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Globalization Threatens One Quarter of Finnish Employment

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We find that one quarter of Finnish employment is highly susceptible to offshoring in the next decade. That is, one in four jobs are easy to move abroad. The share is large. Offshorable workers are often highly educated. And innovators are particularly offshorable. In international comparison, our findings for Finland are similar to those in Sweden and in the United States.

But the estimated threat of globalization through offshoring does not imply future mass unemployment. Jobs that are estimated to be easy to offshore will not necessarily move abroad. And even if they are, we may invent new jobs. The task content of current jobs may change, and the future mix of occupations may be different. But our findings do suggest that offshoring will change how we work.

Introduction

Not every job is offshorable—that is, possible to move from Finland to other countries.[1] But some jobs are. In this paper, we explore how many Finnish jobs might be offshorable in the next decade.

Why try to estimate such a slippery concept? Because the offshoring of jobs from the developed countries, such as Finland and Sweden, to poorer countries, and between similar countries, may be the most important issue in political economy of the our generation (Blinder 2006: Bhagwati and Blinder 2009; Blinder and Krueger 2013).

A well-informed policy response for the threat of offshoring depends on how many Finnish jobs actually are subject to offshoring. If only 2 percent of workforce held *offshorable jobs*, we should not perhaps be worried about it. But if the number is closer to 50 percent—we should.

Our estimates suggest that a quarter of Finnish employment is subject to offshoring. That is, one in four jobs are easy to move abroad. The share is large. It calls for certain policy solutions. But it does not imply major global job dislocations.

Until now, we have lacked an estimate on how many Finnish jobs might be offshorable.[2] But in earlier literature, Blinder (2009) provided an estimate of the offshorability in the United States. He finds that between 22 percent and 29 percent of all the jobs in the U.S. workforce could be offshored. In this paper, we provide corresponding estimates for Finland. We are also interested in not just how many jobs might be offshorable but which kinds of jobs are.

In earlier work in Finland, Pajarinen and Rouvinen (2014) estimated that computerization threatened one third of Finnish employment.[3] This paper is closely related to that of Pajarinen and Rouvinen (2014) with the difference that here we consider the impact of globalization, not technology. Furthermore, we compare these

two key forces—globalization and technology—and their impact on the future of work.

How to measure offshorability?

How to measure offshorability? Blinder (2009) constructs an offshorability measure based on whether work can be carried out remotely or whether the job must be performed on site. Following Blinder (2009), we estimate the number of jobs that might be offshorable in Finland.

In specific, Blinder (2009) provides an index that ranks the offshorability of 817 U.S. occupations.[4] Using this index, we estimate the potential offshorability of 417 Finnish occupations and compute the share of workforce that could be offshored.[5] We also go deeper and analyze which kinds of jobs would be offshorable.

In practice, we went through the 417 Finnish job titles and estimated their offshorability based on the earlier index provided by Blinder (2009). We asked for each and every occupation whether it could be offshored—that is, moved abroad. We estimated, for example, how easy it is to offshore Finnish software and applications developer in Helsinki to places like Bangalore or Mumbai in India (the answer: quite easy). Then we calculated the amount of workers in these jobs and compared it to the total amount of workers.

As a general principle, we measure how easy or hard it is to deliver the task content of a job from abroad—for example, to provide a service to the end-user electronically over long distances. In our view, the key characteristic is whether the job requires *face-to-face interaction* with other people. More details about the methodology are provided in the Appendix.

Using the outlined methodology, we end up with a classification of 417 jobs based on their offshorability. Offshorability is measured between 0 and 100. This is illustrated in Table 1. An example of highly offshorable job is software and applications developers. That job gets an offshorability index of 90. An example of clearly non-offshorable task is primary school teachers—with an index of 0. Somewhere in between are mechanical engineers, that are not easy to offshore but still possible. We classify all government officials, such as military personnel, as non-offshorable.

1 Selected occupations ranked by offshorability

Occupation	*Offshorability Index*	*Category*	*Description*
Data entry clerks	100	I	Highly offshorable
Software and applications developers	90	I	Highly offshorable
Graphic and multimedia designers	86	I	Highly offshorable
Accountants	72	II	Offshorable
Mechanical engineers	70	II	Offshorable
Pulp and papermaking plant operators	68	II	Offshorable
Personnel clerks	50	III	Hard to offshore
Sales and marketing managers	25	III	Hard to offshore
Primary school teachers	0	IV	Non-offshorable
Nursing associate professionals	0	IV	Non-offshorable
Car, taxi, and van drivers	0	IV	Non-offshorable

Data sources: Statistics Finland and Blinder (2009).

