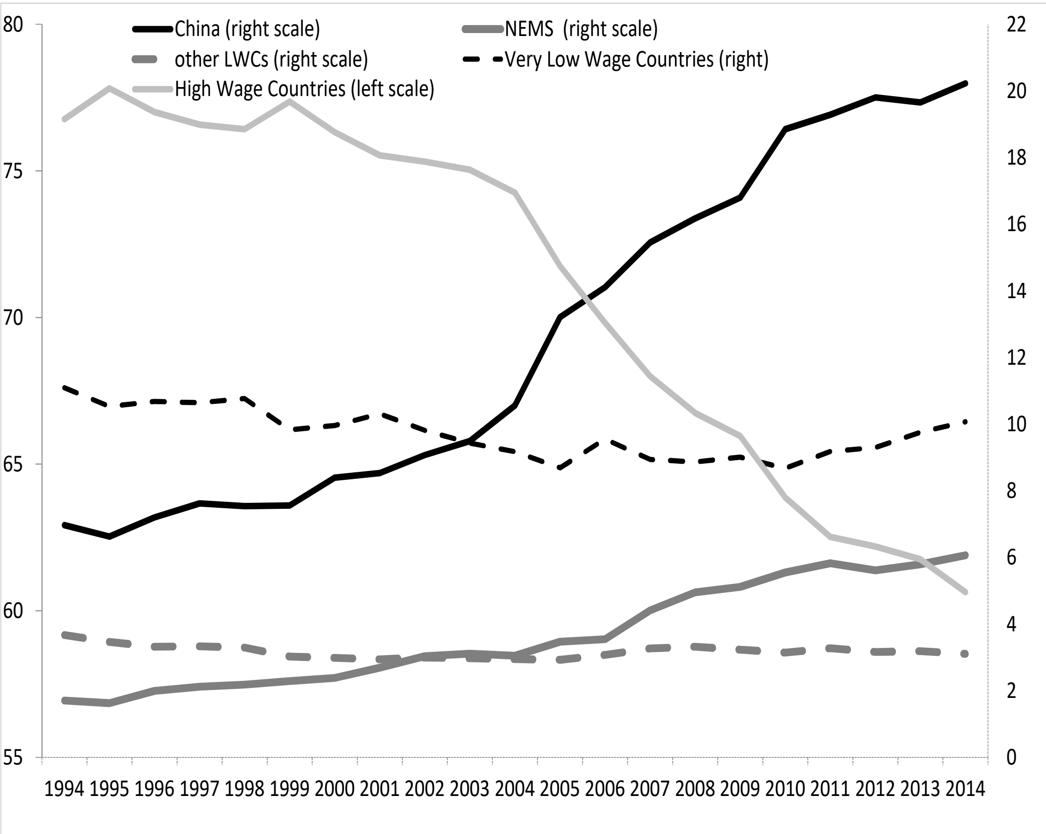
Note: The table presents the values of the main variables used in the analysis. Each variable is first calculated yearly, and then averaged over the period 1994-2014. In the case of variable denoting changes over time (i.e. $\frac{\partial\eta_t}{\partial t}$), first the year-on-year percentage change is calculated and average over the period. "Contrib CPI" is the total contribution of each channel to the evolution of French CPI inflation. Details of the variables' construction are provided in sections 3, 4 and 5.

Figure 1: Import Penetration (1994-2014)



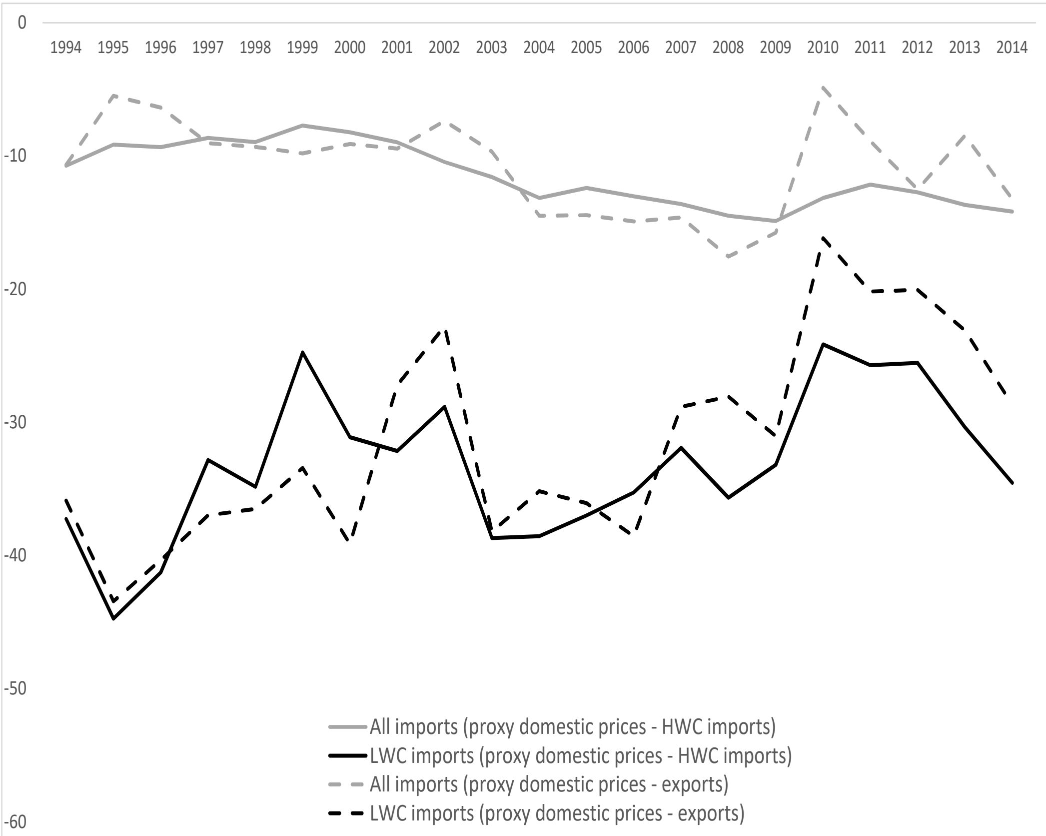
Note: this figure plots the share of imports in total CPI consumption by year (RHS scale, in percentage). Grey histograms The yearly change in import penetration (i.e. the yearly change in the back dashed line) is the sum of both histograms (LHS scale) in a given year. The plain grey histogram plots the changes in total import penetration (η_t) weighted by the share of tradable goods in consumption and the share of LWCs in imports. The dashed grey histogram represents the contribution of changes in β_t to yearly changes in import penetration from LWCs.

Figure 2: Import Market Shares over Time and by Country Category



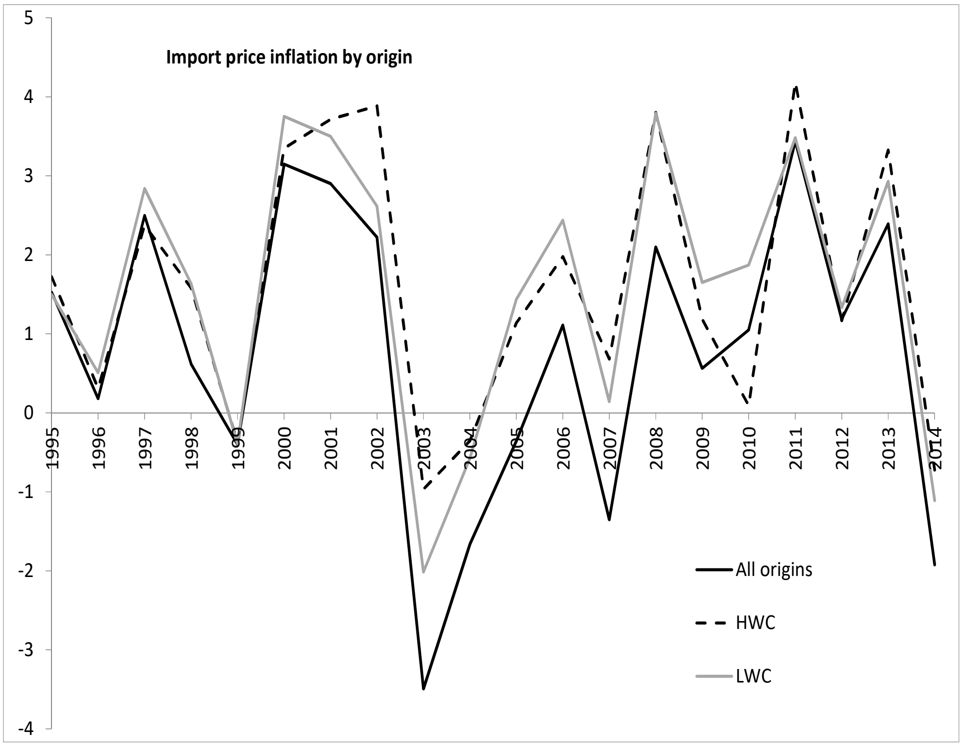
Note: the figure plots the ratio of imports value coming from a given country category over all French imports (in percent), these ratios are computed for the five country categories (see Table A). The grey line plots the share of high wage countries imports in all French imports (left axis), the black line plots the share of Chinese imports in all French imports (right axis), the dashed black line plots the share of very low wage countries imports in all French imports (right axis), the dark grey line plots the share of NEUMS countries imports in all French imports (right axis) and the dashed dark grey line plots the share of low wage countries imports in all French imports (right axis).

Figure 3: Price of Domestically Produced Goods Relative to Prices of Imported Goods (Consumer Goods)



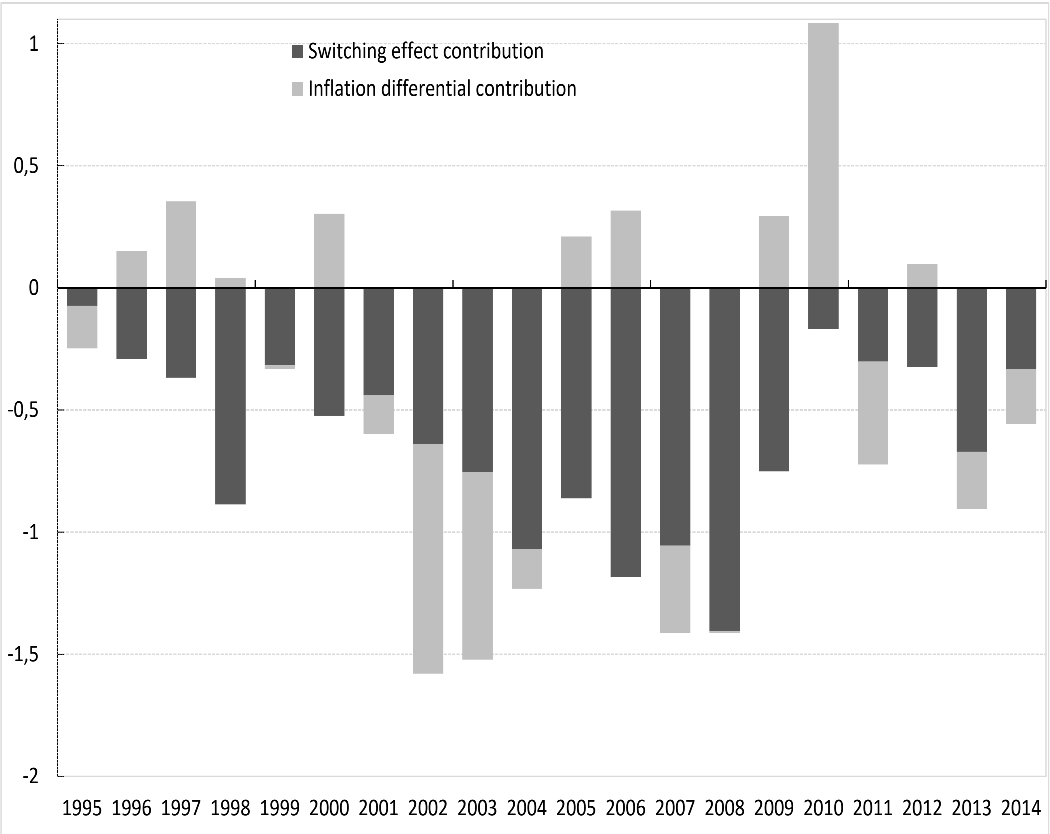
Note: We first compute the price differential (in a given year) at the level 8 of the trade product classification (HS classification) between import unit values and two measures of united values considered as equivalent to the domestic producer price: the first one uses the unit values of imports from high-wage countries (solid lines) and the second one uses the unit values of French exports (dashed lines), export unit values have been normalized so that on average the price differential between French export prices and HWC imports is null. The figure reports the weighted average of this price differential. The black line corresponds to the price differential between unit values of LWC imports and unit values equivalent of domestic prices, the grey line corresponds to the average using price differential between unit values of imports from all origins and unit values equivalent of domestic prices.

