



Measuring the Labor Share of Developing Countries: Challenges, Solutions, and Trends

Katharina Trapp (University of Göttingen and GIGA Hamburg, Germany)

Paper Prepared for the IARIW 33rd General Conference

Rotterdam, the Netherlands, August 24-30, 2014

Session 4D

Time: Tuesday, August 26, Afternoon

Preliminary Draft - Please do not cite or quote



Measuring the Labor Share of Developing Countries

Challenges, Solutions, and Trends

Katharina Trapp

katharina.trapp@giga-hamburg.de

Ph.D. Candidate

Chair of Development Economics

Platz der Göttinger Sieben 3

37073 Göttingen, Germany

Junior Research Fellow

GIGA

Neuer Jungfernstieg 21

20354 Hamburg, Germany

14th August 2014

Abstract

This paper focuses on challenges in measuring the labor share of developing countries, identifies solution approaches and applies the latter to construct a data set on the labor share data of developing countries.

The labor share is a highly informative macroeconomic variable to explore when analyzing inequalities in income within and across countries. Not least because of the recent publication by Thomas Piketty (2014), the labor income share, which simply is the ratio of compensation of labor to gross domestic product, has been put back on the international agenda. Measuring the labor share of developing countries is, however, fraught with major challenges. Most importantly, the poor availability and reliability of national account data in these countries renders computation of the labor share difficult. Furthermore, the necessary estimation of the labor income of the self-employed is complicated by the fact that self-employed in developing countries typically represent a high fraction of the labor force and are often located in the informal sector.

This paper is the first to address these difficulties and special needs of developing countries when measuring the labor share. Literature is reviewed and social accounting matrices studied to face the associated challenges and to construct a labor share data set that is backed up with micro-economic evidence. By this means, this paper seeks to contribute to research on the development of the labor share in low and middle income countries which is a clear gap in economic literature. First descriptive results show a significant downward trend for the labor share of developing countries since the early 1990s.

Keywords: Labor Share, Income Distribution

JEL Classifications: E25, O15

Contents

1	Introduction	1
2	Data Review	3
3	Measuring the Labor Share of Developing Countries	7
3.1	Challenges	7
3.2	Self-employment in Developing Countries	8
3.2.1	Literature Review	8
3.2.2	Social Accounting Matrices	9
3.2.3	Conclusion	13
3.3	Constructing the Labor Share	14
4	Descriptive Results	18
4.1	Trends in the Labor Share Over Time	18
4.2	Differences across Regions and Income Groups	19
5	Conclusion	20
A	Appendix	22
A.1	Countries Included	22
	References	23

List of Figures

3.1	Probability Density Function of the Labor Share (from SAMs) . .	11
3.2	Agricultural Employment Shares by Region	15
3.3	Different Gollin Adjustments	16
4.1	Trend in Labor Share Over Time	18
4.2	Regional Labor Shares	19
4.3	Labor Shares by Income Classification	20

1 Introduction

The labor share is a highly informative macroeconomic variable to explore when analyzing inequalities in income within and across countries. Not least because of the recent publication by Thomas Piketty (2014), the labor income share, which simply is the ratio of compensation of labor to gross domestic product, has been put back on the international agenda. However, to date, there is no compiled and adjusted panel data set available that addresses the peculiarities of developing countries when measuring the labor share. As a consequence, research findings on the development of the labor share in low income countries remain incomplete which is a clear gap in the economic literature. By exploring the challenges associated with the measurement of the labor share in developing countries and presenting possible solutions, this paper intends to take a first step towards closing this gap.

The labor share reflects how much of national value added accrues to labor and consequently measures the functional income distribution. The functional income distribution directly relates to the personal income distribution through factor ownership and therefore is also known as factor income distribution (Ray 1998). Regressive redistribution of factors (most importantly labor, capital and land) and their remuneration will be felt especially strong in developing countries due to weak social safety nets. According to Dani Rodrik (2013), deindustrialization of employment is under way throughout the world, including most low income countries. This decline in manufacturing employment, however, also implies less income opportunities for the poor. This exemplifies how the labor share can be applied to investigate the underlying determinants of inequality and poverty. As such, the labor share can also help to design policies for social protection and tax systems as these usually target at the factor income distribution (minimum wage policies, tax concessions for investments etc.).

Most studies rely on the relation of compensation of employees to GDP from national account statistics when measuring the labor share. A key problem of this simple definition is the fact that compensation of employees does not include the labor income of the self-employed, which is a relevant fraction of the labor force in developing countries. An additional difficulty arises from the fact that many self-employed in developing countries are located in the informal sector. Eventually, developing countries give reason for concern about the scope, detail and quality

of their national accounts (United Nations 2012). The adjustment of the labor share hence requires more prudent handling in the case of less developed countries. Furthermore, the fact that the economic structure of developing countries fundamentally differs from the ones of high income economies makes separate assumptions and estimates indispensable. For example, self-employed in OECD countries are more likely to have consciously decided to enter self-employment while it may be a business out of necessity for workers in the developing world. This paper addresses these special requirements by reviewing empirical and theoretic literature and by drawing on social accounting matrices (SAMs). Thematic literature is reviewed to study the characteristics and composition of self-employed as well as the informal sector in the developing world. SAMs provide detailed data on all the economic transactions that take place within an economy. Insights are used to counter-check the reliability of macro-economic data and to formulate assumptions required for measuring the labor share. By this means, the macro-level data set is backed up by micro-economic evidence. The final data set covers about 100 developing countries from 1990-2011.

The data is used to investigate global trends in the development of the labor share over time as well as differences across developing regions. First descriptive statistics show that labor's relative income in developing countries has been declining since the early 1990s by about 7 percentage points, indicating that global labor income has been lagging behind overall productivity increases. This effect holds true for all major developing regions and is independent of a country's development stage.

The paper is organized as follows: Section 2 reviews existing data on the labor share in OECD countries and worldwide and elaborates on major empirical results from the corresponding literature. Section 3 discusses challenges in measuring the labor share in developing countries and studies literature and SAMs to develop solution approaches that are applied to construct the labor share in a following step. Section 4 provides first descriptive statistics on the labor share in the developing world. Section 5 concludes.

