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How emigration shapes the diffusion of new technologies

A central driver of economic growth is new technology. Gaia Dossi and Davide Coluccia show how migrants from Britain to the US in the late 19th and early 20th century not only brought new ideas with them but helped US innovations spread to the UK.

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The diffusion of new technologies across countries is a key driver of productivity growth and economic progress. Yet surprisingly, little is known about how technology moves across borders.

Our [research](#) provides new evidence on the importance of one such channel: out-migration. We show that migration can help transfer knowledge and innovation from migrants' destination countries back to their countries of origin — a phenomenon we define as *return innovation*.

Our focus was on migration from England and Wales to the United States between 1850 and 1940, a period known as the Age of Mass Migration during which roughly 30 million Europeans crossed the Atlantic, including nearly four million from England and Wales.

How to trace the causal chain of innovation

In order to investigate the importance of return innovation we assembled two new large-scale datasets. First, we link confidential individual-level data from the UK and the US censuses, allowing us to follow British individuals as they migrate to the United States. Second, to measure innovation in 19th-century Britain, we digitise patent records from England and Wales (1853–1899).



What we found was that English and Welsh districts with larger emigrant populations experienced stronger growth in patenting, especially in the same technological areas to which their emigrants are exposed in the US.



Identifying the causal impact of US innovation on British innovation is challenging, as migrants may choose to settle in areas already connected to innovation in their home districts – a pattern known as assortative matching – therefore making it harder to tell whether the innovation boost would have happened independently of their arrival. To address this concern, we used unexpected surges in US patenting – “innovation shocks” – as plausibly exogenous increases in exposure to foreign innovation. We then tracked how these shocks spread back to the UK through existing migration ties.

What we found was that English and Welsh districts with larger emigrant populations experienced stronger growth in patenting, especially in the same technological areas to which their emigrants are exposed in the US. A back-of-the-envelope calculation suggests that, following an unexpected surge in innovation activity in the US, about 15 percent of this increase was transmitted to the UK via migration networks. To directly trace knowledge flows, we applied text analysis methodologies to compare the content of UK and US patents. Specifically, we built a measure of similarity of UK to US patents by comparing patents issued in the UK to those issued in the US in the previous five years. Patenting in districts with stronger migration links becomes significantly more similar to US patents, and this pattern holds even within specific technological fields.

The impact of exposure to foreign innovation is not the same across all industries. We find that the largest increases in UK patenting occur in sectors where the UK and the US have similar levels of specialisation, such as electricity, scientific instruments, and engines. By contrast, the effect is smaller in fields where the US is far ahead – like agriculture and metallurgy – or where the UK leads, such as textiles. This pattern aligns with recent theoretical work suggesting that countries benefit most from sharing knowledge with partners at similar levels of development.

The social connections that drive innovation

In the second part of our analysis, we look at what drives the “return innovation” effect. The physical return of migrants plays a significant role but accounts for only about half of the overall effect. The other half comes from migration ties themselves: even when migrants do not return, their relationships with home communities help spread new ideas and knowledge.



We found that family members of British emigrants to the US become more likely to patent after their relatives move abroad.



We focussed on two keyways these connections operate: through family ties and geographical proximity. Drawing on **research in development economics** that shows how technology spreads through social networks, we looked at whether emigrants influence innovation activity among those they leave behind. We found that family members of British emigrants to the US become more likely to patent after their relatives move abroad. This effect takes about ten years to materialise, but its size is substantial. Return migrants have a larger impact than those who never return, yet even migrants who stay abroad foster innovation within their families.



When people move abroad, they don’t just take skills with them — they also help bring new ideas back home.



Another potential measure of local social connections we looked at was geographical proximity. By linking UK patent data with census records, we showed that when people’s neighbours move to the US, those who stayed behind became more likely to file patents themselves. This effect was strong even after excluding neighbours of return migrants, highlighting the importance of ongoing cross-country connections in spreading new ideas.

Our findings shed new light on how knowledge and innovation move across borders. Migration plays a key role in this process: when people move abroad, they don't just take skills with them — they also help bring new ideas back home. In short, out-migration can promote innovation by fostering the flow of knowledge into migrants' countries of origin.

This article is based on the CEP discussion paper [Return innovation: The knowledge spillovers of the British migration to the United States, 1870-1940](#)

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