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Quality and the Great Trade Collapse

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Abstract

We explore the heterogeneous effects of the global financial crisis on international trade flows differentiated by quality. Combining a dataset of Argentinean firm-level destination-specific wine exports with experts quality ratings, we show that higher quality exports collapsed more dramatically during the recession. This flight from quality was triggered by a fall in aggregate demand, and was stronger for smaller firms' exports and in the countries where households could substitute imports by domestic alternatives. Quantitatively, our results suggest that the quality composition of exports can explain up to nine percentage points difference in trade performance.

JEL Classification: F10, F14, F41

Keywords: Exports, financial crisis, heterogeneity, multi-product firms, quality, wine.

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1 Introduction

One of the consequences of the global financial crisis has been a dramatic fall in world trade. The “Great Trade Collapse” occurred between the third quarter of 2008 and the second quarter of 2009, during which world trade fell by 30 percent in nominal terms, and 18 percent in real terms (World Trade Monitor, 2014). The crisis disproportionately affected trade in a narrow range of products, i.e., “postponable” goods, consumer durables, and investment goods (Baldwin, 2009). As these goods represent a large share of world trade (Engel and Wang, 2011), but a small fraction of world GDP, the world trade-to-GDP ratio collapsed dramatically.

The contribution of this paper is to explore empirically the effects of the global financial crisis on the composition of international trade. More precisely, the aim is to investigate whether the crisis had heterogeneous effects on traded goods differentiated by quality. As higher quality goods are typically more income elastic than lower quality goods, we would expect the adverse income shock induced by the crisis to have resulted in a “flight from quality” (Burstein, Eichenbaum, and Rebelo, 2005; Jaimovich, Rebelo, and Wong, 2015), whereby households in crisis-hit countries reduced not only the quantity, but also the quality of the goods they consume, leading to a sharper contraction in higher than in lower quality imports.^{1,2} We find strong evidence of a flight from quality in traded goods and, quantitatively, our results suggest that the quality composition of exports can explain up to nine percentage points difference in trade performance.

From a theoretical point of view, the models of Fajgelbaum, Grossman, and Helpman (2011) and of Hummels and Lee (2012), which feature non-homothetic preferences, are particularly helpful in supporting our predictions. Fajgelbaum et al. (2011) show that as income falls, a smaller share of agents buys higher quality goods. Their result is therefore consistent with our finding that trade in higher quality goods fell to a larger extent during the crisis. In Hummels and Lee (2012), under the assumption that the income elasticity of demand for higher quality goods is larger than for lower quality items, and that it is larger for poorer than for richer households, the model predicts that a negative income shock that hits most the left tail of the income distribution generates a sharper drop in the consumption of higher quality goods by poorer than by richer households.³ Aggregating over households results in the total consumption, and thus in the imports, of higher quality goods to fall by more, consistent with a flight from quality driven by a negative income shock.

To establish whether the crisis has induced a flight from quality in traded goods, we focus our analysis on Argentinean wine exports, and investigate whether higher quality wine exports fell more

¹For evidence that the income elasticity of demand increases with quality, see Bils and Klenow (2001) who estimate “quality Engel curves,” and show that a higher income increases the consumption of higher quality goods. Berthou and Emlinger (2010) and Esposito and Vicarelli (2011) find that the income elasticity of imports rises with quality. Also see Choi, Hummels, and Xiang (2009).

²Burstein, Eichenbaum, and Rebelo (2005) and Jaimovich, Rebelo, and Wong (2015) define a “flight from quality,” or a “trading down in quality,” as a substitution towards lower quality goods in response to contractionary devaluations or to recessions, respectively. Another example is the civil war in Syria which has reduced tourism in neighboring Lebanon and where, as a result, the imports of luxury goods have collapsed (see “Lebanon suffers flight from quality as Syria war hits economy,” *The Financial Times*, October 4, 2013).

³It is unlikely that all households respond homogeneously to aggregate income shocks. For instance, during the crisis, some households may have consumed goods in smaller quantities, but with a higher quality content. Ultimately, the effect of the crisis on the total consumption of higher quality goods depends on the aggregation over households.

dramatically during the crisis. Anecdotal evidence that the financial crisis has led to a flight from quality in wine consumption abounds. For instance, Veseth (2008) observes that, during the crisis, “the \$10 and up market segment” in the United States was “still expanding, but the pace of growth had slowed considerably and there was evidence that buyers were trading down within it.” Thornton (2013) notes that between 2007 and 2009, consumers in the United States “were paying a lower average price for the wine they purchased” as they moved away from the “higher-priced luxury wines they were consuming prior to the downturn, when they had higher incomes and there was less uncertainty about their employment status.” On Argentinean wines, Trad (2008) observes that “consumers were cutting back on wine spending” and were “willing to seek refuge in lower price ranges.”

To test our predictions, we use a rich and unique trade dataset from the Argentinean customs. The dataset reports, for each export flow between 2002 and 2009, the name of the exporting firm, the country of destination, the date of shipment, the Free on Board (FOB) value of exports (in US dollars), and the volume (in liters) of each wine exported, where a wine is defined according to its name, grape (Chardonnay, Malbec, etc.), type (white, red, or rosé), and vintage year.⁴ To measure quality, we exploit two well-known experts wine ratings, the Wine Spectator and Robert Parker.

Our dataset is well-suited to study the heterogeneous response of traded goods differentiated by quality to the global financial crisis.⁵ First, as the level of disaggregation of the data is unique, we can define a “product” in a much more precise way compared to papers that rely on trade classifications such as the Combined Nomenclature (CN) or the Harmonized System (HS) to identify traded goods (e.g., Behrens, Corcos, and Mion, 2013; Berthou and Emlinger, 2010; Levchenko, Lewis, and Tesar, 2011). As far as we know, our paper is the first to use such highly disaggregated product-level trade data to investigate the effects of the global financial crisis on the composition of international trade.⁶ Second, in contrast to papers that use trade unit values to proxy for quality, our focus on the wine industry allows us to rely on an observable measure of quality. When using the Wine Spectator scores that have the largest coverage of Argentinean wines, our sample includes 138 multi-product firms shipping 1,167 different wines with heterogeneous levels of quality. Aggregating our data at the 12-digit HS level would reduce our sample size fivefold, which would in turn significantly lower the within-firm variation in the quality of exported wines as the 138 exporters would only be selling, at most, three different “products.” Finally, export values are FOB and therefore measure the revenue received by exporters at the border, excluding nontradable factors such as transportation costs, tariffs, and distribution and retail costs in the importing country.

To understand the evolution of Argentinean wine exports, we first perform a decomposition of nominal export growth and find that most of the adjustment during the crisis occurred at the intensive rather than at the extensive margin. As a result, in our empirical analysis we adopt a difference-in-difference specification which explains changes at the intensive margin, and compares the growth of export values, volumes, and unit values, before and during the crisis, across goods with different levels

⁴As explained below, we however define a “product” according to the name of the wine, its type, and grape, but ignore the vintage year. As wine is an exhaustible resource, we want to avoid the possibility that a wine became exported less during the crisis only because its supply was running out.

⁵Evidence suggests that the fine wine market devoted to investors and collectors has remained immune to the global financial crisis. Argentinean wines are not, however, traded by wine auction houses such as Christies or Sothebys, which predominantly specialize in wines from the Bordeaux region as they are the most popular among investors and collectors.

⁶Bems and di Giovanni (2015) use similarly disaggregated product-level data but at the retail-level.

of quality. We identify the episode of the collapse of Argentinean wine exports by visually inspecting the data, and define the “crisis” period as running from the fourth quarter of 2008 to the third quarter of 2009 (henceforth, 2008Q4 and 2009Q3, respectively). The growth rates are computed for each firm-product-destination triplet that reports positive exports between two consecutive periods.

The central result of our paper is that before the crisis, higher quality goods enjoyed a stronger growth of nominal exports than lower quality products, but this trend reversed during the crisis and export growth fell more dramatically for higher quality goods. On average, a one unit increase on the quality scale raised export growth by two percentage points before the crisis, and reduced it by two percentage points during the downturn. We also find that the collapse of nominal exports for higher quality wines was essentially driven by a drop in quantities, rather than by a change in prices. This heterogeneity in the response of trade to the financial crisis remains robust to different measures of quality, samples, specifications, and to the potential endogeneity of quality.

Next, we investigate various channels to explain the sharper fall of higher quality exports during the crisis. First, we show that higher quality exports are more sensitive to changes in aggregate demand. Therefore, the negative income shock induced by the crisis was more detrimental to higher quality exports. Second, by distinguishing export destinations based on their wine self-sufficiency, we show that the flight from quality was stronger in the countries where households could substitute imports by domestically produced alternatives. Third, by relying on changes in the frequency of shipments at the transactions-level, we provide suggesting evidence that inventory adjustments matter to explain wine exports. However, as the effect turns out to be homogeneous across quality levels, we conclude that changes in inventories cannot explain the flight from quality that we observe during the crisis. Finally, we find that the flight from quality was stronger for the exports of smaller firms, which tend to be more sensitive to changes in aggregate demand and more credit constrained.

We also provide extensions to our benchmark results. First, we allow for nonlinearities in the effect of quality. For both the pre-crisis and crisis periods, we find that the marginal effect of quality on trade is mostly significant for the higher quality wines only, and its magnitude rises with quality. Second, our results remain robust to running specifications in first differences, or in levels, that incorporate the extensive margin of adjustment. These regressions also show that the collapse of higher quality exports during the crisis was characterized not only by slower growth, but also by less exports. Finally, we extend the analysis post-crisis, and find that export growth recovered more strongly for higher quality wines, implying that the trade effects of the crisis were only temporary.

Finally, we assess the contribution of quality to the evolution of nominal and real wine exports. We use our regression estimates to evaluate how Argentinean wine exports would have performed during the crisis under two alternative scenarios. On the one hand, if the quality of all exported wines had increased during the crisis to the highest level observed in our dataset, nominal and real exports would have dropped by 38.94 and 40.63 percent, compared to an actual fall of 36.53 and 38.17 percent, respectively. On the other hand, if all ratings had instead fallen during the crisis to the lowest level of quality in the sample, nominal and real exports would have been reduced by 30.00 and 32.39 percent, respectively. The difference in nominal and real trade performance due to the quality composition of exports during the crisis is thus equal to nine and eight percentage points, respectively.

Our paper belongs to several strands of the literature. The first one is the literature that addresses the role of quality during the recent trade collapse. Most closely related to our work are Bems and di Giovanni (2015), Berthou and Emlinger (2010), Esposito and Vicarelli (2011), and Levchenko et al. (2011). We differ from these papers in several dimensions. First, we find evidence of a flight from quality in traded goods. Instead, Bems and di Giovanni (2015) document expenditure switching from imported to domestic goods. Berthou and Emlinger (2010) analyze prices data and conclude that a quarter of the decline in the EU import price during the crisis was driven by a lower demand for higher quality products. Esposito and Vicarelli (2011) estimate that the income elasticity of imports increases with quality, while Levchenko et al. (2011) do not find any evidence that the imports of higher quality goods fell to a larger extent during the crisis. Second, we exploit the within-firm variation in product quality of multi-product firms. In contrast, Berthou and Emlinger (2010), Esposito and Vicarelli (2011), and Levchenko et al. (2011) rely on imports data at the HS or CN levels, while Bems and di Giovanni (2015) study scanner-data on the retail prices and quantities of products sold domestically. Third, our exports data are FOB and are thus free of insurance and transportation costs, while the import and retail data used by these papers are instead measured Cost, Insurance, and Freight (CIF), or in final consumer prices which include nontradables. Finally, our paper uses an observable measure of quality, while these papers rely on unit values as a proxy (Levchenko et al., 2011, also replicate the procedure of Khandelwal, 2010).⁷

Second, our analysis contributes to the literature that investigates changes in consumption patterns in the wake of aggregate shocks. In addition to Bems and di Giovanni (2015) mentioned above, evidence shows that during recessions, households in the United States trade down in the quality of the goods and services they consume (Jaimovich et al., 2015), they reallocate their expenditures towards cheaper goods by switching to lower-price retailers (Coibion, Gorodnichenko, and Hong, 2015), and they purchase more on sale, use more coupons, buy larger sizes, and switch to generic products (Nevo and Wong, 2015).⁸ Burstein et al. (2005) show that the Argentinean devaluation of the early 2000s reduced the market shares of higher quality brands. Griffith, O’Connell, and Smith (2013) find that, during the global recession, households in the United Kingdom reduced real expenditures on food, and substituted towards cheaper and less healthy food with lower nutritional quality.

Third, this paper relates to studies on the determinants of the Great Trade Collapse.⁹ Evidence suggests that trade contracted essentially because of a fall in aggregate demand (Baldwin, 2009), although Eaton, Kortum, Neiman, and Romalis (2015) argue that negative shocks to investment efficiency in durables were mostly to blame. Alessandria, Kaboski, and Midrigan (2010) emphasize the role of inventory adjustments, while Freund (2009) argues that trade is more sensitive to changes in GDP during downturns. Supply side explanations stress the role of cross-border vertical linkages (Bems, Johnson, and Yi, 2010, 2011; Levchenko, Lewis, and Tesar, 2010) and of financial constraints (Ahn, Amiti, and Weinstein, 2011; Bricongne, Fontagné, Gaulier, Taglioni, and Vicard, 2012; Chor

⁷Levchenko, Lewis, and Tesar (2011) “caution against using unit values as proxies for quality, especially when drawing conclusions about the role of quality differentiation in the recent trade collapse.”

⁸As the production of higher quality goods is more labor intensive than that of lower quality goods, Jaimovich et al. (2015) claim that trading down during recessions reduces labor demand, and therefore employment.

⁹Amiti and Weinstein (2011) stress that the key question of the trade collapse literature is not why trade fell, but rather why trade has been much more disrupted than domestic output. Our paper is concerned with how the crisis has affected the composition of trade, and does not look at its impact on domestic production.

and Manova, 2012). Evidence that trade protectionism increased during the crisis is limited (Eaton et al., 2015; Kee, Neagu, and Nicita, 2013). Regarding prices, Gopinath, Itskhoki, and Neiman (2012) find that in the United States, the trade prices of non-differentiated manufactures sharply declined.¹⁰

Fourth, our work relates more broadly to papers that analyze trade patterns during macroeconomic crises in general. Abiad, Mishra, and Topalova (2011) find that in countries hit by financial crises, imports decline sharply while exports are not affected. Amiti and Weinstein (2011) show that deteriorations in bank health during financial crises explain the drop in exports relative to output of Japanese firms. Bernard, Jensen, Redding, and Schott (2009) find that the intensive margin accounted for the majority of the changes in United States trade around the 1997 Asian financial crisis.¹¹

Finally, this paper contributes to the literature on trade and quality, which mainly relies on trade unit values to measure quality. Hummels and Klenow (2005) and Schott (2004) show that export unit values increase with exporter per capita income, while Hallak (2006) and Hummels and Skiba (2004) find that richer countries have a stronger demand for the goods of high unit value exporting countries. Feenstra and Romalis (2014) document that developed countries both export and import more of higher quality goods. Using firm-level data, some papers explore how quality and export performance are related (e.g., Bastos, Silva, and Verhoogen, 2014; Kugler and Verhoogen, 2012; Manova and Zhang, 2012a,b; Verhoogen, 2008). On the measurement of quality, Khandelwal (2010) compares exporters' market shares conditional on price to infer the quality of exports. Crozet, Head, and Mayer (2012) match French firm-level exports of Champagne with experts quality ratings to investigate the relationship between quality and trade. Using the same dataset on Argentinean wine exports as in this paper, Chen and Juvenal (2016) show that exchange rate pass-through falls with product quality.

