Efficiency of firms and markets in Ghana: The role of spatial factors

Emmanuel B. Mensah and Johannes Van Biesebroeck

- Firms' choices of inputs often deviate wildly from predictions based on a model of a profit-maximising firm operating in a perfectly competitive environment. Using information from the 2014 business census, we document that this is also the case in Ghana.
- One strand of the literature interprets these deviations as frictions, for example, firms' failure to optimise their input choices. It implies that the economy's total output could be increased by reallocating input factors between firms. We find that fully eliminating imperfections in the allocation of inputs can boost aggregate output in Ghana by 125%, similar to India (128% in 1994) but higher than in China (87% in 2005) or the United States (43% in 1997).
- A different strand of the literature interprets these same deviations as firms deliberately scaling back production to exercise market power and raise prices. In line with this interpretation, we find that the implied aggregate markups by district are positively related to average firm size and the extent of employment concentration in the largest firms. This pattern is particularly strong for service sectors.
- We verify whether implied frictions or implied markups correlate intuitively with spatial factors to determine the most plausible interpretation. Here, we find support for both interpretations. In line with expectations, local markets with low entry barriers and a large number of active firms tend to show larger frictions. On the other hand, an extensive and efficiently laid-out road network tends to lower the markups that firms can charge in the service sector.

POLICY BRIEF GHA-20185

JUNE 2023

DIRECTED BY

LSE UNIVERSITY OF OXFORD

FUNDED BY

UKaid from the British people

Overview of the research project

Every decade, the Ghana Statistical Service conducts a census of all non-household establishments active in any sector of the Ghanaian economy. The last Integrated Business Establishment Survey (IBES) was collected in 2014. The first phase covers 638,000 firms that employ 3.4 million workers. The second phase contains detailed information on input use and output levels and on a myriad of firm characteristics for a subset of almost 25,000 firms that employ 600,000 workers. We use this unique and underused source of information to learn how efficiently firms and markets are using production factors, labour, and capital.

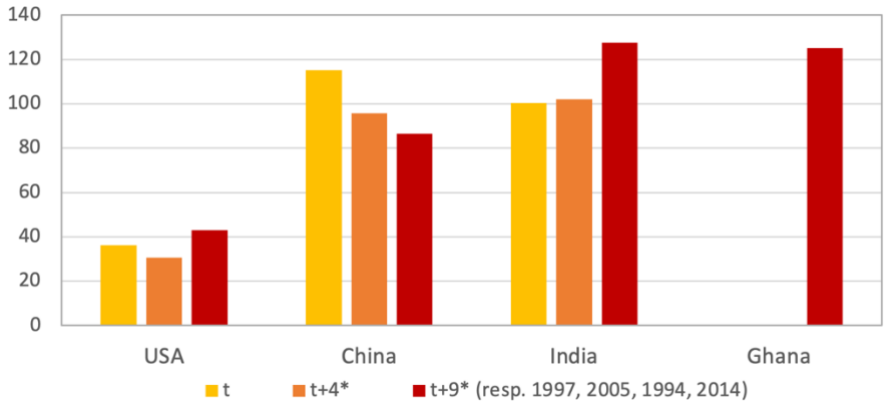
Firm efficiency

One strand of the economics literature studies the efficiency of firms in their choice of inputs. Some firms are more productive than others, but in general, we expect the contribution of each additional worker to be somewhat lower than that of the last worker as the capital stock is spread thinner and a firm's target market becomes saturated. In principle, we expect firms to hire workers until the additional output that an extra worker can produce falls below the prevailing wage rate. In practice, many firms' input choices deviate from this theoretical prediction. These so-called wedges - deviations from the first-order conditions for optimality - can have different interpretations. They must reflect some adjustment friction that makes a firm deviate from its optimal size or input mix. A corollary of these frictions is that it is possible to reallocate workers or capital between firms to equalise productivity and boost aggregate output in the economy.

In a seminal contribution, Hsieh and Klenow (2009) showed that aggregate productivity in the United States could rise by 43% (in 1997) if all frictions could be eliminated. The corresponding change for China was 87% (in 2005) and for India, 128% (in 1994). We performed the same calculations for Ghana and found it would lead to a productivity increase of 125%. While eliminating all frictions is not a realistic target, this statistic gives a sense of the importance of frictions and the misallocation of the production factors they represent for national output. It also shows that Ghana is not as far behind China and India as these countries are lagging behind the United States. Moreover, it is interesting to note that the importance of frictions has been declining in the Chinese economy, while it has increased in India. The next business census by the Ghana Statistical Service—planned for 2023/2024—could be used to

evaluate the direction of change for Ghana. Are firms becoming more or less efficient in their input choices?