Figure 4: Import Price Inflation Differential: High-wage vs. Low-wage Countries



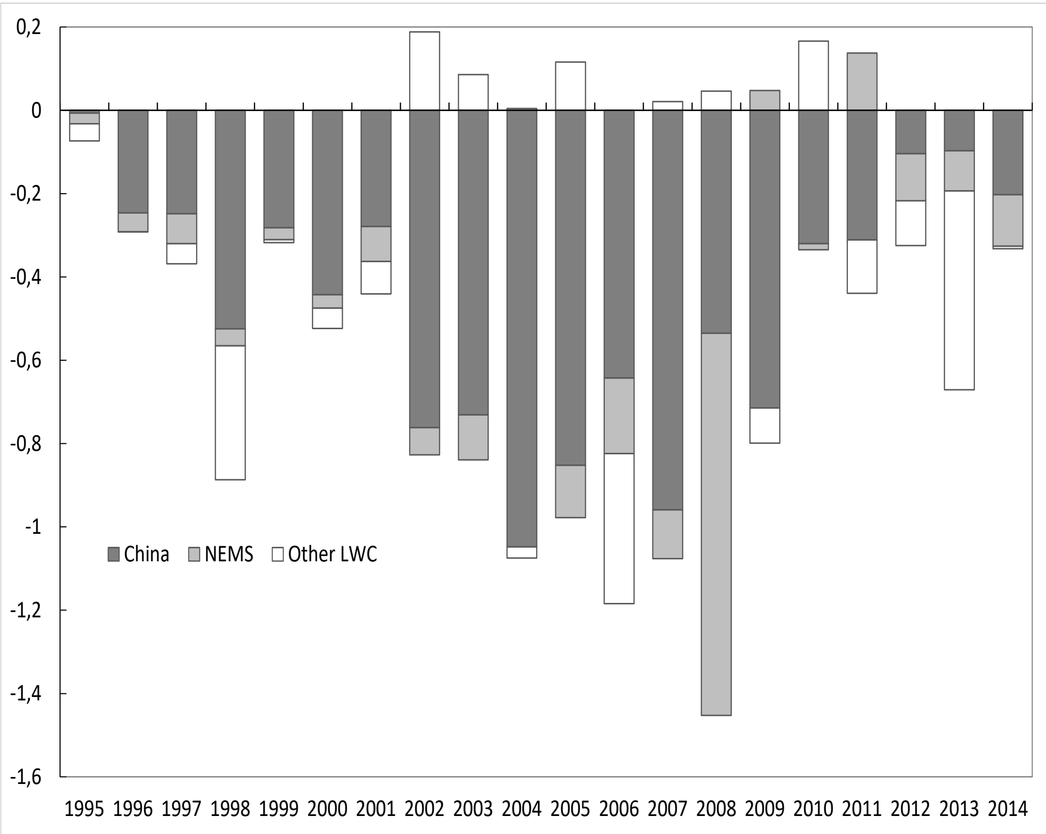
Note: the figure plots the y-o-y inflation rate of two components of the overall French import price inflation (the solid black line). The solid light-grey line is the import price inflation for goods produced in LWCs while the dashed black line corresponds to goods imported from HWCs. Note that overall import price inflation might be lower than the weighted average of the two components because a switching effect is also at play, and the weight of LWCs (with lower import prices in *level*) increase to the detriment of HWCs.

Figure 5: Contribution to Import Price Inflation: Taste-Shift vs Inflation Differential Effects



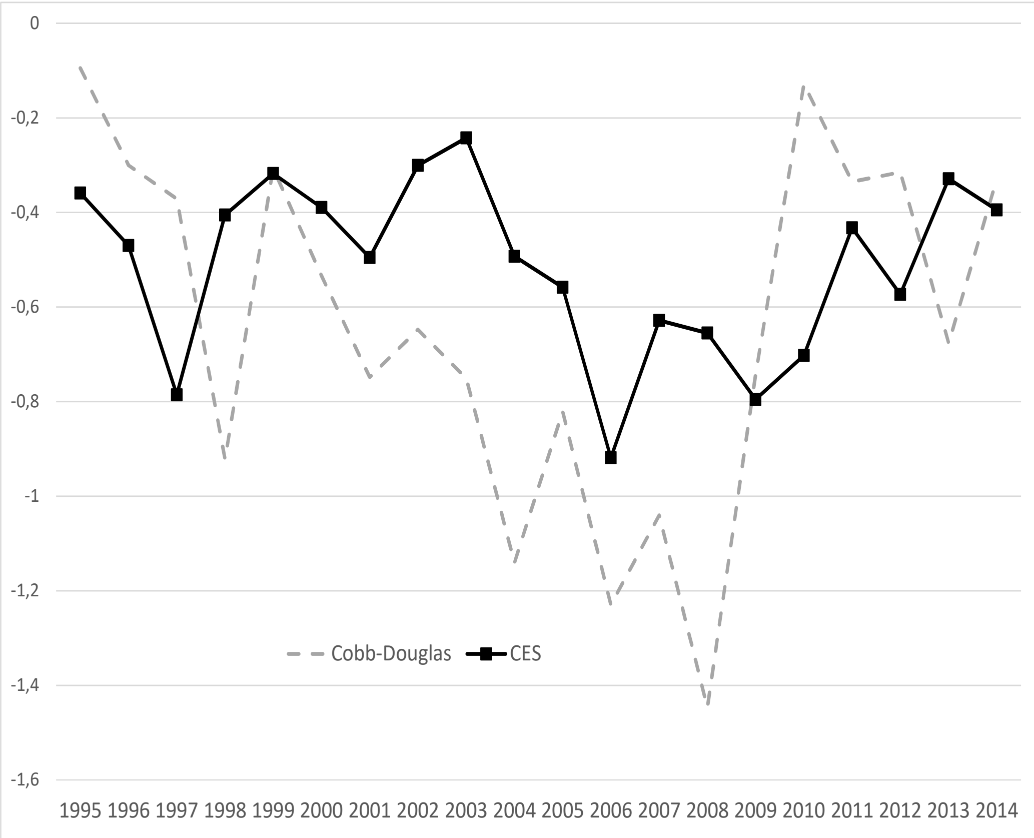
Note: We first calculate for each year and each product (restricting to consumer goods) the impact of LWC imports on import price inflation. We distinguish the impact coming from a variation of the share of LWC imports in total imports (called taste-shift effect) and the impact coming from differences in inflation between LWC and HWC imports (called inflation differential effect). The figure plots the weighted average contribution of LWC imports on French import inflation and distinguish between taste-shift effect (black histogram) and inflation differential effect (grey histogram) contributions. The overall impact of LWC imports on French import inflation is obtained as the sum of both histograms in a given year.

Figure 6: Taste-shift Contribution to Import Inflation: Country Category Decomposition



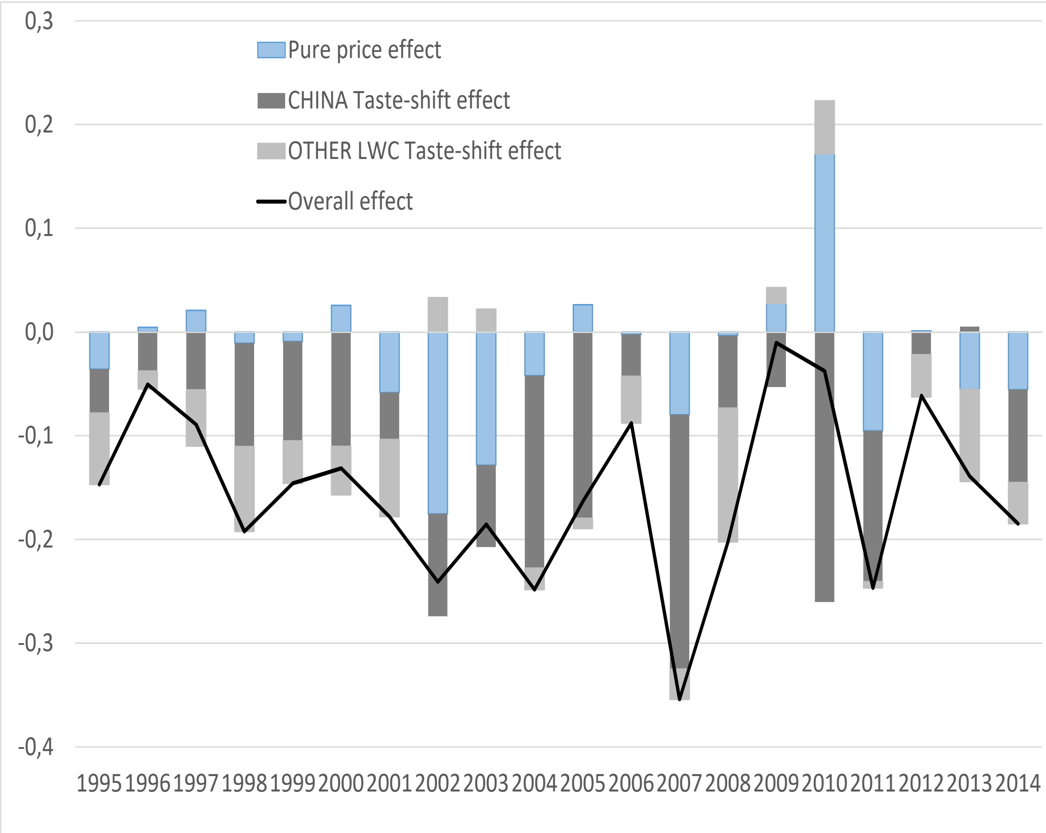
Note: we first calculate the contribution of LWC imports due to variations in the share of LWC imports in total imports by country category. The figure plots the weighted average contribution of LWC imports on French import inflation due to taste-shift effect by country category. The dark grey histogram plots the taste-shift contribution due to the Chinese imports, the light grey histogram plots the taste-shift contribution due to NEUMS imports, the white histogram plots the taste-shift contribution due to all other LWC imports (obtained as the sum of the taste-shift effect due the other LWC imports and other VLWC imports). The overall taste-shift effect of LWC imports on French import inflation is obtained as the sum of all three histograms in a given year.