The paper is organized as follows. Section 2 describes the firm-level customs data and the wine quality ratings, provides descriptive statistics, and assesses the relative contributions of the intensive and extensive margins to the collapse of Argentinean wine exports during the crisis. Section 3 presents the empirical methodology, our main results, and explores various channels to explain the sharper fall of higher quality exports during the crisis. Section 4 discusses extensions. Section 5 addresses the economic significance of quality, while Section 6 provides robustness checks. Section 7 concludes.

2 Data and Descriptive Statistics

This section presents our firm-level customs data and wine experts quality ratings. It also provides descriptive statistics, and investigates the relative contributions of the intensive and extensive margins to the collapse of Argentinean wine exports during the crisis.

2.1 Firm-Level Customs Data

Firm-level exports are from the Argentinean customs and are obtained from a private vendor called Nosis.¹² For each export flow we observe the name of the exporting firm, the destination country, the transaction date, the 12-digit HS classification code, and the value (in US dollars) and volume

¹⁰ Also see, among others, Behrens, Corcos, and Mion (2013) and Haddad, Harrison, and Hausman (2010).

¹¹ See Berman and Martin (2012) and Iacovone and Zavacka (2009), among others.

¹² See www.nosis.com.

(in liters) exported between 2002 and 2009.^{13,14} For each wine exported we have its name, type (red, white, or rosé), grape (Malbec, Chardonnay, etc.), and vintage year. Our sample covers a large range of destination countries that differ in terms of economic development, including OECD and EU countries, but also emerging markets (Brazil, India) and Asian countries (Hong Kong, Singapore).

We clean up the raw data in several ways. We only keep the FOB flows, drop the wines that were not produced in Argentina, and focus on wine producers only (wholesalers and retailers are excluded, therefore each wine is exported by only one firm).¹⁵ We drop the shipments smaller than 4.5 liters (the latter corresponds to a carton of six 75cl bottles) to discard commercial samples exported for the purposes of marketing and promotion (including these flows tends to magnify the effect of quality on export growth). We exclude the few typos where the vintage year reported is ahead of the year in which the export took place, and the observations where the value of exports is positive, but the volume is zero. Also, one concern is that wine is an exhaustible resource: once a wine with a specific vintage year runs out, it can no longer be produced. To avoid the possibility that a wine became exported less during the crisis only because its supply was running out, we define a product according to the name of the wine, its type, and grape, but ignore the vintage year (for each wine name, grape, type, destination, and time period, we sum exports across vintage years).¹⁶ Finally, as we need to precisely date the episode of the trade collapse, we aggregate the data at a quarterly frequency.¹⁷

As changes in nominal exports can be decomposed into changes in quantities and prices, we explore how the crisis has differentially impacted the growth of export values (in US dollars), volumes (in liters), and prices of goods with heterogeneous levels of quality. As export prices are not observed, as a proxy we compute the unit values of exports by dividing the value in US dollars by the volume in liters. In contrast to papers that define products according to trade classifications such as the CN or the HS (e.g., Behrens et al., 2013; Berthou and Emlinger, 2010; Levchenko et al., 2011), the granularity of our data ensures that compositional or quality changes do not affect movements in unit values (Feenstra and Romalis, 2014; Gopinath et al., 2012).

The literature typically assumes that the Great Trade Collapse started in 2008Q3 (which coincides with the bankruptcy of Lehman Brothers in September 2008) and ended around 2009Q2 (Behrens et al., 2013; Levchenko et al., 2011), with some variation across studies.¹⁸ For Argentina, we identify the

¹³According to the Food and Agriculture Organization of the United Nations, in 2008 Argentina was the sixth largest wine producing country worldwide.

¹⁴Due to confidentiality reasons, the customs cannot make the name of the exporting firm public. Therefore, Nosis uses its own market knowledge to identify a first, a second, and a third probable exporter. To identify the exporter's identity, for each wine name we collected from the Instituto Nacional de Vitivinicultura (INV) the name of its producer and of the wholesaler/retailer authorized to export the wine. For each wine name, we then compared the names of the probable exporters reported by Nosis with the names reported by the INV.

¹⁵Wholesalers and retailers represent a very small share of the sample. Once the customs data are merged with the quality ratings, these firms all drop out from the sample.

¹⁶This assumption sounds reasonable as evidence suggests that the quality of Argentinean wines does not vary much across vintage years. If wine producers conclude that the grapes grown during a particular year do not satisfy their quality standards, they may decide not to use them in order to preserve the reputation of a wine. In addition, modern winemaking techniques allow to minimize the variation in wine quality over time (Thornton, 2013). As we show later, our results remain robust to letting wine products vary by vintage year.

¹⁷Due to the highly disaggregated nature of the data, aggregating at a monthly frequency would significantly reduce the number of log changes of exports and prices that can be measured.

¹⁸For instance, Chor and Manova (2012) define August 2009 as the end of the crisis.

episode of the trade collapse by visually inspecting the data. Figure 1 plots the year-on-year growth of quarterly Argentinean wine and total manufacturing exports (in US dollars) between 2006Q4 and 2009Q4.¹⁹ Total exports fell by four percent in 2008Q4, witnessed a dramatic drop of 32 percent in 2009Q3, and started to recover in 2009Q4.²⁰

The collapse, and subsequent recovery, of total wine exports occurred in the same quarters. As shown in Figure 1, the year-on-year growth of quarterly wine exports dropped to 13.9 percent in 2008Q4, and continued to shrink during the first three quarters of 2009, declining by as much as 9.8 percent in 2009Q3, and recovered in 2009Q4, reaching 2.4 percent. Compared to total exports, the collapse of wine exports was therefore less severe, consistent with the observation that the effects of the crisis were not homogeneous across products, and that trade in postponable goods, consumer durables, and investment goods fell more dramatically than in food and beverages, including wine (Baldwin, 2009; Behrens et al., 2013; Freund, 2009; Levchenko et al., 2010).²¹ Still, the dynamics are similar, and the correlation between the two series in Figure 1 is equal to 93 percent.

Given the dynamics depicted in Figure 1, we define the “crisis” period as running from 2008Q4 to 2009Q3, and for each firm-product-destination triplet we sum exports over this four-quarter period (henceforth, 2008Q4–2009Q3).^{22,23} We then calculate the growth of exports between two consecutive four-quarter periods, i.e., between the 2007Q4–2008Q3 and the 2008Q4–2009Q3 periods for the post-treatment (crisis) sample, and between the 2006Q4–2007Q3 and the 2007Q4–2008Q3 periods for the pre-treatment (pre-crisis) sample (Behrens et al., 2013; Iacovone and Zavacka, 2009). Computing changes between the same quarters avoid seasonality issues.²⁴

Our full sample therefore spans the 2006Q4 to 2009Q3 time frame, and includes 5,478 wines of which 2,184 were exported between at least two (out of three) consecutive four-quarter periods. Once matched with the quality ratings, these numbers drop to 2,247 and 1,167 wines, which represent 59 and 50 percent of the total value of red, white, and rosé wine exported over the period. We sum the export values and volumes of all wines across destinations in each four-quarter period, and calculate the growth of export values, volumes, and unit values. For the two samples including 2,247 and 1,167 wines, the collapse of trade during the crisis was substantial: export values fell by 29.48 and 36.53 percent, volumes by 32.37 and 38.17 percent, while unit values rose by 4.11 and 2.57 percent, respectively. The growth of unit values could be, to some extent, due to internal factors taking place in Argentina, such as the rise in inflation or in financial costs (Gil-Fournier, 2008; Thornton, 2013).

¹⁹The growth rates are calculated year-on-year to minimize seasonal effects. Quarterly total exports are from the International Financial Statistics of the International Monetary Fund. Total wine exports are from Nosis.

²⁰The year-on-year growth of quarterly total exports subsequently became positive in 2010Q1, reaching 3.6 percent.

²¹From 2008 to 2009, total and wine exports fell by 23 and 14 percent worldwide, and by 20 and two percent for Argentina, respectively. Wine exports are from the Commodity Trade Statistics Database (Comtrade) of the United Nations (HS code 22.04), available at an annual frequency only. Total exports are from the International Financial Statistics of the International Monetary Fund.

²²Castagnino, D’Amato, and Sangiácomo (2013) observe that the largest Argentinean firms tend to export continuously, while small and medium-sized firms are instead sporadic exporters. Summing exports over four quarters allows us to increase the sample coverage of the small and medium-sized firms.

²³As we show later, our results remain robust to alternative starting or ending dates.

²⁴As pointed out by Levchenko, Lewis, and Tesar (2010), an alternative would be to measure the percentage drop in trade from the peak to the trough of the recession, but this measure would be contaminated by seasonality.

2.2 Quality

To measure quality, we use the time-invariant quality scores published by the Wine Spectator and Robert Parker magazines (Chen and Juvenal, 2016). In both cases, the wines are assessed in blind tastings, and the ratings are given on a (50,100) scale according to the name of the wine, its grape, type, and vintage year. A larger score indicates a higher quality.²⁵ Table 1 describes the Wine Spectator and Parker rating systems. As we define a wine product ignoring its vintage year, we compute, for each wine, the unweighted average of the Wine Spectator and Parker scores of all wines with the same name, grape, and type, and round it to its closest integer. As a robustness check, we also calculate a weighted average using the export shares of each wine as weights.

When we match the wines from the customs dataset with the average quality ratings from the Wine Spectator by name, type, and grape, we end up with 138 firms exporting 1,167 wines with 437 different names, three types, and 22 grapes. The lowest rated wine receives a score of 68, and the highest a score of 96. With Parker, we observe 595 wines exported by 107 firms (with 246 different names, three types, and 18 grapes). The average scores vary between 74 and 98 (only four out of the six bins listed in Table 1 are therefore included in the sample).

A total of 487 wines, exported by 92 firms, are reviewed by both the Wine Spectator and Parker. Compared to Parker, the Wine Spectator ratings are smaller, larger, or equal for 374, 61, and 52 wines, respectively. On average, Parker is therefore more generous in its ratings than the Wine Spectator. The mean absolute difference between the two ratings is equal to 3.3, with a standard deviation of 2.8. The Wine Spectator scores are larger than the Parker ratings by four points at most, while Parker exceeds the Wine Spectator by up to 18 points for one wine, and by more than five, or ten points, for 90 and 11 wines, respectively. This illustrates that the disagreement between tasters can, in some cases, be substantial. Still, the two ratings are positively correlated as Pearson's correlation is equal to 0.55, and Kendall's correlation index of concordance is 0.37. We however rely on the Wine Spectator for our main specifications because it has the largest coverage of Argentinean wines.

2.3 Descriptive Statistics

To illustrate Argentina's relative performance in wine exports during the crisis, we first use data on total wine imports (HS code 22.04) from the Commodity Trade Statistics Database (Comtrade) of the United Nations (only available at an annual frequency), and for the 50 largest importers of Argentinean wine in 2008, we calculate the growth from 2008 to 2009 in their share of Argentinean wine imports in total wine imports. Figure 2 shows that the import shares grew in some countries including the United States and Canada, while they shrank in others such as China and Australia. This heterogeneity across destination countries illustrates that the collapse of wine exports during the crisis has not been limited to Argentina.

Using our customs data, Table 2 then lists the fifteen largest destinations for Argentinean wine exports, and shows that Argentina mostly exports to developed economies, the United States being

²⁵ Subjective quality refers to the evaluation of consumers based on personal tastes and preferences, whereas objective quality rates the characteristics of a wine which are unrelated to personal preferences such as balance, complexity, finish, concentration, or flavor intensity. The role of experts is to provide an objective assessment of quality (Thornton, 2013).

the top destination market. During the crisis, the export shares rose to the United States and Canada, fell to Russia and China, and otherwise remained remarkably stable to the other destination markets.

Table 3 reports summary statistics for the main variables of interest in our dataset, over the full sample and separately for the pre-crisis and crisis periods. Before the crisis, both nominal and real exports enjoyed a positive mean growth (of 6.55 and 3.43 percent), which subsequently collapsed with the downturn (by 7.15 and 12.12 percent, respectively). The mean growth of unit values accelerated during the crisis (from 3.12 to 4.97 percent). Besides, the mean quality ratings remained stable over time at a value of 84 for the Wine Spectator, and 88 for Parker.

Our full sample includes 138 exporters, 1,167 wines, and 84 destination countries (8,051 observations). The pre-crisis sample is composed of 126 firms exporting 996 wines to 81 countries (4,344 observations), while the crisis sample is slightly smaller, with 115 firms selling 945 wines to 76 export markets (3,707 observations). Among the 138 firms, export growth is observed in both periods for 103 exporters, and only before or during the crisis for 23 and 12 firms, respectively. The 35 firms exiting or entering the sample are small in terms of volumes exported (i.e., their total export quantities are below the 80th percentile of total real exports across firms, Bricongne et al., 2012), which is consistent with Castagnino, D’Amato, and Sangiácomo (2013) who document that small and medium-sized Argentinean firms are sporadic exporters. Export growth is observed in both periods for 774 wines, and only before or during the crisis for 222 and 171 wines, respectively. These wines are broadly similar in terms of quality as the mean Wine Spectator and Parker ratings are equal to 84 and 88 for the wines exported continuously, and to 84 and 89 for the ones entering or exiting from the sample. Finally, among the 84 export markets, 73 were served continuously, while eight dropped out, and three entered, during the crisis.²⁶ Overall, changes at the extensive margin for the number of firms, wines, and export markets are not negligible. However, as we show in Section 2.4, the collapse of wine exports during the crisis essentially occurred at the intensive margin. As a result, our main analysis explains changes at the intensive margin, while the extensive margin is addressed in Section 4.2.

