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Has the Labour Share Declined? It Depends

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ABSTRACT / RÉSUMÉ

We revisit the issue of how to best measure the labour and capital shares in OECD economies, distinguishing between production and income-based perspectives. The former adopts a producer perspective with gross income as a reference: it uses a production function in a market setting. The latter adopts a consumer perspective with net income as a reference, taking account of depreciation and including taxes and subsidies as perceived by final consumers. We confirm a statistically significant but small decline in the labour share across OECD countries over the past two decades under a production perspective. But this appears to result mainly from a rise in the gross capital share caused by rising depreciation rates. Accordingly, we find little or no decline in the labour share under an income perspective, where income is measured net and after depreciation. Using a novel dataset from Korea, we further dissect the capital share and suggest that in periods of price bubbles of land, rising asset values are a key element behind rising capital shares. We also show how introducing land prices can explain how both labour shares and real prices of investment goods can decline without assuming a large elasticity of substitution between labour and capital.

Keywords: Labour share, functional distribution, capital share

JEL classification: D33

Nous examinons la question de la mesure du partage des revenus nationaux entre le travail et le capital dans les économies de l'OCDE. À cette fin, nous distinguons entre une perspective basée sur la production et sur les revenus. La première utilise une perspective de producteur prenant les revenus bruts comme référence : le cadre étant une fonction de production dans un environnement marchand. La dernière utilise une perspective de consommateur prenant les revenus nets comme référence et tenant compte de la dépréciation des actifs et des taxes et subventions tels que perçues par les consommateurs. Nous confirmons une baisse de la part du travail à travers les pays de l'OCDE qui est faible mais statistiquement significative pendant les deux dernières décennies sous une perspective de production. Ceci semble-être principalement le résultat d'une croissance de la part du capital due à des taux de dépréciation croissants. Par la même voie nous trouvons que les parts du travail ne baissent guère où pas du tout si une perspective de revenus nets est adoptée. Grâce à un nouveau jeu de données coréens nous sommes en mesure de décomposer la part du capital dans les revenus pour constater que, pendant des périodes de bulles de prix des terrains, celles-ci constituent un facteur important derrière la croissance des parts du capital. Nous démontrons également que, avec l'introduction des terrains parmi les actifs, une baisse des prix réels des biens d'investissement est compatible avec une baisse des parts du travail sans que ceci exige une large élasticité de substitution entre travail et capital.

Mots-clés : part du travail, distribution fonctionnelle, part du capital

Classification JEL: D33

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1. Introduction

1. Along with the debate on the increasing dispersion of income and consumption among households (OECD, 2015b; Atkinson, 2015), the distribution of income between labour and capital has also attracted rising interest¹ in light of evidence of a declining labour share, in particular in the United States. International evidence such as Karabarbounis and Neiman (2014) have corroborated the idea that the declining labour share can be considered a stylised fact in many countries even more so as convincing explanations have been put forward to account for the decline, including technical change that led to rapid declines in relative prices of investment goods, coupled with a large elasticity of substitution between labour and capital, technical change that is biased against unskilled labour, international trade and investment that put pressure on wages through rising competition and declining bargaining power of workers. The declining labour share has also played a central part in the macro-economic discussions around inequality (Stiglitz, 2015) and in the discussions around the role that specific industries play in the evolution of the aggregate labour share (Elsby, Hobijn and Sahin, 2013). One reason for the strong interest in the functional income distribution is the impact from ‘upstream’ that it may exert on the inter-household distribution of income and consumption. As labour income tends to play a larger role as a source of income among lower-income households than among higher income households, a decline in the labour share can translate into a widening overall income distribution². In short, there continues to be strong interest in the evolution of aggregate and industry-level labour shares and, by implication, capital shares.

2. It is hardly news that gauging the labour and capital shares is fraught with measurement issues to which theory provides little guidance. These include the allocation of the income of the self-employed between labour and capital; the right scope of income; the valuation of income and whether it should be measured gross or net of depreciation. Work on some of these issues dates back to Johnson (1954) and Kravis (1959). We revisit the measurement question and make some headway by drawing a distinction between *production-based* and *income-based* measures of the labour share. This distinction reflects different purposes in measuring the labour share. The production-based approach depicts the roles of labour and capital in a production framework; the income-based approach depicts how labour and capital shares influence inter-household income distribution. We carefully decide on various measurement questions with these references in mind and put in place labour and capital measures based on high-quality national accounts data from official sources in OECD countries. This leads to new and differentiated messages about the evolution of the labour share in OECD countries over the past 20 years or so.

3. To foreshadow results, the basic observation of a statistically significant decline in the labour share holds up, for the past two decades, for the *production-based* measure of labour and capital income, albeit with significant variations across countries. Also, while the measured average, cross-country decline of the labour share is statistically significant, it tends to be modest in size. On the other hand, evidence for a decline in the *income-based* labour share is much weaker or non-existent. This is somewhat surprising given the greater proximity of the income measures underlying the income-based labour shares to overall net income which in turn affects net income that is disposable to households and whose distribution has become more unequal in many countries. We devise a method to de-compose the difference between the production and income-based labour shares and find that the single most important explanatory is depreciation. There is no deduction for depreciation of capital in gross income, and its share is rising. And as gross income is the basis of the production-based approach, the capital share is also rising under this

¹ See Bentolila and Saint-Paul (2003), Ellis and Smith (2007, 2010), EU(2007), IMF (2007), Atkinson (2009), Stockhammer, Onaran and Ederer (2009), ILO (2011, 2013), Guerriero (2012), OECD (2012), Karabarbounis and Neiman (2014).

² Other work points to the increasing inequality among those receiving labour income with compensation of top income earners increasing and the position of bottom earners worsening (e.g. Saez and Veall, 2005; Atkinson et al., 2011).

approach, implying a corresponding fall in the production-based labour share. This is not true for the income-based labour and capital shares, where income is measured net. We conclude that the functional income distribution, in particular when measured from an income rather than a production perspective is a weak predictor of the development of the inter-household income distribution whose driving forces must be sought elsewhere.

4. Our second insight comes from dissecting capital income and the capital share. The key aspect here is the proper scope of assets that includes in particular an important non-produced asset, land. A new dataset by the Bank of Korea allows us to investigate empirically how the real rate of return to assets evolves and what role it plays in shaping the capital share compared to the quantity of assets and the price changes of assets. With land in the picture, returns on productive activity can be better distinguished from price changes of assets. Certainly in the Korean case, there is no evidence of an excessive net rate of return on assets used in production. At the same time we find that during periods of strong increases in land prices, these revaluations were a driving factor of increases of the capital share. While not demonstrated empirically here for lack of appropriate data on land for other countries, it is likely that the same observation holds there as well: in periods of price bubbles of non-produced assets, rising asset values are a key element behind rising capital shares.

5. Our third insight is that an asset boundary that includes land is instrumental for a full analysis of the dynamics of the labour share from a production perspective. The stylized facts of a declining labour share along with a declining relative price of produced capital requires that the elasticity of substitution between labour and capital be larger than unity to be in line with basic production theory. Yet, much of the empirical literature points to an elasticity of substitution that is clearly below one. When land is introduced as an additional asset, this problem disappears. We use Korean data to illustrate that a declining real user cost of produced capital and a modest elasticity of substitution between labour and produced capital are compatible with the observed changes in the labour share.

2. Measurement of labour shares

Production and income perspective

6. The labour share is the share of factor income or production costs that accrues to labour. A central analytical use of the labour share arises from its role in production analysis and neoclassical economic models. Under assumptions of cost-minimising behaviour of producers the labour share in production costs approximates the otherwise unobserved cost elasticity of labour. Measurement of the cost elasticity is in turn central for estimating multi-factor productivity (MFP) and for purposes of growth accounting³. The cost elasticity is also instrumental in that it permits establishing a direct link between changes in the labour share and the elasticity of substitution between labour and capital (Hicks, 1932), a relationship that has been used in the analysis of changing labour shares, for instance by Elsby, Hobijn and Sahin (2013), Karabarbounis and Neiman (2014), and Stiglitz (2015). We refer to this analytical use of the labour share as the *production perspective*.

7. Another use of the labour share is to respond to the question about the distribution of income between factors of production, labour and capital⁴ from a political economy angle or from an *income perspective*. Atkinson (2009) is an excellent example of this perspective. He judges the study of labour

³ Under perfect competition, the cost share of labour will also measure the production elasticity of labour, required for primal estimates of MFP. Basic references to productivity measurement include Solow (1957), Jorgenson and Griliches (1967), Balk (1998), OECD (2001), Diewert and Nakamura (2007).

⁴ Krueger (1999) reports that “the empirical determination of factor shares was the proximate cause for the founding of the National Bureau of Economic Research” (p. 1).

shares important because it allows “(i) to make a link between incomes at the macroeconomic level (national accounts) and incomes at the level of the household; (ii) to help understand inequality in the personal distribution of income; (iii) to address the concern of social justice with the fairness of different sources of income” (p. 5). In the debate, a decline of the labour share is often associated with a loss of collective bargaining powers of workers, itself a consequence of declining unionisation, unemployment or increased competition through globalisation of markets. Along the same lines, the labour share is often seen as the link between the functional distribution of factor income and the inter-personal distribution of income and wealth. As Atkinson (2009) explains, differentiating between labour and capital income is important from a policy perspective because different types of incomes raise different policy issues, and “In building bridges between the national accounts and household experience, the factor shares provide, therefore, a valuable starting point” (p. 8).

8. None of these income and distribution-related issues requires setting the labour share discussion in a production model. While in a simple world without taxes and subsidies (on products), and in the absence of any residual profits, losses and mark-ups (typically assumed away via fully competitive markets) the production perspective and the income perspective coincide except for the effects of depreciation, this is not in general the case. From a very practical angle, the distinction will be useful in decisions about measurement of the labour and the capital share, of which there are many including the treatment of taxes, the scope of income and the treatment of depreciation. As we shall see, the two perspectives also give rise to somewhat different conclusions about the development of the labour share over time.

Valuation of income

9. A first measurement question relates to the valuation of income in terms of taxes and subsidies. From a production perspective, value-added (output) is appropriately measured at *basic prices*, a valuation that includes taxes minus subsidies on production and so reflects the value actually received by the producer. Value added at basic prices has to be distinguished from value-added at *market prices*⁵, the headline GDP figure in many countries including the United States. Valuation at market prices reflects *all* taxes minus subsidies on products and production and consequently represents a demand or consumer perspective rather than a producer perspective. We conclude that a computation of labour shares for purposes of production analysis is best based on gross value-added at basic prices whereas a computation of labour shares for purposes of distribution analysis should use gross value-added at market prices. In terms of accounting identities, we relate the gross value-added at basic prices GVA_B and at market prices GVA_M to the compensation of employees CE , gross operating surplus GOS (a measure of profits), gross mixed income GV_{MIX} of the self-employed (of which more below), taxes minus subsidies on products T_{PR} , and other taxes minus subsidies on production T_{PRN} ⁶:

$$(1.1) \quad \text{Gross value-added at basic prices: } GVA_B = CE + GOS + GV_{MIX} + T_{PRN};$$

$$(1.2) \quad \text{Gross value-added at market prices (GDP): } GVA_M = CE + GOS + GV_{MIX} + T_{PRN} + T_{PR}.$$

⁵ EU (2007), IMF (2007), ILO (2011, 2013) and Stockhammer, Onaran and Ederer (2009) use GDP at market prices as the denominator for their labour share calculations; Bentolila and Saint-Paul (2003) and Ellis and Smith (2007, 2010) use GVA at basic prices.

⁶ Both taxes minus subsidies on products T_{PR} , and other taxes minus subsidies on production T_{PRN} comprise taxes on production and imports.

Scope of income and production

10. A further practical question concerns the scope of income or production. Should all resident producers and all domestic income be considered or should certain economic activities or sectors be excluded? One activity that is regularly considered for exclusion is income from owner-occupied housing (see, for instance OECD, 2012; Pionnier and Guidetti, 2015). This income is an imputed item that corresponds to the value of housing services for persons living in their own house. These services are exclusively recorded as operating surplus or capital services in the households sector⁷ along with a corresponding value of consumption, but no imputation is made for the labour input associated with providing housing services, thus producing a potential upwards bias to profit shares and an asymmetric treatment of labour and capital inputs. Excluding these housing services appears plausible from a production perspective but not necessarily from an income perspective – housing services on which owner-occupiers draw are true consumption items even if there is no monetary transaction, they matter for peoples' well-being and have played a significant role in shaping the distribution of consumption and wealth between households (Atkinson, 2015). Therefore, our set of labour shares for purposes of production analysis will exclude imputed housing services, but the contribution of housing services to capital income will be taken into account when calculating labour shares for purposes of analysis of functional income distribution.