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Finally, we compute the share of workforce that is employed in highly offshorable and offshorable occupations using labor force data from Statistics Finland in 2011. This is a conservative estimate, as it only includes those occupations that have a clear potential for offshoring.

How many jobs might be offshorable?

We find that 26.1% of Finnish employment is offshorable. Those are people working in jobs that we classified as highly offshorable or offshorable.

In Figure 1, the two right-most bars illustrate the amount of workers in those offshorable categories. On the other hand, we see that almost two thirds of Finnish jobs are not offshorable.

1 26.1% of jobs are offshorable.
Offshorability and employment.

Data sources: Statistics Finland and Blinder (2009). Offshorability index over 50 means that the job is offshorable.

That is the highest bar on the left—with offshorability of zero.

In a more detail, Table 2 tells us how many Finnish workers fall into four broad occupational categoried based on their offshorability. Over half a million Finnish workers might be offshorable.

When we explore deeper, according to our analysis, offshorability is most prominent in manufacturing. 50.6%—half—of manufacturing workers are still offshorable. While, on the other hand, 25.8%—one in four—of service workers in private sector are subject to offshoring. This is illustrated in Figures 2 and 3.

In Figure 2, the high bar represents the amount of workers that are offshorable in manufacturing, although we know that many workers have already been offshored (Goos, Manning, and Salomons 2014). At the same time, what is new here is that services are becoming more and more offshorable, although not as much as in manufacturing (see, for example, Crinò 2010 and Liu and Trefler 2008 for a discussion).

When we look at the education levels of workers, we find that—contrary to conventional wisdom—offshorable workers are highly educated. This is illustrated in Figures 4 and 5. The correlation between the education level and offshorability is positive and significant.

Why is that? Remember that our key criterion for offshoring was that the job does not require face-to-face interaction. Many knowledge sec-

2 The four main occupational categories

Category	*Description*	*Number of occupations*	*Number of workers*	*Offshorability index*
I	Highly offshorable	38	145 000	100–76
II	Offshorable	103	445 000	75–51
III	Hard to offshore	49	98 000	50–26
IV	Non-offshorable	227	1 571 000	25–0
All		**417**	**2 259 000**	**100–0**

Data sources: Blinder (2009) and Statistics Finland (2011).

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2 Manufacturing: 50.6% offshorable. Offshorability and employment in manufacturing, construction, and energy.

Data sources: Statistics Finland and Blinder (2009). Offshorability index over 50 means that the job is offshorable. NACE Rev.2 10-43.

3 Private services: 25.8% offshorable. Offshorability and empl. in private services.

Data sources: Statistics Finland and Blinder (2009). Offshorability index over 50 means that the job is offshorable. NACE Rev.2 45-82.

tor jobs are just like that. We get a similar picture if we look at wages, which is another measure of skills. Another interpretation, as noted earlier, is that many less-skilled jobs in offshorable occupations have already been offshored (Goos, Manning, and Salomons 2014). High-skilled jobs are what is left.

Most strikingly, we find that innovators are offshorable. By innovators we mean engineers and people in similar R&D jobs[6], following the European statistical classification. We estimate that as much as 61.2% of innovative jobs are offshorable. At the same time, 24.1% of non-innovators are offshorable. This finding is depicted in figures 6 and 7.

The explanation for our findings, again, is that the key criteria for offshoring the need for face-to-face contact. "Thanks to the advances in technology", Friedman (2005) famously argued, you can now "innovate without having to emigrate." But this is not to say that all innovation would be offshored. Those jobs, however, face intense international competition. Finland is an innovation intensive country, and that a one reason why we care about the location of innovators in particular. Those jobs are also very productive (Florida 2012).

But in our earlier research, described in Tuhkuri et al. (2016), we found that the magnitude of R&D offshoring is however small. In 2011,

4 High education: 30.1% offshorable. Offshorability and employment, high ed.

Data sources: Statistics Finland and Blinder (2009). Offshorability index over 50 means that the job is offshorable.

