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## *Comment*

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The idea that an important source of cross-country differences in income is related to differences in the degree of misallocation across countries has core appeal to economists. After all, economic efficiency is all about the nature and extent to which resources are allocated to their highest-valued use. The basic premise in the paper by Alfaro, Charlton, and Kanczuk is that in well-functioning economies such as the United States the size distribution of activity largely reflects an efficient allocation of resources. For the core models of the size distribution of activity in the literature,<sup>1</sup> the key implication is that in efficient economies, firms (and establishments) are large because they are the most productive. However, in low income per capita countries, the working conjecture in this paper is that the allocation of resources across firms is distorted.

Specifically, the authors explore the implications of recent models that idiosyncratic distortions to the scale of activity in a country will distort the size-productivity relationship. In this respect, this paper fits into a growing literature seeking to understand the extent of such misallocation.<sup>2</sup> While I am very sympathetic to this line of argument, I have a number of concerns about the identification approach used in this paper. The concerns reflect both conceptual issues and related concerns on whether the data used are sufficient for this identification.

Before I proceed to my concerns, it is useful to emphasize the various facets of the analysis that I think are on the right track. For one, there is substantial evidence that there is substantial productivity heterogeneity within industries. The results in Syverson (2004) suggest that the inter-quartile range for measured revenue-based total factor productivity within narrowly defined sectors is around 30 log points.<sup>3</sup> In addition, the results in the literature show that there is considerable dispersion and skewness in the size distribution of activity within sectors. These two basic facts offer considerable scope for misallocation to play a role.

In addition, I think the evidence strongly suggests that modeling the curvature of the profit function via product differentiation is appropriate. There is considerable evidence that within sectors there is substantial dispersion not only in physical total factor productivity but also in establishment-level prices. Moreover, these are related in the manner implied by the type of product differentiation used in the model in this paper: high physical productivity producers have lower prices consistent with the implication that high productivity yields lower marginal costs and plants facing downward demand schedules move down their demand schedule.<sup>4</sup> In addition, I think the evidence is accumulating that it is useful to characterize market distortions as having an idiosyncratic component (see, e.g., Hallward-Driemeir and Helppie 2007).

For my concerns, it is useful to summarize briefly the identification approach in this paper. Identification of distortions in this paper is achieved by exploiting differences in the shape of the size distribution of establishments across countries. Using establishment-level data from the Dun & Bradstreet (D&B) WorldBase data set, Alfaro et al. construct histograms of the size distribution of establishments in each of their countries. Using a model similar to those developed in the recent literature, they argue that misallocation distortions will distort the shape of the size distribution of establishments. Their identification starts with the assumption that the United States is a nondistorted economy so that the shape of the size distribution in the United States is the nondistorted benchmark. Using their model, they identify the distribution of distortions (literally the minimum distribution of distortions) that can account for the difference between the shape of the distribution for a given country and for the United States. Using this identification strategy, they find evidence that there are substantial differences in the distribution of idiosyncratic distortions across countries. Taken at face value, these differences in the distribution of distortions across countries account for a substantial fraction of differences in productivity and income differences across countries.

For these results to be credible there are three key requirements. First, there must be a tight relationship between the shape of the size distribution and the distribution of distortions. Second, there must be no omitted variables affecting the empirical variation in the size distribution across countries. Third, the data on the shape of the size distributions must be measured accurately. Unfortunately, I think that there are substantial concerns on each of these requirements as discussed in detail below.

In the authors' model, the only source of heterogeneity across establishments within a country (in the nondistorted version of the model) is heterogeneity in productivity. Given the differentiated product structure

of the model, the most productive establishments will be larger and the size distribution determined by the interaction of the curvature of the profit function and the distribution of underlying productivity. Adding a distribution of distortions has an impact on potentially several margins in the type of model considered. Relevant margins affected include the fraction and mix of establishments that survive, the relationship between size and productivity, the distribution of physical productivity (physical output per unit of input), the distribution of revenue productivity (revenue per unit of input), and the capital-labor mix. As discussed in the literature, all these margins may be affected and all are potentially relevant for differences in aggregate productivity, income per worker, and consumption across countries.<sup>5</sup>

