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AN ANATOMY OF TRADE IN THE 2008–09 CRISIS

Mona Haddad, Ann Harrison, and Catherine Hausman

As discussed in the previous chapters, the global economic crisis of 2008–09 was accompanied by a severe fall in international trade. Baldwin (2009) characterizes the collapse as “sudden, severe, and synchronized . . . the sharpest in recorded history and deepest since WWII.”

A number of hypotheses have attempted to explain what caused the collapse and why it became so widespread and deep.¹ While many highlight the fall in aggregate demand, some suggest that several supply-side factors may have played a role. Supporters of the demand shock hypothesis argue that the collapse in trade was the result of a synchronized postponement of purchases, especially of durable consumer and investment products. Eaton et al. (2010) and Levchenko, Lewis, and Tesar (2010) are among those arguing that the collapse in trade was primarily the result of demand-side shocks. By contrast, supporters of the supply shock hypothesis suggest that the collapse in trade was a consequence of the sudden financial arrest, which froze global credit markets and spilled over onto the specialized financial instruments that finance international trade. Others have noted that with the globalization of supply chains, a fall in manufactures could lead to an outsized fall in total trade, particularly if supply chains are disrupted. Finally, some highlight the role of rising protectionism.

In this chapter, we identify a new set of stylized facts on the 2008–09 trade collapse that can shed light on the importance of demand- and supply-side factors in explaining the fall in trade. In particular, we decompose the fall in international trade into product entry and exit, price changes, and quantity changes for imports to Brazil, the European Union (EU), Indonesia, and the United States. Our ability to separate price and quantity changes allows us to identify the upward trajectory of prices for manufacturing, which could be consistent with a role for credit

constraints in explaining some—but obviously not the majority—of the collapse in world trade.

The rest of this chapter is organized as follows. The next section discusses recent changes in the extensive and intensive margin. The following section presents evidence of the role of demand and supply shocks in the onset of the trade collapse. The subsequent sections analyze how these trends vary by product type and income group. The following section discusses whether any of these trends were present before the crisis. The final section concludes. For full details of our methodology and data sources, readers are referred to the working paper version of this chapter.

Changes in the Intensive and the Extensive Margins

The speed and sustainability of recovery from the crisis depend partly on which margin, extensive or intensive, has been more affected by the crisis and by how fast it responds to fiscal stimulus. The intensive margin refers to changes in the value of exports due to changes in the quantities or prices of already exported goods. The extensive margin refers to changes in the value of exports due to changes in the number of goods exported or changes in the number of destinations to which a country exports old or new goods.

If significant fixed costs are associated with exporting or importing new products (that is, the extensive margin), then identifying the relative size of changes along the extensive and intensive margins is useful in predicting the speed of the recovery. For instance, we would expect a faster recovery if most of the changes in trade were on the intensive margin. Evidence from U.S. and French firms (Schott 2009; Bricongne et al. 2009, respectively) suggests that the intensive margin was more affected during this crisis than the extensive margin. These results are consistent

with Bernard et al. (2009), who analyze past recessionary periods. Yet none of these studies has examined price changes. In this section, we discuss changes in the extensive and intensive margins in recent years.

In October 2008, the total number of bilaterally traded products began to fall in Brazil, Indonesia, and the United States (figure 5.1). The percentage fall in the total number of products was greatest for Brazil and Indonesia, reaching about 10 percent from peak to trough for both countries. By contrast, the percentage of products traded for the European Union did not decline, and the decline for the United States was half of that for Brazil and Indonesia, around 5 percent.

Brazil, the European Union,² Indonesia, and the United States all experienced a sharp drop in the total value of imports beginning in October 2008, with recovery beginning in early 2009 (figure 5.2). None managed to re-attain precrisis levels by the end of the period shown (September 2009). Developing countries experienced much greater volatility than the developed countries. Indeed, before beginning to recover, the total value of imports fell by nearly half for Brazil and Indonesia. At the end of the sample period, however, the total loss in trade was about the same for the developed and developing countries (around one-third of aggregate trade).³