FIGURE 1: Potential gain in aggregate productivity from eliminating frictions that cause firm-level productivity differences



Note: Second year is 3-5 years after first, third year is 7-10 years after first

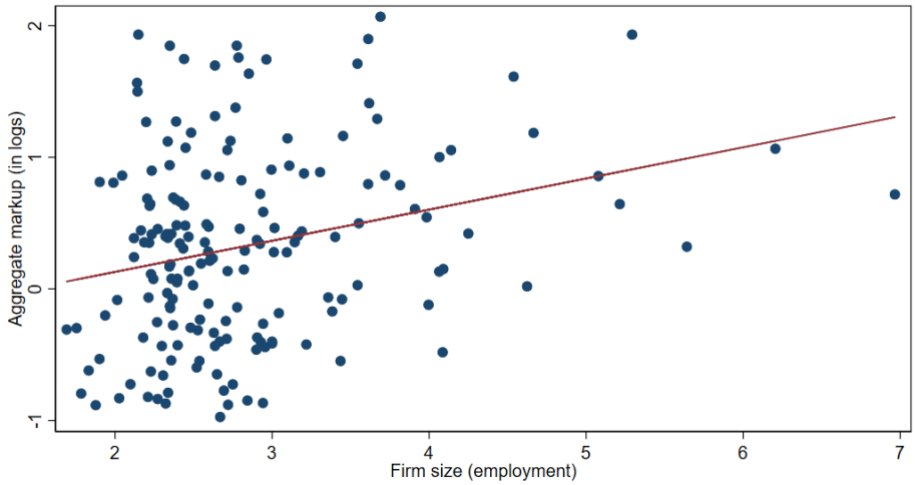
Market efficiency

A second strand of the economics literature starts from the same gap between predicted and actual use of inputs. Rather than interpreting deviations as a lack of firm optimisation, it points to the lack of efficiency in these firms' markets. As discussed, each additional worker a firm hires is likely to generate a lower increase in output than the last worker. A profit-maximising firm operating in a competitive market is expected to hire additional workers until their contribution falls below the wage rate. However, firms that have market power will behave differently. To the extent that they can influence the market price of their output, firms realise that by producing less output, they can raise the price. For example, firms with monopsony power in the labour market have similar incentives because they operate in isolated locations with few competitors. If they hire fewer workers, they are in a stronger bargaining position and can offer lower wages to the remaining hires. In both cases, firms' input choices will deviate from the theoretical prediction, but not because of a lack of optimisation. Firms are exploiting market power to raise their profits at the expense of local consumers and employees.

In another seminal contribution to the economics literature, De Loecker, Eeckhout, and Unger (2020) showed that the average markup firms charge in the US economy has increased notably over time. With only information for a single year available, we cannot evaluate the corresponding change over time for Ghana. However, we can compare the aggregate markup in the country's

216 districts. The results indicate that the aggregate markup in a district increases with the average firm size for most industries. This pattern is most pronounced in service sectors where competition is local. For example, we find the strongest positive relationship in the hotel and restaurant industry. In this case, an increase in the average firm size from 2.5 to 4 employees—from the median value to the 95th percentile—is associated with an increase in the price-marginal cost ratio (markup) from 1.4 to 2. We find a similar positive relationship between the average markup in a district and the share of employment accounted for by the five largest firms in a district. Intuitively, both the firm size and the firm concentration are positively correlated with the average markup in a district.

FIGURE 2: A positive relationship between the aggregate markup and firm size in the hotel and restaurant industry



Distinguishing between the two interpretations

The two interpretations for deviations between predicted and actual input choices are not mutually exclusive, but they have rather different policy implications:

- The first interpretation suggests that removing barriers to adjustments, such as onerous regulations or financing constraints, could improve the allocation of production factors across firms and raise aggregate output.
- The second interpretation, however, suggests that the main obstacle is firms being shielded from competition. Output would be raised if entry barriers were lowered or if it was easier for consumers to substitute

between firms. Therefore, reducing transportation costs or improving price transparency could be policy goals.

To find out which of the two interpretations is most appropriate in the case of Ghana, we investigate the correlation of frictions and markups with several spatial factors. For a number of these factors, there is a natural expectation for the sign of the correlation with either the extent of misallocation frictions or with the level of local markups. We have added the exact firm location for each of the 25,000 firms in the IBES2 sample, which allows us to calculate spatial characteristics regarding the environment in which these firms operate. We conduct this analysis at the district and firm levels within each district.

We can consider three different spatial dimensions. First, we calculate the density of local activity based on the number of competitors or total employment by sector. Some districts contain much more economic activity than others, but even within districts, economic activity is spread highly unevenly across space. Second, we analyse the country's road network and construct several indicators for each district. These capture how extensive the network is (in terms of kilometres of streets and number of intersections), how efficiently it is laid out (regarding travel distance between any two points), and how well locations in a district are connected to the overall road network. For each firm, we further calculate how far it is from the nearest major road. Third, we calculate the distance from each firm to different centres of economic activity. These include the nearest port, regional capital, district capital, and periodic local market.

