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Imputing Away the Ladder: Implications of Changes in National Accounting Standards for Assessing Inter-country Inequalities¹

Jacob Assa and Ingrid H. Kvangraven***

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Abstract

Over the last half century, a large literature has developed on both the nature and the drivers of uneven development. While different methodologies and theoretical approaches to the issue of convergence abound, the use of GDP growth as a measure of economic growth has, remarkably, gone unquestioned. This paper reviews the convergence debates to date, and examines what the changes to the System of National Accounts (SNA) - the international standard for constructing macroeconomic indicators such as GDP - imply for assessing economic convergence. The 1993 and 2008 revisions to the SNA include several major changes to how production is measured - including the reclassification of financial intermediation services, R&D, weapons systems and owner-occupied dwellings as productive activities - all areas in which developed countries have had an advantage in recent decades. We argue that these changes to the production boundary constitute a form of ‘kicking away the ladder,’ i.e. redefining the yardstick of development to fit the new strengths of developed economies. We analyze data series for a range of countries concurrently available under the 1968 SNA, 1993 SNA and 2008 SNA standards. The earlier measure shows a larger and faster convergence of most countries in ‘the Rest’ with those of ‘the West’. Going a step further, we build on Basu and Foley’s (2013) Measured Value-Added concept as a proxy of ‘Core GDP’. This indicator omits any sector for which value-added is imputed based on net incomes, in the absence of an independent measure of output. This allows us to examine more countries and a longer, more consistent time series than concurrent SNA data, but the conclusions are the same - developing countries have caught up more in Core-GDP terms than the contemporary imputation-heavy measure of GDP would suggest. These findings suggest that the current measure of GDP has become decoupled from core employment-generating activities, and is therefore a misleading measure of growth in an economy. Furthermore, it is inconsistent with the understanding the Sustainable Development Goals of inclusive and sustainable growth. Finally, the paper considers the political economy implications of the changes in GDP methodology, such as the justification of voting shares in international financial institutions, epistemological consequences, and domestic political economy considerations.

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1. Introduction

The 2007-8 global financial crisis and the ensuing Great Recession in many countries came as a surprise to most economists, leading to much soul-searching in both academia and policy-making circles. Some aspects of this intellectual crisis focused on analytical failures, as it turned out that most economic models left out private debt, banking and the wider financial sector (Bezemer 2010), and were thus *incapable* of foreseeing the crisis (see also Galbraith 2009). Other critiques focused on leading economic indicators such as Gross Domestic Product (GDP), which were likewise trending upwards until the very precipice of disaster (e.g. Basu and Foley 2013, Assa 2017). Despite emerging critique of GDP as an economic indicator, as well as widespread critique of GDP as an indicator of wellbeing (see e.g. Folbre 2015, Wesselink et al. 2007), GDP remains the most used and most respected accounting measure (see e.g. Seers 1972, van der Bergh and Verbruggen 2009, Jerven 2012b, Felice 2015).

The emerging interest in the shortcomings of the main economic indicator are not surprising, given that public data is known to affect how we perceive reality (Seers 1972, 1976). An interesting paradox in the social sciences and humanities is that GDP sometimes is considered ‘data’ in the sense that it is taken as given, and other times it is considered the product of social construction (a point also made by Assa 2018, Jerven 2012b, Austin 2008). However, to date most critiques of GDP focus on advanced countries which have achieved a certain level of high income, and seek to broaden the scope of GDP from a narrow *economic* view to a wider, well-being related framework, by questioning the measure for what it *does not* account for (such as unpaid labor, environmental degradation, happiness, development, freedom, welfare), rather than what it *does* measure. In fact, in the development literature, GDP is often considered to at least be ‘constrained by a consistent economic theory,’ in contrast to some of the measures that try to incorporate social and environmental goals into a broader measure of social and economic wellbeing (Felice 2015: 2). However, economic theory has had only a weak influence on the development of national accounting in general and GDP in particular (Bos 1995, Mitra-Khan 2011, Assa 2018).

Another problem with the recent cottage-industry of books critiquing GDP is their focus on the most recent measure, with only passing references to the 350-year history of national accounting. Treating GDP as a *deus-ex-machina* gives the appearance that we are confronting the imperfect yet logical conclusion of a natural process of refinement (referred to as the Whig Interpretation of History, Butterfield 1931), where in fact the measurement of the income and growth of nations has been historically and geopolitically contingent from its 17th century beginnings, with critical changes in the structure and substance of the measurements at each step along the way (Assa 2015, 2016). As Seers (1972) observed more than four decades ago: GDP is not a value-neutral measure at all.

A history of national accounting is beyond the scope of this paper, and has been treated elsewhere (Assa 2015, Bos 1995, Studenski 1958, Vanoli 2005). Rather, our focus here is to look at the changes in national accounting standards from the early 1990s in the wider context of globalization, structural changes in both developed and developing countries, and global shifts in economic policy. Starting in the 1980s and accelerating since the end of the Cold War, developed countries have experienced a structural transformation, with a lot of manufacturing activities (and some services) being outsourced to lower- and middle-income countries, and an increasing share of their economic activities being concentrated in high-

end services sectors such as banking, real-estate, insurance, intellectual property, research and development, as well as production of military weapons systems.

Ha-Joon Chang argued in this 2002 book *Kicking Away the Ladder: Development Strategy in Historical Perspective*, that countries in the Global North used a variety of development policies to get to where they are, but once there, preached the opposite policies to poorer countries (similar arguments have also been made by Fine et al. 2001, Kregel 2008, Reinert 2007, Serra and Stiglitz 2008, Treichel 2013). In the statistical realm, one could see a parallel case where countries that developed based on the development of manufacturing but that are now shifting into services and other economic activities, redefine the key measure of development - GDP - to favor their new areas of specialization and move ahead of developing countries which are arguably taking over the manufacturing mantle². More concretely, in 1993 (perhaps not coincidentally right after the end of the Cold War) and then again in 2008, the standards for measuring output (and by derivation, growth) have been changed in a direction which gives more weight to sectors in which the Global North now outweighs the Global South. This change had an enormous impact on the assessment of growth both among countries in the Global North and especially in comparing countries in the Global South to countries in the Global North (kicking away the *statistical* ladder, so to speak). The changes also have implications for theoretical and empirical debates about the source of such growth (see e.g. Chandrasekhar 2018, IMF 2018).

Last but not least, changes in GDP definitions have serious real-world political economy implications. First and foremost, the appearance of success of fast growing countries can inspire other countries to imitate their policies. Depending on the measure of GDP, different countries will appear to grow faster, depending on their particular economic structure. Second, an economy's size relative to world GDP helps determine the country's voting rights in international organizations such as the World Bank and IMF, and its level of per capita GDP determines its eligibility for concessional foreign aid. Third, GDP in both level and growth enters certain sensitive ratios such as debt-to-GDP and deficit-to-GDP, which are central to political debates as well as treaties (such as the Maastricht Treaty establishing the Euro currency). Passing a certain threshold relating to these ratios can trigger the loss of policy space and the imposition of austerity policies.

After surveying the standard literature on convergence which uses GDP uncritically in Section 2, Section 3 documents in detail the changes to the System of National Accounts (SNA) in 1993 and 2008, and demonstrates through several case studies how they have contributed to moving the developmental goal post in favor of developed countries' newly-found areas of specialization. In Section 4 we construct a measure of Core GDP, based on Basu and Foley's (2013) Measured Value-Added concept. Unlike other proposed alternatives to GDP, this measure does not favor a particular sector over another for theoretical or ideological reasons (e.g. the classical political economy distinction of 'productive' vs. 'non-productive' activities). Rather, using the simple technical criterion of whether net output in a certain sector is directly measured or instead imputed from net income, Core GDP includes only the former. This measure correlates better with employment trends around the world, and is therefore more consistent with the Sustainable Development Goals (SDG) idea of inclusive and sustainable growth. It also allows us to

² This is also in line with Jerven's (2012b) observation that the way we measure economic output tends to be in line with the Eurocentrism that pervades our field.

analyze groups of countries - both by region and by income level - and revisit some of the key convergence debates in light of the shifting goal-post of GDP.

Section 5 examines the political economy implications of removing imputations from GDP, and how the relative growth of countries' Core GDP over time differs from the picture painted by the standard measure. This dramatically changes the convergence assessments of countries and regions, and also the timeline for some countries' catch-up with the economic frontier. Both these factors play a key role in informing national and international policies, since the way growth is defined affects what is considered economic success. Finally, Section 6 concludes by pointing out a way forward, both in fostering greater transparency for what goes into GDP, and more balanced reporting of growth using the Core vs. non-Core GDP measures.

2. The Differential Growth of Nations

While the question of assessing economic differences between countries dates back to the work of William Petty in the 17th century, the debates on economic convergence and the empirical question of whether they are catching up really only took off in the 1980s. Before then, the debate was more on the 'Great Divergence,' which took place roughly between 1500 and 1950, between 'the West' (Western Europe and its former settler colonies in North America and Australasia) and 'the Rest'³, in terms of income per capita (Popov and Jomo 2018). The disparity between the West and the Rest was roughly stable between the 1950s and 1970s, but it increased, on average, during the Washington Consensus era. Afterwards, it fell slightly, but in an uneven manner (WESS 2014). According to the Maddison Project (2013), the ratio between the West and the Rest rose from 1:1 in 1500 to 6:1 in 1900. The ratio remained at around 6:1 throughout the 1900s. However, if we exclude China, the ratio per capita income in the West actually increased in the 1900s (see Wade 2004).

By the 1980s, economists and econometricians started approaching the question of convergence in a variety of ways and linking the findings to different growth theories (see for example Kormendi and Meguire 1985, Baumol 1986, DeLong 1988, Grier and Tullock 1989, Barro 1991, Barro and Sala-i-Martin 1992, Mankiw, Romer, and Weil 1992, Holtz-Eakin 1993)⁴. In the neoclassical economic foundations of Solow (1956) and Swan (1956), due to diminishing returns to capital (implicit in the neoclassical production function), the rate of return to capital is large when the stock of capital is small and vice versa. Therefore, if the only difference between countries is their initial levels of capital, the neoclassical growth model predicts that poor countries with little capital will grow faster than rich countries with large capital stocks and that global economic convergence will therefore take place (this has been labeled 'absolute convergence'). However, most will recognize that there are other differences between countries besides their level of capital stock, namely levels of technology, propensities to save, and rates of population growth (see also Sala-i-Martin 1996). In this case, one will expect to observe

³ Amsden (2001). More current usage refers to the Global North vs. the Global South.

⁴ Most of these studies focus on either 'beta convergence,' which looks at the coefficient in the regression equation for growth rates, or 'sigma-convergence,' which considers the standard deviation of the average per capita incomes of countries from the world average, or both (see for example Mauer 1995).

convergence only if all of these factors are the same across countries ('conditional convergence'). Endogenous growth models contradicted the 'absolute convergence' thesis of the neoclassical convergence model, as they rely on the existence of externalities, human capital, and increasing returns, opening up the possibilities for no convergence, or even divergence (see e.g. Romer 1986, Lucas 1990, Rebelo 1990). Given that the neoclassical models predict convergence and the new growth theories do not, it was widely believed in the 1990s that by testing for convergence one would also be testing for alternative growth theories (Islam 2003). Given this connection, it is not surprising that the convergence issue has drawn the attention of many economists.

Although there has been a large number of studies on convergence since the 1980s, there is general consensus that neither unconditional or conditional convergence can be observed in a global sample of national income per capita (Islam 2003). However, there have been some forms of convergence among 'clubs' of countries. For example, in the second half of the 20th century, Korea, Taiwan, Japan, Singapore, and China have each exhibited catch-up growth and convergence with the West, although *on average* there has not been convergence between the West and the Rest. There has also been some discussion on catch-up growth and convergence related to the BRICs - Brazil, Russia, India and China - and developing economies benefiting from the commodity boom (WESS 2010), but that discussion has largely died down now that the commodity boom is over. Regardless, there are some emerging discussions about the Great Divergence potentially about to end or even reverse (e.g. Nayyar 2013, Talvi 2014, Jomo 2018), although the main consensus is still that there is no strong trend to suggest that the world will experience gradual global convergence in income levels (Popov and Jomo 2017, 2018). However, predictions of which countries will 'take off' in the future have rarely been right. No one seemed to think that South Korea or Taiwan would be the countries to catch up in 1960 (Toye 1987), just like it was widely believed that Mauritius was doomed to failure at that same time (Meade 1961), right before it went on to become Africa's success story (Subramanian and Roy 2001).

It is worth also considering what is going on beyond the averages. Most advanced countries that had industrialized in the eighteenth and nineteenth century stayed rich in the twentieth century, with a few exceptions such as Argentina (Popov and Jomo 2018). From the 1930s to 1960s, the USSR and Japan were the first major countries to achieve catch-up growth in income per capita, converging on Western countries (Popov and Jomo 2017). While the East Asian 'tigers' were converging with the West, many countries in Latin America and Africa experienced divergence with the West especially during the 1980s and 1990s (Ocampo *et al.* 2007), while growth accelerated in Southeast Asia (Jomo *et al.* 1997) and China (Lin 2012).

The million-dollar question is, of course, why some countries have managed to 'catch-up' and others have not, and this has been discussed widely, for example by Harris (1986), Hoogvelt (1997), Burbach and Robinson (1999), Chang (2002), Arrighi *et al.* (2003), Reinert (2007), and Parthasarathi (2011), in addition to the neoclassical economic literature. Despite the many contributions to this discussion, or perhaps because of them, there is no consensus regarding what the drivers behind convergence or divergence are⁵. Rather, scholars tend to be able to fit their own causal theory into whichever case study they are looking at. Nothing illustrates this more than the debate about the East Asian 'miracle' countries

⁵ See Popov and Jomo (2018) for a thorough discussion on the different explanations of intense growth episodes leading to convergence that have been put forward over the past half-century.

that went on in the 1990s, with one side claiming that the reason for growth was the Asian governments intervening significantly in the market to stimulate industrialization (e.g. Wade 1990, Amsden 2001) and the other downplaying the role of the state in favor of free market policies (e.g. World Bank 1993, 1996).

The centrality of GDP measurement

The one thing that all sides in the convergence debates have in common is their use of the growth of GDP per capita as the main yardstick for assessing economic development. Many studies of convergence adjust GDP for purchasing power parities (PPPs) in order to correct for price differences between countries (e.g. Talvi 2014, Popov and Jomo 2018). While in principle PPP adjustments might be better for comparing conditions of living or material well-being between countries, it is a country's GDP at market exchange that matters for its capacity to import, repay debts, and participate in international organizations (Wade 2014). In addition, use of PPP GDP arguably underestimates world income inequality, due to its use of rich country price structure to revalue GDP in poor countries, as it gives greater weight to those prices involved in the largest value of transactions⁶. Notably, Wade (2014) finds that the average income of Global South is around 15-20% of the income of the Global North in PPP terms, but only 5-10% in foreign exchange terms. Nonetheless, as most studies on convergence use PPPs, this paper will use them as well for comparability purposes.

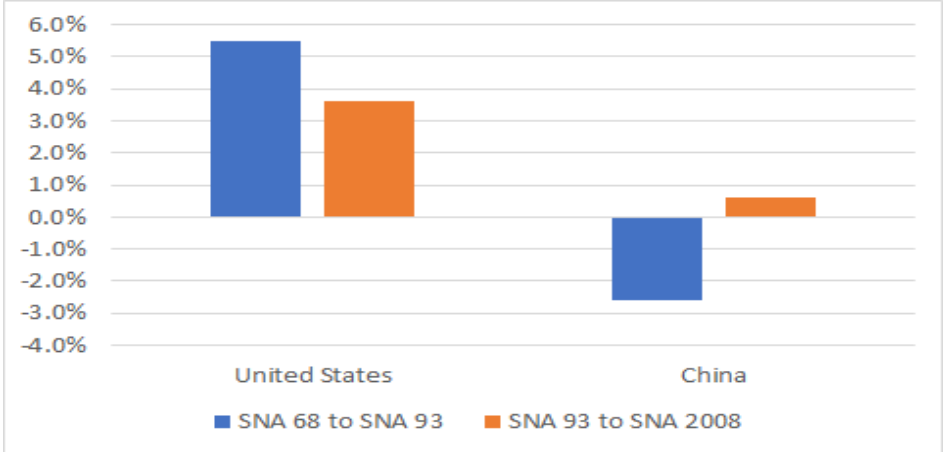
Beyond the issue of currency conversion, there have long been critics of GDP as a measure of wider dimensions of human well-being such as happiness, unpaid care work, environmental costs and quality of life (Coyle 2014, Fioramonti 2013, Fleurbaey and Blanchet 2013, Lepenies 2016, Masood 2016, Pilling 2018, Philipsen 2015, Radermacher 2016, Stiglitz et al. 2009, Tavernier et al. 2015, Waring 1988, Wesselink et al. 2007). However, not much attention has been devoted to the significant *changes* in the methodology of constructing GDP in the past 25 years. In 1993 and then again in 2008, the SNA has undergone critical changes to the concept of output and the location of the so-called production boundary, which determines what is included in GDP and what is not. Many economic activities - financial intermediation, owner-occupied housing, research and development and the production of weapons - were previously excluded from GDP as either non-productive or as constituting productive inputs to other outputs (hence deducted as intermediate consumption). The inclusion of these economic sectors in the production boundary since 1993 and 2008 has added disproportionately to the GDP of developed countries, which have in recent decades specialized in these activities and moved away from traditional pillars of development such as manufacturing and infrastructure-related services.