Figure 7: Taste-shift Contribution to Import Inflation: CES vs. Cobb-Douglas



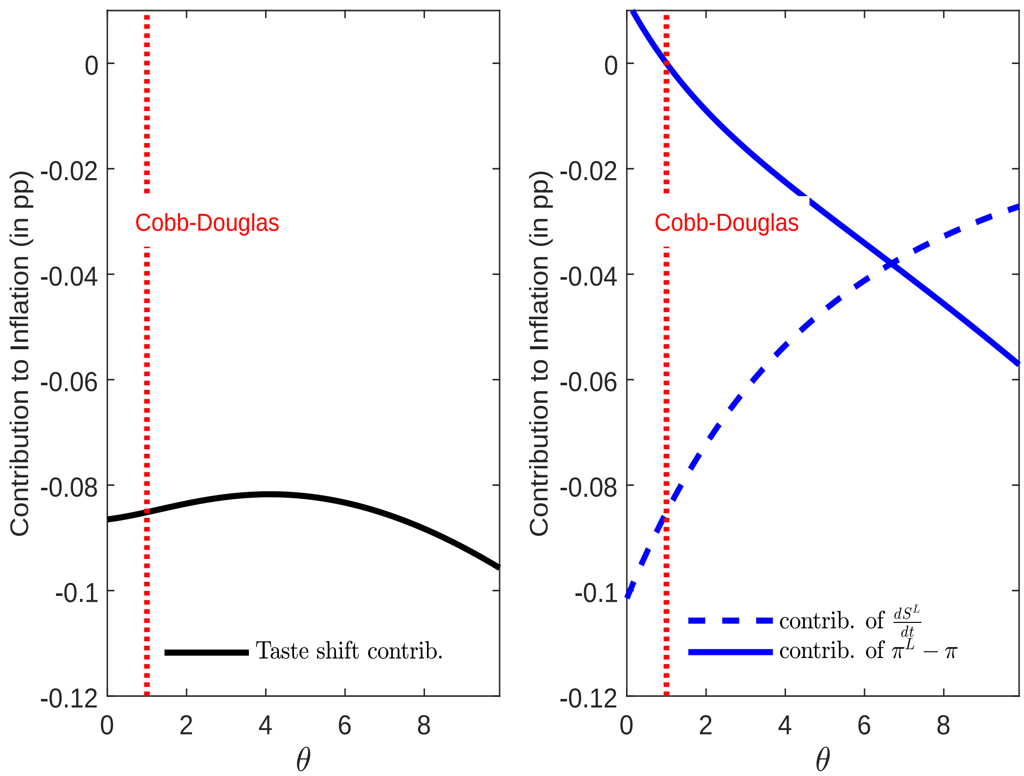
Note: we calculate the contribution of LWC imports due to taste shifts in two cases: first assuming an homogenous $\theta = 1$ for all products; second using a product specific θ (to do so, we use data on trade elasticities at the HS6 level as provided by Fontagne et al. [2022] from variation in bilateral tariffs for the universe of country pairs over the 2001 to 2016 period. The dark solid line reports the contribution of LWC imports to imported French inflation assuming product specific elasticity of substituion whereas the grey dashed line plots the results in the Cobb Douglas case.

Figure 8: Contributions of taste-shift vs inflation differential effects



Note: we calculate year by year the effect of LWC imports on inflation. The dotted black line plots the "pure price" effects of LWC imports calculated as the sum of the effect on import inflation differential and of the effect on domestic inflation. This pure price effect is decomposed by country of import origin: the dark blue histogram corresponds to the effect coming from Chinese imports and the light blue histogram corresponds to the effect of all other LWC. The black solid line corresponds to the overall effect of LWC imports calculated as the sum of the pure-price effect and the taste-shift effect (coming from the shift between domestic and LWC imports and from the shift between HWC and LWC imports). The dark grey histogram corresponds to the taste-shift effect of Chinese imports whereas the light grey histogram corresponds to the taste-shift of other LWC imports.

Figure 9: Contribution of the Taste Shift to Inflation - Variations Over θ



Note: The left-hand-side panel represents the contribution of taste-shift to inflation. It corresponds to the second term in equation (Dixit-Stiglitz) $(-\frac{1}{\theta-1}\left(\left(\frac{P^L}{P}\right)^{1-\theta} - \left(\frac{P^R}{P}\right)^{1-\theta}\right) \times \frac{d\alpha^L}{dt})$ multiplied by the share of tradable goods in consumption. Since taste parameter for LWC, α^L, can be expressed as a function of the market share and the relative price, we decompose this effect into two sub-contributions. The right-hand-side panel presents the contribution stemming from observed variations in market shares $(\frac{dS^L}{dt})$ (dashed blue line) and the contribution stemming from inflation differential $(\pi^L - \pi)$ (plain blue line). The sum of the plain and dashed blue lines is equal by construction to the black one on the left.

Appendix

(Not intended for publication)

Date: July 12, 2023

A) Data

A).1 Data Sources

We merge an administrative dataset on trade flows by product and country with publicly available data on French household consumption and domestic production. Our data cover the period 1994-2014.

Product-country level imports and exports We obtain trade data from a quasi-exhaustive administrative file collected by the French Customs Office. It provides the yearly values (in euros) and quantities of imports (by country of origin and product) and exports (by country of destination and product) for all trading firms over the period 1994-2014.[28]

Trade flows are classified at the CN 8-digit level (Combined Nomenclature of the EU). The first six digits are identical to the subheading level (6-digit) of the international Harmonized Nomenclature (HS6), and the last two digits are added by the European Commission.[29] We restrict our sample to imports and exports of manufactured goods, around 14,000 product codes.[30]

We use the customs data to construct import and export unit values and calculate the share of imports on consumption by product and country.

[28]Flows with non-EU countries whose value is below 1,000 euros are excluded from the data set. In the case of EU countries, the threshold is larger, varying from 40,000 to 150,000 euros depending on the year. These thresholds leave out a very small proportion of French trade flows.

[29]As an example, CN8 code 18061015 "Cocoa powder, containing added sugar or sweetening matter - Containing no sucrose or containing less than 5% by weight of sucrose (including invert sugar expressed as sucrose) or isoglucose expressed as sucrose" is an extension of HS6 code 18061015 "Cocoa powder, containing added sugar or sweetening matter".

[30]We exclude raw materials (HS01-15, 23, 25-27, 31 and 41) e.g., "Vegetable products", "Mineral products", "Fertilizers" and "Works of art, collector's pieces and antiques", and "Services" (HS97-99). We keep only importers whose main activity falls within NACE Rev-2 codes 10-33. Excluded trade flows are about 5% of the total value of French imports and exports.

Product-level consumption expenditures The yearly value of household consumption is provided by INSEE at the 3-digit level of the COICOP (51 sectors), the United Nations' purpose-based classification of consumption expenditures by households. It is the classification used to build the official Consumer Price Index. Values of household consumption will allow us to measure the share of imported goods in households'consumption and thus the share of expenditures devoted to imported goods in the CPI.

Identification of consumer goods in the import data Our aim is to quantify the contribution of imports to the evolution of French consumer prices. We thus restrict our analysis to imports of consumption goods and we define the set of consumption goods as those goods included in the French CPI.

Implementing this definition requires mapping CN8 codes to products in COICOP classification of which the INSEE provides yearly values of consumption expenditures. There is no direct concordance table from CN8 to COICOP available. We first concord CN8 codes into 6-digit CPA codes (about 3,000 different products) and then we use a concordance table from CPA to COICOP.[31] We keep only those products in the Customs data set that match into COICOP categories (about 4,500 CN8 codes out of a total of 14,000).

By definition, products without a match are classified as imports of intermediate goods. As an example, the CN8 code 61112010, "Babies' garments and clothing accessories, knitted or crocheted: Gloves, mittens and mitts", maps into the COICOP code 03.1.2, "Garments". An example of a CN8 code that has no counterpart in the COICOP classification is 28121011, "Chlorides and chloride oxides".

One important caveat is that some products can be used either for consumption or as inputs, depending on the user (e.g., personal computers). This distinction is impossible to make in the data, and thus our import penetration measure might be overestimated. For COICOP categories that refer to services, we assume imports of consumption goods to be zero (e.g. restaurants).

[31] The CPA is the statistical classification of products by activity used in the European Union. Concordance tables were obtained from the EU statistical website RAMON: $http://ec.europa.eu/eurostat/ramon/relations/index.cfm?TargetUrl = LST_REL$.

Country Categories The Customs data provide information on the country origin of imports allowing us to identify imports from LWCs imports. We follow Bernard et al. [2006] and Auer and Fischer [2010] and classify source countries intro three categories according to their GDP per capita relative to the French GDP per capita. "High-wage countries" are those with GDPpc higher than 75% of the French GDPpc. "Low-wage countries (LWCs)" are those for which the GDPpc lies between 25% and 75% of the French GDPpc. "Very low-wage countries (VLWCs)" includes countries with GDPpc lower than 25% of France's. We look separately at the cases of China and the New European Union member states (NEUMS), the former grouping countries that joined the EU after 2004.[32]
GDPpc ratios are averaged over 1994-2014 and the composition of groups is fixed over time. Table A reports a detailed list of countries by category.

A).2 Construction of Main Variables

We consider that a good i is defined at the CN8 level, and that each CN8-country combination identifies a differentiated variety j of such good i. Denote by $(v_{ijt}, P_{ijt}, Q_{ijt})$ the value, price and quantity of variety j of good i, with $v_{ijt} = P_{ijt}Q_{ijt}$, and with g the country groups defined as above. Ideally, we would like to have data on the values and quantities of domestically produced-goods at the CN8 level. Such data is however not available: for all products i, we observe v_{ijt} and q_{ijt} for all origins j except France. Hence we match the detailed trade data with the sector-level consumption (COICOP classification). Let $v_{it} = \sum_{j\in\Omega_i^J} v_{ijt}$ denote the total value of consumption on good i by French households. We have this information at the COICOP level –that corresponds in our framework to a *sector*. We observe v_{st}, defined as $v_{st} = \sum_{i\in s} v_{it}$.

We construct our variables of interest as follows:

Expenditure shares

- γ_{it}^g is the share of imports from country group g in total imports of good i: $\gamma_{it}^g = \sum_{j\in\Omega_i^g} v_{ijt} / \sum_{j\in\Omega_i^F} v_{ijt}$, where Ω_i^g is the set of imported varieties for good i belonging

[32] Bulgaria, Croatia, Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia, Slovenia

to country group g and Ω_i^F denotes the set of all foreign varieties

- η_{st} is the share of imports in COICOP sector s: $\eta_{st} = \sum_{i \in s} \sum_{j \in \Omega_i^F} v_{ijt}/v_{st}$
- β_t is the share of tradable goods T in total consumption: $\beta_t = \sum_{s \in T} v_{st} / \sum_{\forall s} v_{st}$
- η_t is the share of imports in tradable goods: $\eta_t = \sum_{s \in T} \sum_{i \in s} \sum_{j \in \Omega_i^F} v_{ijt}/v_t$, where v_t represents total consumption expenditures in France.

