The Effect of Imports from Low-Wage Countries on French Inflation

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1 The views expressed in this paper do not necessarily reflect the opinion of the BdF or the Eurosystem.
French CPI inflation. Decomposition Tradable - Non Tradable Goods
Motivation

- Large increase of imports from low-wage countries (in particular China) in developed countries
  - China’s accession into the WTO in 2001
  - Potential gain for consumers: having access to cheaper goods
- Draghi (2017): “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”. Introductory speech, ECB forum on Central Banking, Sintra 27/7/2017.

Question: By how much do imports from LWC contribute to lower CPI inflation in France?
Contribution and Results

- Decomposition of the effect of LWC imports on inflation
  - General framework allows to decompose effect into 3 channels
  - Contribution of Substitution, Imported Inflation and Competition effects

- 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

- Quantification
  - Do imports from LWC lower inflation? Yes, by -0.11pp per year on average
  - What are the main channels?
    - Substitution btw domestic and imported goods and between imports from HWC and LWC
    - Small impact of competition channel
Imports and domestic inflation

Consumer price index: \( P_t = \beta P^T_t + (1 - \beta)P^N_t \)

with: \( P^T_t = (1 - \eta_t)P^d_t + \eta_t P^f_t \)

Hence:

\[
\Delta P_t = \Delta \omega_t \left( P^f_t - P^d_t \right) + \omega_{t-1} \Delta P^f_t + (\beta - \omega_{t-1}) \Delta P^d_t + (1 - \beta) \Delta P^N_t
\]

Substitution Channel Import. Infl. Ch. Competition Channel

with \( \omega_t = \beta \eta_t = \text{import penetration} \)

The rise in imports from LWCs:

1. increases import penetration (\( \Delta \omega_t \))
2. lowers import price inflation (\( \Delta P^f_t \))
3. affects domestic producer price inflation (\( \Delta P^d_t \)) (in particular via pro-competitive effects)
Decomposition by origin

\[ P_t^f = \gamma_t P_t^{LWC} + (1 - \gamma_t) P_t^{HW} \]

Hence

\[ \Delta P_t = \gamma_t \Delta \omega_t \left( P_t^{LWC} - P_t^d \right) + (1 - \gamma_t) \Delta \omega_t \left( P_t^{HW} - P_t^d \right) \]

- Substitution Channel
- \[ + \omega_{t-1} \left[ \Delta P_t^{HW} + \Delta \gamma_t \left( P_t^{LWC} - P_t^{HW} \right) + \gamma_{t-1} \left( \Delta P_t^{LWC} - \Delta P_t^{HW} \right) \right] \]
- Imported Inflation Channel
- \[ + (\beta - \omega_{t-1}) \Delta P_t^d + (1 - \beta) \Delta P_t^{NT} \]
- Competition Channel
Trade Data

- Exhaustive administrative file collected by the French Customs.
- Values (in euros) and quantities of imports and exports (by country of origin and product) for all firms over the period 1994-2014.
- Restriction to consumer goods (i.e. products matched with COICOP classification)
- 5 different country categories according to their GDP per capita (Auer and Fischer [2010] and Auer et al. [2013])
  - 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

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

- At date 0.

\[
P_{gi,0} = \prod_{c \in g} P_{ic,0}^{\gamma_{ic,0}}
\]

- At date \( t \), aggregation by groups of country:

\[
\pi_{gi,t} = \frac{\prod_{c \in g} P_{ic,t}^{\gamma_{ic,t-1}}}{\prod_{c \in g} P_{ic,t-1}^{\gamma_{ic,t-1}}}
\]

Then: \( P_{gi,t} = P_{gi,t-1} \pi_{gi,t} \)

- At date \( t \), import price level for product \( i \):

\[
P_{i,t} = \prod_{g} P_{gi,t}^{\gamma_{gi,t}} \quad \text{and} \quad \pi_{i,t} = \ln(P_{i,t}) - \ln(P_{i,t-1})
\]
Aggregate import price inflation: $\pi_t = \sum_i \gamma_{i,t} \pi_{i,t}$
Consumption Data

- Consumption by COICOP products
- A concordance table from CN8 classification (used to report trade statistics) to the COICOP classification (used to construct the CPI inflation)
- Aggregate consumption values are also available at the level 4 of the COICOP classification on the period 1994-2014 from Insee.
- VAT rates + uniform retail distribution margin rate
**Channel 1:**

\[ \Delta \omega_t (P^f_t - P^d_t) + \omega_{t-1} \Delta P^f_t + (\beta - \omega_{t-1}) \Delta P^d_t + (1 - \beta) \Delta P^{NT}_t \]

