Dissecting the Impact of Imports from Low-Wage Countries on French Consumer Prices[1]

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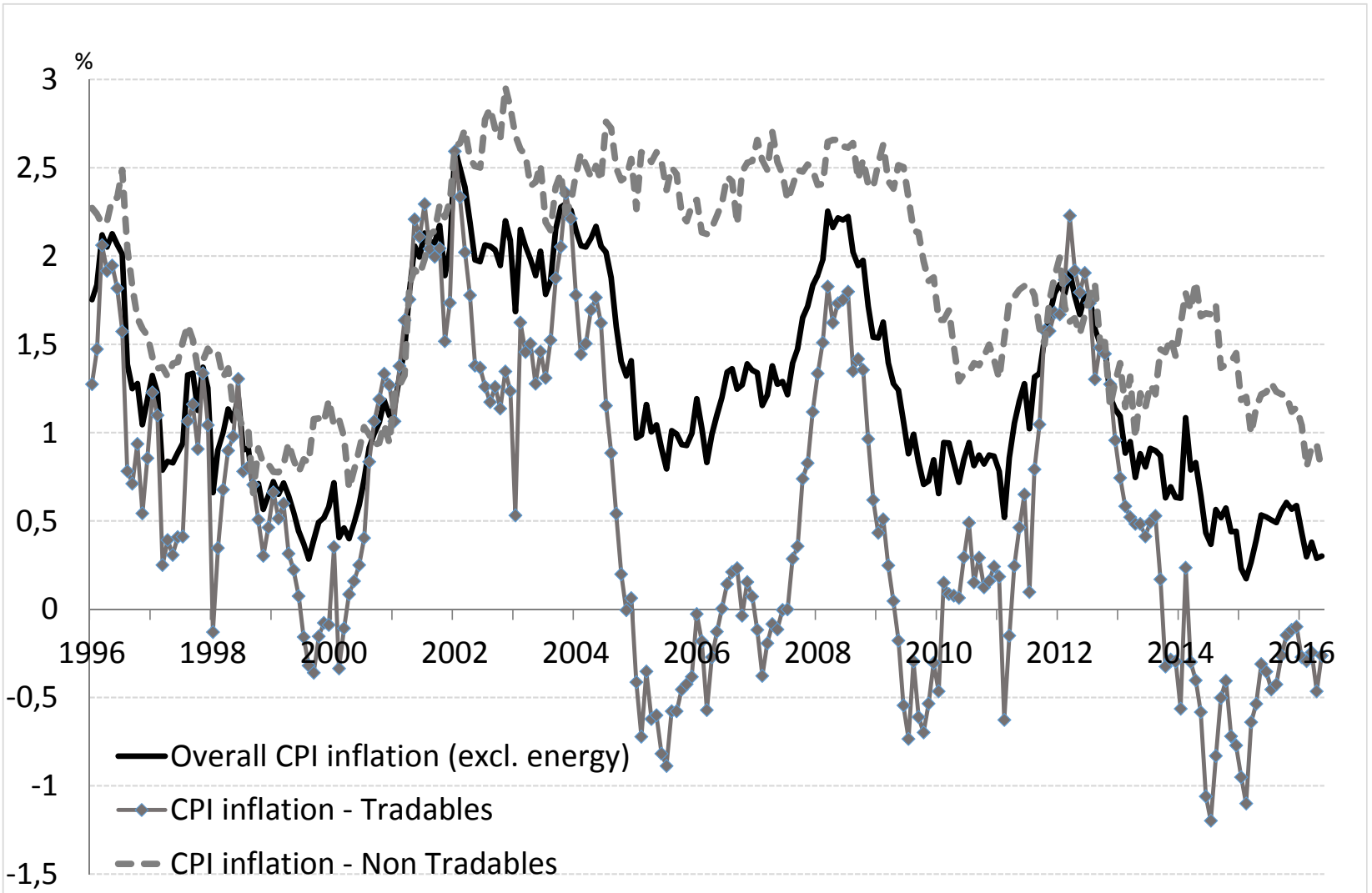
[1]The views expressed in this paper do not necessarily reflect the opinion of the BdF or the Eurosystem

Decomposition of French CPI inflation: Tradable vs Non-Tradables



Motivation

- Low inflation in developed economies (average FR 1991-2016 = 1.3%)
- Large increase of imports from low-wage countries (in particular China) in developed countries

Policy makers' hunch: globalization is (partly) responsible for low inflation

"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" (ECB President Mario Draghi, 2017)

Research Question:
By how much did imports from LWC contribute to lower inflation in France over the past two decades?

Inflation decomposition

- Final consumption comprises both tradable and non-tradable goods. Consumer price inflation writes

$$\pi_t = \beta_t \pi_t^T + (1 - \beta_t)\pi_t^{NT}$$

- Tradable goods inflation is the weighted average of price changes of all tradable goods (indexed by i).

$$\pi_t^T = \sum_i \omega_{it} \pi_{it}^T$$

Price of tradable good *i*

- Weighted average of domestic and foreign (log)prices

$$p_{it}^{T} = (1 - \eta_{it}) p_{it}^{D} + \eta_{it} p_{it}^{F}$$

- Import price incorporates LWC and HWC prices

$$p_{it}^{F} = (1 - \gamma_{t}) p_{it}^{HWC} + \gamma_{it} p_{it}^{LWC}$$

- Combining and differentiating over time

$$\pi_{it}^{T} = \underbrace{\frac{\partial \eta_{it}}{\partial t} \gamma_{it} \left(p_{it}^{LWC} - p_{it}^{D} \right)}_{\text{Substitution Channel}}$$

$$+ \underbrace{\eta_{it} \left[\frac{\partial \gamma_{it}}{\partial t} (p_{it}^{LWC} - p_{it}^{HWC}) + \gamma_{it} \left(\pi_{it}^{LWC} - \pi_{it}^{HWC} \right) \right]}_{\text{Imported Inflation Channel}}$$

$$+ \underbrace{(1 - \eta_{it}) \pi_{it}^{D}}_{\text{Competition Channel}} + \underbrace{\eta_{it} \pi_{it}^{HWC} + (1 - \gamma_{it}) \frac{\partial \eta_{it}}{\partial t} \left(p_{it}^{HWC} - p_{it}^{D} \right)}_{\text{indirect contribution of LWC}}$$