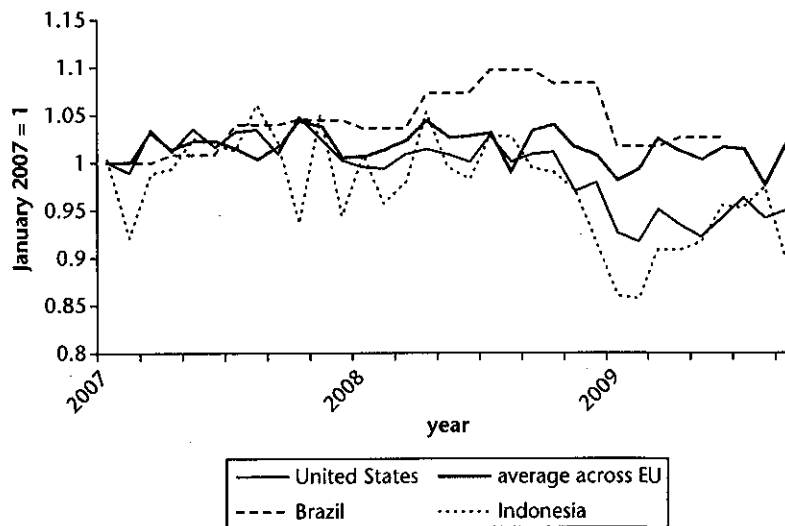
Effects along the intensive margin dramatically outweighed the effects along the extensive margin, both in the U.S.-EU markets and in the Brazil-Indonesia markets (figure 5.3). Imports by the United States and the EU

dropped from US\$4 trillion in 2008 to US\$3 trillion in 2009, a total fall of 25.2 percent from the first half of 2008 to the first half of 2009. The quantity effect accounted for over 15.9 percent out of the total 25.2 percent value drop, and the decline in prices accounted for only 5.5 percent. Net entry, the sum of exit and entry, was negative, but accounted for only a small portion of the change in total value. Imports by Brazil and Indonesia dropped from US\$135 billion to US\$109 billion, a fall of 18.9 percent from the first half of 2008 to the first half of 2009. For Brazil and Indonesia, changes in quantity accounted for 18.5 percent out of the total 18.9 percent drop in the value of trade, with product net exit accounting for 1 percent and a small price increase partially offsetting these effects. The results for the intensive and extensive margins match evidence by Schott (2009) and Bricongne et al. (2009), who find that for U.S. and French firms, changes in the intensive margin outweighed changes in the extensive margin.

Demand and Supply Shocks

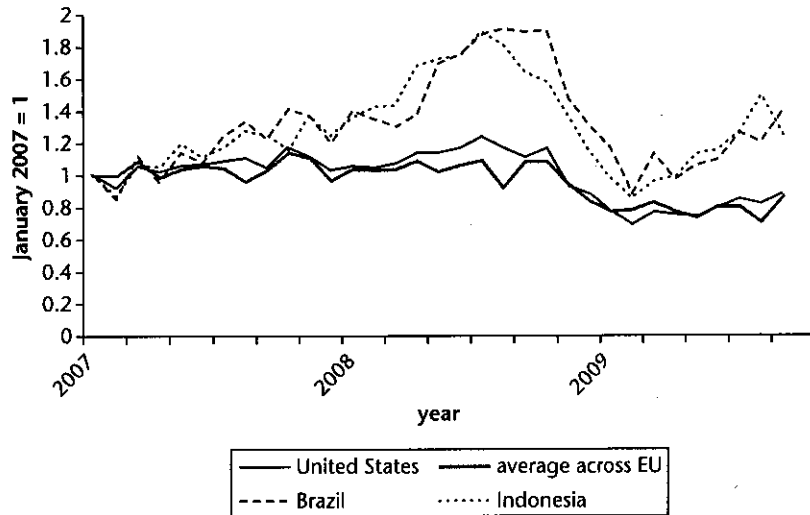
Determining what happened to traded prices and quantities between 2008 and 2009 offers a new approach to determining the role of demand versus supply factors in the trade collapse. If the decline in trade was driven mostly by a negative demand shock, we would expect both prices and quantities to have been negatively affected. However, if supply-side shocks were important, we would expect an

Figure 5.1. Index of Total Number of Products Traded in Brazil, the European Union, Indonesia, and the United States, January 2007–September 2009



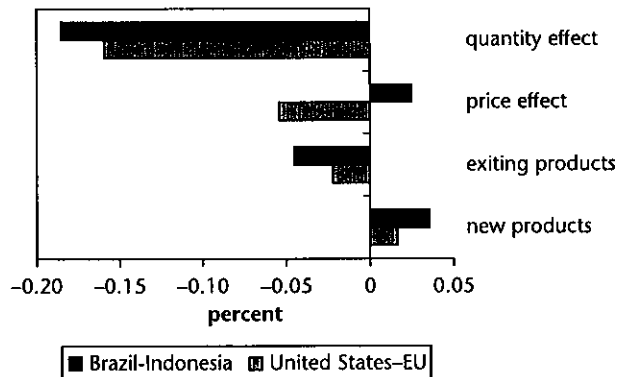
Source: Authors' calculations based on data from national statistics agencies.
Note: Products are tallied by partner country.