This is exemplified by the case of the U.S. and China. When the former implemented the 2008 SNA in 2013 - which for the first time included R&D, weapons systems and artistic originals of entertainment as part of fixed investment (rather than deducting these from GDP as intermediate inputs) - its GDP increased by \$560 billion overnight, which had the effect of "reinforcing America's status as the world's largest economy and opening up a bit more breathing space over fast-closing China" (Economist

⁶ Furthermore, there are many problems with measurement associated with the PPP measurement. Among them are inaccuracy because of lack of data, as the Government of China didn't allow price surveys until 2005, and then only in 11 cities. India did not allow price surveys between 1985 and 2005 (see Wade 2004).

Intelligence Unit, 2013)⁷. By contrast, the impact of moving from SNA 1993 to SNA 2008 only added 0.6% to China’s GDP in 2004 (and an earlier switch from SNA 68 to SNA 1993 first *reduced* Chinese GDP by 2.6% in 1990).

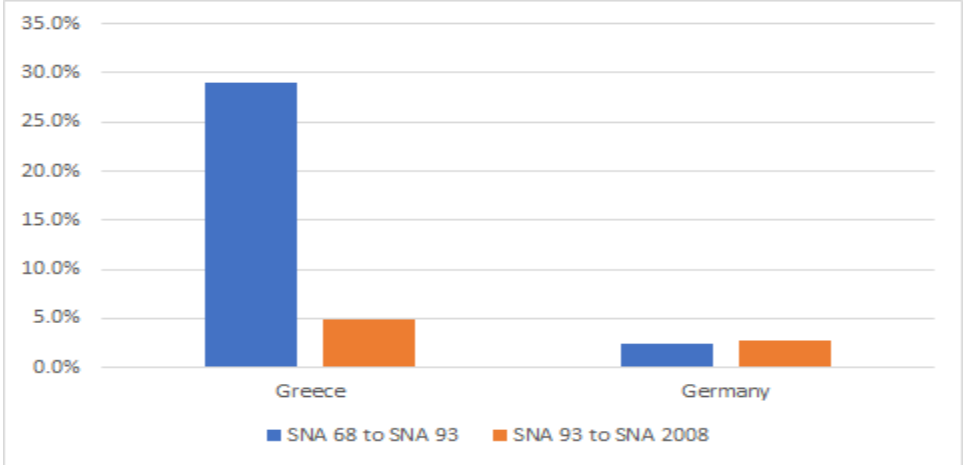
Figure 1: Percent Impact of Changing SNA Methodologies on US (2013) and China (2004) GDP (current prices)



Source: United Nations, Main Aggregates and Detailed Tables (MADT) database, Table 101, http://data.un.org/Data.aspx?d=SNA&f=group_code%3a101 (last accessed June 2018).

The same logic had the opposite effects within the newly-created Eurozone at the end of the millennium. As figure 2 shows, German GDP received a modest boost of between 2 and 3% in moving from SNA 68 to SNA 93 and also to SNA 2008. However, the GDP of Greece - recently considered an example of irresponsible economic policies - increased by *nearly a quarter* on the eve of adopting the euro (switching from SNA 68 to SNA 93), and a more modest increase when switching to SNA 2008.

Figure 2: Percentage Impact of SNA Changes on Greek and German GDP in 1995 (current prices)

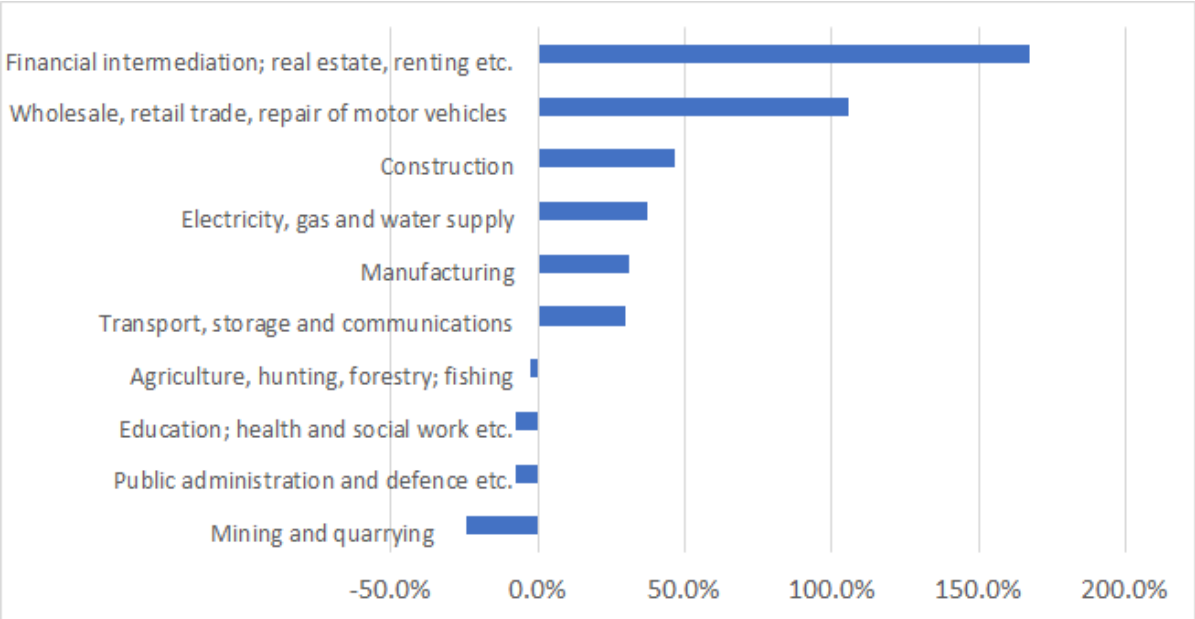


Source: United Nations, Main Aggregates and Detailed Tables (MADT) database, Table 101, http://data.un.org/Data.aspx?d=SNA&f=group_code%3a101 (last accessed June 2018).

⁷ A similar boost to the U.S. economy occurred in 1997, when SNA 1993 added \$435 billion to GDP compared with SNA 68 in that year (a 5.5% increase).

The huge boost to Greek GDP in the 1993 SNA reflects the increased importance ascribed to certain sectors in the ‘new economy’ literature, most prominently finance, real-estate and insurance (though retail and wholesale trade as well as hotels and restaurants also doubled in value under SNA 1993). Figure 3 shows the increases by industry for 1995, the last year for which SNA 68 data are available. Agriculture, mining, the government and public services actually *decreased in value in the new SNA*.

Figure 3: Percentage Change in Greek GDP by Sector from SNA 68 to 93 (current prices)



Source: United Nations, Main Aggregates and Detailed Tables (MADT) database, Table 201, http://data.un.org/Data.aspx?d=SNA&f=group_code%3a201 (last accessed June 2018).

With all the German investment and tourists flowing to Greece after the introduction of the Euro in 2002, it was the sectors which were inflated due to the statistical deregulation of GDP in 1993 that were further boosted. As will be shown below, this statistical bubble in Greek GDP also made its deficit-to-GDP ratio look small enough to qualify for entry into the EU under the Maastricht Treaty criteria, which would otherwise have been less likely.

The next section reviews in detail the institutional and substantive shifts in the construction of GDP, and examines their differential impacts on several countries.

3. Deregulating GDP

Most histories of national accounting, if they acknowledge the period preceding the 20th century at all, mention only one major shift in both its institutional makeup and substantive structure (Kendrick 1970,

Bos 1995, Vanoli 2005)⁸. Institutionally, the task of measuring the wealth (and income) of nations was originally undertaken by individuals from the time of Petty, who was the first to use numerical analysis rather than descriptive comparisons to assess a country's economic power (first in his 1656 survey of Ireland and later in 1676 with his magnum opus, *Political Arithmetick*). Others in England, France and Holland undertook similar estimates, often with the explicit aim of assessing the countries' ability to raise taxes and fight wars with each other (Studenski 1958).

This practice remained an individual undertaking until the 1920s and 1930s, when more and more governments took on the responsibility of both designing the structure of the national accounts and compiling the data. Along with this change in the institutional setup of measurement came a new focus on how much *output* nations could produce, rather than just on their income and expenditure. This was a result of several different changes, including the creation of the Soviet Union as an alternative economic system, the rise of economic planning even in capitalist (and fascist) countries, the need to respond to the Great Depression, and the mobilization for World War II (Vanoli 2005).

Unlike income and expenditure, which are purely monetary concepts, output and production imply non-monetary units, e.g. the number of tanks or refrigerators produced, or haircuts and classes provided. This concept of production is defined in the most recent of the three approaches to calculating GDP (the other two are total expenditure on goods and services and total income earned in the production process), namely by value-added. Every economics textbook explains how, to avoid double-counting, if the output of one producer is an input to another product, the former is deducted as 'intermediate consumption'. For example, if the value of flour produced by the miller is added to the value of the bread sold by the baker, it would have been counted twice. Instead when bread is counted, only the 'value-added' by the baker - namely the baking - gets monetized.

John Maynard Keynes, despite often being considered one of the key champions and inspirations for the development of national accounting, had very mixed feelings about the production approach to calculating aggregate real output (see also Tily 2009). In a special digression from his main argument in the *General Theory* (Ch. 4 on the choice of units), he advocated using only monetary quantities (such as money wages) and employment quantities in economic analysis, *not* aggregate real output. His reasons for this emphatic position are crucial to our paper and therefore worth quoting at length:

“...the proper place for such things as net real output and the general level of prices lies within the field of historical and statistical description, and their purpose should be to satisfy historical or social curiosity, a purpose for which perfect precision - such as our causal analysis requires, whether or not our knowledge of the actual values of the relevant quantities is complete or exact - is neither usual nor necessary.

To say that net output to-day is greater, but the price-level lower, than ten years ago or one year ago, is a proposition of a similar character to the statement that Queen Victoria was a better queen but not a happier woman than Queen Elizabeth - a proposition not without meaning and not without interest, but unsuitable as material for the differential calculus. Our precision will be a mock precision if we try to use such partly vague and non-quantitative concepts as the basis of a quantitative analysis” (Keynes 1936, 40).

⁸ Studenski (1958) is the only exception, as it covers in detail the first two and a half centuries of the development of national accounting.

Nonetheless, the production idea survived into the earlier measure of Gross National Product (GNP) as well as GDP which is used more widely today⁹. The problem is that this productivist concept, unlike income¹⁰ and expenditure, requires a production boundary to determine what is a productive activity and what is not, and therefore what is to be included in GDP. Some economic activities were always excluded from GDP, e.g. unpaid care work (for children, elderly relatives etc.), while others were first excluded and then included (e.g. financial intermediation services, paid for by an interest margin rather than directly measured fees). The production boundary is critical for determining both the level of GDP in a given year and its rate of growth over time. Unfortunately, shifts in the production boundary have historically not been based on progress in economic theory but were rather developed through a ‘techno-political process’ (Bos 1995, Christophers 2011, Assa 2016 and 2018). As the new discipline of national accounting became an international standard of the United Nations in 1953, the methodology was set by a group of chief government statisticians under the aegis of the United Nations Statistical Commission.

The 1953 SNA was the original post-war international standard for measuring national income, inspired by the 1947 report by Richard Stone (who led the Sub-Committee on National Income Statistics of the League of Nations Committee of Statistical Experts). The first revision to the SNA, in 1968, extended its scope by adding input-output tables and balance sheets, as well as attempting to bridge the gap between the SNA - used in capitalist nations - and the Soviet alternative, the Material Product System (MPS)¹¹.

While the first major change in institutional responsibility for the System of National Accounts was the shift from individual scholars to national governments after World War I, the end of the Cold War saw not just the collapse of the Soviet Union, but also, and perhaps not coincidentally, a *second* shift in the institutional responsibility for the System of National Accounts. The U.N. – a universal organization representing 194 Member States with equal voting power – had been the sole custodian of this standard up to that point. In 1993, however, four other organizations joined the U.N. under the aegis of an inter-secretariat working group on national accounts (ISWGNA). These were the World Bank, International Monetary Fund (IMF), the Organization of Economic Co-operation and Development (OECD), and the European Union (EU). The first two are international financial institutions where voting shares are generally determined by proportion of financial contribution as well as economic weight (notwithstanding a commitment to move towards more ‘equitable voting power’ between developed and developing countries over time)¹², while the last two represent rich, developed countries.

This geopolitical shift also reflects a departure from the traditional role of national governments (directly or through the UN) as custodians of national statistics, towards a greater role for financial institutions,

⁹ GDP refers to production by anyone within a given country’s *borders*, while GNP measures income accruing to the country’s *nationals*, from production taking place anywhere. For the purposes of this paper the distinction is not material.

¹⁰ Not all incomes are captured in GDP. Thus, unemployment benefits and other one-way transfers are excluded as non-productive.

¹¹ The latter, ironically, used Adam Smith’s narrow production concept (Studenski 1958), which included only goods and excluded all services.

¹² There are differences between the agencies in each institution, see for example this page for the World Bank allocation policies and voting shares: <http://www.worldbank.org/en/about/leadership/votingpowers>. See also the Bretton Woods Project’s analysis of recent World Bank voting reform: <http://www.brettonwoodsproject.org/2010/04/art-566281> [both sites accessed May 22nd 2018].

both national and international. In the revision process that led to SNA 2008, for example, nearly half of the 74 comments received in the consultation process were from central banks or regional banks, with the remainder coming from national statistical offices. Some statistical agencies opposed certain changes, such as ascribing greater productivity to the financial sector. For example, the German statistical office objected to defining taking on financial risks by banks as a productive activity, “as no input of labor and/or capital is needed”. On the other hand, the European Central Bank supported getting rid of the distinction of lending from intermediated funds vs. lending from banks’ own money (Assa 2015, 2016).

The result of this institutional shift in power was reflected in a substantive change in the structure and definition of GDP, consisting of widely expanding the production boundary to include many things that were hitherto considered either external to production or at most as intermediate inputs to it. The 1993 SNA constituted a radical change from previous standards, in that it pushed the production boundary far from its original location, in a process one may think of as statistical deregulation.

So far, we have considered the production approach to GDP, since this is where the problem of production boundary is clearest. In theory, it should not matter whether one employs the production, expenditure or income approach, although in practice there could be discrepancies due to different data sources and methodology (Bloem et al. 2001). Furthermore, the distinction between the two approaches is also somewhat artificial because they often use the same source data. The production and expenditure approaches are more widely used than the income approach to GDP. In the expenditure approach the total amount spent on goods produced is the main measure, whereas the income approach measures the total incomes earned by the various factors of production (the owner of labor, capital and property). These two approaches are theoretically meant to amount to the same, as all expenditures in an economy should equal the total income generated by the production of all economic goods and services. Note that although it is called the ‘income approach,’ there are certainly many forms of income that are not included in GDP, such as unemployment benefits and illegal activities.

The next section describes specific changes to the SNA and their impact on countries’ GDP, seen through both the output (also known as production or value-added) approach and the expenditure approach. Since in principle GDP by these two approaches should match GDP by income, SNA changes would have a similar overall effect on aggregate income as well. The specific impact on various income categories, however, would depend on the industry affected. As Assa (2018) demonstrates, for example, the FIRE sector is very profit-intensive while other industries are more wage-intensive. Thus an imputation that gives a boost to the FIRE sector (under the output approach) would increase the share of profits in the economy relative to wages.

3.1 Specific Changes to the SNA and their Differential Impact on Countries

The rest of the section describes specific areas of change in the SNA according to whether they impacted the estimation of output for consumption or for investment. As mentioned above, these changes have had differential impacts on countries in the North and those in the South, with critical implications for the

estimated rate of growth of each country and thus for the estimated rate of economic convergence among countries and regions.

A. Imputations affecting Consumption

Owner-occupied Housing

Both the SNA 68 and the SNA 93 excluded services which households produce for their own consumption from the production boundary. This was based on the criteria that only market-based activities are included in GDP. However, the SNA 1993 included “the production of services of owner-occupied dwelling” in GDP (ISWGNA 1993, 654, para. 34). In other words, people who own their own homes are thought of as “unincorporated enterprises that produce housing services for their own consumption”. Thus the rent they would otherwise have to pay a landlord is paid to themselves¹³.

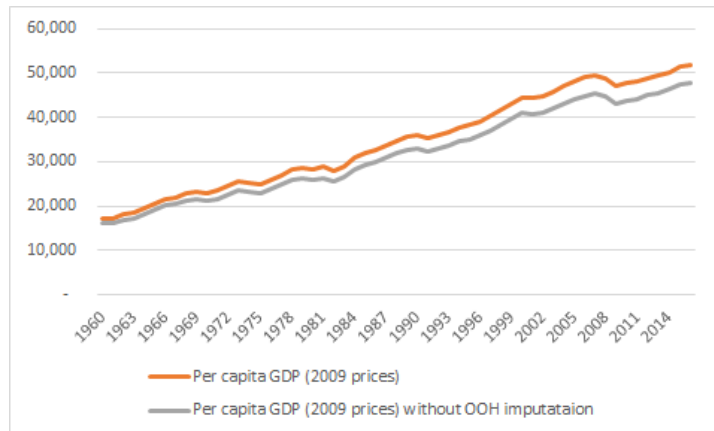
Such imputation does not only violate the principle of including only market-based transactions, but also the real-world accounting principle of recording *actual* transactions. In this case, homeowners do not actually pay themselves rent, which would be the opportunity cost of not owning a home. *No transaction actually takes place*. The rationale for this imputation was to avoid a fall in GDP if a person renting a house then decides to buy it¹⁴. However, the problem this is meant to solve goes back to the neoclassical assumption that renting out property is a service, whereas in classical political economy the ‘rentier’ or landlord is in fact extracting from the net revenue of the economy.