11. A related reasoning applies to non-market producers, such as general administration, health and education where government often provides services for free or below market prices. The value of these services is measured via their costs but, by convention, capital costs only comprise depreciation whereas capital costs of market providers also reflect a net return to capital. The consequence is a systematic downward bias in the remuneration of government-owned capital⁸. Pionnier and Guidetti (2015) therefore also recommend exclusion of the public sector (or of industries that are dominated by non-market producers). We agree in principle with this reasoning for purposes of production analysis but encounter the practical difficulty that in general industry data with the appropriate break-down of value-added components and matching employment series is less timely and patchier than aggregate data which would limit the scope of cross country comparisons. We thus do not exclude Public Administration for the dataset at hand. However, we carry out a sensitivity test for case of Korea for which a full data set is available to find that the exclusion of public administration, defense, health and education from the list of activities can affect the level of the labour shares but hardly matters for their evolution over time.

12. A similar robustness check was applied to test for the effects of excluding the financial services industry, another activity that Pionnier and Guidetti (2015) purge from their computation of production-based labour shares. Again, at least for the Korean case, this exclusion matters little for the trend in labour shares.

13. We do exclude, however, owner-occupied housing for our labour share computations for purposes of production analysis. Accounting identity (1.1) is then modified as in (2) to reflect the exclusion of owner-occupied housing (as value-added consists exclusively of gross operating surplus, one has $GVA_{B_OOH}=GOS_{OOH}$):

$$(2) \quad GVA_B' = GVA_B - GVA_{B_OOH} = CE + GOS - GOS_{OOH} + GV_{MIX} + T_{PRN}$$

⁷ In some countries' national accounts, Non-profit institutions serving households (NPISHs) are combined with households. As NPISHs only generate negligible gross operating surplus, any gross operating surplus of the combined sector would still be mostly attributable to owner-occupied housing.

⁸ Jorgenson and Schreyer (2013) argue for a measure of the cost of government-owned capital that includes a net return to capital, OECD (2009) discusses practical ways of its measurement.

Mixed income

14. Mixed income is the income of unincorporated enterprises owned by households (the self-employed) and lumps together compensation for labour services and a gross return to capital. A tricky issue lies in splitting the income of the self-employed into a labour and a capital component. Some authors, for instance Karabarbounis and Neiman (2014) and Rognlie (2015) have restricted labour share measurement to the corporate sector, thereby aiming to avoid splitting mixed income altogether as, in principle, corporations do not produce mixed income. However, Pionnier and Guidetti (2015) find that the practice of allocation of units to the corporate and to the household sector varies significantly between countries. For instance in Germany and Italy, a large part of self-employed workers, and consequently the mixed income that they receive, are allocated to the corporate sector⁹. Thus, limiting the scope of labour share measurement to the corporate sector, only avoids the issue of dealing with “mixed income” in some countries¹⁰. Absent a consistent allocation of mixed income in countries’ national accounts, the issue of splitting mixed income into a labour and a capital component needs to be tackled¹¹ both for international comparisons and for studying the evolution of the labour share over time¹². Further, from an income perspective, restricting the object of research to corporations is questionable in particular for developing countries where self-employment accounts for significant part of economic activity.

15. Various authors (Johnson, 1954; Jorgenson, 1991; Young, 1995; Gollin, 1998, 2002; Krueger, 1999; Bernanke and Gurkaynak, 2001; Freeman, 2011; Guerriero, 2012; Cho, Kim and Schreyer, 2014; Pionnier and Guidetti, 2015) have employed different approaches towards splitting mixed income. The theoretically most compelling approach is a procedure based on matching micro-data records at national level. As this is not a feasible approach for the task at hand, we shall consider a whole sequence of options for breaking down mixed income as laid out below. The allocation of mixed income to labour and capital is required whether a production or an income perspective prevails.

Gross and net labour shares

16. A key aspect in moving from a production to an income perspective is that income should be measured net of depreciation¹³ rather than gross. Income provides the bridge to consumption expenditures in constant prices (Jorgenson and Slesnick, 1987, 2014). Net saving in constant prices corresponds to increments in the current period to future flows of consumption (Weitzman 1976, Sefton and Weale 2006). Thus, net concepts are a natural choice when labour and capital shares are interpreted from an income and, ultimately, welfare perspective. Gross concepts, on the other hand, are the appropriate set-up for

⁹ The System of National Accounts distinguishes between unincorporated enterprises that are part of the household sector and unincorporated enterprises that resemble corporations in key aspects (e.g. complete set of accounts). These are called *quasi-corporations* and allocated to the corporate sector. In some countries, self-employed businesses with mixed income (and without explicit labour compensation) are treated as quasi corporations and are thus part of corporate sector.

¹⁰ Note that we here use the term “mixed income” for the corporate sector although the SNA reserves it for the households’ sector. Nevertheless, when self-employed workers are attached to the corporate sector, what the SNA calls “gross operating surplus” is actually similar to mixed income in the households’ sector because it mixes labour and capital income.

¹¹ Preferably, this should be done at the industry level.

¹² For instance, when self-employed workers in the agricultural sector are replaced by salaried workers in manufacturing in the course of economic development, the labour share would automatically increase if mixed income is ignored.

¹³ See for instance Stiglitz, Sen and Fitoussi (2009).

production-related analyses with labour shares¹⁴. We conclude that gross and net labour shares are complementary rather than competing concepts.

In terms of identity (1.2), depreciation D is deducted from gross operating surplus and gross mixed income to yield a measure of net domestic product NDP_M :

$$(3) \quad NDP_M = GVA_M - D = CE + GOS + GV_{MIX} - D + T_{PRN} + T_{PR}.$$

Equation (3) will form the basic identity for the measurement of labour shares from an income perspective, and (2) from a production perspective.

Allocation of income items to labour and capital

Taxes

17. The next task is the allocation of the various income items in (2) and (3) to labour and capital. We start from a *production perspective* and define labour compensation $w_{pj}L_j$ as

$$(4) \quad w_{pj}L_j = (CE + \alpha_j V_{MIX})(1 + \tau_p),$$

where w_{pj} is the unit value of labour compensation in the economy, L_j is the corresponding quantity of labour input, α_j is the share of net mixed income V_{MIX} attributed to labour. Labour compensation variables are indexed with $j=1,2,\dots,5$ to reflect the fact that different values of α_j ($j=1,2,\dots,5$) will be selected during computations. We start by noting that gross mixed income GV_{MIX} contains a depreciation part that is clearly not part of labour compensation. Thus, the measurement of the labour part of mixed income uses net mixed income V_{MIX} as a starting point¹⁵. $\tau_p \equiv T_{PRN} / [GVA_B' - T_{PRN}]$ is the rate that proportionally allocates other net taxes on production¹⁶ to labour and capital. There are no strong theoretical reasons for this proportionate allocation of T_{PRN} but it seems like a neutral way of dealing with taxes on production from a production perspective. Also, the proportionate allocation leads to the same labour share as would be observed under a valuation of income at factor costs, i.e., ignoring net taxes on production T_{PRN} ¹⁷. We compute the labour share from a production perspective LS_{pj} as:

$$(5) \quad LS_{pj} = w_{pj}L_j / GVA_B'; j=1,2,\dots,5.$$

Labour compensation for purposes of *income analysis* is:

$$(6) \quad w_{Dj}L_j = CE + \alpha_j V_{MIX}$$

¹⁴ Rognlie (2015) makes a similar point: ‘Whether a gross or net measure is more appropriate depends on the question being asked: the allocation of gross value added between labor and gross capital more directly reflects the structure of production, while the allocation of net value added between labor and net capital reflects the ultimate command over resources that accrues to labor versus capital. [...]’ (p. 5)

¹⁵ If only gross mixed income GV_{MIX} is available (this is the case in many countries), net mixed income is computed as $V_{MIX} = GV_{MIX} - D * GV_{MIX} / (GOS + GV_{MIX})$; i.e. by applying the share of overall depreciation in profits and mixed income. As GV_{MIX} contains a labour component, the overall depreciation share is likely to be understated. However, we prefer a possible downward bias for capital as the focus of the paper is on the declining labour share.

¹⁶ Note that in conjunction with taxes, ‘net’ refers to taxes minus subsidies. In conjunction with income, ‘net’ refers to gross measures minus depreciation.

¹⁷ A factor cost valuation has also been suggested by Atkinson (2009) and Pionnier and Guidetti (2015).

where w_{Dj} is the unit value of labour and L_j is again the quantity of labour input. For purposes of income analysis, we allocate all taxes to the non-labour (capital) component of value-added on the grounds that these taxes must be covered out of operating surplus. One notes that net domestic income at market prices NDI_M which is the same, in nominal terms, as net domestic product at market prices NDP_M also includes taxes on products T_{PR} (such as sales taxes) for which there is no basis for allocation to labour or capital. We then compute the labour shares from an income perspective LS_{Dj} as:

$$(7) LS_{Dj} = w_{Dj}L_j/NDI_M; j=1,2,\dots,5.$$

Mixed income

18. We shall now present alternative measures of α , the share of mixed income allocated to labour. Table 1 below presents various combinations. Some of the computations of α require information on the volume of labour and the following holds: total employment L equals employees (L_W), employers (L_{NW_empr}), and own-account workers and contributing family workers (L_{NW_wkr}). Hours worked are preferred to numbers employed but not widely available so for the computations at hand we use data on numbers employed.

$$(8) L = L_W + L_{NW_empr} + L_{NW_wkr}.$$

19. Of the five computations presented, LS4 – assuming the same unit compensation for the self-employed as for the employees – is a widely-used approach towards dealing with mixed income (OECD 2001). This does not necessarily mean it is correct. Where more in-depth analysis has been carried out, the hypothesis of equal average compensation is not normally confirmed. For instance, Freeman (2011), following the methodology¹⁸ by Jorgenson (1991) finds a downward bias implied by the LS4 method for the United States. Other empirical work (Cho, Kim and Schreyer 2014) uses a different method and finds the unit compensation for the self-employed to be significantly below the unit compensation of employees¹⁹. Also, OECD (2001) reports that small business owners often have a lower average compensation. A second best solution, only based on national accounts data is to make an imputation at the industry level. This allows controlling for industry composition effects (for instance, self-employed workers in the agriculture sector are probably less well paid than self-employed workers in the services sector). Data constraints for our cross-country panel data set prevent us from testing this method for all countries. However, the method was put in place for the Korean case. As it turns out, the resulting economy-wide allocation of mixed income to labour is quite close to the allocation that is obtained by applying an economy-wide adjustment factor $\alpha = 0.5(CE/L_W)(L_{NW}/V_{MIX})$ or $\alpha = 2/3$, in line with LSP5 or LSP2²⁰.

¹⁸ Essentially, micro-data on employees are classified by wage-relevant characteristics and regression analysis is used to evaluate the wage premium for each characteristic (education, industry, age, etc.). As the same characteristics are known for the self-employed, an imputation can be made that yields the relevant compensation.

¹⁹ This was at least the case for Korea. When the relative wage rate of self-employed is estimated relative to per capita compensation of employee by a user cost approach, the value of 0.5 is a good approximation that empirically matches Korean income and wealth data (Cho et al. 2015b). Here the user cost approach implies searching for the value of α_j in equation (4) and (6) which minimizes the gap between capital income derived from the national income account with a certain α_j and the value of capital services derived from capital stock and a rate of return, etc., during 1970 to 2013. The computation entails the assumption of a constant real rate of return during the whole period. Land is included in the asset boundary.

²⁰ In Korea, the case of $j=4$ is regarded as overstating Korean labour income share as observed in Hong (2014), Joo and Jeon (2014), Lee (2015), Cho (2016). Pyo (2015) provides estimates of the Korean labour share for the years 1918 to 1935. In addition, Kim (2016) analyses which factors drive movements in the Korean labour

Table 1. Allocation of mixed income

Variant	α_j	Comment
j=1	0	Unadjusted labour share
j=2	2/3	Johnson's (1954) version with 2/3rds of mixed income allocated to labour
j=3	1	Gollin's (2002) 1 st adjustment with all mixed income allocated to labour
j=4	$(CE/L_w)(L_{NW}/V_{MIX})$	Average compensation of non-salaried workers equals the average compensation of salaried workers (CE/L_w).
j=5	$0.5(CE/L_w)(L_{NW}/V_{MIX})$	The average compensation of non-salaried workers is set to equal half the average compensation of salaried workers. α_5 is also a simple average of α_1 and α_4

3. Results

Labour shares

20. We estimate labour shares from a production and from an income perspective, each for different values of α_j ($j=1, 2, \dots, 5$). As we only rely on officially available national accounts data collected by the OECD, country coverage varies over the period. Our core analysis relates to 22 OECD countries and the period 1995-2014. (When only the period 2000-2014 is considered, the set grows to 28 countries.) A much longer perspective will be taken for Korea where consistent and detailed production, income and balance sheet data are available from 1970 onwards. We start with a visual inspection of results for production-based average labour shares in Figure 1. Two types of averages are presented – an unweighted average across countries and a GDP-weighted measure. A first observation is that the levels of labour shares vary significantly with the choices of allocation of mixed income. Also, in general, the various measures evolve at a different pace, indicating that the allocation of mixed income is indeed a crucial element in the computation and interpretation of labour shares. The exception is labour shares 2 and 5 yield that yield nearly identical results.

share. This seems to be in support of the case $j=5$ although the authors recognize that the 50% figure is may not have been constant over time as assumed in the computations.