Table 4 describes the data by quality bin of the Wine Spectator. For both sub-periods, “Good” and “Very good” wines represent the largest share of the sample (in terms of number of observations, firms, wines, destinations, and mean export shares). In contrast, “Great” and “Not recommended” wines have the smallest coverages. Higher quality wines are, on average, more expensive.²⁷ Due to the small number of observations for “Great” wines, we also merge “Great” and “Outstanding” wines into a single category. The same observations apply.

Table 5 describes the mean growth of export values, volumes, and unit values, before and during the crisis, by quality bin of the Wine Spectator. The table shows there is a significant amount of heterogeneity in the values taken by these variables across quality bins. Before the crisis, nominal export growth was on average the strongest in the higher quality segments, and reached 43.18 percent for “Great” wines, followed by 19.65 percent for “Outstanding,” and 11.02 percent for “Very good”

²⁶The eight countries dropping from the sample during the crisis are Antigua and Barbuda, the Bahamas, Barbados, Belize, Croatia, Cyprus, Hungary, and Suriname, while the three entering are Grenada, Indonesia, and Sri Lanka.

²⁷As mentioned earlier, the literature typically relies on trade unit values to proxy for quality. This approach is criticized by, among others, Khandelwal (2010). The correlations between (log) export unit values and the mean Wine Spectator and Parker ratings are equal to 40 and 55 percent, respectively.

wines. It was close to zero for “Good” wines, and equal to 3.01 and 6.39 percent for “Mediocre” and “Not recommended” wines. Interestingly, this pattern across quality bins reversed during the crisis. On average, the collapse of exports was the sharpest for “Great” wines at 31.88 percent (which implies a $-31.88 - 43.18 = -75.06$ percentage points change compared to the pre-crisis period), followed by 26.45 percent for “Outstanding,” 9.75 percent for “Very good,” 1.69 percent for “Good,” 4.49 percent for “Mediocre,” and 12.05 percent for “Not recommended” wines. Although indicative of a larger fall in trade for higher quality wines during the crisis compared to the earlier period, these numbers remain silent on the behavior of exports *within* quality bins. They are however consistent with a flight from quality during the crisis. The pattern for export volumes is similar, while mean inflation dropped during the crisis for “Great” and “Outstanding” wines only. Similar observations apply if we merge “Great” and “Outstanding” wines into a single category.

Finally, Table 6 describes mean export market shares. Using export values and volumes, we compute the share of exports of each wine in the total wine exports of all firms to each destination in each time period in the sample, and report mean log changes by quality bin of the Wine Spectator. The value-based market shares of “Great” and “Outstanding” wines enjoyed the strongest mean growth before the crisis (of 53.10 and 21.19 percent), which subsequently collapsed dramatically during the downturn (to 10.44 and -2.52 percent, or a fall of 42.66 and 23.71 percentage points, respectively). At the other extreme, the shares of “Not recommended” and “Mediocre” wines grew the slowest before the crisis (by 3.57 and 0.81 percent), but subsequently strongly picked up (by 20.44 and 21.02 percent, or an increase of 16.87 and 20.21 percentage points, respectively). A similar pattern applies to the volume-based market shares. These findings are again indicative of a flight from quality during the crisis. Similar conclusions obtain if “Great” and “Outstanding” wines are merged together.

2.4 Decomposition of Margins

To get a sense of the relative contributions of the extensive and intensive margins to the evolution of Argentinean wine exports during the crisis, we follow Behrens et al. (2013) and Bernard et al. (2009) and decompose nominal exports X in a given time period as $X = f \times \bar{d} \times \bar{p} \times \bar{x}$, where f denotes the number of exporting firms, \bar{d} the mean number of destination countries each firm exports to, \bar{p} the mean number of products each firm exports to each country, and $\bar{x} \equiv X / (f \times \bar{d} \times \bar{p})$ the mean sales per firm-destination-product. Defining $\Delta X = \tilde{X}/X$, where \tilde{X} refers to exports in the next period, the change in exports from the 2007Q4–2008Q3 to the 2008Q4–2009Q3 period can be decomposed as

$$\Delta X = \Delta f \times \Delta \bar{d} \times \Delta \bar{p} \times \Delta \bar{x} \quad (1)$$

where Δf , $\Delta \bar{d}$, and $\Delta \bar{p}$ capture changes at the extensive margin, $\Delta \bar{x}$ represents changes at the intensive margin, and the latter can be further decomposed into changes in mean quantities $\Delta \bar{q}$ (in liters) and mean unit values $\Delta \bar{u}\bar{v}$ (in US dollars per liter), i.e., $\Delta \bar{x} \equiv \Delta \bar{q} \times \Delta \bar{u}\bar{v}$. We perform this decomposition using the full sample of wine exports for which quality is observed (and which includes changes at both the intensive and extensive margins, i.e., with 2,247 wines).

As shown in Table 7, nominal wine exports fell by 29.48 percent during the crisis, and this collapse was driven by a fall in the number of exporters (by 5.33 percent), and in the mean number of destinations (by 6.84 percent) and of wines exported by each firm to each country (by 1.71 percent).

Changes at the extensive margin therefore reduced exports by $(0.9467 \times 0.9316 \times 0.9829 - 1) \times 100 = -13.31$ percent. The adjustment at the intensive margin however dominated as the mean value of exports per firm-destination-product fell by 18.65 percent. In other words, the relative contributions of the intensive and extensive margins to the collapse of wine exports amounted to 63.27 and 36.73 percent, respectively.²⁸ Changes at the intensive margin were essentially driven by a fall in the mean quantities exported (by 21.99 percent), while mean unit values rose over the period (by 4.28 percent).²⁹

3 Quality and Trade During the Crisis

To determine whether the crisis has differentially impacted the growth of exports across goods with heterogeneous levels of quality, we estimate the following reduced-form regression (Behrens et al., 2013; Bernard et al., 2009; Iacovone and Zavacka, 2009)

$$\Delta \ln X_{ijk,t} = \beta_1 \text{quality}_k + \beta_2 \text{quality}_k \times D_{crisis} + D_{ij,t} + D_{grape} + D_{type} + D_p + D_{HS} + \epsilon_{ijk,t} \quad (2)$$

where $\Delta \ln X_{ijk,t}$ is the log change of exports (in US dollars) of wine k sold by firm i to destination country j in period t . The log changes are calculated between the 2007Q4–2008Q3 and the 2008Q4–2009Q3 periods for the post-treatment (crisis) sample, and between the 2006Q4–2007Q3 and the 2007Q4–2008Q3 periods for the pre-treatment (pre-crisis) sample. As computing log changes requires us to observe positive trade flows for each firm-product-destination triplet between two consecutive four-quarter periods, equation (2) explains changes at the intensive margin which, as we have shown previously, dominated the evolution of wine exports during the crisis. The quality of wine k is denoted by quality_k , and the Wine Spectator ratings are used for our benchmark specifications. We define a dummy variable D_{crisis} that is equal to one for the 2008Q4–2009Q3 crisis period, and interact it with quality. The coefficients to be estimated are β_1 and β_2 , and $\epsilon_{ijk,t}$ is an error term. The coefficient β_1 captures the effect of quality on export growth in a “normal” period (i.e., before the crisis), while β_2 measures the *differential* effect of quality on export growth during the crisis.

We control for an extensive set of fixed effects and perform within estimations. We include firm-destination-time effects, $D_{ij,t}$, that sweep out all aggregate, firm, and destination-specific supply and demand shocks that are common across the goods exported by each firm to each destination country at each point in time. These include factors that vary by firm-destination-time (e.g., the time-varying demand of a country for a firm’s exports, or the presence of long term contracts between exporters and importers in each destination country), time-varying characteristics of the exporters such as changes in productivity, firm size, global value chains, inventories, or credit constraints, firm-destination effects such as the tastes of an importer for the goods of a firm, and time-varying destination-specific factors such as GDP growth, multilateral resistance, protectionist measures, or bilateral exchange rates.³⁰ They also absorb the direct effect of the crisis on Argentinean wine exports (i.e., the main effect of D_{crisis}). As product fixed effects are collinear with quality, we control for product characteristics by

²⁸In Behrens et al. (2013), the intensive margin explains up to 97 percent of trade growth.

²⁹Considering both margins, the total change in wine exports is equal to $(0.9467 \times 0.9316 \times 0.9829 \times 0.8135 - 1) \times 100 = -29.48$ percent. Further decomposing the intensive margin into changes in mean quantities and prices, the total change in wine exports is given by $(0.9467 \times 0.9316 \times 0.9829 \times 0.7801 \times 1.0428 - 1) \times 100 = -29.48$ percent.

³⁰Our fixed effects control for the various determinants of the trade collapse that have been studied in the literature.

including grape D_{grape} , type D_{type} , HS D_{HS} , and province of origin of the grapes D_p fixed effects.³¹ Controls for the wine names are not included as they are collinear with the firm fixed effects (as each wine is exported by one firm only). Standard errors are clustered by destination-time to control for time-varying idiosyncratic shocks correlated at the importer-level.

As our main interest lies in the interaction between quality and the crisis dummy variable, we proceed to estimate a more conservative specification

$$\Delta \ln X_{ijk,t} = \gamma \text{quality}_k \times D_{crisis} + D_{ij,t} + D_k + \eta_{ijk,t} \quad (3)$$

which controls for product fixed effects, D_k . As a result, quality drops out from the regression. The coefficient of interest, γ , captures the differential impact of quality on export growth during the crisis.

In addition to export values, we also estimate equations (2) and (3) using the log change of export volumes and unit values as dependent variables. Given that unit values are equal to the ratio between values and volumes, the elasticities for export values are, by construction, equal to the sum of the elasticities for export volumes and unit values.

3.1 Baseline Results

Panel A of Table 8 reports the results for nominal exports. In column (1), we estimate equation (2) but only include quality as a regressor, which is insignificant. Once we let the relationship between export growth and quality vary over time, column (2) shows that higher quality wines enjoyed a stronger growth of exports before the crisis, but were subsequently more negatively affected. On average, a one unit increase in quality raised export growth by two percentage points before the crisis, and reduced it by two percentage points during the downturn (0.018 – 0.036). The results are similar in column (3), where the grape, type, province, and HS fixed effects are interacted with time dummies to control for unobserved, time-varying product characteristics (for instance, white and rosé wines mature for a shorter period of time compared to red wines, and need to be sold within a few months after fermentation, Thornton, 2013), or for shifts in consumer preferences for different types of wines.

The results of estimating equation (3) are reported in column (4). Quality interacted with the crisis dummy remains negative and significant, albeit slightly smaller in magnitude. In column (5), quality is measured using the Parker ratings. Finally, column (6) only includes the wines exported both before and during the crisis to any destination, while column (7) restricts the sample to the permanent exporters only. Qualitatively, our results hold in all cases.³²

Panels B and C report the same specifications for export volumes and unit values. For volumes, the pattern and magnitude of the results are very similar to the ones for export values. In contrast, for unit values the interactions between quality and the crisis dummy are negative, but significant at the ten percent level at most. The collapse of higher quality exports during the crisis was therefore mostly driven by a drop in quantities, rather than a change in prices (Behrens et al., 2013).

³¹ “Old World” wines are labelled by the region where they are produced and where the grapes are grown, whereas “New World” wines are classified by their grapes which can be grown in different provinces.

³² As the mean Wine Spectator and Parker quality scores remained the same before and during the crisis, we can rule out that our results are driven by a lower quality reducing the demand for wine exports during the recession.

3.2 The Channels

This section explores various channels to explain the sharper fall of higher quality exports during the financial crisis. We consider the role of changes in aggregate demand, expenditure switching from imported to domestically produced varieties, inventory adjustments, and firm size.³³

3.2.1 Aggregate Demand

Our presumption is that the flight from quality that we identify in the data was primarily driven by a fall in aggregate demand, combined with higher quality goods being more income elastic than lower quality items. To investigate this channel, we control for real GDP per capita growth in each destination country to capture changes in aggregate demand. We also use the growth of household real final consumption expenditures per capita, and the change in the unemployment rate, as alternative business cycle indicators (due to incomplete country coverage, the sample sizes are slightly reduced).³⁴

We estimate equation (3), but only include quality interacted with each proxy for the change in aggregate demand as a regressor (the main effects of the change in aggregate demand and of quality being absorbed by the fixed effects). The results for export values are reported in Panel A of Table 9. In column (1), the interaction between quality and income growth is positive and significant. In other words, the drop in mean income growth that we observe in the sample, from 1.6 to -3.9 percent during the crisis, was more detrimental to higher quality exports. The results remain consistent if we measure changes in aggregate demand using the growth of household expenditures per capita (column 2), which on average fell from 1.6 to -2.0 percent, or the change in the unemployment rate (column 3), which on average rose from -0.1 to 1.9 percent during the crisis (in column 3, the negative interaction indicates that the rise in unemployment during the crisis reduced higher quality exports to a larger extent). The results for volumes in Panel B are similar. For unit values in Panel C, the interactions are insignificant.³⁵

Columns (4) to (6) include product-time fixed effects to control for unobserved, time-varying characteristics of the different wines (such fixed effects could not be included in the regressions reported in Table 8 as they are collinear with the main variable of interest, i.e., quality interacted with the crisis dummy variable). For nominal and real exports, the interactions between quality and changes in aggregate demand remain significant and with expected signs.

³³ Changes in exchange rates also have heterogeneous effects on the exports and the prices of traded goods differentiated by quality. Chen and Juvenal (2016) show that a real depreciation increases export prices by more, and export volumes by less, for higher quality goods. We estimated equation (3), including changes in bilateral exchange rates interacted with quality, but the estimated coefficients were insignificant, most likely because our sample does not provide sufficient time-series variation to uncover significant exchange rate effects.

³⁴ The data on real GDPs per capita (in US dollars) are from the Penn World Tables, while household real final consumption expenditures per capita (in US dollars) and the unemployment rates are from the World Bank's World Development Indicators. All variables are measured annually for the years 2007–2009. One shortcoming of using annual data is that in many countries, aggregate demand was strong both at the start of 2007 and at the end of 2009. Quarterly data are however not available for most emerging markets and developing economies.

³⁵ Behrens et al. (2013), Bems, Johnson, and Yi (2010), and Freund (2009) find that the sensitivity of trade to GDP growth rose during the crisis. Instead, we look at how changes in aggregate demand affect the elasticity of trade to quality. Including a triple interaction between changes in aggregate demand, quality, and the crisis dummy yields insignificant results.

