



Migration and innovation: A conversation with Francesco Lissoni

Francesco, you are an innovation economist by training; how did you become a migration scholar?

My research interests span from the economics of science and intellectual property rights to knowledge diffusion. And through knowledge diffusion, I came to study migration and innovation because migration is one of the great carriers of knowledge in the geographical space. I got particularly interested in the geography of diffusion and the fact that knowledge diffusion was constrained in space; like others, I thought this was due to the fact that the knowledge codified in patents and papers was just a complement of the tacit knowledge held by expert individuals, access to which required personal interaction. Hence, the extent of knowledge diffusion in space was limited by that of scientists' and engineers' personal mobility. I ultimately ended

up studying the international migration of inventors for these reasons. And in the last few years, this is the field where I did most of my research.

My other interest was in the role played by academic scientists in generating the ideas and tools that ultimately feed R&D activities. For this reason, I started crossing my datasets of inventors with all possible sources of information on the name, affiliation and specialty of academic scientists in several European countries, thus discovering that many patents owned by companies were protecting inventions coming from academia. I also realized that, in those same years, universities throughout Europe were trying to gain more control over these inventions, with the support of public policies encouraging them to engage in commercial ventures. This pushed me to study the

economics of intellectual property rights, in order to evaluate whether these policies made sense or, instead, could hamper rather than promote innovation. I also became curious of the economic mechanisms explaining academic scientists' careers and mobility, and produced some research on that as well.

More specifically, can you describe your current research "Free movement of inventors: open-border policy and innovation in Switzerland"?

This paper, which is the first chapter of my co-author Gabriele Cristelli's PhD thesis at EPFL, deals with the effects of the free movement of people on innovation. It uses the free mobility agreement signed between Switzerland and the European Union in 1999 and studies its effect on innovation in the destination country, that is, Switzerland.

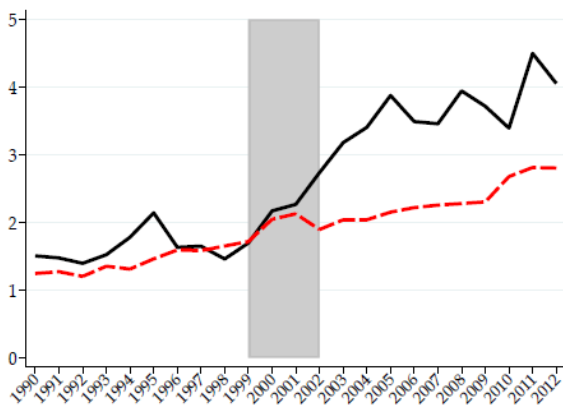
In the years following the agreement, we observe that the regions of Switzerland that are close to the EU borders (with France, Germany, Austria and Italy) experienced a significantly higher inflow of inventors (as revealed by patent data) from the neighboring countries. This natural experiment allows us to compare treated (i.e., bordering) to non-treated regions and to interpret the results of this comparison in a causal way. The main result, beyond the resulting positive differential increase in total patenting activity in those regions, is that such increase did not generate a displacement of Swiss inventors but, rather, added to them. More precisely, the policy change translated into improved opportunities for Swiss native inventors to work with a larger number of foreign and national co-inventors, which ultimately led to an increase in their productivity, as measured by the number of patents filed.

These positive changes are apparent from *Figure 1* which shows the number of distinct collaborators per Swiss inventor (for the left panel) and the number of citations of foreign patents per Swiss patent (for the right panel). The graphs compare the evolution of these two outcomes in treated (i.e., border regions, in black) versus non-treated Swiss regions (in red), suggesting a clear diverging pattern, with more foreign collaborations (left panel) and more relation to foreign invention and knowledge (right panel) in the treated regions after 1999. Moreover, the policy change did not drain resources away from the bordering regions of France, Germany, Italy or Austria. That is, it did not cause a brain drain out of those regions toward Switzerland. Our results suggest that this is due at least partly to “brain gain” effects, but this could equally be due to knowledge diffusion. We show that most foreign

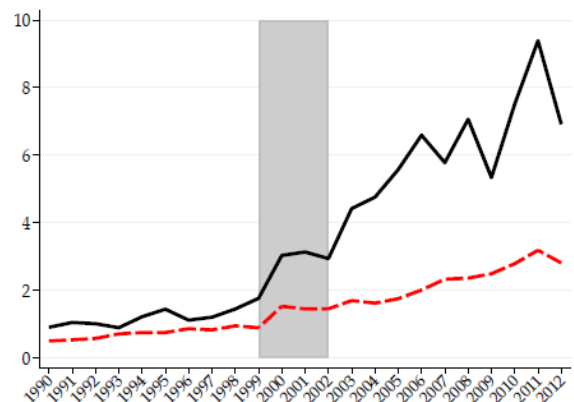
inventors start patenting only once in Switzerland. This suggests that they would not have become inventors absent the opportunity to move abroad, which means they acquired human capital either specific to, or aimed at emigration to Switzerland. This suggests that they would not have become inventors absent the opportunity to move abroad, which means they acquired human capital either specific to, or aimed at emigration to Switzerland. Moreover, when they keep patenting over the years, they mostly do so in Switzerland, that is, they do not go back as inventors to their home countries; however, other studies such as Kerr (2008), Agrawal et al. (2008) or Breschi et al. (2017) put forth that inventors in the origin countries cite disproportionately the patents filed abroad by same-country migrants, which suggests some form of knowledge remittances.

