EXTENDED ABSTRACT

Title: A tale of two countries: Regional Misallocation in Italy and Spain

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Abstract:

Introduction

Total Factor Productivity (TFP) growth is deemed to depend, almost equally, on technological adoption and on the efficiency with which production factors are allocated across firms. In the last decade and especially since the definition of a methodology with lower and more widely accessible data requirements, the degree of inefficiency in resource allocation, referred to as 'misallocation', has attracted increasing interest for the large first-order effects that its reduction would imply. The term misallocation can be intended in numerous ways: it may refer to distortions affecting the economic agents' decisions on how much to consume or work, or on the amounts of capital and labor to use in production. A more specific definition of misallocation, at the core of this article, is one that assumes the amount of labor and capital in the economy as given and refers instead to the degree of efficiency with which said quantities are allocated across heterogeneous producers[1]. Since in an efficient setting inputs market clearing should

[1] The term 'misallocation' is also intended by the growth-accounting literature as the degree of efficiency in the reallocation of resources to more or less distorted parts of the economy over time, instead as of the distance to the Pareto-efficient frontier. A recent publication by Baqaee and Farhi, (2020) reconciled the

imply the equalization of marginal products, the observed dispersion of marginal (revenue) products across firms within a sector[2] is treated as a sign of misallocation.

Motivation

While the magnitude of allocative inefficiencies is generally larger in developing countries, it is indeed deemed to have sizeable effects also in richer and more productive economies: in the US for example, the sole misallocation due to markups dispersion has been found by Baqaee and Farhi (2020) to account for 10-25% loss of economy-wide (*i.e.* including all sectors) TFP. The growing body of literature in the field has been investigating a large number of sources of distortion deemed to be responsible for the observed increases in misallocation across all country. These sources can be grouped, as influentially proposed by Restuccia and Rogerson (2017), in three categories: statutory provisions (taxation and regulation); discretionary provisions (discriminating specific firms or groups of firms and sectors), and market imperfections (financial frictions, segmentation, and market power).

One country that has received most of the attention in the field is Italy, often defined as the 'sleeping beauty' among the EU economies for being characterized by a slowdown in productivity growth dating back to 1997. Spain, in turn, a Southern-Europe country similar to Italy in terms of below-average productivity growth (Mas *et al.*, 2008, Bauer *et al.*, 2020), firms ownership structure (Binda and Colli, 2011), low financial-market's development and equity attractiveness (Groh *et al.*, 2010), and productive concentration (Boix, 2009), has received much less attention.

The present article proposes a comparative analysis of factors misallocation in Italy and Spain, performed at different subnational levels (NUTS1, NUTS2, and NUTS3), with a twofold aim: primarily, by focusing on misallocation at sub-national level and evaluating where inefficiencies concentrate in the two countries, it aims at quantifying which share of the aggregate productivity and of allocative efficiency can be explained at the local level or by specific areas. Secondarily, by exploiting recent data availability, it aims at updating previous evidence on both countries, up to the first year of the pandemic. In particular, it extends the work of Calligaris (2015) and Calligaris *et al.* (2018), exploiting

two streams by generalizing Hsieh and Klenow (2009)'s methodology to be applicable to economies with arbitrary input-output network linkages, different numbers of factors, microeconomic elasticities of substitution, and distributions of distorting wedges.

firm-level data to indirectly quantify factors' misallocation through the within-sector variance of total factor productivity revenues (henceforth TFPR).

Indeed, while for Spain there are no works on the regional distribution of factors' allocative efficiency, for Italy both Calligaris *et al.* (2018) and Lenzu and Manaresi (2019) revealed the dispersion in revenue productivity between macro-areas (NUTS1) within manufacturing sectors to account for a 7.05% of potential output gains from reallocation. However, the issue of the extent at which different within-country regions contribute to aggregate misallocation, and the drivers behind such differences has yet to be properly investigated, as previous research was limited to such broad (NUTS1) level of territorial aggregation. Sparse evidence on a finer grained of territorial aggregation (such as cities or commuting zones) also revealed lower distortions in core cities for both developing (Whited and Zhao, 2021) and western countries (Fontagné and Santoni, 2019), but research on the spatial patterns of inefficiencies and on different levels of territorial aggregation is still scant, notwithstanding theoretical grounding for similar researches. First, denser areas are expected to exhibit lower levels of misallocation, given that sharing and matching mechanisms should ease the sourcing and allocation of resources (Combes *et al.*, 2012). Moreover, firms in larger cities tend to be less financially constrained than those in the peripheries (Lee and Luca, 2019), while differences in credit-access are considered among the main sources of misallocation at across-country (David *et al.*, 2021) and across macro-regions (Lenzu and Manaresi, 2019). Further grounds for a more fine-grained regional analysis of within-country misallocation lie on the differences in institutional quality, social capital and rule of law that have been shown to exist across lower scales of territorial aggregation (Nifo *et al.*, 2018), combined with the growing number of findings on the role of institutional quality on aggregate misallocation levels, and specifically of the business environment (David *et al.*, 2021), crime (Piemontese, 2019), cronyism (García-Santana *et al.*, 2020) and corruption (Brugués *et al.*, 2020), or all of them (Misch and Saborowski, 2020)[2].