**Figure:** Import Penetration in CPI Consumption - Total and by Country Groups
Channel 1: China and NEUMS import penetration

Figure: Import Penetration in CPI Consumption - Low Wage Countries
Imported goods cheaper than domestically produced goods

Figure: Price of Domestically Produced Goods vs. Imported (Consumption) Goods
Effect through Channel 1

Substitution Channel:

\[
\gamma_t \Delta \omega_t \left( P^\text{LWC}_t - P^d_t \right) + (1 - \gamma_t) \Delta \omega_t \left( P^\text{HWC}_t - P^d_t \right)
\]

\[
\approx 0
\]

⇒ Channel 1 = −0.05pp

Remark: Important heterogeneity across products. Clothing, Furnishing and Communication account for a bulk of the effect.
Channel 2: Lower Imported Inflation

Holding import penetration constant, what is the impact of LWC on import price inflation?

\[ \Delta \omega_t \left( P_t^f - P_t^d \right) + \omega_{t-1} \Delta P_t^f + (\beta - \omega_{t-1}) \Delta P_t^d + (1 - \beta) \Delta P_t^{NT} \]

Need to decompose import inflation by country of origin. Can do so at the product level.

\[ \Delta P_t^f = \Delta P_t^{HWC} + \Delta \gamma_t \left( P_t^{LWC} - P_t^{HWC} \right) + \gamma_{t-1} \left( \Delta P_t^{LWC} - \Delta P_t^{HWC} \right) \]

- substitution in imports
- inflation differential
Figure: Contribution to Import Price Inflation: Substitution vs Inflation Differential Effects
**Figure**: Substitution Contribution to Import Inflation: Country Category Decomposition

Details on import shares
Effect through Channel 2

- Imported Inflation Channel:

\[
\omega_{t-1} \left[ \Delta \gamma_t \left( P_t^{LWC} - P_t^{HWC} \right) + \gamma_{t-1} \left( \Delta P_t^{LWC} - \Delta P_t^{HWC} \right) \right]_{-0.38} \Rightarrow \text{Channel 2} = -0.05pp
\]
Channel 3: \((\beta - \omega)\Delta P_t^d\)

**Competition effect through Variable Markups**

- Firm \(j\) within a given industry \(i\).
- \(P_t(j, i) = M_t(j, i)mc_t(j, i)\) where \(M_t(j, i)\) depends on price elast. of demand
  - Price elasticity of demand depends on firm \(j\) price and prices of competitors
  - In equilibrium: this information is summarized in firm’s market share \(S_t(j, i)\) ⇒ \(M_t(j, i) = M(S_t(j, i))\)

⇒ \(\Delta \log(P_t(j, i)) \simeq \Gamma_t(j, i)\Delta \log(S_t(j, i)) + \Delta \log(mc_t(j, i))\)
Channel 3: \((\beta - \omega)\Delta P^d_t\)

**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:
  \[
  \Delta \log(P_t(d)) = \Psi_t^{LWC} \Delta \log(S_t(LWC)) + \Psi_t^{HWC} \Delta \log(S_t(HWC)) + \Delta \log(mc_t(d))
  \]
- Empirical counterpart:
  \[
  \pi_{i,t}^d = \rho^{LWC} \Delta S_{i,t}^{LWC} + \rho^{HWC} \Delta S_{i,t}^{HWC} + \lambda_t + \nu_i + \epsilon_{i,t}
  \]
- OLS estimates using data on producer price inflation at the 4-digit level of the CPA classification.
<table>
<thead>
<tr>
<th></th>
<th>All goods</th>
<th>Consumption goods</th>
<th>High import penetration</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
</tr>
<tr>
<td>∆ share - China</td>
<td>-0.102**</td>
<td>-0.058***</td>
<td>-0.104**</td>
</tr>
<tr>
<td>∆ share - NEUMS</td>
<td>0.036</td>
<td>-0.004</td>
<td>0.007</td>
</tr>
<tr>
<td>∆ share - other LWC</td>
<td>0.108</td>
<td>0.077</td>
<td>0.020</td>
</tr>
<tr>
<td>∆ share - All LWC</td>
<td>-0.041</td>
<td>-0.044*</td>
<td></td>
</tr>
<tr>
<td>∆ share - HWC</td>
<td>0.051*</td>
<td>0.039</td>
<td>0.051</td>
</tr>
</tbody>
</table>