We scale import values with a uniform 20% distribution margin and apply VAT rates to the import values inclusive of margins (20% applies to most products since January 2014, and 5.5% applies to food products).[33]

Price levels We proxy product-level prices with unit values. We calculate unit values at the product(CN8)-country level, the most disaggregated available, in order to minimize measurement errors arising from heterogeneity at lower levels of disaggregation (still more disaggregated than the six-digit level at which the literature tends to focus). For each variety, we define: $P_{ijt} = v_{ijt}/Q_{ijt}$ where v_{ijt} is the value (in euros) of the imports/exports of good i from country j in a given year t and Q_{ijt} are quantities. The Customs files report two distinct measures for physical quantities: one refers to the weight expressed in kilograms; the other refers to units (for example, number of cars, pairs of shoes...). The first measure is homogeneous and available for all goods but might suffer from measurement issues (see Bergounhon et al. [2018] for a full discussion) whereas the second measure is more accurate but is available only for a rather limited subset of products: the proportion of availability of units versus kilograms is about one to three (as shown in Appendix Table E and Figure C). This proportion is rather stable over time except between 2006 and 2010 where the weight of traded goods was not requested for products where quantities in units were reported (Figure C). Given that we are interested in the macro effect, we choose to use kilogram-based unit values as our baseline measure. We also report the main results using units-based unit values as robustness.

[33] It is the average margin of the retail sector from Andrieux and d'Isanto [2015], inclusive of both transportation and distribution costs. The sample of products covered by Andrieux and d'Isanto [2015] for this calculation is close to the set of tradable goods purchased for consumption purposes we consider. Andrieux and d'Isanto [2015] found some heterogeneity in margin rates across products or type of outlets but we cannot apply different margin rates to different types of outlets or different goods. Overall, these differences are going from 10% in communication products sold in supermarkets to 40% for frozen products sold in specialized outlets.

There is no comprehensive data with domestic prices available. We use two different proxies computed from the Customs data. First, we use French export unit values, as in Emlinger and Fontagné [2013], computed similarly to imports unit values.[34] Second, we use unit values of French imports from high-wage countries. Most of these imports come from euro area countries and we assume here that prices of French firms are not very different from the ones set by firms selling exactly the same goods in neighbouring countries. In this case, we will assume that the price differential between LWC imports and domestic prices is the same as the one between HWC imports and LWC imports. We provide results where we use both of these proxies for domestic prices.

Inflation rates Based on the discussion of Section 2, we build Import Price Indices in the following way. For each country category $g \in \{HWCs, LWCs, VLWCs, NEUMS, China\}$ and product i, we first calculate a price index $P^g_{i,0}$ as a weighted geometric average of unit values, where $t = 0$ is the first year this product is in our sample. Weights $\gamma^g_{ij,t}$ are the share of imports at time t of each product i and country j in total French imports of product i from country-group g: $P^g_{i,0} = \prod_{j\in\Omega^g_i} P_{ij,0}^{\gamma^g_{ij,0}}$. For the remaining years we compute the import price level for product i imported from country group g at time t as: $P^g_{i,t} = P^g_{i,t-1}\pi^g_{i,t}$, with $\pi^g_{i,t} = \prod_{j\in\Omega^g_{i,t-1}}(P_{ij,t})^{\gamma^g_{ij,t-1}} / \prod_{j\in\Omega^g_{i,t-1}}(P_{ij,t-1})^{\gamma^g_{ij,t-1}}$
The total import price level for good i is $P^F_{i,t} = \prod_{\forall g}(P^g_{i,t})^{\gamma^g_{i,t}}$. For each good i, imported inflation is constructed as $\pi^F_{i,t} = \log\left(\frac{P^F_{i,t}}{P^F_{i,t-1}}\right)$.
Then, aggregate import price inflation, π^F_t, is calculated as the weighted average of all products' inflation $\pi^F_{i,t}$. As discussed in Section 3, these indices are exact for Cobb-Douglas preferences and are defined for goods present in both $t-1$ and t ("common goods"). When product-country pairs drop out of the sample we impute a price change equal to the average change of the remaining of the index, as prescribed by the IMF Export and Import Price Index Manual (International Monetary Fund [2009]). As highlighted by Atkeson and Burstein [2008], it is equivalent to excluding these goods at the time they drop from the index and re-normalizing

[34] Importantly, we compare prices by origin at the CN8 level and we assume that the definition of products is sufficiently precise so that varieties within each category i share the same "observed" quality. Hence we compare prices of goods that are observationally equivalent. However, to control for any systematic difference between price levels of French exports and prices of goods produced for the domestic market, we calculate the weighted average of the difference between French exports and imports from HWC of the same goods (this difference is on average positive) and we remove this average from the difference between export prices and LWC imports.

the weights for the remaining goods to sum up to one.

Our index has a correlation coefficient of 0.86 with the monthly import price index for the manufacturing industry, constructed by INSEE with surveys to individual firms starting in 2005, and a high correlation, of 0.55, with the import deflator from the National Accounts, in spite of the fact that such index covers a wider range, including manufacturing, services and extractive industries (the latter increasing the volatility of import inflation). Figure A in Appendix shows the evolution of π_t^F and that of the official indices for 1995-2014 (as we use 1994 as the base year, inflation measures start in 1995).

B) Price indices and inflation decomposition

B).1 Derivation of the inflation decomposition

Starting from P_{it} as defined in (2), and applying $\pi_{it} = \frac{\mathrm{d}\log(P_{it})}{\mathrm{dt}} = \frac{\frac{\mathrm{d}P_{it}}{\mathrm{dt}}}{P_{it}}$ we obtain an expression that can be decomposed as the weighted sum of the inflation rates of individual varieties and the weighted sum of changes in taste parameters:

$$\pi_{it} = \frac{d\log P_{it}}{dt} = \sum_{j\in\Omega_i^J} S_{ijt}\frac{dlogP_{ijt}}{dt} + \frac{1}{(1-\theta)}\sum S_{ijt}\frac{d\log\alpha_{ijt}}{dt} \tag{24}$$

where S_{ijt} is the share of variety j in total expenditures on good i, i.e. $S_{ijt} = \frac{v_{ijt}}{v_{it}} = \frac{Q_{ijt}P_{ijt}}{Q_{it}P_{it}} = \alpha_{ijt}\frac{P_{ijt}^{1-\theta}}{P_{it}^{1-\theta}}$. Grouping varieties by origin with superscripts D and F referring respectively to domestic and foreign varieties, inflation for good i can be written as:

$$\pi_{it} = \eta_{it}^D\frac{d\log P_{it}^D}{dt} + \eta_{it}^F\frac{d\log P_{it}^F}{dt} + \frac{1}{(1-\theta)}\left(\eta_{it}^D\frac{d\log\alpha_{it}^D}{dt} + \eta_{it}^F\frac{d\log\alpha_{it}^F}{dt}\right) \tag{25}$$

where

- $\alpha_{it}^F = \sum_{j\in\Omega_i^F}\alpha_{ijt}$. Ω_i^F denotes the set of foreign varieties for good i
- P_{it}^F is the price index of imports of good i, defined as $P_{it}^F = \left[\sum_{j\in\Omega_i^F}\frac{\alpha_{ijt}}{\alpha_{it}^F}P_{ijt}^{1-\theta}\right]^{\frac{1}{1-\theta}}$
- $\eta_{it}^F = \alpha_{it}^F\left(\frac{P_{it}^F}{P_{it}}\right)^{1-\theta}$ is the share of foreign varieties in domestic consumption of good i. It equals the sum of the expenditure share of each variety $j\in\Omega_i^F$: $\eta_{it}^F = \sum_{j\in\Omega_i^F}S_{ijt}$.

In turn, equation (25) is equivalent to:

$$\pi_{it} = \eta_{it}^D \pi_{it}^D + \eta_{it}^F \pi_{it}^F + \frac{1}{(1-\sigma)} \left(\frac{\eta_{it}^D}{\alpha_{it}^D} \frac{d\alpha_{it}^D}{dt} + \frac{\eta_{it}^F}{\alpha_{it}^F} \frac{d\alpha_{it}^F}{dt} \right) \tag{26}$$

Noting that $\frac{\eta_{it}^D}{\alpha_{it}^D} = \left(\frac{P_{it}^D}{P_{it}} \right)^{1-\theta}$ and $\frac{d\alpha_{it}^D}{dt} = -\frac{d\alpha_{it}^F}{dt}$ (by construction), then equation (26) can be rewritten as equation (3) in the main text.

B).2 Divisia index versus Sato-Vartia

We rely on Divisia price indices that are defined in continuous time. In practice, data are only collected at discrete intervals. The Divisia price index must be approximated by a discrete price index. Typically for France and other EU countries, national statistical agencies follow the Eurostat guidance and use the chained Laspeyres index, which are close to the Divisia index, thereby making our approach compatible with the empirical counterpart, the harmonised index of consumer prices (HICP).

An alternative approach would be to use discrete price indices, an option that we discuss now. Given the CES demand system, there exists an exact solution for inflation derived from the Sato-Vartia price index. Let inflation be defined as $\pi_{it} = \log \left(\frac{P_{it}}{P_{it-1}} \right)$. It can be written as:

$$\pi_{it} = \log \left(\frac{P_{it}}{P_{it-1}} \right) = \sum_{j \in \{D,F\}} \omega_{ijt} \log \left(\frac{P_{ijt}}{P_{ijt-1}} \right) + \frac{1}{1-\theta} \sum_{j \in \{D,F\}} \omega_{ijt} \ln \left(\frac{\alpha_{ijt}}{\alpha_{ijt-1}} \right) \tag{27}$$

where ω_{ijt} is the Sato-Vartia weight: $\omega_{ijt} = \frac{\frac{S_{i,j,t} - S_{i,j,t-1}}{\log(S_{i,j,t}) - \log(S_{i,j,t-1})}}{\sum_j \left(\frac{S_{i,j,t} - S_{i,j,t-1}}{\log(S_{i,j,t}) - \log(S_{i,j,t-1})} \right)}$.

The Sato-Vartia price index allows for decomposing inflation into two terms that parallel the formula in equation (3): *(i)* a weighted average of price changes and *(ii)* a weighted average of relative taste changes. Importantly, the weights are different from the ones in the Divisia index (and in our empirical counterpart, the chained Laspeyres) and are based on logarithmic weights. The Sato-Vartia approach has a major advantage, namely it provides an exact price index in discrete time given our system of preferences. But this goes with a pitfall: the weighted average of price changes is not comparable to any actual price index computed by statistical agencies.

Redding and Weinstein [2020] pursue one step further the decomposition of inflation and show that it includes a pure price channel, which is the *non-weighted* geometric average of individual prices and an expenditure share channel which is the *non-weighted* geometric average of market shares. Following the steps of their demonstration, the price index of good i can be written as $P_{it} = P_{ijt}\alpha_{ijt}^{\frac{1}{1-\theta}} S_{ijt}^{\frac{1}{1-\theta}}, \forall j$. Thus: $\frac{P_{i,t}}{P_{i,t-1}} = \frac{P_{i,j,t}}{P_{i,j,t-1}} \left(\frac{\alpha_{i,j,t}}{\alpha_{i,j,t-1}}\right)^{\frac{1}{1-\theta}} \left(\frac{S_{i,j,t}}{S_{i,j,t-1}}\right)^{\frac{1}{1-\theta}}$.