2 Data Review

The labor share reflects how much of national income is earned by labor and hence measures the factor income distribution of a country. It is defined as the fraction of value added that accrues to labor. Assuming that value added is given by $Y = f(K, L, N)$, where K is capital, L labor and N land used in production, the income distribution between production factors is given by:

$$Y = \frac{w}{P} \times L + \frac{i}{P} \times K + \frac{r}{P} \times N, \quad (2.1)$$

where w is wage, i the interest rate, r rent and P the price level. The labor share LS then can be expressed as:

$$LS = \frac{w \times L}{P \times Y}. \quad (2.2)$$

The labor share can be computed from national accounts statistics. The empirical literature usually starts out from the relation of compensation of employees (*CoE*) from the primary distribution of income accounts to GDP, drawing on the United Nations System of National Accounts (UN SNA) National Accounts Official Country data:

$$LS = \frac{CoE}{GDP}. \quad (2.3)$$

As pointed out by Krueger (1998) and Gollin (2002), a key problem of this simple definition is the fact that compensation of employees does not include the labor income of the self-employed. As a consequence, the income of the self-employed is mistakenly treated as only consisting of capital income and is added to the denominator of equation 2.3 but not to the numerator, which biases the labor share downwards. Furthermore, in a dynamic perspective, *ceteris paribus* shifts in the composition of employment automatically change the labor share. In developing countries, this typically is the movement away from subsistence agriculture to wage labor (Gollin 2002). The labor income of formerly self-employed suddenly appears in employee compensation statistics, raising the labor share, even though labor income has effectively not changed (or only very little). It is therefore essential to adjust this measure such that it does not only reflect the share of national income that is earned by employees but the entire share that accrues to labor input, regardless of how it was earned. UN SNA lists the remuneration of the self-employed as mixed income which - as the term already

suggests - includes income of labor, capital and land (UN et al. 2008). By using this item and filtering out its labor income component which is then added to the employee compensation, a meaningful measure of the labor share can be obtained. Gollin (2002) presents three possible approaches in this regard.

First Adjustment: Mixed income of the self-employed (MIX) is completely added to CoE assuming the income of the self-employed to be only composed of labor income:

$$LS_{adjusted}^{G1} = \frac{CoE + MIX}{GDP} \quad (2.4)$$

As this procedure ignores income from other factors of production, it is likely to overestimate the labor share.

Second Adjustment: The second adjustment assumes mixed income to consist of the same mix of labor and other factor income as the rest of the economy:

$$LS_{adjusted}^{G2} = \frac{CoE}{GDP - MIX} \quad (2.5)$$

This approach is straightforward but disregards that capital, land and labor shares might vary substantially across sectors and with the size and structures of businesses. This adjustment is applied by Piketty (2014).

Third Adjustment: Gollin's third adjustment is based on the assumption that the average wage sum of the self-employed is equivalent to the average wage sum of employees, i.e. that total labor productivity of self-employed persons and employees is identical. Only income of the self-employed that exceeds the average wage sum is counted as income from capital or land. The raw labor's share in income is increased drawing on data on the employment structure:

$$LS_{adjusted}^{G3} = \frac{CoE}{GDP} \times \frac{TE}{E} = \frac{\frac{CoE}{E}}{\frac{GDP}{TE}}, \quad (2.6)$$

where E is number of employees and TE total employment, with $TE = E + S$ and S being the self-employed. While the naive labor share reflects the share of the *total* wage bill of employees in *total* value added produced in the respective country (GDP), the labor share computed using this third adjustment relates the wage *per* employee to the value added *per* employed person. It follows that the adjusted labor share in Equation 2.6 rises (falls) if the wage per employee grows faster (slower) than the productivity per employed person. It is hence closely

linked to the unit labor costs which relate average wages to overall performance, that is to productivity (Marterbauer and Walterskirchen 2003, 151). This third suggestion is the commonly used adjustment of the labor share and is applied by most of the international organizations (for example, it is published in the AMECO database of the European Commission).

The majority of the empirical literature on countries' labor share (Bentolila and Saint-Paul 2003, Guscina 2006, Hutchinson and Persyn 2012, Jaumotte and Tytell 2007, Richardson and Khripounova 1998, Slaughter 2001, and others) is restricted to OECD countries, where the data availability and quality is high. The studies find the labor share to be decreasing in these countries which is mainly explained with capital-augmenting technological progress and the specialization into capital-intensive commodities, an argument which is consistent with the expectations of the Heckscher-Ohlin model and Stolper-Samuelson theorem (Heckscher 1919, Ohlin 1933, Samuelson 1948, Stolper and Samuelson 1941).

Some other studies (e.g. Diwan 2001, Harrison 2005, Jayadev 2007, Rodriguez and Jayadev 2010, Karabarbounis and Neiman 2013) include industrialized as well as developing countries into their analyses. They use UN SNA data to compute the naive share as well as Gollin's first and second adjustment and provide evidence of a worldwide declining labor share over time. Their data, however, only covers a few low income countries as just a handful of them report mixed income data. The recent study of Karabarbounis and Neiman (2013) covers more developing countries but this is against the backdrop of an exclusion of the unincorporated sector (i.e. the self-employed).

The work of Inklaar and Timmer (2013) is the first covering a broad range of low, middle and high income countries (in total 127 countries). Their data confirms the finding of worldwide decreasing labor shares. They develop a best estimate labor share for the PWT database that chooses the most appropriate from the above three adjustments given the country-specific data situation. The expansion of the scope of countries is possible through the use of total value added in agriculture as proxy for mixed income. Data comes from the ILO LABORSTA and World Input-Output database. Their framework, however, does not allow to verify the assumptions on which the measurement relies and to check the reliability of macro-economic data. Some risk remains that this mechanic approach incorrectly computes the labor share.

There is no study explicitly exploring the development of the labor share in low and middle income countries. This is a clear gap in the literature as the special economic structures and endowments of developing countries require a distinct model as well as a separate empirical investigation. This neglect is mainly because of the poor data availability in these countries. The fact that mixed income as well as the share of self-employed is only reported by a few developing countries makes it difficult to provide a comprehensive data base because these data are needed to apply either of the three adjustments suggested by Gollin.

3 Measuring the Labor Share of Developing Countries

In this paper, I focus on the challenges in measuring the labor share of developing countries (3.1) and present possible solutions (3.2). Goal of this paper is to construct a reliable data set on the labor share in developing countries (3.3).