Another way to explore the role of aggregate demand is to focus on specific destination countries. Indeed, the financial crisis has hit some countries more than others, with some countries falling deeply into recession and others avoiding it. The resulting drop in aggregate demand, and in turn in the demand for Argentinean wines, can thus be expected to be stronger in some countries than in others. Examples include the United States (the epicenter of the global financial crisis) and the United Kingdom, where real GDP per capita growth fell from -0.8 and -0.6 percent to -5.2 and -5.9 percent during the crisis, respectively.³⁶ Conversely, as China has remained immune to the global recession (with a real income growth of 8.5 and 8.8 percent before and during the crisis), higher quality wine exports to China may have grown.^{37,38} Finally, Hong Kong entered into a recession in 2008, and its income per capita growth shrank from 1.2 to -4.2 percent. At the same time, however, its ad-valorem import duties on wine were cut from 40 to zero percent in February 2008, and all import licences and permits on wine were removed in June 2008, potentially stimulating higher quality wine imports.³⁹ Separately for each country, we therefore investigate how the exports and the prices of higher quality goods performed during the crisis relative to lower quality items. We estimate equation (3), and let the interaction between quality and the crisis indicator vary between each country and the other countries in the sample.⁴⁰

Table 10 shows that higher quality wine exports to the United States and the United Kingdom fell dramatically during the crisis. In nominal terms (Panel A), a one unit increase in quality reduced export growth from its pre-crisis level by 11.2 percentage points for the United States (column 1), and by 7.3 percentage points for the United Kingdom (column 2), compared to around 2.5 percentage points for the other countries. Both the quantities (Panel B) and the prices (Panel C) of higher quality wine exports decreased by more for the United States, while for the United Kingdom only the quantities declined more sharply. For China, the interactions for nominal and real exports are insignificant (column 3). Despite the sustained growth that China has enjoyed during the crisis, its imports were therefore not differentially affected across quality levels, although higher quality wines experienced lower inflation. For Hong Kong, a one unit increase in quality raised the growth rates of nominal and real exports from their pre-crisis levels by 7.0 and 7.8 percentage points, respectively, and reduced the growth of unit values by 0.8 percentage points (column 4).⁴¹ The impact of the liberalization measures introduced during the crisis has thus most likely offset the negative trade effect attributable to the fall in aggregate demand. Column (5) separately controls for each country simultaneously. Finally, to ensure that our results are not driven by firms adjusting the composition of their exports across destinations in response to differences in demand shocks, column (6) restricts the sample to the wines exported continuously to each destination country.

³⁶ Chor and Manova (2012) note that, by the end of 2008, the collapse of US imports was larger than that of exports, reflecting “the particular sharp decline in consumer sentiment and import demand in the US relative to other countries.”

³⁷ Behrens et al. (2013) observe that Belgium’s trade with China was much less affected during the crisis.

³⁸ Compared to Western countries, China’s per capita wine consumption is low. However, due to the size of its adult population, and the fact that “income growth has led to a burgeoning middle class and enriched their elite” (Anderson and Wittwer, 2013), China’s demand for wine has soared. China has expanded its wine production dramatically, and is today among the world’s five largest wine producers, but as “supply expansion has not been able to keep up with China’s growth in demand [...], wine imports have surged” (Anderson and Wittwer, 2015).

³⁹ See the US Department of Agriculture’s report http://gain.fas.usda.gov/Recent%20GAIN%20Publications/Hong%20Kong%E2%80%99s%20Import%20Regulations%20on%20Wine_Hong%20Kong_Hong%20Kong_12-13-2010.pdf.

⁴⁰ The results remain similar if we also include interactions between quality and a dummy for each country group.

⁴¹ In support of our findings, Kym Anderson has argued, at the American Association of Wine Economists meeting in 2011, that “the removal of wine import taxes in Hong Kong has led to a large increase in demand for iconic wines.”

3.2.2 Expenditure Switching

In response to an adverse income shock, households reduce both the quantity and the quality of the goods they consume, leading to a sharper contraction in higher than in lower quality imports. Our expectation is that this flight from quality in traded goods should be stronger in the countries where households can substitute imports by domestic alternatives. Such a substitution could happen because imports are more expensive than domestic goods (Alchian and Allen, 1964), or because households buy relatively more from home suppliers during downturns as they become more patriotic in product choices or have stronger trust in domestic goods.⁴² Using data on the retail prices and quantities of products sold in Latvia, Bems and di Giovanni (2015) find evidence of a substitution from imported to domestically produced goods in response to the 2008–2009 balance of payments crisis.

Missing any data on the consumption and the prices of domestically produced wines with different and comparable levels of quality in each destination country, we are unable to directly assess expenditure switching from imported to domestically produced wines. As expenditure switching is only possible in wine producing countries, especially the ones where the supply of domestic wines is large enough to satisfy local demand, an alternative way of proceeding is to distinguish countries based on their wine self-sufficiency and to check whether, during the crisis, higher quality Argentinean wine exports fell by more when shipped to self-sufficient destinations. Self-sufficiency is given by the volume of domestic wine production over consumption (Anderson and Nelgen, 2011). It is equal to zero for non-producing countries, but is larger or smaller than one for self-sufficient and non-self-sufficient nations, respectively. It therefore captures whether a producing country is dependent, or not, on imports to satisfy domestic demand.

Table 11 summarizes the mean growth of export values, volumes, and unit values for the wines shipped to wine producing, non-producing, self-sufficient, and non-self-sufficient countries. Before the crisis, nominal and real exports enjoyed a positive mean growth to both producing (of 6.06 and 2.61 percent) and non-producing nations (of 7.49 and 5.04 percent), which then collapsed with the onset of the crisis. Nominal and real exports fell by 10.01 and 16.16 percent on average to wine producing countries, compared to only 0.91 and 3.30 percent to non-wine producers. Interestingly, the collapse of nominal and real exports (of 14.49 and 17.76 percent) was the largest to self-sufficient nations.

We then estimate equation (3), and let quality interacted with the crisis dummy vary between three groups of countries: the non-producers, the self-sufficient, and the non-self-sufficient countries. In column (1) of Table 12, the interaction is large and negative at a value of -0.073 for the self-sufficient countries, equals -0.026 for the non-self-sufficient nations, and is insignificant for the non-producers. A one unit increase in quality therefore reduced nominal export growth from its pre-crisis level by 7.3 percentage points to the self-sufficient nations, versus 2.6 percentage points to the non-self-sufficient ones. Similar observations apply for export volumes and unit values in columns (2) and (3). Despite becoming cheaper in relative terms, higher quality wines therefore suffered more dramatically when exported to self-sufficient countries.

⁴²The increase in patriotism during recessions can be instigated by policymakers. Examples include the call in January 2009 from the industry minister of Spain for the population to shop Spanish in order to fight the recession, or the inclusion of a “Buy American” provision in the US fiscal stimulus package that was enacted in February 2009.

With the exception of China, the five major producing countries (France, Italy, Spain, and the United States), which are also self-sufficient in wine consumption, were all severely hit by the financial crisis. To ensure that our results are not driven by changes in aggregate demand, columns (4) to (6) include real GDP per capita growth interacted with quality, separately for the three groups of countries. The coefficients on quality interacted with the crisis indicator become smaller in magnitude and less significant, but our results still hold.⁴³

3.2.3 Inventory Adjustments

Alessandria et al. (2010) claim that inventory adjustments contributed to the trade collapse during the global financial crisis. In response to a negative demand shock, importers may indeed deplete their inventories instead of importing from abroad, amplifying the magnitude of the trade decline. One way to address the role of inventories is to consider, for each wine exported to each destination country in each time period, the change in the frequency of shipments at the transactions-level as a lower frequency could be an indication that the destination country is depleting its inventories.

To check if inventory adjustments explain the growth of Argentinean wine exports, and of higher quality wines in particular, equation (3) includes the log change in the frequency of shipments, on its own and interacted with quality, as regressors (product-time fixed effects are controlled for). In columns (1) to (3) of Table 13, the change in frequency is positive and significant, as expected, but its interaction with quality is insignificant for export values and volumes, and negative for unit values.⁴⁴

As white and rosé wines need to be sold within a few months after fermentation, inventory adjustments could matter more for red wines as the latter can be stored. In columns (4) to (6) we therefore let the frequency of shipments, and its interaction with quality, vary between red and white/rosé wines. Frequency is positive and significant for red wines only, but its interaction with quality remains insignificant (and negative for unit values). We therefore conclude that inventory adjustments matter to explain trade flows, but as their effect is homogeneous across goods differentiated by quality they cannot explain the flight from quality that we observe during the crisis.

3.2.4 Firm Size

This section investigates whether the trade effects of the crisis vary between exporters of different sizes. We hypothesize that the flight from quality should be stronger for the exports of smaller firms. First, as small firms tend to specialize in “niche” markets by producing more differentiated, higher quality wines, while large producers supply more standardized, cheaper wines targeted for everyday consumption (Holmes and Stevens, 2014; Thornton, 2013), a negative income shock that hits most higher quality wine exports should affect the small firms to a larger extent. Second, if

⁴³Using the 2005–2006 World Values Survey, we explored whether the extent to which some countries are more patriotic than others could also explain our results. Respondents were asked the question “How proud are you to be [nationality]?” For each country, we calculated the share of respondents who are either “Very proud” or “Quite proud” of their citizenship. Due to limited coverage, our sample was reduced to 36 countries. We interacted the share of patriotic respondents with quality, and included it as a regressor in equation (3), but its coefficient was insignificant.

⁴⁴In results available upon request, we estimated equation (3), separately for positive and negative log changes in the frequency of shipments. For both export values and volumes, the interaction between quality and the crisis dummy was insignificant for positive changes, and negative at the ten percent level only for negative changes, which again provides little evidence that changes in inventories explained the flight from quality during the crisis.

importers anticipate to sell less of higher quality wines due to the recession, they may cut down on their purchases from the small wineries and instead continue to import from the largest producers who are more important business partners to them. Finally, on the supply side, as small firms are typically more restricted in their access to external finance than large firms, the tightening of credit conditions during the crisis could have reduced the exports of small firms by more (Bricongne et al., 2012; Chor and Manova, 2012).^{45,46} Lack of external financing could in turn be more detrimental to higher quality wine exports because the latter need, for instance, heavier bottles and cartons for shipping (Hummels and Skiba, 2004), and as these costs need to be incurred before export revenues are realized, their payments are highly reliant on external credit availability.

To measure firm size, we rank firms by their total volume of exports (in liters), and classify them into two categories. As in Bricongne et al. (2012), based on the 80th percentile of total exports, the small group includes the smallest 80 percent of exporters, while the large group includes the others. We estimate equation (3), and let quality interacted with the crisis dummy vary by firm size. Consistent with expectations, Table 14 shows that the nominal and real exports of higher quality wines collapsed to a large extent during the crisis for the small firms, while no significant effect is detected for the large firms (columns 1 and 2). The results for unit values are insignificant (column 3). Columns (4) to (6) further include income growth interacted with quality separately for each firm size. For nominal and real exports (columns 4 and 5), the coefficients for the small firms are reduced in magnitude but remain significant. This suggests that demand side factors were not the only reason for the collapse of these firms' higher quality exports, and that supply side factors, such as tighter credit conditions, may have also played a role (although the results for unit values are insignificant).

4 Extensions

This section discusses extensions to our benchmark specifications. We investigate nonlinearities in the effect of quality, extensive margin adjustments, and the post-crisis recovery.

4.1 Nonlinearities

To gain further insights on the relationship between trade and quality, we investigate whether the marginal effect of quality is heterogeneous across goods with different qualities. We estimate equation (2) and include quality and its squared value, both on their own and interacted with the crisis dummy, as regressors. Columns (1) to (3) of Table 15 show that nonlinearities are present for export values, volumes, and (less so) unit values. The negative squared quality terms for the crisis period indicate that the elasticities of values and volumes to quality increase in magnitude at higher levels of quality.

To evaluate the marginal effects of quality, the lower part of the table reports, for the pre-crisis and crisis periods, the elasticities of each dependent variable to quality, evaluated at the mid-score

⁴⁵Using data (which are not publicly available) on the domestic and foreign debt held by Argentinean firms, Castagnino et al. (2013) show that small and medium-sized firms are more restricted in accessing external finance than large firms.

⁴⁶Domestic credit conditions in Argentina became tighter during the crisis, as evidenced by the daily interbank lending rate that rose from an average of 8.8 to 10.9 percent between the 2007Q4–2008Q3 and 2008Q4–2009Q3 periods (data from Chor and Manova, 2012).

of each quality bin defined in Table 1.⁴⁷ In column (1), the elasticity of nominal export growth for the pre-crisis period is positive and significant for “Good,” “Very good,” “Outstanding,” and “Great” wines only, and its magnitude rises with quality (from 0.015 for “Good” to 0.061 for “Great” wines). For the crisis period, the elasticity is negative and significant for the higher quality wines only, and its magnitude again increases with quality (from -0.014 for “Good” to -0.072 for “Great” wines), while the coefficient for “Not recommended” wines is, in contrast, positive.

Columns (2) and (3) show that the stronger growth of nominal exports for higher quality wines in the pre-crisis period was driven by changes in quantities only. In contrast, the lower growth for “Very good,” “Outstanding,” and “Great” wines during the crisis was driven by lower growth for both quantities and prices (and to lower inflation only for “Good” wines). Columns (4) to (6) further include product fixed effects, and the results remain similar (for prices, the elasticities are insignificant).

Using the estimates of columns (1) to (3), and separately for the two periods, Figure 3 plots the elasticities of the growth of export values, volumes, and unit values to quality, evaluated at each quality score in the sample (i.e., from 68 to 96), and their 95 and 90 percent confidence intervals. For the pre-crisis period, the elasticities of export values and volumes are positive for quality levels above 81, and insignificant for unit values. For the crisis period, the elasticities are positive at low quality levels (below 74), and become negative for quality scores above 81 for export values, and 84 for volumes. For unit values, the elasticities are negative and significant for quality levels above 79.

4.2 Extensive Margin

By relying on log first difference specifications, our analysis has so far explained changes at the intensive margin. As noted earlier, the changes we observe at the extensive margin are not negligible, however. Crozet et al. (2012) show that OLS estimations that only include positive trade flows suffer from a selection bias which leads to underestimate the effect of quality on exports. The bias arises because a low quality firm that succeeds to export must be characterized by above-average determinants of export profitability, which are unobserved. To incorporate the extensive margin in our analysis, we proceed in several ways. First, we use as a dependent variable in equation (3) the mid-point export growth rate $g_{ijk,t}$ of each wine k sold by firm i to country j in period t

$$g_{ijk,t} = \frac{X_{ijk,t} - X_{ijk,t-1}}{\frac{1}{2}(X_{ijk,t} + X_{ijk,t-1})} \quad (4)$$

where $X_{ijk,t}$ can take on zero values. This measure, which is symmetric around zero and is bounded between -2 and +2, has become standard in the labor economics literature as it allows to simultaneously study entries, exits, and continuing flows in an integrated framework (Bricongne et al., 2012; Davis, Haltiwanger, and Schuh, 1996).⁴⁸ Second, we use as a dependent variable the first difference of $\ln(1 + X_{ijk,t})$. For high levels of trade flows, $\ln(1 + X_{ijk,t}) \simeq \ln X_{ijk,t}$, and for $X_{ijk,t} = 0$, $\ln(1 + X_{ijk,t}) = 0$.