Preview of the Results

- Decompose the contribution of LWC imports on inflation
  - Compute contribution of *Substitution*, *Imported Inflation* and *Competition* channels
- Use of detailed individual data
  - Trade data to build **import price indices by countries of origin and by product**
  - Mapping CPI and trade product classifications
- Do imports from LWCs lower inflation?
  - **Yes, by -0.17 pp per year on average** over 1994-2014
  - What are the main channels?
    - ★ 3 equally important
    - ★ China $\approx -0.10pp$

Comparison with the literature

- Closely related papers: Bai & Stumpner (2019), Jaravel & Sager (2019) $\rightarrow$ find roughly same order or magnitude for the U.S.
- We do **decompose the overall effect** in three additive channels
- We do **rely on both import penetration and price data** (Unit Values by product $\times$ origin).

Measuring the contribution of each channel

We match trade and consumption data for 1994-2014 to measure the different components of LWC-contribution to inflation:

- Consumption shares: $(\beta_t, \eta_t, \gamma_t)$ and their evolution $\left(\frac{\partial \beta_t}{\partial t}, \frac{\partial \eta_t}{\partial t}, \frac{\partial \gamma_t}{\partial t}\right)$
- Price-level differences: $\left(p_t^{LWC} - p_t^{D}\right)$, $\left(p_t^{LWC} - p_t^{HWC}\right)$
- Inflation differences: $\left(\pi_t^{LWC} - \pi_t^{HWC}\right)$

Trade Data

- Exhaustive administrative database collected by the French Customs.
- Values (in euros) and quantities of imports and exports (by country of origin and product) at the CN8 level over the period 1994-2014.
- We restrict to consumer goods (i.e. products matched with COICOP classification)

Consumption Data

- Consumption by COICOP products
- Concord CN8 classification (trade statistics) to COICOP classification (CPI)
- Aggregate consumption values at the level 4 of COICOP from Insee.
- VAT rates + uniform retail distribution margin rate

Production Data

- Producer Price Indices from INSEE at the 4-digit CPA level
- Domestic production from PRODCOM Data
- Labor and intermediate input costs at NACE 2-digit level from OECD-STAN

Country groups

- 5 different country categories according to their GDP per capita (Auer and Fischer [2010] and Auer et al. [2013]) details
  - 3 main groups:
    - ★ High-wage countries (above 75% of French GDP pc): EU countries, US, Can., Jap
    - ★ Intermediate group of LWC (btw 25% and 75% of French GDPpc): South America, Eastern European countries, South East Asia...
    - ★ LWC (less than 25% of the French GDPpc): China, India, Vietnam and most of African countries
  - 2 separate groups for:
    - ★ China
    - ★ New EU member states (NEUMS)

Import Price Indices p_t^F

g=country group, i=product(CN 8-digit level), c=country

- At date 0.

$$P^F_{gi,0} = \prod_{c \in g} P^{\gamma_{ic,0}}_{ic,0}$$

- At date t, aggregation by groups of country:

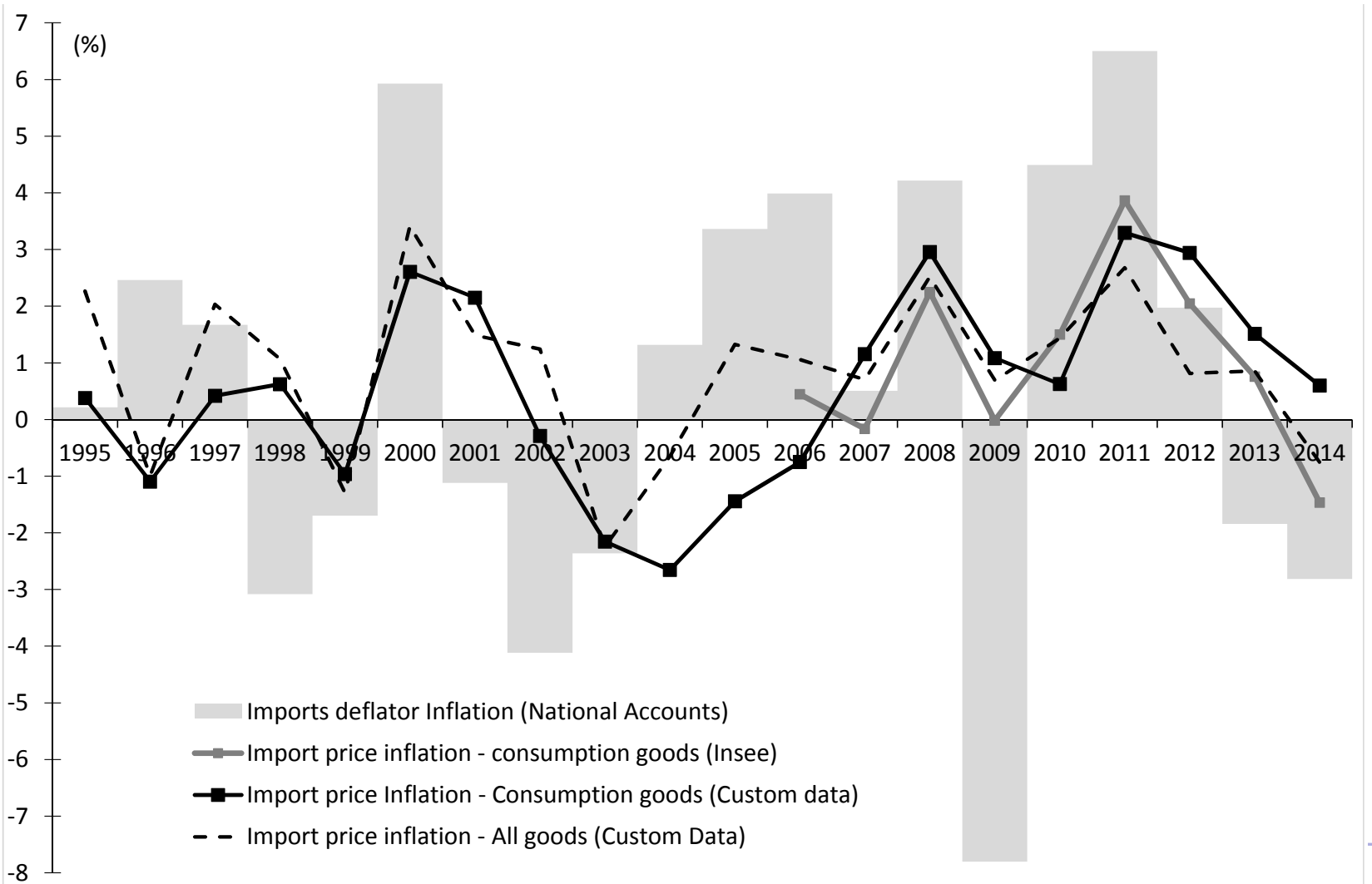
$$\pi^F_{gi,t} = \frac{\prod_{c \in g} P^{\gamma_{ic,t-1}}_{ic,t}}{\prod_{c \in g} P^{\gamma_{ic,t-1}}_{ic,t-1}}$$

