



SNB Policy Paper. Prices of Swiss traded goods during the Great Trade Collapse

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This study analyses prices of Swiss exports and imports during the Great Trade Collapse between 2008 and 2009. Prices decreased across the board during this period, on average by around 3.5%. Yet, these price decreases were especially large for goods traded in centralised markets. This suggests that market structure is an important factor influencing the response of goods prices to large contractions in demand, such as those seen during the Great Trade Collapse.

1 Introduction

Imports and exports account for a large part of the Swiss economy, and import and export prices affect Switzerland through a variety of different channels.¹ To carry out its mandate of price stability, the SNB closely follows price developments, including changes in import and export prices.²

As the global financial crisis unfolded, world trade flows collapsed sharply between 2008 and 2009. Chart 1 illustrates that, during this period, Swiss quarterly exports and imports fell by about 21% and 20%, respectively, from peak to trough.³ This sudden drop in Swiss trade was part of the biggest contraction in world trade since the 1930s and is now typically referred to as the Great Trade Collapse.

International shocks of the dimension of the Great Trade Collapse strongly affect Switzerland's small open economy.⁴ A central bank's focus on price developments raises the question of how exactly the prices of traded goods responded. Did they change in 2008 and 2009? Did mounting difficulties in cross-border trade financing push up the prices of internationally traded goods? Or did decreasing import prices add to deflationary pressures – and if so, was this effect equal across goods classes?

A close examination of the dynamics of import and export prices during the Great Trade Collapse helps address these questions. The current study examines import and export data from the Swiss Customs Administration, focusing in particular on the years 2008 and 2009.

Two important empirical findings for Switzerland stand out. First, average Swiss export prices fell by 3.6% and import prices by 3.5% during the Great Trade Collapse. These decreases are relatively small when compared with the fall in aggregate export values (21%) and import values (20%). They show that the drop in prices accounts for only a small portion of the drop in aggregate trade values. By far the largest part is accounted for by a contraction in quantities.

The second, and more important, finding concerns the decomposition of price drops into two different product classes: homogeneous goods and differentiated goods.⁵ Homogeneous goods are traded in centralised markets.⁶ The resulting higher degree of price transparency generally constrains the ability of producers to set prices for these products. The data show that the price drop during the Great Trade Collapse was especially pronounced for homogeneous goods. This suggests that the specific market structure has played an important role in price movements and the transmission of international shocks.

Interestingly, the general direction of all price changes also points to the underlying determinants for the Great Trade Collapse. Specifically, the observed price decreases are consistent with the conventional view that a drop in demand was the key driver of the Great Trade Collapse. Conversely, supply-side factors such as mounting trade frictions would push up prices of traded goods and increase goods prices; they are thus harder to reconcile with the observed price drops.

The next sections document in detail the price changes for Swiss imports and exports during the Great Trade Collapse. Prior to this, however, the main explanations for the sharp decline in world trade are reviewed.

1 There are several phenomena that relate prices of traded goods to CPI dynamics. These phenomena include the impact of imports from low-wage countries (Auer and Fischer (2010)), the exchange rate pass-through (Campa and Goldberg (2005) and Stulz (2007)), and the role of commodity prices (Nakov and Pescatori (2010) and Natal (2012)) or simply the evolution of terms of trade (Kohli (2004)).

2 Hildebrand (2010) stresses the importance of trade linkages for monetary policy in the recent period of the Great Trade Collapse.

3 Chart 1 plots only world imports, since world exports equal world imports – excluding measurement errors.

4 During the period of the financial crisis, disruptions in trade flows as well as strong reversals of capital flows occurred (cf., for example, Milesi-Ferretti and Tille (2011) and Brutti and Sauré (2013)).

5 Typical examples of homogeneous goods are standardised intermediate inputs and commodities such as petroleum oil, unfinished metals or coffee beans. Examples of differentiated goods are specific medicaments or motor vehicles.

6 These are markets where prices are publicly and transparently quoted. An important example is the Chicago Mercantile Exchange.

2 Common explanations for the Great Trade Collapse

International trade is procyclical: trade flows, measured as shares of GDP, tend to increase during economic booms and decline during recessions. This does not imply, of course, that the reasons for the Great Trade Collapse are entirely obvious. Indeed, trade economists have been busy scrutinising the determinants of the sharp decline in world trade.

A number of explanations have been put forward, which can be broadly classified into two camps: those related to a decrease in demand and those associated with supply-side factors and, specifically, with increases in trade frictions.

