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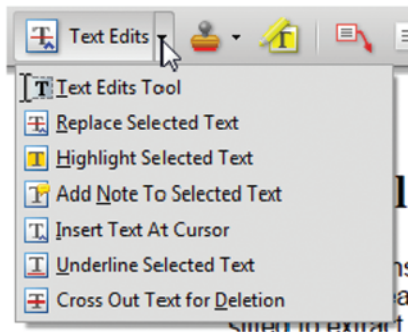


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# Trade collapse, quality and food exports

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This article revisits the so-called 'Collapse in Quality' hypothesis, according to which, during the 2008–2009 crisis, higher quality goods experienced a stronger export reduction compared to low-quality ones. Using disaggregated trade data from three European countries that traditionally export high-quality food products – France, Italy and Spain – we do not find any econometric evidence supporting this hypothesis. In contrast, we provide preliminary evidence for the concurrent hypothesis, namely that firms reduced their markup to preserve market share.

**Keywords:** 2008–2009 crisis; trade collapse; food quality; markup

**JEL Classification:** F41; F42; Q17

## I. Introduction

During the 2008–2009 global crisis, international trade slowed down dramatically with respect to the level of economic downturn. Among the different dynamics that stand behind this trade collapse, the idea that the quality of exported products played a significant role – the so-called 'Collapse in Quality' hypothesis – has been only marginally explored by the economic literature.[1] This hypothesis has been put forward by Berthou and Emlinger (2010), who found that, during the crisis, goods with higher unit value were affected by stronger import collapse in the EU market. This pattern supports the 'Collapse in Quality' hypothesis, assuming that price (unit value) represents a good proxy for quality. Yet, this assumption has been brought into question by recent literature (Khandelwal, 2010; Hallak and Schott, 2011).

The idea that the demand for quality goods reduced during the crisis is supported by some key stylized facts and anecdotal evidence. First, the reduction in trade flows has been stronger in nominal than in real terms. Considering the US food and beverage exports, their value component dropped by 12.7%, whereas their quantity only by 6.7% (Levchenko *et al.*, 2010). Thus, one can infer that this relevant price reduction is the result of a shift in the consumers' demand from high- to low-quality products. This interpretation is also supported by the fact that, in 2009, European consumers changed their behaviour, shopping more often in discounts and convenience stores and increasing their purchases of supermarket-(cheaper)

[1] Several possible explanations are put forward in the literature to interpret the trade collapse during the global crisis. Bems *et al.* (2010) point to the role played by vertical trade, and the subsequent strong reduction of trade in intermediates. Ahn *et al.* (2011) find evidence that bank credits play a key role in the international transactions. By contrast, Levchenko *et al.* (2010) proved the existence of a 'compositional effect', namely sectors that experienced a larger reduction in domestic output lowered more their trade. Interestingly, although trade protection increased during the recent crisis, it is by far not considered among the main reasons of the trade collapse (Baldwin and Evenett, 2009). See Levchenko *et al.* (2010) for a review on the main empirical evidence.

owned brands. Moreover, European households reduced their luxury goods consumption by more than 30% (EBDR, 2011).

Levchenko *et al.* (2011) tested the 'Collapse in Quality' hypothesis on the US market, using direct quality estimates from trade data, instead of simple unit values. However, they did not find any sizable reduction in the quality of US imports during the crisis. By contrast, Esposito and Vicarelli (2011), working on Italian exports towards the EU, provide evidence that quality had a relevant role in the trade collapse. However, once again, their exercise relied on the use of unit value as proxy for quality.

Our article contributes to this literature focusing on food exports from the three EU countries – France, Italy and Spain – that are universally recognized as producers and exporters of the highest quality food products. Differently from previous works, we first infer quality at the very detailed product level using trade data relying on the Khandelwal *et al.* (2013) method. Then we test the extent to which the 2008–2009 crisis affected the quality of the exported products. Our main results show that although we detect a significant reduction in the prices of the exported goods, their quality component did not display any significant change.

## II. Empirical Approach and the Data

We infer product quality using trade data, relying on the approach recently proposed by Khandelwal *et al.* (2013), which is based on the following straightforward intuition: 'conditional on price, a variety with a higher quantity is assigned higher quality'.

This method exploits the property of the CES demand function. Let us assume that the consumer's preference in a country $c$ for a variety $v$ (product $h$, imported by country $c$), produced by industry $I$, is characterized by the following CES utility function:

$$U = \left[ \int_{v \in V} [\lambda(v)q(v)]^{(\sigma-1)/\sigma} dv \right]^{\sigma/(\sigma-1)} \quad (1)$$

where $q(v)$ is the consumed quantity of variety $v$, characterized by a quality $\lambda(v)$, and $\sigma > 1$ is the elasticity of substitution across varieties. The demand for variety $v$ in year $t$ is then obtained by maximizing the relation (1) subject to the usual budget constraint, yielding

