

Can Brexit defy gravity? It is still much cheaper to trade with neighbouring countries



*Is the UK locked into economic relationships dominated by geography? Can it reorient its trade and FDI patterns from the slower growing European economy to faster-growing markets in Asia, Latin America and Africa, as promised by the proponents of Brexit? In this article **Saul Estrin, Christine Cote (LSE), and Daniel Shapiro (Simon Fraser University)** concentrate their attention*

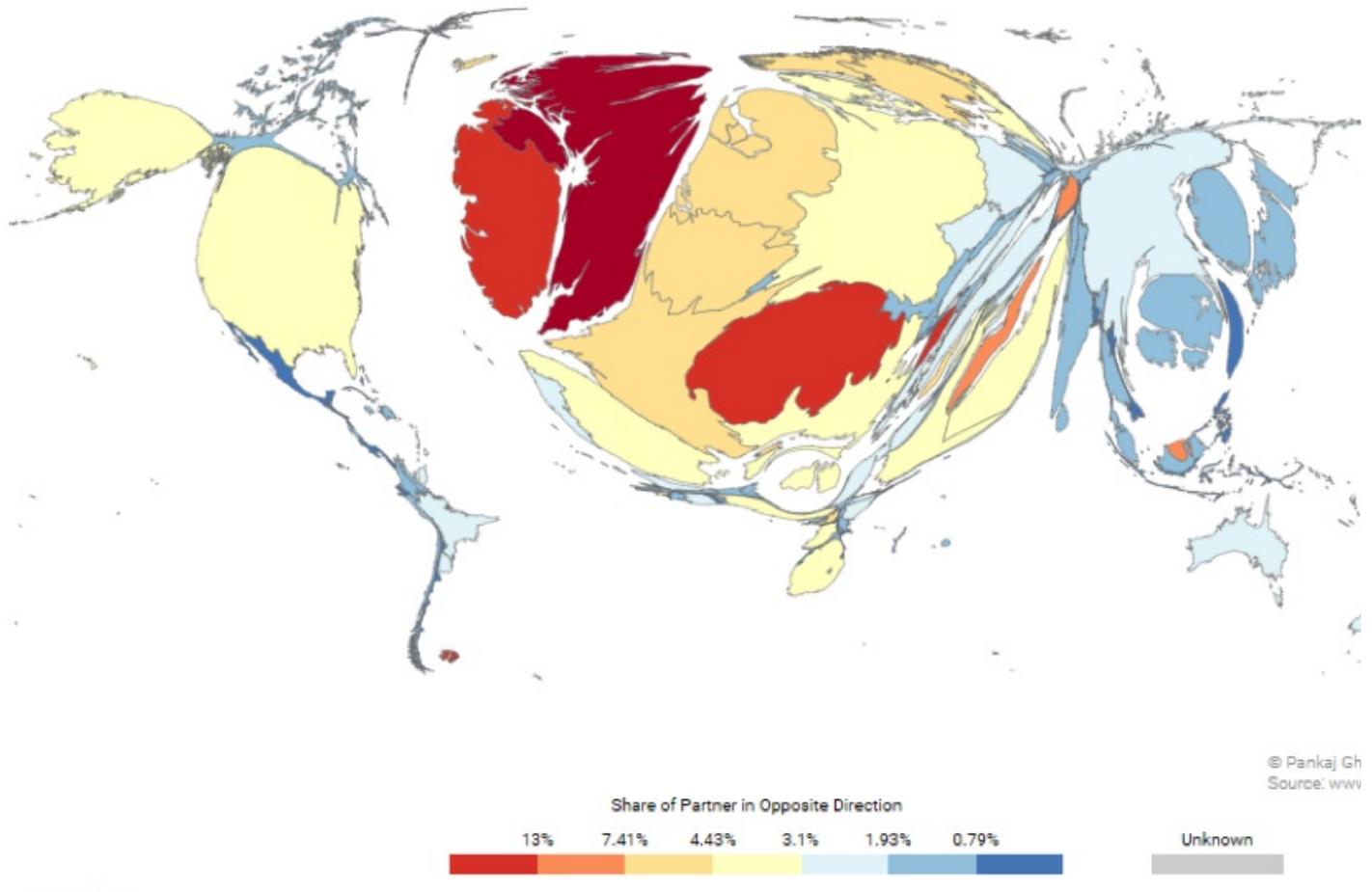
on trade in goods and conclude that in practice, it is much cheaper to trade with neighbouring countries, and it will remain so in the near term.