On the *demand side*, a prominent explanation relates to the specific composition of the trade basket. Thus, demand fell especially heavily for specific goods classes, which happen to be those that constitute a disproportionately large share of the trade basket. Eaton et al. (2011) show that this composition effect of the trade basket can explain up to 80% of the Great Trade Collapse. Following the same line of argument, Behrens et al. (2013) analyse Belgian trade and production data, and find that the collapse of trade values was product-specific rather than specific to cross-border transactions. Other studies examine specific reasons for the drop in demand. Alessandria et al. (2010)

and Alessandria (2013), for example, argue that inventory management magnified the Great Trade Collapse. They show that, when anticipating a drop in future demand, importers run down their inventories, and this leads to a temporary collapse of import demand.⁷

Considering the *supply side*, a number of studies point to increased trade frictions as the reason for the Great Trade Collapse. For example, Ahn et al. (2011) and Chor et al. (2012) stress the role of trade credit. They argue that exporters' banks may have stopped financing export transactions during the crisis, thereby inducing a drop in cross-border trade. An alternative friction is protectionism. Mounting protectionist policies during the acute phase of the crisis could have generated adverse effects on the cross-border supply of goods (cf. Bems et al. (2012)).

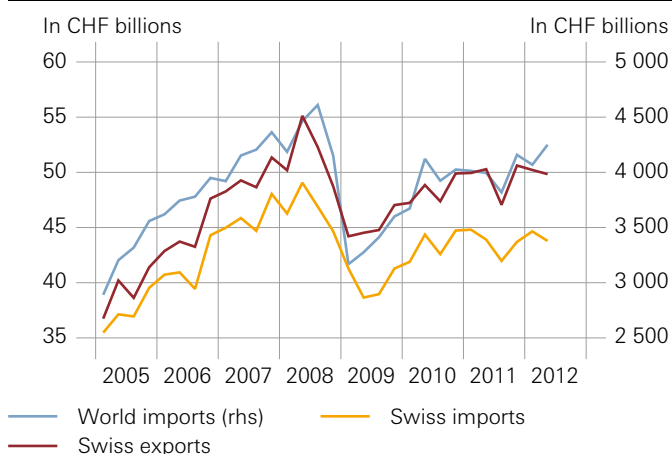
Interestingly, by assessing export and import prices, one can draw a demarcation line through the two broad sets of theories.⁸ Specifically, a drop in export and import prices can be read as evidence against explanations relying on increased export costs such as those of financing trade flows, because such effects are generally associated with increased prices of traded goods. By contrast, explanations stressing demand-side effects, such as those based on the composition of export baskets or inventory management, are consistent with the observed declines in prices of traded goods.⁹

In sum, the general decrease in prices of traded goods between 2008 and 2009 strengthens the common interpretation that the Great Trade Collapse was primarily driven by a fall in demand for traded goods.

Chart 1

WORLD AND SWISS TRADE

Values



Sources: Federal Customs Administration (FCA), International Monetary Fund (IMF)

7 Domit and Shakir (2010), Crowley and Luo (2011), and Bems et al. (2012) survey the literature.

8 Gopinath et al. (2012) emphasise this point in an earlier study on the Great Trade Collapse.

9 Rising trade friction or decreasing demand may both lead to a complete stop in export flows of certain goods, so that price changes remain unobserved. Such effects may indeed blur the overall picture conveyed by trade indices and the statistical estimations. However, the direction of observed price changes can still be considered as strongly indicative for the underlying drivers of the Great Trade Collapse.

3

Price developments in Swiss traded goods

This section presents the key findings of the study in two steps. After discussing general price trends in the first subsection, the subsection thereafter explores the more detailed patterns in the prices of homogeneous and differentiated goods.

GENERAL TRENDS

The analysis of Swiss export and import prices relies on detailed trade data from the Swiss Customs Administration. In the absence of direct information on unit prices, unit values are analysed; these are defined as the value (in CHF) over the mass (in kg).¹⁰ Unit values are known to proxy prices imperfectly, but reasonably well.¹¹

In order to build an aggregate index, unit values for each country-product pair are normalised to 100 in the initial period (January 2005). These are then aggregated through

10 The Swiss Customs Administration records 240 different countries and regions as trade partners and, following the 8-digit HS classification system, roughly 9,000 products.