Figure 1. Average labour shares (production perspective)

Note: Data starting in 1995 comprise 22 countries of Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Italy, Japan, Korea, Netherlands, Norway, Portugal, Slovak Republic, Sweden, Switzerland, United States; data starting in 2000 also include 6 countries of Iceland, Ireland, Poland, Slovenia, Spain, United Kingdom.

21. To check the presence of a common time trend, we set up the following regression models for the production-based labour share:

$$(9a) \text{LS}_{Pi,t} = \mu_i + \beta \cdot t + \varepsilon_{i,t}; \quad \varepsilon_{i,t} \sim N(0, \sum_{\varepsilon});$$

$$(9b) \text{LS}_{Pi,t} = \mu_i + \beta \cdot t + \varepsilon_{i,t}; \quad \varepsilon_{i,t} = \varphi \varepsilon_{i,t-1} + v_{i,t}; \quad v_{i,t} \sim N(0, \sum_v).$$

(9a) is a fixed effects model where $\text{LS}_{Pi,t}$ is the production-based labour share in country $i=1, \dots, 22$ and year $t=1, \dots, 20$, μ_i are the corresponding country dummies, β captures a positive or negative common trend among countries' labour shares and a normally-distributed error term $\varepsilon_{i,t}$ allows for random deviations. In

(9b) we test for a common trend in a set of a random effects model with an autocorrelated error term²¹. Both regression models are run for each of the five versions of α_j with results in Table 2. Overall, there is a statistically significant *downward trend for production-based labour shares*, independent of the way mixed income has been allocated, except for LS_{P1} under the random effects specification. The unit of the β coefficient is percentage points per year, so the estimated average decline in the labour share over the period ranges from $-0.004 \times (2014-1995) = -0.07$ percentage points for LS_{P1} (fixed effects model) to $-0.139 \times (2014-1995) = -2.64$ percentage points for LS_{P3} (fixed effects model). While these values are most statistically highly significant, the magnitude of declines remains after all, contained. Time trends under the random effects model are also significant with the exception of LS_{P1} and LS_{P5} but even smaller in magnitude. Also, averages hide significant cross-country variation, as is apparent from Figure 2. It compares estimates of LS_{P5} between the beginning and the end of the period for individual countries. Of the 23 countries, 14 show a declining labour share and 9 countries show a rising share. Overall, however, our results confirm earlier examinations of production-based labour shares across countries, for instance OECD (2012) and OECD-ILO (2015) and forthcoming work by Schwellnus et al.

Table 2. Time trends in production-based labour shares, 1995-2014

Time variable(β_t)	LS_{P1}	LS_{P2}	LS_{P3}	LS_{P4}	LS_{P5}
Fixed effects model (9a)	-0.004 (0.015)	-0.094*** (0.013)	-0.139*** (0.013)	-0.107*** (0.019)	-0.055*** (0.016)
Random effects model with AR1 error term (9b)	0.005 (0.054)	-0.075** (0.034)	-0.113*** (0.037)	-0.100* (0.056)	-0.049 (0.042)

Note: Standard errors between brackets. One, two, and three asterisks indicate parameter significance at the 10, 5, and 1% level. Estimates based on 22 countries (see Figure 1 for list).

²¹ We introduce both specifications because a Hausman test indicates that the null hypothesis cannot be rejected that the random fixed model is superior to the fixed effect model. Also we could not reject serial correlation in error terms. As a consequence we consider that the random effect model with AR1 error terms is the preferred specification. Test results and full presentation of the regressions can be found in Appendix D.

Figure 2. Changes in production-based labour shares (LSP5)

Note: End-years and starting years were averaged to allow for country differences in observations. Depending on data availability, adjacent three-year averages are used for a few countries.

22. Turning to labour shares LSD_j computed from an income perspective²², we find a different picture. Figure 3 immediately conveys a visual message of broad constancy of the labour shares on average, whether weighted or not. A more systematic statistical analysis in the form of a panel regression along the lines of equation (9) demonstrates indeed that the common time trend has become weaker overall. If coefficients were already moderate in size for the production-based labour share (Table 2), they are even smaller for the income-based variables (Table 3). The maximum cumulative decline of the income based labour share ($LSD3$) over the past 20 years is hardly noticeable with $-0.081 \times (2014-1995) = -1.54$ percentage points. What is more, in four of the five cases under the random effects estimate, statistical significance disappears altogether²³. Thus, on average, and in terms of a common trend across countries, there is no evidence of a pervasive decline of labour shares under an income-based measure. Similar to production-based labour shares, the allocation of mixed income matters for the levels of income-based labour shares except for $LSD2$ and $LSD5$ that are virtually identical. This result of a missing downward trend in income-based labour shares weakens the link that has been put forward between declining labour shares and rising inter-household income inequality as described in OECD (2012) or OECD-ILO (2015)²⁴.

²² A word of caution is in place here: as assumptions about depreciation patterns tend to vary between countries, labour shares based on net income measures are less comparable across countries than labour shares based on gross income measures.

²³ If 28 countries are analysed for data starting in 2000, statistical significance disappears in four cases and LS_{D1} with significance at 10% shows a rising labour share trend, as presented in Appendix E.

²⁴ Of course, a labour share in net income that is approximately constant is in no way inconsistent with rising income inequality. For once, wage income has become more unequally distributed even if the average growth of labour income has equalled capital income growth. The effects on total income inequality can be compounded when capital income grows faster than the wages of *low-income* workers, and even more so as the distribution of wealth is highly skewed. Thus, constant capital and labour shares may well be associated with growing income inequality.

23. Two caveats are in place here: one of the reasons why we find only a small or no contraction in the labour share may be the period under study. Labour shares tend to be counter-cyclical (IMF 2012) and until the onset of the crisis there was a downward trend in labour shares one as shown in Figure 3. The trend was reversed afterwards. Now, many countries for which the upward trend in both income-based and production-based labour shares is most evident are countries that are still under a protracted period of crisis (e.g. Italy, Greece, France but also Finland and Denmark) and it is possible that, as growth resumes in these countries, the labour share will go down again. Ideally, longer term computations should thus be based on peak-to-peak comparisons to control for cyclical effects. Another caveat is that the picture may turn out differently if only the business sector is considered, in particular in conjunction with production-based labour shares. As mentioned earlier, the capital income of government producers is measured as depreciation. For the income-based measures of labour shares where income is measured net of depreciation it follows that government entities enter with a labour share equal to one. If their share in total net income increases this may be one of the reasons why no decline in the income based labour share is visible. There is indeed some evidence (OECD, 2012) that the negative trend is on average stronger when looking only at the business sector.

Figure 3. Average labour shares (income perspective)

Note: Data starting in 1995 comprise 22 countries of Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Italy, Japan, Korea, Netherlands, Norway, Portugal, Slovak Republic, Sweden, Switzerland, United States; data starting in 2000 also include 6 countries of Iceland, Ireland, Poland, Slovenia, Spain, United Kingdom.

Table 3. Time trends in income-based labour shares, 1995-2014

Time variable(β_i)	LS _{D1}	LS _{D2}	LS _{D3}	LS _{D4}	LS _{D5}
Fixed effects model	0.048*** (0.016)	-0.038*** (0.014)	-0.081*** (0.014)	-0.043** (0.020)	0.002 (0.017)
Random effects model with AR1 error term	0.036 (0.040)	-0.041 (0.035)	-0.080** (0.036)	-0.061 (0.053)	-0.011 (0.042)

Note: Standard errors between brackets. One, two, and three asterisks indicate parameter significance at the 10, 5, and 1% level. Estimates based on 22 countries (see Figure 1 for list).

What drives the differences between production-based and income-based labour shares? We consider the following decomposition of the changes of LSP and LSD (leaving out subscripts that refer to different allocations of mixed income for ease of notation):

$$\begin{aligned}
 (10) \text{LS}_D &= [w_D L_D / w_P L_P] \cdot [w_P L_P / V A_B'] \cdot [V A_B' / V A_B] \cdot [V A_B / V A_M] \cdot [V A_M / \text{NDI}_M] \\
 &= \text{LS}_P \cdot [w_D L_D / w_P L_P] \cdot [V A_B' / V A_B] \cdot [V A_B / V A_M] \cdot [V A_M / \text{NDI}_M] \\
 &= \text{LS}_P \cdot \gamma_1 \cdot \gamma_2 \cdot \gamma_3 \cdot \gamma_4
 \end{aligned}$$

where $\gamma_1 \equiv [w_D L_D / w_P L_P]$: proportional attribution of net taxes on production T_{PRN} to labour;

$\gamma_2 \equiv [V A_B' / V A_B]$: exclusion of owner-occupied housing;

$\gamma_3 \equiv [V A_B / V A_M]$: valuation at basic prices rather than market prices;

$\gamma_4 \equiv [V A_M / \text{NDI}_M]$: gross rather than net measure (depreciation effect).

The components on the right hand side of (10) indicate the various adjustments that are required to move from the labour share measures LS_D (income perspective) to labour shares LS_P (production perspective). Table 4 presents the results of the decomposition for the case of LS_{P5} and LS_{D5} . It breaks down the percentage point change of the labour share $\text{LS}_{P5}^{2014} - \text{LS}_{P5}^{1995}$ into its additive components. This is achieved by transforming the percentage point difference into a logarithmic difference by applying a logarithmic mean²⁵:

$$(11) \text{LS}_D^{2014} - \text{LS}_D^{1995} \equiv \Delta \text{LS}_D = m(\text{LS}_D^{2014}, \text{LS}_D^{1995}) \Delta \ln \text{LS}_D$$

with $\Delta \ln \text{LS}_D = \Delta \ln \text{LS}_P + \Delta \ln \gamma_1 + \Delta \ln \gamma_2 + \Delta \ln \gamma_3 + \Delta \ln \gamma_4$.

²⁵ For any two real numbers $a, b > 0$, the logarithmic mean is defined as $m(a,b) = (a-b)/\ln(a/b)$ – for a discussion see Balk (2008) who attributes the origins of the logarithmic mean to unpublished work by Törnqvist in 1935 (Balk 2008, p. 134).

Table 4. Explaining the gap in changes between LSP5 and LSD5 by country

Percentage points, cumulative over the period 1995-2014

Country	Time period	Changes in production-based LS	+ Effect of allocation of net taxes	+ Effect of exclusion of owner-occupied housing	+ Effect of valuation	+ Effect of depreciation	Changes in income-based LS
		$m \cdot \Delta \ln LS_{P5}$	$m \cdot \gamma_1$	$m \cdot \gamma_2$	$m \cdot \gamma_3$	$m \cdot \gamma_4$	$= \Delta LS_{D5}$
Australia	1995~2014	-1.62	-0.55	-0.82	0.97	0.20	-1.82
Austria	1996~2014	-2.27	-0.31	-1.05	-0.77	1.45	-2.95
Belgium	1996~2014	-2.28	1.16	0.86	-0.53	3.27	2.47
Canada	1995~2014	-4.10	0.97	0.00	1.17	1.55	-0.41
Czech Republic	1996~2014	3.94	0.51	-0.62	-0.40	0.24	3.67
Denmark	1996~2014	3.20	-0.60	0.03	0.01	0.50	3.14
Estonia	1996~2014	-6.03	0.54	-0.29	-0.74	0.31	-6.22
Finland	1996~2014	3.97	-0.44	-1.51	-1.20	0.82	1.63
France	1995~2014	3.13	0.01	-0.55	-0.34	1.88	4.14
Germany	1996~2014	-1.63	-0.72	-0.21	-0.45	1.22	-1.78
Hungary	1996~2014	-6.21	-0.15	0.43	-0.27	-1.37	-7.58
Italy	1996~2014	3.52	-2.06	-1.70	-0.33	2.39	1.83
Japan	1995~2013	-3.40	-0.69	-1.48	0.16	1.14	-4.27
Korea	1995~2014	-6.30	-0.02	0.11	0.35	5.62	-0.24
Netherlands	1996~2014	-0.18	-0.24	1.09	-0.43	0.36	0.60
Norway	1996~2014	-5.65	-0.28	3.52	1.69	-0.77	-1.50
Portugal	1996~2014	-3.98	-0.41	-2.66	-0.52	1.38	-6.20
Slovak Republic	1996~2014	0.75	-0.39	-0.09	0.45	-0.83	-0.10
Slovenia	1997~2014	-5.55	-0.41	1.43	0.20	1.70	-2.64
Sweden	1996~2014	5.13	-2.11	1.00	0.69	2.05	6.75
Switzerland	1996~2013	2.08	-0.93	0.00	-0.05	0.64	1.75
United Kingdom	1998~2014	2.62	0.16	-1.91	-0.38	-0.51	-0.03
United States	1998~2014	-2.97	-0.08	-0.47	1.03	1.15	-1.33
Average		-1.04	-0.31	-0.21	0.01	1.06	-0.48
Average of absolute effects			0.60	0.95	0.57	1.36	

Note: Shaded cells indicate the largest absolute component.

