Box 1

UNDERSTANDING GLOBAL TRADE ELASTICITIES: WHAT HAS CHANGED?

In recent years world trade growth has been weak not only in real terms but also relative to global economic activity. This box reviews the weakness in global trade since mid-2011 from a historical perspective and discusses the factors underpinning the relationship between global trade and GDP. It finds that the income elasticity of global trade has varied significantly over time and that, in addition to cyclical demand developments, structural factors appear to have lowered the trade-to-income elasticity well before the recent economic and financial crisis. While the global trade elasticity is expected to recover from its current low levels, it is unlikely to return to pre-crisis averages in the medium term.

Weakness in global trade

In absolute terms, global trade growth was weaker in 2013 than the already low growth rate observed in 2012. It has also weakened significantly relative to global economic activity. Over the period 1981-2007, the gross income elasticity of global trade, measured as the ratio of the average growth rate of imports of goods and services to average GDP growth, was 1.8. In 2011-13, this ratio declined significantly to 1.1.[1] The decline is robust to different aggregation weights being used for global GDP and to the choice of more narrowly defined sectors such as trade in goods or manufacturing (see table). However, the results appear to be sensitive to the chosen pre-crisis sample period: the decline becomes relatively limited when the sample is extended back to the 1950s, suggesting that the trade-output relationship has varied over time.

Indeed, when the trade-to-GDP ratio is assessed using moving averages, the elasticity displays clear and persistent deviations from the constant mean ratio. Whereas trade growth accelerated relative to economic activity from the mid-1980s to the mid-1990s, the elasticity started to

1 The quantification of the elasticity based on the period 2011-13 is only suggestive, as the sample is relatively limited.

Historical ratios of global trade to output growth

Sample period	Ratio[1]	Trade variable	Output variable
1981-2007	1.8	Imports of goods and services	GDP[2]
2011-2013	1.1		
1981-2007	2.0	Imports of goods and services	GDP[3]
2011-2013	1.4		
1950-2007	1.6	Merchandise exports	Merchandise production
1981-2007	1.9		
2011-2013[4]	1.4		
1950-2007	1.6	Manufacturing exports	Manufacturing production
1981-2007	2.1		
2011-2013[4]	1.5		

Sources: ECB calculations, World Trade Organization, CPB Netherlands Bureau for Economic Policy Analysis and United Nations Industrial Development Organization (UNIDO).
1) Imports, GDP: quarterly data; exports, production: annual data.
2) At purchasing power parity.
3) At market exchange rates.
4) For 2013, WTO series are extrapolated using growth rates from CPB and UNIDO data.

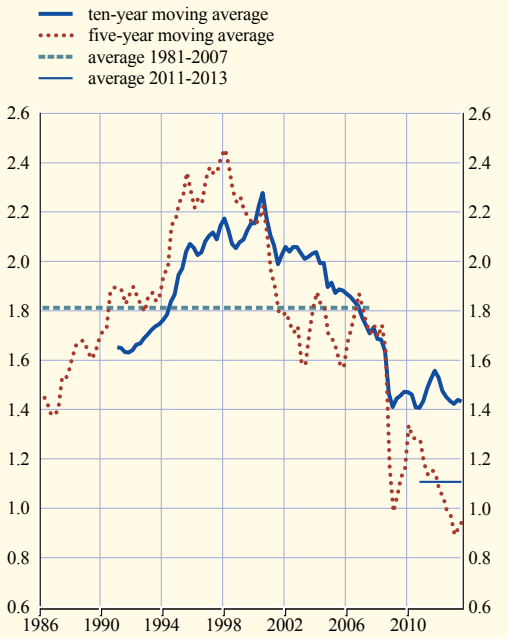
decline in the late 1990s, before falling to 20-year lows after the crisis and remaining weak thereafter (see Chart A). The chart shows in particular that the gross income elasticity of global trade started to decline about a decade before the crisis.

Factors driving global trade elasticities

The recent change in the trade-to-GDP relationship can be explained in part by cyclical factors and shifts in demand composition. Global demand components that typically have a high import content, such as business investment, have remained uncharacteristically weak since the financial crisis. The slowdown in trade-intensive demand components has been a strong drag on trade growth, leading to a lower trade-to-GDP growth ratio. This effect is of a temporary nature, as it would be reversed by a recovery in global activity and investment.

Taking a historical perspective, however, the decline in the trade elasticity also has structural determinants, which are likely to have a more lasting impact on the trade-to-GDP relationship. A number of factors that had boosted trade in the decades prior to 2000 have since had a diminishing or negligible role. In the literature, falling transportation costs, declining relative prices of tradables and the reduction of trade barriers are commonly cited as factors having

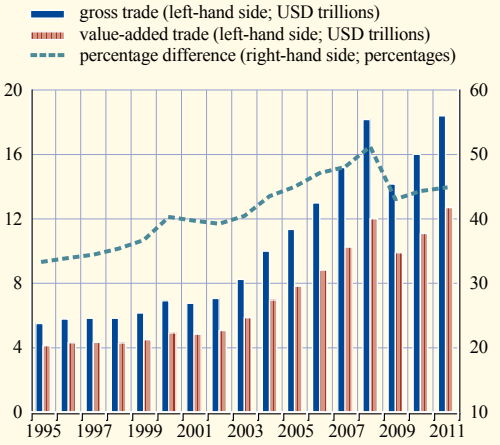
Chart A Ratio of global import growth to GDP growth