Figure 5.2. Index of Total Value of Imports for Brazil, the European Union, Indonesia, and the United States, January 2007–September 2009



Source: Authors' calculations based on data from national statistics agencies.

Figure 5.3. Change in Total Import Value of All Products in Brazil-Indonesia and United States–EU Trade, by Margin, 2008–09 percent



Source: Authors' calculations based on data from national statistics agencies.

upward pressure on prices because a reduction in trade credit would lead to a reduction in the supply of traded goods independently of the negative demand shock.

While the largest contributor to the crisis seems to be the demand shock, there is also systematic evidence of factors generating negative supply shocks in manufacturing. By extending work by Bernard et al. (2009) to decompose the intensive margin into price and quantity effects in an ordinary least squares linear regression, we find evidence of both demand and supply shocks. Indeed, at the aggregate

level,⁴ the evidence is consistent with a pure demand shock story: a fall in demand generated declines in prices and quantities. For the United States, 36 percent of the reduction in trade across all trading partners can be explained by a decline in prices, while 57 percent can be explained by a decline in quantity. The contribution of entry and exit accounted for less than 1 percent of the observed changes. In both the EU and Indonesia, the quantity declines dominated the price effect, while for Brazil the opposite is true. For all countries, the intensive margin again is substantially larger than the extensive margin. Exit again outweighs entry, leading to negative net entry in all regions.

However, if we restrict the sample to manufacturing, a different story emerges. We see that for manufactures, the fall in quantity continues to account for the major share of the observed trade collapse. However, for Brazil, Indonesia, and the United States there is also evidence of a supply shock: price increases offset the contribution of declining prices to the fall in trade. This finding is particularly striking for Indonesia. All in all, the evidence suggests that supply-side disruptions play a more important role in manufacturing.

Several outliers in these trends should be noted. For instance, members of the Organization of the Petroleum-Exporting Countries experienced larger price effects on their exports to the United States than did other countries. Oil-exporting countries, including Algeria, Angola, Iraq, the Russian Federation, Saudia Arabia, and República Bolivariana de Venezuela, show price effects that are larger (more negative) than the average. Their quantity effects

are, correspondingly, smaller than the average. Other large trading partners—such as France; Germany; Italy; Japan; the Republic of Korea; Malaysia; Taiwan, China; and the United Kingdom—show larger quantity effects than the average across countries.

In an alternative decomposition of the total trade value⁵ by trading partner, product, and average value,⁶ we find that while the extensive margin experienced negative changes, the intensive margin mattered more. No country saw an increase in the number of trading partners from 2008 to 2009. In fact, Brazil lost almost 10 trading partners. All four regions also saw a fall in the number of products traded, although this was a very small percentage of the total loss. The largest changes were in average value, which fell by 10 to 28 percent across the various regions.

Variation by Product Type

Our research shows that these average effects mask enormous differences across different products. Figure 5.4 shows the difference between commodities and manufactures, where each margin is shown as a percentage of the change in total import value in 2008. The differences across product classes are striking. The negative price effect, apparent for the United States and EU when aggregating across all goods, is still evident for commodities but not for manufactures. With commodity prices falling during the crisis, it is not surprising that the price effect was large for