Year dummies: Yes, Yes, Yes, Yes, Yes, Yes, Yes
Product dummies: Yes, Yes, Yes, Yes, Yes, Yes, Yes

$R^2$: 0.09, 0.09, 0.13, 0.13, 0.118, 0.14
Number of observations: 1,970, 1,970, 712, 712, 1,290, 320
Effect through Channel 3

- Pro-Competitive Channel:

\[
(\beta - \omega_{t-1}) \Delta P^d_t = (\beta - \omega_{t-1}) \left( \frac{\partial \Delta P^d_t}{\partial \Delta \omega_{t}^{LWC}} \frac{\partial \Delta \omega_{t}^{LWC}}{\partial \omega_{t}} \right) \\
\Rightarrow \text{Channel 3} < -0.01pp
\]
Conclusion

Total effect = 0.05 + 0.05 + 0.01

- Mostly due to substitution effect
- Channel 3 very small.
- China accounts for half of the effect

What we plan to do next?
IV and imported intermediate consumption
Thank you for your attention!
Appendix
### Table: List of Countries by Country Categories

<table>
<thead>
<tr>
<th>Group of countries</th>
<th>GDP per capita description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>High-Wage countries</strong></td>
<td>GDP per capita above 75% of France's:</td>
</tr>
<tr>
<td>- EU countries, US, Canada, UK, Japan, South Korea, Australia, New Zealand, Israel...</td>
<td></td>
</tr>
<tr>
<td><strong>Low wage countries</strong></td>
<td>GDP per capita between 25% and 75% of France's</td>
</tr>
<tr>
<td>- New EU member states</td>
<td>Bulgaria, Croatia, Cyprus, Czech, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia, Slovenia</td>
</tr>
<tr>
<td>- Other Low wage countries</td>
<td>Turkey, Brazil, Mexico, Malaysia, Russia, Argentina,...</td>
</tr>
<tr>
<td><strong>Very Low wage countries</strong></td>
<td>GDP per capita below 25% of France's</td>
</tr>
<tr>
<td>- China (including Hong-Kong)</td>
<td>India, Thailand, Tunisia, Morocco, Indonesia, Philippines, Vietnam, Egypt, Pakistan, Ukraine,...</td>
</tr>
</tbody>
</table>
## Table: Import Penetration by COICOP Product Categories (1994-2014)

<table>
<thead>
<tr>
<th>CPI weight</th>
<th>COICOP category</th>
<th>% of imports in consumption</th>
<th>% of LWC imports in consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.15</td>
<td>01. Food</td>
<td>6.9</td>
<td>1.0</td>
</tr>
<tr>
<td>0.04</td>
<td>02. Alcohol</td>
<td>11.6</td>
<td>0.2</td>
</tr>
<tr>
<td>0.04</td>
<td>03. Clothing</td>
<td>33.7</td>
<td>17.9</td>
</tr>
<tr>
<td>0.14</td>
<td>04. Housing</td>
<td>4.9</td>
<td>0.7</td>
</tr>
<tr>
<td>0.06</td>
<td>05. Furnishings</td>
<td>29.5</td>
<td>4.0</td>
</tr>
<tr>
<td>0.10</td>
<td>06. Health</td>
<td>1.6</td>
<td>0.1</td>
</tr>
<tr>
<td>0.16</td>
<td>07. Transport</td>
<td>5.6</td>
<td>0.3</td>
</tr>
<tr>
<td>0.03</td>
<td>08. Communication</td>
<td>0.3</td>
<td>0.2</td>
</tr>
<tr>
<td>0.08</td>
<td>09. Recreation and culture</td>
<td>21.1</td>
<td>4.0</td>
</tr>
<tr>
<td>0.08</td>
<td>12. Restaurants</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>0.13</td>
<td>13. Miscel.</td>
<td>5.0</td>
<td>1.4</td>
</tr>
</tbody>
</table>
### Table: Contribution of LWC Imports to Import Price Inflation: Comparison

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

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

Import Penetration of LWC in CPI imports

- HWC 2014
- LWC 2014
- HWC 1994
- LWC 1994

Categories:
- Food
- Alcohol
- Clothing
- Housing
- Furnishings
- Health
- Transport
- Communication
- Culture
- Misc.
Figure: Price of Domestically Produced Goods Relative to Prices of Imported Goods (Consumer Goods) - Median
Figure: Import Market Shares over Time and by Country Category