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Offshore Profit Shifting and Domestic Productivity Measurement

Fatih Guvenen, University of Minnesota, FRB of Minneapolis, NBER, guvenen@umn.edu
Raymond J. Mataloni, Jr., Bureau of Economic Analysis, raymond.mataloni@bea.gov
Dylan G. Rassier, Bureau of Economic Analysis, dylan.rassier@bea.gov
Kim J. Ruhl, Pennsylvania State University, kjr42@psu.edu

The recent slowdown in U.S. productivity growth since 2004 has generated widespread concern about growth prospects for the U.S. economy. U.S. labor productivity growth fell from 2.2 percent per year in 2000-2004 to 0.6 percent per year in 2004-2007 and 0.9 percent per year in 2007-2011 (Fernald 2014). According to official statistics, the slowdown has taken place primarily in industries that either produce or use information technology (IT) services intensively. These findings have raised skepticism among some economists, who point to major innovative products and technologies introduced in recent decades, and conjecture that the appearance of a slowdown might be caused by mismeasurement. Recent literature addressing productivity measurement focuses mainly on official price indices as a source of mismeasurement. For the productivity growth to be biased, however, mismeasurement alone is not sufficient; the problem must be worsening over time, which is a harder fact to establish. While the jury is still out, the recent studies generally find modest effects from mismeasurement.[1]

In this paper, we study another potential source of mismeasurement—one often acknowledged but one not investigated thoroughly in the existing literature. This mismeasurement arises from the increasing offshore profit shifting by domestic and foreign multinational enterprises (MNEs) operating in the U.S. Moving profits out of the U.S. may understate gross domestic product (GDP) in official statistics, yielding a slowdown in GDP growth and related aggregate productivity growth.

To explain the source of mismeasurement and why it has worsened over time, we begin with two facts. First, the total economic activity generated by MNEs is very large and has grown significantly in the last 20 years. Global value-added of U.S. MNEs was almost $4.7 trillion in 2012, making them equivalent to the fourth largest economy in the world, tied with Japan and trailing only the United States, the European Union, and China. In addition, earnings on U.S. direct investment abroad (USDIA) averaged less than one percent of U.S. GDP from 1973 to 2000 but grew to approximately 3 percent of GDP by 2012. Second, MNEs engage in significant research and development (R&D) and own significant stocks of resulting intangible capital (e.g., intellectual property, blueprints, brands, etc.). R&D expenditures of U.S. MNEs in 2012 were $232 billion, accounting for 77 percent of the $302 billion for the entire U.S. economy. MNEs also have access to countries that vary widely in corporate tax rates, which enables MNEs to take advantage of differences in national tax regimes to shift profits from high tax jurisdictions, such as the United States, to low tax jurisdictions, such as Bermuda, through transfer pricing and complex global structuring, which Sanchirico (2015) describes as "unsoundably elaborate and only rarely publicly visible" (page 210). These strategies have generated concern among official statistics compilers

[1] For example, Brynjolfsson and McAfee (2011), Byrne, Oliner and Sichel (2015), and Mokyr (2014) have explored measurement error in productivity. Byrne, Fernald, and Reinsdorf (2016) and Syverson (2016) argue that it is unlikely that measurement error is large enough to account for the productivity slowdown.

and users of official statistics regarding the treatment of transactions within MNEs and their effects on national statistics.[2]

In national accounting, actual payments made by an affiliate to a parent for the use or purchase of intangible capital should be captured as an export in expenditure-based GDP. These are explicit returns to the parent for the use of its intangible capital. An MNE shifts profits abroad when the affiliate pays only a part of the total return to intangible capital owed to the parent. The part of the return on intangible capital that is not explicitly paid to the parent is measured in the earnings (revenues minus expenditures) of the affiliate—the earnings for foreign affiliates of U.S. parents are part of income on USDIA in the U.S. national accounts. The analog to earnings on USDIA is earnings on foreign direct investment in the United States (FDIUS)—earnings by U.S. affiliates of foreign MNEs. These flows are a part of the difference between GDP and gross national product (GNP): GNP = GDP + earnings on USDIA − earnings on FDIUS + · · · .[3] When MNEs shift profits and the shifted profits are reflected in source data, some of the return on the U.S. share of intangible capital may be recorded as foreign earnings instead of domestic earnings. Thus, we reattribute earnings on direct investment across the entities of the MNE. The additional earnings attributed to U.S. parents on USDIA or U.S. affiliates on FDIUS imply an increase in domestic business sector value-added for understated payments on intangible capital for USDIA and for overstated payments for FDIUS, which may increase measured productivity growth.[4]