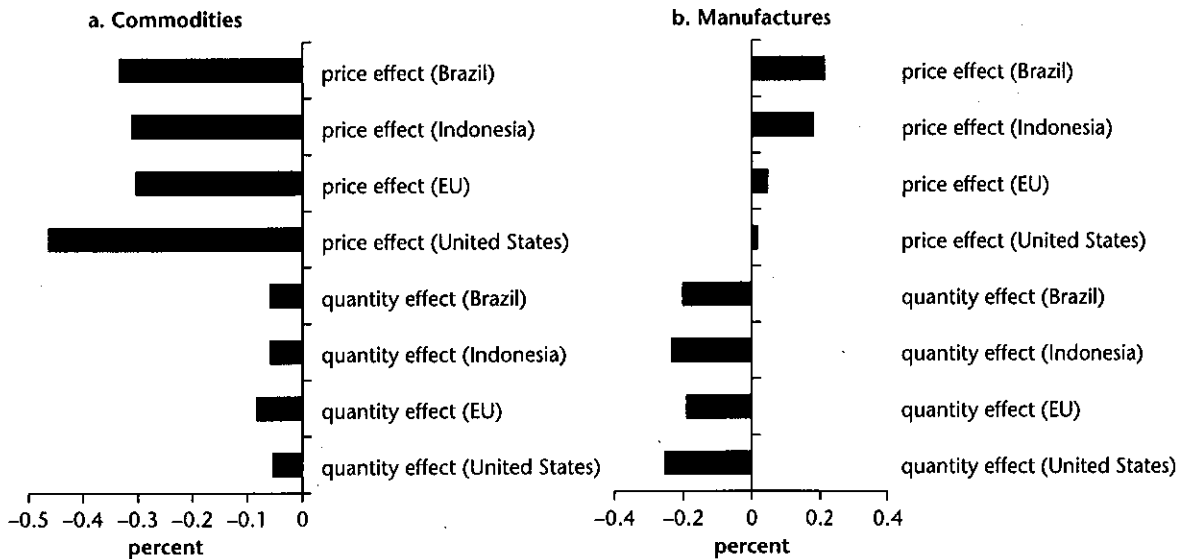
commodities; it is, however, noteworthy that the price effect was generally limited to commodities; the price effect for manufactures was positive.

Since we know that demand for manufactures fell during the crisis, the effect on prices can tell us something about what happened to supply. Where prices rose or where they fell only slightly, it is plausible that supply shifted in. Thus, the evidence on manufactures, contrasted with commodities and particularly in the case of Brazil and Indonesia, points to a negative supply shock in manufactures in addition to the negative demand shock. This negative supply shock could be from fragmentation of the global supply chain or from reductions in trade finance.

The prevalence of supply shocks in the manufacturing sector is also confirmed when we analyze differences across product types. The largest total value change is in minerals, which fell by US\$134 billion. Almost 90 percent of that decline was due to price falls. Machinery and electrical equipment and transportation equipment also experienced large falls in total volume, but almost all of the changes were due to a decline in quantity for these products.

Prices increased in the following product categories: chemicals, footwear, leather, miscellaneous, and transportation equipment (note that because the total value change is negative, a positive total price effect is represented by a negative percentage of the value change). Most of the large negative price effects were in product categories made up largely of commodities (animal products,

Figure 5.4. Variations in Price and Quantity in Commodities and Manufactures, 2008



Source: Authors' calculations based on data from national statistics agencies.

minerals, and vegetable products). All products saw falls in quantity, with the quantity effect generally contributing to over half of the total effect. The quantity effect was relatively small for minerals, where the price effect was largest.

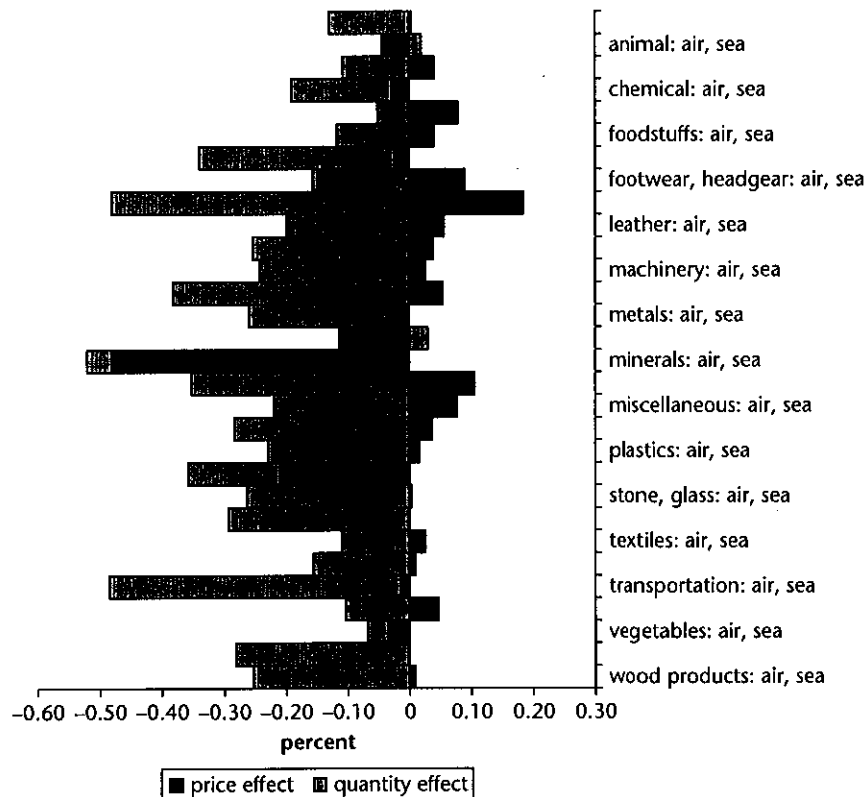
As figure 5.5 illustrates, differences in trade responses across modes of transport are not significant. However, a distinction can be made between manufactures and commodities. Commodities exhibited both price and quantity declines.⁷ In contrast, manufactures showed quantity declines but mild price increases. The overall trends in figure 5.5 are consistent with an overall pattern of demand contraction, with some evidence of supply constraints in manufacturing. The largest price increases were in the leather and footwear sector, where credit constraints and trade frictions may have restricted supply. Finally, it is interesting to note that for many products, the quantity effect is larger for transport by air than for transport by sea.⁸