5 Low education: 24.1% offshorable. Offshorability and employment, low ed.

Data sources: Statistics Finland and Blinder (2009). Offshorability index over 50 means that the job is offshorable.

6 Innovators: 61.2% offshorable.
Offshorability and employment, innovators.

Data sources: Statistics Finland and Blinder (2009). Offshorability index over 50 means that the job is offshorable.

7 Non-innovators: 24.1% offshorable.
Offshorability and empl., non-innovators.

Data sources: Statistics Finland and Blinder (2009). Offshorability index over 50 means that the job is offshorable.

most R&D offshoring from Europe was directed to high-income European countries, such as Finland, not so to low-cost countries in Europe, China, or India (Tuhkuri et al. 2016). Innovation is offshorable but it has not been offshored.

How about Finland compared to the original results from the U.S.?[7] For both countries, we estimate that one quarter of employment is threatened by offshoring. In other words, Finland is surprisingly similar to the U.S. in this sense. Our explanation is that Finland has a more educated work force than the U.S.—which would mean more offshoring—but Finland also has a larger government that is hard to offshore. We interpret that there are at least two factors that eventually even out each other. That is why the picture is so similar, although the countries are very much different.

In Sweden, we find that 22.9% of workers are offshorable.[8] The occupational structure in Sweden is similar to Finland. It is therefore reasonable that the potential for offshoring is also similar. The results for the U.S. and Sweden are illustrated in Figures 8 and 9.

Globalization vs. technology

Two key forces shape the future of work: globalization and technology. By globalization we mean increase in the global interconnectedness

8 Sweden: 22.9% of jobs are offshorable.
Offshorability and employment.

Data sources: Statistics Sweden (2014) and Blinder (2009). Offshorability index over 50 means that the job is offshorable.

9 USA: 22.2% of jobs are offshorable.
Offshorability and employment.

Data source: Blinder (2009) and US Bureau of Labor Statistics (2004). Offshorability index over 50 means that the job is offshorable.

of the economy. That includes increase in the amount of offshoring, trade, communication and even migration between countries. And by technology we simply mean ways of producing economic value. The two most prominent examples of globalization and technology are China and the machines.

Earlier analysis by Pajarinen and Rouvinen (2014) estimated that a third of Finnish employment is threatened by automatization, that is, technology. They based their analysis on a measure developed by Frey and Osborne (2013).[9]

How does the impact of offshoring differ from that of technology? In other words, are same jobs threatened by globalization and technology, or are these two different? In Table 3, we look at how offshoring is related to job market automatization. When we compare offshorability measure and the automatization measure, we can see that they are related but different. The two measures agree on 2/3 of cases but disagree on one third.

In short, offshoring affects jobs that do not require face-to-face contact (Blinder 2009, Blinder and Krueger 2013). But automatization is about jobs that are routine so that machines can perform them (Autor, Levy, and Murnane 2003)[10]. Sometimes these two criteria refer to same jobs, but sometimes they do not. Shop sales assistants or taxi drivers, for example, are more likely to be replaced by technology than to be offshored. On the other hand, innovation is hard to automate but easy to offshore (Tuhkuri et al. 2016). Another key distinction between globalization and technology is that technology may replace human labor, while globalization mainly changes the location where the work is done.

However, these two forces—globalization and technology—are deeply interconnected. Advances in technology, especially in communications and transportation, allow ever-deeper patterns of globalization. On the other hand, globalization has contributed to technological advancement. For example, it has allowed firms in developed countries to specialize in innovative activity through offshoring manufacturing jobs to developing countries (Bloom, Draca, and Van Reenen 2015). And, as we know, historically this is nothing new (see, for example, Autor 2015 and the references therein). But it is happening right now and changing our labor market.

What does this mean for policy?

Globalization creates winners and losers. Trade is good because of the benefits from specialization. That means countries, firms, and people can do what they are good at and trade their services. But when two countries change their trading arrangements, some industries expand and some industries contract. The people that are in the contracting industry suffer. The people in the expanding industries gain.

What is new now, is that electronic communications are making many *services* tradable that were not tradable before. The result of this is that a number of workers face potential competition from people in other countries that could provide the same service. This is something manufacturing workers have experienced for decades. Good manufacturing jobs moved from Salo to Suzhou. But there are now much more service sector workers than manufacturing workers in Finland.