11 The unit value indices analysed here track conventional price indices such as the import and export price indices computed by the Swiss Federal Statistical Office (www.bfs.admin.ch). Recent studies, such as Haddad et al. (2010) and Behrens et al. (2013), have used unit values to proxy and assess price dynamics during the Great Trade Collapse.

weighted geometric averages.¹² The data cover the period from January 2005 to June 2012. Charts 2a and 2b plot the evolution of Swiss trade for the years around the Great Trade Collapse. They show the unit value (indexed, red line) with aggregate trade values (blue line) and the real effective exchange rate (yellow line, inverted)¹³ for Swiss exports and imports separately.

The Great Trade Collapse is defined as the four consecutive quarters since the beginning of 2007 during which Swiss exports and imports were lowest. By this definition, it coincides with the calendar year 2009, which is shaded blue in charts 2. Chart 2a illustrates that unit values of exports gradually increased between 2005 and 2008. Between 2008 and 2009, the unit value index dropped somewhat but remained quite stable, especially when compared with the sharp drop in the aggregate value of Swiss exports.¹⁴ The chart suggests that unit values of exports decreased by about 3% to 4% between 2008 and 2009. Indeed, an econometric analysis shows that the unit value of Swiss exports decreased on average by 3.60% during the Great Trade Collapse. This estimated drop is statistically significant and robust to various controls (cf. table in the box).¹⁵

12 Weights are constant over time and proportional to total values for the whole period. Unit values are assumed to be constant when monthly observations are missing. Goods classes with an aggregate value of more than 1% are excluded. These classes are mostly residual goods classes, for which within-class substitution effects are likely to be large.

13 The real effective exchange rate is from the BIS.

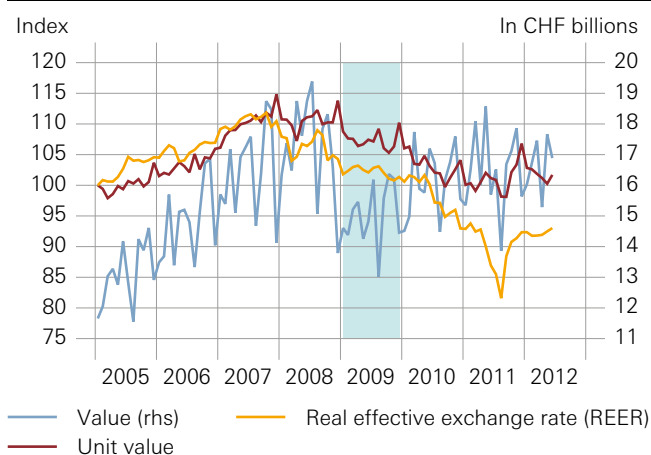
14 The subsequent fall and rise in unit values between 2010 and mid-2012 largely reflect the appreciation of the Swiss franc.

15 In all empirical specifications, changes in the composition of destination and products are controlled for. Thus, increased trade shares of emerging economies do not affect these results.

Chart 2a

SWISS TRADE, EXPORTS

Values and unit values

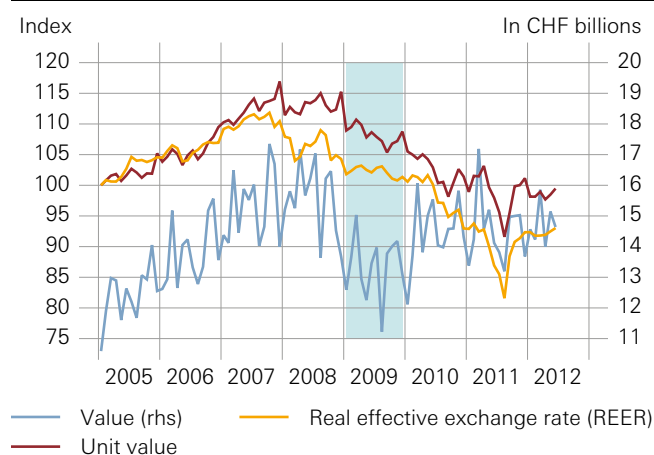


Sources: Bank for International Settlements (BIS), FCA

Chart 2b

SWISS TRADE, IMPORTS

Values and unit values



Sources: BIS, FCA

BOX

Empirical analysis

This box describes the empirical analysis of Swiss unit values during the Great Trade Collapse. Unit values are defined as value over mass. The unit of observation is a single export or import transaction, also called a *shipment*.¹ The period of the Great Trade Collapse is the calendar year 2009 (cf. chart 1). Accordingly, Swiss trade data are used for 2009 and the reference year 2008.

