



Firms and their networks[☆]

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HIGHLIGHTS

- Firms are not only means of production, finance, labor, contracts. Firms' networks are part of the firm.
- Workers or CEOs and their social relations, suppliers are examples of such networks.
- These networks may enhance firm's productivity but they may also have a detrimental effect on governance.

ARTICLE INFO

Article history:

Received 4 April 2014

Received in revised form 29 April 2014

Accepted 7 May 2014

Available online 2 June 2014

JEL classification:

G30

J20

J30

L20

Keywords:

Networks

Governance

Hiring

ABSTRACT

I present a summary of virtually ten years of research using a simple point of view in which firms among other assets, use networks to perform a wealth of tasks: hiring, firing, buying from suppliers, governing the firm ... Access to such networks is rarely included when financiers assess the value of a firm. This line of research suggests that they should.

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1. Introduction

Keynotes are good moments to ponder, to reflect on a series of papers, a strain of research that has been pursued for some time. Given the (relatively) rare moments that a researcher faces such opportunities, it is likely that these things are presented at an (relatively, again) old age ... A testament? Hopefully not! A direction for future research? Surely! A recapitulation of years with a somewhat unconscious direction during which you keep digging in the same furrow.

Not surprisingly given the audience, my research has been on labor ... on labor and firms. Indeed, the first paper of mine that attracted attention is “High-Wage Workers, High-Wage Firms” published in 1999 in *Econometrica*, jointly written with John Abowd and David

Margolis, which already was speaking of workers, firms, and how the two are related through a *network structure* (a bipartite graph), even though we never used such words in those times. And, we only became fully aware of the usefulness of such a structure when John Abowd and I started to think about identification of the estimated person and firm effects through connectedness (see our paper [Abowd et al., 2002](#)).

Reflecting on connections between workers and firms, there are many potential routes. The first one I followed even before working with matched worker-firm data sources was “labor demand” which, I think now, is not the richest way to think about workers and firms in conjunction. An important, even central, element that the analyst needs to introduce into the picture is the environment in which firms evolve when employing workers. This environment comprises *markets*, multiple types of markets indeed. And we want to embed our thinking within this environment. The first strategy hence tries to connect labor markets with product markets, within a structural framework since product markets constrain firms quite heavily (firms have to be profitable, at least a little bit, to survive). This led me to start thinking within a new “discipline” that I coined *Labor IO*. The third, and at this stage final, route I thought about relies on the structure of links of the firms with

[☆] This article was prepared for a Keynote Address to the EALE, 2013, Torino. I would like to thank the organizers for providing me with this opportunity to present my work. I would also like to thank my co-authors, without implicating them, for our common endeavors which are constant sources of pleasure: John Abowd, Giacinta Cestone, Jonathan Eaton, Chiara Fumagalli, Markus Eliasson, Lena Hensvik, Samuel Kortum, Julien Martin, Isabelle Mejean, Gio Pica, Oskar Skans, and last but not the least David Thesmar.

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their environments, including the various markets they are embedded in (see Granovetter, 1985 on embeddedness). Hence, in this third view, I am mostly focusing on *Firms and Their Networks*. There, firms face suppliers', workers', CEOs', or board members' networks ... It is the perspective adopted here. I will rely every time on recent, often unpublished, articles that I have been writing with various co-authors using mostly French and Swedish data sources. Important too is the structural approach taken here: a fair fraction of the papers I will briefly describe have been or will be structurally estimated using some type of simulated method of moments. It is also important to keep in mind that structural estimation goes hand in hand with theory. In this set of work, two theoretical models loom large. One is the heterogeneous firm view expressed in new models of international trade (see Melitz, 2003, and Eaton et al., 2011 EKK, 2011 hereafter). It will be rapidly presented below. A second is the "Theory of the Firm" as expressed in the Contract/Corporate Finance models. A good starting point is "In Search of New Foundations" published in 2000 in the *Journal of Finance* by Luigi Zingales (Zingales, 2000). It is a very clear and lucid account of the challenges facing theorists when modeling firms. At this stage, my (modest, admittedly) contribution is to bring networks into the picture with the idea that firms can use various such resources at various moments, each network being a potential source of value.