One of the arguments made in favour of the UK withdrawal from the EU is that the deep process of trade integration between EU members restricts the ability of the UK to trade with other, perhaps faster growing, economies in Asia and the Americas. Thus the UK is said to be tied by trade agreement to a group of economies that are expanding slowly, while being less able to exploit opportunities in more dynamic regions. There seems some *a priori* evidence for this; using World Bank data, Europe as a region on average saw real GDP growth of 1.6% in the 1990-2000 period and the same, 1.6%, since then to 2017. This contrasts with other regions, for example South Asia, where comparable growth rates are 5.6% and 7%, or Sub-Saharan Africa with 2.4% and 5.4% respectively. So why pin your colours to the mast of the slowest ship in the race?

Trade, FDI and Gravity

The problem with this argument is that it is not random with whom one trades. For many years, it has been argued that the main economic relations between countries – trade, FDI, migration – are driven by similar forces to those identified by Isaac Newton in his Law of Gravity determining the movement of the planets around the sun ([Anderson and Wincoop, 2003](#); [Head and Meyer, 2016](#)). Consider, for example, flows of goods and services between two countries. The gravity model argues that these will be determined by three key factors: the size (GDP) of the exporting (home) economy, the size of the recipient (host) economy and the distance between them. Following Newton's original formulation, the effect of home and host GDP on trade is expected to be approximately linear. Thus ignoring distance for the moment, trading with an economy which is five times larger than another will be associated with imports and exports also approximately five times larger. Hence, *ceteris paribus*, the UK's trade with China might be expected to be slightly less than five times larger than trade with France. However, this ignores the effect of distance which Newton argued would be nonlinear, indeed exponential. Hence in our application to economic relations, trade is reduced at an accelerating rate as the distance between trading partners increases. For example, consider two countries of equal size, one twice as far away as another. The non-linear distance effect means that for the host economy, trade with the further country will be one-quarter of trade with the closer. If the distance is measured by miles between capital cities, then London to Paris is approximately 300 miles and London to Beijing is approximately 5000 miles. The gravity model implies that the distance effect will reduce trade between the UK and China, relative to that between the UK and France, by a factor of (16.6) squared, or around 277 times. Thus the impact of distance much more than offsets the benefits of trading with larger (or faster growing) economies.

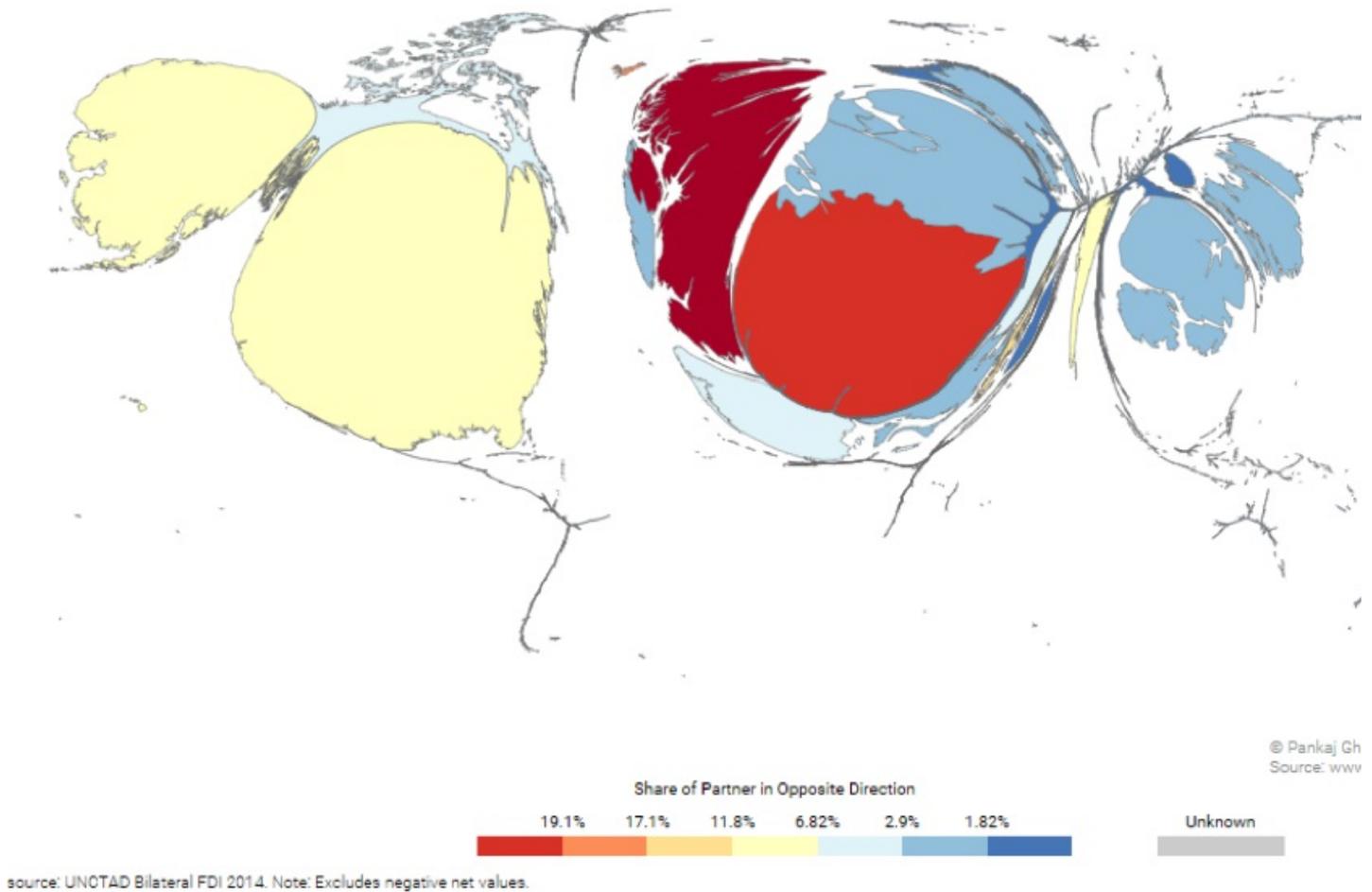
Figure 1: UK exports to the world graphed to scale 2017