3.1 Challenges

The crucial problem in constructing a panel data set on the labor share is the limited availability of national account data in developing countries. The item 'compensation of employees' is available for about two thirds of low and middle income countries. They report the data in the UN SNA on a regular basis since 1990. Data on mixed income, which is needed to compute the first and second Gollin adjustment, however, is lacking for the majority of countries as small businesses and agricultural households are difficult to capture. Similarly, data on the employment structure is scarce. The share of self-employment in total employment is needed for Gollin's third correction but even this less demanding data is only provided for a fraction of developing countries, for example by World Bank World Development Indicators (WB WDI). So while data on the corporate sector is available, a systematic recording of small-scale businesses is missing.

These data constraints require to select proxy variables for either mixed income or the proportion of self-employed in the workforce. This, in turn, involves making assumptions about the characteristics and composition of self-employed as well as their factor intensities and productivities. The recently published Version 8.0 of the Penn World Table uses total value added in agriculture as proxy for mixed income (Inklaar and Timmer 2013). This adjustment is based on the assumption that most of self-employed income stems from agricultural production, with labor being by far the most important input factor. It ignores the factors capital and land in agriculture and further disregards labor income from other forms of self-employment. Choosing a proxy for either the number of self-employed or their earnings needs to be performed with utmost care, especially since - in contrast to advanced economies - an average of almost 50 percent and up to 90 percent of the working population in developing countries is self-employed (World Bank 2013). As an additional challenge, most of these self-employed belong to the informal sector.

Finally, developing countries give reason for concern about the scope, detail and quality of their national accounts (United Nations 2012). For example, it is not immediately obvious what is covered by the items 'compensation of employees' and 'mixed income' of the self-employed as they are not always standardized with international guidelines (i.e. SNA 2008). Ideally, national account data should cover the informal sector but due to its very nature accounting often fails to do so. So given the lack of consistency and reliability, developing countries' national accounts should be processed with caution.

To address these challenges, I do not rely exclusively on macro-level data, as previous studies have done, but use empirical and theoretical literature as well as social accounting matrices as additional sources of information. Related literature is consulted in order to study the background and conditions of the self-employed (3.2.1); SAMs are used to get additional insights about the factor productivities and intensities of the self-employed, to formulate final assumptions about their labor income and to counter-check the reliability of macro-economic data (3.2.2).

3.2 Self-employment in Developing Countries

3.2.1 Literature Review

The International Labor Organisation (ILO) defines employers, own-account workers, members of producer's cooperatives and contributing family workers as self-employed (International Labor Organisation 2014a). Self-employment is highly prevalent in developing countries. Although self-employment decreased over time, it still accounts for about two thirds of employment in the low and middle income countries (International Labor Organisation 2014c). The literature discusses two main reasons for a high share of self-employment in national employment: On the one hand, formerly employed people might wish to set up their own business and become their own boss; on the other hand, workers may be forced into self-employment as they do not find an employment on the regular job market (Field 2014, World Bank 2013). While the first reason should be able to explain self-employment in high income countries, the second reason should prevail in the developing world. In fact, the formal job market in the low and middle income countries is relatively underdeveloped offering only limited opportunities. Furthermore, a high share of the workforce is poorly educated, causing difficulties to meet the job profiles. Only a limited number of workers are able to enter the labor market and for a significant part of the workforce, selfemployment may be

a means of last resort. By implication, self-employed people in these countries are likely to have received little or no education at all. This, in turn, suggests low labor productivities for this fraction of the workforce.

Another important determinant of self-employed factor income certainly is the sector of activity. Most self-employed work in the agricultural sector and are smallholder farmers (World Bank 2013). Outside agriculture, self-employment usually takes the form of own-account enterprises that primarily engage in wholesail or retail. A smaller share conducts light manufacturing, especially in rural areas where processing of agricultural products is common (Fox and Sohnesen 2012, Mead and Liedholm 1998). Due to the availability of family labor, smallholder farming is more labor-intensive than large-scale agriculture (World Bank 2013). Literature even finds an inverse relationship between farm size and productivity, attesting that smallholders are often relatively more productive even though they cannot afford as many capital inputs as the larger farms (*ibid*). This finding, however, remains puzzling and has only been observed in South Asia and Sub-Saharan Africa. Own-account enterprises, on the other hand, are less productive than their larger counterparts: They produce less per unit of labor and accordingly pay out lower wages (World Bank 2013). This corresponds to their low educational attainment but is also due to their limited access to (financial) capital.

Furthermore, self-employment in developing countries is considered vulnerable as its remuneration is entirely dependent on self-made profits while a formal contract and support by a social system is usually missing (International Labor Organisation 2014b). As a consequence, self-employed in developing countries face a high risk of being active in the informal sector. This risk is especially high in Africa, Asia, Latin America and the Caribbean (*ibid*). The fact that self-employment often goes hand in hand with informality recommends to also search for the self-employed workers in the so-called economy. UN SNA standards demand to record this part of the economy but the exact coverage of the informal sector is of course fraught with problems as it can only be estimated (OECD 2004, chapter 5).

3.2.2 Social Accounting Matrices

A SAM is a square matrix that represents flows of all transactions that take place in an economy. Rows display the income of an account while columns denote its expenditures. SAMs draw a comprehensive picture of the economy and thus can

reveal a country's economic structure more than national accounts can do. They are constructed by matching and complementing national accounts, input-output tables, labor force surveys, household surveys et cetera. As SAMs disaggregate by sector and type of employment, they make the sectoral composition of labor visible. By this means, SAMs can be used to identify the sectors of the self-employed as well as the corresponding productivities and factor intensities. This information can be used as basis for a suitable estimation of the labor income of the self-employed. Unfortunately, SAMs are not available at large scale but the International Food Policy Research Institute (IFPRI) and the UN Development and Analysis Division (UN DESA) freely provide some data for developing countries. In addition, there are several country case studies available from various sources. Usually, the cross-entropy approach is applied to develop SAMs. This method exploits scattered and inconsistent data in a highly flexible and efficient way and thus can deal with the poor data situation of developing countries (Robinson, Cattaneo and El-Said 2001). Since SAMs are usually only constructed at large time intervals, the data mostly covers one observation per country.

SAMs can help to understand the substance of self-employed in two ways.