24. It emerges from Table 4 that the most important element in this decomposition is the passage from a gross to a net measure of income and thus the role of depreciation (or consumption of fixed capital as it is labelled in the national accounts)²⁶. On average, and in many individual countries, the share of depreciation in gross income has indeed seen a steady upward trend (Figure 4), driving a wedge between the growth of gross value added and net domestic income²⁷. Rising average depreciation can be caused by more rapid wear and tear as well as obsolescence of certain capital goods or by a shifting composition of the capital stock towards a higher share of quickly depreciating assets. For instance, since the introduction of the 2008 SNA, intellectual property products (such as stocks of R&D) form part of measured capital. These assets depreciate quickly and their share in total assets has risen over time. Larger or more frequent replacement investments are required to keep the productive capacity of capital intact. Put differently, one

²⁶ Bridgman (2014) and Zheng et al. (2015) arrive at a similar conclusion for United States.

²⁷ Thus, in many countries, the increase in nominal net income is likely to have been even feeble than the increase in gross income (GDP) that has been a concern since the onset of the crisis.

reason for a rising capital share (falling labour share) from a production perspective may simply be the fact that more income is needed for potential replacement investment than in the past. Another important factor is cyclical effects – indeed, the strong uptake around 2007-08 is no coincidence: rather stable flows of depreciation met contracting output and so generated a fast rise in depreciation rates²⁸. Whatever the precise reason for rising rates of depreciation, an increasing net return on capital has not been the source of rising capital shares. Indeed, the Korean case examined below shows a slightly declining real net rate of return on capital. The gross return, on the other hand, may be rising to cover rising wear, tear and obsolescence of capital.

25. Table 4 also points to the importance of owner-occupied housing as an element that drives a wedge between production-based and income-based labour shares²⁹. There is no clear pattern, however. In many countries, and on average, owner-occupied housing enters the de-composition with a negative sign, thus contributing to a decline (or reducing a rise) in LS_p . This suggests that the imputed capital income associated with owner-occupied housing has increased less quickly than capital income in other parts of the economy. For about one third of countries, the effect is positive, contributing to a rise or reducing a decline in labour shares. Either way, the imputations are likely to reflect the influence of land prices in the following sense. While revaluations of assets such as land are not *as such* part of income, they affect rental prices and rents for dwellings: a widely-used method to value owner-occupied housing services is by imputing observed market rents for comparable dwellings. As market rents tend to move in tandem with land prices, changes in the latter will translate into values of owner-occupied rents. An alternative estimation technique is the user cost method. As user costs are computed as a proportion of asset values, there is again a direct link from land revaluation to the value of owner-occupied housing. Rising/falling land prices will thus raise/dampen the income from owner-occupied housing and this appears to be at least a partial explanation for movements in the production-based labour and capital shares.

²⁸ Some caution is also called for regarding the quality of countries' depreciation measures. While some countries can point to recent surveys to determine age profiles of assets and rates of depreciation, this is not the case for many other countries and assumed service lives may not be up to date (OECD 2009).

²⁹ This supports Rognlie's (2015) finding for the United States "Overall, the net capital share has increased since 1948, but when disaggregated this increase comes entirely from the housing sector: the contribution to net capital income from all other sectors has been zero or slightly negative, as the fall and rise have offset each other."

Figure 4. Depreciation/Gross Value-Added

Note: data for Australia, Canada, France and Korea: 1981-2014; data for all 21 countries: 1995-2014.

Capital shares, rates of return and land – the case of Korea

26. Land, probably the single most important non-produced asset in most countries' balance sheets, made already a brief appearance in the discussion of owner-occupied housing above. As it turns out, there is more to say on its role in capital income. Despite its importance, data on the volume and on the value of land is at best patchy in the reality of countries' balance sheets³⁰. For the following discussion which requires a well-developed set of national accounts balance sheets, preferably over a long time period we deviate from cross-country comparisons and take the case of Korea where a suitable dataset has been developed recently.

Dissecting the capital share

27. Although capital shares are simply derived as one minus the labour share, it is useful to dissect capital income for better interpretation of the findings above. We shall look at the income-based capital share as it includes owner-occupied housing although a number of observations carry over to the production related measure. The value of capital income net of depreciation, $u_j^n S_j$ (with $j=1,2,\dots,5$ corresponding again to the different ways of splitting mixed income) is:

$$(12) u_j^n S_j = GV_{MIX} - \alpha_j V_{MIX} + GOS - D + T_{PRN} + T_{PR} = r^*(1+\rho) \left[\sum_{i=1}^N P_{Ki} K_i + \sum_{i=1}^M P_{Zi} Z_i \right].$$

28. The right hand side of equation (12) indicates first how capital income is constructed from the national accounts. The second part defines a net real rate of return $r^*(1+\rho)$ ³¹ as the ratio of capital income

³⁰ Progress is under way, however. A recent methodological guide (Eurostat and OECD 2015) will help countries' measurement efforts. Also, all countries in the European Statistical System are committed to developing data on land over the near future.

³¹ This is a simplified version of the standard approach to measuring user costs developed by Jorgenson (1963) and Hall and Jorgenson (1967) and Diewert (1974). A discrete-time formulation is $\sum_{i=1}^N P_{Ki}(r-\rho_i)K_i + \sum_{i=1}^M P_{Zi}(r-\rho_i)Z_i$ where ρ_i is the one period rate of change of the asset price P_{Ki} or P_{Zi} (remembering that

$u_j^n S_j$ over the value of the net capital stock. The net capital stock consists of N different types of produced assets K_i (such as machinery, equipment, structures, inventories), and of M different types of land Z_i (such as agricultural land, residential land, land under structures but possibly also other non-produced assets within the SNA asset boundary). The stock of produced assets is valued at new asset prices P_{Ki} , the stock of land is valued at land prices P_{Zi} .

Turning (12) around, the real net rate of return r_j^* is computed endogenously as

$$(13) \quad r_j^* = [GV_{MIX} - \alpha_j V_{MIX} + GOS - D + T_{PRN} + T_{PR}] / (1 + \rho) / [\sum_{i=1}^N P_{Ki} K_i + \sum_{i=1}^M P_{Zi} Z_i]; j=1, \dots, 5.$$

The income-based capital shares CS_{Dj} are then:

$$(14) \quad CS_{Dj} = 1 - LS_{Dj} = r_j^* (1 + \rho) [\sum_{i=1}^N P_{Ki} K_i + \sum_{i=1}^M P_{Zi} Z_i] / NDI_M$$

29. We are now in a position to disentangle two components of the capital share: the net rate of return $r_j^* (1 + \rho)$ and the wealth/income ratio $[\sum_{i=1}^N P_{Ki} K_i + \sum_{i=1}^M P_{Zi} Z_i] / NDI_M$. We note that $[\sum_{i=1}^N P_{Ki} K_i + \sum_{i=1}^M P_{Zi} Z_i]$ is a measure of nominal wealth, valued in prices of the current period that is then compared to nominal net income, again in prices of the current period. Whether changes in the capital share are driven by movements in the real rate of return or by movements in the capital-income ratio is a matter of interest. r^* reflects the average real net return on capital used in production. A long-term rise or fall in r^* would point to changing conditions in access to capital, changes in international capital mobility, or the emergence/decline of excessive returns in production. The wealth-income ratio, on the other hand, indicates how much wealth has been accumulated that generates income at a given real rate r^* .

depreciation has been purged from the expression). The balancing real rate of return r^* (Diewert, Mizobuchi and Nomura 2009) is computed under the simplifying assumption that the (expected) price changes of the different types of assets all equal a general rate of inflation $\rho = p_i$ for all $i=1, \dots, N+M$ assets. Note that, as the real rate of interest is defined as $(1+r^*) = (1+r)/(1+\rho)$, it follows that $r^* (1+\rho) = r - \rho$ is simply the real interest rate that corresponds to end-year interest payments, expressed in prices of the end of the year. The major advantage of the simplified user cost approach is that it largely avoids the occurrence of negative user costs – quite likely during spurs of land price bubbles for instance. The simplified method also benefits from ease of implementation. Its disadvantage is the bias that may arise in asset weights due to the assumption of equal real price changes across all asset types (see OECD 2009 for further discussion).

Figure 5. Capital shares in Korea, income-based

Figure 6. Real net rate of return, $r^*(1+p)$

Figure 7. Net rate of return based on CSD5, wealth-income ratio, Korea

Note: Wealth comprises fixed assets, inventories and land.

30. To present results for Korea, we start with Figure 5 that presents the five types of income-based capital share CS_{Dj} during four a half decades. Figure 6 shows the corresponding real net rates of return $r_i^*(1+p)$. Several points arise: (i) choices for the treatment of mixed income matter tremendously, in particular at the country level. For instance, while CS_{D1} (all mixed income is attributed to capital) yields a declining capital share, the opposite is true for CS_{D4} (imputed wage rate of the self-employed equals wage rate of employees). CS_{D5} , on the other hand, suggests a broadly constant capital share; (ii) these differences are directly mirrored in the real net rates of return that show significantly different trends, in particular in the early decades. One reason why our preferred choice among the different ways of imputing mixed income is CS_{D5} is that the long-run level of the associated real rate of return is a good match for long-run real rates of return on financial markets, as well as other Korean income and wealth data (Cho et al. 2014, 2015a). The relatively weak downward trend of the real rate of return under CS_{D5} is also consistent with functioning international capital markets if one transposes the analysis by Caselli and Feyrer (2007) from a cross-country perspective to a temporal perspective³².

31. Next, we examine the complete break-down of capital share #5 into its various components. As above we start by transforming the percentage point difference between periods t and s into a logarithmic difference by applying a logarithmic mean $\Delta CS_{D5} = m(CS_{D5}^t, CS_{D5}^s) \Delta \ln CS_{D5}$. The proportional change $\Delta \ln CS_{D5} \equiv \ln(CS_{D5}^t / CS_{D5}^s)$ is then further broken down into a real rate of return effect, a (nominal) wealth effect and a (nominal) net income effect:

$$(15) \quad \Delta \ln CS_{D5} = \Delta \ln(r^*(1+p)) + \Delta \ln(\sum_{i=1}^N P_{Ki} K_i + \sum_{i=1}^M P_{Zi} Z_i) - \Delta \ln NDI_M$$

Next define Törnqvist price indices of produced capital and of non-produced capital as follows:

$$(16a) \quad \Delta \ln P_K \equiv \sum_{i=1}^N \frac{1}{2} [v_{Ki}^t + v_{Ki}^s] \Delta \ln P_{Ki}$$

$$(16b) \quad \Delta \ln P_Z \equiv \sum_{i=1}^M \frac{1}{2} [v_{Zi}^t + v_{Zi}^s] \Delta \ln P_{Zi}$$

³² The real net rate of return $r^*(1+p)$ in CS_{D5} was found to be broadly stable over the last four decades (Cho, Kim and Schreyer, 2014) when land was included in the Korean asset boundary. Caselli and Feyrer (2007) find that marginal products of capital are equalized across countries regardless of their development stage when land and natural resources are included in the capital boundary.

where $v_{K_i}^t \equiv P_{K_i}^t K_i^t / \sum_{i=1}^N P_{K_i}^t K_i^t$ and $v_{Z_i}^t \equiv P_{Z_i}^t Z_i^t / \sum_{i=1}^M P_{Z_i}^t Z_i^t$ are the shares of asset types K_i and Z_i in total produced and non-produced wealth, respectively. Next, define a Törnqvist price index of overall wealth as:

$$(17) \Delta \ln P_W \equiv \frac{1}{2} [a_{K_i}^t + a_{K_i}^s] \Delta \ln P_k + \frac{1}{2} [a_{Z_i}^t + a_{Z_i}^s] \Delta \ln P_Z$$

where $a_{K_i}^t \equiv \sum_{i=1}^N P_{K_i}^t K_i^t / (\sum_{i=1}^N P_{K_i}^t K_i^t + \sum_{i=1}^M P_{Z_i}^t Z_i^t)$ and $a_{Z_i}^t \equiv \sum_{i=1}^M P_{Z_i}^t Z_i^t / (\sum_{i=1}^N P_{K_i}^t K_i^t + \sum_{i=1}^M P_{Z_i}^t Z_i^t)$ are the shares of produced assets and non-produced assets in overall nominal wealth. With the help of (17) the change in nominal wealth is broken down into the change in the price index $\Delta \ln P_W$ and into the change in an implicit quantity index $\Delta \ln Q_W$:

$$(18) \Delta \ln Q_W = \Delta \ln [\sum_{i=1}^N P_{K_i} K_i + \sum_{i=1}^M P_{Z_i} Z_i] - \Delta \ln P_W$$