The empirical assessment needs to control for composition effects. Such effects may arise, for example, if Swiss imports from East Asia exhibit relatively low unit values and the share of Swiss imports from East Asia increases, as indeed it has. In that case, the larger weight of cheap Asian import goods may drive part of the dynamics in charts 2 and 3.² The following empirical model controls for such effects:

$$p_i = \alpha_{j(i)k(i)} + \beta_0 GTC_{t(i)} + \beta_1 GTC_{t(i)} * HOM_{k(i)} + \varepsilon_i \quad (1)$$

1 The general term shipment does not refer to transportation via the waterway.
2 Cf., for example, Sauré (2012) and Simonovska (2010) for theory and evidence on destination-specific export prices. Cf. Auer and Sauré (2011 and 2012) for characteristics of trade flows which are Swiss-specific.

Here p_i is the log unit value and the index i identifies the individual shipments. Each shipment i is associated with a unique country of destination, indicated by j , a narrowly defined product, indicated by k , and date of shipment, indicated by t .³ The dummy GTC_t is set to one if time t is in 2009 and zero otherwise. The dummy HOM_k is one if the product k is classified as homogeneous and zero when it is differentiated. The dummies α_{jk} , one for each country-product combination, control for the average level of unit values for each country-product combination, thus absorbing the composition effects discussed above.⁴ The coefficients of interest are β_0 and β_1 , which indicate, respectively, the *average* price change during the Great Trade Collapse and the *additional* price change for homogeneous goods.

Table 1 summarises the estimation results. Column 1 reports those of the specification including only the dummy GTC_t and the country-product dummies α_{jk} . The estimated coefficient β_0 suggests that, during the Great Trade Collapse, the unit value of Swiss exports decreased significantly, by about 3.60%. Column 2

3 All three indices j , k and t depend on shipment i , as indicated in equation (1).
4 Following Gopinath et al. (2012), bilateral exchange rates are not controlled for in the empirical model (1). The average annual CHF/USD exchange rate changed by less than half a percent between 2008 and 2009.

Table 1

UNIT VALUES AND THE GREAT TRADE COLLAPSE

Dependent variable: logged unit value

	1	2	3	Exports 4	5	6	7	Imports 8
GTC	-0.0360*** [0.000504]	-0.0355*** [0.000566]	-0.0273*** [0.000675]	0.00881*** [0.00122]	-0.0352*** [0.000331]	-0.0298*** [0.000362]	-0.0269*** [0.000408]	-0.0307*** [0.000581]
GTC*HOM		-0.0277*** [0.00146]	-0.0149*** [0.00157]	-0.0231*** [0.00158]		-0.0266*** [0.000999]	-0.0234*** [0.00102]	-0.0214*** [0.00104]
GTC*COMM			-0.0254*** [0.00114]	-0.00660*** [0.00126]			-0.0117*** [0.000765]	-0.0158*** [0.000890]
GTC*DUR				-0.0522*** [0.00146]				0.00732*** [0.000814]
Observations	23061154	21048848	21048848	21048848	37873337	35092584	35092584	35092584
R-square adjusted	0.813	0.818	0.818	0.818	0.724	0.723	0.722	0.722
Dummy: goods destination	yes	yes	yes	yes	yes	yes	yes	yes

Transaction-level data for Swiss exports and imports, for 2008 and 2009. GTC = Great Trade Collapse. Stars indicate significance at 10% (*); at 5% (**); and at 1% (***). Standard errors in brackets.

Source: FCA

corresponds to the estimation with the interaction term $GTC_t * HOM_k$.⁵ It shows that unit values for Swiss exports of differentiated goods decreased by about 3.55% during the Great Trade Collapse. Unit values for homogeneous goods also decreased, by 2.77%, yielding a total decrease of 6.32%.

Columns 3 and 4 report results of the estimations which additionally control for GTC interaction using dummy variables for commodities and durable goods. The estimated coefficients corresponding to both interaction terms are negative and significant. This result shows that prices of both product classes, commodities and durable goods, exhibited a drop that was larger than that of the average product. At the same time, the qualitative difference between prices of homogeneous goods and differentiated goods is preserved: controlling for the effects of other goods classes causes the former to drop by significantly more than the latter.⁶

Columns 5 to 8 of table 1 report results for tests based on Swiss import data. On average, unit values of Swiss imports decreased by about 3.52% during the crisis (cf. column 5). Distinguishing between the effect for differentiated and homogeneous goods, column 6 shows that the unit values of the two classes dropped by 2.98% and 5.64% (2.98% + 2.66%) respectively between 2008 and 2009. Again, the qualitative results remain unchanged when controlling for the specific effects of commodities and durable goods in columns 7 and 8.