Another justification given for this imputation is that it is necessary to avoid distortion in cross-country (as well as inter-temporal) comparisons, since home-ownership rates vary quite a bit (ibid. 6.29). However, the rental values from which such expenditure is imputed also vary greatly, inflating the value of ‘production’ taking place in high-rent cities (e.g. New York, London, Singapore, Tokyo). In the United States, for example, the share of imputed owner-occupied housing (OOH) in GDP has increased from 4.6% in 1929 to around 8% in the 21st century. Figure 4 shows the impact of this imputation on the country’s per capita GDP since 1960.

¹³ Paragraph 9.58. Of SNA 93 also states “Persons who own the dwellings in which they live are treated as owning unincorporated enterprises that produce housing services that are consumed by the household to which the owner belongs. The housing services produced are deemed to be equal in value to the rentals that would be paid on the market for accommodation of the same size, quality and type. The imputed values of the housing services are recorded as final consumption expenditures of the owners.”

¹⁴ This is akin to the famous suggestion by Paul Samuelson that when a man marries his (hired) housekeeper, GDP goes down since non-market house-care is not included in GDP.

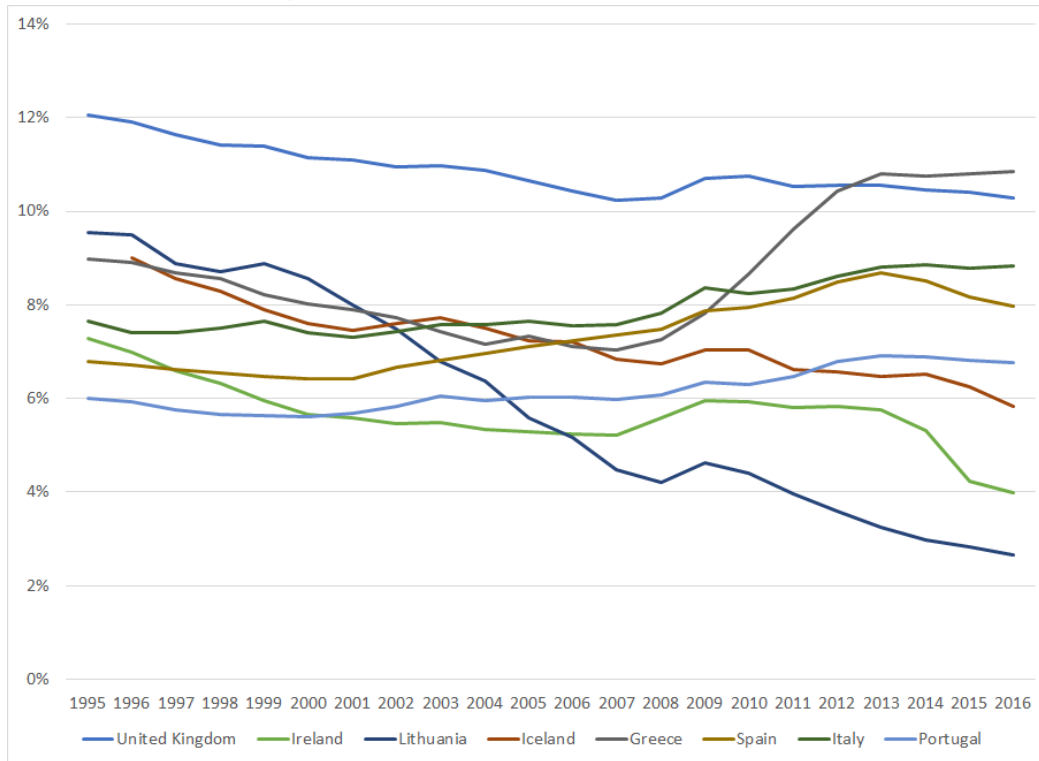
Figure 4: US Per Capita GDP with and without the Imputation for Owner-Occupied Housing (in 2009 USD)



Source: Authors' calculations based on data from the U.S. Federal Reserve, FRED database accessed June 2018

While visually this may seem insignificant, GDP per capita (in 2009 dollars) increased by \$34,526 from 1960 to 2015 with the imputation, but only \$31,686 without it. The difference of \$2,840 is greater than the entire 2015 per capita GDP of over 70 countries as of 2016, so it matters greatly for cross-country comparisons. Figure 5 shows both the cross-country variation among OECD countries as well as differing trends across time:

Figure 5: OOH as % of GDP (in 2009 USD)



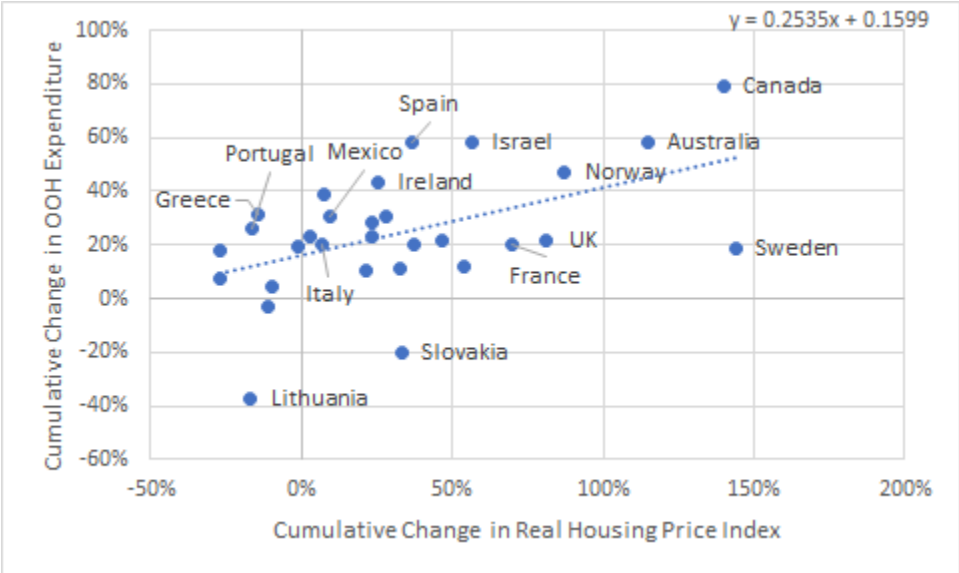
Source: OECD Stat, <https://data.oecd.org/hha/housing.htm>, last accessed May 2018.

As figure 5 shows, while OOH as a share of GDP increased for the Southern European countries, Portugal, Italy, Greece, Spain (the original PIGS) in this period, it fell for the UK, Ireland, Lithuania, and Iceland. Although this increase was driven by these countries' respective housing bubbles (also visible in Ireland for parts of the period), the inclusion of OOH has inflated the GDP growth of these countries, according to the revised GDP measure. This is precisely why imputing value-added from incomes differs from measuring it directly. In the latter case, both gross output and intermediate inputs are deflated using a price index (to account for inflation), and real value-added equals real gross output less real intermediate inputs. The deflation ensures that while the price of a car increases, for example, real value-added accounts for only the *quantity* of cars produced. When value-added is imputed based on income, by contrast, the formula degenerates to deflating gross revenues and deflating costs, then deducting the latter from the former. There is no accounting for a quantity here, in spite of adjusting for inflation, since there was no direct measure of 'output' to begin with. Thus, quantity and price are inseparable for imputed services, since net income is a monetary concept to start with. As Mazzucato (2018) points out, "a house price bubble...will show up as an acceleration of GDP growth" (p. 94).

The imputed value of OOH has increased not only as a percentage of GDP for some countries - i.e. relative to other sectors - but also in absolute terms *for most advanced economies*. For the EU-28, the OOH imputation increased from 657 billion euro (in 2010 prices) in 1995 to 934 billion in 2014 (a 42% increase). Estonia's OOH increased by 148%, and in Canada and Israel this rise was 97% over the same period. Even in Ireland, which as figure 5 shows had a relative decrease in OOH as % of GDP, in absolute terms this imputation has gone up 74%, from 5.8 billion euros in 1995 (in 2010 prices) to 10 billion euros in 2016.

The contribution of housing price bubbles to the increase in the 'output' imputed to OOH can be seen in the scatter plot below. While there is a rough linear relationship, wealthier countries are concentrated to the right, while poorer (southern and eastern European countries) appear further to the left.

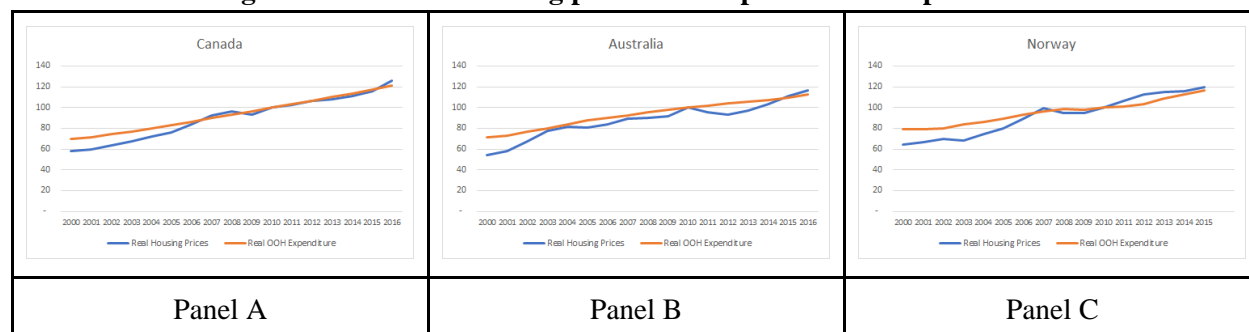
Figure 6: Housing Prices versus OOH Expenditure



Source: Authors' calculation based on OECD.stat database, accessed June 2018

The relationship is even tighter in the countries with the biggest real-estate bubbles (2010=100), as illustrated in figure 7.

Figure 7: Indices of housing prices and imputed OOH expenditures



Source: Authors' calculation based on OECD.stat database, accessed June 2018

The World Bank itself acknowledged that this imputation is not very suitable for developing countries, i.e. those outside of the OECD (ICP 2011):

“The SNA recommends that rents for owner-occupiers should be imputed by reference to rents actually paid for similar dwellings. This works fairly well for OECD-EU countries because in most of them enough dwellings of different kinds are actually rented to provide a good basis for imputing rents to owner-occupied dwellings. In many developing countries, however, relatively few dwellings are rented so that it is difficult to apply the SNA Guidelines.

In many non OECD-EU countries people build their own houses from locally gathered materials. These dwellings are almost never rented so that in many developing countries, particularly in Africa, national accountants have no guidelines for estimating imputed rents for owner-occupiers. In many countries no imputations are made while in other cases the imputations appear to be based on actual rents paid for dwellings that may be quite unlike most of the owner-occupied dwellings.”

For this reason, data on OOH in developing countries is extremely scarce. However, one example can serve to illustrate the contrast between OHHs' contribution in developing and developed economies. In 2012, actual rentals accounted for only 2.8% of Costa Rica's total household consumption, while imputed rentals (OOH) accounted for 9.9%. In the US, by contrast, actual rentals in 2012 accounted for 4% of total household expenditure, but the imputed rentals constituted 12.3%. As a percentage of GDP, the imputed rentals amounted to 6.5% in Costa Rica vs. 8.3% in the US.

The fact that the imputed rentals are much bigger than the actually measured rentals cuts across countries. In the EU and US the proportion in 2016 was roughly 3 to 1. Germany is on the low end with 1.3, as well as Netherlands with 2.0, compared to 12.7 for Hungary and 15.4 for Slovenia.

Financial Intermediation

The 1968 SNA treated the intermediation activities of banks - for which income is derived from interest differentials rather than explicit fees - as the input of a notional (read 'imaginary') sector, and thus it was

deducted from total value-added and did not affect GDP. While this statistical fiction of assigning banking output as an input to an imaginary sector was bizarre, the SNA 1993 went further and allocated the part of this income stream paid by households to final consumption (while treating the part paid by firms as intermediate consumption, again deducted from total value-added). In a stroke of a pen, this methodological change *made* finance productive (Christophers 2011).

In the process referred to as ‘financialization’ in the literature, also accompanied by deindustrialization, many developed countries moved away from manufacturing towards financial and real-estate activities. Thus the share of this imputation (known technically as *Financial Intermediation Services Indirectly Measured* or FISIM) has grown much faster in these countries than in developing countries. While in most OECD countries financial intermediation (paid for by households) adds between 1 and 2 percentage points to GDP, in the US this was 3.4% in 2011 (last year of data).

The FISIM formula (discussed critically in Assa 2015a) is calculated (in current prices) as follows:

$$FISIM = (rL - rr)yL + (rr - rD)yD \quad (1)$$

where: rr is a reference rate, rL is the interest rate on loans, yL is the average balance on loans, rD is the interest rate on deposits and yD the average balance on deposits.

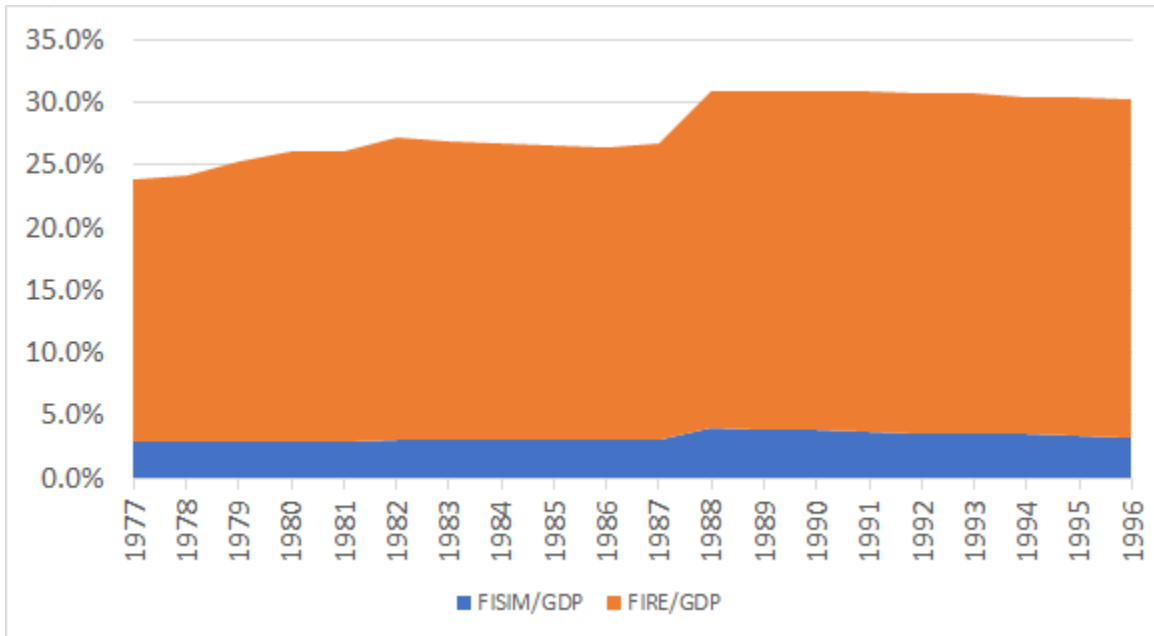
The SNA 2008 did away with the requirement that only interest on intermediated funds be included. From now on, all loans and deposits were used to impute FISIM, “not just those made from intermediated funds” (UN 2009, 583:A3.25). In other words, even banks’ own money could now be used to create such ‘production’, without the pretext of providing an intermediation service. Since 80% of bank loans in the US goes to finance the purchase of real-estate or financial assets rather than productive activities, the SNA 2008 also made *speculation* productive.

Since the 1970s, however, the importance of interest income for banks declined as much more of their revenues came from fees (anything from overdraft charges, late fees, mortgage origination fees, to underwriting and foreign exchange fees). Although the fee income of banks is explicit (rather than implicitly estimated using the FISIM formula), the value-added of the financial sector based on these fees is still an imputation, based on deducting fees paid by banks from fees received by them. Together with similar charges in the real-estate and insurance industries, these so-called FIRE sectors¹⁵ account for nearly a quarter of GDP in OECD economies in the 21st century.

The relative importance of the FISIM imputation of net-interest has gone down in recent decades, as more and more of banks’ income now comes from explicit fees charged to households and included in GDP under the value-added side of the FIRE sector. The share of this imputation has reach nearly a quarter of GDP in developed countries and is discussed further below.

¹⁵ Some authors focus on the narrow financial sector. Here we follow Krippner (2005) in combining finance with real-estate and insurance, as all these sectors originate and trade claims to assets and their associated income streams rather than produce goods and services.