We can see the operation of gravity effects when we rescale a global map to represent the UK's exports to its main trading partners by volume in 2017. Figure 1 draws on Pankaj Ghemawat's [website](#). UK exports to close neighbours – Ireland, Switzerland, Belgium, Holland and France – are much larger than to more distant comparably sized economies in Eastern Europe, North Africa or Latin America. Three of the world's largest economies – US, China and Japan – also represent important locations for British exports, but the scale is not as large as their economic size would imply, because of distance.

Distance has a similar effect on patterns of FDI. Thus we use [Ghemawat's mapping tool](#) to consider inward FDI flows to the UK in 2014 to produce Figure 2. The geographic pattern is not identical to that in Figure 1 because FDI is also affected by other factors such as the scale of home economy capital markets and multinational firms. Hence because of its huge capital market and numerous multinational firms, the US plays a bigger role as a source of FDI to the UK, and Ireland a smaller one, than for trade. However, the impact of gravity effects – the size of the home economy and distance, are obvious in both Figures.

Figure 2: Inward FDI to the UK with home economy graphed to scale



But economics is not physics and rules for physical objects do not necessarily apply in a simple-minded way to sentient beings. Are these distance effects immutable? Is the UK locked into economic relationships dominated by geography? Is distance only measured by geographic factors? If so, there is little logic to Brexit, and policies to weaken trade relationships with our closest neighbours, some of them very large economies, can do little but cause loss of growth and welfare. This would be consistent with the conclusion of [Mayer, Vicard & Zignano \(2018\)](#) who, on the basis of highly sophisticated gravity modelling conclude “*that the Single Market has increased trade between EU members by 109% on average for goods, with associated welfare gains reaching 4.4% for the average European country.*”

Thinking more about distance

In this article, we consider whether recent developments might relax the iron logic of the gravity model, and therefore the force of this negative conclusion about Brexit. In particular, do the effects of gravity remain as strong now, in this age of the internet, global value chains and populism, as they did when much of the data behind these studies were undertaken twenty or more years ago. We concentrate our discussion on trade in goods; we consider services in a subsequent post. Moreover, we illustrate our discussion with reference to a trading relationship often pointed to as an alternative for each country to their current close ties with their large neighbours – Britain and Canada.

Does distance matter less than it used to?

