Productivity Dispersion and Measurement Errors

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It is widely accepted that dispersion of productivity across establishments and industries is large. A common way to measure dispersion is by looking at the standard deviation across establishments where the productivity of each establishment is measured relative to a reference point, such as the mean productivity level at a given point in time. Using this procedure, it is typically found that the standard deviation across establishments is large and typically lies in the range of 30 to 100 per cent, see Bartelsman and Wolf (2017).

Several reasons have been put forward to explain this large dispersion in productivity: quality of management (Bloom and Van Reenen, 2010), different input usage, as the intensity of R&D or other intangible capital (Crepon et al., 1998), product substitutability (Syverson, 2004), product market rivalry (Bloom et al., 2013), or market distortions (Hsieh and Klenow, 2009), to name a few. Although it is acknowledged that a sizable portion of productivity dispersion may also be due to measurement errors, little research has been devoted to identify how much they actually contribute.

In this paper, we outline a novel procedure to identify the role of measurement errors in explaining the empirical dispersion in productivity across establishments. The starting point is the typical errors-in-variable framework consisting of a measurement equation and a structural equation for the true productivity. The key idea in our identification strategy is to estimate the variance of the measurement errors in a consistent way such that we can deduce the variance of the companion true variable. To this end we build on the econometric theory of measurement errors, see e.g. Meijer et al. (2017). Specifically, we estimate a dynamic panel model where the log of establishment- specific productivity is modelled as an autoregressive process augmented with time dummies and establishment-specific unobserved heterogeneity, represented by random effects. To get the results on a form that are comparable with earlier studies, we deduced the (model-based) standard deviation of the log of productivity scaled by a geometric mean of the

productivity of the establishments that are present in a given time period. Such a calculation is done both for the variable contaminated by measurement errors and for the true variable. Our findings indicate that only about 4 per cent of measured dispersion in productivity is caused by measurement error.