The goal of the paper is to obtain a more accurate measure of U.S. domestic productivity growth by correcting for mismeasurement in value-added introduced by intangible capital belonging to MNEs. For this purpose, we use confidential data collected by the Bureau of Economic Analysis (BEA) on MNEs covering the period 1982 to 2014. The survey data cover the worldwide operations of U.S. MNEs and contains information on their employment, sales, and R&D expenditures, among other key measures. We also use annual data for transactions in income on direct investment published by BEA in the International Transactions Accounts (ITAs) for 1982 to 2014. While these data allow us to examine the effects of profit shifting of U.S. MNEs, foreign MNEs are also likely to be shifting profits out of the United States for some of the same tax reasons, biasing measured U.S. production further downward. The BEA survey data cover the U.S. affiliates of foreign MNEs, but they do not cover their foreign parent operations. Without the latter piece, determining the profit shifting of foreign MNEs with the BEA survey data alone is impossible. Thus, we combine data from a commercial database to construct a preliminary data set on the largest foreign MNEs with operations in the United States to begin to estimate their contribution to mismeasurement.

Using the data described above, we reattribute earnings on direct investment among U.S. parents and their foreign affiliates and foreign parents and their U.S. affiliates based on factors that reflect economic activity under a method of formulary apportionment. In particular, the total worldwide earnings of MNEs are attributed to locations based on apportionment factors that aim to capture the true location of economic activity. We consider labor compensation and sales to unaffiliated parties as

[2] See, for example, Lipsey (2010), Rassier (forthcoming), and United Nations, Eurostat and Organisation for Economic Cooperation and Development (2011).

[3] The complete difference between GDP and GNP is accounted for by income and interest on direct investment, portfolio investment, and other investment.

[4] While the advantages of treating intangible capital in national accounts as capital formation rather than current expenditures has been promoted in academic literature – see, for example, Corrado, Hulten, and Sichel (2009) and McGrattan and Prescott (2010) – the treatment of returns to intangible capital has not been controversial.

apportionment factors, as they are likely to reflect real production taking place at a location. Given our interest in intangible capital, we also consider R&D expenditures as an apportionment factor.

We use the results of formulary apportionment to compute an adjusted measure of domestic business sector value-added and labor productivity growth for the United States for 1973-2014. Since aggregate earnings by MNEs are disproportionately booked to low tax jurisdictions with little real economic activity, our adjustments reattribute earnings toward the United States, thereby increasing measured value-added and labor productivity growth for the United States.

Formulary apportionment has been primarily applied in multijurisdictional tax practice. The treatment of global income under formulary apportionment is widely explored in multidisciplinary research, and formulary apportionment has been proposed as an alternative to the complexity and subjectivity of transfer prices for the allocation of international tax obligations within multinationals.[5] However, formulary apportionment also presents some challenges from a tax policy perspective.[6] To the extent that MNEs do not make operating or investment decisions based on surveys intended solely for statistical purposes, formulary apportionment applied in economic accounting faces fewer challenges compared to its use in international taxation.

Our approach follows Rassier and Koncz-Bruner (2015), which proposes formulary apportionment as an alternative measurement method for attributing the profits component of income-based value-added measures to foreign affiliates of U.S. MNEs. The formulary adjustments reduce distortions created by excess profits attributed to tax haven countries (Lipsey 2010). Rassier (2015) treats the reduction in earnings on USDIA under formulary apportionment as an implied increase in U.S. GDP, which is a necessary counterpart to the related increase in domestic income. However, the author does not construct a time series of adjusted business sector value-added and does not consider consequences for productivity measurement or focus on R&D and IT intensive industries.

Our adjustments raise U.S. business sector value-added by less than 0.5 percent per year from 1973 to the late 1990s, but starting in the 2000s, the mismeasurement problem and, therefore, the resulting adjustments grow rapidly. By 2010, the adjustment increases value-added by more than 2.5 percent per year. When we group industries by R&D intensity, the adjustments to R&D intensive industries are as high as 8.0 percent of the group's value-added in 2008. The effects of these adjustments on growth can be substantial: the annual productivity growth rate from 2000-2008 is 0.6 percent higher in R&D intensive industries after the adjustment. Nevertheless, the overall effect on aggregate productivity growth since 2004 remains modest because our adjustments increase productivity growth not only during the slowdown but also during the period of rapid productivity growth (i.e., 1994-2004). The accompanying figure presents preliminary unadjusted and adjusted cumulative labor productivity growth series for 1994-2014 since our adjustments make the biggest difference starting in 1994.