First, national factor income shares are extracted from SAMs, thereby compiling a small pool of data on the labor share. To ensure comparability, I restrict the data to SAMs from IFPRI and UN DESA who both apply the cross-entropy approach. Together, they provide 51 SAMs for 45 developing countries. Unfortunately, the size of the data pool is too small to conduct large-scale comparisons and correlations with the adjusted labor shares obtained from national accounts. Nevertheless, this data provides important basic descriptives about the size and distribution of labor shares in developing countries. Summary statistics of the 51 country-specific SAMs display that the labor share ranges between 0.24 and 0.71, with a mean and a median of 0.46. It is normally distributed as shown in Figure 3.1 which provides its probability density function obtained from Epachenikov kernel density estimates. This information may be used to counter-check the reliability of national account data at a later stage.

Second, I take a close look at individual SAMs from the three major developing regions Asia, Africa and Latin America. I decided to take studies on Zambia, Indonesia and Bolivia as example since these come along with a detailed analysis on income distribution. This is to exemplarily investigate in which sectors the self-

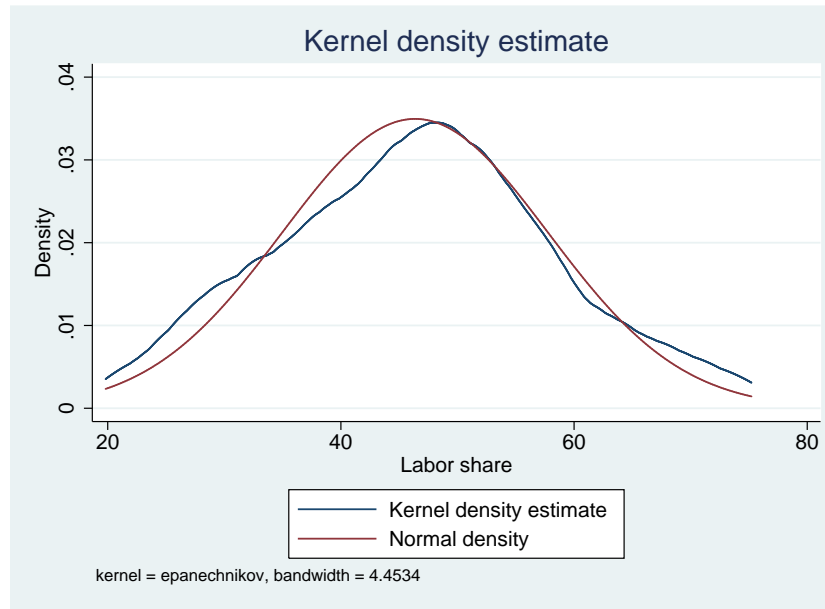


Figure 3.1: Probability Density Function of the Labor Share (from SAMs)

employed work, how their factor productivities and intensities look like and finally how high their labor income share is. Insights are used to develop assumptions about self-employment income when adjusting the labor share on the macro-level using national account data. The information content of micro- and macro-level data are hence optimally exploited.

The Case of Indonesia Yusuf (2006) constructs a SAM for Indonesia for 2003 which provides a detailed study of the factor distribution of incomes. He imputes wages for the self-employed workers by identifying the average wage in the corresponding corporate sector for a similar type of labor (according to skills, sector and urban-rural location) and multiplying it with the number of working hours. In this way, he can ascertain the labor and capital share of self-employment income ('mixed income' in UN SNA). This strategy is also applied by Ivanic (2004) and others. His distributional analysis reveals that self-employment is more prevalent in rural than in urban areas. Furthermore, it shows that self-employed in Indonesia primarily work in agriculture, some engage in retail and the hospitality industry (hotels and restaurants) whereas they are rarely found in the mining, manufacturing (except for food manufacturing), electricity, gas, water and textile industry. The sectors in which self-employment prevails are also the labor-intensive ones: The agricultural and hospitality sector have a labor share above 0.6; the labor share of the retail sector is at 0.58. At the same time, mining has the lowest labor share (below 0.2); the electricity, water and gas sector has a labor share slightly

above 0.2 and the manufacturing and textile industry of about 0.4. His analysis can also provide some guidance regarding labor productivity. Assuming that the skill content of labor correlates with its productivity, labor productivity in agriculture is very low. The skill content of the other sectors is much higher, with retail and hospitality even having the highest shares. Unfortunately, the study does not reveal the land income share of the self-employed workers.

The case of Zambia Thurlow et al. (2004) who present a 2001 SAM for Zambia is taken as an example for Sub-Saharan Africa. Their study includes land as production factor and further distinguishes between different skill types of labor (unfortunately not employment types). They show that the agricultural sector has an average land share of 0.07, an average capital share of 0.2 and an average labor share of 0.73. It is further distinguished between small, medium and large-scale farms: The labor share of agricultural production decreases and the capital share increases with the farm size while the land share does not show a specific pattern. What is also striking is the fact that most of labor in smallholder farming is uneducated, while the skill content of labor is higher for larger farms. Smallholder agricultural has by far the highest labor share, followed by the tourism industry and other private services. Retail, which the empirical literature emphasizes as another important income source of the self-employed, is bundled with transportation and displays a labor share of about 0.37. The other industries (especially mining, manufacturing, electricity and water and financial services) have much lower labor shares. Urban self-employed and employers have a high capital share compared to employees. At the same time, the urban self-employed have a relatively poor education suggesting lower productivities.

The case of Bolivia Finally, we take a look at a 1997 SAM for Bolivia by Thiele and Piazzolo (2002) as it focuses on household and factor income distribution. Unfortunately, the SAM separates unincorporated income only into mixed income and employers' profits but not further into their returns to capital, land and labor. Self-employment mixed income is mainly generated in traditional agriculture, followed by trade, the hospitality sector and other services. Employers are mostly active in modern agriculture and the service sector, especially transport. A small share of both forms of self-employment engages in the food processing industry. By contrast, the sectors of mining, coca, capital goods and construction are dominated by wage employment. The distribution of factor to household income further reveals that smallholders and urban self-employed (excluding employers)

are worst off which is a further indication to a low productivity.

3.2.3 Conclusion

The literature review as well as the consultancy of SAMs allows for major conclusions about the labor income of the self-employed in developing countries, given by $LI^{SE} = w^{SE} \times L^{SE}$.

