

The Effects of Digital Technologies on Income Distribution and Production: Evidence from Observational and Field Experimental Data

Proposal for the NBER Innovation Policy Post-Doctoral Fellowship

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1 Introduction

Digital technologies have important effects on our everyday work and social lives. Some of these technologies are introducing meaningful changes to the global economy. These include changes in the organization of production, and labor markets and human capital investment decisions. In particular, by connecting geographically dispersed individuals and organizations, digital technologies are increasing the size of markets, and introducing opportunities for participation in markets into regions that previously did not have access to them.

An important example of these technologies is digital labor markets. These markets allow employers to divide and outsource tasks so that even very small firms have access to temporary service workers. These markets also give self-employed workers from around the world access to jobs being offered almost exclusively by employers in high income countries.¹ By providing detailed and frequent data on job searching, hiring, and production, these markets may contribute to our understanding of traditional labor markets. In addition, by reducing the costs of geographic distance, and the transaction costs of outsourcing, these markets are introducing novel features relative to traditional labor markets (Agrawal, Horton, Lacetera, and Lyons, 2013).

Cell phone applications are also connecting geographically dispersed groups. Cell phones have been widely adopted throughout high and lower income countries, and are making important services increasingly accessible.² Cell phone applications that give rural populations access to services that were previously very difficult for them to access are changing the opportunities open to these populations. For instance, SMS-based training programs are helping farmers and food sales people improve their productivity in increasingly competitive markets.

In my dissertation research, I have begun to explore some of the potential implications of digital technologies for the organization of production, and changes in the global distribution of income by analyzing cross-border collaborations and hiring in online contract labor markets. As a post-doctoral fellow with the NBER's Innovation Policy Working Group, I would continue my research on this topic, both using experimental and observational data from the online contract labor market oDesk, from the mobile training platform g.Maarifa, and from other settings in which digital technologies are changing how people work and produce.

2 Description of Studies

In this section, I outline projects that I plan to work on during the period of the post-doctoral fellowship. In particular, I discuss two projects I will be working on in the context of online labor markets, and two I will be working on in the context of mobile training. While I am not limiting myself to research in these settings over the next year and a half, I am focusing on these projects here because I have already begun work on them and am confident I will be able to execute large portions of them during the fellowship.

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¹While the number of employers from lower income countries online has been increasing, this number remains low. On the world's largest online contract labor market, oDesk, more than 90% of employers in 2013 were located in high income countries. In contrast, more than 80% of contract workers were living in lower income countries.

²For example, research on the mobile money product M-PESA has shown how significant an impact these technologies can have in regions where financial services were previously under-provided (Jack and Suri, 2011).

2.1 Online Labor Markets

2.1.1 What Determines who Succeeds in International Labor Markets?

In my dissertation research, I used observational data from oDesk³ to study how employers located in high income countries interpret information differently when hiring workers located in high income countries than they do when hiring workers located in lower income countries (Agrawal, Lacetera, and Lyons, 2013). In doing this research, it became evident that the differences in wages commanded both between and within countries, even among contractors competing for the same jobs, was an important topic for further investigation. I have since begun research with Ajay Agrawal and John Horton to look at exactly this question.

In this project, we are using a panel of contractors active on oDesk over time to study what determines how much a contractor earns on oDesk, and in particular why some contractors are able to increase their earning power over time, and others are not. We are in the data cleaning phase of this study right now.

2.1.2 Managing Cross-National Collaboration in Online Labor Markets

In the first Chapter of my dissertation, I designed and conducted a natural field experiment on oDesk to study the effect of national diversity on the returns to organizing workers into teams. While online labor markets reduce the direct costs of geographic distance, some of the indirect costs of communicating and coordinating across countries may persist. My empirical analysis shows that they do. In particular, I find that when contractors are located in the same country, team work significantly outperforms independent work but that national diversity not only eliminates the gains to team work, cross-country teams actually perform worse than independent workers located in different countries (Lyons, 2013). Identifying and measuring the costs of cross-country collaboration is important for our understanding of how workers interact. However, an important next step is understanding how these costs can be overcome.