3 Offshoring and Computerization, Two-by-two contingency table, Number of occupations

		Computerization	
		No	*Yes*
Offshoring	No	194	82
	Yes	65	73

Source: Statistics Finland, Blinder (2009), and Frey and Osborne (2013).

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This trade adjustment is a major policy concern. It is a similar adjustment we have seen earlier in many countries. And earlier labor market adjustments from rapid changes in trade have not been painless for everyone (see, for example, Autor et al. 2014). In particular, the less-able and less-skilled workers have been most vulnerable for the impact of offshoring.

We can make that adjustment easier. New jobs for workers in offshorable occupations may require acquiring new skills. By providing better resources for education and programs for re-activating displaced workers, policy makers can increase the future competitiveness of the Finnish economy. Those investments tend to pay back themselves. More generally, an educated workforce is better adaptable to institutional changes.

Offshoring may also be a good thing. Bloom, Draca, and Van Reenen (2015) provide evidence that trade with China was directly responsible 15% European technological upgrading over 2000–2007. The idea is that firms innovate in response to competition from lower wage countries and that employment reallocates towards technologically more advanced firms and industries. Easier access to imported inputs—that is, globalization—promotes innovation and, ultimately, technological change and productivity (Bøler, Moxnes, and Ulltveit-Moe 2015). These productivity gains support people's buying power and may even eventually increase domestic employment (Grossman and Rossi-Hansberg 2008). With intelligent policy, Finland may be one of the winners of globalization.

In the end, offshoring is about where people and their jobs are located. In particular, Florida (2010; 2012) and related literature indicates that it is not only economic reasons that define where people choose to live. From a policy perspective, it is not only about attracting firms and capital—it is also about attracting people.

A key policy take-out from our research is that much of current work in our labor market can be done—and will be done—from a different location than where its end results are consumed. This means that many jobs face increasing international competition. At the same time, workers—that is, people—move across borders. A policy concern is attracting and retaining productive people and their jobs.

In the long run, there is a wide array of factors that make a country a good place to live in and to do business. It is a question of quality of life, education, technology, infrastructure, crime, and government. Combination of these things makes people and businesses stay. Countries that have these qualities tend to be succesful over long periods of time and are able to take up the opportunities of the new economy.

Conclusions

We estimate that one quarter of Finnish jobs might be offshorable in the next decade. This number is large in the policy sense, but not so large that we should panic. It calls for certain policy solutions—but it does not imply major global job dislocations.

We find that manufacturing jobs are more threatened. But offshorable workers are also often highly educated. Innovators are particularly offshorable. In international comparison, our findings for Finland are similar to those in Sweden and in the United States.

