Second Generation Productivity Analysis and Policy

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Structural Change, Misallocation and Aggregate Productivity

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1. My talk will cover 4 parts. I will first argue that the large differences in income per capita across countries are mostly accounted for by differences in total factor productivity (TFP). So then the key question I will focus on is: what accounts for these productivity differences?

   I will then describe a simple framework to discuss the potential channels though which the literature has tried to account for productivity differences, channels that I will broadly refer to as technology, selection, and misallocation.

   I will use this context to focus the rest of my talk into two elements that I think are essential in this area. First, I will discuss some of the specific policies, frictions, and institutions that generate misallocation and hence lower productivity. Second, I will discuss the work that studies the broader consequences of misallocation on productivity via additional effects on selection and technology channels.

2. At the aggregate level, income differences across countries are mostly accounted for by TFP differences. This finding has been documented in many places, here I refer to the early work of Klenow and Rodriguez-Clare and Jones using more recent data. The importance of TFP remains even after accounting for differences in human capital quality across countries that, while important, are also driven by TFP differences.

At a more disaggregate level, productivity is also essential in accounting for cross country differences in economic structure and the time series patterns of structural change and aggregate outcomes.

For example, a key finding is that the productivity gaps across countries are largest in agriculture and services and smaller in manufacturing. Because structural change proceeds by reallocating resources from agriculture to manufacturing and services in a first phase and then from agriculture and manufacturing to services in a second phase, this implies that productivity growth and structural change also account for the observed patterns of catch up, stagnation, and decline in relative aggregate productivity observed in a number of countries.

3. The literature has also emphasized the role of agriculture when focusing on the productivity differences between the richest and poorest countries in the world. This is because compared to rich countries, poor countries are much less productive in agriculture and in addition allocate most of their labor to that sector. The real productivity gap in agriculture is a factor of 45-fold while in non-agriculture only 4-fold and the share of employment in agriculture is only 5% in rich countries while 85% in poor countries. It turns out that standard sectoral models can easily rationalize the allocation of employment across sectors from the given differences in productivity. So again the key question is what accounts for the large productivity differences we observe in agriculture? The typical sectoral framework assumes some form of non-homotheticity in preferences so there is a minimum consumption of agricultural goods, so that for example poorer households spend more resources in agriculture. To illustrate this I assume an extreme form where the consumption per capita of agricultural goods is constant and given by a minimum consumption level $\bar{a}$. What this implies is that the labor allocation in agriculture is inversely related to labor productivity in agriculture. Over time, growth in labor productivity in agriculture g_A implies that labor can is reallocated away from agriculture into the other sectors. Across countries, low labor productivity countries (poor) have to allocate more labor into agriculture. This simple structure (or small deviations from it)

fit the data quite well, both the changes in the share of labor in agriculture associated with labor productivity growth and the cross country differences in the employment allocation in agriculture in relation to labor productivity.

4. The figure shows the data for 1985 from Restuccia, Yang, and Zhu on the employment share in agriculture and the real labor productivity differences in agriculture across countries. The black line is the model I described before and the dashed red line is a model with a long run share of employment in agriculture of 1% instead of 0 in that model.

5. So what accounts for the productivity differences? To discuss the advances in the literature on the factors accounting for productivity differences, consider a simple framework, based on my recent work with Richard Rogerson, where a single good is produced by a number of potential production units that are heterogeneous in their total factor productivity A and output y is produced with capital and labor. The production function is such that it would not be optimal to allocate all the factors in the more productive unit. Each production unit is subject to a fixed cost of operation so it would not be optimal to operate all production units. Given aggregate resources, the efficient allocation that maximizes output involves selecting production units to operate that can cover the fix cost and to allocate inputs across operating units as a proportion of their productivity so more productive producers are allocated more capital and labor.