⁴⁷The elasticities are evaluated at a value of 62 for “Not recommended,” 77 for “Mediocre,” 82 for “Good,” 87 for “Very good,” 92 for “Outstanding,” and 97.5 for “Great” wines.

⁴⁸The mid-point growth rate is equal to +2 for an entry, -2 for an exit, takes on values between zero and +2 if flows increased over time, and between -2 and zero if they decreased over time.

We also estimate specifications in levels. As a benchmark, we first estimate equation (3), but using $\ln X_{ijk,t}$ as a dependent variable. This approach excludes the zero trade observations, but includes the firm-product-destination triplets which exports are not observed between two consecutive periods. Second, we follow Crozet et al. (2012) and regress by a Tobit procedure the log of exports which are censored at their minimum observed positive value to each destination country in the sample. Finally, we regress $X_{ijk,t}$ by Poisson Pseudo-Maximum Likelihood (Santos Silva and Tenreyro, 2006). Another way to address sample selection would be to implement Heckman’s correction, as in Helpman, Melitz, and Rubinstein (2008), but this requires a variable that determines a firm’s destination-specific fixed costs of exporting, and not its variable trade costs, which is unavailable.

The results for nominal and real exports are reported in Table 16. Despite some variation in the magnitude of the effect of quality on trade across specifications, the resulting patterns are supportive of our baseline results. The level specifications in columns (3) to (5) indicate that the collapse of higher quality exports was characterized not only by slower growth, but also by less exports. Also, notice that compared to column (3), the interactions between quality and the crisis dummy in columns (4) and (5) are smaller once the extensive margin is accounted for.

4.3 Post-Crisis Recovery

We argue that the crisis has led to a sharper contraction in higher than in lower quality exports. One way to validate our interpretation is to extend the analysis post-crisis, and to investigate whether the exports of higher quality goods picked up more strongly once the world economy started to recover from the recession. This exercise also helps us to establish whether the trade effects of the crisis were only temporary (Baldwin, 2009).^{49,50}

Unfortunately, due to a glitch in the data collection, the customs dataset for 2010 reports the wine names as missing (while the firm names, export destinations, grapes, types, and vintage years are available). As a result, we cannot identify any of the wines exported during that year.⁵¹ Given the constraint to measure export growth between the same quarters to avoid the effects of seasonality, the earliest post-crisis data that can be used are observed for the 2011Q4–2012Q3 period. For each firm-product-destination triplet, the growth rates of export values, volumes, and unit values for the post-crisis sample are therefore measured between the 2008Q4–2009Q3 and the 2011Q4–2012Q3 four-quarter periods (i.e., with a two-year gap).

Our full sample now spans three different time periods as trade growth is calculated for the pre-crisis, crisis, and post-crisis periods. For export values, we then estimate

$$\begin{aligned} \Delta \ln X_{ijk,t} = & \alpha_1 quality_k + \alpha_2 quality_k \times D_{crisis} + \alpha_3 quality_k \times D_{post} + D_{ij,t} + D_{grape} \\ & + D_{type} + D_p + D_{HS} + \varepsilon_{ijk,t} \end{aligned} \quad (5)$$

⁴⁹Anderson and Wittwer (2013) note that, “due to the fall in income and wealth,” the crisis has brought “a temporary decline in the quantity and quality of wine demanded in traditional markets.”

⁵⁰World trade growth experienced a sharp recovery in 2010, but slowed down markedly in the course of 2011 and has remained sluggish since then. Evidence suggests that both cyclical and structural factors are negatively impeding global trade growth (Hoekman, 2015). Also, see Eaton, Kortum, Neiman, and Romalis (2015).

⁵¹According to Nosis, the issue with the 2010 data comes from the Argentinean customs and is, unfortunately, unlikely to be fixed in the future.

where D_{post} is a dummy variable equal to one for the 2011Q4–2012Q3 post-crisis period. The coefficient α_1 captures the effect of quality on export growth before the crisis, while α_2 and α_3 measure the differential effects of quality on export growth during and after the crisis, respectively. For the pre-crisis and crisis periods, we have already shown that $\alpha_1 > 0$, $\alpha_2 < 0$, and $\alpha_1 + \alpha_2 < 0$. For the recovery, the effect of quality on export growth is given by $\alpha_1 + \alpha_3$. If export growth recovered more strongly for higher than for lower quality wines, α_3 should either be insignificant, positive, or negative but with $|\alpha_1| > |\alpha_3|$ such that $\alpha_1 + \alpha_3 > 0$ (i.e., the effect of quality on export growth during the recovery was positive, and its magnitude was either the same, larger, or smaller than before the crisis).

The results of estimating equation (5) for export values are reported in column (1) of Panel A in Table 17. As expected, export growth was stronger for higher quality wines both before and after the crisis, and fell to a larger extent during the downturn. As in Table 8, a one unit increase in quality strengthened export growth by about two percentage points before the crisis, and subsequently lowered it by two percentage points. The positive coefficient on quality interacted with the post-crisis dummy indicates that a one unit increase in quality raised export growth by 6.3 percentage points ($0.018 + 0.045$) over the period. At first glance, this seems to suggest that the growth of higher quality exports post-recession has outpaced its pre-crisis performance. However, due to the unavailability of the 2010 customs data, recall that the growth rate post-crisis is calculated over a three-year period.

We estimate variants of equation (5). Column (2) excludes the post-crisis interaction. Higher quality exports increased by more in “normal” periods (i.e., before and after the crisis combined), and fell to a larger extent during the crisis. Columns (3) and (4) exclude the pre-crisis and crisis data from the sample, respectively, and the results remain consistent. Finally, columns (5) to (8) report the same specifications but with product fixed effects included. The crisis and post-crisis interactions all remain negative and positive, respectively. The results for export volumes in Panel B are highly comparable, both quantitatively and qualitatively. In Panel C, there is some indication that inflation fell to a larger extent for higher quality wines during the crisis, and became stronger after the downturn.

To conclude, our findings show that the crisis had heterogeneous effects on products differentiated by quality. The flight from quality in traded goods was only temporary, however, given the stronger recovery of higher quality exports that we observe after the end of the crisis.⁵²

5 Economic Significance of Quality

We assess the contribution of quality in explaining the evolution of wine exports. More precisely, we use our regression estimates to evaluate how Argentinean wine exports would have performed during the crisis under two alternative scenarios. First, we assume that the quality of all exported wines had increased to the highest level observed in our dataset (“quality upgrading”). Second, we consider the opposite extreme, and assume that the ratings of all wines had instead fallen to the lowest level of

⁵²In March 2008, the Argentinean government introduced a system of ad-valorem export taxes on most agricultural products, including wine, with the aim of restoring the fiscal surplus to curb domestic inflation. In our regressions, the inclusion of time fixed effects does not allow us to disentangle the effects of the crisis from the ones of the policy. However, we argue that this policy cannot drive our results as its effects should be homogeneous across destination countries, while we find that the flight from quality varies across destinations depending on their GDP per capita growth or self-sufficiency. Also, the policy cannot explain the stronger recovery of higher quality exports that we find post-crisis.

quality in the sample (“quality downgrading”). These two counterfactuals provide us with upper and lower bound estimates of the hypothetical performance of trade during the crisis due to changes in the quality composition of exports.⁵³

We use our point estimates from regressing equation (3), reported in column (4) of Panel A in Table 8. Using the actual Wine Spectator scores, we derive the predicted values of export growth for each wine shipped to each destination country, and compare them against the predicted values obtained under the assumption that the quality ratings had all increased during the crisis to the highest level observed in the sample (which is equal to 96). On the basis of predicted export levels, we then calculate that Argentinean exports would have dropped by 38.94 percent, compared to an actual fall of 36.53 percent. In other words, quality upgrading during the crisis would have reduced nominal export growth by 2.4 additional percentage points. The opposite exercise, which assumes that the quality scores had fallen during the crisis to the lowest level of quality in the sample (which is equal to 68), predicts that exports would have dropped by 30.00 percent. The two opposite scenarios thus predict a difference in export performance of about nine percentage points, which is not negligible.

Using the same methodology, and the point estimates reported in column (4) of Panel B in Table 8, we then investigate the hypothetical performance of real export growth during the crisis. Compared to an actual fall of 38.17 percent, we find that export quantities would have decreased by 40.63 percent with quality upgrading, and by 32.39 percent with quality downgrading. The difference in export growth predicted by the two opposite scenarios is therefore equal to about eight percentage points.

6 Robustness

This section considers alternative specifications to check the robustness of our findings. Overall, the patterns we find are broadly supportive of the paper’s main conclusions.

Measurement Error Ashenfelter and Quandt (1999), Hodgson (2008), and Quandt (2007), among others, argue that wine ratings are subjective and imperfect measures of quality. Measurement error in the quality scores can thus create an endogeneity bias when explaining exports and prices. To address endogeneity, we estimate equation (3), and use the Parker scores as an instrument for the Wine Spectator ratings (both interacted with the crisis dummy variable) under the assumption that their measurement errors are uncorrelated. Column (1) of Table 18 reports the results. For both export values and volumes, the instrumented coefficients increase in magnitude, but qualitatively, our results continue to hold (the interaction is insignificant for unit values). The Kleibergen-Paap F statistic (equal to 431, with a critical value equal to 16, Stock and Yogo, 2005) rejects the null of weak correlation between the instrument and the endogenous regressor, and the first-stage regression shows that the Parker and Wine Spectator ratings, interacted with the crisis dummy, are positively correlated (the estimated coefficient is equal to 0.703, and is significant at the one percent level).

Quality We compute a weighted average of the quality scores using the share of exports of each wine in the total exports of all wines with the same name, grape, and type, by destination and time

⁵³These predictions are derived from reduced-form specifications and therefore only provide a rough estimate of the contribution of quality to export growth.

period, as weights. This reduces our sample size as it restricts the analysis to the wines which original quality ratings are available. The correlation between weighted and unweighted quality is equal to 89 percent. The results are reported in column (2) of Table 18.

In column (3), to minimize possible noise in the measurement of quality when defined on a (50,100) scale, we use a variable which takes on values between one and six, where each value corresponds to one of the bins of the Wine Spectator (Table 1), and a larger value indicates a higher quality. In column (4), to include some unrated wines in the sample, we calculate a mean Wine Spectator rating by wine name and type, and assign this rating to all wines with the same name and type. Besides, as the Wine Spectator and Parker both originate from the United States, one concern is that they may not capture taste preferences for quality in other destination countries. In column (5), we therefore drop the United States from the sample.

We also check that our results remain robust to measuring quality using unit values. Although this approach has been widely criticized (e.g., Khandelwal, 2010), its main advantage is to increase data coverage as all unrated wines can be included in the sample. First, we use as a proxy for quality the log mean unit value of exports across destinations and over time. Second, we rank for each exporter in each time period its wines by mean unit values in decreasing order (Mayer, Melitz, and Ottaviano, 2014). The wine with the highest unit value has a rank equal to one, the second a rank equal to two, etc., and we use these ranks as an inverted indicator of quality. Columns (6) and (7) report the results using unit values and product ranks, respectively.

Controlling for Prices To ensure that our results capture that consumers switch to lower quality rather than just to cheaper goods when times are tough, we control for changes in unit values in the nominal and real exports regressions. As unit values are endogenous to both export values and volumes, these specifications remain silent on the direction of causality between the three variables. Column (1) of Table 19 shows that the flight from quality remains robust to controlling for inflation.⁵⁴

Mean Reversion The exports of higher quality wines grew the most before the crisis, and experienced the largest drops during the recession. To ensure that our findings are not just capturing mean reversion, we include lagged dependent variables. The results, reported in column (2) of Table 19, show that the effect of quality on trade during the crisis mattered beyond mean reversion.⁵⁵

Weighted Regression To make sure that our results are not driven by observations that are economically small, column (3) of Table 19 weights the observations by the volume of exports in the previous period (Behrens et al., 2013).

Total Firm Exports Our analysis aims at identifying the variation in export growth across products and over time. For our purposes, the destination country dimension is therefore not crucial. We aggregate the data to eliminate the destination dimension, and sum wine exports in each time period across destinations. In column (4) of Table 19, we estimate equation (3), replace the firm-destination-time fixed effects by firm-time dummy variables, and cluster standard errors by firm-time.

⁵⁴The results remain similar if the change in unit values is included with a one period lag or interacted with quality.

⁵⁵Due to the short time dimension of our data, we cannot use dynamic panel data estimation techniques to deal with the well-known problem of regressing within-group equations with lagged dependent variables.

Clustering Given the high dimensionality of the data, we show that our results remain robust to alternative clustering of the standard errors. In column (5) of Table 19 we cluster standard errors by destination only to control for destination-specific idiosyncratic shocks that are correlated over time. In addition to clustering by destination-time, columns (6) and (7) also control for the correlation of shocks within multi-product firms, and within products in each time period, respectively.

Sampling and Crisis Period In column (1) of Table 20, we extend the pre-crisis sample by one more year (up to 2005Q4). The pre-treatment sample therefore also includes trade growth between the 2005Q4–2006Q3 and the 2006Q4–2007Q3 four-quarter periods. In column (2), we further extend the pre-crisis sample up to 2003Q4 (we do not include the year 2002 as Argentina was in a recession). The pre-crisis sample therefore includes growth rates computed over four different periods.

We also vary the length of the crisis episode. In column (3), we exclude the fourth quarter of 2008 from the crisis. To avoid the effects of seasonality, the growth rates are measured between the same three-quarter periods. Instead, column (4) includes the fourth quarter of 2009 in the crisis period.

Placebo We use a sample between 2005Q4 and 2008Q3 which drops the crisis period. We calculate the log changes from 2006Q4–2007Q3 to 2007Q4–2008Q3, and from 2005Q4–2006Q3 to 2006Q4–2007Q3 for the post- and pre-treatment samples, respectively, and define a “crisis dummy” variable as equal to one for the 2007Q4–2008Q3 period (i.e., for the same four quarters as the actual crisis period, but in the previous year). The results obtained using this placebo sample, reported in column (5) of Table 20, validate the interpretation of our results as the interaction between quality and the crisis dummy is insignificant for both export values and volumes (and negative for unit values).