Note that $\Delta \ln P_W - \Delta \ln NDI_M = \frac{1}{2} [a_{K_i}^t + a_{K_i}^s] [\Delta \ln P_k - \Delta \ln NDI_M] + \frac{1}{2} [a_{Z_i}^t + a_{Z_i}^s] [\Delta \ln P_Z - \Delta \ln NDI_M]$ is conveniently interpreted as a real price index or more precisely as an overall asset price index normalised by net income. This leads to the overall de-composition of the change in the capital share:

$$(19) \quad \Delta CS_{D5} = \gamma_r + \gamma_Q + \gamma_{PK} + \gamma_{PZ}, \quad \text{with:}$$

$$\gamma_r \equiv m(CS_{D5}^t, CS_{D5}^s) \Delta \ln(r^*(1+\rho)) \quad \text{net rate of return effect}$$

$$\gamma_Q \equiv m(CS_{D5}^t, CS_{D5}^s) \Delta \ln Q_W \quad \text{effect of quantity change in assets}$$

$$\gamma_{PK} \equiv m(CS_{D5}^t, CS_{D5}^s) (\frac{1}{2} [a_{K_i}^t + a_{K_i}^s] [\Delta \ln P_k - \Delta \ln NDI_M]) \quad \text{effect of change in real produced asset prices}$$

$$\gamma_{PZ} \equiv m(CS_{D5}^t, CS_{D5}^s) (\frac{1}{2} [a_{Z_i}^t + a_{Z_i}^s] [\Delta \ln P_Z - \Delta \ln NDI_M]) \quad \text{effect of change in real non-produced asset prices}$$

Table 5. Evolution of Capital Share CSD5 in Korea

Yearly average, percentage points

			Produced assets	Land	
	ΔCS_{D5}	γ_r	γ_{PK}	γ_{PZ}	γ_Q
	Changes in capital share	Effect of real rate of return	Effect of real asset price change		Effect of asset quantity
1973~2015	-0.031	-0.360	-0.855	-0.183	1.367
1973~1982	-0.424	-0.048	-1.174	-1.067	1.864
1983~1991	0.205	-1.494	-1.368	1.518	1.550
1992~2002	0.209	1.047	-0.778	-1.370	1.309
2003~2008	-0.333	-2.217	-0.215	1.078	1.022
2009~2015	0.111	0.033	-0.407	-0.326	0.811

Source: Authors' calculations.

32. Table 5 summarises the results of this de-composition for various sub-periods. For the entire period, the near-constancy of the capital share (an average decline of -0.031 percentage points) reflected two off-setting influences: a decline in real asset prices and a persistent positive effect of capital formation. Interestingly, even real land prices declined as nominal income grew quicker than the price of land. This changes during sub-periods of land price bubbles, in particular during the 1980s and early 2000s. Strong appreciation of land prices contributed a 1.518 percentage point rise (1.078 percentage point rise, respectively) in the capital share. While Korea is a special case due to its strong investment performance in

produced assets, the sub-periods with land price bubbles may be characteristic for other economies as well. Strong upward revaluations of land prices may dominate the movements in capital shares and lead to their increase.

33. We note in passing a revaluation effect that drives up the wealth-income ratio and possibly capital shares needs to be carefully distinguished from a rise in the capital-output ratio in volume terms – essentially a production perspective. This point was also made by Stiglitz (2015). “There are many forms of wealth that are not produced assets. Much of the increase in wealth in recent years is associated with an increase in the value of land. The increase in the value of land does not, however, mean that there is more land, and that therefore the productivity of labour should go up. And an increase in the value of land does not mean that the marginal productivity of capital should decrease”(p.17).

34. This statement is borne out by the Korean data as Figure 8 demonstrates. Wealth-income ratios and land-income ratios in nominal terms have fluctuated strongly as a consequence of asset price bubbles and busts³³ with an overall upward trend. On the other hand, the capital-output ratio in volume terms has seen a steady decline, implying rising average (and probably marginal) capital productivity. Capital here comprises both produced capital and land – as the latter grows much more slowly than the former and commands an important weight, the volume growth of the overall capital aggregate is slow, too.

Figure 8. Wealth-income and capital-output ratios in Korea

Notes: 1) Capital-output ratio = quantity index of produced capital and land/Gross Value-Added (in volume terms)
2) Wealth-income ratio = (produced capital + land)/NDI (in nominal terms).

Land in the production-based labour share

35. The effects of land prices are not confined to dissecting the composition of the capital share. They carry over to analysis of labour and capital shares from a production perspective. Although the production perspective excludes owner-occupied dwellings in our calculations, it does not follow that land as a capital input is purged from our considerations – there are large parts of the corporate sector where land constitutes a factor of production, for instance the primary industries such as agriculture or mining but also land under corporate structures such as office buildings, often in urban areas.

³³ Value of land figures prior to 1995 are from Cho et al. (2015a) which is an update of Cho et al. (2014). Lee and Yoon (2015) analyse how the capital-income ratio, capital income share, rate of return etc. have evolved over the entire history of modern capitalism in Korea. They also use authors' estimates of land value in the case of pre-1995 years.

Karabarbounis and Neiman (2014), in a recent analysis of declining labour shares in the U.S. corporate sector, quantify the determinants of this decline and in a convincing reasoning identify the relative decline of real investment prices (similar to the P_K term in our notation) as one key ingredient for their explanation: “the decrease in the relative price of investment goods, often attributed to advances in information technology and the computer age, induced firms to shift away from labour and toward capital. The lower price of investment goods explains roughly half of the observed decline in the labour share” (p.61). Introducing land into the analysis likely takes away little from these findings but adds an important element in the following sense: without repeating Karabarbounis and Neiman’s (2014) rich model here, a key feature is the requirement of an elasticity of substitution between labour and (produced) capital that exceeds unity, otherwise it would not be possible to consolidate the observations of a declining labour share and a falling real price of capital³⁴. With cross-country regressions, the authors establish indeed that the substitution elasticity is larger than one and so produce a consistent analysis. The point we make here is that with the introduction of land, the stylised facts are consistent even if the elasticity of substitution between labour and produced capital is less than unity. Our observation expands on Stiglitz (2015) who highlights the role of land in the development of labour shares and the link to inter-personal income distribution.

36. To illustrate this idea, we introduce land into a standard model of production and examine the dynamics of production-based labour shares. Consider a cost function $C(Q, W, U_K, U_Z)$ with three inputs, labour L , produced capital K and land Z with input prices W, U_K and U_Z respectively. $U_K = P_K[r^*(1+\rho)+d]$ are the user costs of produced capital with depreciation rate d and deflator ρ as above; $U_Z = P_Z r^*(1+\rho)$ are the user costs of land. Uzawa (1962) showed that the partial Allen-Uzawa elasticity of substitution between any two factors – say L and K – is given by $\sigma_{L,K} = C C_{WU_K} / (C_W C_{U_K})$ where subscripts denote partial derivatives³⁵. The labour share itself is $LS_P = WC_W / C$, and its elasticity with respect to the price of the other inputs (Diewert 1974) is:

$$(20a) \quad \partial \ln LS_P / \partial \ln U_K = [\sigma_{L,K} - 1][U_K K / C] = [\sigma_{L,K} - 1]KS \text{ with } KS \text{ as cost share of produced capital;}$$

$$(20b) \quad \partial \ln LS_P / \partial \ln U_Z = [\sigma_{L,Z} - 1][U_Z Z / C] = [\sigma_{L,Z} - 1]ZS \text{ with } ZS \text{ as cost share of non-produced capital.}$$

37. Note that by a basic property of cost functions (Diewert 1982) the factor shares and the elasticity of substitution are functions of relative input prices only. Letting $u_i \equiv U_i / W$ ($i=K, Z$) be the price of capital inputs relative to the price of labour, we can express the rate of change of the labour share as a function of the rate of change of relative prices, cost shares and elasticities of substitution:

$$(21) \quad d \ln LS_P(u_K, u_Z) = \sum_{i=K,Z} [\partial \ln LS_P(u_K, u_Z) / \partial \ln u_i] d \ln u_i \\ = [\sigma_{L,K}(u_K, u_Z) - 1]KS d \ln u_K + [\sigma_{L,Z}(u_K, u_Z) - 1]ZS d \ln u_Z.$$

38. From (21) it is apparent that a declining real user cost of produced capital u_K (which will be driven by the rate of change of the purchase price of produced capital) is perfectly consistent with an elasticity of substitution between K and L of less than one, including when real land prices u_Z are increasing, as long as the land-labour substitution elasticity is sufficiently small. Inputs i and j are substitutes (complements) in the Allen-Uzawa sense if $\sigma_{ij} > 0$ ($\sigma_{ij} < 0$). The same information is provided by cross-price elasticities ε_{ij} that are linked to the elasticity of substitution by dividing by the respective

³⁴ “Absent economic profits and capital-augmenting technology growth, a positive relationship between trends in the relative price of investment and trends in the labor share is possible only when the elasticity of substitution between capital and labor exceeds 1” (Karabarbounis and Neiman, 2014, p. 86).

³⁵ For a full derivation see Appendix E.

input share: $\sigma_{LK} = \epsilon_{LK}/KS$ and $\sigma_{LZ} = \epsilon_{LZ}/ZS$ ³⁶. Thus, for example labour is a substitute for capital if demand for labour increases as a consequence of a rise in the real user cost of capital. The absolute size of σ_{LK} and σ_{LZ} on the other hand, determines how a relative price change plays out in terms of factor shares as could be seen from equation (21).

39. Empirical estimation of the various price elasticities for Korea is not a particular focus of this paper but we can use existing data to carry out a back-of-the envelope calculation³⁷. With time series available for the labour and capital shares, as well as the real user costs, σ_{LK} and σ_{LZ} can be estimated econometrically in equation (21). The elasticity of substitution between labour and produced capital turns out to be well below unity, thus lining up with a large body of literature and supporting Stiglitz' (2015) reasoning. Interestingly, the elasticity of substitution between labour and land takes a negative value, thus suggesting that land and labour are complements³⁸. Indeed it does not seem implausible that rising real land prices for instance in urban areas dampen labour demand rather than produce a dynamic of substitution of less land for more labour. However, firms may relocate outside urban areas which may help maintaining or increasing employment. Another possible explanation is that land price bubbles may divert investment away from productive to purely financial use and so reduce labour demand. One should also keep in mind that the present estimates do not account for possible non-constant returns to scale or mark-ups whose introduction may modify the size and sign of cross-price elasticities. As this question is well beyond the scope of our current work, we leave its exploration to future research.

4. Conclusions

40. We revisit the recurring question of how best to measure the labour share in OECD economies by drawing a distinction between production-based and income-based perspectives. The former examines labour and capital in a reference framework of a production function in a market setting, the latter looks at labour and capital income measures that have macro-economic net income measures as a reference, thus including income generated by non-market production, taking account of depreciation and recognising taxes and subsidies as perceived by final consumers. The distinction is helpful in deciding on various measurement decisions and results in different observations on the development of the labour share. We find in particular:

³⁶ ϵ_{LK} is defined as $\partial \ln L(Q, U_K, U_Z) / \partial \ln U_K$ where labour demand L is linked to the cost function via Shepard's Lemma $L(Q, U_K, U_Z) = C_w(Q, U_K, U_Z)$. Blackorby and Russell (1989) underline that 'the comparative statics of absolute income shares is a property of cross-price elasticities and shares; the [Allen-Uzawa] elasticity of substitution provides no new information about these shares' (p.884).

³⁷ Data on labour and capital shares was described earlier. For the user costs of produced capital and land we rely on an updated and consistent version of the data set first presented in Cho, Kim and Schreyer (2015) and further developed in Cho et al. (2015a). We run an OLS estimation for equation (21) with the following results: $\Delta \ln L_{Sp5} = -0.341 * KS \ln u_K - 1.359 * ZS \ln u_Z$. With standard errors of 0.14 and 0.18, the estimated coefficients are significant at the 5% and 1% level. σ_{LK} is then 0.659 (=1-0.341) and σ_{LZ} is -0.359 (=1-1.359). KS and ZS are evaluated at the sample mean to compute cross price elasticities. However, the present computation should be taken as a quick indication rather than a robust result. We note in particular that no meaningful results could be obtained without imposing a zero intercept on the regression. Despite that fact that equation (21) justifies suppression of an intercept, it is obvious that more investigation will be needed in a separate research project.

³⁸ The implied own-price elasticity of labour is -0.072. This can be compared with results from a meta-analysis by Lichter, Peichl and Sieglösch (2014) who analyse 942 estimates of own-price elasticities of labour from 105 studies. The simple average across all estimates is -0.136, somewhat higher than the value implied by our study but not entirely out of scope. Also, while Lichter, Peichl and Sieglösch (2014) put their preferred point estimate at -0.24, they place it within an interval of [-0.07 and -0.44] which (just) encompasses our own result.