According to [UNCTAD \(2013\)](#) some 60% of world trade is now in intermediate goods, largely going through the value chains of large multinational enterprises. This development is relatively recent and implies that trade in goods and FDI are closely linked, with economic activity largely being distributed by function ([Baldwin 2016](#)). Perhaps these value chains are constructed with a logic which relies as much on cost factors other than transport, for example labour costs.

The most commonly cited reason for the dominance of distance effects is transport costs, but as [Baldwin \(2017\)](#) points out, these have been dropping significantly for many years and may no longer pose the constraints to trade and FDI of yesteryear. Indeed, Baldwin argues that the key driver of globalisation today is the falling price of 'transporting' ideas, as opposed to the cost of moving goods.

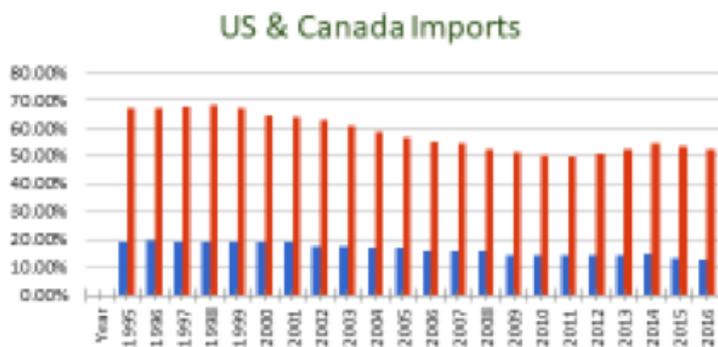
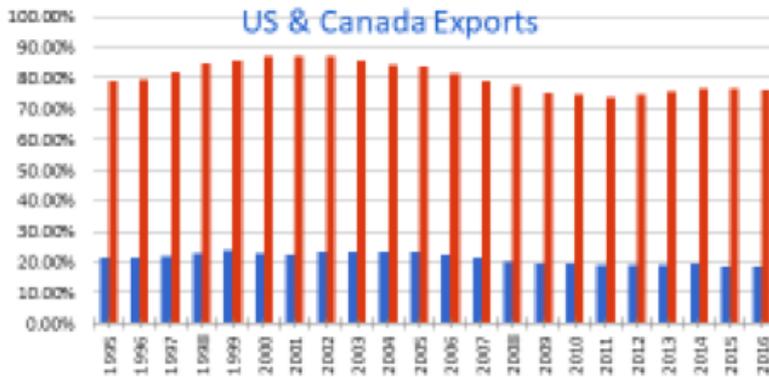
So perhaps gravity is less important now than it was when much of the definitive research was undertaken, back around 2000. We, therefore, ask whether recent studies continue to find strong evidence for the importance of distance in explaining trade and FDI patterns?

A recent paper by [PWC \(2017\)](#) summarises the new evidence regarding gravity effects. It argues that these remain substantial but have in fact been coming down slightly in recent years. For example, it suggests that UK trade with a country 500 miles away would have been 111% higher than with a country 1000 miles away in the 2000s, but only by 97% in 1970s. The reasons they cite are consistent with Baldwin's arguments and include supply chain dynamics and technological changes. Thus, the evidence suggests that gravity effects for trade in goods remain almost as important now as twenty or thirty years ago.

We can see the implications of gravity with the example of trade in goods between Britain and Canada. Both countries are quite large, being members of the G7 for example, but they are geographically quite distant; the distance from London to Ottawa is around ten times that from London to Paris. Figure 3 again illustrates the impact of distance. Canada's main trading relationship is with its large Southern neighbour, the US, while nearby economic power Germany is a major trade partner with the UK. These patterns have not varied greatly in the past 20 years. Despite the historical and cultural links, UK trade with Canada has remained for many years at a much lower level.

Figure 3: Trade between the UK, Germany and Canada; and Canada and the US, 1995-2016.

