

1 *Introduction*

Studying productivity and sensibly advising on best policies for its enhancement is a tricky affair. Two are the main challenges. First, productivity diverges widely and persistently between – and most notably within – countries and industries. It is a constant empirical regularity across the globe that there are only a few firms (even within narrowly defined sectors) which are highly productive. Most of them instead are struggling just to make it, while several others will inexorably exit their respective markets. This implies that there is not such a thing as an “average” firm performance, with meaningful implications, but rather a small set of exceptionally performing firms and the remaining others. Understanding why – and under which circumstances – such “stars” exist and what are the conditions under which others could follow is the key to interpret and foster productivity developments at the country and sector level, which is what ultimately counts for overall economic welfare. Connecting the micro and macro perspective is, however, the second challenge productivity research has to face. Put simply, there are not good enough data to do that, particularly in Europe. Data at the firm level are often solely available at the individual country level and with rather severe restrictions on their use, because of their confidentiality. Cross-country analysis is therefore severely hampered, since the available datasets at the national level are very uneven in terms of firms’ coverage, and thus hardly comparable.

To tackle such issues, since early 2010 the two of us have been engaged in the creation of the Competitiveness Research Network – CompNet – a large European initiative with two main objectives: (i) developing a forum for discussion on productivity research and (ii) setting up a truly comparable European Union (EU) dataset of productivity indicators, based on firm-level information of top quality.

In this book, we aim at providing the intuitions and all the necessary tools to analyse firms’ productivity, taking into account

their heterogeneity. At the same time, we will attempt to identify and study a wide range of potential drivers of firms' performance, which could help explaining why it diverges across and within countries and industries. To this end, we will extensively use the research work and the dataset generated by CompNet. Our ultimate objective is to show how rich and critical information we can gather by taking a firm-level perspective, but also point out that despite the progress made, additional EU-wide efforts need to be made on the data front to ensure sufficient depth and accurateness.

1.1 Overall Feature/Intellectual Underpinnings

The concept of “granularity” in the economic literature captures the idea that economic phenomena, rather than being the result of a homogeneous process carried out by atomistic, indistinguishable agents, can be driven to a great extent by a few outstanding individuals or firms that play a dominant role in regional and national economic performance. In most countries, a handful of firms are responsible for a large part of economic activity, including export sales and foreign direct investment. Within narrowly defined (four-digit Standard Industrial Classification [SIC]) US manufacturing industries, Syverson (2004) found that firms in the 90th percentile of the (total factor) productivity (TFP) distribution are on average 1.92 times more productive than the 10th percentile. In other words, though producing the same products with the same endowments of labour and capital, the top productive firms are able to produce twice as much as the least productive firms. These within-industry differences are significantly larger than the difference in average TFP measured across industries. The situation is not different in Europe. As shown by Mayer and Ottaviano (2007), in European countries on average about 1% of these “Happy Few” firms produce more than 75% of output or of foreign sales. An even greater within-industry heterogeneity has been reported in China and India, with average 90th to 10th decile ratios in terms of productivity in excess of 5:1 (Hsieh and Klenow, 2009).

The finding that a handful of firms determine to a great extent the aggregate economic outcomes has two important policy implications. First, it underlines how countries are subject to the actions of a few dozen firms. For instance, Gabaix (2011) estimated that even for the US economy, the business cycle movements of the largest 100 firms explain a third of the aggregate movements in output growth.

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The impact is a fortiori much greater for smaller countries or regions that accommodate only one or a few of those “top” enterprises. Di Giovanni et al. (2014) look at the universe of French firms between 1990 and 2007, decomposing aggregate sales fluctuations (in both domestic and foreign markets) and identifying reactions to macro, sectoral and firm-specific idiosyncratic shocks. Similar to the findings of Gabaix (2011) for the US, they confirm the substantial contribution of firm-specific shocks to aggregate volatility in France, with the magnitude of the effect of firm-level shocks being similar to those of sectoral and macroeconomics shocks, common to all firms. Second, the presence of heterogeneous firms in an economy provides a major additional channel through which aggregate productivity and thus competitiveness can be boosted. Recent literature (Bartelsman et al., 2013; Hopenhayn, 2014; Gopinath et al., 2017) takes advantage of the availability of cross-country competitiveness indicators built from firm-level data to show that a significant part of the differences in productivity between countries can be accounted for by differences in allocative efficiency. That is, aggregate productivity in a country might, in part, be lagging behind because capital and labour are not allocated efficiently between firms within an industry. In other words, some technology or policy-induced frictions in factor markets might prevent productive inputs from flowing into the firms that would use them in the most productive way. Removing these frictions thus provides a potential new channel for boosting aggregate productivity, i.e., the reallocation of resources away from poorly performing firms towards the most productive firms, with gains that in some cases can be quantified as an additional 30%, with proportional impacts on potential output (Bartelsman et al., 2013). CompNet research shows that this is particularly the case for the euro area, with major policy implications: “the type of policies that could release an upward shock to potential growth are not just those focused on price flexibility. They include [...] on the TFP side, policies that encourage the reallocation of resources – which could be powerful in the euro area given the wide and skewed distribution between the least and most productive firms”.¹

¹ Mario Draghi, speech on “Structural Reforms, Inflation and Monetary Policy”, ECB Forum on Central Banking, Sintra, 22 May 2015, available at www.ecb.europa.eu/press/key/date/2014.

Much of the subsequent research in international trade has been undertaken within this integrated “new trade theory” framework, which has become a standard paradigm of analysis. Yet, traditional models based on the representative firm setup are not able to explain a significant number of empirical findings. Indeed, traditional economic analysis used to build on the role of countries and sectors rather than firms within countries and sectors, which are, however, the actors who produce, trade and compete among themselves. If the underlying structure of firms is not properly taken into account, aggregate variables might undermine their reliability as indicators of average performance.