41. Confirmation of a statistically significant decline in the labour share when adopting a production perspective. While the decline is significant, it is rather small on average but with large variations between countries.

42. A much lower or entirely insignificant decline in the labour share when adopting an income perspective. Given this evidence, it is hard to argue that changes in the functional income distribution – labour against capital – have been a driving force behind a rather pervasive trend towards more income inequality in OECD countries (OECD 2015). Rather, our analysis shows that there has been a change in the distribution *within* capital income components. To the extent that the gross income share of capital has risen (our production-related measure), this appears to have been a consequence of rising depreciation rates. A weakened link between the functional and the inter-household distribution of income is compatible with a rising inequality among wage earners, i.e., within the labour share. It may also be consistent with rising inequality within the capital share when rents on non-produced assets account for an increasing part of capital income as opposed to returns to produced capital (Stiglitz, 2015). If the wealth distribution effect from appreciating land assets is persistent, and if the ultimate ownership structure between households of non-produced assets is different from the ultimate ownership structure of produced assets, this will translate into income distribution effects through a different distribution of property income associated with the different assets. Absent the necessary cross-country data for non-produced assets, we cannot test this idea. For the Korean case where such data exists, this evidence is not borne out, except for two periods of asset price bubbles. Otherwise the strong long-term growth and investment performance of Korea brought asset prices that tended to rise less quickly than income thus dampening any rise in the country's capital share.

43. Interpretation of the movement of capital shares (and labour shares) is difficult without including land into measurement. This helps distinguish returns on productive activity from rents. It also provides an explanation of how labour shares can decline in the presence of declining real prices of investment goods while maintaining the stylised fact of an elasticity of substitution between labour and produced capital that is smaller than one.

44. Mixed income cannot be ignored in labour and capital share calculations. Given statistical practices, restricting the scope of observations to the corporate sector does not resolve the issue and comes at the price of ignoring about 1/3 of economy-wide income. How mixed income is allocated to labour and capital strongly affects results.

45. Land – and possibly other non-produced assets – makes a significant difference when explaining the changes in labour and capital shares. This holds for analysing the components of capital income but also for measuring the elasticities of substitution between labour and capital. We show that introducing land does away with the need for a large elasticity of substitution between labour and capital to square declining labour shares with falling real user costs for capital.

REFERENCES

- Allen, R.G.D. (1938), *Mathematical Analysis for Economists*, London: Macmillan.
- Atkinson, A.B. (2009), “Factor Shares: The Principal Problem of Political Economy?”, *Oxford Review of Economic Policy*, Vol. 25, pp. 3-16.
- Atkinson, A.B. (2015), *Inequality*, Harvard University Press.
- Atkinson, A.B., T. Piketty, and E. Saez (2011), “Top Incomes in the Long Run of History”, *Journal of Economic Literature*, Vol. 49:1, pp. 3-71,
<http://www.aeaweb.org/articles.php?doi=10.1257/jel.49.1.3>.
- Balk, B.M. (1998), *Industrial Price, Quantity and Productivity Indices, The Micro-economic Theory and an Application*, Kluwer Academic Publishers.
- Balk, B.M. (2008), *Price and Quantity Index Numbers: Models for Measuring Aggregate Change and Difference*, Cambridge University Press New York.
- Bentolila, S. and G. Saint-Paul (2003), “Explaining Movements in the Labor Share”, *B.E. Journal of Macroeconomics*, Berkeley Electronic Press, Vol. 3(1), pp. 1-33.
- Bernanke, B. and R. Gurkaynak (2001), “Is Growth Exogenous? Taking Mankiw, Romer, and Weil Seriously”, *NBER Macroeconomics Annual*, Vol. 16, pp. 11-57.
- Blackorby, C. and R.R. Russell (1989), “Will the Real Elasticity of Substitution Please Stand Up? (A Comparison of the Allen/Uzawa and Morishima Elasticities)”, *The American Economic Review*, Vol. 79, No. 4 (Sep), pp. 882-888.
- Bridgman, B. (2014), “Is Labor's Loss Capital's Gain? Gross versus Net Labor Shares”, BEA Working Paper 2014-10.
- Caselli, F. and J. Feyrer (2007), “Marginal product of capital”, *The Quarterly Journal of Economics*, Vol. 22 Issue 2, pp. 535-568.
- Cho, T. (2016), “Decomposing the sources of economic growth and increased real income in Korea: 1970-2014” (in Korean), PhD thesis, Chung-Ang University.
- Cho, T., B. Choi, K. Jang and E. Kim (2015a), “Estimating the value of land for Korea since 1964” (originally in Korean but available in English translation upon request), Discussion Paper Series 2015-6, the Bank of Korea.
- Cho, T., B. Choi, S. Hwang and M. Kim (2015b), “Estimating Korea's volume of capital services by applying the endogenous, ex post rate of return on capital” (in Korean), *Quarterly National Accounts Review* 2015-3, The Bank of Korea.
- Cho, T., J. Kim and P. Schreyer (2015), “Measuring the evolution of Korea’s material living standards, 1980-2012”, *Journal of Productivity Analysis*, Vol. 44 (2), pp. 157-173.

- Diewert, W.E. (1974a), “Intertemporal Consumer Theory and Demand for Durables”, *Econometrica* 42, 497-516.
- Diewert, W.E. (1974b), “A Note on Aggregation and Elasticities of Substitution”, *The Canadian Journal of Economics*, Vol. 7, No. 1, pp. 12-20.
- Diewert, W.E. (1982), “Duality Approaches to Microeconomic Theory”, in M.D. Intriligator (ed.) *Handbook of Mathematical Economics*, North Holland, Amsterdam, pp. 535-599.
- Diewert, W.E. and A. Nakamura (2007), “The Measurement of Aggregate Total Factor Productivity Growth”, in J. Heckman and E. Leamer (eds.) *Handbook of Econometrics*, Vol. 6A.
- Diewert, W.E., H. Mizobuchi and K. Nomura (2009), “On measuring the productivity and the standard of living in Japan, 1955-2006”, KEO discussion paper No. 115.
- Ellis, L. and K. Smith (2007), “The global upward trend in the profit share”, BIS Working Papers No. 231.
- Ellis, L. and K. Smith (2010), “The Global Upward Trend in the Profit Share”, *Applied Economics Quarterly*, Vol. 56, pp. 231-256.
- Elsby, M.W., B. Hobijn and A. Sahin (2013), “The Decline of the U.S. Labor Share”, Brookings Papers on Economic Activity, Fall 2013, pp. 1-52.
- European Union (2007), “Labour income share in the European Union”, *Employment in Europe*, Chapter 5.
- Eurostat and OECD (2015), *Eurostat-OECD Compilation Guide on Land Estimation*, European Union, <http://ec.europa.eu/eurostat/documents/3859598/6893405/KS-GQ-14-012-EN-N.pdf>.
- Freeman, R.A. (2011), “Accounting for the Self-Employed in Labour Share Estimates: The Case of the United States”, OECD Science, Technology and Industry Working Papers, 2011/04, OECD Publishing, <http://dx.doi.org/10.1787/5kg0w877vlgw-en>.
- Gollin, D. (1998), “Getting Income Shares Right: Self Employment, Unincorporated Enterprise, and the Cobb-Douglas Hypothesis”, Unpublished, Williams College.
- Gollin, D. (2002), “Getting Income Shares Right,” *Journal of Political Economy*, Vol. 110, pp. 458-74.
- Guerriero, M. (2012), “The Labour Share of Income around the World: Evidence from a Panel Dataset”, IDPM Working Paper Series WP No. 32.
- Hall R.E. and D.W. Jorgenson (1967), “Tax Policy and Investment Behavior”, *American Economic Review* 91, No. 3, pp. 341-414.
- Hicks, J. (1932), *The Theory of Wages*, London Macmillan.
- Hong, M. (2014), “Changes in the Industrial Structure and Labor Income Share”, *KLI Labor Review*, Vol. 109, pp. 50-62, Korea Labor Institute.
- ILO (2011), “Chapter 3. The labour share of income: Determinants and potential contribution to exiting the financial crisis”, World of Work Report 2011: Making markets work for jobs.

- ILO (2013), “Chapter 5. The fall in the labour income share”, *Global Wage Report 2012/13*.
- IMF (2007), “Chapter 5. The Globalization of Labor”, *World Economic Outlook 2007*, Washington.
- IMF (2012), “Chapter 1. Global Prospects and Policies”, *World Economic Outlook 2012*, Washington.
- Johnson, D.G. (1954), “The Functional Distribution of Income in the United States, 1850-1952”, *The Review of Economics and Statistics*, Vol. 36, pp. 175-182.
- Joo, S. and S. Jeon (2014), “Measuring Labor Income Share for Korea” (in Korean), *Review of Social and Economic Studies*, Vol. 43, pp. 31-65.
- Jorgenson, D.W. (1963), “Capital Theory and Investment Behavior”, *American Economic Review* Vol. 53, No. 2, pp. 247-259.
- Jorgenson, D.W. (1991), “Productivity and Economic Growth.” Chapter from *Fifty Years of Economic Measurement: The Jubilee of the Conference on Research in Income and Wealth*. University of Chicago Press, pp. 19-118.
- Jorgenson, D.W. and Z. Griliches (1967), “The Explanation of Productivity Change”, *Review of Economic Studies* Vol. 34(3), pp. 249-83.
- Jorgenson, D.W. and D.T. Slesnick (1987), “Aggregate Consumer Behavior and Household Equivalence Scales”, *Journal of Business and Economic Statistics*, Vol. 5(2), pp. 219-232.
- Jorgenson, D.W. and D.T. Slesnick (2014), “Measuring social welfare in the U.S. national accounts”, in D.W. Jorgenson, S. Landefeld and P. Schreyer (eds.), *Measuring Economic Sustainability and Progress*, CRIW and NBER Studies in Income and Wealth, Vol. 72, pp. 43-88.
- Jorgenson, D.W. and P. Schreyer (2013), “Industry-level Productivity Measurement and the 2008 System of National Accounts”, *Review of Income and Wealth* Vol. 59(2), pp. 185-211.
- Karabarbounis, L. and B. Neiman (2014), “The Global Decline of the Labor Share”, *Quarterly Journal of Economics*, Vol. 129(1), pp.61-103.
- Kim, B-G. (2016), “Explaining movements of the labor share in the Korean economy: factor substitution, markups and bargaining power”, *The Journal of Economic Inequality*, Vol. 14, pp. 327-352, <http://link.springer.com/10.1007/s10888-016-9330-x>.
- Kravis, I.B. (1959), “Relative Income Shares in Fact and Theory”, *American Economic Review* 49, No. 5, pp. 917-949.
- Krueger, A. (1999), “Measuring Labor’s Share”, *American Economic Review*, Vol. 89(2), pp. 45-51.
- Lee, B-H. (2015), “Labour Income Share in Korea: Measuring Issues and Trends” (English translation of a paper published in *Monthly Labor Review*, January 2015), e-Labor News No. 159, Issue paper, Korea Labor Institute.
- Lee, W. and Y. Yoon (2015), “Capital in South Korea: 1966-2013”, presented at the conference on Social Welfare, Justice and Distribution: celebrating John Roemer’s contributions to economics, political philosophy and political science, Queen Mary University of London, UK, June 19-20.