6. Now consider economies with the same amount of aggregate resources K, H, and N. In this setting three channels account for TFP aggregate differences across these countries. First, it may be the the countries have different distributions of producer level TFP, we call this channel technology. Second, it may be that even if the distribution of productivity is the same, countries may choose different set of producers to operate, we call this channel selection. Third, it may be that even if the distribution of productivity is the same, and the set of operating producers is also the same, countries may choose different allocation of resources

across the producers, we call this channel misallocation and in essence is the pure, static form of misallocation that the literature has considered. An important insight of current work on misallocation is that specific policies/institutions creating misallocation can have larger effects on TFP by altering technology/selection channels.

7. With this setting in mind, I now discuss two key issues in the current literature on productivity: what are the policies/institutions that cause misallocation? and are there broader consequences of misallocation, in the sense of these policies/institutions having effects on selection and technology channels in accounting for aggregate TFP differences?

   To give some context, some of the early work on misallocation approached the problem in terms of trying to assess the importance of misallocation in accounting for TFP differences without trying to identify the sources of misallocation.

   This was very useful in quantifying the overall importance of misallocation and identifying important patters, such where the misallocation occurs: within industries, across industries, across time and space, etc., but the approach is silent as to the specific sources of misallocation.

   The identification of policies creating misallocation is key for policy analysis.

   An alternative approach is to quantify the role of specific policies/institutions on misallocation such as specific measurable regulations and discretionary provisions, financial development, among many others. This approach requires a good measurement of the policies and additional structure, so often the results are subject to the quality of those choices. But I want to focus here on a different challenge from the many studies that have followed this approach.

   The results of this approach have essentially left a challenge in that the literature has not identified a single or set of sources that can account for the bulk of productivity differences so many different policies/institutions are needed to account for the data.

   The are a couple of exceptions to this general conclusion that is relevant to discuss: First, the role of land market institutions in agriculture. Second, the focus on changes in polices over

time in specific contexts instead of differences in policies across countries at a point in time.

8. Land institutions in poor countries are characterized by a lack of well-defined property rights over land, instead land-use rights are distributed at the local level in a fairly uniform basis with varying degrees of difficulty to reallocate/adjust operational scales.

   The resulting pattern is one where land is not allocated to best uses, leading to small farm sizes, misallocation of other factor inputs and potentially also preventing the adoption of best practices and investment in farm operation.

   The best evidence points to substantial factor misallocation with substantial negative consequences for aggregate agricultural productivity in poor and developing countries.

9. I will show two examples. One comes from excellent micro data from the World Bank on Malawi, where land institutions fit the broad pattern described above. Here, I am showing the resulting pattern of land in each farm against the farm TFP (productivity), blue dots. The red line shows the efficient land allocation (one that maximizes output given aggregate resources). The resulting pattern is one where land does not relate systematically to productivity. This is a dramatic pattern that would be difficult to find in other contexts. But at the same time, given the context of the land institutions I just described, this is the pattern that is expected. I note that there are two types of misallocation in this figure, misallocation across different farm TFP and within farm TFP. The consequences for aggregate agricultural productivity are very large, on the order of a factor of 3.6-fold.

10. The other interesting context is China where the land market institutions are entangled with severe restrictions to migration across space. The resulting pattern of misallocation is similar, although in China we see more of the misallocation within farm TFP suggesting that migration restrictions may serve as an additional source of misallocation. The other interesting aspect is that the data from China is a panel of about 10 years and one of the findings of that is that despite reforms in other sectors, land market institutions have remained essentially the same

and so is the resulting misallocation in the data over time.

11. I want to emphasize that the pattern of distortions that emerges from the data is of severe misallocation. We can summarize the distortions facing farmers as an output distortion (which is a weighted average of distortions to land and capital for example) and are typically proportional to what is referred to as revenue productivity or TFPR. An efficient allocation in the context of the framework I described would imply no dispersion in TFPR. What you see is substantial dispersion in revenue productivity and systematically related to TPF, the correlation between distortions and productivity is almost 90 percent, which means that the more productive farmers face the more severe distortions.

12. To show that this represents much larger distortions in agriculture. Take for example the distribution of productivities in US manufacturing from HK. If you take US distortions and China/India distortions in manufacturing from HK, then the relative gain from reallocation is 1.3 fold. If you instead apply the China distortions in agriculture the relative gain is 4 fold. So much larger distortions in agriculture.