[5] See, for example, Avi-Yonah (2010) and Fuest, Hemmelgarn, and Ramb (2007).
[6] See, for example, Altshuler and Grubert (2010), Gresik (2001), and Hines (2010).

References

Altshuler, Rosanne and Harry Grubert. 2010. Formula Apportionment: Is it better than the Current System and Are there better Alternatives? *National Tax Journal*, 63(4), pp. 1145-1184.

Avi-Yonah, Reuven S. 2010. Between Formulary Apportionment and the OECD Guidelines: A Proposal for Reconciliation. *World Tax Journal*, 2(1), pp. 3-18.

Bloom, Nicholas, Raffaella Sadun, and John Van Reenen. 2012. Americans do IT Better: U.S. Multinationals and the Productivity Miracle. *American Economic Review*, 102(1), pp. 167-201.

Brynjolfsson, Erik and Andrew McAfee. 2011. *Race against the Machine: How the Digital Revolution is Accelerating Innovation, Driving Productivity, and Irreversibly Transforming Employment and the Economy*. Lexington, MA: Digital Frontier Press.

Byrne, David M., John G. Fernald, and Marshall B. Reinsdorf. 2016. Does the United States have a Productivity Slowdown or a Measurement Problem? Brookings Paper on Economic Activity, March 10-11.

———————, Stephen D. Oliner, and Daniel E. Sichel. 2015. How Fast are Semiconductor Prices Falling? NBER Working Paper No. 21074.

Corrado, Carol, Charles Hulten, and Daniel Sichel. 2009. Intangible Capital and U.S. Economic Growth. *Review of Income and Wealth*, 55(3), pp. 661-685.

Fernald, John. 2014. Productivity and Potential Output Before, During, and After the Great Recession. NBER Working Paper No. 20248.

Fuest, Clemens, Thomas Hemmelgarn and Fred Ramb. 2007. How Would the Introduction of an EU-Wide Formula Apportionment Affect the Distribution and Size of the Corporate Tax Base? *International Tax and Public Finance*, 14(5), pp. 605-626.

Gresik, Thomas A. 2001. The Taxing Task of Taxing Transnationals. *Journal of Economic Literature*, 39(3), pp. 800-838.

Hines, James R. 2010. Income Misattribution under Formula Apportionment. *European Economic Review*, 54(1), pp. 108-120.

Lipsey, Robert E. 2010. Measuring the Location of Production in a World of Intangible Productive Assets, FDI, and Intrafirm Trade. *Review of Income and Wealth*, 56(1), pp. S99-S110.

McGrattan, Ellen R. and Edward C. Prescott. 2010. Technology Capital and the US Current Account. *American Economic Review*, 100(4), pp. 1493-1522.

Mokyr, Joel. 2014. "Secular Stagnation? Not in Your Life" in *Secular Stagnation: Facts, Causes and Cures*, Coen Teulings and Richard Baldwin, eds. London: CEPR Press.

Rassier, Dylan G. Forthcoming. Improving the *SNA* Treatment of Multinational Enterprises. *Review of Income and Wealth*.

———————. 2015. Formulary Measures for the U.S. Current Account: Accounting for Transactions Attributable to Special Purpose Entities of Multinational Enterprises. *Journal of Economic and Social Measurement*, 39(4), pp. 257-281.