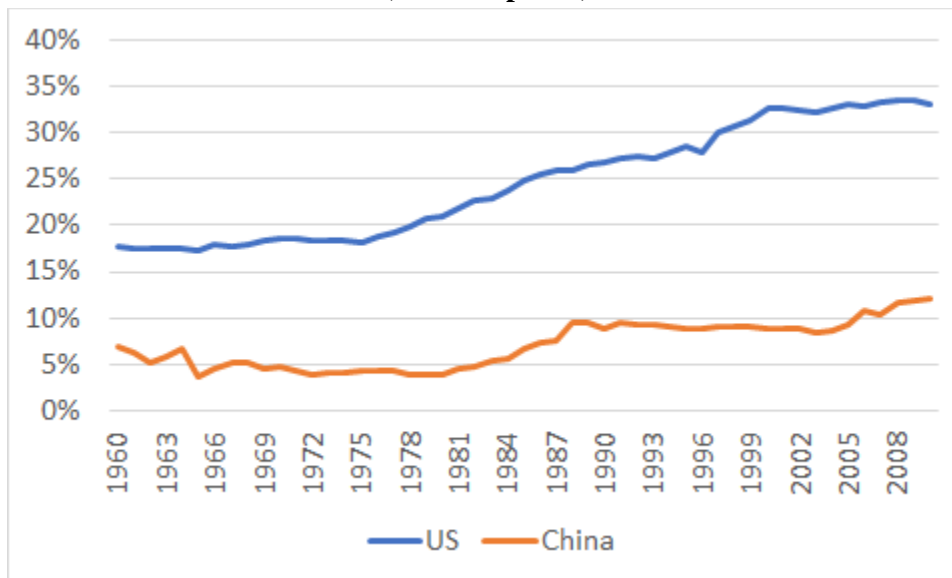
Figure 8: Interest and Fee-based Income of Banks as % of U.S. GDP, 1977-1996 (SNA 68)



Source: United Nations, Main Aggregates and Detailed Tables (MADT) database, Table 202, http://data.un.org/Data.aspx?d=SNA&f=group_code%3a202 (last accessed June 2018).

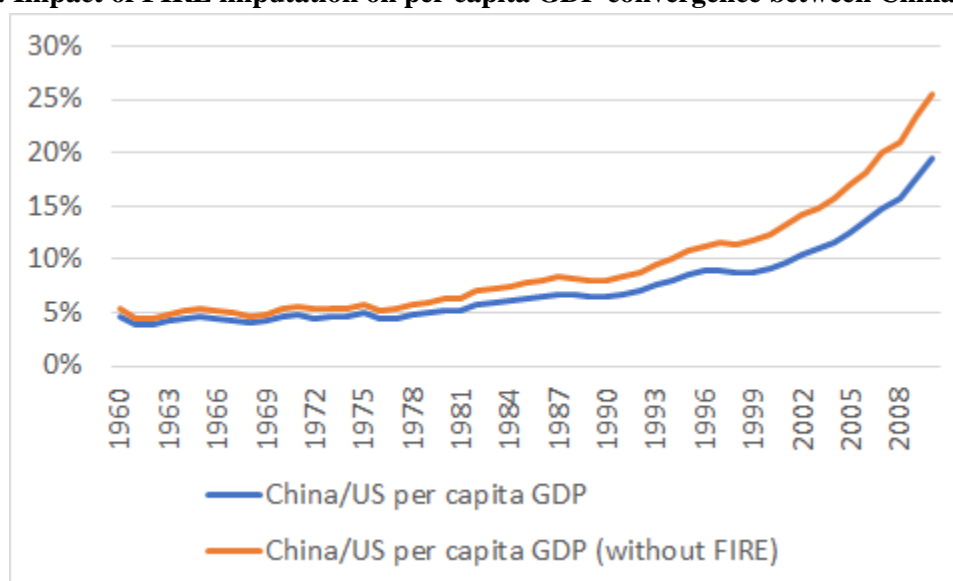
The financialization of the US economy and of other developed countries thus has far-reaching implications for the assessment of their growth rates, especially in comparison to developing countries where finance did not explode in a similar manner:

Figure 9: The Finance, Insurance and Real-Estate (FIRE) sectors as % of GDP in the US vs. China (constant prices)



Source: United Nations, Main Aggregates and Detailed Tables (MADT) database, Table 202, http://data.un.org/Data.aspx?d=SNA&f=group_code%3a202 (last accessed June 2018).

Figure 10: Impact of FIRE imputation on per capita GDP convergence between China and the US



Source: United Nations, Main Aggregates and Detailed Tables (MADT) database, Table 201, http://data.un.org/Data.aspx?d=SNA&f=group_code%3a201 (last accessed June 2018).

B. Imputations affecting Investment

Military Expenditures

The SNA 68 - the international standard during the Cold War - did not include military expenditures on fixed assets as investment (except those related to constructing or modifying family dwellings of military personnel). By contrast, SNA 93 included all military expenditures “which could be acquired by civilian users for purposes of production and that the military uses in the same way” (UN 1993, 660:70). Thus docks, roads, airfields etc. were included, while weapons or vehicles and equipment solely used to launch them were excluded. The idea was that the former were potentially productive assets while the latter were only destructive in nature.

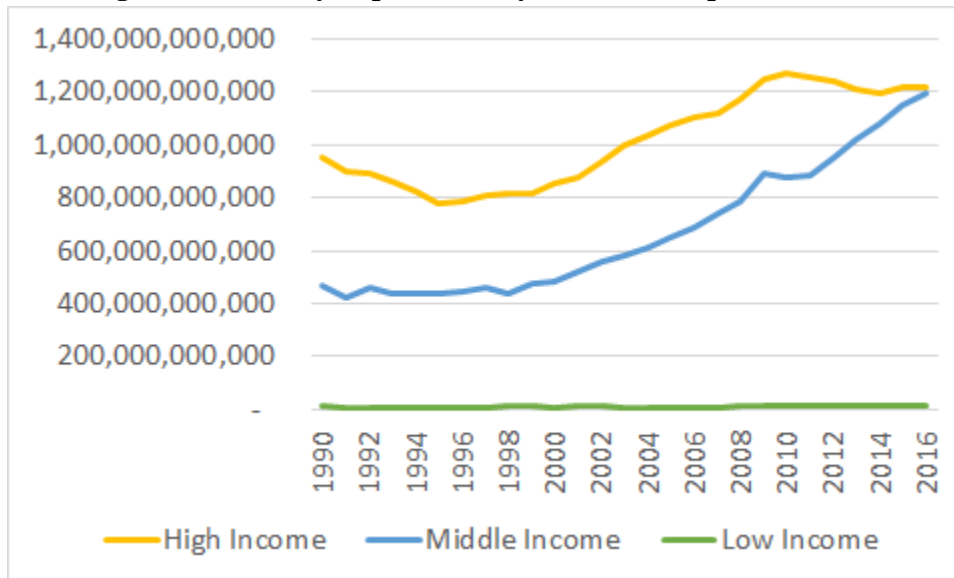
The 2008 SNA knocked down the boundary further, by doing away with this distinction, and included expenditures on weapons systems in government investment:

A3.55 The military weapons systems comprising vehicles and other equipment such as warships, submarines, military aircraft, tanks, missile carriers and launchers, etc. are used continuously in the production of defence services, even if their peacetime use is simply to provide deterrence. The 2008 SNA, therefore, recommends that military weapons systems should be classified as fixed assets and that the classification of military weapons systems as fixed assets should be based on the same criteria as for other fixed assets; that is, produced assets that are themselves used repeatedly, or continuously, in processes of production for more than one year. (ISWGNA 2009)

This change inflated the GDP of weapons-producing countries, changing the definition of ‘output’ from one including consumption goods and means of production to one including means of destruction.

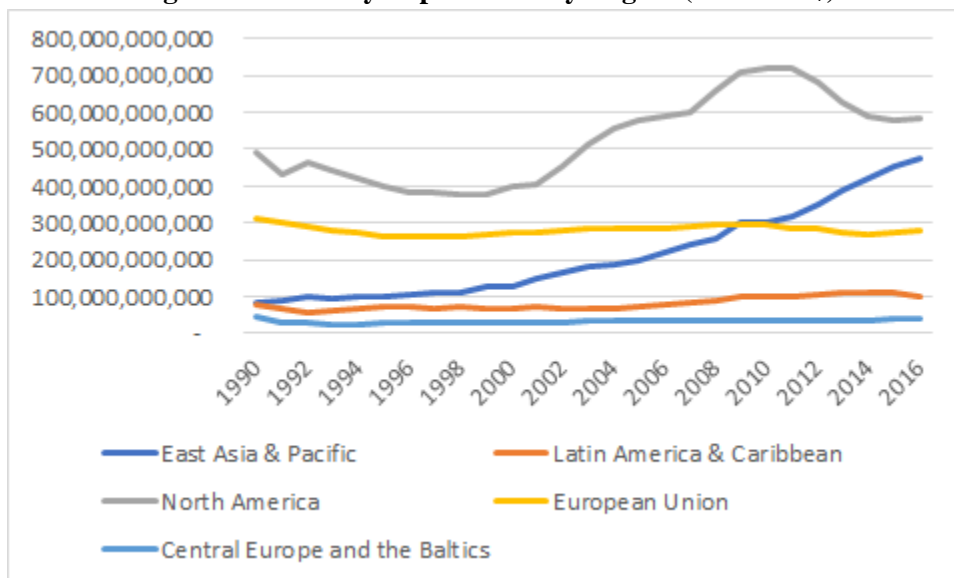
Looking at military expenditure in constant prices reveals how both high and middle income countries have pulled far away from low income countries. The inclusion of weapons systems in GDP is thus inherently biased against the poorest countries (which may be large consumers of weapons, large and small, but produce very little of t

Figure 11: Military Expenditure by Income Group (2011 PPP\$)



Source: Authors' calculations based on World Bank, World Development Indicators database, series MS.MIL.XPND.GD.ZS. Accessed June 2018.

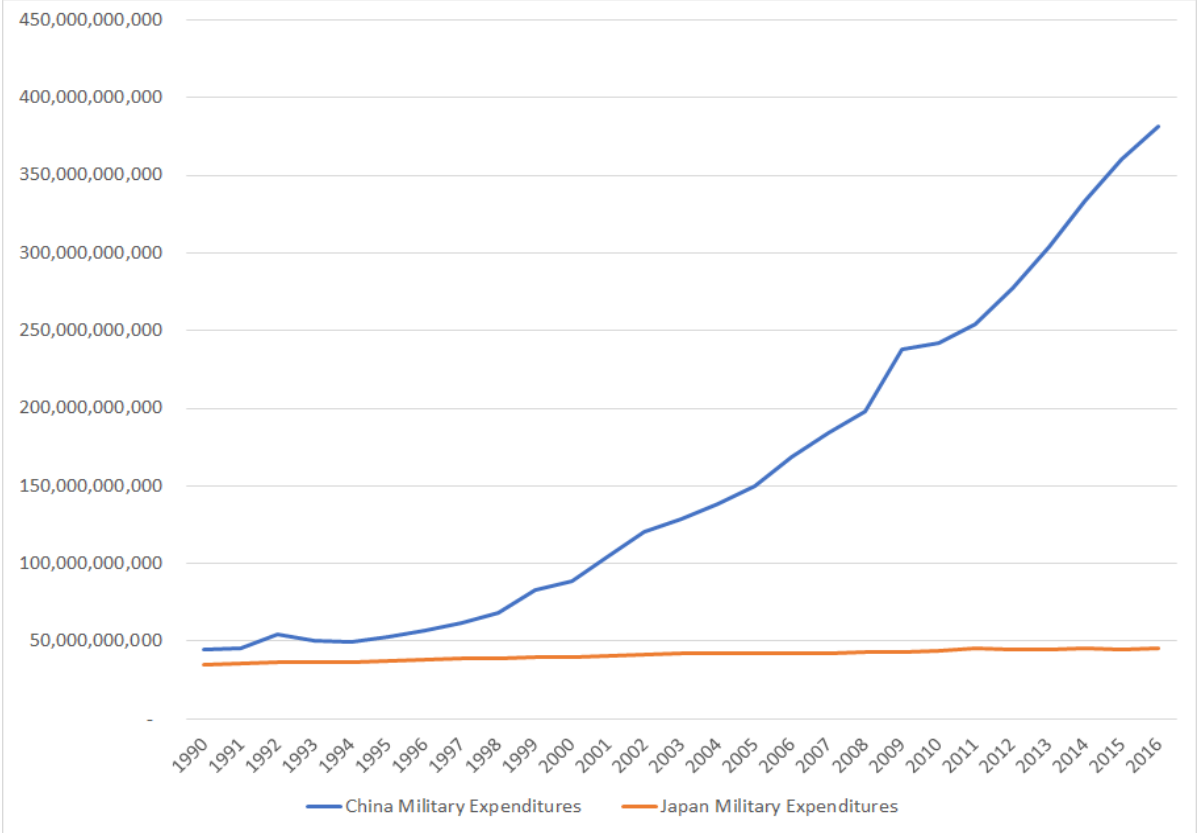
Figure 12: Military Expenditure by Region (2011 PPP\$)



Source: Authors' calculations based on World Bank, World Development Indicators database, series MS.MIL.XPND.GD.ZS. Accessed June 2018.

These regional average mask enormous intra-regional differences. A clear example is the differential role of military expenditures in the GDP growth of Japan - the 1980s star - and China, the more recent success story. In line with its anti-war constitution, Japanese military expenditures since 1960 averaged 0.9% of GDP per year. For China (where data starts in 1989), the average has been 2% per year. But as the Chinese economy grew bigger, its military spending in absolute terms dwarfed that of Japan:

Figure 13: Military Expenditure of China and Japan (2011 PPP dollars, Constant Prices)



Source: Authors’ calculations based on World Bank, World Development Indicators database, series MS.MIL.XPND.GD.ZS. Accessed June 2018.

Intellectual Property

Developed countries have a lead in activities resulting in intellectual property products (previously named “intangible produced assets”), including R&D, computer software and databases, entertainment, and literary and artistic originals. The SNA 2008 reclassified several of these as productive activities, as described below.

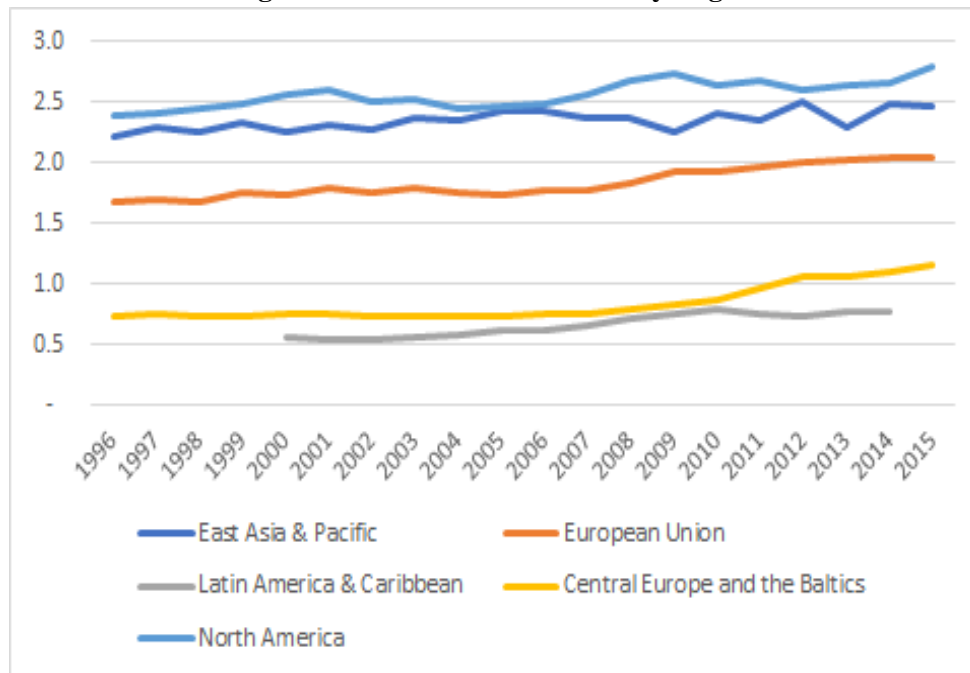
Research and Development

Before 2008, research and development activities - which are intended to improve efficiency and productivity and thus have the *potential* to increase future output - were treated as part of intermediate consumption, thus not included in GDP. The SNA 2008 changed this classification with the following reasoning:

The 2008 SNA does not treat the research and development activity as an ancillary activity. Research and development is creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society, and enable this stock of knowledge to be used to devise new applications (United Nations 2009, 583:A3.21).

While this seems to be a reasonable argument, it also has - intentionally or not - a much bigger impact on the GDP of countries *creating* new technologies rather than those adapting them. Figure 14 shows R&D expenditure as % of GDP by region, 1996-2015.

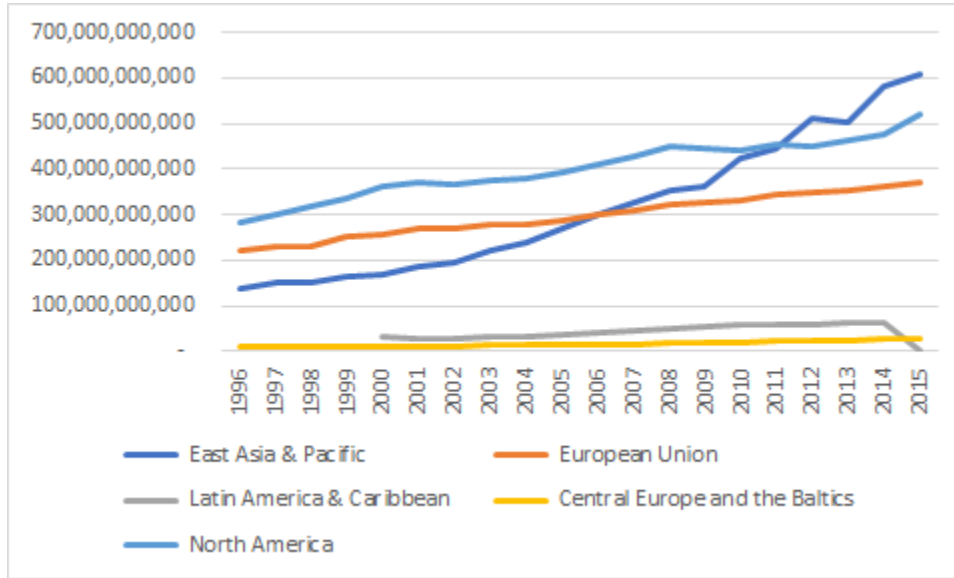
Figure 14: R&D as a % of GDP by Region



Source: Authors' calculations based on World Bank, World Development Indicators database, series GB.XPD.RSDV.GD.ZS. Accessed June 2018.