Vintage Year We construct a new sample and define a product according to the name of the wine, its grape, type, and vintage year (the sample includes 99 firms exporting 1,025 different wines to 73 countries). The original Wine Spectator scores can therefore be used, but the highly unbalanced nature of this more disaggregated data reduces our sample size more than twofold. Column (6) of Table 20 shows that for nominal and real exports, the interactions between quality and the crisis indicator increase in magnitude, but qualitatively, our results remain similar.

Small Volumes The small volumes of less than 4.5 liters are included in column (7) of Table 20. The effect of quality is slightly larger, but our results remain robust.

7 Concluding Remarks

Using a unique dataset of Argentinean firm-level destination-specific export values and volumes of highly disaggregated wine products combined with experts wine ratings to measure quality, this paper shows that the global financial crisis has led to a flight from quality in traded goods. This flight from quality was triggered by a fall in aggregate demand, was stronger for the exports of smaller firms, and was more acute in the countries where households could substitute imports by domestic alternatives. Quantitatively, our results suggest that the quality composition of exports can explain up to nine percentage points difference in trade performance. Our paper is the first to provide such evidence using firm-level data on traded goods.

Due to data limitations, our analysis however suffers from a number of caveats. First, as we only observe Argentinean wine exports, we are unable to determine whether consumers in crisis-hit countries substituted from more expensive French or Italian wines towards cheaper Argentinean varieties.⁵⁶ Indeed, Gil-Fournier (2008) notes that “many consumers will not want to pay abusive prices for European, mainly French, wines and they will probably decide to taste wines from other countries with a better relation between price and quality.”

Second, as our analysis concentrates on a specific sector in a single country, we cannot check whether the empirical regularities documented in this paper remain relevant in a more general setting, and in particular whether they extend to other countries and industries. Using different datasets and alternative methodologies, some studies however reach conclusions that are complementary to ours, suggesting that our findings are likely to generalize beyond the wine industry of Argentina. Such papers include Bems and di Giovanni (2015), Berthou and Emlinger (2010), and Esposito and Vicarelli (2011) who use data for Latvia, the EU, and Italy to study the role of quality during the trade collapse. They also include Burstein et al. (2005), Coibion et al. (2015), Griffith et al. (2013), Jaimovich et al. (2015), and Nevo and Wong (2015) who study household consumption over the business cycle, and show that consumers in Argentina, the United States, and the United Kingdom reallocate their expenditures towards cheaper and lower quality goods when times are tough.

A number of macroeconomic implications can, therefore, tentatively be drawn from our results. First, as they provide evidence that the composition of trade matters for the responsiveness of trade flows to economic downturns, our findings are helpful to infer how different countries are likely to perform in recessions. As higher income countries tend to be more specialized in the production of higher quality goods, our results imply that these countries’ exports might suffer more in recessions. Second, by showing that the crisis has impacted more the quantities than the prices of traded goods, our results suggest that the real effects of financial crises can be large. Finally, our findings have implications for understanding the distributional effects of crisis episodes as a flight from quality resulting from a negative income shock can be costly for consumers in terms of welfare. Under the assumption that consumers love variety, but also quality (Baldwin and Harrigan, 2011; Chen and Juvenal, 2016; Crozet et al., 2012; Johnson, 2012; Kugler and Verhoogen, 2012; Manova and Zhang, 2012b), a decline in the quality consumed reduces welfare.

One promising avenue for future research would be to investigate the behavior of markups during the recent downturn, and in particular whether the fall in inflation that we observe for the higher quality wines resulted from firms compressing their margins in order to preserve, or restore, export market shares.⁵⁷ Indeed, differences in the prices of the same wines sold to multiple destinations reflect differences in markups as these wines are subject to the same marginal cost (see, for instance, Burstein and Jaimovich, 2012).

⁵⁶Levchenko et al. (2011) investigate this type of cross-country substitution within a specific product category but find no significant evidence. Also, households may have switched from wine to cheaper alcoholic beverages, such as beer, but we are unable to explore this possibility.

⁵⁷Anecdotal evidence suggests that during the crisis, wine producers had “no choice but lowering prices” in order to offer “wines that consumers can afford” (Malizia, 2008). Also, see Thornton (2013).

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Table 1: Experts Quality Ratings

Wine Spectator (50,100)		Robert Parker (50,100)	
95-100	“Great”	96-100	“Extraordinary”
90-94	“Outstanding”	90-95	“Outstanding”
85-89	“Very good”	80-89	“Above average/very good”
80-84	“Good”	70-79	“Average”
75-79	“Mediocre”	60-69	“Below average”
50-74	“Not recommended”	50-59	“Unacceptable”

Notes: For both the Wine Spectator and Robert Parker rating systems, the table reports the quality bins corresponding to the scores assigned to each wine.

Table 2: Top Export Destinations

Export share (%)	Pre-crisis 2007Q4–2008Q3	Crisis 2008Q4–2009Q3
United States	24.31	30.70
Canada	8.68	11.03
United Kingdom	7.65	6.99
Russia	6.99	2.97
Brazil	6.17	6.60
Netherlands	5.43	5.28
Japan	5.14	3.28
Denmark	3.46	2.67
Paraguay	3.39	3.05
China	2.01	0.93
Mexico	2.00	1.89
Germany	1.99	2.06
Sweden	1.87	2.19
Finland	1.46	1.59
Venezuela	1.45	1.16

Notes: The table reports total wine exports to each destination country as a share of total wine exports.

Table 3: Summary Statistics

	Full sample		Pre-crisis		Crisis	
	Obs.	Mean	Obs.	Mean	Obs.	Mean
Export values growth (%)	8,051	0.24	4,344	6.55	3,707	-7.15
Export volumes growth (%)	8,051	-3.73	4,344	3.43	3,707	-12.12
Unit values growth (%)	8,051	3.97	4,344	3.12	3,707	4.97
Wine Spectator	8,051	84	4,344	84	3,707	84
Parker	5,138	88	2,748	88	2,390	88
Number of firms	8,051	138	4,344	126	3,707	115
Number of wines	8,051	1,167	4,344	996	3,707	945
Number of destinations	8,051	84	4,344	81	3,707	76

Notes: For each variable listed in the first column, and separately for the full, pre-crisis, and crisis samples, the table reports the mean value and the number of observations available.

Table 4: Descriptive Statistics by Quality Bin of the Wine Spectator

	Observations			Number of firms		
	Full sample	Pre-crisis	Crisis	Full sample	Pre-crisis	Crisis
“Outstanding” and “Great”	711	403	308	43	39	37
“Great”	7	2	5	2	1	2
“Outstanding”	704	401	303	43	39	37
“Very good”	3,091	1,672	1,419	75	69	60
“Good”	3,707	1,973	1,734	89	77	76
“Mediocre”	402	217	185	37	31	29
“Not recommended”	140	79	61	9	7	6
	Number of wines			Number of destinations		
	Full sample	Pre-crisis	Crisis	Full sample	Pre-crisis	Crisis
“Outstanding” and “Great”	129	105	102	58	56	35
“Great”	3	1	3	4	2	4
“Outstanding”	126	104	99	58	56	35
“Very good”	353	306	289	79	75	73
“Good”	533	466	431	81	78	72
“Mediocre”	136	105	110	34	32	29
“Not recommended”	16	14	13	29	26	23
	Mean unit value			Mean export share (%)		
	Full sample	Pre-crisis	Crisis	Full sample	Pre-crisis	Crisis
“Outstanding” and “Great”	14.60	14.17	15.16	9.58	10.43	8.32
“Great”	22.38	27.17	20.47	0.02	0.01	0.03
“Outstanding”	14.52	14.10	15.07	9.56	10.42	8.29
“Very good”	4.57	4.58	4.55	39.86	41.50	37.47
“Good”	4.24	4.15	4.35	42.56	39.81	46.55
“Mediocre”	3.49	3.06	3.99	5.90	6.34	5.27
“Not recommended”	2.64	2.59	2.71	2.10	1.91	2.39

Notes: For each quality bin of the Wine Spectator, and separately for the full, pre-crisis, and crisis samples, the table reports the mean number of observations, exporters, wines, and destinations, the mean unit value (in US dollars per liter), and the mean export share (%).

Table 5: Mean Growth Rates by Quality Bin of the Wine Spectator

	Export values (%)		Export volumes (%)		Unit values (%)	
	Pre-crisis	Crisis	Pre-crisis	Crisis	Pre-crisis	Crisis
“Outstanding” and “Great”	19.77	-26.53	13.97	-19.23	5.79	-7.30
“Great”	43.18	-31.88	51.82	-27.93	-8.64	-3.95
“Outstanding”	19.65	-26.45	13.78	-19.09	5.87	-7.35
“Very good”	11.02	-9.75	7.69	-15.39	3.33	5.64
“Good”	0.45	-1.69	-2.87	-7.41	3.32	5.72
“Mediocre”	3.01	-4.49	8.88	-17.51	-5.86	13.02
“Not recommended”	6.39	-12.05	1.83	-17.38	4.55	5.33

Notes: For each quality bin of the Wine Spectator, and separately for the pre-crisis and crisis samples, the table reports the mean growth of export values, volumes, and unit values.

Table 6: Mean Growth of Export Market Shares by Quality Bin of the Wine Spectator

	Value-based shares (%)		Volume-based shares (%)	
	Pre-crisis	Crisis	Pre-crisis	Crisis
“Outstanding” and “Great”	21.34	-2.31	16.88	9.44
“Great”	53.10	10.44	62.87	19.78
“Outstanding”	21.19	-2.52	16.65	9.27
“Very good”	12.44	16.38	10.85	15.10
“Good”	2.74	22.70	2.84	20.83
“Mediocre”	0.81	21.02	8.53	12.86
“Not recommended”	3.57	20.44	5.83	21.49

Notes: For each quality bin of the Wine Spectator, and separately for the pre-crisis and crisis samples, the table reports the mean growth of the value- and volume-based export market shares.

Table 7: Decomposition of Margins

	Total exports	Extensive			Intensive		
		Firms	Destinations	Products	Sales	Quantities	Prices
2007Q4–2008Q3	178,071	169	7.47	5.98	23,557	7,545	3.12
2008Q4–2009Q3	125,585	160	6.96	5.88	19,164	5,886	3.26
Growth	-29.48%	-5.33%	-6.84%	-1.71%	-18.65%	-21.99%	4.28%
Contribution			36.73%		63.27%		

Notes: If we denote changes at the extensive and at the intensive margins as ΔEM and ΔIM , the contributions of the two margins to the total change in exports ΔX are given by $\Delta EM/\Delta X$ and $\Delta IM/\Delta X$. Total exports are in thousand US dollars and average sales per exporter-destination-product are in US dollars.

Table 8: Baseline Results

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A: Export values							
<i>quality</i>	0.002 (0.006)	0.018 ^b (0.008)	0.017 ^b (0.008)	—	—	—	—
<i>quality</i> × <i>D_{crisis}</i>	—	−0.036 ^a (0.012)	−0.034 ^a (0.011)	−0.030 ^b (0.012)	−0.044 ^c (0.023)	−0.030 ^b (0.012)	−0.030 ^b (0.012)
R-squared	0.501	0.502	0.505	0.592	0.630	0.565	0.586
Panel B: Export volumes							
<i>quality</i>	0.006 (0.006)	0.020 ^a (0.008)	0.019 ^b (0.008)	—	—	—	—
<i>quality</i> × <i>D_{crisis}</i>	—	−0.031 ^a (0.012)	−0.029 ^b (0.011)	−0.026 ^b (0.012)	−0.043 ^c (0.022)	−0.026 ^b (0.012)	−0.026 ^b (0.012)
R-squared	0.495	0.496	0.498	0.589	0.616	0.563	0.583
Panel C: Unit values							
<i>quality</i>	−0.004 ^a (0.001)	−0.002 (0.002)	−0.002 (0.002)	—	—	—	—
<i>quality</i> × <i>D_{crisis}</i>	—	−0.005 ^c (0.003)	−0.005 ^c (0.003)	−0.004 ^c (0.002)	−0.001 (0.005)	−0.004 ^c (0.002)	−0.004 ^c (0.002)
R-squared	0.507	0.508	0.511	0.600	0.652	0.564	0.594
Sample	Full	Full	Full	Full	Full	Intensive <i>k</i>	Intensive <i>i</i>
Quality	WS	WS	WS	WS	Parker	WS	WS
Wine characteristics*	Yes	Yes	Yes [†]	No	No	No	No
Product fixed effects	No	No	No	Yes	Yes	Yes	Yes
Observations	8,051	8,051	8,051	8,051	5,138	7,505	7,978

Notes: Firm-destination-time, grape, type, province, and HS fixed effects are included in (1) and (2). The grape, type, province, and HS fixed effects are further interacted with time dummies in (3). Product fixed effects are included in (4) to (7). Robust standard errors adjusted for clustering by destination-time between parentheses. ^a, ^b, and ^c indicate significance at the one, five, and ten percent levels. * “Wine characteristics” refers to grape, type, province, and HS fixed effects. [†] “Yes” indicates that the wine characteristics fixed effects are further interacted with time dummies.

Table 9: Aggregate Demand

	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Export values						
$\Delta AD \times quality$	0.411 ^a (0.125)	0.372 ^b (0.143)	-0.073 ^a (0.025)	0.340 ^b (0.139)	0.302 ^c (0.160)	-0.057 ^b (0.028)
R-squared	0.593	0.596	0.592	0.663	0.671	0.664
Panel B: Export volumes						
$\Delta AD \times quality$	0.397 ^a (0.120)	0.377 ^b (0.147)	-0.068 ^a (0.023)	0.364 ^a (0.130)	0.329 ^b (0.163)	-0.059 ^b (0.025)
R-squared	0.589	0.593	0.589	0.660	0.668	0.662
Panel C: Unit values						
$\Delta AD \times quality$	0.014 (0.025)	-0.005 (0.028)	-0.005 (0.006)	-0.024 (0.035)	-0.027 (0.030)	0.002 (0.008)
R-squared	0.601	0.606	0.599	0.668	0.676	0.667
Aggregate demand ΔAD	$\Delta \ln GDP_{pc}$	$\Delta \ln Exp_{pc}$	ΔU	$\Delta \ln GDP_{pc}$	$\Delta \ln Exp_{pc}$	ΔU
Product-time fixed effects	No	No	No	Yes	Yes	Yes
Observations	7,990	7,492	7,741	7,990	7,492	7,741

Notes: Firm-destination-time and product fixed effects are included in (1) to (3). Product-time fixed effects are further included in (4) to (6). Robust standard errors adjusted for clustering by destination-time between parentheses. ^a, ^b, and ^c indicate significance at the one, five, and ten percent levels.