The purpose of this project is to study how certain managerial interventions effect the costs of cross-country collaboration. These types of collaborations facilitate knowledge transfer, and are becoming harder to avoid as labor markets and firms are increasingly spanning multiple countries, so understanding how to improve their performance is important for efficient production, and for economic development more generally. To do this, I will run a field experiment on oDesk in which I will hire contractors from different countries and randomly assign them into teams. I will have a control group that experiences no interventions, and three treatment groups. One treatment group will be assigned a team leader, one treatment group will be forced to use half an hour at the beginning of their work period to talk about something other than the task, and one treatment group will receive an article describing the benefits to cross-country teams before beginning the task.

2.2 Mobile Training

For the projects described below, I will work with g.Maarifa, an SMS-based training platform. I have recently signed an NDA and MOU with g.Maarifa, and plan to begin work with them in the Spring of 2014.

2.2.1 Youth Entrepreneurs and Venture Capital Funds in Jordan: The Effect of Mobile Screening on Successful Financing Decisions

g.Maarifa is currently working with a venture capitalist in Jordan to improve the firm's screening of first time entrepreneurs. This firm is particularly interested in funding youth who would otherwise be unemployed.⁴ Using g.Maarifa's SMS technology, they are now screening them through SMS tests, and are interested in whether these tests are improving the quality of the entrepreneurs they fund.

³oDesk is the world's largest online contract labor market in terms of earnings, and the fastest growing. This platform allows employers to hire contractors who apply to their jobs and complete these jobs remotely. For a more detailed description of online contract labor markets, please see Agrawal, Horton, Lacetera, and Lyons (2013).

⁴Until they began work with g.Maarifa, they were doing their first round of screening entrepreneurs using individual investigators who would travel across the country to meet these individuals in person.

For this project, I will study whether mobile screening can effectively identify successful entrepreneurs through a randomized control trial. One subset of the entrepreneurs the venture capital firm is considering will be screened in the traditional way, i.e. through face-to-face interviews, another subset will be screened through an SMS test for cognitive characteristics, and a third subset will be screened through an SMS test for knowledge of managerial and financial concepts. This study will contribute to a better understanding of what contributes to a successful entrepreneur, and will identify whether digitized screening processes can effectively replace face-to-face interviews.

2.2.2 Mobile Brand Awareness Training for Rural Sales People

Multiple brands are increasingly competing in rural areas of many developing countries. Many sales people at road-side food stands in these regions are not familiar with some of the new brands being sold in their shops, and many are not familiar with the importance of brand recognition because they have not previously sold competing products for which branding is important. For this project, I propose to test whether SMS-based training in sales improves outcomes for rural sales people in Kenya using a randomized control trial. To do this, I will randomly assign one third of the sales people in my sample free access to SMS-based sales training through g.Maarifa's platform, one third will receive an offer to pay for the training program, and one third will not receive access to the training program. I will then observe whether certain brands sold better than others across the treatment groups, and whether overall sales differed across the groups.

This study will improve our understanding of the effectiveness of SMS-based training which is important given that many people in rural areas of developing countries have access to cell phones, but only have rare or unreliable access to the internet. In addition, this study will improve our understanding of whether sales training is effective.⁵

3 Summary

In summary, if selected, I propose to use the NBER Innovation Policy Post-Doctoral Fellowship to study how digital technologies are contributing to changes in the organization of production, and the distribution of income. More specifically, I propose to study how workers from lower income countries increase their earning power in international labor markets, how cross-border remote work teams can improve their performance, how effectively venture capitalists can screen entrepreneurs through SMS-based tests, and how effectively sales people can learn through SMS-based training. In addition to continuing to work on these four projects, I plan to initiate other projects that investigate questions related to my broad topic of interest.

4 References

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⁵Over 34 million people were employed in a sale-related job in the United States in 2012 (United States Census Bureau, 2012).