To the author's knowledge this is the first study that attempts to analyze the degree of factors misallocation at different geographical scales and the main firm's and regional characteristics associated with it.

[2] Misch and Saborowski (2020) found all the above-mentioned characteristics to explain local variations of misallocation measured for Mexican regions, with the same methodology applied in this article.

Methodology

It does so by applying the methodology[3] proposed by Hsieh and Klenow (2009) who proved input and output distortion to be with the dispersion in revenue total factor productivity (henceforth *TFPR*)[4]. This allows, by using widely available data on total revenues, labor and capital total costs, to calculate and plot the evolution of distortions in factors allocation across and within sectors, and to calculate the ratio between the observed (*Y*) and the potential efficient output (*Y**) as:

$$\frac{Y}{Y^*} = \prod_{s=1}^{S}\left(\frac{A_s}{A^*_s}\right)^{\theta_s} = \prod_{s=1}^{S}\left[\frac{1}{N_s}\sum_{i=1}^{N_s}\left(\frac{A_{si}}{A^*_s}\frac{\overline{TFPR_s}}{TFPR_{si}}\right)^{\sigma-1}\right]^{\frac{\theta_s}{\sigma-1}} \quad (1)$$

where A_s is the weighted average physical productivity in sector '*s'* (measured at 3digits Nace Rev.2 code), *'*θ_s*'* is the share of value added of each sector, σ is the elasticity of substitution among varieties, 'N_s*'* is the number of firms '*i'* in each sector, $\overline{TFPR_s}$ is the sectoral weighted average of firm level TFPR, and time subscripts are not displayed in the interest of simplification. Furthermore, the potential output gains (as a function of TFP) from reallocation can be obtained as:

$$\%\text{Gains} = \left(\frac{Y^*}{Y}\text{-}1\right) \times 100 \quad (2)$$

In a second step of the analysis, the extension suggested by Calligaris *et al.* (2018), consisting in a within- and between-group decomposition of the dispersion in sectoral *TFPR*, is seized to analyze how misallocation concentrate across different geographical areas and/or groups of firms (by NUTS1, NUTS2, NUTS3 regions and by size, age, ownership and patenting intensity), in turn representing a different firm group '*g'*:

[3] Hsieh and Klenow (2009) developed a model of monopolistic competition á la Melitz (2003) where heterogeneously productive firms face two types of idiosyncratic distortions: a capital wedge affecting the relative marginal revenue product of one factor with respect to the other, and an output wedge affecting the marginal products of both factors, human and physical capital, by the same proportion. They proved, under the model assumption, sectoral (log)TPF to be negatively correlated with the dispersion in revenue total factor productivity, and to be directly proportional to the weighted geometric average of mean marginal revenue products of capital and labor and, in turn, to input and output distortions.

[4] In Hsieh and Klenow (2009) model setting, the TFPR of firm 'i' in sector 's' is equal to the ratio between Value Added ($P_{si}Y_{si}$) and inputs utilization ($K_{si}^{\alpha}L_{si}^{1-\alpha}$).

$$Var(TFPR) = \sum_{g=1}^{G} \frac{VA_g}{VA} \sum_{s=1}^{S} \frac{VA_{gs}}{VA_g} \sum_{i=1}^{N_s} \frac{VA_{gsi}}{VA_{gs}} \left(\mathrm{TFPR}_{gsi} - \overline{\mathrm{TFPR}}_{gs}\right)^2 + \sum_{g=1}^{G} \frac{VA_g}{VA} \sum_{s=1}^{S} \frac{VA_{gs}}{VA_g} \sum_{i=1}^{N_s} \frac{VA_{gsi}}{VA_{gs}} \left(\overline{\mathrm{TFPR}}_{gs} - \overline{\mathrm{TFPR}}_{\mathrm{s}}\right)^2 \quad (3)$$

In eq. 3, the first line represents the within-group component, while the second line the between-group one.