This holds true for all j, hence:

$$\prod_{j\in\Omega_i^J} \frac{P_{i,t}}{P_{i,t-1}} = \prod_j \left(\frac{P_{i,j,t}}{P_{i,j,t-1}} \left(\frac{\alpha_{i,j,t}}{\alpha_{i,j,t-1}}\right)^{\frac{1}{1-\theta}} \left(\frac{S_{i,j,t}}{S_{i,j,t-1}}\right)^{\frac{1}{1-\theta}}\right) \tag{28}$$

By definition: $\prod_j \left(\frac{\alpha_{i,j,t}}{\alpha_{i,j,t-1}}\right) = 1$ because $\sum_j d\log \alpha_{i,j,t} = 0$.

The equation becomes:

$$\frac{P_{i,t}}{P_{i,t-1}} = \underbrace{\left(\prod_{j\in\Omega_i^J} \frac{P_{i,j,t}}{P_{i,j,t-1}}\right)^{\frac{1}{N_i}}}_{\text{Jevons index}} \left(\prod_{j\in\Omega_i^J} \left(\frac{S_{i,j,t}}{S_{i,j,t-1}}\right)^{\frac{1}{1-\theta}}\right)^{\frac{1}{N_i}} \tag{29}$$

The first term is the Jevons price index. The authors argue that this is the standard price index used by statistical agencies at the finest level of aggregation to construct the CPI. However, in our case the Jevons index is not well-suited because our level of data agregation (CN8 level) is higher than what statistical agencies generally use. The geometric Laspeyres, which is the empirical counterpart of the Divisia index, better represents the INSEE methodology.

B).3 Derivation of domestic inflation as a function of imported intermediate inputs

In this Appendix we present the derivations of the formulas in Section 4.2. Assume that production requires a combination of domestic and imported intermediates, given by:

$$x_{st}^{\frac{\theta_I-1}{\theta_I}} = \left[x_{st}^{D\,\frac{\theta_I-1}{\theta_I}} + x_{st}^{F\,\frac{\theta_I-1}{\theta_I}}\right] \tag{30}$$

θ_I is the constant elasticity of substitution between any two varieties of intermediate good

i. The price of the intermediate goods' bundle x_{st} is:

$$P_{Ist} = \left[P_{Ist}^{D\ 1-\theta_I} + P_{Ist}^{F\ 1-\theta_I} \right]^{\frac{1}{1-\theta_I}} \tag{31}$$

Defining $\pi_{it} = \frac{\frac{\mathrm{d}P_{it}}{\mathrm{d}t}}{P_{it}}$ we obtain Equation (10) in the main text.

P_{Ist}^F is the weighted average of prices P_{Iit}^F of all intermediate inputs imported by sector s. We define the price index for intermediate goods P_{Iit}^F in an analogous way to P_{it}^F:

$$P_{Iit}^F = \left[\alpha_{Iit}^L P_{Iit}^{L\ 1-\theta_I} + \alpha_{Iit}^H P_{Iit}^{H\ 1-\theta_I} \right]^{\frac{1}{1-\theta_I}} \tag{32}$$

where $\alpha_{iIt}^L = \sum_{j\in\Omega_i^L} \alpha_{ijt}$ and Ω_i^L are the subset of imported intermediate varieties of good i originated in low-wage countries, P_{it}^L is equal to $\left[\sum_{j\in\Omega_i^L} \frac{\alpha_{Iijt}}{\alpha_{Iit}^L} P_{Iijt}^{1-\theta}\right]^{\frac{1}{1-\theta}}$, and the same definitions apply to inputs indexed with superscript H, which originate in high-wage countries. We assume $\alpha_{it}^L + \alpha_{it}^F = 1$.

From (32) we compute $\pi_{Iit}^F = \frac{\frac{\mathrm{d}P_{Iit}^F}{\mathrm{d}t}}{P_{Iit}^F}$.

To solve the system, we write it in matrix form. Call Λ_D the $S \times S$ matrix of production interlinkages for domestic inputs, $\Lambda_D = [\phi_{ks}(1-a_k)(1-\eta_{Ikt})]$ and Λ_M the $S \times S$ matrix of production interlinkages for imported inputs, $\Lambda_F = [\phi_{ks}(1-a_k)\eta_{Ikt}]$. Collect sector-level input inflation rates in $\pi_I^D = [\pi_{st}^D]$ and $\pi_I^F = [\pi_{st}^F]$, which are $S \times 1$ vectors. We thus can write the system as: $\pi^D = \Lambda_D \times \pi^D + \Lambda_F \times \pi^F$. Solving the system, we obtain a matrix expression in which the vector of domestic input inflation is a function of imported input inflation:

$$\pi_I^D = (1-\Lambda_D)^{-1} \times \Lambda_F \times \pi_I^F \tag{33}$$

π_I^D is a $S \times 1$ vector of inflation rates of intermediate goods by sector, of which the s element is π_{Ist}^D. We need to insert the solution for each sector s and time period t, π_{Ist}^D, into (10) and in turn into (8) to compute domestic inflation rates by sector, π_{st}^D. Final good consumer domestic inflation in sector s is:

$$\pi_{st}^D = (1-a_s)\left[(1-\eta_{Ist})\pi_{Ist}^D + \eta_{Iit}\pi_{Iit}^F\right] \tag{34}$$

We can also use the structure of Equation (14) to provide the contributions of both the price and substitution channels. We aggregate each component of π^F_{ist} to the sector level using the weight of each product in total imports in sector s (i.e. w_{ist}). Thus, we can replace the $S \times 1$ dimensional vector π^F_I with and $S \times 2$ matrix Ψ^F with each column corresponding to one of the two terms (ie pure price and substitution) of π^F_{ist} detailed in (14):

$$\pi^D_I = (1 - \Lambda_D)^{-1} \times \Lambda_F \times \Psi^F \tag{35}$$

The solution of (35) is a $S \times 2$ matrix that provides domestic input inflation as a function of both components of the contribution of LWCs to imported input inflation.

B).4 Cobb-Douglas demand structure

The general case relies on a CES aggregation of different varieties j of a given product i, as expressed in equation (1). This definition holds $\forall \theta > 1$. As $\theta \to 1$, the Dixit-Stiglitz aggretor boils down to the Cobb-Douglas case. Typically as the elasticity of substitution tends to one, equation (1) becomes equivalent to $Q_{it} = \prod_{j \in \Omega^J_i} Q_{ijt}^{\alpha_{ijt}}$, with $\sum_{j \in \Omega^J_i} \alpha_{ijt} = 1$ and Ω^J_i represents the set of all varieties for good i.

The Cobb-Douglas demand structure has the particular feature that α_{ijt} equals the expenditure share on variety j of good i at time t, so it is directly observable in the data.

The price index of tradable good i is $P_{it} = \prod_{j \in \Omega^J_i} P_{ijt}^{\alpha_{ijt}}$. Denoting Ω^F_i the set of foreign varieties for good i, the share of imports in total consumption of i is $\eta_{it} = \sum_{j \in \Omega^F_i} \alpha_{ijt}$. Writing log prices with small letters, we have: $p^T_{it} = (1 - \eta_{it}) p^D_{it} + \eta_{it} p^F_{it}$, where superscripts D and F refer to domestic and foreign varieties, and the price index of imports of good i is $p^F_{it} = \sum_{j \in \Omega^F_i} \frac{\alpha_{ijt}}{\eta_{it}} p_{ijt}$.

The rate of change of the price index p_{it} is denoted $\pi_{it} = \frac{dp_{it}}{dt}$. It can be decomposed as:

$$\pi_{it} = \pi^D_{it} + \eta_{it} \left(\pi^F_{it} - \pi^D_{it} \right) + \frac{d\eta_{it}}{dt} \left(p^F_{it} - p^D_{it} \right). \tag{36}$$

This is analog to equation (3), with a decomposition of π_{it} into a pure price term, $\pi^D_{it} + \eta_{it} \left(\pi^F_{it} - \pi^D_{it} \right)$, and a taste shock, $\frac{d\eta_{it}}{dt} \left(p^F_{it} - p^D_{it} \right)$.

The price index of imported varieties, p_{it}^F, can in turn be expressed as the combination of prices of varieties originated in low-wage and high-wage countries (respectively denoted L and H), with γ_{it} representing the share of LWC varieties in total imports of good i, just as equation (4) in the main text: $p_{it}^F = (1-\gamma_{it})p_{it}^H + \gamma_{it}p_{it}^{LWC}$.[35]

Combining expressions for p_{it} and p_{it}^F and rearranging, we obtain:

$$\begin{aligned}\pi_{it} &= (1-\eta_{it})\pi_{it}^D + \eta_{it}\pi_{it}^{HWC} + \eta_{it}\gamma_{it}\left(\pi_{it}^L - \pi_{it}^H\right) \\ &+\eta_{it}\left[\frac{d\gamma_{it}}{dt}(p_{it}^L - p_{it}^H)\right] + \frac{d\eta_{it}}{dt}\gamma_{it}\left(p_{it}^L - p_{it}^D\right) + (1-\gamma_{it})\frac{d\eta_{it}}{dt}\left(p_{it}^H - p_{it}^D\right)\end{aligned} \tag{37}$$

The interest of assuming a Cobb-Douglas structure is that the decomposition of π_{it} in (37) allows a clean quantification of the pure price and taste shift channels. The difference between the welfare-consistent and the pure price index is $\eta_{it}\left[\frac{d\gamma_{it}}{dt}(p_{it}^L - p_{it}^H)\right] + \frac{d\eta_{it}}{dt}\gamma_{it}\left(p_{it}^L - p_{it}^D\right) + (1-\gamma_{it})\frac{d\eta_{it}}{dt}\left(p_{it}^H - p_{it}^D\right)$, which represents the contribution of consumer switching expenditures from relatively more expensive products to cheaper ones. This is equivalent to the *substitution bias* described by Boskin et al. [1996] and Boskin et al. [1998].