This observation has since led many economists to adopt a different perspective. As a result, seminal empirical works in the 1990s – such as the work by Olley and Pakes (1996a) on the US telecommunications sector – departed from a representative firm’s setting to focus on firms within sector, in order to keep into account the role of firms’ productivity heterogeneity to explain aggregate productivity growth. Since then, the economic literature has found that, using firm-level information, similar aggregate productivity growth might be the result of very different dynamics at the firm level.² This finding related to the high heterogeneity and skewness of the firm productivity distribution has several implications for economic analysis and policy, and represents the feature which will be more thoroughly analysed and disentangled in this book.

One implication of such high dispersion and skewness is that there are obviously two major meta-drivers of firm productivity.

- Some are common to all firms as deployed in a specific territory or sector. This includes infrastructures, logistic efficiency, institutions, barriers to entry, market structures, the degree of competition and the like. Such elements tend to influence the average productivity of all the firms present in that specific market/regions.
- Some other pertains instead to firm specific characteristics; something that makes the firm “special”. This includes that peculiar mix of innovative content, managerial capacity, marketing and such.

² For a review of preliminary empirical results on firm heterogeneity and trade, see Tybout (2021) and Bernard et al. (2003).

1.2 *Relevance for Policy Institutions*

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Overall, assuming that the aim of societies is the maximisation of their respective economies productivity, the role of governments is to draw a right balance between policy measures aimed at increasing the overall productivity (of the relevant country or sector) and others promoting a reallocation of resources – within that country or sectors – towards the firms that could use them most productively. It is the role of empirical research to provide the necessary evidence to tilt the balance in one direction or the other. This represents also the main objective of this book, i.e., disentangling the different drivers of productivity and collect evidence on the extent to which different factors and alternative strategies may matter when policies are actually put in place.

The second implication is that the response to external shocks – or to policies – of any economy will be strictly dependent on the overall constellation of firms that populate such economy. Take as an example the exchange rate fluctuations and their overall impact on export performance. It is by now a rather consolidated result in the most recent empirical literature that the impact will be much stronger for smaller and less productive firms, than for large and more productive ones. For the latter, the exchange rate may represent just a small driver of firms' results. And obviously such differentiated impact will be also observable for other potential productivity drivers, availability of external finance, cost of labour force and so on. A critical conclusion of such dimension is that – yet again – it is up to empirical research to provide the right quantitative context on which to base policies, following a correct assessment of likely outcomes.

1.2 **Relevance for Policy Institutions**

Awareness of firm heterogeneity and its implications for effective policy making is widely increasing among major institutions, also because of substantial improvements in the availability of novel datasets in which firm-level or individual-product-level information is disaggregated. For instance, for central banks such as the European Central Bank (ECB), when looking at transmission mechanisms of monetary policy, it is key to bear in mind that firms react differently to changes in factors such as money supply or loans availability. The need to identify the drivers of productivity and competitiveness is even more relevant when domestic or international public institutions

are involved in designing (and monitoring the implementation of) structural reforms, such as the International Monetary Fund (IMF), the European Commission, as well as the ECB. For instance, similar types of structural reforms will have different outcomes depending upon the prevailing constellation of firms characterising that sector or country (e.g., in terms of size of operations, firms' financial stance, export orientation) as well as the institutional environment surrounding those firms (e.g., product market access, labour market flexibility). There is an increasing awareness among researchers and practitioners that firm-level information must therefore – at the very least – be used to complement traditional aggregated information at the country and sector level in order to improve the policy toolkit. And efforts are being made to that end by all concerned institutions – as we will mention later.

1.3 Overall Content/Gap Bridging

Against this background, this book aims at handling the issue of what drives aggregate productivity by taking a firm-level (micro) empirical perspective. Its ultimate objective is to provide a toolkit of conceptual underpinnings and of empirical evidence which could help improve policy analysis and formulation. In line with a growing literature, the book will also attempt to bridge the wide gap which still exists between the micro and macro perspective. A gap that – as previously implied – can be a source of quite considerable errors in policy formulation.

In looking at productivity drivers, the book will have in mind the two previously mentioned dimensions of productivity. These are related to firm-specific characteristics such as size, organisation and technological capacity. But they are also related to other critical external conditions that firms have to confront – labour market regulation, financial constraints and so on – which are of paramount importance as drivers of firm productivity.

1.4 Overall Structure/Value Added

Overall, the book will provide a solid and comprehensive, yet not overly voluminous, handbook of the economics of productivity, taking

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a firm-level approach. The novelty of the book with respect to other existing books (see Annex 1 for a brief summary of existing books on the topics, including a brief outline of content) is that it will put upfront its micro-foundation, both at the conceptual and empirical level. The interaction with the macro perspective of course will not be forgotten, but will form more a critical part of the final chapters of the book, rather than its initial starting point. This is a stark departure from the traditional approach, which mostly considers firm-level analysis as additional, supportive information – e.g., “case study” material – rather than the bulk of the framework.

In terms of overall structure, the book will include in a first chapter after the introduction a stylised theoretical micro-founded model on which to base the analysis and facilitate the discussion throughout the book. It will then present some of the most relevant ways to define and measure productivity so that the reader will have a comprehensive view of the challenges that researchers have to face when dealing with productivity analysis.

The bulk of the book, however, will be composed of empirical evidence. For that, the book will draw extensively from the research results produced by members of CompNet, the Competitiveness Research Network.

The tight connection between the authors of this book and the members of CompNet has permitted a close participation of the economists in the network to the output of this book, including facilitating the process of obtaining the permission of using part of their research as supporting material.