Looking at absolute values (in 2011 PPP dollars), East Asia has overtaken North America and the E.U. in recent years (see figure 15).

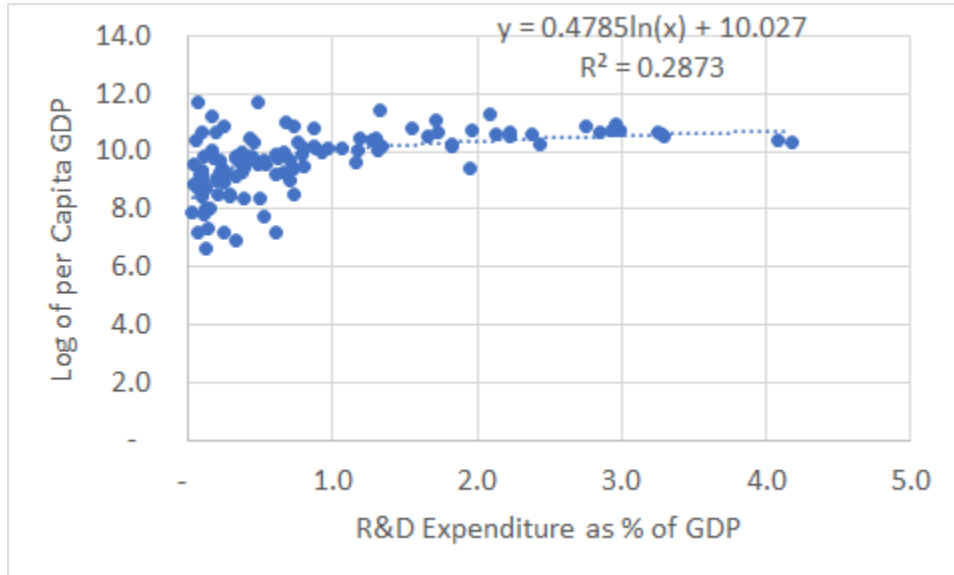
Figure 15: R&D in constant prices by Region



Source: Authors' calculations based on World Bank, World Development Indicators database, series GB.XPD.RSDV.GD.ZS. Accessed June 2018.

While there is a wide variation among rich countries in terms of their spending on R&D as a percentage of GDP, the relationship is clearer among poor countries. Countries with average per capita GDP (2011-2015) of less than \$11,500 spend just 0.3% of GDP in R&D. Below \$23,000, only China (\$11,962) and Brazil (\$15,112) spend more than 1% (2% and 1.2% respectively). At income levels over \$40,000, on the other hand, only a handful of countries spend small percentages, mostly oil-rich countries or tax havens (Oman, Bahrain, Saudi Arabia, Bermuda, UAE, Kuwait and Qatar). The rest of the \$40,000 plus group average 2.3% R&D in GDP.

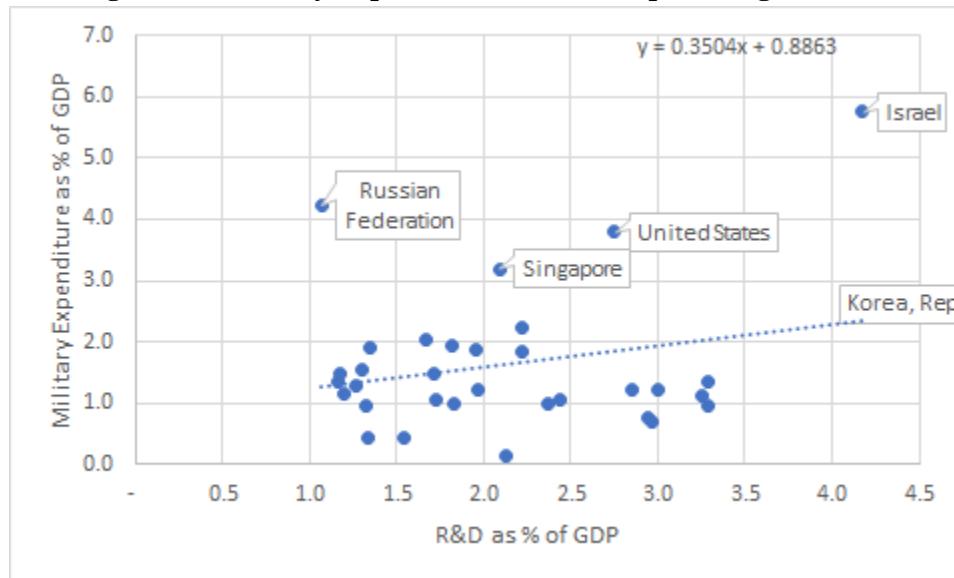
Figure 16: R&D Expenditure as % of GDP vs. log of Per Capita Income, 2011-2015



Source: Authors' calculations based on World Bank, World Development Indicators database, series GB.XPD.RSDV.GD.ZS and NY.GDP.PCAP.PP.KD. Accessed June 2018.

A complicating factor is the fact that many countries invest a significant portion of their R&D budget in their military industries. While the overall correlation between R&D and military spending (both as % of GDP) is insignificant, it is quite strong and significant for the countries spending more than 1% of GDP on R&D (see figure 17).

Figure 17: Military Expenditure vs. R&D as percentages of GDP



Source: Authors' calculations based on World Bank, World Development Indicators database, series GB.XPD.RSDV.GD.ZS and MS.MIL.XPND.GD.ZS. Accessed June 2018.

Other changes to the classification of IP products include the inclusion of database under 'computer software' and the inclusion of copies, not just original IP products, as productive assets.

3.2 Redefining Growth

Each of the above revisions to the national accounting methodology has added disproportionately to the perceived output (as measured by GDP) and therefore growth of more developed countries. To see the combined effect of these methodological revisions on estimated growth rates, we now look at a selection of countries for which data is available in contemporaneous GDP series. Such overlap in years for which data is available under multiple SNA systems is limited. This is especially the case for countries which have never used SNA 1968, including many countries previously dubbed as being 'in transition' from command economies to market-based economies. The list includes the former USSR, other east-european countries, as well as China and Cuba. Even for non-Communist countries, data is limited, especially in poorer countries.

This fact limits the extent of the analysis undertaken below, and also makes it impossible to construct aggregates comparable to those presented in the convergence literature summarized in Section 2. Furthermore, the changes between one SNA version to another, as mentioned above, were driven by a techno-political process of revisions, in the context of a geopolitical shift in the ownership of the SNA

standards. There is no unifying theoretical framework which could explain the changes made in the 1993 and 2008 SNAs (Bos 1995, Assa 2016). The next section will utilize a more coherent alternative methodology and also enables the comparison of aggregate convergence patterns.

Returning to the US-China example, moving from SNA 1993 to SNA 2008 increased GDP of the US much more than China's because of the combined effect of adding research and development, weapons systems and artistic originals to gross fixed capital formation (fixed investment).

Table 1: US GDP in 2011 (in current dollars)

	SNA 1993	SNA 2008	Change in Billions	Change %
Final Consumption				
Households Consumption	10,437	10,414	-23	-0.2%
Government	2,594	2,531	-64	-2.3%
Gross Capital Formation				
Fixed Investment	2,202	2,836	634	28.8%
Changes in Inventories	34	42	8	24.3%
Net Exports				
Exports of Goods and Services	2,094	2,106	12	0.6%
Imports of Goods and Services	-2,662	-2,686	24	0.9%
Gross Domestic Product	14,699	15,243	544	3.7%

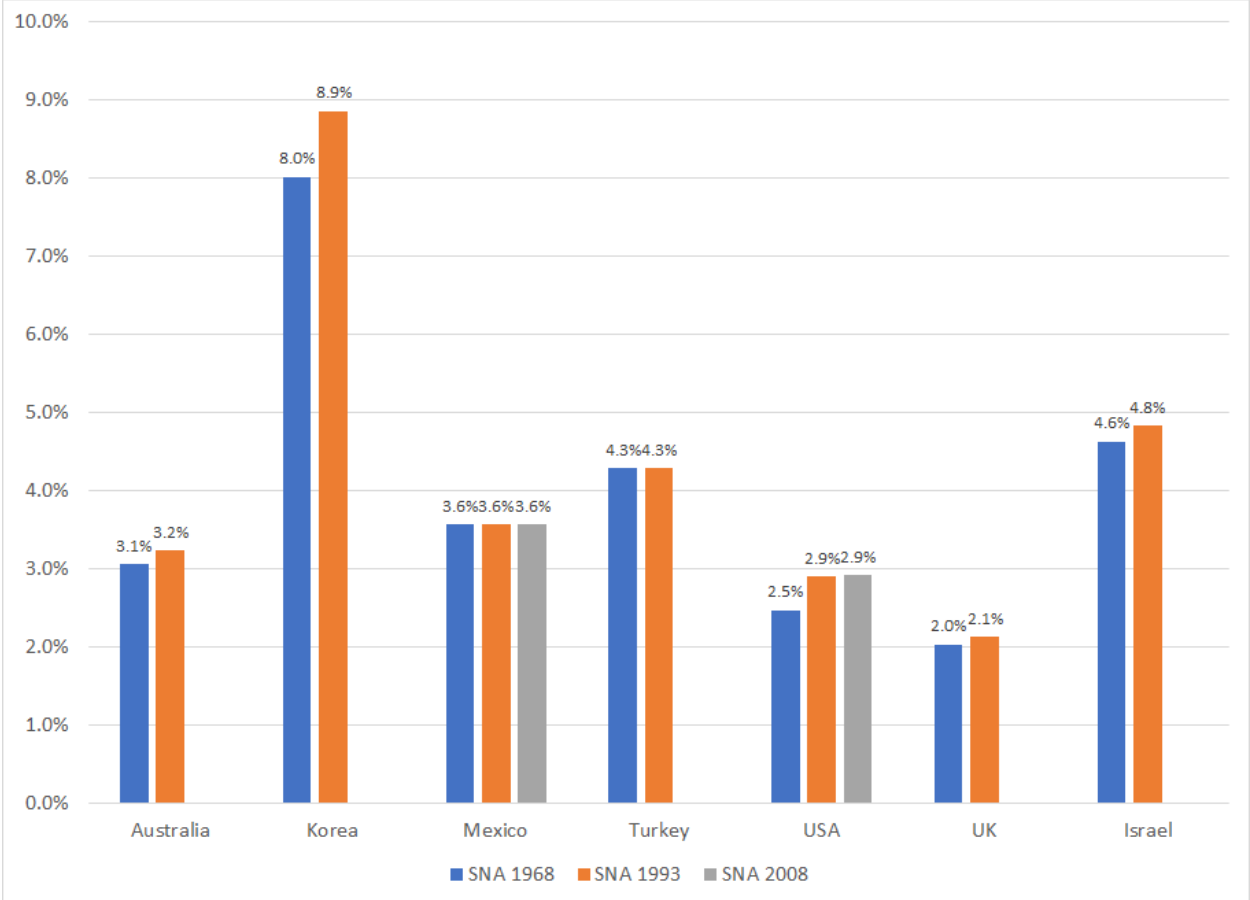
Source: United Nations, Main Aggregates and Detailed Tables (MADT) database, Table 101, http://data.un.org/Data.aspx?d=SNA&f=group_code%3a101 (last accessed June 2018).

The single biggest contribution to the increase in US GDP was from fixed investment (which now includes R&D, weapons production and artistic originals), a \$634 billion or 28.8% increase. By contrast, fixed investment in China only got a boost of 2.7%, or 573 billion Yuan. This is a clear example of the differential boost to the level of production in each country at a given point in time, based only on changes to the production boundary.

However, comparing countries using GDP in current prices is limited in two ways. First, it can only serve to compare the impact of changes in SNA rules on GDP in a single year. Looking at a time series in current prices would conflate real growth (which is best measured in constant prices) and inflation. Another reason for looking at constant price data is that it allows abstracting from the currency in each country, and this comparing the rate of *growth* of output in each economy rather than its level of

production in a given year (and currency). Figure 18 shows that shifting to the new SNA had differential impacts even for the growth rates of developed countries (the years selected were the ones where data for all three SNAs was available for these countries):

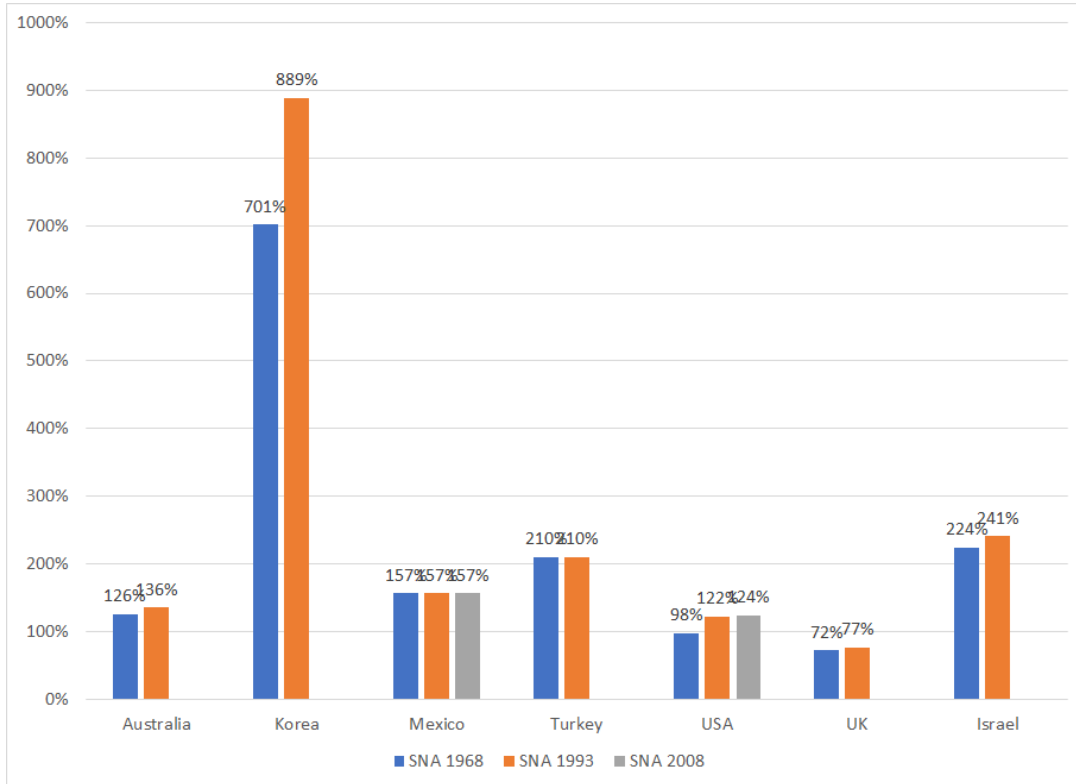
Figure 18: Annual GDP Growth Rates for 1970-1996 Under Three SNA systems



Source: United Nations, Main Aggregates and Detailed Tables (MADT) database, Table 102, http://data.un.org/Data.aspx?d=SNA&f=group_code%3a102 (last accessed June 2018).

While these differences in average annual growth rates may seem small, their cumulative impact over 27 years is significant (see figure 19).

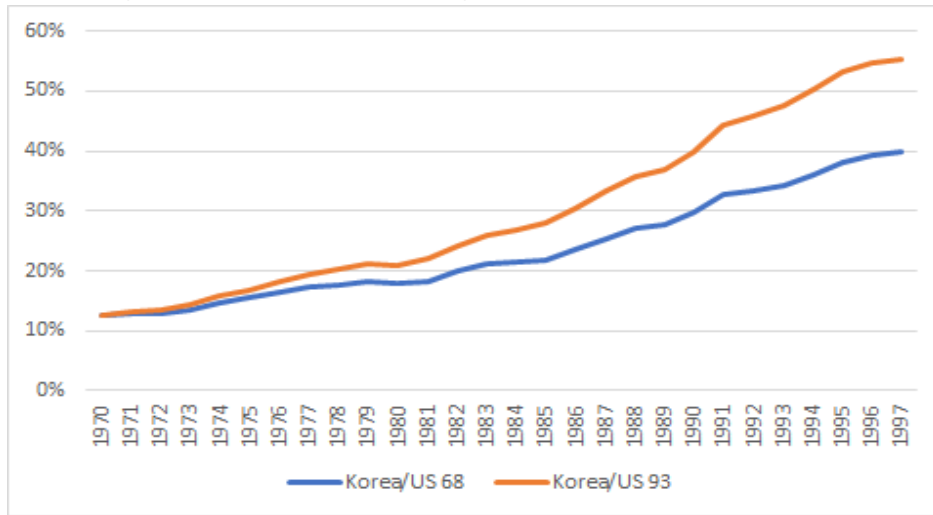
Figure 19: Cumulative GDP Growth 1970-1996 Under Three SNA systems



Source: United Nations, Main Aggregates and Detailed Tables (MADT) database, Table 102, http://data.un.org/Data.aspx?d=SNA&f=group_code%3a102 (last accessed June 2018).