Similarly, the contribution of imported intermediate inputs from LWCs and HWCs can also be derived under Cobb-Douglas preferences, corresponding to the degenerated case $\theta_I \to 1$. The analog of equation (14) then becomes:

$$\pi_{Iit}^F = \gamma_{Iit}^L\left(\pi_{Iit}^L - \pi_{Iit}^H\right) + \frac{d\alpha_{Iit}^L}{dt}\left[p_{Iit}^L - p_{Iit}^H\right].$$

B).5 Derivation of the contribution of taste shocks within imports

Using the definition of P_{it}^F from equation (4) we can express inflation of product i as:

$$\pi_{it}^F = \gamma_{it}\pi_{it}^L + (1-\gamma_{it})\pi_{it}^H + \frac{1}{1-\theta}\left[\left(\frac{P_{it}^L}{P_{it}^F}\right)^{1-\theta} - \left(\frac{P_{it}^H}{P_{it}^F}\right)^{1-\theta}\right]\frac{d\tilde{\alpha}_{it}^L}{dt} \tag{38}$$

Note that $\tilde{\alpha}_{it}^L + \tilde{\alpha}_{it}^H = 1$ so that these appeal parameters measure relative preferences across

[35] Denoting $\Omega_i^{LWC} \subset \Omega_i^F$ the subset of imported varieties originated in low-wage countries: $\gamma_{it} = \sum_{j\in\Omega_i^{LWC}} \frac{\alpha_{ijt}}{\eta_{it}}$ and $p_{it}^{LWC} = \sum_{j\in\Omega_i^{LWC}} \frac{\alpha_{ijt}}{\gamma_{it}\eta_{it}} p_{ijt}$. Similarly $p_{it}^{HWC} = \sum_{j\in\Omega_i^{HWC}} \frac{\alpha_{ijt}}{(1-\gamma_{it})\eta_{it}} p_{ijt}$, with $(1-\gamma_{it}) = \sum_{j\in\Omega_i^{HWC}} \frac{\alpha_{ijt}}{\eta_{it}}$.

origins. Using the fact that $\tilde{\alpha}_{it}^{H} = 1 - \tilde{\alpha}_{it}^{L}$ we can express the taste parameter as a function of unadjusted relative prices and expenditures shares:

$$\tilde{\alpha}_{it}^{L} = \frac{\left(\frac{P_{it}^{L}}{P_{it}^{H}}\right)^{\theta_i - 1} \frac{\gamma_{it}}{1-\gamma_{it}}}{1 + \left(\frac{P_{it}^{L}}{P_{it}^{H}}\right)^{\theta_i - 1} \frac{\gamma_{it}}{1-\gamma_{it}}} \tag{39}$$

C) Additional Tables and Figures

Table A: List of Countries by Country Categories

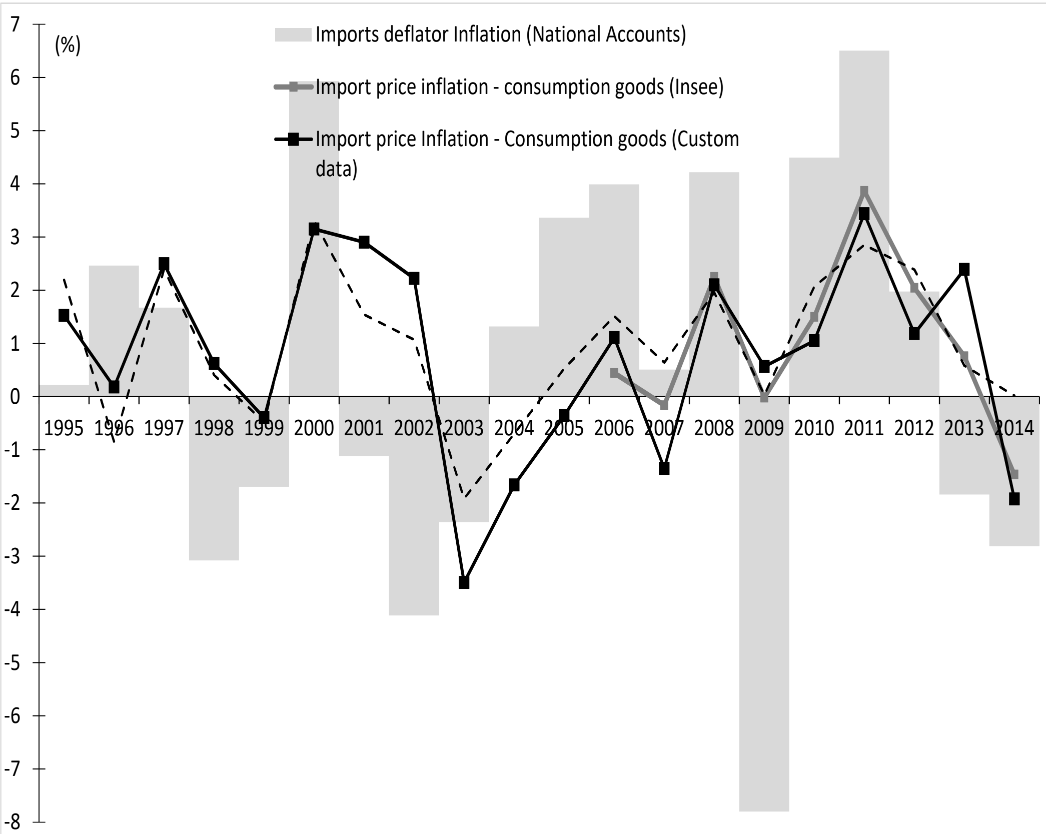
Group of countries	
High-wage countries	GDP per capita above 75% of France's: EU countries, US, Canada, UK, Japan,South Korea, Australia, New Zealand, Israel...
Low-wage countries	GDP per capita between 25% and 75% of France's
- New EU member states	Bulgaria, Croatia, Cyprus, Czech, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia, Slovenia
- Other low-wage countries	Turkey, Brazil, Mexico, Malaysia, Russia, Argentina,...
Very low-wage countries	GDP per capita below 25% of France's
- China (including Hong-Kong)	
- Other Very low wage countries	India, Thailand, Tunisia, Morocco, Indonesia, Philippines, Vietnam, Egypt, Pakistan, Ukraine, Ivory Coast,...

Table B: Contribution of LWC Imports to Import Price Inflation: an International Comparison

Country	Period	Impact of LWC imports on import inflation	Source
France	1995-2005	-0.48 pp	This study
Austria	1995-2005	-0.66 pp	Glatzer et al. [2006]
Finland	1996-2005	-1 pp	Bank of Finland [2006]
Portugal	1998-2006	-0.2 pp	Cardoso and Esteves [2008]
Sweden	1996-2004	-1 to -2 pp	Sveriges Riksbank [2005]
United States	1993-2002	-0.8 to -1 pp	Kamin et al. [2006]
France	2000-2005	-0.74 pp	This study
United Kingdom	2000-2005	-0.7 pp	Mac Coille [2008]

Note: this table reports estimates of the contribution of LWC imports to import price inflation in different countries. These estimates are obtained using a very similar methodology presented in section 3 and correspond to our "imported inflation effect" (Channel 2). Differences in methodologies may come from the definitions of country categories and also from the level of product disaggregation. Results presented for France are calculated over two different periods (1995-2005) and (2000-2005) to facilitate cross country comparisons.

Figure A: Comparison between Import Price Indices



Note: the figure plots in dark grey line the annual variation of import price inflation for industrial goods (source: Insee - aggregate monthly series of import price index), in grey histogram the annual variation of the import deflator for manufactured goods including mining and quarrying (source Insee - annual national accounts) and in black lines, annual variations of our import price index computed using trade unit values and price indices by product and country categories (see section 3.2). The black dashed line corresponds to import inflation including all goods whereas the black line corresponds to import inflation only for consumption goods.

Table C: Inter-linkages coefficients from the ICIO Tables, 1994-2014 averages

ISIC codes		η_{Iit} Mean	$1 - a_s$ Mean	% Consumption Mean	Direct imports?
	Extractive				
01 - 02	Crop and animal production, hunting, forestry	0.17	0.58	0.03	Yes
3	Fishing and aquaculture	0.20	0.53	0.00	Yes
05 - 06	Coal, lignite, extraction of crude petroleum and gas	0.12	0.41	0.00	Yes
07 - 08	Mining of metal ores and Other mining	0.23	0.58	0.00	Yes
9	Mining support service activities	0.21	0.26	0.00	No
	Mean	**0.19**	**0.47**	**0.01**	
	Manufacturing				
10 - 12	Manufacture of food products, beverages or tobacco products	0.12	0.73	0.10	Yes
13 - 15	Manufacture of textiles, wearing apparel, leather and related products	0.29	0.65	0.01	Yes
16	Manufacture of wood and of products of wood and cork; except furniture	0.16	0.68	0.00	Yes
17 - 18	Manufacture of paper and paper products — Printing	0.23	0.64	0.00	Yes
19	Manufacture of coke and refined petroleum products	0.67	0.87	0.02	Yes
20	Manufacture of chemicals and chemical products	0.27	0.68	0.01	Yes
21	Manufacture of basic pharmaceutical products and pharmaceutical preparations	0.23	0.48	0.00	Yes
22	Manufacture of rubber and plastics products	0.30	0.56	0.01	Yes
23	Manufacture of other non-metallic mineral products	0.17	0.62	0.00	Yes
24	Manufacture of basic metals	0.30	0.76	0.00	Yes
25	Manufacture of fabricated metal products; except machinery and equipment	0.26	0.59	0.00	Yes
26	Manufacture of computer; electronic and optical products	0.33	0.54	0.00	Yes
27	Manufacture of electrical equipment	0.33	0.61	0.00	Yes
28	Manufacture of machinery and equipment n.e.c.	0.29	0.65	0.00	Yes
29	Manufacture of motor vehicles; trailers and semi-trailers	0.33	0.70	0.02	Yes
30	Manufacture of other transport equipment	0.40	0.71	0.00	Yes
31 - 33	Manufacture of furniture	0.24	0.56	0.01	Yes
	Mean	**0.29**	**0.65**	**0.01**	

Note: The Table presents the value of the share of inputs that is purchased from abroad (η_{Iit}) calculated as the sum of all import origins, the share of input expenditure in total output (a_s), the share of each sector in total consumption expenditures and whether there are HS6 codes that map into the sectors. All values are calculated as simple averages for 1994-2014. ICIO sectors are a combination of ISIC Rev4 4-digit sectors. ICIO sectors merge several ISIC codes as mentioned in the first column. This part of the Table focuses on ISIC sectors 01-33. The data source is ICIO Tables from OECD.

Table D: Inter-linkages coefficients from the ICIO Tables, 1994-2014 averages (ctd)

ISIC codes		η_{Iit} Mean	$1 - a_s$ Mean	% Consumption Mean	Direct imports?
	Other Sectors				
35	Electricity; gas; steam and air conditioning supply	0.24	0.53	0.04	Yes
36 - 39	Water collection — Sewerage — Remediation activities	0.14	0.57	0.01	Yes
41 - 43	Construction	0.15	0.57	0.01	No
45 - 47	Wholesale and retail trade and repair of motor vehicles and motorcycles	0.12	0.44	0.15	No
49	Land transport and transport via pipelines	0.13	0.46	0.02	No
50	Water transport	0.19	0.82	0.00	No
51	Air transport	0.21	0.65	0.00	No
52	Warehousing and support activities for transportation	0.13	0.47	0.01	No
53	Postal and courier activities	0.11	0.30	0.00	No
55 - 56	Accommodation — Food and beverage service activities	0.11	0.46	0.06	No
58 - 60	Publishing activities — Motion picture — Programming and broadcasting activities	0.14	0.53	0.02	No
61	Telecommunications	0.12	0.43	0.03	Yes
62- 63	Computer programming — Information services	0.12	0.33	0.00	No
64 -66	Financial services — Insurance	0.08	0.58	0.06	No
68	Real estate	0.06	0.18	0.23	No
69 - 75	Legal — Architectural — Research — Advertising — Veterinary	0.11	0.46	0.01	No
77 - 82	Rental and leasing — Employment — Travel — Security — Office	0.11	0.38	0.01	No
84	Public administration and defence	0.15	0,25	0.01	No
85	Education	0.10	0,17	0.01	No
86- 88	Human health activities — Residential care activities	0.17	0,22	0.05	No
90 - 93	Creative; arts and entertainment activities	0.12	0,42	0.02	No
94 - 96	Repair of computers and personal and household goods	0.13	0.33	0.02	No
	Mean	**0.20**	**0.52**	**0.02**	

Note: The Table presents the value of the share of inputs that is purchased from abroad (η_{Iit}) calculated as the sum of all import origins, the share of input expenditure in total output (a_s), the share of each sector in total consumption expenditures and whether there are HS6 codes that map into the sectors. All values are calculated as simple averages for 1994-2014. ICIO sectors are a combination of ISIC Rev4 4-digit sectors. ICIO sectors merge several ISIC codes as mentioned in the first column. This part of the Table focuses on ISIC sectors 34-96 which we call “Services”. The data source is ICIO Tables from OECD.