⁵ The dummy HOM_k is collinear to the product dummies and thus does not enter the regression separately. Note also that column 1 reports a larger number of observations because not all goods classes are matched.

⁶ The estimated coefficient on GTC indicates that differentiated goods that are neither durable nor commodities exhibited a mild increase in prices of 0.88%.

The picture looks similar for the dynamics of Swiss imports, plotted in chart 2b. Here again, unit values of Swiss imports increased prior to the crisis and dropped sharply during the Great Trade Collapse. Over the same period, unit values of Swiss imports are estimated to have decreased on average by 3.52%.

In sum, charts 2 and the corresponding estimations reported in the box suggest that, during the Great Trade Collapse, firms exporting to and importing from Switzerland cut prices significantly.

DIFFERENT PRODUCT CLASSES: THE ROLE OF MARKET STRUCTURE

Looking at the drop in unit values documented in charts 2, one may wonder whether specific products or product classes were driving the general trends. One of the product classes for which prices reacted strongly is *homogeneous* goods.¹⁶ This class exhibits quite distinctive price characteristics.¹⁷ A distinguishing feature of homogeneous goods is their market structure. Homogeneous goods are sold through centralised market exchanges, so that prices are transparent and comparable across international markets. All other products are called *differentiated* goods and are exchanged through less standardised markets. They are distinguished by quality differences and important brand characteristics. Corresponding international markets are typically segmented, i.e. different prices are charged in different countries. Consequently, prices of differentiated goods tend to be less uniform.

¹⁶ The trade literature frequently distinguishes between homogeneous goods and differentiated goods. Rauch (1999) defines these classes at the 4-digit HS level.

¹⁷ In 2008, the share of homogeneous goods in the Swiss export basket was about 15.4%, and in the import basket 21.8%; the respective shares in 2009 were 15.3% and 19.6%.

Homogeneous goods typically comprise intermediate inputs, building materials, chemical substances, unfinished metals and energy sources. Within Swiss exports, the largest categories of homogeneous goods include electrical energy, specific organic chemicals, roasted coffee and plates of aluminium alloys. Corresponding homogeneous products within Swiss imports are petroleum products and metal products (such as copper wire or unwrought aluminium). As regards differentiated goods, large classes of Swiss exports are medicaments and watches; corresponding import classes are vehicles and telephone sets.

The data analysis reveals distinct price dynamics in the homogeneous and differentiated goods classes during the Great Trade Collapse. To that aim, unit value indices, as defined above, are computed separately for both classes. The unit value index from charts 2 thus decomposes into two sub-indices.

Charts 3a and 3b plot the two resulting sub-indices of unit values (red lines) together with the normalised aggregate values (blue lines) between January 2005 and June 2012.¹⁸ The time series corresponding to homogeneous and differentiated goods are plotted in dashed and solid lines, respectively. Chart 3a illustrates the dynamics of Swiss exports, chart 3b those of Swiss imports.

As charts 3 show, during the Great Trade Collapse the dynamics in *aggregate values* of homogeneous and differentiated goods were not very different: both declined sharply. At the same time, the dynamics in *unit values* of

both classes were quite distinct. The unit values of Swiss exports seem to exhibit greater volatility for homogeneous goods (cf. chart 2a, dashed red line) than for differentiated goods (cf. chart 2a, solid red line). Not only did unit values of homogeneous goods fluctuate more strongly on a monthly basis, they also exhibited larger swings from peak to trough in the period of the Great Trade Collapse. By comparison, unit values of differentiated goods are relatively stable. A similar impression is conveyed by the corresponding plots for Swiss import data in chart 3b.

This general message is corroborated by corresponding empirical estimates. They show that unit values for Swiss exports of differentiated goods decreased by about 3.55% during that period, while those for exports of homogeneous goods decreased by 6.32%. Regarding Swiss imports, unit values of differentiated and homogeneous goods dropped by 2.98% and 5.64% respectively during the crisis (cf. table in the box).