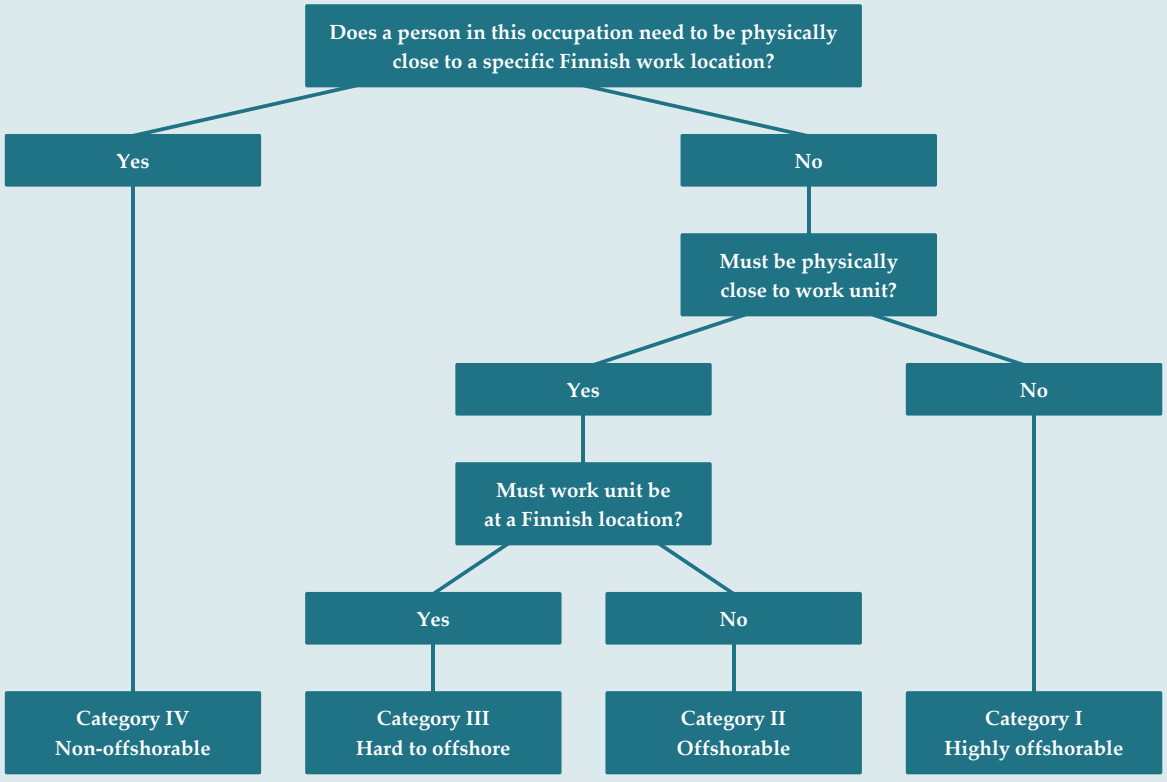
We do not predict the end of work. Neither trade nor technology has caused mass unemployment in the economic history. Jobs that are estimated to be easy to offshore will not necessarily move abroad. And even if they are, we may invent new jobs. The task content of current jobs may change, and the future mix of occupations may be different. Our findings, however, do suggest that offshoring will change how we work.

Globalization creates winners and losers. From policy perspective, we need to attract those that fare well and provide the skills and opportunities needed for those that fall behind.

Appendix

Blinder's (2009) offshorability index was constructed based on detailed job descriptions in the O*NET database and using a flow diagram provided in Table A.[11] That diagram divides jobs into four broad occupational categories based on their offshorability. Each occupation was additionally assigned with a more nuanced index between 0 and 100. In this paper, we made adjustments to the baseline index based on our knowledge of Finnish occupational characteristics. In that sense, our analysis is subjective. This is also a forecasting analysis. We consider the future of work 20 years ahead.

A The four broad occupational categories



Source: Blinder (2009).

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Endnotes

[1] We use the term *offshoring* as a short hand for 'movement of jobs to other countries, whether or not that movement is within the same firm or to a different firm' as in Blinder (2009). The crucial distinction is the country where the job is located. *Outsourcing*, in turn, refers to movement of jobs to other firms, whether or not that movement is within same country.

[2] In fact, no one even knows exactly how many jobs have already been offshored from Finland to other countries.

[3] In more recent work, Pajarinen and Rouvinen also provide these estimates for Norway. This line of research is closely related to Frey and Osborne (2013) and traces back to Autor, Katz, and Krueger (1998) and Bresnahan, Brynjolfsson, and Hitt (2002), with excellent reviews by Acemoglu and Autor (2011) and Autor (2015).

[4] Several other studies have provided methods for estimating the potential for offshoring. Goos, Manning, and Salomons (2014), Blinder and Krueger (2013), Firpo, Fortin, and Lemieux (2013), and Acemoglu and Autor (2011) have made important contributions.

[5] The number of occupations is different because Finland and the U.S. use different occupational classifications.

[6] R&D is an acronym for research and development. This group of people working in innovative jobs is sometimes called the knowledge sector or *the creative class* (Florida 2012).

[7] We replicate Blinder's (2009) analysis, and receive the same results. The share of highly offshorable and offshorable work force in the U.S. is 23%. Blinder and Krueger (2013) reach the same conclusion using different, survey-based, methodology.

[8] Eliasson and Hansson (2016) study the impact of offshoring in Sweden. They find that workers are more vulnerable in tradable indutries.

[9] In that paper, Frey and Osborne estimated that 47% of U.S workforce could be automated in the future.

[10] These are jobs that follow rules that we understand well.

[11] Earlier version of this data was better known as *Dictionary of Occupational Titles*. Blinder (2009) provides a detailed description of the methodology and a review on previous approaches.

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