Figure 1.
 Foreign inventor’s impact on Switzerland following the 1999 Free Movement Treaty with the EU

Division of labour: Nr of distinct collaborators, per Swiss inventor



Knowledge access: Nr of citations to foreign prior art, per patent by Swiss inventors



Source: Free movement of inventors: open-border policy and innovation in Switzerland

Some of such remittances may be generated by returnees and/or migrant inventors and scientists engaging in collaborations with colleagues in the home countries, as shown by my coauthor Ernest Miguelez (2018). We are not testing for such knowledge diffusion but believe it also plays a role in explaining why inventors' mobility does not seem to harm innovation in their home countries. Overall, and very much in the spirit of the new brain drain literature (Docquier and Rapoport, 2012), our results using citation data point to some form of "brain gain", whereby certain fields/regions with more emigration prospects and better connections to scientific hubs and leaders become more attractive to new inventors while at the same time those who stay can enjoy the benefits from the higher connectivity thereby created.

Two papers recently published in the *American Economic Review* (Beerli et al., 2021) and in the *Journal of International Economics* (Ariu, 2022) have used the same natural experiment that you have used here. What exactly is your contribution?

The paper that introduced the experiment and showed that it was valid and clever was the one by Beerli et al. (2021). We started from it because the paper was already known well before it was published. Basically, their paper is a labor

economics study: they prove that the opening of Switzerland increased the amount of highly skilled workers much more than low skilled ones, against expectations. At the very end of the paper, with questionnaire data, they prove that the companies that hire these foreign workers have a higher probability to file a patent. In our work, we have all the data on all the patents filed by these companies, the name of all the inventors, we know who is a migrant, which type of visa they have, with whom they work, to whom they pass their knowledge (if at all), whether they cite the literature from their own country, etc. In other words, we can test all the possible mechanisms through which migration may have increased innovation – this is our contribution. We find that the inflow of foreign inventors increases the productivity of native ones through direct collaborations. Native inventors in the Swiss regions with the highest intake of foreign ones end up having, thanks to them, a higher number of distinct co-inventors than those in regions with fewer immigrants. Besides, the patents stemming from mixed teams of native and migrant inventors have a higher propensity to cite the prior art from the migrants' home countries, which suggest the latter bring in specific knowledge assets. However, we do not observe any spillovers: native inventors in regions with high inflow

of foreign ones, but with no direct collaborations with them, do not cite that foreign prior art in their patents.

What are the implications of your research both for the economy as a whole, from a macro perspective, and the policy implications that you derive from it?

Let's start with the policy implications. Switzerland is representative of many countries in Europe that share similar characteristics: small, rich, R&D-intensive countries surrounded by bigger countries with a lot of human capital to offer. And these countries clearly benefit from the free movement principle that is typical of the European Union. So the first policy conclusion is that for relatively small, advanced European countries, free movement has high benefits in terms of innovation. At a more macro level, I would also argue that our results are suggestive of the fact that the free movement of people may have increased innovation in Europe as a whole. In contrast, if somebody could study in the next few years what's going on in Britain, my hunch is that he or she would find evidence of the negative effects of Brexit on British innovation. We can already witness the fact that one of the main preoccupations of the British government at the moment is to attract highly skilled migrants to replace the Europeans that are not there anymore.

At an even higher level, our research constitutes one more piece of evidence on the positive link between migration and innovation, in destination countries of course but also, potentially, in the source countries as well. This is the main result, for example, from a recent paper structurally estimating the effects of the brain drain from Europe to the USA in the last few decades (Prato, 2022). To qualify this somewhat surprising result, I would want to see more research on countries of origin: under what conditions they stand to gain from high skill emigration, at least in science and technology?

Overall, from an economist of innovation's viewpoint, the free mobility of workers in general, and of inventors in particular, is mostly good news and a source of optimism for the future of innovation worldwide. Above all, migration offers to many individuals the opportunity to complete their education and develop skills that would have gone otherwise underexploited. Despite being possibly the most authoritative scholar on brain drain, a great economist like Jagdish Bhagwati put it very clearly. I quote: "... even were it possible to force the professionals to stay at home, it would be a foolish policy. Lack of congenial working conditions, absence of

peer professionals to interact with, and resentment at being deprived of the chance to emigrate can lead to a wholly unproductive situation in which one has the body but not the brain. The brain is not a static thing: it can drain away faster sitting in the wrong place than when travelling to Cambridge or Paris!"¹. The challenge for both the home and host countries of migrants is therefore to make sure that the latter will be free to return and/or to maintain or establish links between the two. We know for sure that migrants are a key resource for host countries, we must make sure to develop their potential for being the same for their home ones.

1 Bhagwati J., 2007, *In defense of globalisation*, Oxford University Press, p.214.

This interview was conducted by Hillel Rapoport on the occasion of Francesco Lissoni's seminar presentation at Paris School of Economics in November 2022.

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