In this paper, the authors focus on only one margin—the shape of the size distribution. It is unclear whether this is the most relevant margin affected, and there is no persuasive case made that this is a sufficient statistic to capture the distribution of distortions. This margin was selected primarily because of data limitations. The Worldbase D&B database has limited information on productivity (physical or revenue) or on market selection. It can, however, be used to quantify the size distribution of employment. The problem is that many other margins may be affected depending on the structure of the economy and the nature of distortions. It could easily be the case that a country is identified as having relatively small distortions because the size distribution is not much affected but in fact has very large distortions since other relevant margins are affected by the distortions.

Another problem with the identification strategy is that in terms of taking the model to the data, there are potentially many omitted variables that are not taken into account in using cross-country variation in the size distribution of employment. There is a large literature on the determinants of the size distribution of activity (see, e.g., Sutton 1997), and while productivity heterogeneity is one source of variation in the size distribution, many other factors are relevant as well and are not taken into account. At the most basic level, differences across industries including technology, minimum efficient scale, overhead labor, and sunk costs all yield differences in the size distribution. In addition, market structure issues including the size of the market, the distribution of idiosyncratic demand shocks, the nature of transactions costs, contracting issues, input costs, advertising, and the role of R&D affect within- and between-industry differences in the size distribution. As just an example of the relative importance of factors other than productivity heterogeneity, Foster et al. (2008) found that, within narrowly defined sectors, idiosyncratic

demand shocks account for 62% of the variation in size across establishments. All these different factors can potentially be viewed as omitted variables to the extent that they vary across countries. Obvious differences across countries included differences in the industry mix and scale of the market, so not controlling for these factors alone raises questions about the identification. The authors have some robustness analysis on these dimensions but with only limited variation in the factors that might differ across industries. Put differently, the number of factors that potentially underlie the size distribution of establishments is large relative to the number of factors that they hold constant in their analysis.

Now turning to the D&B WorldBase data, I also have some concerns about whether D&B data accurately capture the size distribution of activity for establishments and firms. While the D&B data have many valuable uses, it is not clear that the data adequately represent the size distribution of activity across countries. The coverage in the United States looks reasonably good, although D&B is missing 3 million out of 7 million of the U.S. establishments in any given year. Of even more concern is the extent to which D&B has a representative distribution of small establishments in the emerging and transition economies. The authors recognize this concern and explore robustness checks. In particular, in their benchmark exercise they use establishments only with at least 20 employees in all countries. Moreover, they require at least 10 observations in each country. They then check their results for restricted samples with only large numbers of observations. While these are useful robustness checks, they are not convincing without comparison to alternative more reliable sources of evidence on the nature of the size variation across countries. There are data limitations here, but as discussed below, there are sources of information about the size distribution from arguably more reliable sources for a substantial number of countries.

Contributing to these concerns are the patterns depicted in figures 2 and 3. Alfaro et al. find that both average establishment size and the employment-weighted average establishment size (the coworker mean) fall with income per capita. If this pattern is correct, it is interesting, but alternatively this pattern is consistent with precisely the type of measurement error that is of concern (i.e., in poor countries, only large establishments are likely to be in the D&B data). Also, there is evidence from other sources that raises questions about this pattern. Table 3 of Bartelsman, Haltiwanger, and Scarpetta (2009) presents statistics on the size distribution of firms across countries from a sample of 24 countries ranging from industrial economies to emerging and transition economies. The

advantage of the statistics reported in their paper is that they are derived from the business registers of countries administered by the statistical agencies. As such, the coverage is inherently better than that of D&B (e.g., the U.S. business register is the source from which we know there are about 7 million establishments in the United States in any given year with at least one paid employee). The findings in Bartelsman et al.'s table 3 show that the United States has a lower share of employment in small firms than most other industrial economies as well as Latin American economies. While more systematic analysis is called for, this latter pattern is at least suggestive that the United States (a high income per capita country) has a lower share of employment in small businesses than lower income per capita countries, in other words, the opposite pattern of that depicted in figures 2 and 3. Moreover, even though the evidence is only suggestive, since the United States is the benchmark economy in the analysis, this raises related questions about how reliable the D&B data are in making comparisons of the size distribution for the United States relative to other countries. Note that in Bartelsman et al.'s table 3 there are some low income per capita transition economies (including Hungary, Slovenia, and Romania) with the share of employment at small firms about the same as or smaller than that for the United States. This latter pattern is interesting since it indicates that the distortions in the transition economies likely differ from others given the prevalence of large, state-owned enterprises in the former centrally planned economies. But then this suggests that the nature of distortions may differ substantially between transition economies and emerging economies.