  Then: $P^F_{gi,t} = P^F_{gi,t-1} \pi^F_{gi,t}$

- At date t, import price level for product i:
  $P^F_{i,t} = \prod_g {P^F_{gi,t}}^{\gamma_{gi,t}}$ and $\pi^F_{i,t} = ln\left(P^F_{i,t}\right) - ln\left(P^F_{i,t-1}\right)$

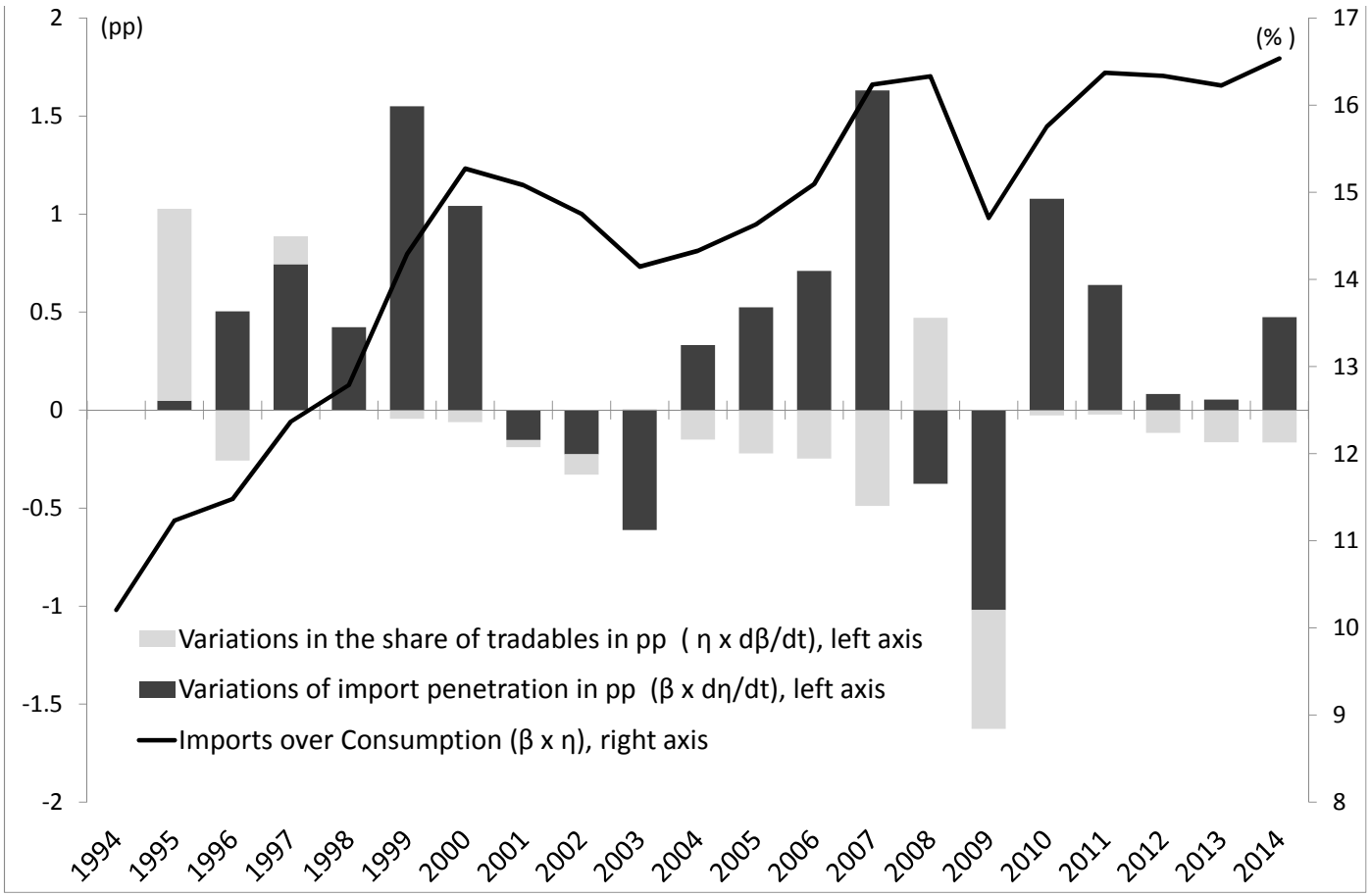
Aggregate import price inflation: $\pi_t^F = \sum_i \gamma_{i,t} \pi_{i,t}^F$