Using these measures, we verify several priors in the data. For example, if an area has more active firms, the chances are higher that some are not operated very efficiently and will perhaps not remain in business very long. We thus expect to find more frictions if a district or town has more firms; this is borne out at the district level but only for the manufacturing sector. Frictions also increase with the amount of employment, which can be considered a proxy for general economic activity. This relationship is stronger with the number of firms, which is in line with expectations. It is curious, however, that the same pattern does not appear in the service sector, where we would expect this to be even stronger, nor for individual towns within districts.

A second pattern verified in the data is the relationship between the quality and extent of the road network and the two types of wedges. Here, we expect a negative impact of roads on the ability of service sector firms to charge markups. Customers' ease of reaching firms is expected to limit market power, especially in services. In manufacturing, the prediction is more ambiguous because firms might be able to use the road network to reach their customers. Demand is less likely to be localised in manufacturing, and good road

connections could help manufacturing firms serve customers on time, possibly raising their pricing power. The results show that a better road network in the district lowers the aggregate services markup. For manufacturing, the results are more ambiguous, with a longer and more efficient road network raising markups while better connections limit markups. While these results are interesting, we cautiously note that measurement error seems to be a particular problem for the road network variables, and several effects are not precisely estimated.

Finally, we expect market isolation and firms' distance to sources of demand or competition to raise the incidence of input misallocation and firms' ability to exercise market power. Neither of these predictions is borne out clearly in the results. If anything, several of the measures of market isolation tend to lower markups and the importance of frictions. One potential explanation is that firms locate endogenously in places with high demand. That could allow them to charge higher markups and allow inefficient firms to survive.

Policy implications

Irrespective of which of the two interpretations is most plausible, the economy would benefit from eliminating deviations from optimal input choices. Their presence indicates that production factors are not deployed at their most productive use and that aggregate output could be increased by reallocating them.

Lowering entry barriers is one policy option

A recent project by the World Bank[1] reports six main barriers entrepreneurs (especially women) face in Ghana: Entrepreneurs have limited access to finance, lack quality technical assistance, skills and management capabilities, and have limited access to land, capital, and more sophisticated business practices. Lowering all these barriers is a potential way to increase entry and market competition in Ghana. One specific policy option is for young entrepreneurs to be given access to finance, technical support, and skills development. The government of Ghana's skills development programme[2] through the National Innovation Entrepreneurship Programme (NEIP)[3] is one such policy. However, the training and business incubation services offered by this programme tend to focus on artisans in the light manufacturing sector. Our findings suggest this will likely introduce more distortions in the manufacturing

[1] https://www.worldbank.org/en/results/2022/12/08/ghana-supporting-small-and-medium-enterprises-to-recover-from-the-covid-19-pandemic
[2] https://ghanaskillscentre.gov.gh/
[3] https://neip.gov.gh/

sectors. Such programs should focus more on entrepreneurs who want to enter the service sector. Raising the competition faced by incumbent firms has the potential to reduce markups. However, allowing a broader set of firms to enter will likely raise the fraction of less efficient firms in the market. Our results suggest that the markup-constraining effect might be more important for the service sector, and the friction-raising effect might be more important in manufacturing. Hence, lowering entry barriers should be a higher priority in the service sector than manufacturing.

The weak relationship between an extensive road network and market isolation with both types of deviations suggests that connecting markets better is unlikely to generate important effects

This finding differs from prior results for India, where Donaldson (2018) shows the large effects of new railroads on reducing price disparities. A possibility is that, nowadays, more efficient communication technologies already provide alternative mechanisms for arbitrage. One exception is the ability of a better-connected road network, not just a more extensive one, to lower markups in the service sector. There are potential benefits to the extent that connections between roads and between towns can be improved. In this context, it is important to highlight that, on average, markups tend to be quite a bit higher in the service sector than for manufactured goods. In other words, as road connections between towns improve, local firms in services are likely to be exposed to more competition, which will lower their ability to charge markup (or higher) prices. These benefits could be substantial because markups are currently higher in the service sector than for manufactured goods.

References

De Loecker, J., Eeckhout, J., & Unger, G. (2020). The rise of market power and the macroeconomic implications. *Quarterly Journal of Economics, 135*(2), 561-644.

Donaldson, D. (2018). Railroads of the Raj: Estimating the impact of transportation infrastructure. *American Economic Review, 108*(4-5), 899-934.

Hsieh, C. T., & Klenow, P. J. (2009). Misallocation and manufacturing TFP in China and India. *Quarterly Journal of Economics, 124*(4), 1403-1448.