

Economists often point out the benefits of trade, yet empirical evidence for these benefits has been hard to come by and tends to be recent.

**Jan David Bakker, Stephan Maurer, Jörn-Steffen Pischke and Ferdinand Rauch** go back to the millennium before the common era to investigate the growth effects of one of the first major trade expansions in human history: the systematic crossing of the open sea in the Mediterranean by the Phoenicians.

# Trade and growth in the Iron Age

**W**hile economists extol the virtues of trade, advocates of free trade face stiff political headwinds these days. The economic ideas for the benefits of trade go back more than 200 years to Adam Smith and David Ricardo, but empirical evidence for these benefits has been much harder to come by and is much more recent.

In particular, empirical economists have sought to demonstrate that more open economies or more integrated markets see faster growth. While the relationship between these two variables is hardly disputed, the much more difficult question is whether this is due to trade causing growth or richer economies being more open.

A number of recent studies have made some headway on this question, mostly drawing on historical episodes related to the opening of new trade routes or the introduction of cheaper trading technologies.

A pioneering CEP study by Redding and Sturm (2008) looks at the growth of German cities when the country was divided after the Second World War. The division of Germany meant that West German cities near the new border lost part of their hinterland and access to

East German markets. The researchers find that these border cities grew slower than comparable cities elsewhere in West Germany during the time of division.

Other studies have looked at the impact of new transport technologies. For example, Donaldson and Hornbeck (2016) examine the impact of the expansion of railroads in the United States between 1870 and 1890 on agriculture. They find that the value of agricultural land doubled due to the presence of the railroad network.

The expansion of the US highway system a century later, starting in the late 1950s, led to an increase in retail sales of around 10% in counties near highways compared with those further away, as CEP research by Michaels (2008) demonstrates. During the same period, air freight began to enhance the connections of landlocked countries and their trading partners. Feyrer (2009) finds that a 10% increase in trade raises income by about 5%.

In a similar vein, Pascali (2017) exploits the fact that the introduction of steamships during the second half of the nineteenth century provided advantages on certain trade routes and less on others, depending on how well prevailing wind patterns allowed sailing ships to serve these routes. Pascali's findings are more sobering and less

in line with the simple economic benefits of trade: trade had negative effects on most countries and only benefited those with more inclusive political institutions.

So are the economic consequences of trade limited to the period since the height of the Industrial Revolution? What if we delve deeper into history? Trade seems to have played an important role long before this. Acemoglu et al (2005) link the opening of Atlantic trade from around the early sixteenth century to the ensuing shift in the focus of economic activity in Europe from the south and centre of the continent to the Atlantic periphery: England, France and the Netherlands.

Our research goes back even further and explores this connection in the

Geography and trade played a large role in economic development even at an early juncture in human history

millennium before the common era (BCE). We analyse the growth effects of one of the first major trade expansions in human history: the systematic crossing of the open sea in the Mediterranean by the Phoenicians.

### Merchants and mice during the time of the Phoenicians

Seafaring in the Mediterranean started with hunter-gatherer societies around 10,000 BCE. We know that humans began to settle islands at that time (Broodbank, 2006). They also moved obsidian, a volcanic rock, over considerable distances.

With the advent of the sail around 3,000 BCE, ships had a considerable cost advantage over land transport. Regional trade networks grew in importance in the Mediterranean during the next two millennia. But most of this sailing was coastal. While sailors made open-sea crossings where they were difficult to avoid – for example, to reach Cyprus or Crete, or to cross from Albania to the heel of the Italian boot – coast hugging prevailed elsewhere.

Only from around 900 BCE did Phoenicians and other sailors begin to cross the open Mediterranean systematically and routinely. A dense trading network began to emerge, and on the eve of classical antiquity, the Mediterranean was constantly criss-crossed by Phoenicians, Greeks and other sailors.

This was an expansion in scale and scope far beyond the trading activities in previous millennia. The house mouse is a marker for the magnitude of this expansion.

Originating in South East Asia, this species reached the eastern seaboard of the Mediterranean around 12,000 BCE. From there, it slowly veered into Southern

**Along the Mediterranean coast, locations that were better connected over sea display more archaeological sites, implying more human activity**

Figure 1:  
Log connectedness around the Mediterranean



**Note:** Darker blue indicates better connected coastal locations.

Anatolia and Northeastern Africa during the next 10,000 years. By 1,000 BCE, it had barely spread to Greece. Then, with the intensifying maritime connections across the Mediterranean, the mouse rapidly appeared all over the Central and Western Mediterranean (Cucchi et al, 2005).

### Empirical evidence

To analyse whether this increased trade also caused growth, we exploit the fact that open-sea sailing creates different levels of connectedness for different points on the coast. The shape of the coast and the location of islands determines how easy it is to reach other potential trading partners within a certain distance.