- Lichter, A., A. Peichl and S. Sieglöcher (2014), “The Own-Wage Elasticity of Labor Demand: A Meta-Regression Analysis”, Institute for the Study of Labor (IZA) Discussion Paper No. 7958, available at <http://ftp.iza.org/dp7958.pdf>.
- OECD (2001), *Measuring Productivity - OECD Manual: Measurement of Aggregate and Industry-level Productivity Growth*, OECD Publishing, Paris, <http://dx.doi.org/10.1787/9789264194519-en>
- OECD (2009), *Measuring Capital - OECD Manual 2009: Second edition*, OECD Publishing, Paris, <http://dx.doi.org/10.1787/9789264068476-en>
- OECD (2012), "Labour Losing to Capital: What Explains the Declining Labour Share?", in *OECD Employment Outlook 2012*, OECD Publishing, Paris, http://dx.doi.org/10.1787/empl_outlook-2012-4-en
- OECD (2015), *OECD Compendium of Productivity Indicators 2015*, OECD Publishing, Paris, <http://dx.doi.org/10.1787/pdty-2015-en>
- OECD (2015), *In It Together: Why Less Inequality Benefits All*, OECD Publishing, Paris, <http://dx.doi.org/10.1787/9789264235120-en>
- OECD-ILO (2015), “The Labour Share in G20 Countries”, report prepared for the G20 Employment Working Group Antalya, Turkey, 26-27 February 2015, <https://www.oecd.org/g20/topics/employment-and-social-policy/The-Labour-Share-in-G20-Economies.pdf>.
- Piketty, T. and G. Zucman (2014), “Capital is Back: Wealth-Income Ratios in Rich Countries 1700-2010”, *Quarterly Journal of Economics*.
- Pionnier, P. and E. Guidetti (2015), "Comparing profit shares in value-added in four OECD countries: Towards more harmonised national accounts", *OECD Statistics Working Papers*, No. 2015/03, OECD Publishing, Paris, <http://dx.doi.org/10.1787/5js0bsm2g0lt-en>.
- Pyo, H. (2015), “On the Empirical Test of the Piketty Propositions” (in Korean), *The Korean Economic Forum* Vol. 8 Issue 1, The Korean Economic Association.
- Rognlie, M. (2015), “Deciphering the fall and rise in the net capital share”, BPEA Conference Draft, March 19-20, Brookings, http://www.brookings.edu/~media/Projects/BPEA/Spring-2015/2015a_rognlie.pdf?la=en.
- Saez, E. and M.R. Veall (2005), “The Evolution of High Incomes in Northern America: Lessons from Canadian Evidence”, *American Economic Review*, Vol. 95(3), pp. 831-849.
- Sefton, J. A. and M.R. Weale (2006), “The Concept of Income in a General Equilibrium”, *Review of Economic Studies*, Vol. 73, pp. 219-249.
- Schwellnus, C., A. Kappeler and P-A. Pionnier (forthcoming); “Decoupling of Wages from Productivity: Macro-level Facts”; OECD Economics Department Working Paper; OECD.
- Stockhammer, E., Onaran, Ö. and Ederer, S. (2009), “Functional income distribution and aggregate demand in the Euro area”, *Cambridge Journal of Economics*, Vol. 33 (1), pp.139-159.

- Solow, R.M. (1957), “Technical change and the aggregate production function”, *Review of Economics and Statistics*, Vol. 39, pp. 312-320.
- Stiglitz, J.E. (2015), “New Theoretical Perspectives on the Distribution of Income and Wealth among Individuals: Part I. The Wealth Residual”, NBER Working Paper 21189, available under <http://www.nber.org/papers/w21189>.
- Stiglitz, J., A. Sen and J-P. Fitoussi (2009), *Report by the Commission on the Measurement of Economic Performance and Social Progress*; online document http://www.stiglitz-sen-fitoussi.fr/documents/rapport_anglais.pdf.
- Uzawa, H. (1962), “Production Functions with Constant Elasticities of Substitution”, *Review of Economic Studies*, Vol. 30, pp. 291-299.
- Weitzman, M.L. (1976), “On the Welfare Significance of National Product in a Dynamic Economy”, *The Quarterly Journal of Economics*, Vol. 90, pp. 156-162.
- Young, A. (1995), “The Tyranny of Numbers: Confronting the Statistical Realities of the East Asian Growth Experience”, *Quarterly Journal of Economics*, Vol. 110, pp. 641-80.
- Zheng, Y., D. Koh and R. Santaaulalia-Llopis (2015), “Labor Share Decline and the Capitalization of Intellectual Property Products”, https://www.economicdynamics.org/meetpapers/2015/paper_844.pdf.

APPENDIX A. DESCRIPTION OF VARIABLES AND COMPUTATION OF LABOUR INCOME SHARES

46. The analysis is based on data downloaded on August 3, 2016 from the Annual National Accounts part of the OECD.stat Database (<http://stats.oecd.org/>). Korean income data has been divided into operating surplus and mixed income by authors' estimation.

1) Item code used in computing labour income shares

Item code	Variable	Description
■ Based on Detailed Non-Financial Sector Accounts, in OECD Annual National Accounts		
D1P	CE	Compensation of employees
D2P-D3R		Taxes(D2P) less subsidies(D3R) on production and imports
D21P-D31R	T _{PR}	Taxes(D21P) less subsidies(D31R) on products
D29P-D39R	T _{PRN}	Other taxes(D29P) less subsidies(D39R) on production
B2GR	GOS	Operating surplus, gross
B3GR	GV _{MIX}	Mixed income, gross
K1MP	D	Consumption of fixed capital
B1GR	GDP, GVA _M	GDP or Gross Value Added at market prices
■ Sectoral code		
S1	S1	Total Economy
S14+S15	S14+S15	Households and Non-profit institutions serving households (NPISHs)
■ Based on Summary tables in Annual Labour Force Statistics		
	L	Civil employment rather than total employment due to data availability
	L _W	o Wage and salaried workers excluding soldiers
	L _{NW}	o Self-employment (=L-L _W) o It includes employers, own-account workers, contributing family workers, workers not classifiable by status according to ILO Labour Statistics

2) Variables derived from the above information

Variables	Description
GOS _{OOH}	o Gross operating surplus derived from owner-occupied housing o GOS(S14+S15). GOS _{OOH} is considered as the same as gross operating surplus earned by households and NPISHs under the condition that gross operating surplus is separately compiled from gross mixed income in the S14+S15 sector.
V _{MIX}	o V _{MIX} , if mixed income is compiled in net terms as well as in gross terms. o $GV_{MIX} - D * GV_{MIX} / (GOS + GV_{MIX})$, if V _{MIX} is not identified separately.
GVA _M	o $CE + GOS + GV_{MIX} + T_{PRN} + T_{PR} = GDP$
GVA _B	o $CE + GOS + GV_{MIX} + T_{PRN}$
GVA _B '	o $CE + GOS + GV_{MIX} + T_{PRN} - GOS_{OOH}$
NDI _M	o $GVA_M - D = GDP - D = CE + GOS + GV_{MIX} + T_{PRN} + T_{PR} - D$

3) Types of labour income shares

Type	Computation of labour income share with variables
LS _{P1}	$o \text{ CE}/(\text{CE}+\text{GOS}+\text{GV}_{\text{MIX}}-\text{GOS}_{\text{OOH}})$
LS _{P2}	$o (\text{CE}+2/3*\text{V}_{\text{MIX}})/(\text{CE}+\text{GOS}+\text{GV}_{\text{MIX}}-\text{GOS}_{\text{OOH}})$
LS _{P3}	$o (\text{CE}+1*\text{V}_{\text{MIX}})/(\text{CE}+\text{GOS}+\text{GV}_{\text{MIX}}-\text{GOS}_{\text{OOH}})$
LS _{P4}	$o \text{ CE}/\text{L}_W*(\text{L}_W+1*\text{L}_{\text{NW}})/(\text{CE}+\text{GOS}+\text{GV}_{\text{MIX}}-\text{GOS}_{\text{OOH}})$
LS _{P5}	$o \text{ CE}/\text{L}_W*(\text{L}_W+0.5*\text{L}_{\text{NW}})/(\text{CE}+\text{GOS}+\text{GV}_{\text{MIX}}-\text{GOS}_{\text{OOH}})$
LS _{D1}	$o \text{ CE}/\text{NDI}_M$
LS _{D2}	$o (\text{CE}+2/3*\text{V}_{\text{MIX}})/\text{NDI}_M$
LS _{D3}	$o (\text{CE}+1*\text{V}_{\text{MIX}})/\text{NDI}_M$
LS _{D4}	$o \text{ CE}/\text{L}_W*(\text{L}_W+1*\text{L}_{\text{NW}})/\text{NDI}_M$
LS _{D5}	$o \text{ CE}/\text{L}_W*(\text{L}_W+0.5*\text{L}_{\text{NW}})/\text{NDI}_M$

APPENDIX B. DATA AVAILABILITY BY COUNTRY

(For production-based labour shares)

	LSP1	LSP2	LSP3	LSP4	LSP5	Compensation of Employees	Operating surplus + Mixed income, gross	GOSOOH	Mixed income, net	Wage and salaried workers excluding soldiers	Self employment
						D1P(S1)	B2GR+B3GR(S1)	B2GR(S14+S15)	VMIX	LW	LNW
Australia	1959~2014	1959~2014	1959~2014	1964~2014	1964~2014	1959~2014	1959~2014	1959~2014	1959~2014	1964~2014	1964~2014
Austria	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1968~2014	1968~2014
Belgium	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1956~2014	1956~2014
Canada	1981~2014	1981~2014	1981~2014	1981~2014	1981~2014	1981~2014	1981~2014	1981~2014	1981~2014	1956~2014	1956~2014
Chile	N/A	N/A	N/A	N/A	N/A	2003~2014	2003~2014	N/A	N/A	1996~2014	1996~2014
Czech Republic	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1992~2014	1992~2014
Denmark	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1960~2014	1960~2014
Estonia	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1989~2014	1989~2014
Finland	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1959~2014	1959~2014
France	1950~2014	1978~2014	1978~2014	1978~2014	1978~2014	1978~2014	1950~2014	1950~2014	1978~2014	1956~2014	1956~2014
Germany	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1957~2014	1957~2014
Greece	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1960~2014	1960~2014
Hungary	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1992~2014	1992~2014
Iceland	2000~2013	2000~2013	2000~2013	2000~2013	2000~2013	2000~2013	2000~2013	2000~2013	2000~2013	1964~2014	1964~2014
Ireland	1999~2014	1999~2014	1999~2014	1999~2014	1999~2014	1999~2014	1999~2014	1999~2014	1999~2014	1956~2014	1956~2014
Israel	N/A	N/A	N/A	N/A	N/A	2000~2014	2000~2014	N/A	N/A	1995~2014	1995~2014
Italy	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1956~2014	1956~2014
Japan	1994~2014	1994~2014	1994~2014	1994~2013	1994~2013	1994~2014	1994~2014	1994~2014	1994~2014	1956~2013	1956~2013
Korea	1970~2014	1975~2014	1975~2014	1975~2014	1975~2014	1970~2014	1970~2014	1970~2014	1975~2014	1963~2014	1963~2014
Luxembourg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1960~2014	1960~2014
Mexico	2003~2013	2003~2013	2003~2013	2003~2013	2003~2013	2003~2013	2003~2013	2003~2013	2003~2013	1970~2014	1970~2014
Netherlands	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1956~2014	1956~2014
New Zealand	N/A	N/A	N/A	N/A	N/A	1971~2014	1971~2014	N/A	N/A	1956~2014	1956~2014
Norway	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1956~2014	1956~2014
Poland	2000~2014	2000~2014	2000~2014	2000~2014	2000~2014	2000~2014	2000~2014	2000~2014	2000~2014	1956~2014	1956~2014
Portugal	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1956~2014	1956~2014
Slovak Republic	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1994~2014	1994~2014
Slovenia	1995~2014	1995~2014	1995~2014	1996~2014	1996~2014	1995~2014	1995~2014	1995~2014	1995~2014	1996~2014	1996~2014
Spain	1999~2014	1999~2014	1999~2014	1999~2014	1999~2014	1999~2014	1999~2014	1999~2014	1999~2014	1960~2014	1960~2014
Sweden	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1963~2014	1963~2014
Switzerland	1995~2013	1995~2013	1995~2013	1995~2013	1995~2013	1995~2013	1995~2013	1995~2013	1995~2013	1991~2014	1991~2014
Turkey	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1960~2014	1960~2014
United Kingdom	1995~2014	1997~2014	1997~2014	1997~2014	1997~2014	1995~2014	1995~2014	1995~2014	1997~2014	1956~2014	1956~2014
United States	1970~2014	1970~2014	1970~2014	1970~2014	1970~2014	1970~2014	1970~2014	1970~2014	1970~2014	1956~2014	1956~2014

(For income-based labour shares)