My presentation will briefly review three directions of my recent work and evoke future research ideas. The three directions presented are: 1) how Networks affect employment through outsourcing or offshoring using "A Random Supplier-Network Theory of Employment and Wages" written with J. Eaton and S. Kortum; complemented by research on "Networks of Buyers and Suppliers" written with J. Martin and I. Mejean both relying on international trade data and models; 2) CEOs and their Networks affect corporate governance, based on paper published in the *JEEA* with D. Thesmar; 3) how Networks affect firms' hiring strategies using two papers "When Strong Ties are Strong" forthcoming in the *Review of Economic Studies* written with O. Skans in which we look at the role of strong ties (Family) and "Hiring Networks" unpublished and written with M. Eliasson, L. Hensvik, and O. Skans in which we look at various types of workers' networks, including former co-workers, former classmates as well as family. Finally, as an example of future directions of research that I intend to follow, I will briefly mention how labor and finance can be connected using "Networks of Firms, Financial Flows, and Worker Flows", a project recently started with G. Cestone, C. Fumagalli, and G. Pica. The study – both empirical and theoretical – of how the various functions in a firm such as finance, production, and marketing ... interact with labor decisions is my ultimate scientific goal.

2. Building a network of suppliers

The Melitz–Chaney model of firms' behavior in trade has been a resounding success. It is able to pick-up qualitatively and quantitatively patterns of entry across the world as well as sales distributions around the world (see Eaton et al., 2011). It is also able to capture the size advantage in France of the large exporters. One reason of this success is the tight connection between theory and measurement.

However, some aspects are not well-captured by this wave of models:

- the fragmentation of production and the lengthening of the supply chain;
- the sudden loss of jobs through outsourcing;
- the declining share of labor in manufacturing;
- firms' heterogeneity in their use of inputs.

What (2013) does is to add to EKK (2011) a buyer–supplier network, as in Oberfield (2013). It also adds the endogenous displacement of workers through outsourcing.

The basic facts – as measured from French manufacturing firms – that are put forward in (2013) are a) the share of total variable costs

is extremely heterogeneous across firms; b) a small fraction of firms (20%) import intermediates or final goods, but the resulting share of total variable costs is also extremely heterogeneous across those firms; the share of production labor within variable costs is, again, extremely heterogeneous; this also holds for the share of unskilled production labor; the share of imports in total intermediates is strongly increasing in the size of the firm (as measured by sales in France); the share of production labor, as well as the skilled/unskilled share strongly decreases with firm size. In addition, Imbs (2013) shows that the share of labor compensation over total gross production has been decreasing over time; this fact holds across virtually all countries.

To account for these facts, we add the following features to the original model which has firms with heterogeneous productivities, distributed as a power law, fixed entry costs in foreign countries, iceberg trade costs:

- firms perform K tasks in the Cobb–Douglas fashion, each having a β_K share of production;
- each task can be performed by either workers or replaced with intermediates;
- workers have an opportunity cost which may differ by firm;
- intermediate prices may also differ by firm.

Now, because firms can replace some of their tasks and the associated workers with intermediate inputs from suppliers, the cost of producing a good varies for two reasons: efficiency of the firm as well as efficiency of its suppliers. Suppliers meet buyers in a very simple way, through random matching with price quotes distributed Poisson. And firms, depending on whom they meet endogenously shed tasks. Indeed, we show the cost-reducing role of firm-to-firm trade. Because meetings are random, heterogeneity is generated at the firm-level, as in the facts singled-out above (share of imported intermediates, share of production workers ...). In addition, because the model is General Equilibrium, aggregate effects can be derived and matched with aggregate measures. Typically, simulation exercises show that this framework may generate a strong increase in the skilled/unskilled wage, with no need for SBTC, together with an increased fraction of outsourcing. It can also induce mobility away from the manufacture to service industries.

This model will constitute the structure that will be used to structurally estimate a model of firm-to-firm trade that should induce heterogeneity in employment and wage micro-responses for firms facing different suppliers' networks.

In a related, but separate, project with J. Martin and I. Mejean we analyze directly the structure of suppliers and buyers in trade. We use data for French sellers to European countries on the identity of their buyers i.e. a buyer who buys from two different sellers, potentially different goods, is perfectly identified. This allows us to distinguish the role of products versus buyers. It also allows us to examine the role of the network structure through time since we have such a match between buyers and sellers for multiple years. One question we examine is how the network structure affects the volatility of firms' sales. Such data sources also inform EKK (2013) on the structure of trade networks.

3. CEOs and their networks

David Thesmar and myself published last year (Kramarz and Thesmar, 2013) in which we focus on how French CEOs shape boards suited to their needs whenever they belong to the very French networks of ENA and Polytechnique alumni. To perform our analysis, we rely on the set of listed French firms on the Paris Bourse (exchange), at the so-called "Premier et Second Marchés". This leaves us with approximately 600 firms that we can follow over a period of more than 10 years. For each such firm, we know the name of the CEO as well as all board members. We also know where each such person was educated, in particular if they were trained at one of the French elite schools and if they had worked as civil-servant for some period of time, including as a cabinet member within a ministry, potentially left-wing or

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