- Typically, the self-employed in developing countries work in agriculture, followed by retail and light manufacturing; they hardly appear in the sectors of mining, manufacturing and textile.
- The sectors in which the self-employed are active are also the labor-intensive sectors (high L^{SE}).
- In a given sector, self-employed further pursue a more labor-intensive strategy than larger firms (especially in the agricultural sector): $L^{SE} > L^E$.
- There is evidence that the self-employed have much lower skills and less education, suggesting that they are less productive per unit of labor than the employed staff: $w^{SE} < w^E$. This seems to be true for both self-employed inside and outside agriculture.
- Up to here, it is not clear whether the final labor income of self-employed is higher or lower than that of the employees as labor intensity and labor productivity of the self-employed pull labor income into different directions.
- However, both SAMs and literature ascertain that self-employed in DCs are worst off. This may be a sign of a low factor income compared to that of wage employees. An exception are urban employers who are small in number though. This result is also contradicted by the inverse-productivity-hypothesis put forward in the context of Sub-Saharan Africa and South Asia. It can be carefully concluded that self-employed labor-income is equal or lower than that of employees: $LI^{SE} \leq LI^E$.
- At the same time, it is found that self-employed earn income from capital as well as from land (primarily in agriculture). This non-labor income is reasonable but not too high, with the result of a comparatively high labor share: $LS^{SE} > LS^E$. An exception are urban self-employed, especially employers, who have a higher capital share but are also small in number.

3.3 Constructing the Labor Share

Insights from the exercise above provide the basis for the construction of the labor share. As has been outlined by Gollin (2002), there are three different options when adjusting the labor share for self-employment (see Section 2).

Gollin's first proposition, which treats all self-employment income as labor income, overestimates the adjusted labor share. Although the labor share in self-employed sectors is quite high, income from capital and land should not be excluded. For example, the non-labor share in agriculture in Zambia and Indonesia amounts to $1/4$ and $1/3$ respectively.

Another option is to apply Gollin's second modification, which assumes self-employed income to contain the same mix of capital and labor income as the rest of the economy. This, by contrast, underestimates the labor share as it has been shown that self-employed work more labor-intensively than the other workers.

Gollin's third alternative imputes the average wage sum under wage employment to the self-employed assuming that the labor income of both groups is the same. This adjustment appears fairly straightforward, given that self-employment on the one hand is labor-intensive and on the other hand comparatively unproductive. There are, however, also signs that self-employed in the developing world are low-income earners which may again bias the labor share upwards.

When adjusting the labor share, it must also be kept in mind that this exercise is challenged by the low data availability and reliability in these countries (see Section 3.1). While economies report national GDP and total corporate labor income, data on the *sum* of self-employment income as well as on the *number* of self-employed is missing for most of the developing countries, not to mention data on the distribution between income from labor, capital and land.

Bearing in mind the strengths and weaknesses of the different adjustments as well as the data problems, I present the most efficient labor share for developing countries in the following.

As a basis, I rely on Gollin's third adjustment, using the agricultural employment share as a proxy for the fraction of self-employed in total employment. The assumption behind this adjustment is not too far-fetched and data availability renders it the most efficient. Data on the agricultural employment share is provided for almost all developing countries by either WB WDI or the Food and Agricultural Organization of the UN (FAOSTAT) (see Figure 3.2). The strength

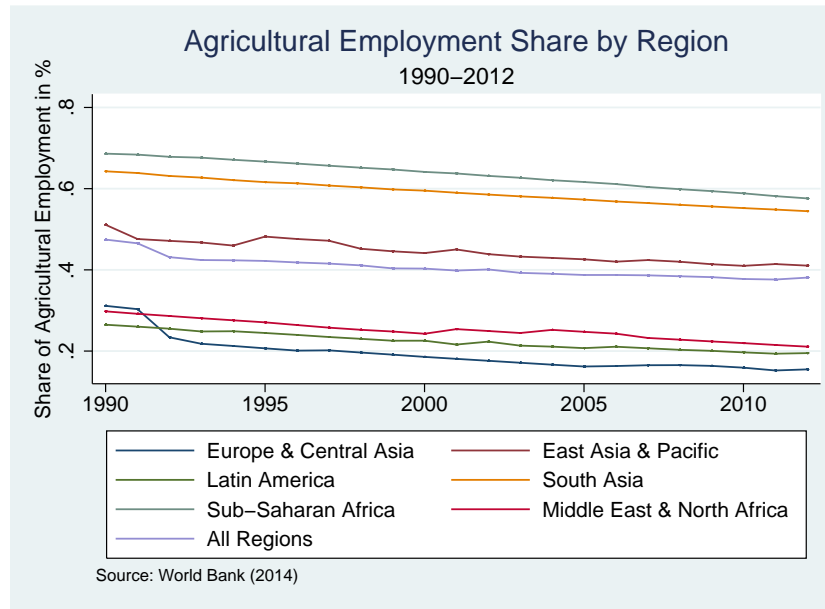


Figure 3.2: Agricultural Employment Shares by Region

of this proxy is the clear overlap of self-employment and agricultural employment, as highlighted in 3.2. This close connection is also confirmed by a correlation between data on national agricultural employment and self-employment shares (wherever it is available) which shows a coefficient of 0.80. Comparing the thus obtained labor share to Gollin’s corrections based on mixed income furthermore shows that over 80 % of the observations lie between Gollin’s first and second adjustment or below. Given that it is more likely to overestimate the labor share employing Gollin’s third correction, this approach seems to be reasonable.

In countries where mixed income is available, I further set Gollin’s first adjustment as upper and Gollin’s second adjustment as lower limit of the labor share. Specifying the labor share to either Gollin’s first or second adjustment is rejected since the former is likely to overestimate and the latter to underestimate the labor share. Instead, I prefer to use mixed income data as a means of control that can channel the labor share based on Gollin’s third adjustment. As Gollin’s third adjustment remains the standard, this procedure also ensures comparability between countries which report mixed income and countries that do not.