To sum up, the basic premise in Alfaro et al.'s paper has considerable appeal. The premise is that cross-country differences in productivity are associated with cross-country differences in the degree of misallocation. This paper explores the potential importance of such misallocation. Moreover, the paper identifies the misallocation using a novel approach to identifying distortions through variation in the size distribution of activity across countries. While I think that this is a useful exploration, at the end of the day I am not convinced that this identification strategy works in practice. Part of the problem is conceptual: the size distribution of activity will be affected by distortions, but so will many other margins. Put differently, moments of the size distribution of activity are likely important but not sufficient statistics to identify the distribution of distortions across countries. In addition, the data requirements for this approach are substantial, and I am not convinced that the data used provide an adequate representation of the variation in the size distribution across countries.

## Endnotes

1. See Lucas (1978), where the size distribution emerges from productivity heterogeneity in the presence of decreasing returns, or more recent incarnations in which the curvature in the profit function derives from product differentiation as in Melitz (2003).
2. Other recent papers include Restuccia and Rogerson (2007), Bartelsman, Haltiwanger, and Scarpetta (2008), and Hsieh and Klenow (2009).
3. The Syverson (2004) evidence reflects dispersion in revenue per unit of input and thus includes variation in prices across establishments within the same narrowly defined sector.
4. See Foster, Haltiwanger, and Syverson (2008) for evidence on physical productivity dispersion and the relationship to plant-level prices.
5. See Restuccia and Rogerson (2007), Bartelsman et al. (2008), and Hsieh and Klenow (2009) for a discussion of the full range of margins that may be affected by distortions in this setting.

## References

- Bartelsman, Eric J., John Haltiwanger, and Stefano Scarpetta. 2008. "Cross-Country Differences in Productivity: The Role of Allocative Efficiency." Unpublished manuscript, University of Maryland.
- . 2009. "Measuring and Analyzing Cross-Country Differences in Firm Dynamics." In *Producer Dynamics: New Evidence from Micro Data*, ed. Timothy Dunne, J. Bradford Jensen, and Mark J. Roberts. Chicago: University of Chicago Press (for NBER).
- Foster, Lucia, John Haltiwanger, and Chad Syverson. 2008. "Reallocation, Firm Turnover, and Efficiency: Selection on Productivity or Profitability?" *American Economic Review* 98 (March): 394–425.
- Hallward-Driemeir, Mary, and Brooke Helppie. 2007. "Why Don't Firms Take Advantage of More Flexible Labor Options? Regulation, Enforcement and Corruption." Unpublished manuscript, World Bank, Washington, DC.
- Hsieh, Chang-Tai, and Peter J. Klenow. 2009. "Misallocation and Manufacturing Productivity in China and India." *Quarterly Journal of Economics*, forthcoming.
- Lucas, Robert E. 1978. "On the Size Distribution of Business Firms." *Bell Journal of Economics* 9, no. 2:508–23.
- Melitz, Marc J. 2003. "The Impact of Trade on Intra-industry Reallocations and Aggregate Industry Productivity." *Econometrica* 71:1695–1725.
- Restuccia, Diego, and Richard Rogerson. 2007. "Policy Distortions and Aggregate Productivity with Heterogeneous Plants." Working Paper no. 13018, NBER, Cambridge, MA.
- Sutton, John. 1997. "Gibrat's Legacy." *Journal of Economic Literature* 35:40–59.
- Syverson, Chad. 2004. "Substitutability and Productivity Dispersion." *Review of Economics and Statistics* 86, no. 2:534–50.