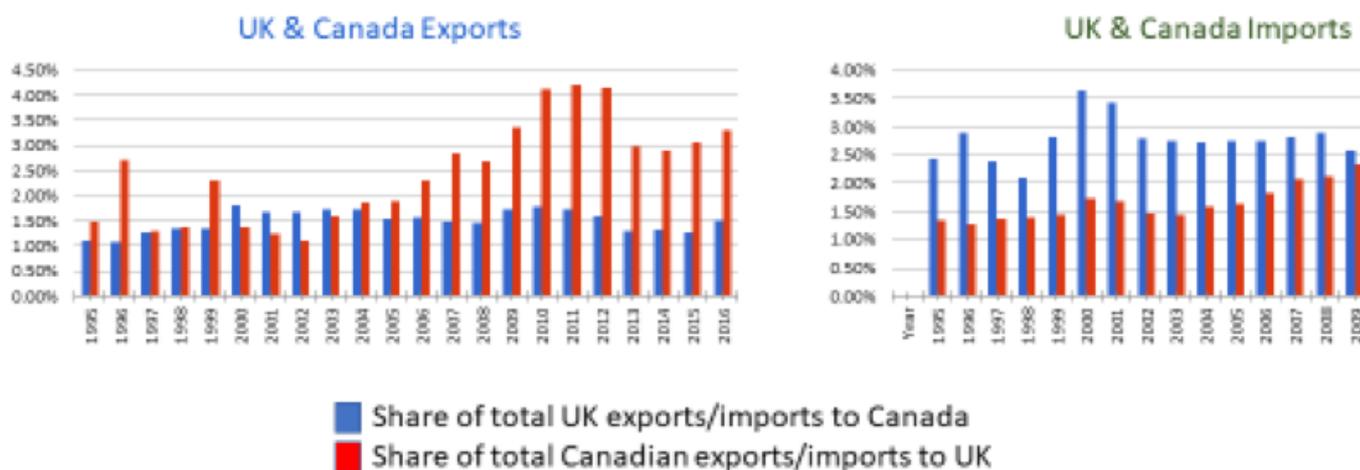
Trade Patterns are Relatively Con.



■ Share of total US exports/imports to Canada
■ Share of total Canadian exports/imports to US

■ Share of total UK exports/imports to Germany
■ Share of total German exports/imports to UK

Canada-UK Trade is Limited



Other notions of Distance: History and Culture

These findings need to be tempered to some extent because the higher costs of doing business in more distant locations may be driven not only by transport costs but also by unfamiliarity about key factors like different language, rules, regulations, taxes and social norms. This led researchers like [Baghdasaryan, Estrin and Meyer \(2009\)](#) to explore new measures of distance that account for differences in institutional arrangement and human resource practices. This approach has been brought together by [Ghemawat \(2007\)](#) in his CAGE framework whereby the factors driving distance in a gravity model can be categorised into four: cultural, administrative, geographic and economic. This framework expands considerably the notion of distance, and permits compensation for the force of geographic distance, for example for trade between countries which have close cultural or historical affinity, leading to similar administrative arrangements. The CAGE models help us to understand why trade for example between countries with a common language, or with former colonial ties, is significantly higher than would be predicted using geographical gravity effects.

The CAGE framework, therefore, tells us that distance effects in trade are not immutable, and can be influenced by common histories and legacies. This opens up prospects for greater trade between countries like the UK and Canada, with an intertwined past, than is allowed in the basic gravity model. Moreover, some CAGE factors such as administrative or economic distance can be influenced by policy, opening up the possibility that trade patterns can be altered over time.



Image by [Jun](#), (CC

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Distance effects; paramount for now?

It has been argued that the UK can use the opportunities offered by Brexit to reorient its trade and FDI patterns from the slower growing European economy to faster-growing markets in Asia, Latin America and Africa. Indeed, much of the discussion about the importance of the UK being free to make its own trade deals with new jurisdictions can best be interpreted from this perspective. However, this argument largely ignores the effects of transport and other transactions costs on trade and to a lesser extent FDI. In practice, it is much cheaper to trade with neighbouring countries, which is why that is what, for the most part, we observe. The impact of distance on FDI is less pronounced, but is also significant.

We have shown in this article both the role of gravity and the persistence of the distance effects as they pertain to trade in goods. Recent developments in technology and value chains have not altered the central significance of distance in trade and FDI. Expanding the definition of distance to include administrative, cultural and economic “distance” provides some, but not total, relief from the effects of physical distance. There will be no easy way for the UK to make up the losses from specialisation resulting from Brexit by the speedy development of new trading partnerships with more distant economies, however rapidly they are growing.

This is not to say that the future for post-Brexit UK is bleak into the long run. The [PWC Report \(2017\)](#) points out that distance effects may be only short to medium term – in fact, the UK’s trade with European countries has shown wide variations historically. Furthermore, the picture looks different when we focus on trade in services – the subject of the next paper in this series. Hence over a long enough period, British trade patterns could be recast as factors other than physical distance or trade in goods become more important. However, in the near term, the effects of distance remain paramount.

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