It further has to be considered that an adjustment of the labor share overestimates the labor share of those countries that have already included the labor income of the self-employed into the source data. For example, Bhutan reports a relation of compensation of employees to GDP of about 0.9. Summary statistics

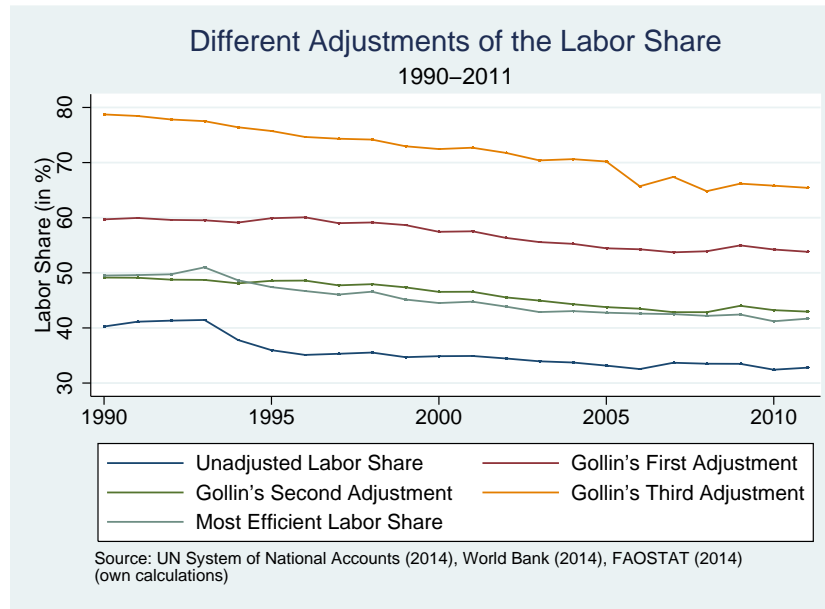


Figure 3.3: Different Gollin Adjustments

from the SAM data pool and from the labor shares using mixed income show that the labor share is never below 0.21 and never above 0.73. In order to avoid double adjustments, no further corrections are made for countries where the computation would lift the labor shares above 0.73.

The naive share is also used in communist countries (Soviet regime, Cuba, China, Russia) as literature and data suggest that private self-employment is hardly present in these countries, meaning that all labor income should be already subsumed under the item compensation of employees.

In some limited cases, the reported unadjusted labor share is very low (below 0.21) but at the same time, adjusting for self-employment would lift the labor share above 0.73 or even above unity. Most likely, this is the result of a measurement error by the statistical agencies. They may wrongly define self-employment and compensation of employees or incompletely record the (informal) self-employment sector, implying that Gollin's third correction adds a share of value added to the numerator which is not accounted for in the denominator. In order to deal with these cases, weights are computed so that self-employment labor income does not completely enter the labor share. This strategy prevents the loss of observations and allows to compute a labor share that takes into account trends in the corporate as well as self-employment sector.

In the light of the above insights and available data, the resulting labor share

renders the most efficient. The final dataset covers 100 low and middle income countries from 1990 until 2011. It is an unbalanced panel. Labor share data ranges between 0.05 and 0.9, with a mean and a median of 0.45. Comparing these summary statistics to the labor shares obtained from SAMs confirms that the construction of the labor share is on the right track.

Figure 3.3 illustrates the unadjusted labor share as well as the three Gollin adjustments and the most efficient labor share. The most efficient labor share is almost on the same level as Gollin's second adjustment and in between the naive labor share and Gollin's first adjustment. Gollin's third adjustment based on the agricultural employment share is on a very high level, which is the result of the double adjustment for countries where the unadjusted labor share already accounts for self-employment. For example, alone dropping Bhutan from the sample puts Gollin's third adjustment down to the level of Gollin's first adjustment. The unadjusted as well as all adjusted versions of the labor share show a decreasing trend in the labor share.

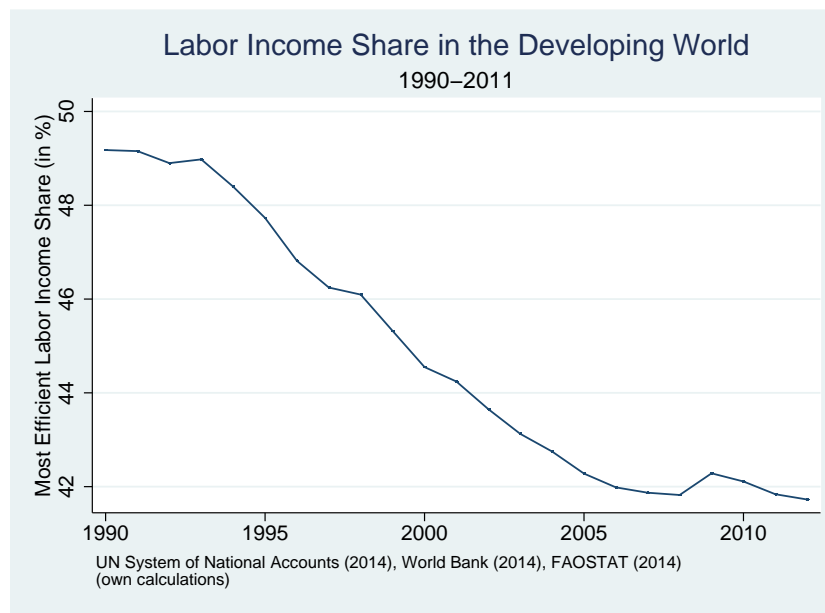


Figure 4.1: Trend in Labor Share Over Time

4 Descriptive Results

4.1 Trends in the Labor Share Over Time

It is a well-known fact that the labor share has fallen in high-income economies over the last two decades. This is mainly explained with capital-augmenting technological progress and the specialization into capital-intensive commodities in the course of globalization - an argument based on the factor-proportion models by Heckscher, Ohlin, Stolper and Samuelson. To the extent that labor is abundant in developing countries, one would hence expect the labor share in developing countries to rise with international integration. However, after having prepared the labor share data, a first important finding is that labor's relative income in developing countries has declined over time as illustrated in Figure 4.1. This result is in line with the other studies presented above and suggests that labor income is lagging behind overall productivity increases. In this way, it confirms Piketty's (2014) hypothesis that wealth grows faster than economic output as this phenomenon directly translates into a shrinking labor share.

The labor share is found to be stable in the early 1990s. Harrison (2005) reaches a similar conclusion and even finds a slightly increasing global labor share from the 1960s through 1993. The labor share starts declining with the end of the Cold War. In the post-1993 era, it falls in total by about 7 percentage points.