    The pattern that distortions are correlated with productivity is more severe in agriculture but is perversive in poor countries and sectors, and this pattern is key for understanding the broader implications of misallocation on productivity.

13. The second exception to the general pattern of small quantitative effects of misallocation from specific policies is when instead of focusing on the big variation in productivity across countries, the focus is on assessing the productivity impact of changes in policies/institutions over time. Often the resulting effects can account for the bulk of observed changes in the data. Here I selected a couple of examples from the literature using micro data and either a quantitative model or empirical strategy to assess the impact of the reforms on the change in aggregate productivity: a comprehensive land reform in the Philippines capping farm sizes and a comprehensive trade reform in Chile.

14. The last key issue on the misallocation literature is to study of the broader consequences of misallocation. The early misallocation analysis assumed a fixed productivity distribution constant across countries and study the quantitative impact of factor misallocation. But the key insight of the current work on misallocation is that the policies/institutions causing misallocation can generate larger effects on aggregate productivity by altering the productivity distribution of micro units in the economy via technology and selection channels.

    This is important because the evidence is that the distribution of A's differs substantially across countries. For example, micro and aggregate data for the manufacturing sector in China/India and the US suggests that TFP is roughly decomposed as 1/4 coming from misallocation, 1/4 from selection and 1/2 from technology suggesting both selection and technology shifts are needed to account for the data.

15. Some illustrative examples of work that connects policies/institutions generating misallocation with effects also on selection and hence on the productivity distribution include: First is the role of financial development affecting not only capital misallocation but also the occupation choice of entrepreneurs, reducing the mass of productive entrepreneurs and increasing the mass of less productive entrepreneurs, shifting the productivity distribution. Second, is work that emphasizes the land market institutions that affect misallocation as discussed earlier but also potentially the sector choice of individuals. Implicitly or explicitly in these examples is the fact that the distortions affect occupational choices of the more productive producers so the negative effects on productivity are strong due to selection.

16. Other examples emphasize the connection of misallocation with effects on technology (the distribution of potential micro productivities). Intuitively, if distortions penalize the most productive producers, in a dynamic setting distortions then reduce the return to adopting the most productive technologies or productivity investment by establishments.

    There is recent work by Ayerst emphasizing the effect of idiosyncratic distortions on technology

adoption lags across countries. There is also several works emphasizing the effect of distortions on productivity investment: for example the investment of entrepreneurs on their managerial ability or human capital, or the life cycle investment of plants in their productivity and hence size.

17. I discuss one such a framework, a standard monopolistic competition framework building on Hsieh and Klenow augmented to include endogenous entry of establishments and entry level and life cycle productivity of establishments. The main emphasis is on the productivity implications for differences in the correlation of distortions with productivity. Here I focus on two opposing cases, the US where this correlation is small and India, where the correlation is high. Key insights from this work include. First, distortions have a large negative impact on establishment size, which is consistent in quantitative magnitude with what is found empirically. Second, correlated distortions affect negatively investment on productivity both upon entry and during the life cycle of establishments, this second effect consistent with the patterns documented by HK on the life cycle productivity of plants in India vs the US. Third, in terms of amplification effect on income, the effect of correlated distortions on the productivity distribution has the largest effects through misallocation (standard channel) and on entry investment which is a shift in the mean of the productivity distribution. The effect on life cycle growth has negligible effect on income. This suggests that going forward the more likely channels accounting for productivity gaps across countries involve effects via selection and shifts in mean productivity as a technology channel.

18. Productivity at the core of cross-country differences in economic structure, structural change, and aggregate outcomes. Misallocation quantitatively important in accounting for productivity differences but...

    ...although identifying the source of misallocation is essential for policy analysis, there is not a single source of misallocation that can account for the bulk of differences.

Current work shows an important link between misallocation and technology/selection channels in accounting for productivity differences. I believe this is an essential area for further work.