Figure: Import Price Inflation - A Comparison



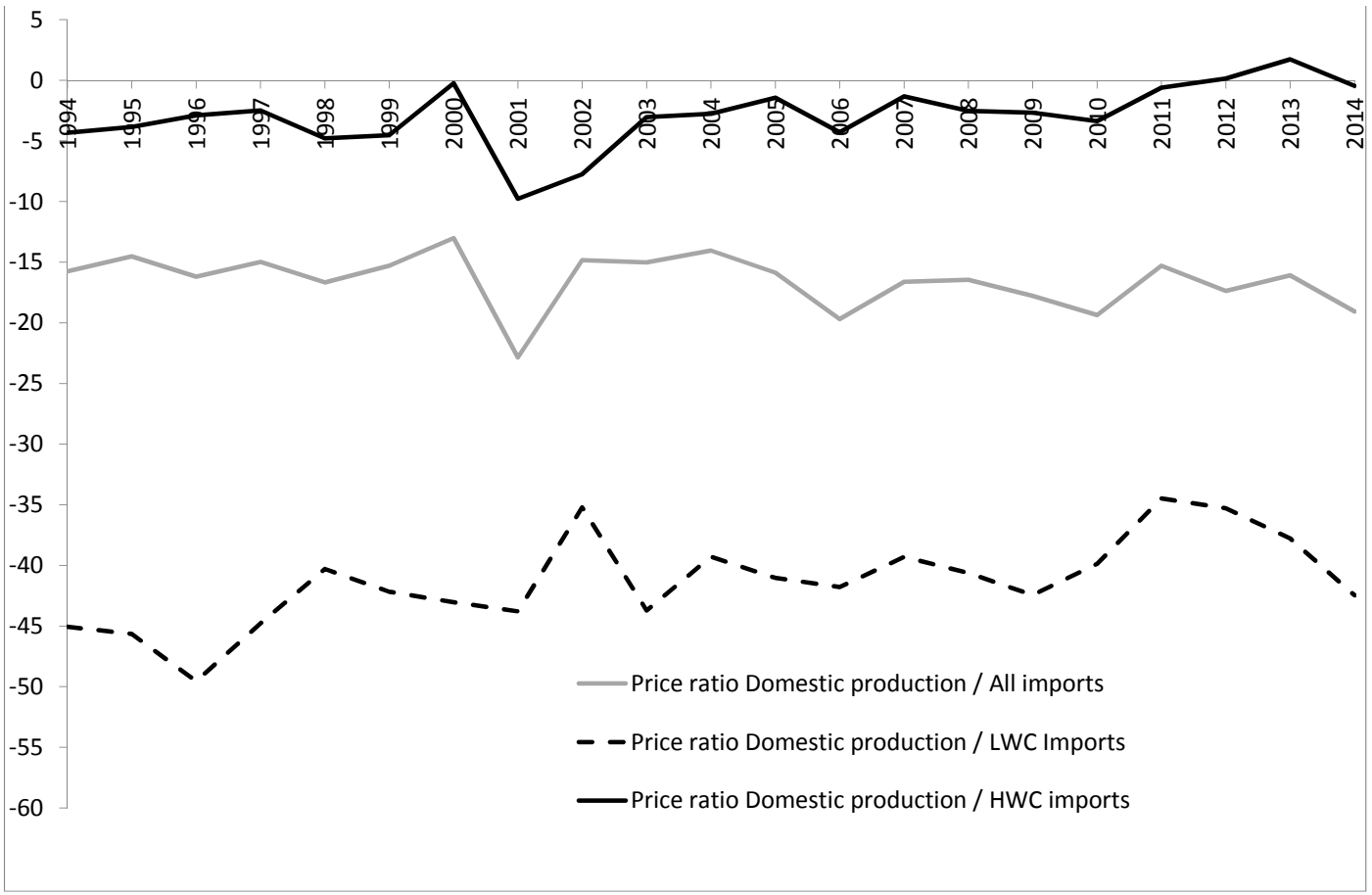
Substitution towards imports: $\beta_t \frac{\partial \eta_t}{\partial t} \gamma_t \left(p_t^{LWC} - p_t^D \right)$

Figure: Import Penetration in CPI Consumption - Total and by Country Groups



Price differential: $\beta_t \frac{\partial \eta_t}{\partial t} \gamma_t \left(p_t^{LWC} - p_t^D \right)$

Figure: Price of Domest. Produced Goods vs. Imported (Consumption) Goods



Substitution Channel: Total Effect

- Substitution Channel:

$$\underbrace{\beta_t \frac{\partial \eta_t}{\partial t} \gamma_t}_{0.46 \times 0.8 \times 0.31} \quad \underbrace{\left(p_t^{LWC} - p_t^D \right)}_{-0.41}$$

$$\Rightarrow \text{Channel 1} = -0.05pp$$

- ▸ Remark: Important heterogeneity across products. Clothing, Furnishing and Communication account for a bulk of the effect.
- China accounts for -0.03 pp in the total effect

Lower Imported Inflation

$$\beta_t \eta_t \left[\underbrace{\frac{\partial \gamma_t}{\partial t}(p_t^{LWC} - p_t^{HWC})}_{\text{Switching effects}} + \underbrace{\gamma_t \left(\pi_t^{LWC} - \pi_t^{HWC} \right)}_{\text{Inflation differential}} \right]$$

- Switching effects: replaced HWC imports for LWC imports
- Inflation differential effects: differences in evolution of import prices