D) Appendix - Units-based vs. Kilograms-based Unit Values

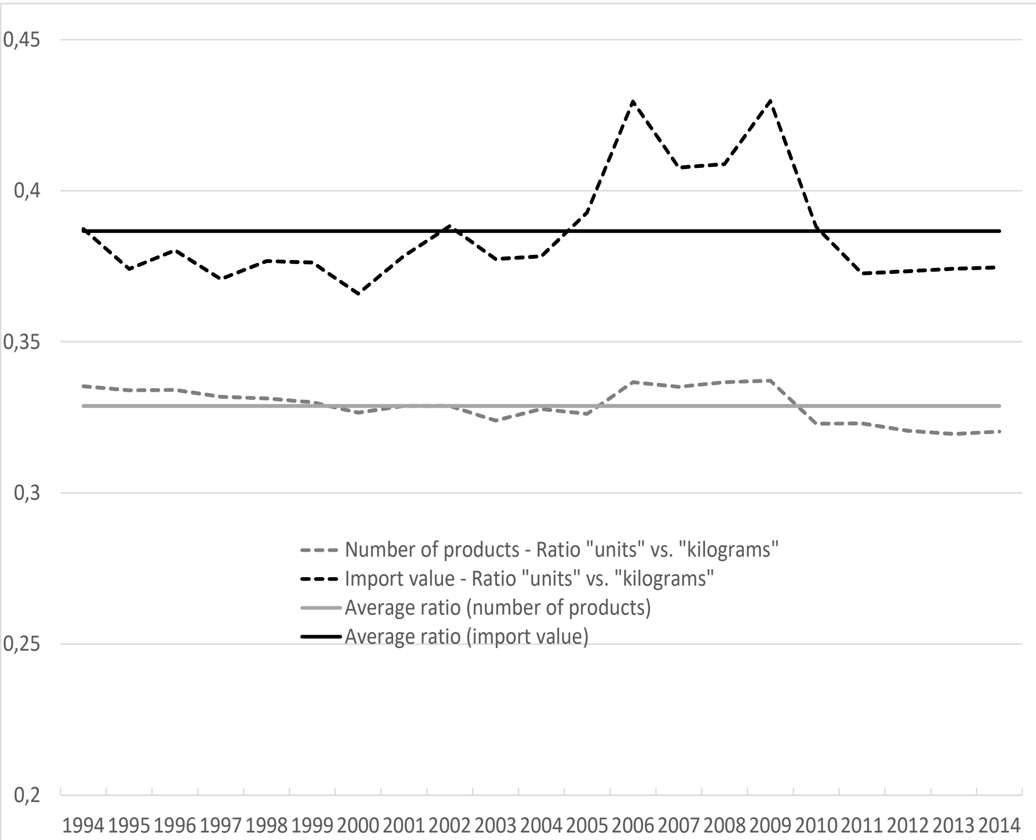
In this section, we provide detailed results for the case where instead of kilograms we use units to construct unit values at the product level. In our baseline exercise, we calculate unit values by dividing the import values by quantities measured in kilograms. Firms are not required to provide quantities in units since mid-1990s but quantities in kilograms. However, many firms continue to provide both measures of quantities in kilograms and units. In this appendix, we first document the share of imports where the quantitities are reported in units and we also provide results using the subset of products for which quantities in units are available.

Table E: Ratio of the number of products (and import values) - units vs. kilograms

	Ratios "units vs. kgs"	
	Number of products	Import value
All	0.33	0.39
Consumption goods	0.43	0.45
Non-consumption goods	0.26	0.36
By country of origin		
Very LWC (excl. China)	0.49	0.70
China	0.46	0.64
Other LWC (excl. NEMS)	0.44	0.62
NEMS	0.49	0.61
HWC	0.39	0.36

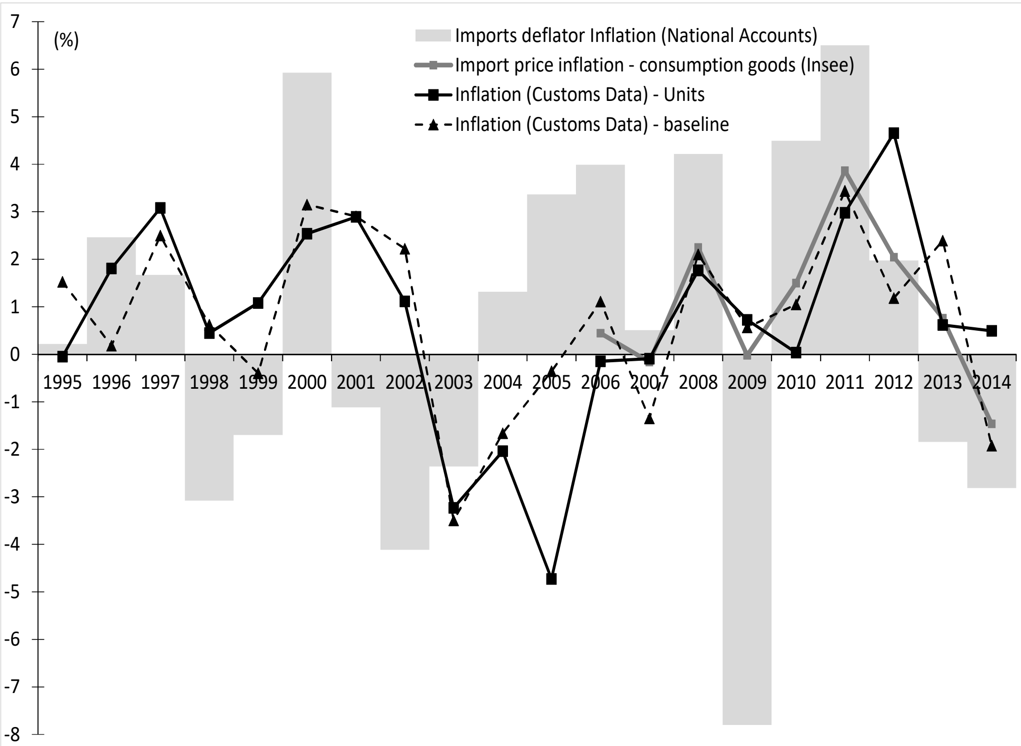
Note: In the first column, we report the ratio between the number of products for which quantities in units are available and the number of products for which quantities are reported in kilograms. In the second column, we report the same ratio but calculated with import values instead the number of products. We have computed these ratios for all products and country of origins but also by type of goods (Consumption or non-comnsumption goods) and by groups of country of origin. All the ratios are calculated on average over the sample period 1994-2014.

Figure B: Ratio of the number of products (and import values) - units vs. kilograms - by year



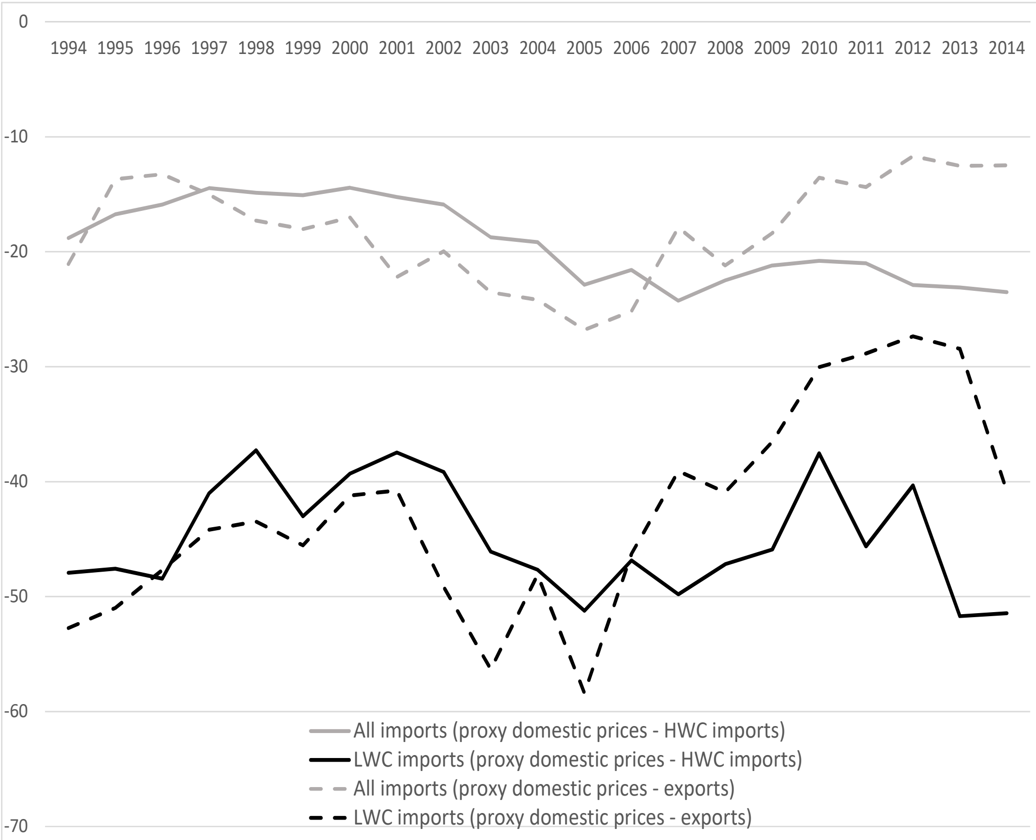
Note: the grey lines plot the ratio between the number of products for which quantities in units are available and the number of products for which quantities are reported in kilograms (on average (solid line) and by year (dashed line)). the black lines plot the same ratio but calculated with import values instead the number of products (on average (solid line) and by year (dashed line)).

Figure C: Comparison between Import Price Indices



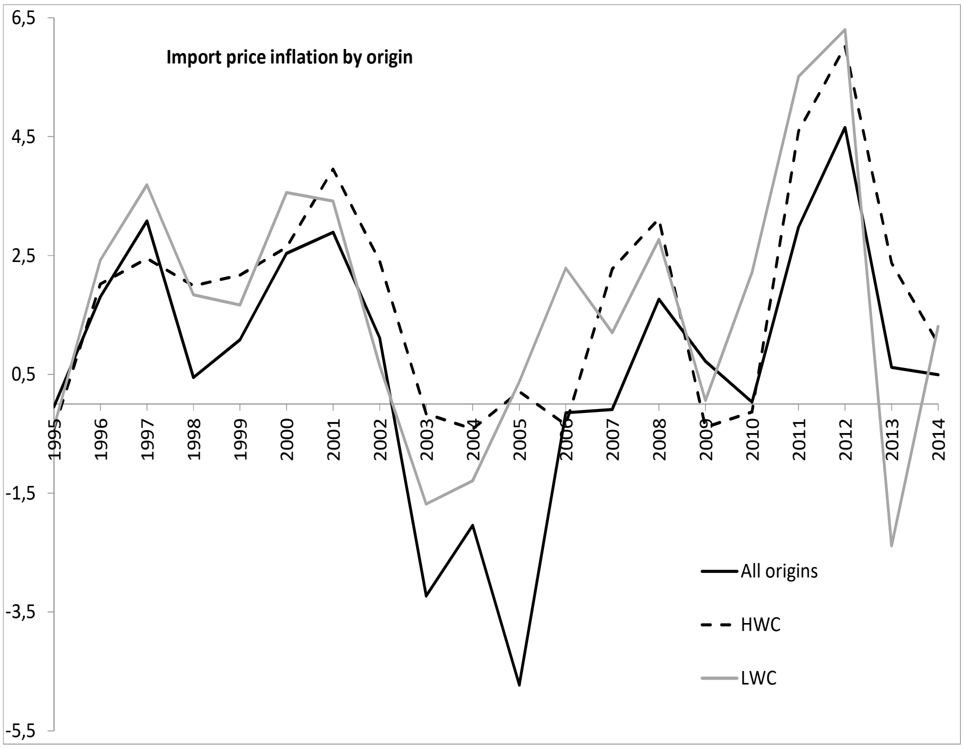
Note: the figure plots in dark grey line the annual variation of import price inflation for industrial goods (source: Insee - aggregate monthly series of import price index), in grey histogram the annual variation of the import deflator for manufactured goods including mining and quarrying (source Insee - annual national accounts) and in black lines, annual variations of our import price index computed using trade unit values and price indices by product and country categories. The black dashed line corresponds to import inflation for consumption goods using units instead of kilograms to compute unit values whereas the black solid line corresponds to import inflation for consumption goods using kilograms to compute the unit values at the product level.