Table 10: Destination Countries

	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Export values						
<i>quality</i> × <i>D_{crisis}</i> × <i>others</i>	−0.024 ^c (0.012)	−0.026 ^b (0.012)	−0.030 ^b (0.012)	−0.032 ^a (0.012)	−0.021 ^c (0.011)	−0.012 (0.011)
<i>quality</i> × <i>D_{crisis}</i> × <i>US</i>	−0.112 ^a (0.021)	−	−	−	−0.114 ^a (0.022)	−0.094 ^a (0.019)
<i>quality</i> × <i>D_{crisis}</i> × <i>UK</i>	−	−0.073 ^a (0.021)	−	−	−0.076 ^a (0.019)	−0.098 ^a (0.020)
<i>quality</i> × <i>D_{crisis}</i> × <i>China</i>	−	−	0.009 (0.028)	−	0.008 (0.028)	0.059 (0.044)
<i>quality</i> × <i>D_{crisis}</i> × <i>Hong Kong</i>	−	−	−	0.070 ^a (0.016)	0.072 ^a (0.016)	0.064 ^a (0.015)
R-squared	0.593	0.592	0.592	0.592	0.593	0.571
Panel B: Export volumes						
<i>quality</i> × <i>D_{crisis}</i> × <i>others</i>	−0.020 ^c (0.012)	−0.023 ^c (0.012)	−0.027 ^b (0.012)	−0.028 ^b (0.012)	−0.018 ^c (0.011)	−0.007 (0.011)
<i>quality</i> × <i>D_{crisis}</i> × <i>US</i>	−0.100 ^a (0.020)	−	−	−	−0.102 ^a (0.021)	−0.083 ^a (0.019)
<i>quality</i> × <i>D_{crisis}</i> × <i>UK</i>	−	−0.069 ^a (0.019)	−	−	−0.072 ^a (0.017)	−0.097 ^a (0.016)
<i>quality</i> × <i>D_{crisis}</i> × <i>China</i>	−	−	0.036 (0.030)	−	0.035 (0.031)	0.072 ^c (0.043)
<i>quality</i> × <i>D_{crisis}</i> × <i>Hong Kong</i>	−	−	−	0.078 ^a (0.016)	0.080 ^a (0.016)	0.072 ^a (0.014)
R-squared	0.589	0.589	0.589	0.589	0.590	0.570
Panel C: Unit values						
<i>quality</i> × <i>D_{crisis}</i> × <i>others</i>	−0.003 (0.002)	−0.004 ^c (0.002)	−0.004 ^c (0.002)	−0.004 ^c (0.002)	−0.003 (0.002)	−0.004 (0.003)
<i>quality</i> × <i>D_{crisis}</i> × <i>US</i>	−0.012 ^a (0.003)	−	−	−	−0.012 ^a (0.003)	−0.011 ^b (0.005)
<i>quality</i> × <i>D_{crisis}</i> × <i>UK</i>	−	−0.004 (0.003)	−	−	−0.004 (0.003)	−0.001 (0.004)
<i>quality</i> × <i>D_{crisis}</i> × <i>China</i>	−	−	−0.027 ^b (0.011)	−	−0.027 ^b (0.011)	−0.013 ^b (0.005)
<i>quality</i> × <i>D_{crisis}</i> × <i>Hong Kong</i>	−	−	−	−0.008 ^a (0.003)	−0.008 ^a (0.003)	−0.009 ^a (0.003)
R-squared	0.600	0.600	0.600	0.600	0.600	0.590
Sample	Full	Full	Full	Full	Full	Intensive <i>ik</i>
Observations	8,051	8,051	8,051	8,051	8,051	5,244

Notes: Firm-destination-time and product fixed effects are included. Robust standard errors adjusted for clustering by destination-time between parentheses. ^a, ^b, and ^c indicate significance at the one, five, and ten percent levels.

Table 11: Mean Growth Rates for Wine Producing and Non-Producing Countries

	Export values (%)		Export volumes (%)		Unit values (%)	
	Pre-crisis	Crisis	Pre-crisis	Crisis	Pre-crisis	Crisis
Wine non-producing countries	7.49	-0.91	5.04	-3.30	2.45	2.40
Wine producing countries	6.06	-10.01	2.61	-16.16	3.46	6.14
Self-sufficient	5.84	-14.49	1.34	-17.76	4.49	3.27
Non-self-sufficient	6.16	-8.26	3.13	-15.52	3.03	7.27

Notes: For each group of countries listed in the first column, and separately for the pre-crisis and crisis samples, the table reports the mean growth of export values, volumes, and unit values.

Table 12: Self-Sufficiency

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable	Export values	Export volumes	Unit values	Export values	Export volumes	Unit values
$quality \times D_{crisis} \times sufficient$	-0.073 ^a (0.021)	-0.064 ^a (0.020)	-0.009 ^b (0.004)	-0.072 ^a (0.022)	-0.060 ^a (0.021)	-0.011 ^b (0.005)
$quality \times D_{crisis} \times non - sufficient$	-0.026 ^c (0.015)	-0.022 (0.014)	-0.004 (0.003)	-0.010 (0.015)	-0.004 (0.014)	-0.006 ^c (0.003)
$quality \times D_{crisis} \times non - producers$	-0.018 (0.015)	-0.016 (0.015)	-0.001 (0.003)	0.003 (0.017)	0.006 (0.017)	-0.003 (0.004)
R-squared	0.593	0.589	0.600	0.593	0.590	0.601
GDP per capita	No	No	No	Yes	Yes	Yes
Observations	8,051	8,051	8,051	7,990	7,990	7,990

Notes: Firm-destination-time and product fixed effects are included. Robust standard errors adjusted for clustering by destination-time between parentheses. ^a, ^b, and ^c indicate significance at the one, five, and ten percent levels.

Table 13: Inventory Adjustments

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable	Export values	Export volumes	Unit values	Export values	Export volumes	Unit values
$\Delta \ln frequency$	1.589 ^b (0.700)	1.245 ^c (0.673)	0.343 ^b (0.148)	–	–	–
$\Delta \ln frequency \times quality$	–0.006 (0.008)	–0.002 (0.008)	–0.004 ^b (0.002)	–	–	–
$\Delta \ln frequency \times red$	–	–	–	1.742 ^b (0.701)	1.319 ^b (0.647)	0.423 ^b (0.177)
$\Delta \ln frequency \times white/rosé$	–	–	–	0.911 (1.403)	0.787 (1.392)	0.124 (0.223)
$\Delta \ln frequency \times quality \times red$	–	–	–	–0.008 (0.008)	–0.003 (0.008)	–0.005 ^b (0.002)
$\Delta \ln frequency \times quality \times white/rosé$	–	–	–	0.002 (0.017)	0.003 (0.016)	–0.001 (0.003)
R-squared	0.766	0.774	0.667	0.766	0.774	0.667
Observations	8,051	8,051	8,051	8,051	8,051	8,051

Notes: Firm-destination-time and product-time fixed effects are included. Robust standard errors adjusted for clustering by destination-time between parentheses. ^a, ^b, and ^c indicate significance at the one, five, and ten percent levels.

Table 14: Firm Size

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable	Export values	Export volumes	Unit values	Export values	Export volumes	Unit values
$quality \times D_{crisis} \times small$	–0.048 ^a (0.017)	–0.042 ^a (0.015)	–0.006 (0.004)	–0.042 ^b (0.020)	–0.033 ^c (0.018)	–0.009 (0.007)
$quality \times D_{crisis} \times large$	–0.018 (0.015)	–0.015 (0.015)	–0.002 (0.004)	0.004 (0.015)	0.007 (0.014)	–0.003 (0.005)
R-squared	0.592	0.589	0.600	0.593	0.589	0.601
GDP per capita	No	No	No	Yes	Yes	Yes
Observations	8,051	8,051	8,051	7,990	7,990	7,990

Notes: Firm-destination-time and product fixed effects are included. Robust standard errors adjusted for clustering by destination-time between parentheses. ^a, ^b, and ^c indicate significance at the one, five, and ten percent levels.

Table 15: Nonlinearities

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable	Export values	Export volumes	Unit values	Export values	Export volumes	Unit values
<i>quality</i>	-0.227 (0.167)	-0.259 (0.171)	0.032 (0.034)	—	—	—
<i>quality</i> × <i>D_{crisis}</i>	0.518 ^a (0.198)	0.473 ^b (0.196)	0.044 (0.046)	0.351 (0.213)	0.342 (0.219)	0.009 (0.054)
<i>quality squared</i>	0.001 (0.001)	0.002 ^c (0.001)	0.000 (0.000)	—	—	—
<i>quality squared</i> × <i>D_{crisis}</i>	-0.003 ^a (0.001)	-0.003 ^b (0.001)	0.000 (0.000)	-0.002 ^c (0.001)	-0.002 ^c (0.001)	0.000 (0.000)
Elasticities (pre-crisis)						
“Great”	0.061 ^b (0.028)	0.069 ^b (0.028)	-0.008 (0.007)	—	—	—
“Outstanding”	0.045 ^a (0.017)	0.051 ^a (0.017)	-0.006 (0.005)	—	—	—
“Very good”	0.030 ^a (0.009)	0.034 ^a (0.009)	-0.004 (0.003)	—	—	—
“Good”	0.015 ^c (0.008)	0.017 ^b (0.008)	-0.002 (0.002)	—	—	—
“Mediocre”	0.000 (0.016)	0.000 (0.016)	0.000 (0.002)	—	—	—
“Not recommended”	-0.044 (0.044)	-0.050 (0.045)	0.006 (0.008)	—	—	—
Elasticities (crisis)						
“Great”	-0.072 ^a (0.024)	-0.050 ^b (0.022)	-0.022 ^a (0.006)	-0.097 ^b (0.040)	-0.092 ^b (0.040)	-0.006 (0.010)
“Outstanding”	-0.051 ^a (0.018)	-0.035 ^b (0.016)	-0.016 ^a (0.004)	-0.072 ^a (0.027)	-0.067 ^b (0.026)	-0.005 (0.006)
“Very good”	-0.033 ^a (0.012)	-0.021 ^c (0.011)	-0.011 ^a (0.002)	-0.049 ^a (0.017)	-0.045 ^a (0.016)	-0.004 (0.003)
“Good”	-0.014 ^c (0.008)	-0.008 (0.008)	-0.006 ^a (0.002)	-0.026 ^b (0.012)	-0.023 ^c (0.012)	-0.004 ^c (0.002)
“Mediocre”	0.004 (0.008)	0.006 (0.007)	-0.001 (0.003)	-0.003 (0.019)	-0.000 (0.020)	-0.003 (0.004)
“Not recommended”	0.060 ^b (0.024)	0.046 ^b (0.022)	0.014 (0.008)	0.066 (0.054)	0.066 (0.056)	-0.001 (0.013)
R-squared	0.503	0.496	0.508	0.593	0.589	0.600
Observations	8,051	8,051	8,051	8,051	8,051	8,051

Notes: Firm-destination-time, grape, type, province, and HS fixed effects are included in (1) to (3). Product fixed effects are further included in (4) to (6). Robust standard errors adjusted for clustering by destination-time between parentheses. ^a, ^b, and ^c indicate significance at the one, five, and ten percent levels.

Table 16: Extensive Margin

	(1)	(2)	(3)	(4)	(5)
Panel A: Export values					
$quality \times D_{crisis}$	-0.024 ^a (0.008)	-0.086 ^a (0.032)	-0.037 ^b (0.017)	-0.008 ^a (0.001)	-0.019 ^a (0.001)
R-squared (or pseudo)	0.650	0.616	0.777	0.183	—
Panel B: Export volumes					
$quality \times D_{crisis}$	-0.023 ^a (0.008)	-0.063 ^b (0.027)	-0.031 ^c (0.018)	-0.008 ^a (0.001)	-0.016 ^a (0.001)
R-squared (or pseudo)	0.652	0.611	0.787	0.185	—
Dependent variable	Mid-point	Log difference	Log levels	Log levels	Levels
Estimation	OLS	OLS	OLS	Tobit	Poisson
Zero observations included	Yes	Yes	No	Yes	Yes
Observations	12,420	13,468	14,112	26,224	26,224

Notes: Firm-destination-time and product fixed effects are included. Robust standard errors adjusted for clustering by destination-time between parentheses. ^a, ^b, and ^c indicate significance at the one, five, and ten percent levels.

Table 17: Post-Crisis Recovery

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: Export values								
<i>quality</i>	0.018 ^b (0.008)	0.031 ^a (0.007)	-0.018 ^b (0.009)	0.017 ^b (0.008)	—	—	—	—
<i>quality</i> × <i>D_{crisis}</i>	-0.036 ^a (0.012)	-0.049 ^a (0.012)	—	—	-0.031 ^b (0.012)	-0.042 ^a (0.012)	—	—
<i>quality</i> × <i>D_{post}</i>	0.045 ^a (0.015)	—	0.081 ^a (0.017)	0.046 ^a (0.015)	0.039 ^b (0.017)	—	0.057 ^a (0.018)	0.045 ^b (0.019)
R-squared	0.491	0.490	0.505	0.469	0.577	0.576	0.638	0.609
Panel B: Export volumes								
<i>quality</i>	0.020 ^a (0.008)	0.029 ^a (0.007)	-0.010 (0.008)	0.019 ^b (0.008)	—	—	—	—
<i>quality</i> × <i>D_{crisis}</i>	-0.031 ^a (0.012)	-0.040 ^a (0.011)	—	—	-0.026 ^b (0.012)	-0.034 ^a (0.011)	—	—
<i>quality</i> × <i>D_{post}</i>	0.029 ^b (0.013)	—	0.060 ^a (0.014)	0.030 ^b (0.013)	0.027 ^c (0.015)	—	0.042 ^a (0.015)	0.034 ^b (0.017)
R-squared	0.485	0.485	0.507	0.457	0.572	0.572	0.639	0.598
Panel C: Unit values								
<i>quality</i>	-0.002 (0.002)	0.002 (0.003)	-0.008 ^a (0.002)	-0.002 (0.002)	—	—	—	—
<i>quality</i> × <i>D_{crisis}</i>	-0.005 ^c (0.003)	-0.010 ^a (0.003)	—	—	-0.004 ^c (0.002)	-0.008 ^a (0.003)	—	—
<i>quality</i> × <i>D_{post}</i>	0.016 ^b (0.007)	—	0.021 ^a (0.007)	0.015 ^b (0.007)	0.012 ^b (0.005)	—	0.016 ^b (0.006)	0.011 ^b (0.005)
R-squared	0.490	0.489	0.504	0.459	0.581	0.581	0.626	0.623
Product fixed effects	No	No	No	No	Yes	Yes	Yes	Yes
Sample included								
Pre-crisis	Yes	Yes	No	Yes	Yes	Yes	No	Yes
Crisis	Yes	Yes	Yes	No	Yes	Yes	Yes	No
Post-crisis	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	9,617	9,617	5,273	5,908	9,617	9,617	5,273	5,908

Notes: Firm-destination-time, grape, type, province, and HS fixed effects are included in (1) to (4). Product fixed effects are further included in (5) to (8). Robust standard errors adjusted for clustering by destination-time between parentheses. ^a, ^b, and ^c indicate significance at the one, five, and ten percent levels.