Looking at Korea and the US convergence in more detail is illustrative. Both countries have parallel data series for SNA 68 and SNA 93 from 1970-1997, allowing us to view the drastic impact of revising the SNA on their relative growth rates. Using as starting figures for 1970 data on per capita income from the Maddison Project (\$2,989 for Korea and \$23,958 for the US), Korea's per capita income in 1970 was 1/8th (or 12.5%) that of the US. By 1997, it has grown to just under 40% according to SNA 68, but over 55% according to SNA 1993.

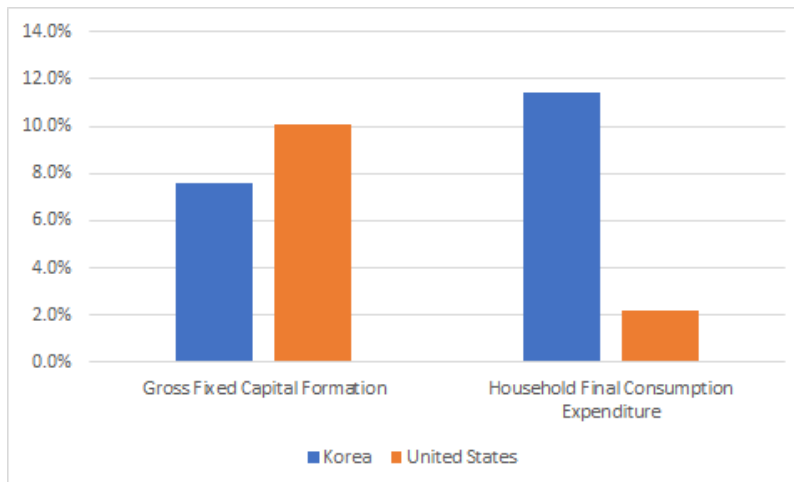
Figure 20: Korea-US Convergence under SNA 68 vs. SNA 93



Source: United Nations, Main Aggregates and Detailed Tables (MADT) database, Table 102, http://data.un.org/Data.aspx?d=SNA&f=group_code%3a102 (last accessed June 2018).

In this case the move to SNA 93 favored Korea relative to the US. This can be disaggregated by the differential impact of moving from SNA 68 to SNA 93 had on both countries, as is illustrated in figure 21.

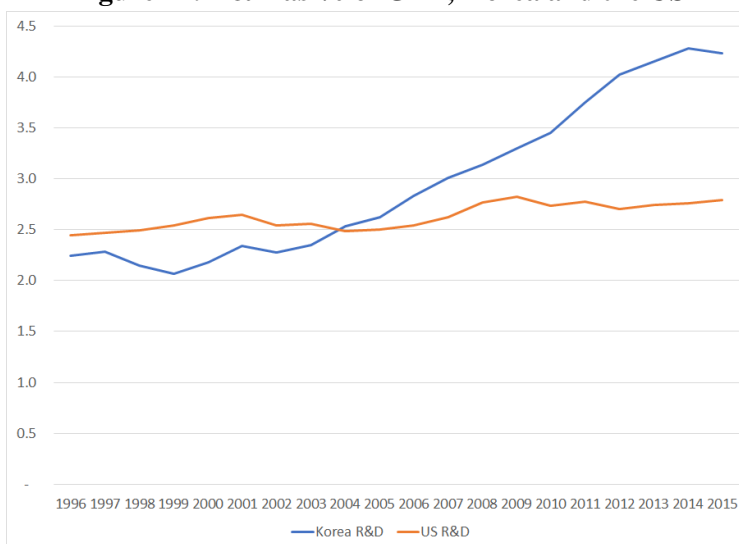
Figure 21: Average (1994-1996) Percentage Increase by Component of Moving from SNA 68 to SNA 93



Source: United Nations, Main Aggregates and Detailed Tables (MADT) database, Table 101, http://data.un.org/Data.aspx?d=SNA&f=group_code%3a101 (last accessed June 2018).

However, even though the initial boost to US investment by changing to SNA 93 was bigger than the comparable increase in Korea, over time Korean R&D (which is recorded under investment) increased much faster as % of GDP than in the US (see figure 22).

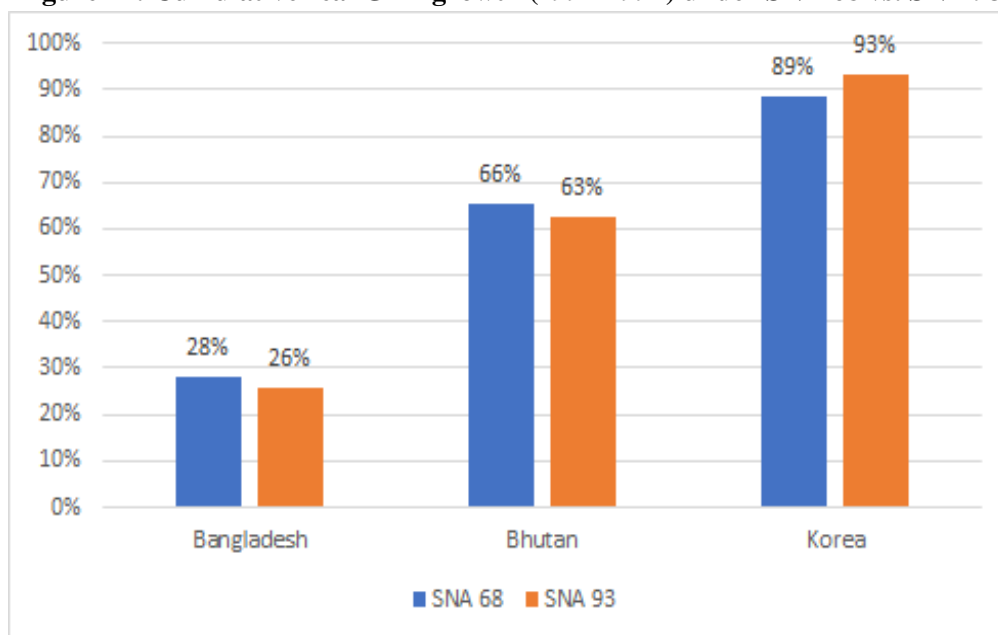
Figure 22: R&D as % of GDP, Korea and the US



Source: Authors' calculations based on World Bank, World Development Indicators database, series GB.XPD.RSDV.GD.ZS. Accessed June 2018.

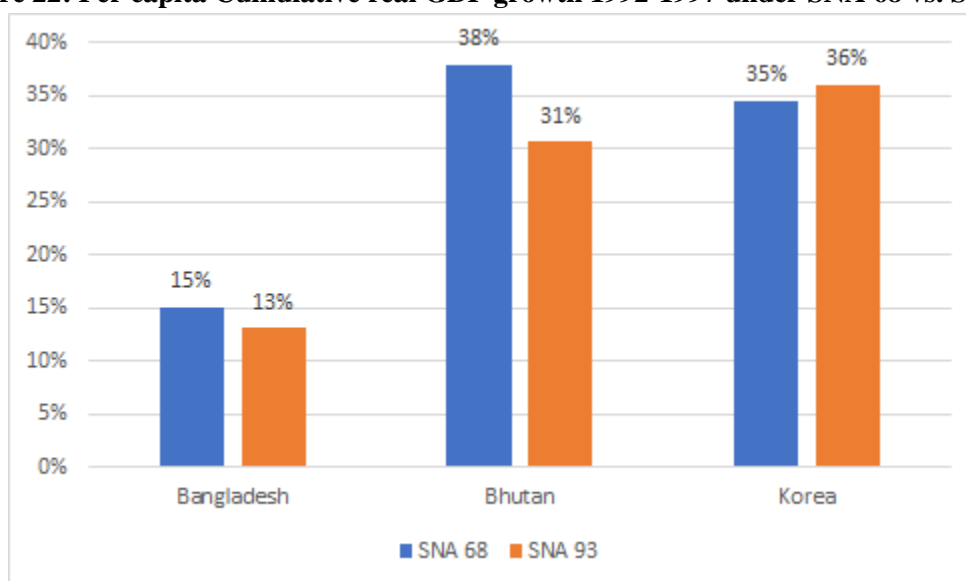
The differences are even more dramatic among developing countries, and looking at cumulative growth rates over several years for which these countries all have data in both SNAs:

Figure 21: Cumulative real GDP growth (1992-1997) under SNA 68 vs. SNA 93



Source: United Nations, Main Aggregates and Detailed Tables (MADT) database, Table 102, http://data.un.org/Data.aspx?d=SNA&f=group_code%3a102 (last accessed June 2018).

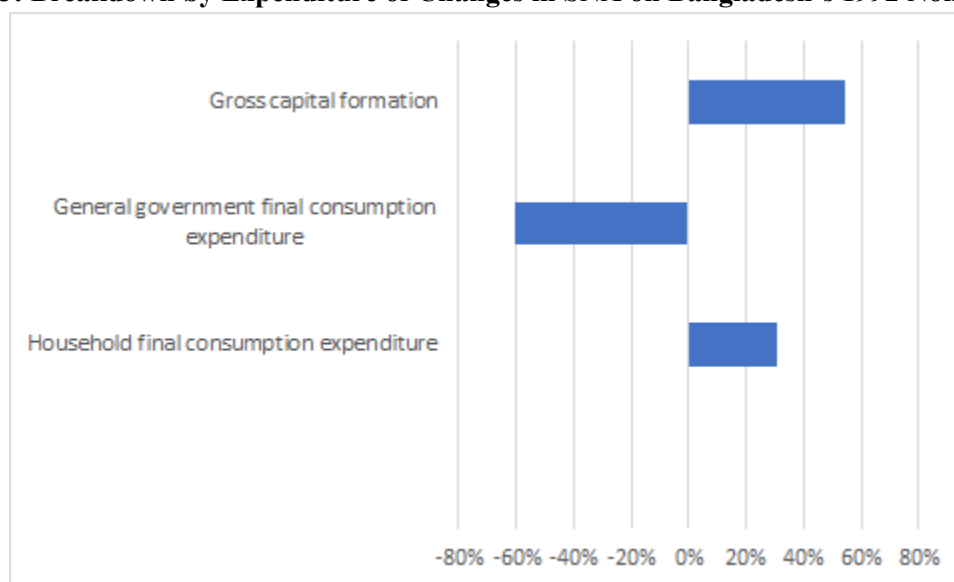
Figure 22: Per capita Cumulative real GDP growth 1992-1997 under SNA 68 vs. SNA 93



Source: United Nations, Main Aggregates and Detailed Tables (MADT) database, Table 102, http://data.un.org/Data.aspx?d=SNA&f=group_code%3a102 (last accessed June 2018).

Both the graphs above show that the SNA 1993 not only benefited Korea but actually *penalized* Bangladesh and Bhutan. In the case of Bangladesh, the moderate increases in its 1992 household expenditure and business investment were outweighed by the 60% decrease in government expenditure:

Figure 23: Breakdown by Expenditure of Changes in SNA on Bangladesh's 1992 Nominal GDP



Source: United Nations, Main Aggregates and Detailed Tables (MADT) database, Table 101, http://data.un.org/Data.aspx?d=SNA&f=group_code%3a101 (last accessed June 2018).

4. Imputed Growth: GDP vs. measured value-added

A wider analysis of the role of imputations in the measurement of output discussed by Basu and Foley (2013) and Foley (2013). In contrast with the critiques of GDP mentioned in the introduction - which seek to broaden the measure and include additional dimensions of welfare - this line of research goes back to an issue raised by Nordhaus and Tobin (1972). In their paper 'Is Growth Obsolete?', they classify certain consumer and government outlays as *instrumental* expenditures, that is, intermediate rather than final. Thus the costs of commuting to work, police and sanitation services, and national defence are deducted from total (final) output (Nordhaus and Tobin, 1972).

Shaikh and Tonak (1994) likewise emphasize the difference between outcomes and outputs. The former are the result of any activity - productive or not - while the latter are the result of a production process. Thus they reclassify military, bureaucratic and financial activities as social consumption rather than social wealth creation, arguing that these activities, "like personal consumption, actually use up social wealth in the performance of their functions."

Going a step further, the delineating criteria in Basu and Foley (2013) is not that of productive vs. non-productive activities (reminiscent of classical political economy) but rather a technical criteria - goods and services for which value-added can be directly measured rather than imputed based on incomes. Such industries include agriculture; mining; utilities; construction; manufacturing; wholesale trade; retail trade; transportation and warehousing; storage and communications (see Table 2 below). Value-added in these sectors is measured as the monetary value (i.e. the quantity of goods and services times their price) of the actual output produced less the monetary value of the intermediate inputs used. For other industries, this is not possible given the intangible nature of their outcomes. Value-added (GDP) for these sectors is therefore *imputed* based on their net incomes (revenues less costs). This is based on the (implicit) market-centered assumption that where there is income there must be production. As Mazzucato (2018) demonstrates, this logic is circular. Income is earned from productive activities, and activities are considered productive since they earn income. This not only leaves-out unpaid activities (such as unpaid care work), but also lets in unearned income, or what the classical political economists (and even Keynes) thought of as *rentier* income (earned from ownership, control or even monopolistic power).

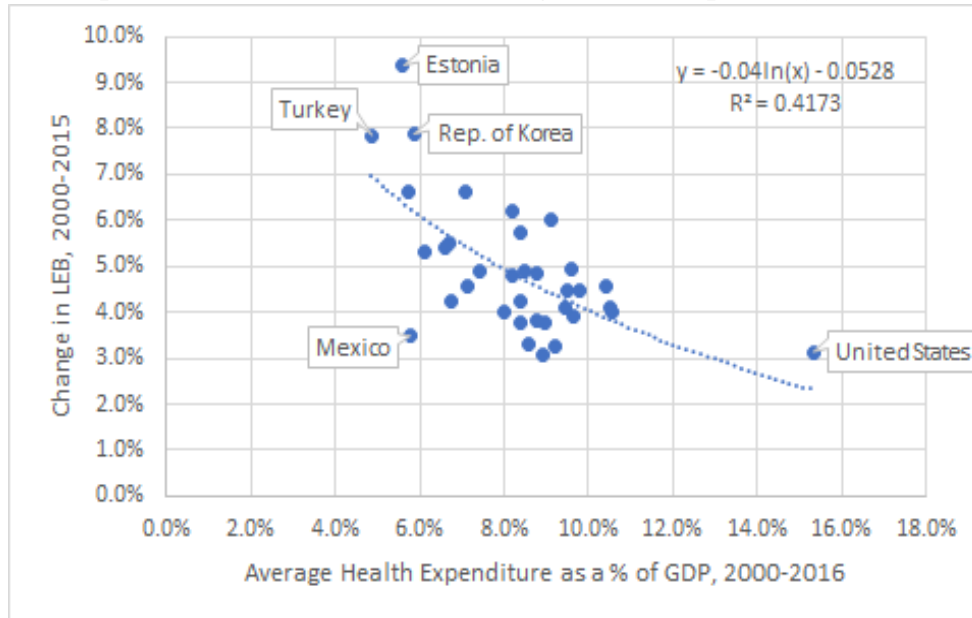
Table 2: Measured Value-Added vs. Imputed Value-Added Sectors (ISIC 3.1)

Measured Value-Added	Imputed Value-Added
Agriculture, hunting, forestry, fishing (ISIC A-B)	Financial intermediation (ISIC J)
Mining, Manufacturing, Utilities (ISIC C-E)	Real estate, renting and business activities (ISIC K)
Manufacturing (ISIC D)	Public administration and defense, compulsory social security (ISIC L)
Construction (ISIC F)	Education (ISIC M)
Wholesale, retail trade, restaurants and hotels (ISIC G-H)	Health and social work (ISIC N)
Transport, storage and communication (ISIC I)	Other community, social and personal service activities (ISIC O)
	Activities of private households as employers and undifferentiated production activities of private households (ISIC P)

Source: Basu and Foley (2013) and United Nations Statistics Division.

Imputed industries include Education and Health, not because they are not important but due to a lack of a direct measure of output. Value-added in this sector is imputed based on total revenues minus total costs. E.g. the US healthcare sector is huge due to very high prices for medicine and insurance, as well as over-prescription of procedures and drugs, but outcomes are worse than other OECD countries. As figure 24 shows, large expenditures on health-care are not necessarily correlated with improvements in health outcomes such as life expectancy at birth (LEB):

Figure 24: Expenditure on Healthcare and Changes in Life Expectancy at Birth, 2000-2015



Source: World Bank (Healthcare as % of GDP) and UNDP, HDRO

The inclusion of such imputations in GDP is one reason why this measure of output has diverged dramatically from aggregate employment in recent decades (Basu and Foley 2013, Assa 2016). This has manifested itself in spurious mysteries such as ‘jobless recoveries’, on the one hand, and ‘severe job-loss downturns’ - in which more jobs are lost than standard output-employment dynamics would predict (ibid). In addition to the short-term political costs of such employment-insensitive growth, the current growth dynamics of rising profits with stagnating employment, related to globalization and financialization, may not be socially and politically viable in the long term. For example, UNDP (2015) attributes the fall in labor income relative to GDP (the labor income share) in part to the changing structures of economic production, including financialization. In order to counter this trend of jobless growth, UNDP recommends investments in the real economy, as increases in financial investment is likely to produce fewer jobs.

This distortion has also created spurious ‘productivity miracles’, since labor productivity is defined as output (GDP) divided by (labor) input. If the denominator is inflated, productivity may be overestimated. One such example is Goldman Sachs’ CEO saying - very soon after the Global Financial Crisis - that his employees were among the most productive in the world (Huffington Post 2010).