$$q_{cht} = (\lambda_{cht})^{\sigma-1}(p_{cht})^{-\sigma} P_{ct}^{\sigma-1} Y_{ct} \quad (2)$$

where $p_{cht}$ represents the price of the imported variety and $\lambda_{cht}$ the relative quality attached by the consumer. $P_{ct}$ is the ideal price index associated with Equation 1 and $Y_{ct}$ represents the total spending for industry $I$'s varieties. Taking the logs of Equation 2, product quality is inferred from the residual of the following OLS regression:

$$\ln q_{cht} + \sigma \ln p_{cht} = \alpha_h + \alpha_{ct} + e_{cht} \quad (3)$$

where $\alpha_h$ and $\alpha_{ct}$ account for, respectively, product and country-year fixed effects. Thus, product quality is inferred weighting the estimated residual from Equation 3 by the country-industry-specific elasticity of substitution minus one, $\hat{\lambda}_{cht} \equiv \hat{e}_{cht}/(\sigma - 1)$.

We estimate Equation 3 separately for each of the three considered exporter countries (France, Italy and Spain), within each NACE 4-digit industry, with varieties classified at the CN 8-digit level. Country-industry-specific elasticities of substitution are taken from Broda *et al.* (2006), where they are available at the HS 3-digit level of disaggregation.[2]

Next, to test the 'Collapse in Quality' hypothesis, we follow Khandelwal *et al.* (2013), decomposing the price of each variety into a quality-adjusted price and a quality component. The quality-adjusted price is obtained by subtracting from the log prices the estimated quality (which is already in log).[3] Then, using a single difference approach, we regress, alternatively, the three variables (price, quality and price-adjusted quality) on a dummy indicator, which assumes the value of 0 for the 2007–2008 and the value of 1 for the 2008–2009 variation, yielding

$$\Delta y_{cht} = \alpha_0 + \alpha_h + \alpha_c + \alpha CRISIS_t + e_{cht}$$

where $\Delta y_{cht} \equiv ln y_{cht} - ln y_{ch,t-1}$, $\alpha_h$ and $\alpha_c$ account for, respectively, product and destination country fixed effects. This approach allows us to check, first, whether during 2009 (set as the crisis year) there has been a significant price reduction for exported goods, when compared to the pre-crisis period. Second, we test whether this possible slowdown is mostly attributable to a reduction in the quality or in the price component of the exported goods.

Data in value and in volume for both the quality estimates and the empirical exercise are taken from the EUROSTAT Comext database at the maximum level of disaggregation (CN 8-digit level). In order to infer quality separately for each exporter country-industry, the CN 8-

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[2] Following Colantone and Crinò (2011), we aggregate these elasticities at the NACE 4-digit level, by taking the median value across all corresponding HS 3-digit products. Before estimating Equation 3, as usual, we drop varieties with unit value that fall below the 5th and above the 95th percentile.

[3] Note that, by construction, prices are the sum of the quality and price-adjusted quality components.

digit products are then mapped into the corresponding NACE 4-digit industries, through appropriate correspondence tables provided by EUROSTAT.

## III. Results

We first analyse the extent to which nominal and real food exports of the three considered countries have been affected by the crisis. Results in columns 1 and 2 of Table 1 confirm a significant reduction in both the value (−18.0%) and the volume (−10.6%) of the exported food products. The observed stronger reduction in the nominal food exports is in line with findings from previous literature referred to total trade (see Berthou and Emlinger, 2010; Levchenko *et al.*, 2010). These results hold true with only minor differences when the three exporting countries are studied separately (see columns 3 and 4) and, interestingly, even when the destination markets are split in developed (OECD) and emerging (BRIC) countries (columns 5 and 6).

Table 2 displays our main findings, obtained by testing whether the export price decrease due to the global crisis corresponds to a significant reduction in the quality component. First, results in column 1 confirm that, on average, export price shrank by 7.3%. However, when we regress the quality component on the crisis indicator, its estimated coefficient, although negative, is not statistically different from zero. Results in column 3 display a negative and significant reduction in price-adjusted quality, providing further evidence that the decrease in the value of trade is not due to exporting lower quality products but to a

**Table 1. Variation in volume and value of exports during the crisis (2007–2008 versus 2008–2009)**

|  | (1) Δ Volume | (2) Δ Value | (3) Δ Volume | (4) Δ Value | (5) Δ Volume | (6) Δ Value |
|---|---|---|---|---|---|---|
| Crisis | −0.106*** (0.0111) | −0.180*** (0.0106) |  |  |  |  |
| Crisis × France |  |  | −0.102*** (0.0142) | −0.168*** (0.0128) |  |  |
| Crisis × Italy |  |  | −0.105*** (0.0146) | −0.184*** (0.0140) |  |  |
| Crisis × Spain |  |  | −0.118*** (0.0173) | −0.195*** (0.0160) |  |  |
| Crisis × OECD |  |  |  |  | −0.0891*** (0.0110) | −0.149*** (0.0103) |
| Crisis × BRIC |  |  |  |  | −0.105*** (0.0357) | −0.170*** (0.0301) |
| Product F.E. | Yes | Yes | Yes | Yes | Yes | Yes |
| Destination F.E. | Yes | Yes | Yes | Yes | Yes | Yes |
| No. of obs. | 106 578 | 106 576 | 106 578 | 106 576 | 106 578 | 106 576 |

*Note*: Robust SEs in parentheses are clustered within products. ***, ** and * indicate, respectively, significance at 1%, 5% and 10% level.