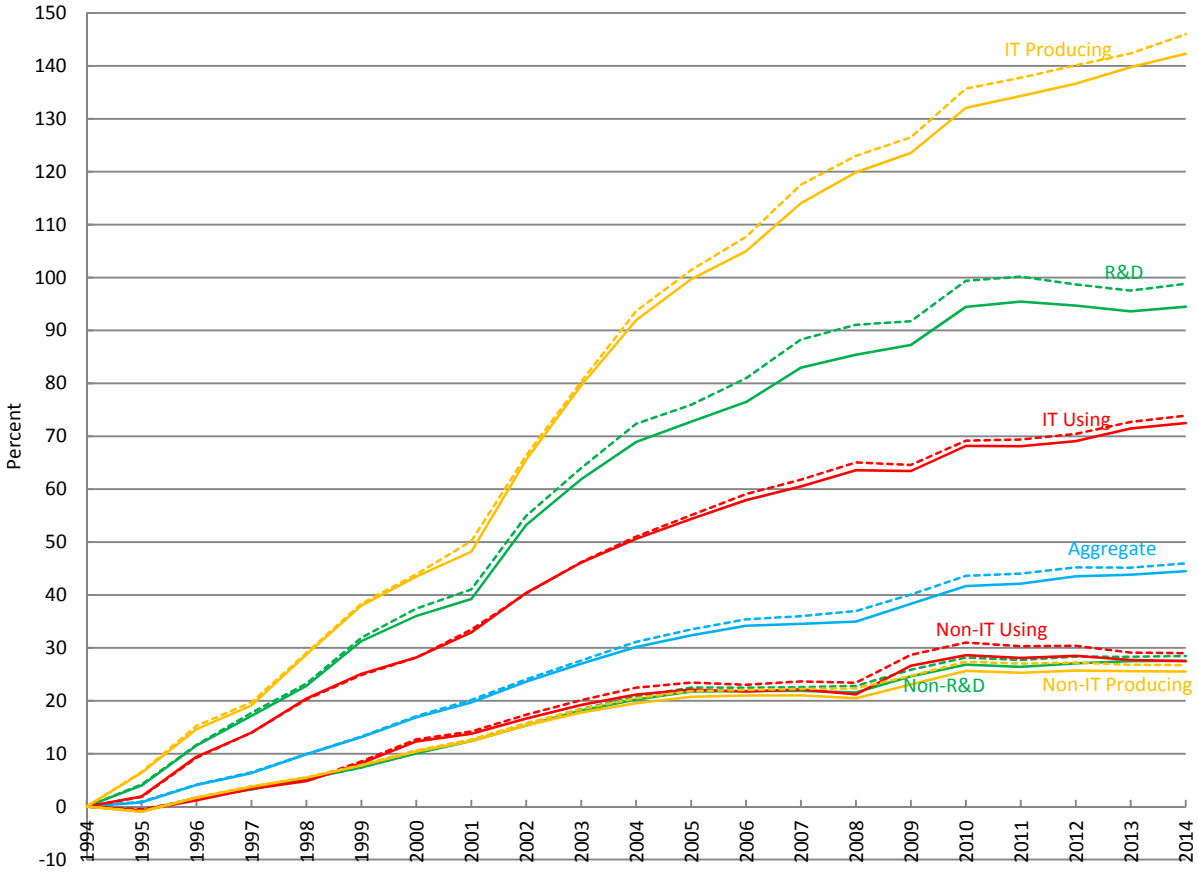
——————— and Jennifer Koncz-Bruner. 2015. "A Formulary Approach for Attributing Measured Production to Foreign Affiliates of U.S. Parents" in *Measuring Globalization: Better Trade Statistics for Better Policy*, Susan N. Houseman and Michael Mandel, eds. W.E. Upjohn Institute for Employment Research.

Sanchirico, Chris William. 2015. As American as Apple Inc.: International Tax and Ownership Nationality. *Tax Law Review*, 68(2), pp. 207-274.

Syverson, Chad. 2016. Challenges to Mismeasurement Explanations for the U.S. Productivity Slowdown. NBER Working Paper No. 21974.

United Nations; Eurostat; and Organisation for Economic Co-operation and Development. 2011. *The Impact of Globalization on National Accounts*. New York and Geneva: United Nations.

Figure: Unadjusted and Adjusted Cumulative Labor Productivity Growth, 1994-2014



Source: Authors' calculations using BEA survey data on USDIA, BEA published data on business sector value-added, and data on employment hours published by the Bureau of Labor Statistics.

Note: Solid series present unadjusted cumulative labor productivity growth. Dashed series present cumulative labor productivity growth with adjustments for income on USDIA. Adjustments for income on FDIUS are not included. Blue reflects the U.S. aggregate. Green reflects R&D and non-R&D industries determined by ratios of R&D expenditures to unaffiliated sales. Yellow reflects IT- and non-IT-producing industries as defined in Fernald (2014). Red reflects IT- and non-IT-using industries as defined in Bloom, Sadun, and Reenen (2012).