As shown in Assa (2015, 2016), the FIRE sector in most OECD countries has no correlation (or in some cases a negative correlation) between its share of total value-added in the economy and its share of total employment, while most others sector have a positive correlation. The Goldman Sachs view mentioned above would interpret this anomaly as evidence of significant productivity increases in the financial sector, enabling it to produce far more output with less labor input. But this negative correlation could also be a symptom of a problem with the measurement of output for this sector. . This is explained formally in Assa (2015):

- Sector i’s share of employment is $\sigma_i^e = \frac{N_i}{N}$, where N_i is employment in sector I and N is the total employment in the economy
- Sector i’s share of output is $\sigma_i^y = \frac{Y_i}{Y}$, where Y_i is output in sector i and Y is total output in the economy
- Sector i’s productivity is $P_i = \frac{Y_i}{N_i}$
- Average productivity in the economy is $P = \frac{Y}{N}$

If all sectors of the economy are productive, the relationship between sectoral employment shares and output shares would be mediated by each sector’s labour productivity relative to the average productivity:

$$\sigma_i^e \frac{P_i}{P} = \sigma_i^y \quad (2)$$

where σ_i^e is sector i's share of employment, p is average productivity, p_i is sector i's productivity, and σ_i^y is sector i's share of output. This can be rearranged as follows:

$$\sigma_i^e = \sigma_i^y \frac{P}{P_i} \quad (3)$$

Thus, a sector’s share of total employment should be related to its share of output through its productivity relative to the average productivity in the economy. Since the latter can never be negative (i.e. $P_i/p \gg 0$), there is indeed a problem with imputing superior productivity to the financial sector given the observed negative correlation between its share of value added and its share of employment.

Therefore, the reported productivity of the financial sector is more of a statistical artefact than a real phenomenon. To see why, rearranging (3) gives:

$$P_i = \sigma_i^y \frac{P}{\sigma_i^e} \quad (4)$$

Since σ_i^y is increasing but σ_i^e is decreasing faster for the financial sector, its productivity based on standard national accounting is indeed too good to be true.

While most severe in the financial, this problem is common to all sectors where value-added is imputed based on incomes rather than on directly measured net output and is one main reason for the appearance of ‘jobless recoveries’. Top countries in terms of share of imputations in GDP in 2016 were neither large developed countries nor fast-growing developing countries. If they had anything in common, it was their reputation as tax-havens (see table 3).

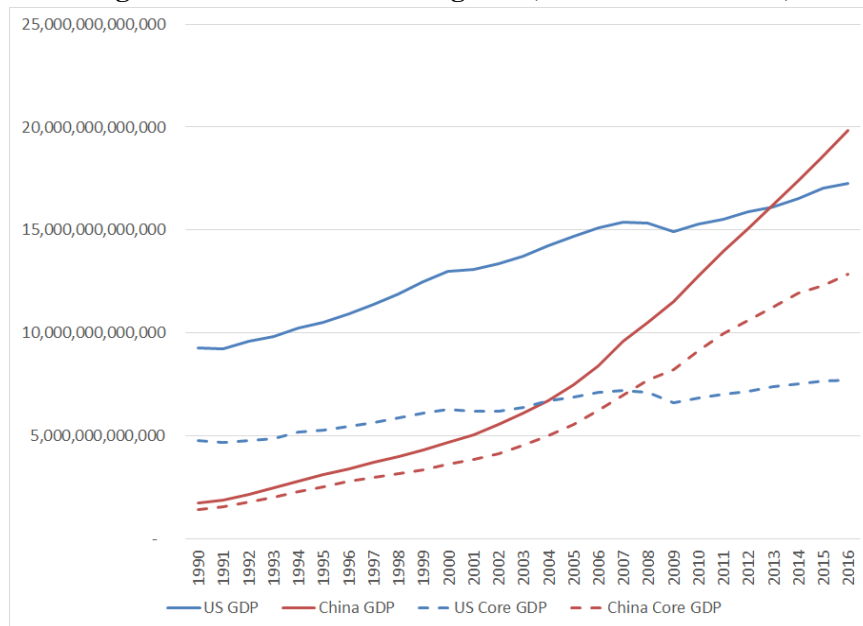
Table 3: Countries with Highest Imputed Value-Added as Share of GDP

Country	Share of Imputed Value-added in GDP
Bermuda	77.7
China, Macao SAR	74.2
Cayman Islands	72.0
Montserrat	68.6
Luxembourg	64.4
British Virgin Islands	63.0

Source: United Nations, Analysis of Main Aggregates (AMA) database, Table “Shares of breakdown of GDP/Value Added at current prices in Percent (all countries)”, accessed June 2018.

The share of imputed value-added in the US has increased far more than in China, as is shown in figure 24. In turn, this has had huge consequences for convergence between the two countries, depending on whether one looks at GDP (which includes the imputations) or Core GDP (which does not).

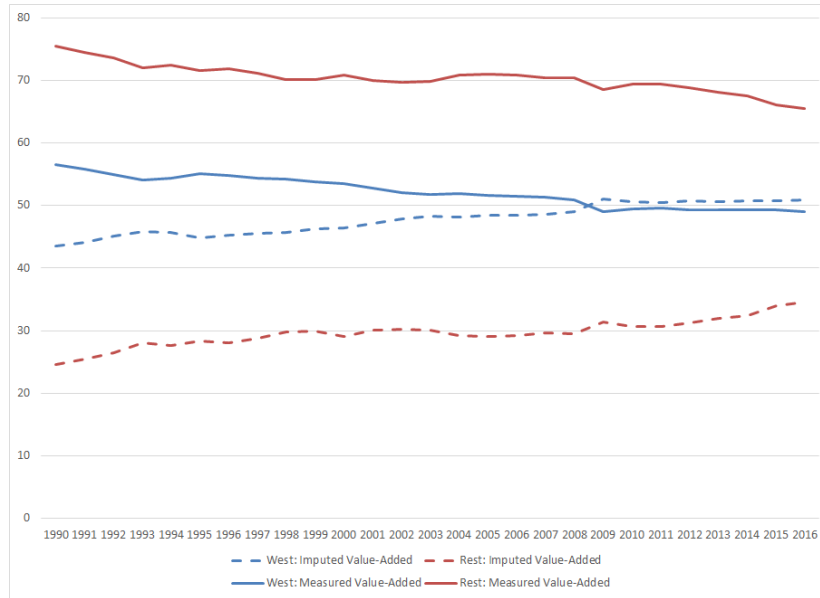
Figure 25: China-US Convergence (GDP and core GDP)



Source: Authors' calculations based on GDP shares from the United Nations Main Aggregates Database (<https://unstats.un.org/unsd/snaama/dnlList.asp>) and GDP in \$PPP from the World Bank.

Looking at China's convergence with the US economy with and without imputations, it is clear that both the initial gap and the rate of convergence are very different. GDP - which includes both measured and imputed value-added - shows China starting in 1990 with an economy one fifth that of the US, while Core GDP (measured value-added) was nearly a third. China is also said to have taken over the US (in PPP terms) in 2013, when its economy was 16.2 trillion international dollars vs. 16.1 trillion in the US. Excluding imputations, however, convergence occurred already in 2008, with Core GDP in China reaching 7.7 trillion vs. the US's 7.1 trillion. This is in large part due to the differential impacts of the financial crisis of 2007-8, not just across countries, but also within developed economies. While US GDP contracted -0.3% and -2.8% in these two years, respectively, the US economy measured by Core GDP lost -1.3% and -6.7%, respectively, of measured output. Overall, the share of industries for which value-added is imputed (government, FIRE, and other services) has increased, but the increase was most dramatic in the West (defined as Western Europe, Australia, Canada, New-Zealand, the U.S. and Japan), where by 2009 more than half of GDP was thus imputed.

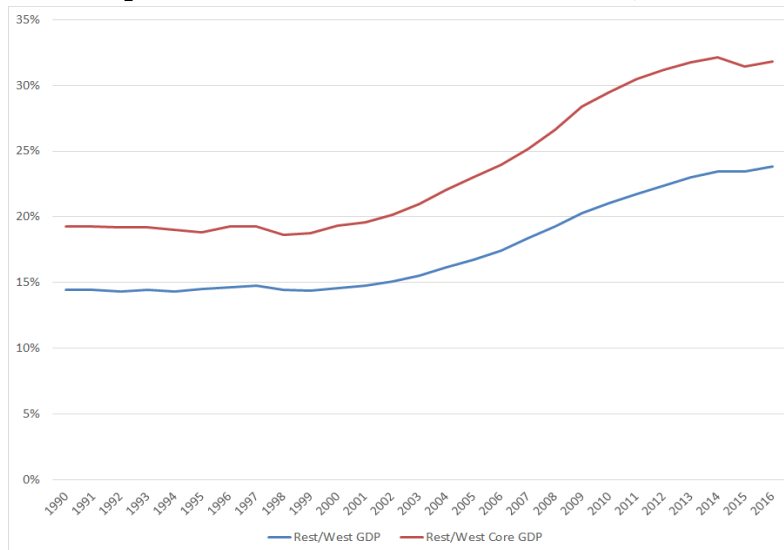
Figure 26: Measured and Imputed Value-Added as % of Total, West and the Rest, Core GDP and regular GDP



Source: Authors' calculations based on GDP shares from the United Nations Main Aggregates Database (<https://unstats.un.org/unsd/snaama/dnlList.asp>) and GDP in \$PPP from the World Bank.

Thus the reclassification of several imputed sectors from intermediate inputs to final outputs has an inherent bias towards advanced economies with a particular economic structure. Looking only at narrowly-measured production (Core GDP) gives a very different picture of convergence in per capita income. Figure 27 shows the differences in convergence between the West and the Rest using the two GDP methodologies

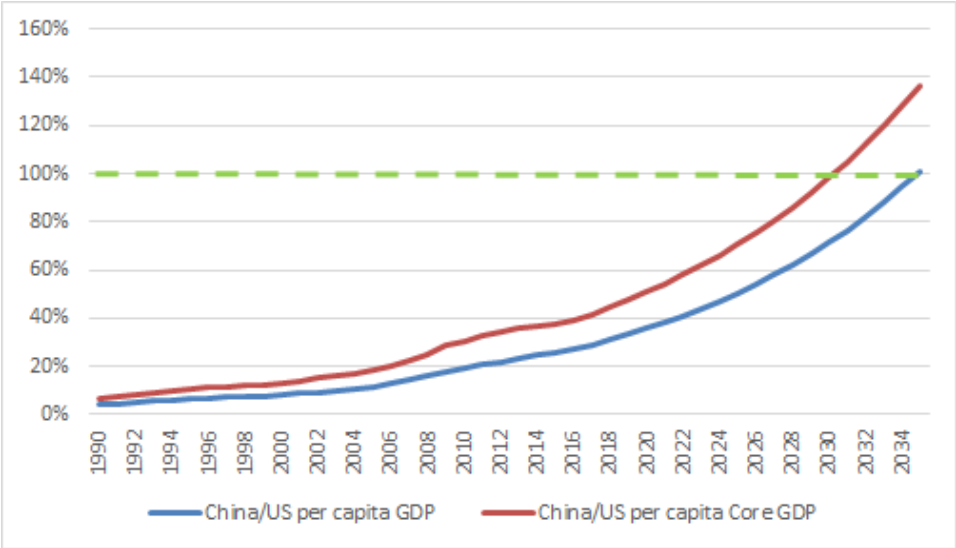
Figure 27: Per Capita Income in the Rest as % of the West, alternative measures



Source: Authors' calculations based on GDP shares from the United Nations Main Aggregates Database (<https://unstats.un.org/unsd/snaama/dnlList.asp>) and GDP in \$PPP from the World Bank.

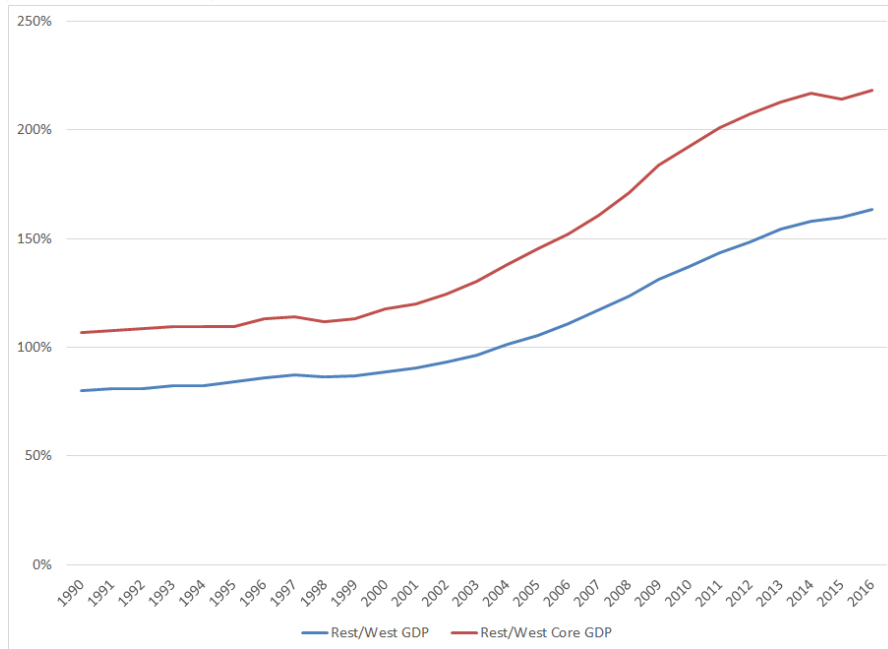
This is of course an average of many different countries in both groups. Looking at one country such as China has more dramatic results. Core per capita convergence between China and the US is 1.5 times faster than per capita GDP convergence. That means China’s per capita income would take 19 years to overtake the US’s, but using Core GDP instead would take only 15.

Figure 29: China-US Convergence in per capita GDP, alternative measures



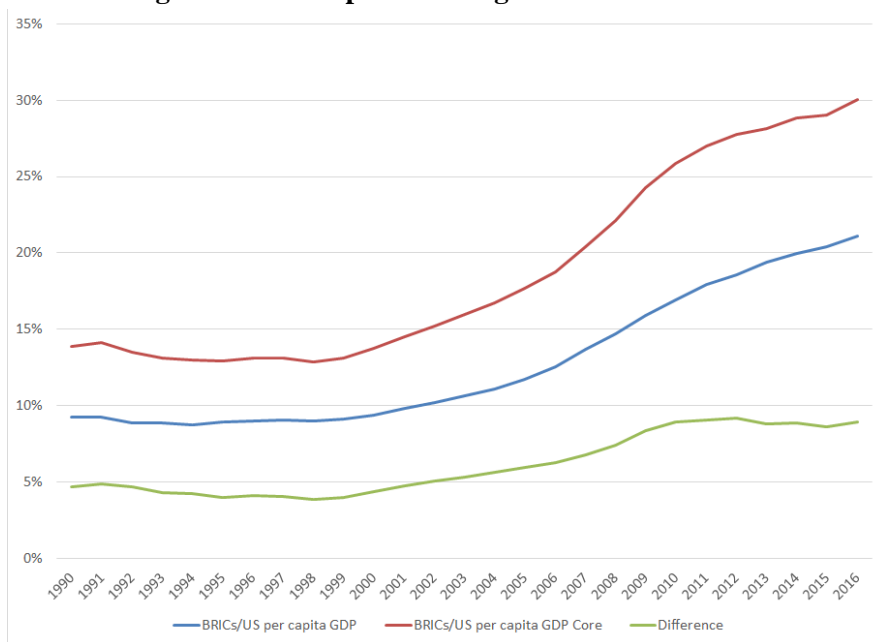
The convergence of Core GDP not only starts from a higher level (with the rest comprising 19% of the West’s per capita income in 1990 as opposed to 14% with GDP), but also proceeds at a faster rate. The average annual growth rate of Core GDP between 1990 and 2016 was 2.6% for the Rest and 0.7% for the West, compared to 3.1% and 1.2% using GDP, respectively. That is, Core per capita GDP was growing *3.7 times faster* in the developing world, compared with only 2.5 times faster for GDP. At this rate, per capita GDP of the Rest would converge with that of the West only in 77 years, as opposed to 66 years for core GDP.

Figure 28: Convergence between the West and the Rest, GDP and Core GDP



Source: Authors' calculations based on GDP shares from the United Nations Main Aggregates Database (<https://unstats.un.org/unsd/snaama/dnlList.asp>) and GDP in \$PPP from the World Bank.

Figure 30: Per capita Convergence of BRICs to US



Source: Authors' calculations based on GDP shares from the United Nations Main Aggregates Database (<https://unstats.un.org/unsd/snaama/dnlList.asp>) and GDP in \$PPP from the World Bank.

Core per capita GDP grew 3.8% annually in the BRICs vs. 0.8% in the US. In both cases these rates are lower than total GDP (4.5% and 1.4% respectively), but in relative terms, the Core per capita growth of the BRICS was 4.5 faster than that of the US, compared to only a factor of 3.3 with standard GDP.

Furthermore, the divergence between the two measures first declines in the 1990s when it averages around 4 percentage points, accelerates to 5 to 7 p.p. From 2001-2008, and even accelerates even more after the crisis to 9%.