We also examine evidence on credit constraints by adopting the classification scheme of Bricongne et al. (2009) to separate products according to sectoral dependence on external finance. We restrict our analysis to manufactures. For the United States, price increases were most significant in sectors that are typically credit constrained, partially counteracting the large quantity effect. The EU does not show this effect. For Brazil, the overall import value for the finance-dependent sectors dropped (by 3 percent) but rose for the low-dependence sectors (by 9 percent). The overall import value also fell more for finance-dependent sectors (19 percent as opposed to 6 percent) in Indonesian imports.

Variation by Income Group

While the financial crisis originated in high-income countries, its effects on trade were rapidly transmitted to low-income countries. It has been hypothesized that the effects

Figure 5.5. Changes in Import Values across Product Types and Shipment Methods for U.S. Imports as a Percentage of Value by Margin, 2008



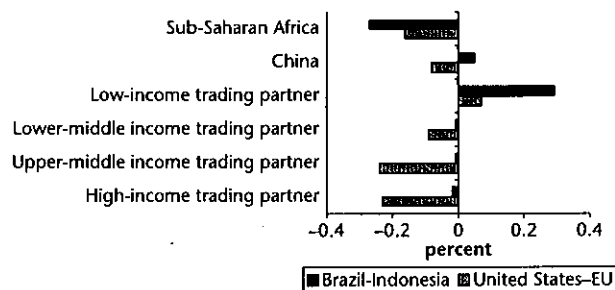
Source: Authors' calculations based on data from national statistics agencies.
 Note: Within each product grouping (for example, animal products), the upper bar shows the effect on air shipments and the lower bar shows the effect on vessel shipments. The effects are percentage changes of the total effect within that shipment type. For instance, the price effect for animal products shipped by sea is divided by the total value in 2008 of animal products shipped by sea. Note that typically sea shipments were much larger in 2008, so the gross value changes for sea shipments are larger compared to those for air shipments than what is shown. Entry and exit are not shown and represent less than 5 percent of the change in any given category. Continuing products with unobserved price or quantity are also not shown.

of constrained trade finance could vary by exporter income (Malouche 2009; Berman and Martin 2010) and by geographic region (Berman and Martin 2010). On the one hand, high-income countries with well-developed markets were most affected in the financial crisis; on the other hand, low-income exporters with less-developed financial markets may be more reliant on trade finance originating in their trading partners. Countries with different levels of income export different baskets of goods, which embody different levels of quality and variety.

To analyze how the response in trade volumes changes with the income level of the exporting country, we classify trading partners in four categories: high, upper-middle, lower-middle, and low income, according to the World Bank's country classification. We also add China and Sub-Saharan Africa as separate categories, two regions where researchers have hypothesized that the trade fall was unique. As mentioned above, it has been theorized that the trade finance constraint could have been either much more severe or much less severe in Sub-Saharan Africa. China has been unique both because it recovered from the crisis more rapidly and because it has been a target for protectionism (Bown 2009). The story can be further elaborated by returning to the heterogeneity across trading partner income but restricting the sample to manufactures. The results are shown in figure 5.6.