Figure D: Price of Domestically Produced Goods Relative to Prices of Imported Goods (Consumer Goods)



Note: On this graph, all units values have been calculated from quantities measured in units (instead of kilograms as in our baseline). We first compute the price differential (in a given year) at the level 8 of the trade product classification (HS classification) between import unit values and two measures of united values considered as equivalent to the domestic producer price: the first one uses the unit values of imports from high-wage countries (solid lines) and the second one uses the unit values of French exports (dashed lines), export unit values have been normalized so that on average the price differential between French export prices and HWC imports is null. The figure reports the weighted average of this price differential. The black line corresponds to the price differential between unit values of LWC imports and unit values equivalent of domestic prices, the grey line corresponds to the average using price differential between unit values of imports from all origins and unit values equivalent of domestic prices.

Figure E: Import Price Inflation Differential: High-Wage vs. Low-Wage Countries



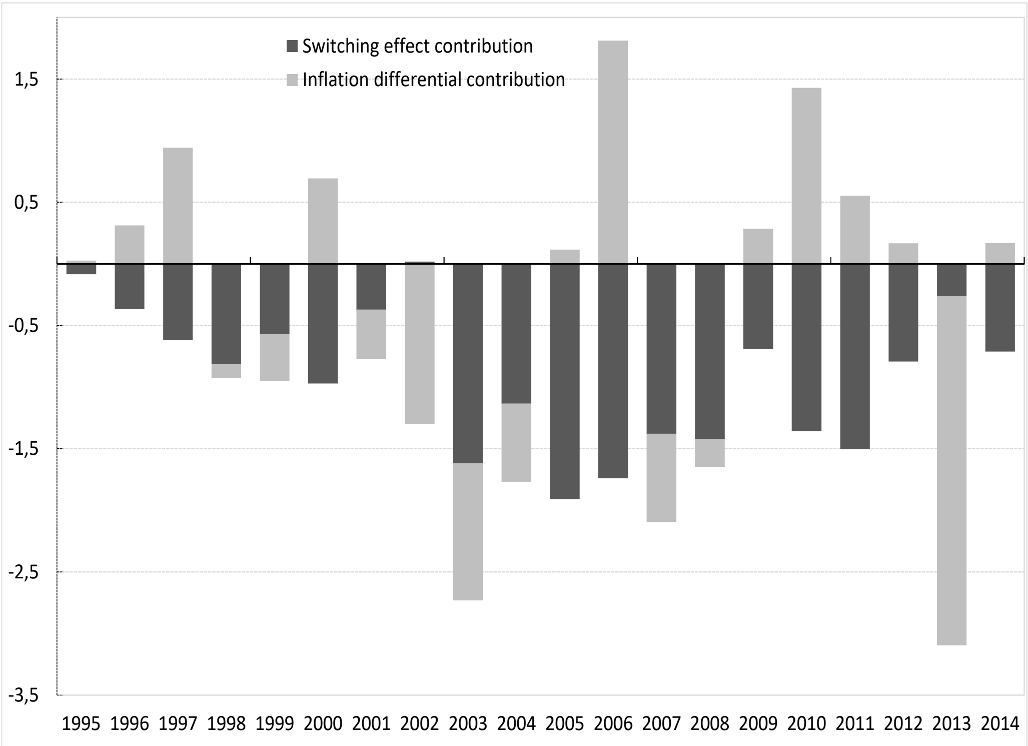
Note: on this graph, all units values are calculated from quantities measured in units (instead of kilograms as in our baseline). The figure plots the y-o-y inflation rate of two components of the overall French import price inflation (the solid black line). The solid light-grey line is the import price inflation for goods produced in LWCs while the dashed black line corresponds to goods imported from HWCs. Note that overall import price inflation might be lower than the weighted average of the two components because a switching effect is also at play, and the weight of LWCs (with lower import prices in *level*) increase to the detriment of HWCs.

Table F: Contribution to domestic inflation of imported inputs from LWCs (percentage points, units-base UVs.)

	All	**Manufacturing**	**Other**
Total Contribution	-0.035	-0.096	-0.007
Pure Price	-0.000	-0.000	0.000
Substitution	-0.035	-0.096	-0.007
Weight (expenditure)		0.31	0.69

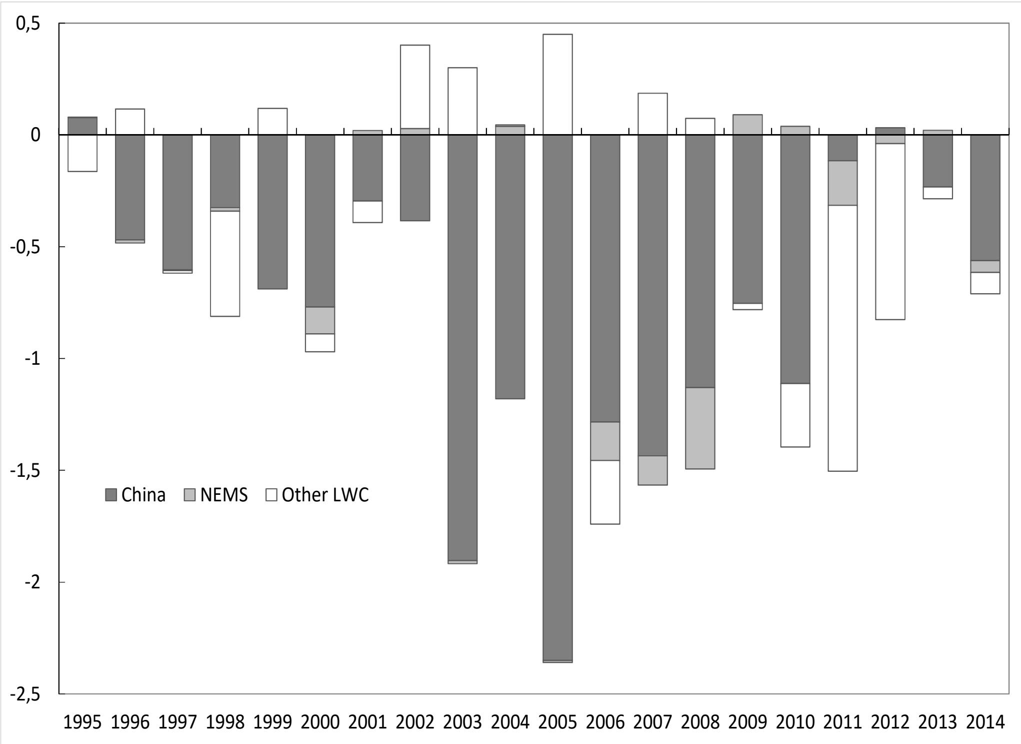
Note: The table presents the contribution of imports from LWCs to domestic inflation, expressed in percentage points, calculated using Equation (35). To aggregate the results, for each year, we first compute the weighted average across ISIC sectors using the share of each ISIC sector in total consumption from the ICIO tables. We then compute a simple average across years. "Total Contribution" provides the contribution as explicitly in Equation (14), imposing $\theta == 1$. "Pure Price" and " Substitution" measure respectively the values of the first and second terms in Equation (14).The column "Manufacturing" includes ISIC 2-digit industries 10 to 33. The column "Other" includes ISIC 2-digit industries 35 to 96 (see Appendix Tables C and D for more details).

Figure F: Contribution to Import Price Inflation: Taste shocks vs Inflation Differential Effects



Note: On this graph, all units values have been calculated from quantities measured in units (instead of kilograms as in our baseline). We first calculate for each year and each product (restricting to consumer goods) the impact of LWC imports on import price inflation. We distinguish the impact coming from a variation of the share of LWC imports in total imports (taste shocks) and the impact coming from differences in inflation between LWC and HWC imports (called inflation differential effect). The figure plots the weighted average contribution of LWC imports on French import inflation and distinguish between taste shocks (black histogram) and inflation differential effect (grey histogram) contributions. The overall impact of LWC imports on French import inflation is obtained as the sum of both histograms in a given year.

Figure G: Taste-shock Contribution to Import Inflation: Country Category Decomposition



Note: On this graph, all units values have been calculated from quantities measured in units (instead of kilograms as in our baseline). We first calculate the contribution of LWC imports due to variations in the share of LWC imports in total imports by country category. The figure plots the weighted average contribution of LWC imports on French import inflation due to taste shock by country category. The dark grey histogram plots the taste-shock contribution due to the Chinese imports, the light grey histogram plots the taste-shock contribution due to NEUMS imports, the white histogram plots the contribution of taste shocks due to all other LWC imports (obtained as the sum of taste shocks due the other LWC imports and other VLWC imports). The overall taste-shock effect of LWC imports on French import inflation is obtained as the sum of all three histograms in a given year.

Table G: Average Values of Main Variables (1994-2014) and Main Results

Pure Price effects

	Imported inflation			
	$\beta\eta$	$\gamma\,(\pi^{LWC} - \pi^{HWC})$		Contrib CPI
All LWC	0.15	-0.06		-0.009
China only	0.15	-0.15		-0.022
	Domestic inflation			
	$1 - \beta\eta$			Contrib CPI
All LWC	0.85	-0.035		-0.029

Taste-shock effects

	Imported Inflation			
	$\beta\eta$	$\frac{\partial\gamma_t}{\partial t}(p^{LWC} - p^{HWC})$		Contrib CPI
All LWC	0.15	-0.92		-0.138
China only	0.15	-0.77		-0.116
	Domestic inflation			
	β	$\frac{\partial\eta_t}{\partial t}$	$\gamma \times (p_t^{LWC} - p_t^{D})$	Contrib CPI
All LWC	0.42	1.06	0.29×-0.45	-0.073
China only	0.42	1.06	0.13×-0.75	-0.041

Note: The table presents the values of the main variables used in the robustness analysis where we use units instead of kilograms to compute unit valuses. Each variable is first calculated yearly, and then averaged over the period 1994-2014. In the case of variable denoting changes over time (i.e. $\frac{\partial\eta_t}{\partial t}$), first the year-on-year percentage change is calculated and average over the period. "Contrib CPI" is the total contribution of each channel to the evolution of French CPI inflation. Details of the variables' construction are provided in sections 3, 4 and 5.