Finally, the firm and regional levels of the logarithm of *TFPR*'s dispersion will be regressed with respect to several distortion 'markers' in order to evaluate their correlation with aggregate, regional and sectoral misallocation. The estimation of the firm-level ratio with respect to its sectoral mean, in log-linearized pooled OLS form, will include three vectors of firm-level (X_{tsgi}, which includes age, size, ownership type, patenting activity), sectoral (Z_{tsg}, including measure of industrial concentration and shocks to the technological frontier[5]), and regional-specific (W_{tg}, controlling for population and firm density, institutional quality, and average financial constraint of firms by region, age and sector) controls, and year (ζ_{t}), sector (ε_{s}) and region (ϑ_{g}) fixed effects[6].

$$\ln \frac{\mathrm{TFPR}_{tsgi}}{\overline{\mathrm{TFPR}}_{tgs}} = \alpha + \beta \mathrm{X}_{tsgi} + \gamma \mathrm{Z}_{tsg} + \delta \mathrm{W}_{tg} + \zeta_{\mathrm{t}} + \varepsilon_{\mathrm{s}} + \vartheta_{\mathrm{g}} + \eta_{tsgi} \quad (4)$$

Data

The main variables used for the misallocation and reallocation gains calculations[7] are collected from the *Bureau Van Dijk Orbis* dataset, which includes the quasi-totality of firms with more than 10 employees. I collected balance-sheet data for the years 2013-2020 for all the enterprises active in the manufacturing sector and located in Italy and/or

[5] To measure the shocks to the technological frontier, I borrow Calligaris *et al.* (2018)'s measure, based on the average change of R&D intensity between the period 2003-2008 in each 3digits sector in European countries excluding Italy and Spain.

[6] The regression will be separately estimated for each of the two countries, and for such reason country fixed effects are not included.

[7] In particular, I exploit nominal Value Added as Total Revenues, Tangible Fixed Assets as a measure of capital, and Total Wage and Salaries as the wage bill. I thus calculate the sectoral level Variance of TFPR as the weighted (by sectoral value-added share) sum of the square of the difference between firm-level TFPR and its sectoral mean.

Spain. The variables for firms' age[8], size[9], ownership[10] and patenting type[11], and industrial concentration[12] are also created through *Orbis* data, while regional controls such as population and firm density, and average financial constraint[13] of firms by region, age and sector are collected through the *Eurostat* regional and structural databases. Finally, institutional quality is measured through the lagged (2010) value of the NUTS2 level European Quality of Government Index, developed and released by Charrero *et al*. (2021).

For both countries, the constructed sample can reproduce around 70% of total manufacturing output, labor costs, and employment, both for the aggregate and for the by-size group of firms. This calculation should be considered as rather conservative, being obtained by comparing the final sample, *i.e.* after all data cleaning procedures[14] with SBS Eurostat data, the latter representing the full Census population of firms in the two countries.

Preliminary Results

As a first step, the article provides estimates of aggregate misallocation for the manufacturing sector in both countries, as of potential output gains from reallocation. Italy is found to exhibit a potential of manufacturing output gains around 85%, consistent with Calligaris (2015) estimate of 80% for 2011 (or 84% for 2009). In Spain, potential output gains from reallocation are found to be around 94% in 2013. In both countries, misallocation have been quite stable, with a slight increasing trend in Spain and a slightly decreasing one in Italy. Moreover, in the first year affected by the Covid-19 crisis (2020) misallocation increased in both countries, but potential output gains from reallocation

[8] The age group is created as a categorical variable taking the value of *1* for firms with an age <5 y.o., *2* for 5-9 y.o., *3* for 10-19 y.o., 4 for 20-29 y.o. and 5 for >29 y.o.

[9] The categorical variable for the firm's size follows the OECD definition by number of employees (*micro* <10, *small* 10-49, *medium* 50-250, *large* >250).

[10] Ownership is defined through Orbis information on the global shareholder, and distinguishes among: *1* Corporates; *2* Families or Individuals; *3* Private Equity Firms, Venture Capitalist, and Pension funds; and *4* Public entities.

[11] Patenting group depends on the total number of granted patents (0, 1-3, >3).

[12] Industrial concentration is measured as the sum of the shares of sectoral operating revenues, produced by the 8 firms with the largest operating revenues in each year, sector and country.

[13] Regional financial constraints are proxied through the Eurostat Regional Business Statistics variable of *"Success rate in obtaining loan finance by sources, type of enterprise and NACE Rev. 2"*.