Overall, upper- and upper-middle-income exports to developed countries were most affected by the crisis, with falls in the value of their exports reaching 25 percent to the United States and EU. Low-income countries were able to increase their exports to the United States and EU by 7 percent. The impact of the crisis on the exports of countries of various income groups to Brazil and Indonesia was

Figure 5.6. Percentage Change in Imports to Brazil and Indonesia and to the United States and the EU from Countries in Different Income Groups, 2008–09



Source: Authors' calculations based on data from national statistics agencies.

very small. The most striking result is the large increase in exports of low-income countries to Brazil and Indonesia of nearly 30 percent between 2008 and 2009. This finding confirms that South-South trade is becoming increasingly important and was reinforced during the crisis. Sub-Saharan Africa, however, was not able to take advantage of these South-South trade opportunities as its exports to Brazil and Indonesia dropped 27 percent. China's exports to the United States and the EU dropped by only 8 percent, in line with other lower-middle-income countries; but China's exports to Brazil and Indonesia increased by 5 percent.

Were Any of These Trends Present before the Crisis?

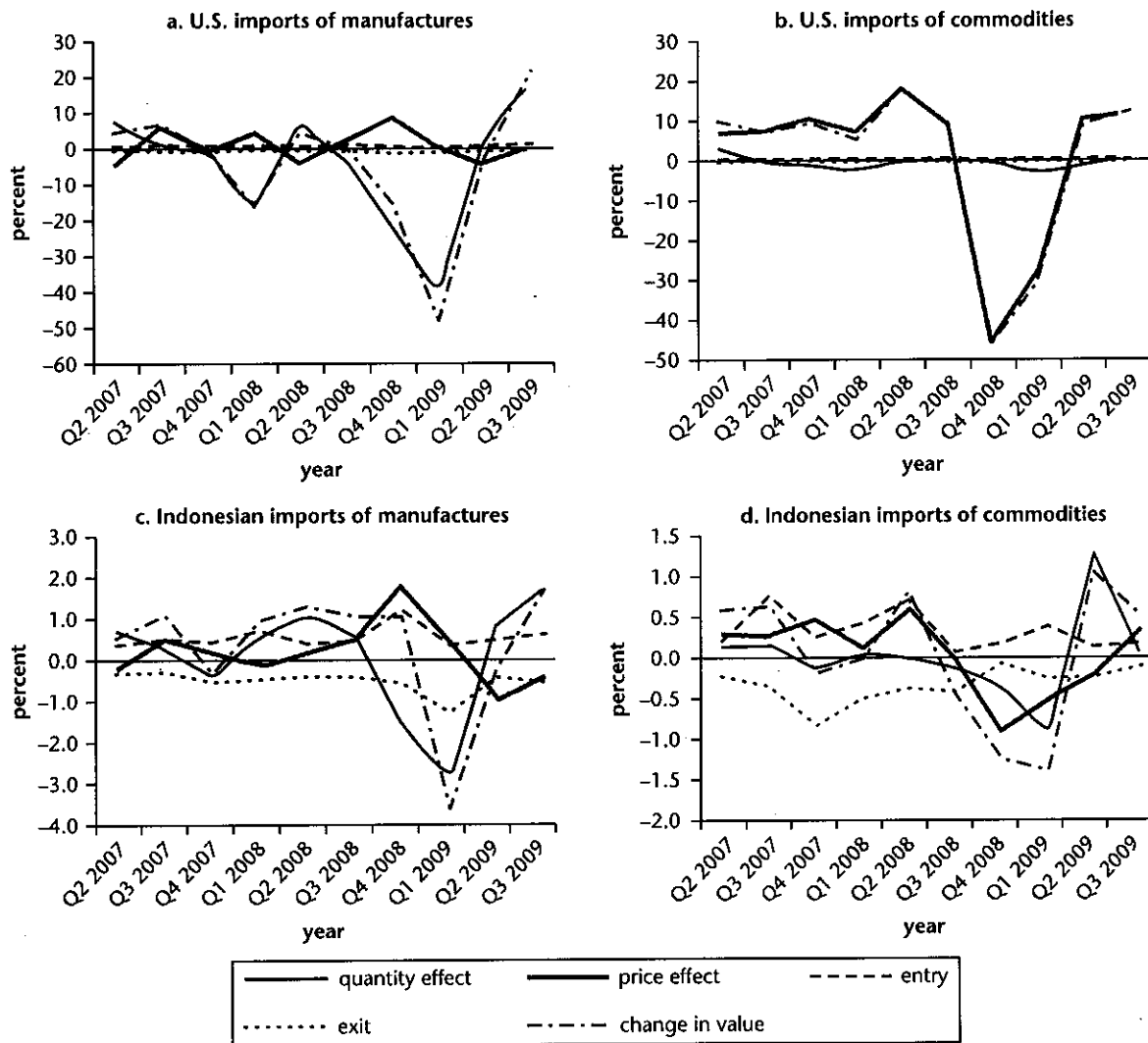
We examine whether these findings are unique to the crisis or whether they represent the continuation of historical trends. Figure 5.7 shows changes in each margin (in billions of U.S. dollars) for U.S. and Indonesian imports across quarters for 2007–09. Price and quantity changes are now defined relative to the previous quarter rather than to the same quarter of the previous year. Hence, the magnitudes of these changes do not match the magnitudes given in the other figures, but they do show the specific timing of the collapse in trade.