Figure: Import Market Share by Country Category

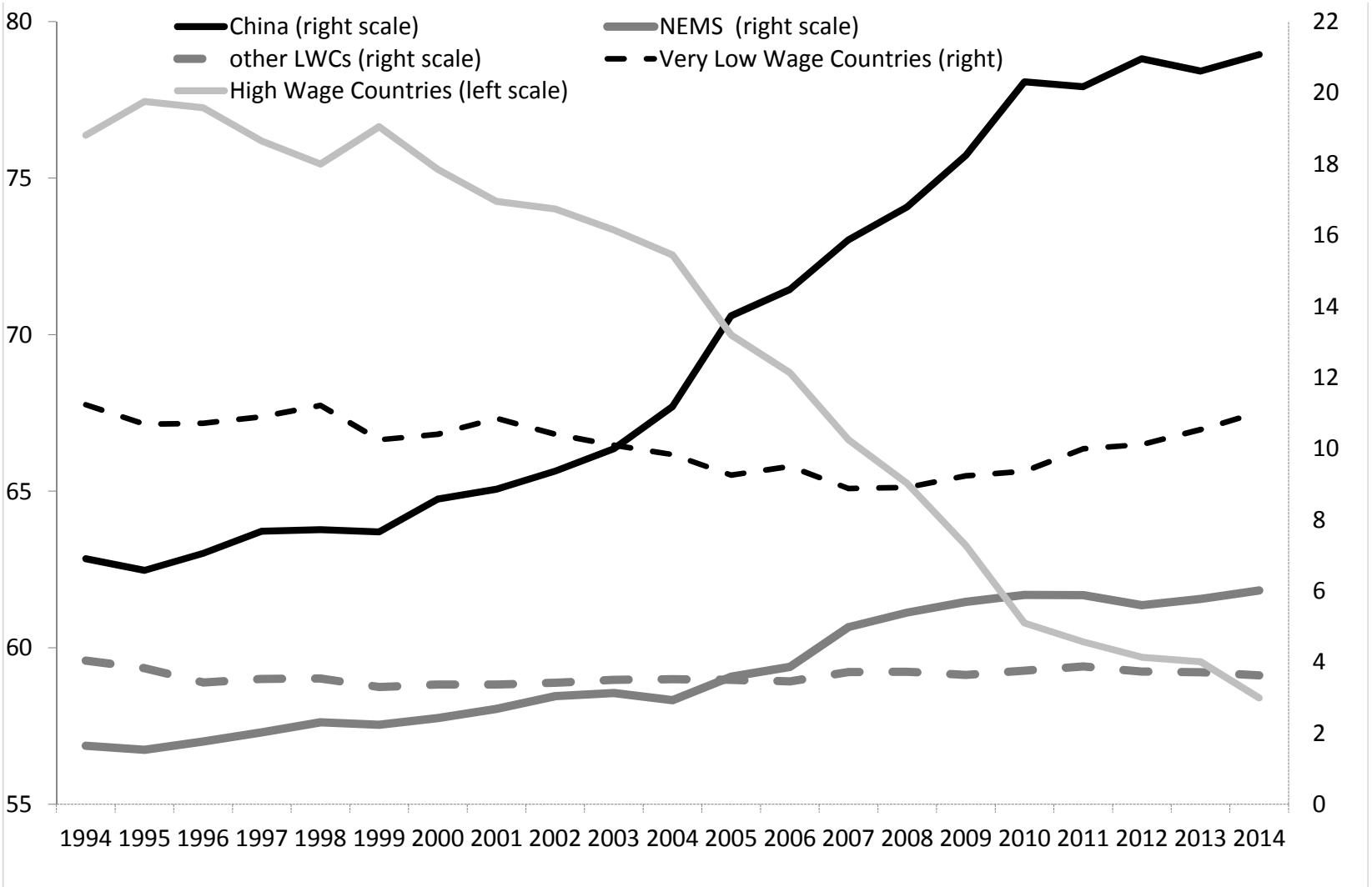


Figure: Import Price Inflation Differential: High-wage vs. Low-wage Countries

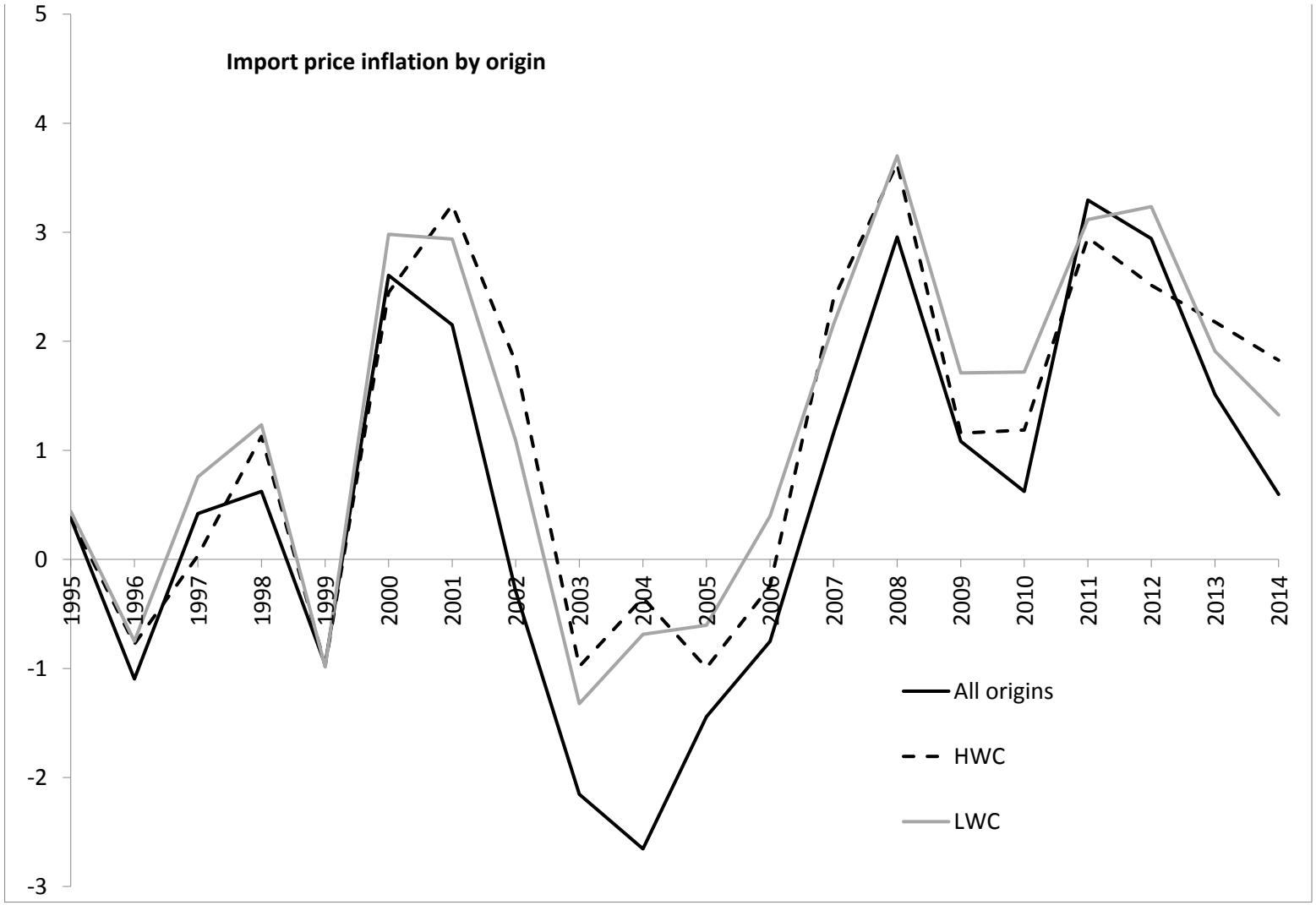
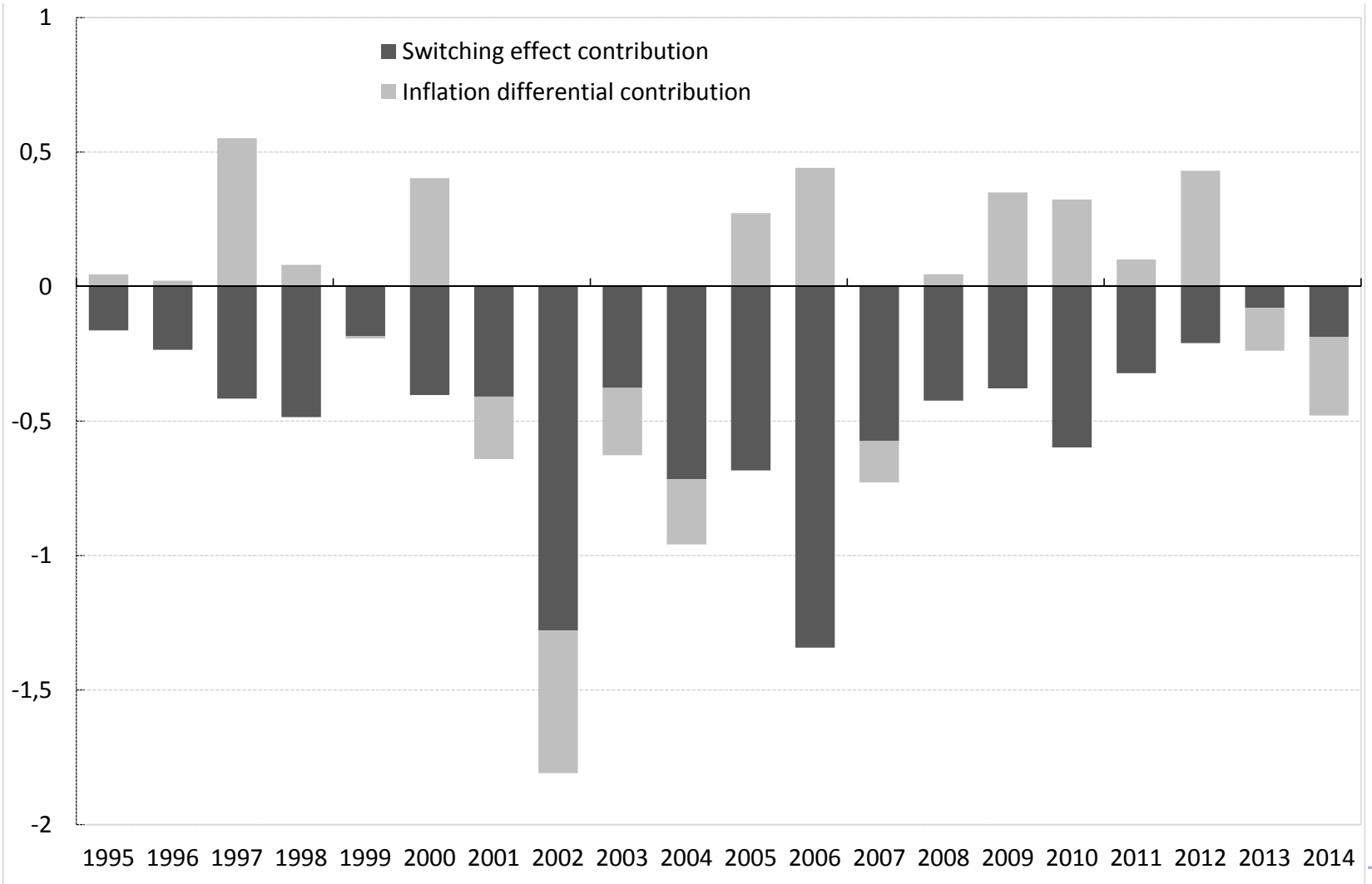


Figure: Contribution to Import Price Inflation: Substitution vs Inflation Differential Effects



Total Effect of the *Imported Inflation* channel

- Imported Inflation Channel:

$$\underbrace{\beta_t \eta_t}_{0.14} \left[\underbrace{\frac{\partial \gamma_t}{\partial t}(p_t^{LWC} - p_t^{HWC})}_{-0.47} + \underbrace{\gamma_t \left(\pi_t^{LWC} - \pi_t^{HWC} \right)}_{+0.06} \right]$$

$\Rightarrow$ Channel 2$=$ $-0.06pp$

- with China $=$ -0.05 pp

Competition channel

$$\beta_t(1-\eta_t)\pi_t^D$$

- We estimate the impact of changes in LWC import penetration on changes in domestic producer prices:

$$\pi_{i,t}^D = \Psi \Delta S_{i,t}^{LWC} + \kappa \Delta labcost_{i,t} + \eta \Delta inputcost_{i,t} + \lambda_t + \nu_i + \epsilon_{i,t}$$