We create such a measure of connectedness for travel via sea. Figure 1 shows the values of this measure on a map and demonstrates how some regions – for example, the Aegean, but also southern Italy and Sicily – are much better connected than others. We use this measure of connectedness as a proxy for trading opportunities. For each 10x10km cell on the coast, we calculate how many other coastal cells can be reached by straight-line travel over water within 500km.

Measuring growth for an early period of human history is more difficult as we have no standard measure of income, GDP or even population. We measure growth by the presence of archaeological sites for settlements or urbanisations. While this is clearly not a perfect measure, more sites should imply more human presence and activity. We then relate the number of active

archaeological sites in a particular period to our measure of connectedness.

We find a large positive relationship between connectedness and archaeological sites. The effect of connections on growth in the Iron Age Mediterranean is up to twice as large as the effects that Donaldson and Hornbeck (2016) find for US railroads. Although these results are unlikely to be directly comparable, the magnitudes suggest a large role for geography and trade in development even at such an early juncture in history.

When we repeat our analysis for different points in time, we find considerably smaller effects in the second millennium BCE and then a sizable increase from 750 BCE onwards. While this is consistent with the increased trade activity during the Iron Age, we caution that the archaeological data for the earlier period are sparser and appear to be less reliable.

The effects of connections peak around 500 BCE and then become weaker. This may be due to new settlements emerging between 900 BCE and 500 BCE in the best-connected locations. As the density of cities grew over time, new cities, which started later, arose in relatively worse connected locations as the best locations were already settled. We find some evidence for this while at the same time the best-connected cities persist.

This is consistent with a large body of work on the persistence of city locations (including Davis and Weinstein, 2002; Bleakley and Lin, 2012; Bosker and Buringh, 2017; Michaels and Rauch, 2018).

## Not purely a Mediterranean phenomenon

While we have the most systematic data on archaeological sites for the Mediterranean, we also explore whether we can find similar effects at a world scale. For this exercise, we use a measure of population density in the first year of the common era, constructed by economic historians McEvedy and Jones (1978). This measure varies only at the level of modern countries, so we also aggregate connectedness to the country level.

As Figure 2 shows, there is a strong positive relationship between a country's average connectedness and its population density in year 1 as well.

## Conclusions

Our results suggest that connectedness and the associated trading opportunities matter for human development. Along the Mediterranean coast, locations that were better connected over sea display more archaeological sites. This relationship emerges most strongly after 1,000 BCE, when open-sea routes were travelled routinely, and trade intensified. Once these locational advantages emerged, the favoured locations retained their urban developments over the following centuries.

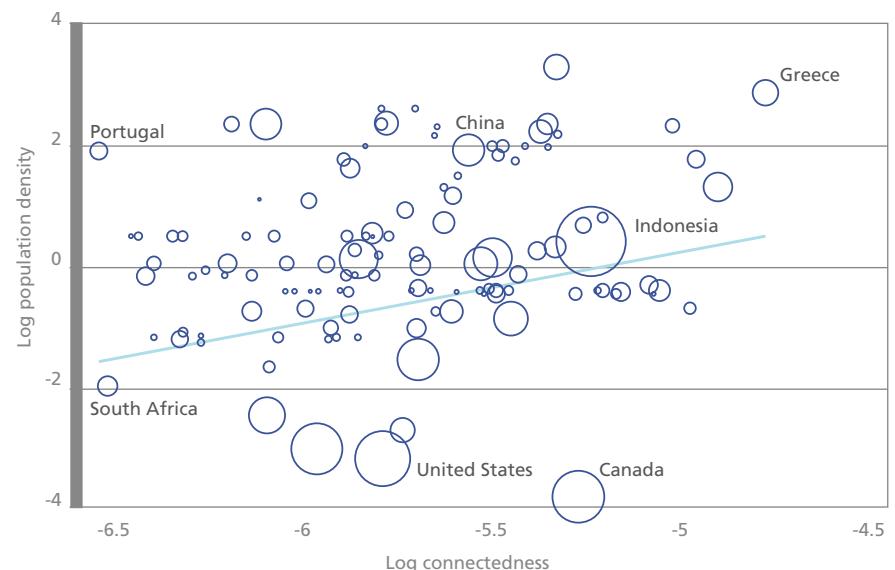
This article summarises 'Of Mice and Merchants: Trade and Growth in the Iron Age' by Jan David Bakker, Stephan Maurer, Jörn-Steffen Pischke and Ferdinand Rauch, CEP Discussion Paper No. 1558 (<http://cep.lse.ac.uk/pubs/download/dp1558.pdf>).

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Figure 2:  
Relationship between population density in 1AD and connectedness



**Note:** Each dot corresponds to a modern country and the size of the dots represents the length of the coast in the country.

## Further reading

Daron Acemoglu, Simon Johnson and James Robinson (2005) 'The Rise of Europe: Atlantic Trade, Institutional Change, and Economic Growth', *American Economic Review* 95: 546-79.

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