As expected, entry and exit do not play a large role in U.S. imports (before and after the crisis) but are more important in a developing country like Indonesia, where trade relations are thinner and less established. The quantity and price effects are not part of broader historical trends; rather, they match the timing of the global economic crisis. Manufacturing imports to the United States level off in the third quarter of 2008, as the crisis is beginning, and then plummet in the following two quarters. For this whole period, the negative quantity effect dominates, and there is a smaller positive price effect for the fourth quarter of 2008. Manufacturing imports to Indonesia follow a similar pattern, with a negative quantity effect beginning in the fourth quarter of 2008 and an initial positive price effect. Commodity imports to the United States also plummet in the fourth quarter of 2008, but here the negative price effect dominates. For commodity imports to Indonesia, both quantity and price effects are negative and begin around the fourth quarter of 2008.

Conclusion

In summary, the great trade collapse occurred along both intensive and extensive margins. The intensive margin had much greater impacts, with negative effects for both prices

Figure 5.7. Percentage Changes in Imports of Manufactures and Commodities to the United States and Indonesia, Second Quarter, 2007–Third Quarter, 2009



Source: Authors' calculations based on data from national statistics agencies.

and quantities. Across all products, most of the countries analyzed experienced a decline in new products, a rise in product exit, and reductions in quantity for product lines that continued to be traded. These effects are similar for high-income and middle-income partner countries, but trade with low-income partner countries was much less affected.

The evidence suggests that the intensive rather than the extensive margin mattered the most, consistent with studies of other countries and previous recessionary periods. On average, quantities declined and prices fell, which is consistent with a story in which the demand shock played a dominant role. Aggregating across all product categories, we find that the evidence is consistent with the

conclusions reached by Eaton et al. (2010) and Levchenko, Lewis, and Tesar (2010), who argue that the collapse in trade was caused primarily by a synchronized demand-side shock.

However, these average effects mask enormous differences across different product types. Disaggregating the data into manufactures and nonmanufactures, we find that the price declines are driven primarily by commodities. Within manufacturing, however, while most quantity changes were negative, in many cases price changes moved in the opposite direction, particularly for products imported by developing-country trading partners. Consequently, within manufacturing, some evidence indicates that supply-side frictions did play a role.

Considerable differences emerge across product types and exporter incomes. Some have argued that South-South trade was less disrupted during the crisis. While this appears to be the case if one examines aggregate trade patterns across all goods, a large decline occurred in manufacturing trade with Sub-Saharan Africa. The most striking result is the large increase in exports of low-income countries to Brazil and Indonesia—nearly 30 percent between 2008 and 2009. We also find evidence consistent with the view that credit constraints could account for the price increases occurring in the manufacturing sector. For the United States, for example, price increases were most significant in sectors that are typically credit constrained.

Notes

1. For summaries, see Baldwin (2009) and Council of Economic Advisers (2010).
2. This is an average across the European Union.
3. Since the sample ends in September 2009, we do not capture the continued slow recovery since that period.
4. This level includes commodities.
5. The change in total trade value is included.
6. This follows Bernard et al. (2009).
7. Declines are indicated by both the dark and the light bars located on the left-hand side of the graph for minerals, stone and glass, animal products, and vegetables.
8. Products do not include chemicals, foodstuffs, and transportation equipment.

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