[14] As a usual standard procedure in the field, all firms with negative values for either the cost of labor, of capital (tangible fixed assets), or of the value added, have been dropped. Moreover, the 1st and 99th percentile of the distribution of our main variables of interest (TFP and TFPR) have been trimmed to exclude outliers.

decreased due to lower average sectoral productivity. The result holds both with or without considering the extensive margin (i.e. entry and exit of firms), so that no cleansing effect, normally associated with market crisis, can be grasped. This can be due by the limited extension of our data to the sole first year of the phenomenon, and by the complexity and number of channels with which Covid-19 is expected to affect factors allocation across countries and regions depending on their productive specialization, on specific public policy issued to face the emergency, on collaterals and so on (see Barrero *et al.* (2020) for a detailed discussion).

In the second and focal part of the article, I apply the decomposition described in eq. 3 to a number of firm groupings (namely, the location at NUTS1, NUTS2 and NUTS3 level, the age group, the size, ownership and patenting type). The between group variance of age and size, two characteristics unambiguously linked with differences in efficiency and productivity, are found to account for between the 10% and the 18% of the overall variance (being the sum of the between and within group). Most interestingly, all the three regional between-group components explain a larger share of aggregate misallocation than size and age (18% at NUTS1 level, 25% at NUTS2 level and 29% at NUTS3 level). Indeed, the share of dispersion explained by the between-region variance component decrease with the level of territorial aggregation, which explains why first studies on the topic dismissed it as rather unimportant when analyzing the misallocation decomposition only by macro-areas (NUTS1). While at NUTS3 level, *i.e.* for *provinces*, such dispersion could be related with the different degrees of urbanization, the high levels of misallocation between *regions* (NUTS2 level), could refer to systemic differences in institutional terms as to the structure of the economy that should be further analyzed. In the next step of this research, I am going to investigate the role of major firm-level and regional characteristics that could explain differences in misallocation across regions.

Conclusions

The research deals with the indirect quantification of factors misallocation at national and subnational level, with a comparative framework among two Southern countries, Italy and Spain, sharing similar economic features. As such, it provides preliminary evidence on the unequal spatial distribution of misallocation, and on the distinct drivers and magnitude of within-sector between regions disparities in allocative efficiencies across firms.

By performing the analysis at different levels of geographical aggregation, it has by far provided insights on the within-country imbalances in factors' allocative efficiency, assessing how much of the two countries' aggregates are explained at local level, and which areas are the ones deserving more attention. Notably, the between region dispersion accounts for a larger share of aggregate misallocation (between 18% and 29%) than size or age, therefore confirming the need for further research on the spatial scope of factors allocative efficiency. Finally, on account of the timespan of Bureau Van Dijk data up to the end of 2020, the research has offered some preliminary results of the impact of Covid-19 on the misallocation trends in the two Southern European countries, revealing an increase in misallocation both with or without considering the extensive margin (entry and exit of firms).

The work, at its actual stage, has several limitations to be acknowledged: first of all, since previous studies have established misallocation to be higher in the service sector (see Dias *et al.*, 2020 or García-Santana *et al.*, 2020), future direction for research would be to include such extension. Moreover, the indirect methodology applied does not allow to claim any causality in the econometric analysis of misallocation markers performed as last step in the article. While recent methodologies such as that proposed by David *et al*. (2021) could allow to better disentangle the role of each of the markers analyzed, they are less reliable in terms of the quantification of overall aggregate and regional misallocation, for the higher data-requirements imply a large use of imputation. As such, my work should be intended as an exploratory study that should be followed further research on the topic. Finally, while the two economies were chosen for their longstanding North-South divide and low degree of convergence between regions, making more salient the expected differences in local allocative efficiency, the work would benefit from a broader cross-country analysis, in order to better grasp the magnitude and external validity of findings given the multiple other similarities of these two economies. I aim to overcome this limitation by extending the analysis to all EU-15 economies as a next step of this research.

References

Baqaee, D. R., Farhi, E. (2020): "Productivity and Misallocation in General Equilibrium", The Quarterly Journal of Economics, nº135(1), p.105–163.

Barrero, J. M., Bloom, N., Davis, S. J. (2020): "COVID-19 is also a reallocation shock",Brookings Papers on Economic Activity, p.329–383.

Bauer, P., Fedotenkov, I., Genty, A., Hallak, I., Harasztosi, P., Martínez-Turégano D., Nguyen D., Preziosi, N., Rincon- Aznar, A., Sanchez-Martinez, M. (2020): "Productivity in Europe -Trends and drivers in a service-based economy", Publications Office of the European Union.

Binda, V., Colli, A. (2011): "Changing big business in Italy and Spain, 1973-2003: Strategic responses to a new context", Business History, n°53(1), p.14–39.