Table 18: Robustness on Quality

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A: Export values							
<i>quality</i>	—	0.010 (0.017)	—	—	—	—	−0.010 ^b (0.004)
<i>quality</i> × <i>D_{crisis}</i>	−0.072 ^b (0.034)	−0.042 ^a (0.015)	−0.101 ^c (0.052)	−0.029 ^b (0.013)	−0.023 ^c (0.013)	−0.216 ^a (0.074)	0.001 ^c (0.001)
R-squared	0.610	0.610	0.592	0.600	0.579	0.600	0.600
Panel B: Export volumes							
<i>quality</i>	—	0.013 (0.016)	—	—	—	—	−0.008 ^b (0.003)
<i>quality</i> × <i>D_{crisis}</i>	−0.069 ^b (0.033)	−0.039 ^a (0.015)	−0.079 (0.049)	−0.030 ^b (0.013)	−0.019 ^c (0.011)	−0.180 ^b (0.070)	0.001 ^c (0.001)
R-squared	0.597	0.605	0.588	0.595	0.571	0.594	0.594
Panel C: Unit values							
<i>quality</i>	—	−0.003 (0.004)	—	—	—	—	−0.003 ^c (0.001)
<i>quality</i> × <i>D_{crisis}</i>	−0.003 (0.007)	−0.003 (0.003)	−0.021 ^b (0.011)	0.001 (0.003)	−0.003 (0.002)	—	0.000 (0.000)
R-squared	0.637	0.613	0.600	0.598	0.607	—	0.606
Quality	WS	Weight. WS	WS [1,6]	Mean WS	Excl. US	Unit value	Ranks
Estimator	IV	OLS	OLS	OLS	OLS	OLS	OLS
Observations	4,712	6,063	8,051	8,391	7,181	10,869	10,869

Notes: Firm-destination-time and product fixed effects are included. Robust standard errors adjusted for clustering by destination-time between parentheses. ^a, ^b, and ^c indicate significance at the one, five, and ten percent levels.

Table 19: Robustness on Specifications

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A: Export values							
<i>lagged export values growth</i>	–	–0.389 ^a (0.030)	–	–	–	–	–
<i>quality × D_{crisis}</i>	–0.024 ^b (0.012)	–0.027 ^a (0.010)	–0.027 ^b (0.011)	–0.019 (0.014)	–0.030 ^b (0.014)	–0.030 ^b (0.014)	–0.030 ^a (0.011)
<i>unit values growth</i>	1.600 ^a (0.141)	–	–	–	–	–	–
R-squared	0.649	0.643	0.577	0.300	0.592	0.592	0.592
Panel B: Export volumes							
<i>lagged export volumes growth</i>	–	–0.410 ^a (0.031)	–	–	–	–	–
<i>quality × D_{crisis}</i>	–0.024 ^b (0.012)	–0.019 ^c (0.010)	–0.023 ^b (0.010)	–0.024 ^c (0.015)	–0.026 ^c (0.013)	–0.026 ^b (0.013)	–0.026 ^b (0.011)
<i>unit values growth</i>	0.600 ^a (0.141)	–	–	–	–	–	–
R-squared	0.598	0.651	0.580	0.300	0.589	0.589	0.589
Panel C: Unit values							
<i>lagged unit values growth</i>	–	–0.340 ^a (0.044)	–	–	–	–	–
<i>quality × D_{crisis}</i>	–	–0.008 ^a (0.002)	–0.004 ^c (0.002)	0.005 (0.004)	–0.004 ^c (0.002)	–0.004 ^a (0.001)	–0.004 ^b (0.002)
R-squared	0.649	0.572	0.332	0.332	0.600	0.600	0.600
Sample	Full	Full	Full	No dest	Full	Full	Full
Weighted	No	No	Yes	No	No	No	No
Clustering	<i>j, t</i>	<i>j, t</i>	<i>j, t</i>	<i>i, t</i>	<i>j</i>	<i>j, t</i> and <i>i</i>	<i>j, t</i> and <i>k, t</i>
Observations	8,051	5,649	8,051	2,335	8,051	8,051	8,051

Notes: Firm-destination-time and product fixed effects are included in (1)–(3) and (5)–(7). In (4), the firm-destination-time fixed effects are replaced by firm-time dummy variables. Weighted regression in (3) where the weights are the lagged values of export volumes in liters. ^a, ^b, and ^c indicate significance at the one, five, and ten percent levels.

Table 20: Other Robustness Checks

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A: Export values							
<i>quality × D_{crisis}</i>	–0.032 ^a (0.010)	–0.025 ^a (0.010)	–0.055 ^a (0.018)	–0.046 ^a (0.016)	–0.001 (0.013)	–0.127 ^a (0.044)	–0.033 ^b (0.015)
R-squared	0.561	0.544	0.590	0.575	0.566	0.685	0.661
Panel B: Export volumes							
<i>quality × D_{crisis}</i>	–0.024 ^b (0.010)	–0.018 ^c (0.009)	–0.053 ^a (0.015)	–0.044 ^a (0.014)	0.004 (0.013)	–0.134 ^a (0.043)	–0.028 ^b (0.013)
R-squared	0.554	0.533	0.585	0.571	0.552	0.687	0.654
Panel C: Unit values							
<i>quality × D_{crisis}</i>	–0.007 ^a (0.002)	–0.007 ^a (0.002)	–0.002 (0.005)	–0.001 (0.005)	–0.005 ^c (0.003)	0.007 (0.010)	–0.006 (0.003)
R-squared	0.564	0.542	0.610	0.596	0.574	0.700	0.636
Sample	From 2005	From 2003	Crisis 09Q13	Crisis 09Q14	Placebo	Vintage	<4.51
Observations	12,381	18,665	6,228	7,472	8,674	3,333	8,641

Notes: Firm-destination-time and product fixed effects are included. Robust standard errors adjusted for clustering by destination-time between parentheses. ^a, ^b, and ^c indicate significance at the one, five, and ten percent levels.

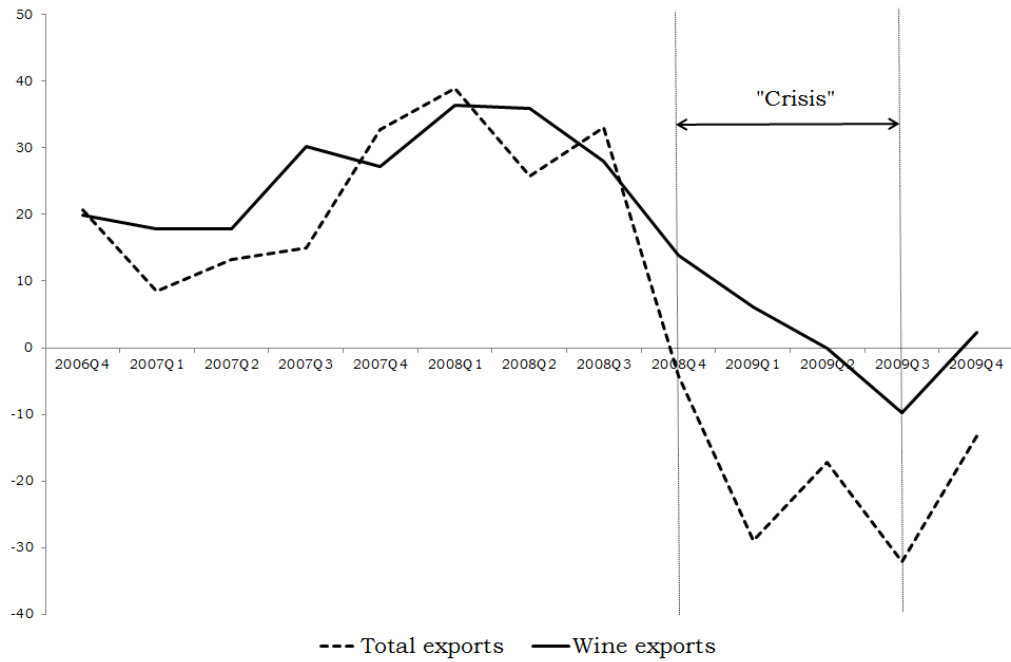


Figure 1: Year-on-year growth (%) of quarterly wine and total exports (US dollars)
Sources: Nosis and International Financial Statistics

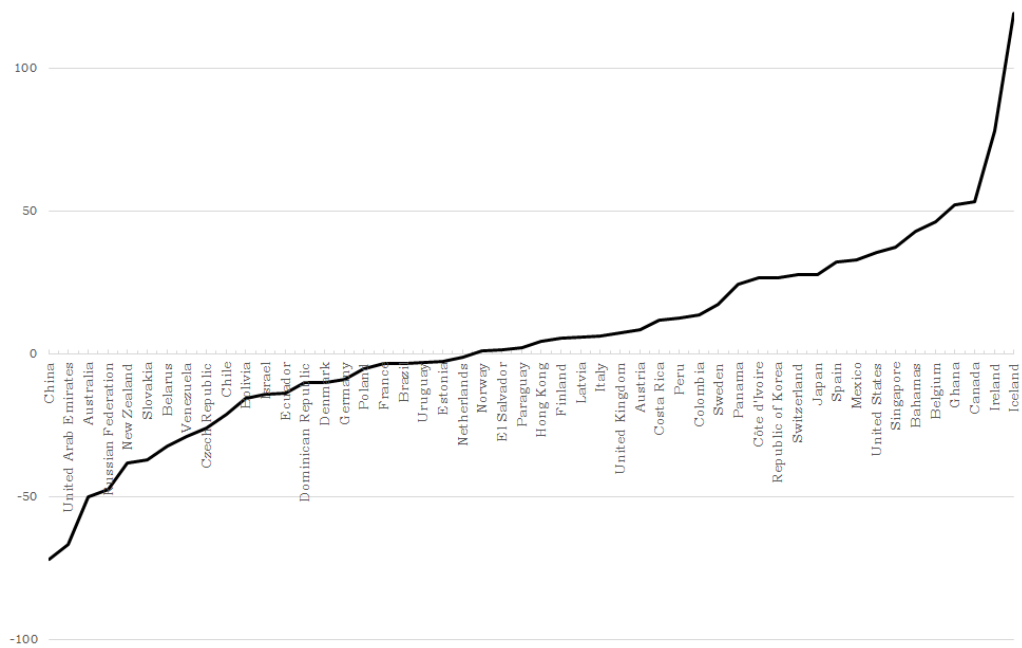


Figure 2: Share of wine imports from Argentina in total wine imports, growth rate 2008-2009 (%)
Source: United Nations Comtrade

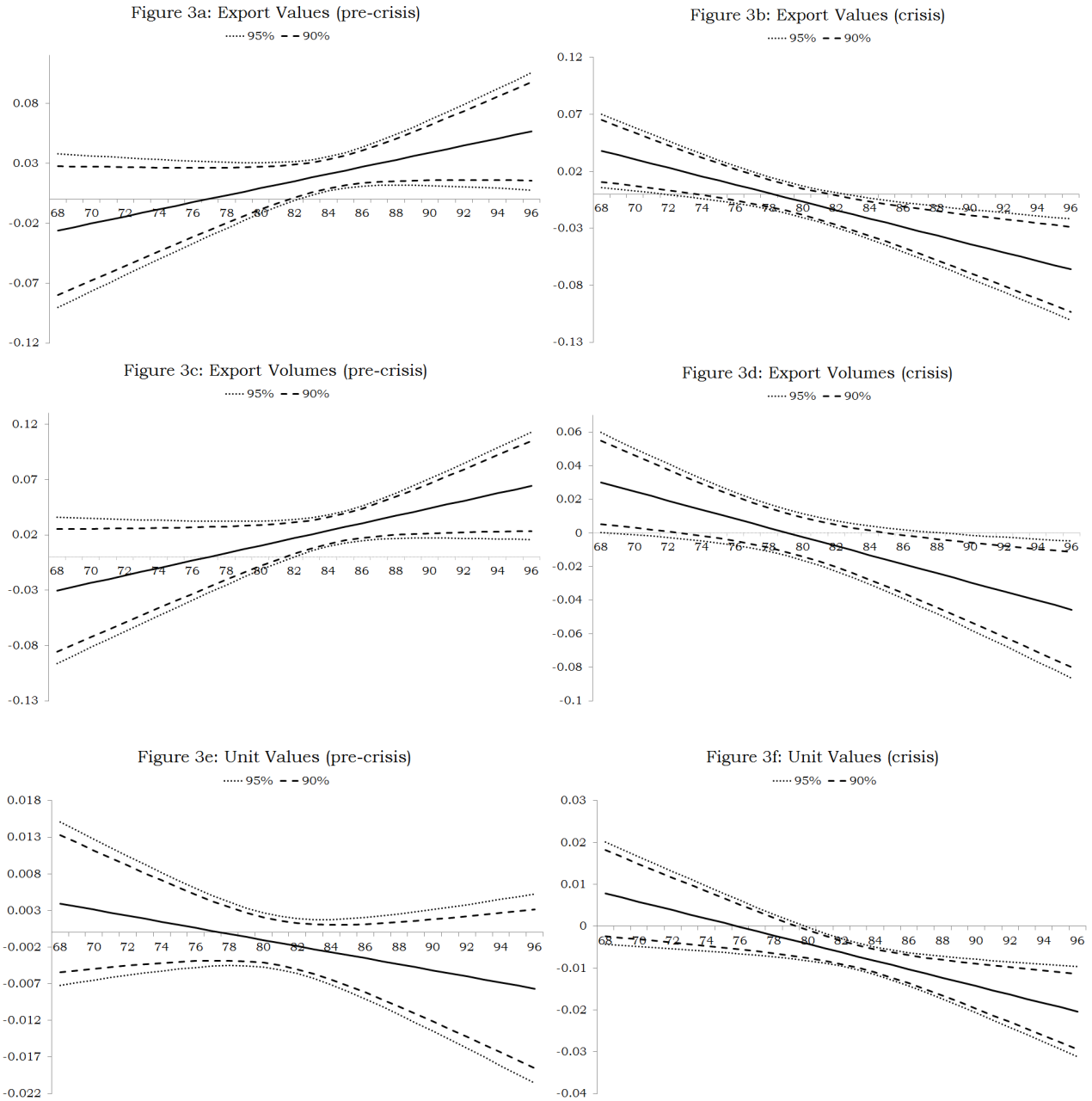


Figure 3: Elasticities of export values, volumes, and unit values growth to quality, by quality score and for the pre-crisis and crisis periods