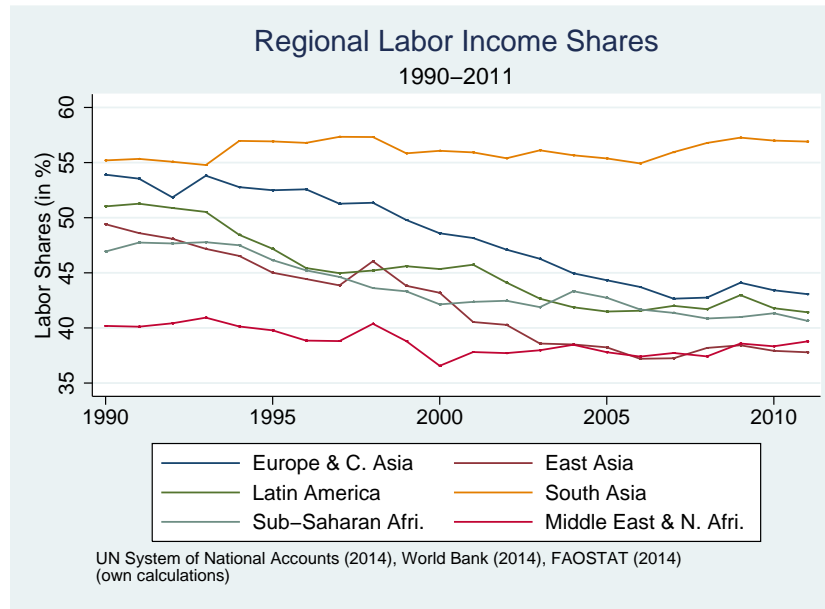


Figure 4.2: Regional Labor Shares

The labor share recovers slightly in the late 2000s in the course of the Global Financial Crisis of 2007-8 but continues falling afterwards.

The negative trend is also confirmed by a simple regression of the labor share on time: Regression results show that the labor share is falling by on average 0.45 percentage points per year.

4.2 Differences across Regions and Income Groups

As shown in Figure 4.2, this downward trend of the labor share has been present in all developing regions. An exception is only South Asia (Sri Lanka, Bhutan and India) whose level of the labor share is also comparatively high due to Bhutan data. The downward trend is most pronounced in Europe & Central Asia, Latin America & the Caribbean and East Asia and to a lesser extent in Sub-Saharan Africa and the Middle East & North Africa.

Figure 4.3 displays the labor shares for different income groups according to country classification by World Bank (2011). The downward trend is independent of a country's stage of development and similar for low income, lower middle income and upper middle income countries.

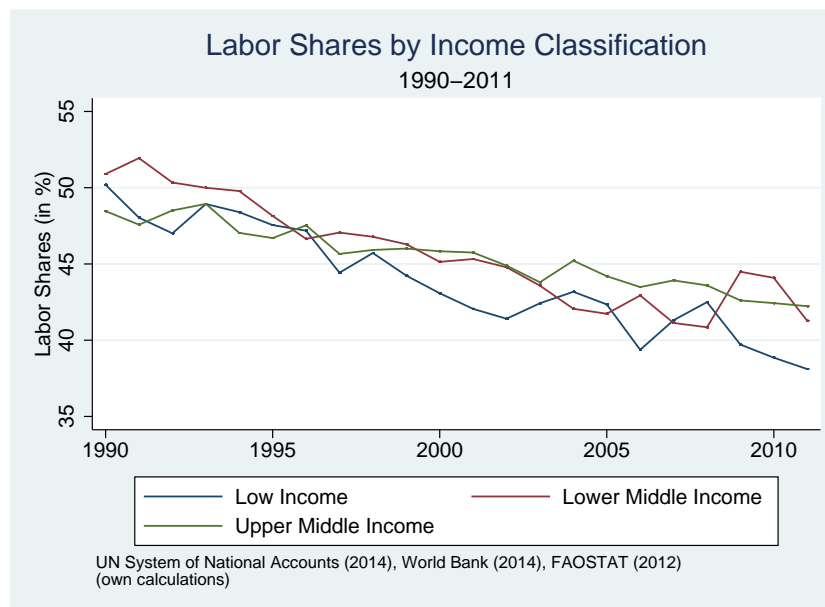


Figure 4.3: Labor Shares by Income Classification

5 Conclusion

The goal of this paper is to construct a labor share data set for developing countries. The measurement is substantially challenged by the poor data availability and reliability in these countries. An additional complication is the high share of self-employment and its overlap with informality. Before constructing the labor share from national account data, I address these challenges by consulting thematic literature and social accounting matrices. This is to study the essence of self-employment in the developing world and to integrate lessons learned into the process of computing the labor share. Furthermore, labor shares obtained from social accounting matrices enable to cross-check the reliability of macro-level data. By this means, this paper provides the first labor share data set for developing countries that is backed up by literature and micro-economic evidence. Basic descriptive statistics reveal a significant downward trend of the labor share over time. The results of previous studies, which only cover a limited number of low and middle income countries, can hence be transferred to the whole developing world.

This paper reveals that computing the labor share of developing countries is fraught with difficulties. However, giving up on its measurement cannot be the consequence. After all, research on the labor share is too important to be hampered by a poor data situation. Particularly in developing countries, knowledge

about the labor share can be used to develop poverty reduction strategies. In fact, the labor share does not only influence income inequality within a country but also has significant implications for aggregate demand and thus growth. It is hence recommended that national statistics offices increase their effort in gathering data on the (informal) self-employment sector. Future research on the labor share depends crucially on more stalwart and robust data. Counter-checking national accounts with micro-economic data can only be a second best option.