5. Political economy implications

The absolute and relative sizes of economies (both in total and per capita terms) matter for reasons beyond the empirical convergence debates (and the competing theoretical models behind them). There are also geopolitical and political economy implications related to the measurement of GDP (see e.g. Coyle 2014). Petty and Gregory King in England, and Pierre de Boisguilbert and Marshall Vauban in France, all used their estimates of national income to demonstrate their countries' fiscal strength. Their estimates were accompanied by calls for certain policies (for a political history of these practices, see Assa 2015). Thus, from the beginning of the practice of measuring the income and growth of nations, this exercise has involved geopolitical concerns. In this section we consider possible political economy implications of GDP measurements, including the consequences the choice of measure may have on national and global policy-makers.

The most obvious reason for why countries may want to inflate their GDP is to show economic strength – which is relevant today just as it was in the days of Petty. As Philipsen (2015) points out, GDP became increasingly important in the 20th century, first to measure the recovery from the Great Depression, and then as a measure to show how the US was out-performing the Soviet Union during the cold war. In modern times, the heated debates about the *actual* size of China's GDP confirms that economic strength is still of utmost importance in our society (see e.g. Toma et al. 2017).

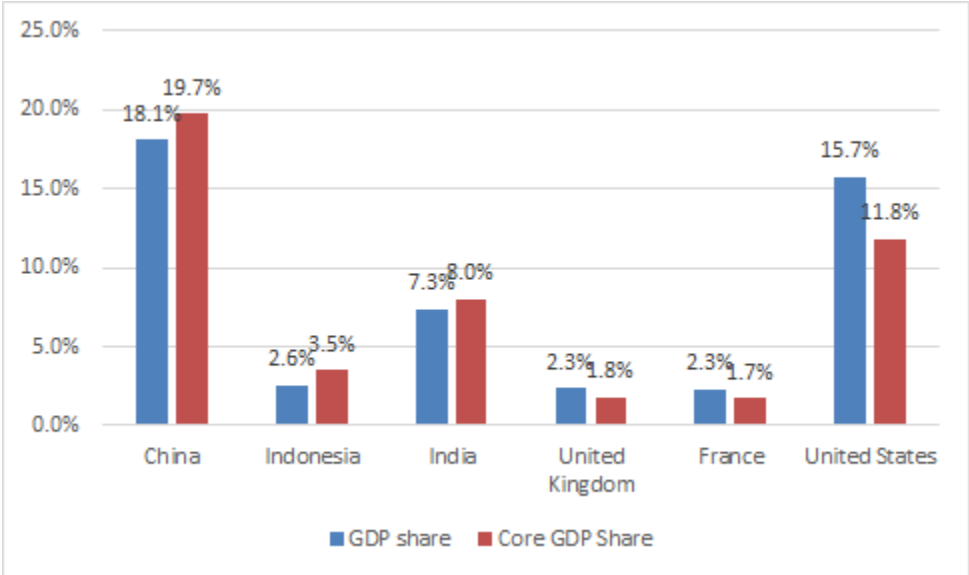
While hypothetically, there could be some economic incentives for low-income countries to remain 'low income' in order to access concessional lending from the World Bank, the IMF, and bilateral lenders, low-income and lower-middle income countries often make it a national priority to move up the income-ladder which in turn is thought to attract funds from commercial banks and investors (Jerven 2012a). Furthermore, political leaders have incentives to show to their populace that they are able to foster economic development, which a transition to a higher income-category could do. For example, before Nigeria revised its GDP in 2010, it had announced that middle-income status was a 'political target' (Jerven 2012a:140). In this case, growth is not just about creating jobs or sustained economic production, but actually a target in itself that makes politicians look good.

Given that countries wish to demonstrate economic strength, how GDP is measured could then have implications for the kinds of policies governments pursue in order to increase their GDP. This is in line with Speich's (2011) observation that economic statistics are prominent agents of societal change, as they can shape what kinds of activities come in focus (see also Seers 1972, who sees GDP and other development indicators as subject to targets for planning). For example, while the measure of Core GDP as explained above would likely motivate countries to focus their production on traditional sectors such as manufacturing, utilities, infrastructure and related services, the new versions of GDP open up a variety of routes bypassing industrialization in which countries can increase their GDP, including through housing bubbles, increasing financial activities, increasing R&D investments, and more weapons production – not

all of which would necessarily be boosts to employment or development more generally, and certainly not along the inclusive and sustainable growth envisioned in the 2030 Agenda and the SDGs.

At the international level, an obvious example of institutions in which GDP measurement matter are the IMF and the World Bank. How votes in these institutions are determined vary by agency, but as mentioned, the economic weight of the countries in the world economy is one of the issues that determines a country’s voting share. While Wade (2013) argues that the Western countries keep the lead in international organizations by deliberate manipulation of how votes are distributed, we identify a more subtle form of manipulation. Reforming how GDP is measured to fit the strengths of Western economies also gives benefits to these same countries in institutions that rely on economic size in their determination of votes.

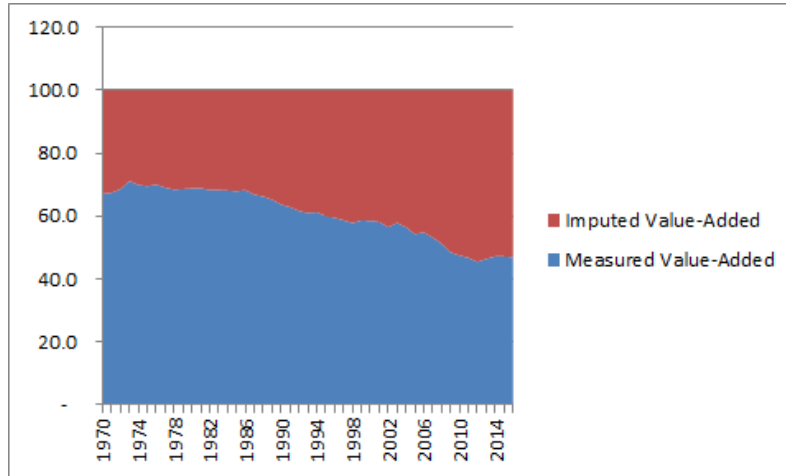
Figure 31: Alternative Shares of Global Economy, GDP vs. Core GDP



Source: Authors’ calculations based on GDP shares from the United Nations Main Aggregates Database (<https://unstats.un.org/unsd/snaama/dnlList.asp>) and GDP in \$PPP from the World Bank.

The changes in national accounting standards also have serious implications for admittance to international organizations such as the E.U. As mentioned in the introduction, SNA 93 made the Greek government deficit look smaller, by inflating the denominator (GDP) compared to SNA 1968. More broadly, Greece’s economy has gone through structural changes with an increase in imputed value-added industries, surpassing measured value-added activities in 2009 (see figure 32).

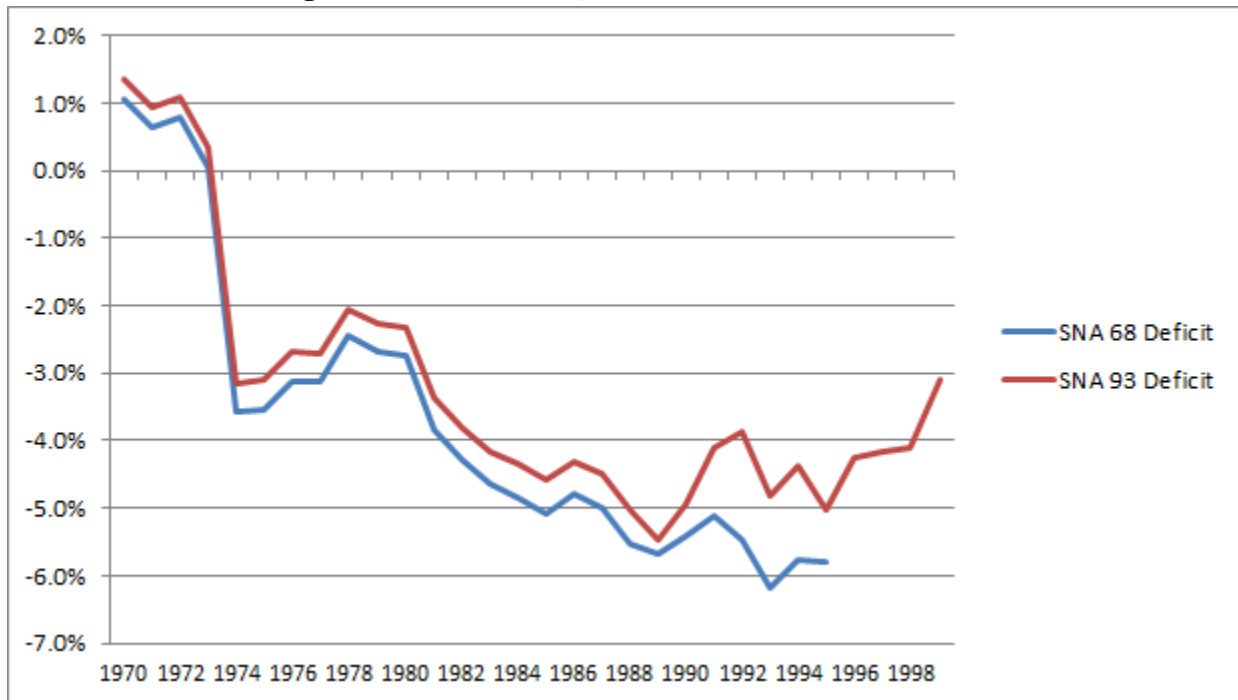
Figure 32: Imputed vs. Measured Value-Added as a % of Greek GDP



Source: Authors' calculations based on GDP shares from the United Nations Main Aggregates Database (<https://unstats.un.org/unsd/snaama/dnlList.asp>) and GDP in \$PPP from the World Bank.

The rising proportion of imputation has inflated GDP, which is the denominator in the Deficit-to-GDP ratio, and as a result Greek deficits looked milder under SNA 93 than they would have under the earlier, SNA 68:

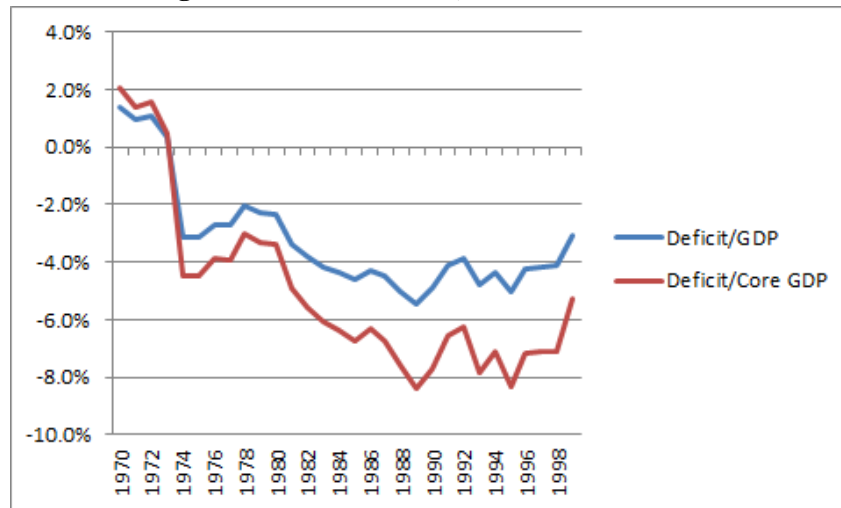
Figure 33: Greek Deficit, SNA 68 GDP vs. SNA 93 GDP



Source: United Nations, Main Aggregates and Detailed Tables (MADT) database, Table 202, http://data.un.org/Data.aspx?d=SNA&f=group_code%3a202 (last accessed June 2018).

Taking out all imputations (using Core GDP), the picture is even more dramatic, as illustrated in figure 34.

Figure 34: Greek Deficit, GDP vs. Core GDP



Source: United Nations, Main Aggregates and Detailed Tables (MADT) database, Table 202, http://data.un.org/Data.aspx?d=SNA&f=group_code%3a202 (last accessed June 2018).

It appears likely that, had the EU considered the ratio of government deficit to *Core GDP* rather than GDP in Greece, the country may not have been admitted to the Eurozone (given the Maastricht Treaty criteria of no more than 3% Deficit-to-GDP).

In addition, GDP growth plays an important role in the Sustainable Development Goals (SDG) agenda, as over 8% of the indicators use GDP (19 of 232). For example, consider Goal 8 to ‘Promote sustained, inclusive and sustainable economic growth’. Target 8.1 calls for a 7% annual GDP growth rate per capita in the least developed countries. And while Target 8.2 is about achieving higher productivity through diversification, technological upgrading and innovation through focusing on high-value added and labor-intensive sectors, the indicator of this target is reduced to GDP growth per employed person. As shown in the previous section, there is no obvious connection between GDP and productivity or diversification, and therefore the indicator could be satisfied by routes that would not satisfy the target (e.g. through growth in the financial sector or increased commodity prices)¹⁶. Although governments in developing countries may not be directly incentivized by SDG goals and targets¹⁷, relying on standard GDP as a measure of the SDGs is fraught with potential mismeasurements.

As GDP is used as a measure of growth and is analyzed in relation to a lot of other economic features and policies, using a measure of GDP that is not a true reflection of economic production could be problematic. For example, economists have tirelessly tried to identify what drives economic growth, often by running regressions of GDP growth (suggesting countries can ‘leapfrog’ from agriculture - past

¹⁶ A similar point was made in Valensisi and Gauci (2013), who show that even if all LDCs somehow manage to grow at 7% per annum, this GDP growth would be insufficient to generate enough employment for everyone seeking a job. Generally, this discrepancy between targets and goals runs through the SDGs, as also shown by Reddy and Kvangraven (2015).

¹⁷ Developing countries, as developed countries, tend to focus on the SDG targets that are in line with their national priorities anyway, as documented by Horn and Grugel (2018) in the case of Ecuador.

industrialization - directly to services¹⁸. GDP thus forms the epistemic basis for economic research and policy decisions. Indeed, the way growth is measured has important implications on the types of sectors that are considered growth-enhancing. For example, IMF (2018) has recently argued that declining share of manufacturing jobs need not hurt growth and that services could be considered the new engine of growth¹⁹. Such arguments must be theoretically and empirically scrutinized closely, as one can easily be misled by what drives growth by using a misleading measure of growth.

In fact, there have been calls for the cultural analysis of the history of economic knowledge to be its own sub-field of Economics, because we often take the epistemic practices of economic knowledge production for granted (Schatzki et al. 2001, Schabas 2002, Speich 2011). This history is of course closely related to national accounting and bookkeeping techniques. While economists and the public at large tend to see numbers as more precise than qualitative evidence of economic growth, there are many times – especially with GDP – that producing one single number to represent economic output may obscure more than it clarifies (Jerven 2012b).²⁰

6. Conclusions

Given how central GDP is to economic reporting, economic research and generally for our perception of growth in the world, unpacking how exactly GDP is measured and how this has changed over time is crucial. This paper traces the changes in GDP through time and discusses the implications of these changes. The findings of our paper are twofold: 1) the standards of measuring GDP have changed drastically and through an imperfect technocratic process over the past decades in ways that are not consistent with any economic theory, but that undermine public debate about what constitutes the economy; and 2) these changes have a significant impact on the perceived growth rates relative strengths of different countries in the world.

When it comes to the second point, this paper demonstrates that the changes made to GDP measurement over the past five decades are not random. They systematically favor economic structures that are more likely to be found in advanced countries, thus making their growth rates look higher and their relative strengths larger. As we show, these changes have a significant impact on the convergence debates, as they camouflage the reduction in directly-measurable economic activities in advanced countries. Without the imputed values of some service sectors, the non-Western world has in fact caught up with the West to a larger extent than what current measures of GDP suggest. We therefore argue that changes in GDP

¹⁸ This has been referred to as the ‘growth regression industry’ by Durlauf et al. (2005).

¹⁹ This report was criticized by Chandrasekhar (2018), among others.

²⁰ There are also well-documented problems associated with GDP measurements in developing economies (Dawson et al. 2001, Johnson et al. 2009, Ciccone and Jarocinski 2010, Jerven 2012b). For example, while GDP is often presented as a clean and clear-cut statistic, there are many reasons for why it could be highly inaccurate, especially in a developing country context. For example, in 2010 Ghana announced that it was revising the GDP estimates upwards by over 60%, and in 2011 Nigeria announced that it was making a similar upwards revision (Jerven 2012a). With Ghana’s statistical revision, it literally became a lower-middle income country overnight. While many in the development community saw this revision as good news that the African country is no longer as poor as people thought (see e.g. Moss 2010, Kenny and Sumner 2011), the United Nations Development Program representative in Ghana argued that Ghana is still lagging behind on most development indicators and that the middle income status is a ‘statistical hypothesis’ (UNDP 2011).

measurement constitute a form of ‘kicking away the ladder,’ by measuring growth according to the structure of production of advanced countries, rather than consistently measuring actual production in the economy. In addition, the paper takes a novel approach to measurement of convergence by adopting a measure of ‘core GDP’ - that is GDP measured by goods and services for which value-added can be directly measured rather than imputed based on incomes. Analyzing convergence with this measure of GDP suggests that core developing economies have had higher growth than what is usually assumed, and that they are catching up with advanced economies at faster rates than what is commonly believed.

Furthermore, we find that the change in GDP measurement has real and important political and economic effects. For example, developing economies are given smaller voting shares in international institutions than they would otherwise be able to demand based on the older measures of GDP and new measures of GDP made it possible for countries to join the EU, which otherwise may not have been admitted (e.g. the case of Greece). Finally, the contemporary measure of GDP has become decoupled from core employment-generating activities and goods actually produced - and is therefore a misleading measure of growth in an economy. We therefore think it is time to increase transparency in changes to measures of GDP and bring the debate about what constitutes value to the public sphere.

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