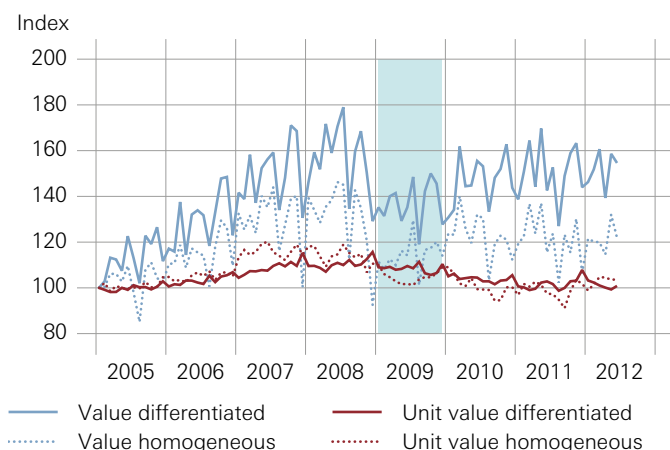
One might suspect that the pronounced differences between the price drops for homogeneous and differentiated goods can be attributed to commodities, a large proportion of which are indeed classified as homogeneous.¹⁹ It turns out, however, that the dynamics of homogeneous goods prices presented in this section are not driven by this overlap. Controlling for effects that are specific to commodities or durable goods leaves the qualitative results unchanged (cf. the econometric estimates in the box, where the effects of commodities are controlled for.)

18 Differentiated goods constitute a large share of total Swiss trade values, with their export value exceeding that of homogeneous goods by more than five times. Thus, the index of differentiated goods has a larger weight in the aggregate index plotted in chart 2.

19 The strong fluctuations of commodity prices are well known and their importance for central bank policy is widely acknowledged. Thus, monetary policy is known to be inefficient if it neglects the components of an oil shock that works like a productivity shock. Cf., for example, Nakov and Pescatori (2010) and Natal (2012).

Chart 3a

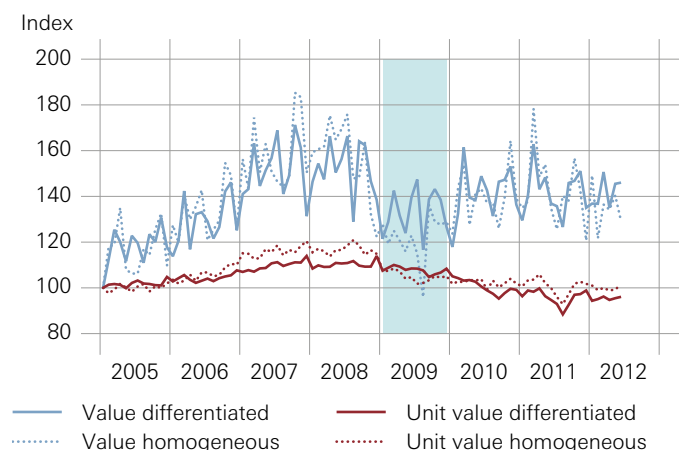
DIFFERENTIATED AND HOMOGENEOUS PRODUCTS, EXPORTS



Source: FCA

Chart 3b

DIFFERENTIATED AND HOMOGENEOUS PRODUCTS, IMPORTS



Source: FCA

The robust difference between the price declines for homogeneous and differentiated goods is interesting for at least two reasons. First, the significantly larger drop in prices of homogeneous goods compared to differentiated goods focuses attention on the impact of market structure on product prices. It suggests that price adjustments during the crisis depended on the specific market structure of goods.²⁰ In particular, competitive pressure and higher price transparency seem to have induced stronger price adjustments for those goods that are traded in centralised markets.

Second, the findings show that, while the change in prices during the Great Trade Collapse differed in magnitude for different goods classes, the direction was universal: prices in all broad goods classes dropped. This second observation underpins and reconfirms the view that the Great Trade Collapse was primarily the result of a contraction in demand as opposed to increased trade frictions, which would have increased the price of traded goods.

²⁰ Of course, the market structure itself is the outcome of underlying product characteristics, such as market size, price elasticity of demand and intrinsic product comparability and substitutability (cf. Broda et al. (2008)). Disentangling the impact of all underlying determinants of market structure, however, is beyond the scope of the current analysis.

This study presents new information on how prices for Swiss exports and imports, proxied by unit values, behaved during the Great Trade Collapse. Between 2008 and 2009, when aggregate trade values contracted sharply, prices of Swiss exports and imports decreased. The universal fall in prices underpins the common view that demand factors were the prime drivers of the Great Trade Collapse.

A closer examination of different goods classes shows that the prices of homogeneous goods fell especially heavily. Their prices dropped by more than average. A characteristic of homogeneous goods is that they are traded through highly centralised exchanges. Together, these observations suggest that market structure played an important role in price changes during the Great Trade Collapse. Specifically, firms operating in homogeneous goods markets were exposed to stronger international competition and may have responded by cutting prices more than firms operating in differentiated markets.

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