Boeri, T., Ichino, A., Moretti, E., Posch, J. (2021): "Wage Equalization and Regional Misallocation: Evidence from Italian and German Provinces", Journal of the European Economic Association, p.1–46.

Boix, R. (2009): "The empirical evidence of industrial districts in Spain", in Becattini, G., Bellandi, M, De Propis, L. (Eds.), A Handbook of Industrial Districts, p.343-359.

Brugués, F., Brugués, J., Giambra, S. (2020): "Political Connections and Misallocation of Procurement Contracts: Evidence from Ecuador", Working Paper, p.1–34.

Calligaris, S. (2015): "Misallocation and Total Factor Productivity in Italy: Evidence from Firm-Level Data", Labour, n°29(4), p.367-393.

Calligaris, S., Del Gatto, M., Hassan F., Ottaviano, G., Schivardi, F. (2018): "The Productivity Puzzle and Misallocation: An Italian Perspective", Economic Policy, n°33(96), p. 635–684.

Charron, N., Lapuente V., & Bauhr M., (2021): "Sub-national Quality of Government in EU Member States: Presenting the 2021 European Quality of Government Index and its relationship with Covid-19 indicators", University of Gothenburg: The QoG Working Paper Series 2021, n°4.

Combes, P.-P., Duranton, G., Gobillon, L., Puga, D., Roux, S. (2012) The productivity advantages of large cities: distinguishing agglomeration from firm selection", Econometrica, n°80, p.2543–2594.

David, J. M., Venkateswaran, V., Cusolito, A. P., Didier, T. (2021): "Capital Allocation in Developing Countries", The World Bank Economic Review, n°35(4), p.1102–1121.

Dias, D. A., Robalo Marques, C., Richmond, C. (2020): "A Tale of Two Sectors: Why is Misallocation Higher in Services than in Manufacturing? ", Review of Income and Wealth, n°66(2), p.361–393.

Fontagné, L., Santoni, G. (2019): "Agglomeration economies and firm-level labor misallocation", Journal of Economic Geography, n°19(1), p.251–272.

García-Santana, M., Moral-Benito, E., Pijoan-Mas, J., Ramos, R. (2020): "Growing Like Spain: 1995–2007", International Economic Review, n°61(1), p.383–416.

Groh, A. P., von Liechtenstein, H., Lieser, K. (2010): "The European Venture Capital and Private Equity country attractiveness indices", Journal of Corporate Finance, n°16(2), p.205–224.

Guiso, L., Sapienza, P., Zingales, L. (2004): "Does local financial development matter?", The Quarterly Journal of Economics, p.929–969.

Hsieh, C.-T., Klenow, P. J. (2009): "Misallocation and manufacturing TFP in China and India", The Quarterly Journal of Economics, n°CXXIV(4), p.1403–1447.

Lee, N., Luca, D. (2019): "The big-city bias in access to finance: evidence from firm perceptions in almost 100 countries", Journal of Economic Geography, n°19(1), p.199–224.

Lenzu, S., Manaresi, F. (2019): "Sources and Implications of Resource Misallocation: New Evidence from Firm-Level Marginal Products and User Costs", Banca d'Italia, Questioni di Economia e Finanza, p.1-70.

Mas, M., Milana, C., Serrano, L. (2008): "Spain and Italy: Catching up and falling behind . Two different tales of productivity slowdown", MPRA Paper, n°15834, p.1-39.

Melitz, Marc J. 2003. The impact of trade on intra-industry reallocations and aggregate industry productivity", Econometrica, n°71(6), p.1695–1725.

Misch, F., Saborowski, C. (2020): "The Drivers and Consequences of Resource Misallocation: Exploiting Variation across Mexican Industries and States", Economia, n°2020 (2), p.61–96.

Nifo, A., Ruberto, S., Vecchione, G. (2018): "Does institutional quality matter for lending relationships? Evidence from Italy", Journal of Applied Finance Banking, n°8(2), p.69–100.

Piemontese, L. (2019): "Mafia and Misallocation in Northern Italy: a new approach of estimating the cost of organised crime", Working Paper, p.1–52.

Restuccia, D., Rogerson, R. (2017): "The Causes and Costs of Misallocation", The Journal of Economic Perspectives, n°31(3), p.151–174.

Rodríguez-Pose, A., Ganau, R., Maslauskaite, K., Brezzi, M. (2021): "Credit constraints, labor productivity, and the role of regional institutions: Evidence from manufacturing firms in Europe", Journal of Regional Science, n°61, p.299-328.

Whited, T. M., Zhao, J. (2021): "The Misallocation of Finance", Journal of Finance, n°76(5), p.2359–2407.

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