A Appendix

A.1 Countries Included

Algeria, Argentina, Armenia, Azerbaijan, Bahrain, Belarus, Benin, Bhutan, Bolivia, Bosnia and Herzegovina, Botswana, Brazil, Bulgaria, Burkina Faso, Burundi, Cameroon, Central African Republic, Chad, Chile, China, Colombia, Costa Rica, Cote d'Ivoire, Croatia, Cuba, Czech Republic, Democratic Republic of Congo, Djibouti, Dominican Republic, Ecuador, Egypt, Estonia, Fiji, Gabon, Georgia, Greece, Guatemala, Guinea, Honduras, Hungary, India, Iran, Iraq, Jamaica, Jordan, Kazakhstan, Kenya, Kyrgyz Republic, Lao People's Democratic Republic, Latvia, Lebanon, Lesotho, Lithuania, Macedonia, Malta, Mauritania, Mauritius, Mexico, Moldova, Mongolia, Morocco, Mozambique, Namibia, Netherlands Antilles, Nicaragua, Niger, Nigeria, Oman, Panama, Papua New Guinea, Paraguay, Peru, Philippines, Poland, Portugal, Republic of Korea, Romania, Russia, Saudi Arabia, Senegal, Serbia, Seychelles, Sierra Leone, Slovak Republic, Slovenia, South Africa, Sri Lanka, Sudan, Suriname, Tajikistan, Tanzania, Thailand, Trinidad and Tobago, Tunisia, Turkey, Ukraine, Uruguay, Venezuela, Zimbabwe

References

- Bentolila, Samuel and Gilles Saint-Paul (2003) “Explaining Movements in the Labor Share,” *Contributions to Macroeconomics*, Vol. 3(1).
- Diwan, Ishac (2001) “Debt as Sweat: Labor, Financial Crisis, and the Globalization of Capital,” *mimeo*, World Bank.
- European Commission (2012) “Annual Macro-Economic Database,” http://ec.europa.eu/economy_finance/db_indicators/ameco/index_en.htm, [access on 19th May 2012].
- Field, Gary (2014) “Self-employment and poverty in developing countries,” *IZA World of Labor*, Vol. 60.
- Fox, Louise and Thomas Pave Sohnesen (2012) “Household Enterprises in Sub-Saharan Africa - Why They Matter for Growth, Jobs, and Livelihoods,” *World Bank Policy Research Working Paper*.
- Gollin, Douglas (2002) “Getting Income Shares Right,” *Journal of Political Economy*, Vol. 110(2), pp. 458–74.
- Guscina, Anastasia (2006) “Effects of Globalization on Labor’s Share in National Income,” *IMF Working Paper*, Vol. 294.
- Harrison, Ann (2005) “Has Globalization Eroded Labor’s Share? Some Cross-Country Evidence,” *MPRA Paper*.
- Heckscher, Eli (1919) “The Effects of Foreign Trade on the Distribution of Income,” *Ekonomisk Tidskrift*, Vol. 21, pp. 497–512.
- Hutchinson, John and Damiaan Persyn (2012) “Globalisation, Concentration and Footlose Firms: In Search of the Main Cause of the Declining Labor Share,” *Review of World Economics*, Vol. 148(1), pp. 17–43.
- Inklaar, Robert and Marcel Timmer (2013) “Capital, labor and TFP in PWT 8.0,” *Groningen Growth and Development Center*.
- International Labor Organisation (2014a) “Current Guidelines,” [access on 11th August 2014].
- (2014b) *Global Employment Trends 2014*.

- (2014c) *World of Work Report 2014 - Developing with Jobs*.
- Ivanic, Maros (2004) “Reconciliation of the GTAP and household survey data,” *GTAP Research Memorandum*, Vol. 5.
- Jaumotte, Florence and Irina Tytell (2007) “How Has The Globalization of Labor Affected the Labor Income Share in Advanced Countries?” *IMF Working Paper*, Vol. 298.
- Jayadev, Arjun (2007) “Capital Account Openness and the Labor Share of Income,” *Cambridge Journal of Economics*, Vol. 31(3), pp. 423–43.
- Krueger, Alan B. (1998) “Measuring Labor’s Share,” *The American Economic Review*, Vol. 89(2), pp. 45–51.
- Marterbauer, Markus and Ewald Walterskirchen (2003) “Bestimmungsgründe der Lohnquote und der realen Lohnstückkosten,” *WIFO-Monatsberichte*, Vol. 2, pp. 151–9.
- Mead, Donald C. and Carl Liedholm (1998) “The Dynamics of Micro and Small Enterprises in Developing Countries,” *World Development*, Vol. 26(1), p. 61.74.
- OECD (2004) *OECD Employment Outlook*: OECD Publishing, Paris.
- Ohlin, Bertil (1933) *Interregional and International Trade*: Havard University Press, Cambridge.
- Piketty, Thomas (2014) *Capital in the Twenty-First Century*: Harvard University Press.
- Ray, Debraj (1998) *Development Economics*: Princeton University Press, Princeton, 1st edition.
- Richardson, J. David and Elena Borisovna Khripounova (1998) “U.S. Labor Market Power and Linkages to International Trade: Identifying Suspects and Measures,” *mimeo*, Draft for U.S. Department of Labor.
- Robinson, Sherman, Andrea Cattaneo, and Moataz El-Said (2001) “Updating and Estimating a Social Accounting Matrix Using Cross Entropy Methods,” *Economic Systems Research*, Vol. 13(1), pp. 47–64.

- Rodriguez, Francisco and Arjun Jayadev (2010) "The Declining Labor Share of Income," *Human Development Reports Research Paper*, Vol. 36.
- Samuelson, Paul A. (1948) "International Trade and the Equalisation of Factor Prices," *The Economic Journal*, Vol. 58(230), pp. 163–84.
- Slaughter, Matthew (2001) "International Trade and Labor Demand Elasticities," *Journal of International Economics*, Vol. 54(1), pp. 27–56.
- Stolper, Wolfgang and Paul A. Samuelson (1941) "Protection and Real Wages," *Review of Economic Studies*, Vol. 9(1), pp. 58–73.
- Thiele, Rainer and Daniel Piazzolo (2002) "Constructing a Social Accounting Matrix with a Distributional Focus - The Case of Bolivia," *Kiel Working Paper*, Vol. 1094.
- Thurlow, James, David Evans, and Sherman Robinson (2004) "A 2001 Social Accounting Matrix for Zambia," *International Food Policy Research Institute*.
- UN et al. ed. (2008) *System of National Accounts*: United Nations, International Monetary Fund, Worldbank et al., New York.
- United Nations (2012) *Report of the Friends of the Chair on the barriers to the implementation of the System of National Accounts 1993*: Economic and Social Council Statistical Commission.
- United Nations System of National Accounts (2011) <http://data.un.org/Explorer.aspx?d=SNA>, [access on 20th March 2011].
- World Bank (2011) "A Short History," <http://data.worldbank.org/about/country-classifications/a-short-history>, [access on 23rd March 2011].
- (2013) "Jobs," *World Development Report 2013*.
- Yusuf, Arief Anshory (2006) "Constructing Indonesian Social Accounting Matrix for Distributional Analysis in the CGE Modelling Framework," *MPRA Paper*, Vol. 1730.