**Table 2. Variation in price, quality and price adj. quality of exports during the crisis (2007–2008 versus 2008–2009)**

|  | (1) Δ Price | (2) Δ Quality | (3) Δ Price Adj. Qual. | (4) Δ Price | (5) Δ Quality | (6) Δ Price Adj. Qual. |
|---|---|---|---|---|---|---|
| Crisis | −0.0735*** (0.00586) | −0.0113 (0.00715) | −0.0622*** (0.00683) |  |  |  |
| Crisis × OECD |  |  |  | −0.0595*** (0.00478) | −0.0102 (0.00730) | −0.0493*** (0.00605) |
| Crisis × BRIC |  |  |  | −0.0653*** (0.0153) | −0.0101 (0.0232) | −0.0552*** (0.0206) |
| Product F.E. | Yes | Yes | Yes | Yes | Yes | Yes |
| Destination F.E. | Yes | Yes | Yes | Yes | Yes | Yes |
| No. of obs. | 106 576 | 106 576 | 106 576 | 106 576 | 106 576 | 106 576 |

*Note*: Robust SEs in parentheses are clustered within products. ***, ** and * indicate, respectively, significance at 1%, 5% and 10% level.
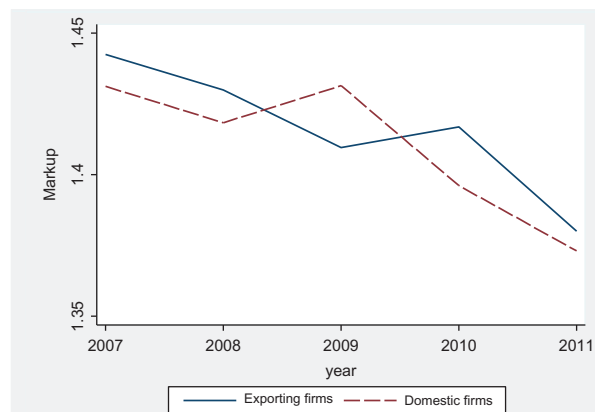
**Fig. 1.  Evolution of markup for exporting and domestic French firms**
*Note*: Markup is computed using Amadeus data

genuine reduction in prices. Finally, columns 4–6 show that the above results do not change significantly when OECD and BRIC countries are considered separately. Similar results are obtained by running the same regression for each of the three exporting countries taken individually (results not shown).[4] Thus, our findings provide a broad confirmation that the export price turned down during the crisis, but fail to attribute this reduction to a variation in the quality of products. Thus, in line with the findings of Levchenko *et al.* (2011), we do not support the 'Collapse in Quality' hypothesis.

A concurrent explanation for the export prices slowdown, alternative to the 'Collapse in Quality' hypothesis, is that, during the crisis, exporting firms reduced their markup. This means that they lowered the prices of the exported products, maintaining their quality constant. To provide evidence for this hypothesis, we computed markup for a representative sample of French food firms.[5]

Figure 1 reports the last few years' evolution of markup for domestic and exporting French firms.[6] Consistent with our conjecture, in 2009 only the exporting firms experienced a reduction in markup, thereby providing some preliminary credence to our alternative interpretation.

## IV. Conclusions

In this article, the 'Collapse in Quality' hypothesis is revisited with respect to exports of three EU countries (France, Italy and Spain). To do this, we estimated quality at the product line level relying on the Khandelwal *et al.* (2013) method. Overall, the main results provided a broad confirmation to the key stylized facts emerged from the literature on the trade effects of the global crisis, i.e. a stronger reduction in value than in the volume of exports. However, although we detect a significant reduction in food export prices, this cannot be attributed to a change in the quality of the products. By contrast, we find preliminary evidence supporting the concurrent hypothesis, according to which during the 2008–2009 crisis exporting firms reduced the markup in order to maintain their market share.

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[4] These additional results are available from the authors upon request.

[5] Markup is computed from Amadeus data. Ideally, we would need data on prices and marginal costs to measure markup. However, marginal costs are difficult to observe. Thus, we estimate markup for firm $f$ in year $t$, following Chen *et al.* (2009) and many others, using the information on turnover and variable costs: $\mu_{ft} = \left[ \frac{\text{turnover}_{ft}}{\text{tot.variable costs}_{ft}} \right] = \left[ \frac{\text{unit price}_{ft}}{\text{unit cost}_{ft}} \right]$

[6] We select France among the three exporting countries, as it is the only one with information on international trade activities in the Amadeus database, allowing us to compare the markup of domestic and exporting firms.