- See underlying model with strategic complementarities ▸ here
- Endogeneity
  We follow Auer et al (2016) and instrument $\Delta S_{i,t}^{LWC}$ with:

$$\text{labor share in sector } i \times \Delta X_t^{LWC}$$

Impact of LWCs on French Producer Inflation

Table: Impact of LWC Imports on French Producer Price Inflation

	All goods		Consumption goods		High Import penetration	
	OLS	IV	OLS	IV	OLS	IV
Δ share - LWC	0.134*	-1.208**	0.198*	-0.803	0.102	-1.656
	(0.063)	(0.615)	(0.103)	(1.283)	(0.086)	(1.312)
Δ Interm. Input costs	0.226***	0.249***	0.095**	0.100*	0.245***	0.340***
	(0.041)	(0.044)	(0.048)	(0.051)	(0.058)	(0.103)
Δ Labour costs	-0.052	0.025	-0.069	0.004	-0.043	0.145
	(0.044)	(0.054)	(0.080)	(0.077)	(0.068)	(0.140)
R^2	0.11	0.03	0.14	0.06	0.11	0.06
Nb products	154	154	52	52	81	81
Nb observations	1,986	1,981	699	699	984	981

See first stage

Effects through the *Competition Channel*

- Competition Channel:

$$\underbrace{\beta_t}_{0.46}\underbrace{(1-\eta_t)}_{0.68}\underbrace{\frac{\partial \pi_t^D}{\partial S_t^{LWC}}}_{-1.21}\underbrace{\frac{\partial S_t^{LWC}}{\partial t}}_{0.17}$$

$$\Rightarrow \text{Channel 3} = -0.06 \text{ pp}$$

- China effect $= -0.02$ pp

Discussion of the results

We provide a quantification of the contribution of imports from LWC to inflation in France during 1994-2014.

- Share of imports from LWCs in consumption increased from 2.4% to 6.9%.
- Contributed negatively to CPI inflation by 0.17pp by year on average:

$$\underbrace{0.05}_{\text{substitution}} + \underbrace{0.06}_{\text{imported inflation}} + \underbrace{0.06}_{\text{competition}} \simeq 0.17$$

- 2/3 stemming from substituting LWC imports to domestic production or switching from goods produced in HWC towards imports from LWC.
  - The way the CPI is constructed: a pure price index –holding the structure constant (no substitution effect) ▸ example
  - Hence this estimate is an upper bound for the contribution on CPI. Without substitution, contribution of LWC $= -0.05pp$ per year

Concluding Remarks

- LWC contributed negatively to CPI inflation by 0.17pp by year on average over 1994-2014
- China accounts for two thirds of the overall effect
- Households pay €1000 less for consumption in 2014 compared to 1994
- Caveats: scope of our analysis restricted to **short-run effects only** –over a year, but abstract for GE effects (e.g. impact on other HWC prices, impact on prices and share of non-tradables *via* income effects..)
- To-do list:
  - Impact through imported intermediate inputs
  - Indirect impact through import prices from HWC
  - Discuss quality differences ▸ quality
  - Impact of across households consumption habits by decile of income

Thank you for your attention!

Appendix

back

Table: 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 - New EU member states	GDP per capita between 25% and 75% of France's 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 - China (including Hong-Kong) - Other Very low wage countries	GDP per capita below 25% of France's India, Thailand, Tunisia, Morocco, Indonesia, Philippines, Vietnam, Egypt, Pakistan, Ukraine,...

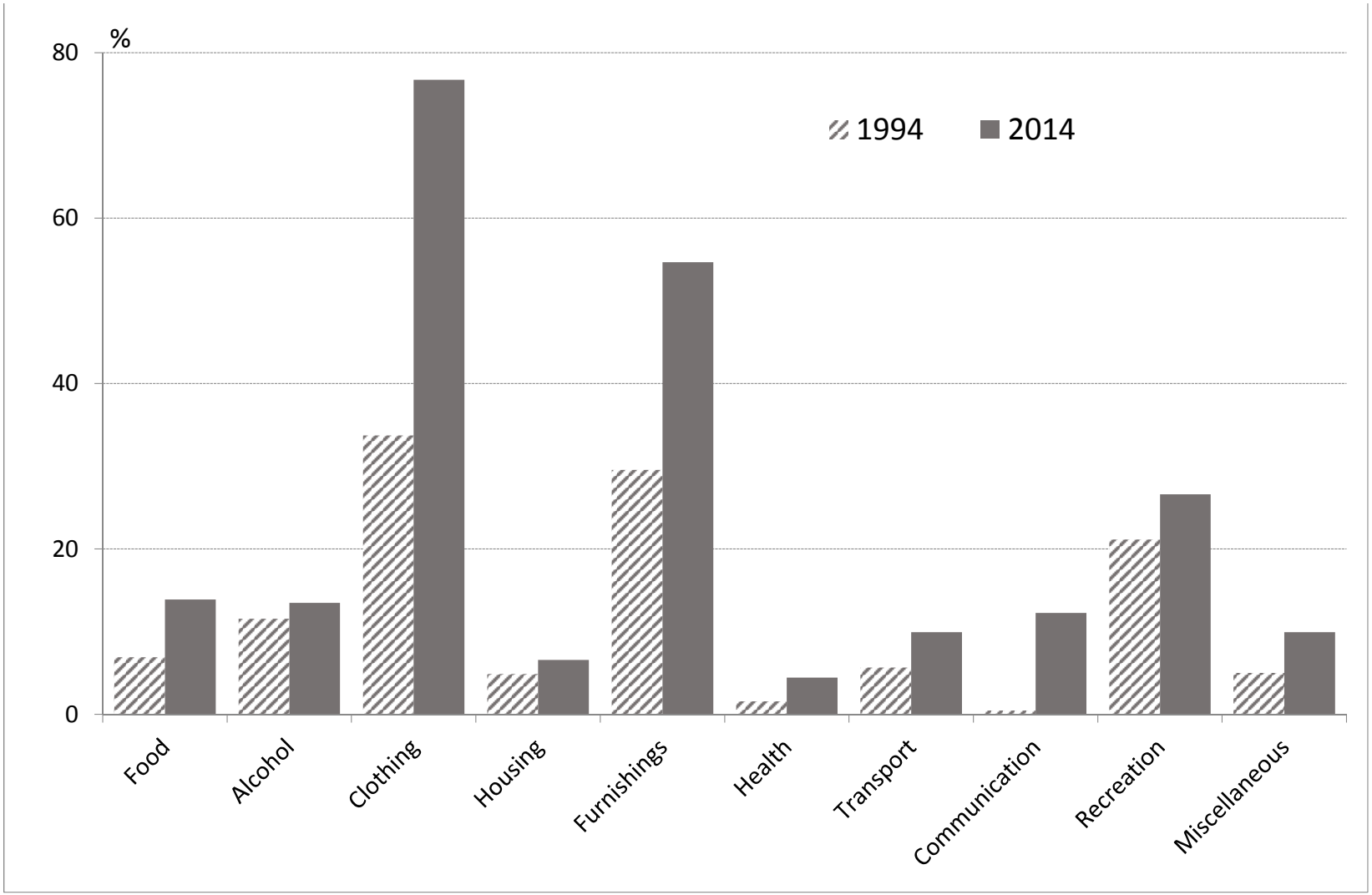
Table: Contribution of LWC Imports to Import Price Inflation: Comparison