Source: ECB calculations.
Notes: Data are quarterly. The latest observation is for the fourth quarter of 2013.

contributed to trade growing faster than output.[2] Yet the significant cost reductions stemming from earlier technology breakthroughs, the amplifying effects on trade from trade liberalisation agreements and productivity gains in the tradable sectors had levelled off by the mid-1990s and have since provided less support to trade growth, which explains in part the fact that the trade elasticity peaked during the mid- to late 1990s (see Chart A).

Chart B Global gross versus value-added trade



Sources: ECB calculations and WIOD.

More recently, the rise of global value chains has helped trade to grow faster than output. Global value chains imply the international fragmentation of production, involving increased outsourcing of intermediate inputs to foreign suppliers. Trade flows are measured in gross terms, which means that they "double count" any traded item whenever it crosses more than one international border. This implies that outsourcing increases (gross) trade relative to activity. The rise of global value chains, or outsourcing, can be measured by comparing gross and value-added trade, as the latter is invariant to where intermediate inputs are produced. Data from the World Input-Output Database (WIOD) show that the gap between gross and value-added trade indeed increased from 33% in 1995 to 51% before the crisis (see Chart B). A comparison of the implied trade-to-income elasticities for value-added and gross trade for the pre-crisis period shows that outsourcing added 0.2 percentage point to the elasticity of global trade over this period.

However, this source of support for the relative growth in trade may decline. The WIOD data, which are only available up to 2011, show that the crisis of 2008-09 has already led to a downward shift in the average length of global value chains. Moreover, anecdotal evidence suggests that in the wake of the 2011 Japanese earthquake and the subsequent supply disruptions in certain manufacturing industries, some companies are aiming to reduce the complexity and length of their supply chains.[3] This would have a downward impact on the medium to long-term global trade elasticity.

An empirical analysis based on a bivariate Bayesian vector autoregression (BVAR) model further quantifies the decline in the trade elasticity. The BVAR is estimated using quarterly global real imports of goods and services and global real GDP with five lags, and projects trade conditional on the world GDP path implied by the June 2014 Eurosystem staff macroeconomic projections. Chart C shows that when the model is estimated over the pre-crisis period from the first quarter of 1981 to the fourth quarter of 2007, the trade-to-GDP growth ratio at the end of the forecast horizon is 1.8, in line with the pre-crisis trade elasticity. When full account is taken of the post-recession data by extending the sample to the first quarter of 2014, the projected ratio at the end of 2016 declines to 1.6, suggesting that medium-term trade is likely to remain below

2 See, for example, Jacks, D., Meissner, C. and Novy, D., "Trade Costs, 1870-2000", *American Economic Review*, Vol. 98, No 2, 2008, pp. 529-534; and Baier, S. and Bergstrand, J., "The growth of world trade: tariffs, transport costs, and income similarity", *Journal of International Economics*, Vol. 53, No 1, 2001, pp. 1-27.

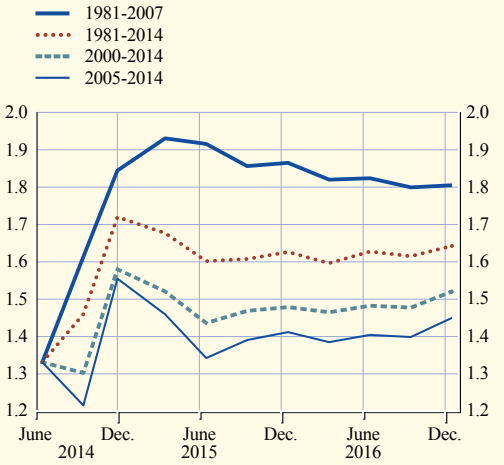
3 See, for example, "Global value chains: Managing the risks" in *Interconnected Economies: Benefiting from Global Value Chains*, OECD Publishing, 2013.

levels implied by pre-crisis elasticities. If greater weight is given to the more recent data, for example by taking account of only the last 15 or ten years, the ratio declines further to 1.5 and 1.4 respectively.

Conclusion

In sum, the relationship between trade and output growth observed over the past three years is weaker than that recorded over the 25 years prior to the recent economic and financial crisis. Some of this weakness is likely to be cyclical, reflecting relatively moderate growth in trade-intensive demand components, in particular business investment, since the crisis. However, the gross income elasticity of global trade displays a high degree of variation over time, with the elasticity having already begun to decline well before the crisis. This cautions against taking a specific pre-crisis trend as given. Instead, empirical models and the prospect of reduced support to trade coming from global value chains point to a medium-term trade elasticity that remains below the levels implied by the pre-crisis relationship between global trade and economic activity.

Chart C Projections for the ratio of global trade to GDP growth using different sample periods



Source: ECB calculations.
Note: Lines show projections using a BVAR model estimated over different sample periods.