Country	Period	Impact of LWC on import inflation	Source
France	95-05	-0.44 pp	This study
Austria	95-05	-0.66 pp	Glatzer et al. 2006
Finland	96-05	-1 pp	BoFinland 2006
Portugal	98-06	-0.2 pp	Cardoso et al.2006
Sweden	96-04	-1 to -2 pp	Bank of Sweden 2005
United States	93-02	-0.8 to -1 pp	Kamin Marazzi 2006
France	00-05	-1 pp	This study
United Kingdom	00-05	-0.7 pp	Mac Coille 2008

Note: this table reports estimates of the contribution of LWC to import prices in different countries. These estimates are obtained using a very similar methodology presented in section 4.2. 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).

Channel 1: Heterogeneity across products

back



Sketch of the Model for Channel 3

Competition effect through Variable Markups

- Firm j within a given industry i.
- $P_t(j,i) = \mathcal{M}_t(j,i) mc_t(j,i)$ where $\mathcal{M}_t(j,i)$ depends on price elast. of demand
  - Price elasticity of demand of competitors
  - In equilibrium : this information is summarized in firm's market share $S_t(j,i) \Rightarrow \mathcal{M}_t(j,i) = \mathcal{M}(S_t(j,i))$

$$\Rightarrow \Delta \log(P_t(j,i)) \simeq \Gamma_t(j,i) \Delta \log(S_t(j,i)) + \Delta \log(mc_t(j,i))$$ back

Sketch of the Model for Channel 3

Foreign Competition

- 3 firms: $j \in \{d, LWC, HWC\}$.
- Within each sector i: $S_t(d) = 1 - (S_t(HWC) + S_t(LWC))$.
- Theoretical Prediction:

$$\Delta \log(P_t(d)) =$$
$$\Psi_t^{LWC} \Delta \log(S_t(LWC)) + \Psi_t^{HWC} \Delta \log(S_t(HWC)) + \Delta \log(mc_t(d))$$

back

Table: Results of first-stage estimation

	All goods		Consumption goods		High Import penetration	
	(1)	(2)	(3)	(4)	(5)	(6)
Δ Export LWC × Labour share	0.236***		0.175*		0.205**	
	(0.055)		(0.092)		(0.097)	
Δ Export China × Labour share		0.135***		0.113**		0.179***
		(0.034)		(0.052)		(0.059)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Product dummies	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.10	0.05	0.08	0.06	0.13	0.08
Nb products	154	154	52	52	81	81
Nb observations	1,981	1,982	699	699	980	980

back

Accounting for quality differences

- How can it be that prices from LWCs have been consistently 40% cheaper over the last 2 decades and French consumers are still buying French products?
- Can we compute quality-adjusted prices?
- We follow Khandelwal et al. (2013). Quality = the part of the share of expenditures on import from j that is not explained by its relative price (given the elasticity of substitution between goods)

$$x_j P_j^{\sigma} = C P^{\sigma} \lambda_j^{\sigma-1}$$

- We regress: $ln(x_{j,t}) + \sigma ln(P_{j,t})$ on μ_t and get λ_j as the residual
- Limits: 1) For CPI index: no quality effect (pure price index holding structure and quality constant)? 2) With CES framework: most of the price differential disappears.

back

Pure Price index versus Constant Utility index

Table: Two price indices with and without composition effect

year	FR			CN			CPI	CUI
	P	Q	ξ	P	Q	ξ	$\sum_j \xi^j_{-1} \frac{P^j}{P^j_{-1}}$	$\frac{\sum_j \xi^j P^j}{\sum_j \xi^j_{-1} P^j_{-1}}$
$t-1$	10	10	1		0	0		
t	10	7	$\frac{70}{100}$	5	6	$\frac{30}{70}$	1	$\frac{0.7*10+0.3*5}{1*10}$
$t+1$	10	2	$\frac{20}{80}$	5	12	$\frac{60}{80}$	$0.7\frac{10}{10}+0.3\frac{5}{5}$	$\frac{0.25*10+0.75*5}{0.7*10+0.3*5}$
$t+2$	10	1	$\frac{10}{100}$	5	18	$\frac{90}{100}$	$0.25\frac{10}{10}+0.75\frac{5}{5}$	$\frac{0.1*10+0.9*5}{0.25*10+0.75*5}$

Pure Price index versus Constant Utility index

Table: Two price indices with and without composition effect

year	FR			CN			CPI inf	CUI inf
	P	Q	ξ	P	Q	ξ	$\sum_j \xi^j_{-1} \frac{P^j}{P^j_{-1}}$	$\frac{\sum_j \xi^j P^j}{\sum_j \xi^j_{-1} P^j_{-1}}$
$t-1$	10	10	1		0	0		
t	10	7	$\frac{70}{100}$	5	6	$\frac{30}{70}$	0%	−15%
$t+1$	10	2	$\frac{20}{80}$	5	12	$\frac{60}{80}$	0%	−11%
$t+2$	10	1	$\frac{10}{100}$	5	18	$\frac{90}{100}$	0%	−12%

back