	LSD1	LSD2	LSD3	LSD4	LSD5	Compensation of Employees	NDIM	Mixed income, net	Wage and salaried workers excluding soldiers	Self employment
						D1P(S1)	NDIM	VMIX	LW	LNW
Australia	1959~2014	1959~2014	1959~2014	1964~2014	1964~2014	1959~2014	1959~2014	1959~2014	1964~2014	1964~2014
Austria	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1968~2014	1968~2014
Belgium	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1956~2014	1956~2014
Canada	1981~2014	1981~2014	1981~2014	1981~2014	1981~2014	1981~2014	1981~2014	1981~2014	1956~2014	1956~2014
Chile	N/A	N/A	N/A	N/A	N/A	2003~2014	N/A	N/A	1996~2014	1996~2014
Czech Republic	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1992~2014	1992~2014
Denmark	1995~2014	1995~2014	1995~2014	1995~2013	1995~2013	1995~2014	1995~2014	1995~2014	1960~2014	1960~2013
Estonia	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1989~2014	1989~2014
Finland	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1959~2014	1959~2014
France	1978~2014	1978~2014	1978~2014	1978~2014	1978~2014	1950~2014	1978~2014	1978~2014	1956~2014	1956~2014
Germany	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1957~2014	1957~2014
Greece	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1960~2014	1960~2014
Hungary	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1992~2014	1992~2014
Iceland	2000~2013	2000~2013	2000~2013	2000~2013	2000~2013	2000~2013	2000~2013	2000~2013	1964~2014	1964~2014
Ireland	1999~2014	1999~2014	1999~2014	1999~2014	1999~2014	1999~2014	1999~2014	1999~2014	1956~2014	1956~2014
Israel	2000~2014	N/A	N/A	2000~2014	2000~2014	2000~2014	2000~2014	N/A	1995~2014	1995~2014
Italy	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1956~2014	1956~2014
Japan	1994~2014	1994~2014	1994~2014	1994~2013	1994~2013	1994~2014	1994~2014	1994~2014	1956~2013	1956~2013
Korea	1970~2014	1975~2014	1975~2014	1970~2014	1970~2014	1970~2014	1970~2014	1975~2014	1963~2014	1963~2014
Luxembourg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1960~2014	1960~2014
Mexico	2003~2013	2003~2013	2003~2013	2003~2013	2003~2013	2003~2013	2003~2013	2003~2013	1970~2014	1970~2014
Netherlands	1995~2014	1995~2014	1995~2014	1995~2013	1995~2013	1995~2014	1995~2014	1995~2014	1956~2014	1956~2013
New Zealand	1971~2012	N/A	N/A	1986~2012	1986~2012	1971~2014	1971~2012	N/A	1956~2014	1956~2014
Norway	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1978~2014	1995~2014	1956~2014	1956~2014
Poland	2000~2014	2000~2014	2000~2014	2000~2014	2000~2014	2000~2014	2000~2014	2000~2014	1956~2014	1956~2014
Portugal	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1956~2014	1956~2014
Slovak Republic	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1994~2014	1994~2014
Slovenia	1995~2014	1995~2014	1995~2014	1996~2014	1996~2014	1995~2014	1995~2014	1995~2014	1996~2014	1996~2014
Spain	1999~2014	1999~2014	1999~2014	1999~2014	1999~2014	1999~2014	1999~2014	1999~2014	1960~2014	1960~2014
Sweden	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1995~2014	1963~2014	1963~2014
Switzerland	1995~2013	1995~2013	1995~2013	1995~2013	1995~2013	1995~2013	1995~2013	1995~2013	1991~2014	1991~2014
Turkey	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1960~2014	1960~2014
United Kingdom	1997~2014	1997~2014	1997~2014	1997~2014	1997~2014	1995~2014	1997~2014	1997~2014	1956~2014	1956~2014
United States	1970~2014	1970~2014	1970~2014	1970~2014	1970~2014	1970~2014	1970~2014	1970~2014	1956~2014	1956~2014

APPENDIX C. DESCRIPTIVE STATISTICS FOR LABOUR SHARES

1) LS_{P1}

Country	Data availability	Labour share averages							Max.(year)		Min.(year)	
		1970s	1980s	1990s	2000s	2010s	Initial 3 yrs	Last 3 yrs				
Australia	1959~2014	0.615	0.609	0.598	0.584	0.582	0.528	0.589	0.650	(1982)	0.517	(1959)
France	1950~2014	0.636	0.654	0.638	0.647	0.665	0.506	0.669	0.677	(1982)	0.495	(1950)
Korea	1970~2014	0.387	0.464	0.522	0.512	0.512	0.379	0.518	0.551	(1996)	0.357	(1974)
United States	1970~2014	0.662	0.653	0.655	0.646	0.623	0.673	0.618	0.679	(1970)	0.617	(2013)
Austria	1995~2014	..	..	0.597	0.567	0.579	0.601	0.585	0.607	(1995)	0.548	(2007)
Belgium	1995~2014	..	..	0.610	0.604	0.602	0.610	0.606	0.621	(2002)	0.588	(2007)
Canada	1981~2014	..	0.589	0.595	0.562	0.560	0.598	0.562	0.626	(1992)	0.551	(2008)
Czech Republic	1995~2014	..	..	0.452	0.455	0.473	0.459	0.475	0.481	(2013)	0.440	(2001)
Denmark	1995~2014	..	..	0.613	0.627	0.637	0.605	0.634	0.667	(2009)	0.603	(1995)
Estonia	1995~2014	..	..	0.556	0.521	0.524	0.574	0.522	0.597	(1995)	0.499	(2005)
Finland	1995~2014	..	..	0.575	0.569	0.613	0.578	0.620	0.621	(2012)	0.555	(2007)
Germany	1995~2014	..	..	0.598	0.581	0.583	0.601	0.588	0.607	(2000)	0.552	(2007)
Greece	1995~2014	..	..	0.360	0.405	0.437	0.354	0.427	0.454	(2010)	0.350	(1996)
Hungary	1995~2014	..	..	0.538	0.542	0.531	0.546	0.530	0.558	(1995)	0.524	(1999)
Iceland	2000~2013	..	..	..	0.661	0.616	0.640	0.626	0.725	(2007)	0.566	(2009)
Ireland	1999~2014	..	..	0.467	0.468	0.455	0.458	0.446	0.522	(2008)	0.434	(2002)
Israel	N/A	..	..	..	..	..	..	..	..		..	
Italy	1995~2014	..	..	0.461	0.472	0.504	0.461	0.505	0.507	(2012)	0.455	(2001)
Japan	1994~2014	..	..	0.626	0.609	0.616	0.624	0.618	0.633	(1998)	0.591	(2007)
Mexico	2003~2013	..	..	..	0.331	0.314	0.341	0.312	0.356	(2003)	0.309	(2012)
Netherlands	1995~2014	..	..	0.568	0.561	0.552	0.567	0.554	0.575	(2000)	0.543	(2006)
New Zealand	N/A	..	..	..	..	..	..	..	..		..	
Norway	1995~2014	..	..	0.593	0.520	0.527	0.580	0.529	0.622	(1998)	0.482	(2006)
Poland	2000~2014	..	..	..	0.458	0.436	0.491	0.434	0.501	(2001)	0.432	(2006)
Portugal	1995~2014	..	..	0.560	0.568	0.560	0.558	0.554	0.575	(2005)	0.553	(2014)
Slovak Republic	1995~2014	..	..	0.476	0.438	0.429	0.472	0.430	0.491	(1998)	0.408	(2008)
Slovenia	1995~2014	..	..	0.644	0.620	0.624	0.659	0.618	0.678	(1995)	0.598	(2007)
Spain	1999~2014	..	..	0.562	0.567	0.576	0.561	0.569	0.589	(2010)	0.557	(2002)
Sweden	1995~2014	..	..	0.582	0.598	0.611	0.581	0.621	0.624	(2013)	0.563	(1995)
Switzerland	1995~2013	..	..	0.578	0.587	0.597	0.579	0.602	0.607	(2013)	0.569	(2007)
United Kingdom	1995~2014	..	..	0.602	0.640	0.632	0.588	0.625	0.657	(2001)	0.579	(1996)

Note: 1970s means an average over 1970 to 1979.

2) LS_{P2}

Country	Data availability	Labour share averages							Max.(year)		Min.(year)	
		1970s	1980s	1990s	2000s	2010s	Initial 3 yrs	Last 3 yrs				
Australia	1959~2014	0.676	0.657	0.640	0.626	0.623	0.633	0.628	0.703	(1974)	0.605	(2008)
France	1978~2014	0.716	0.694	0.674	0.678	0.688	0.716	0.692	0.718	(1981)	0.657	(1989)
Korea	1975~2014	0.649	0.624	0.626	0.576	0.551	0.651	0.556	0.653	(1975)	0.544	(2010)
United States	1970~2014	0.709	0.695	0.699	0.693	0.670	0.719	0.667	0.724	(1970)	0.665	(2013)
Austria	1995~2014	..	..	0.638	0.603	0.614	0.642	0.619	0.649	(1995)	0.584	(2007)
Belgium	1995~2014	..	..	0.649	0.636	0.628	0.649	0.631	0.655	(2001)	0.618	(2007)
Canada	1981~2014	..	0.643	0.651	0.614	0.610	0.650	0.610	0.681	(1992)	0.601	(2008)
Czech Republic	1995~2014	..	..	0.520	0.516	0.523	0.528	0.524	0.531	(1997)	0.505	(2001)
Denmark	1995~2014	..	..	0.646	0.648	0.654	0.642	0.651	0.681	(2009)	0.631	(2000)
Estonia	1995~2014	..	..	0.616	0.570	0.558	0.630	0.556	0.639	(1995)	0.547	(2005)
Finland	1995~2014	..	..	0.600	0.594	0.635	0.605	0.641	0.642	(2012)	0.582	(2007)
Germany	1995~2014	..	..	0.645	0.620	0.620	0.649	0.625	0.654	(1995)	0.592	(2007)
Greece	1995~2014	..	..	0.549	0.566	0.559	0.547	0.548	0.583	(2010)	0.540	(2013)
Hungary	1995~2014	..	..	0.603	0.595	0.572	0.614	0.570	0.628	(1995)	0.564	(2014)
Iceland	2000~2013	..	..	..	0.674	0.624	0.660	0.634	0.734	(2007)	0.574	(2009)
Ireland	1999~2014	..	..	0.523	0.513	0.489	0.513	0.479	0.563	(2008)	0.477	(2014)
Israel	N/A	..	..	..	..	..	..	..	..		..	
Italy	1995~2014	..	..	0.566	0.569	0.587	0.566	0.588	0.590	(2009)	0.557	(2001)
Japan	1994~2014	..	..	0.650	0.627	0.629	0.649	0.631	0.655	(1998)	0.608	(2007)
Mexico	2003~2013	..	..	..	0.456	0.443	0.468	0.439	0.485	(2003)	0.434	(2012)
Netherlands	1995~2014	..	..	0.615	0.601	0.588	0.614	0.590	0.620	(2000)	0.584	(2010)
New Zealand	N/A	..	..	..	..	..	..	..	..		..	
Norway	1995~2014	..	..	0.600	0.525	0.531	0.587	0.534	0.628	(1998)	0.486	(2006)
Poland	2000~2014	..	..	..	0.589	0.565	0.620	0.563	0.631	(2001)	0.559	(2014)
Portugal	1995~2014	..	..	0.636	0.633	0.615	0.634	0.610	0.639	(2005)	0.609	(2012)
Slovak Republic	1995~2014	..	..	0.537	0.525	0.523	0.532	0.523	0.553	(1998)	0.510	(2004)
Slovenia	1995~2014	..	..	0.688	0.661	0.656	0.701	0.650	0.718	(1995)	0.640	(2014)
Spain	1999~2014	..	..	0.644	0.637	0.619	0.642	0.612	0.644	(1999)	0.610	(2014)
Sweden	1995~2014	..	..	0.599	0.613	0.624	0.599	0.633	0.635	(2013)	0.583	(1995)
Switzerland	1995~2013	..	..	0.626	0.629	0.635	0.628	0.638	0.648	(2002)	0.612	(2007)
United Kingdom	1997~2014	..	..	0.644	0.671	0.666	0.644	0.659	0.687	(2001)	0.624	(1997)

Note: 1970s means an average over 1970 to 1979.

3) LS_{P3}

Country	Data availability	Labour share averages							Max.(year)		Min.(year)	
		1970s	1980s	1990s	2000s	2010s	Initial 3 yrs	Last 3 yrs				
Australia	1959~2014	0.707	0.681	0.661	0.646	0.643	0.685	0.647	0.729	(1974)	0.626	(2008)
France	1978~2014	0.740	0.714	0.691	0.694	0.700	0.740	0.704	0.740	(1978)	0.678	(1989)
Korea	1975~2014	0.774	0.704	0.679	0.609	0.571	0.786	0.575	0.798	(1975)	0.565	(2010)
United States	1970~2014	0.732	0.716	0.721	0.717	0.693	0.742	0.691	0.747	(1970)	0.690	(2013)
Austria	1995~2014	..	..	0.658	0.622	0.631	0.662	0.636	0.671	(1995)	0.602	(2007)
Belgium	1995~2014	..	..	0.669	0.652	0.640	0.669	0.644	0.673	(2001)	0.634	(2007)
Canada	1981~2014	..	0.671	0.679	0.640	0.634	0.676	0.635	0.708	(1992)	0.626	(2008)
Czech Republic	1995~2014	..	..	0.554	0.546	0.548	0.562	0.548	0.565	(1996)	0.538	(2001)
Denmark	1995~2014	..	..	0.663	0.659	0.662	0.660	0.660	0.689	(2009)	0.644	(2000)
Estonia	1995~2014	..	..	0.646	0.594	0.575	0.658	0.573	0.662	(1996)	0.566	(2011)
Finland	1995~2014	..	..	0.613	0.607	0.646	0.618	0.652	0.653	(2012)	0.595	(2007)
Germany	1995~2014	..	..	0.668	0.640	0.638	0.673	0.643	0.678	(1995)	0.613	(2007)
Greece	1995~2014	..	..	0.644	0.647	0.621	0.644	0.608	0.657	(2003)	0.601	(2013)
Hungary	1995~2014	..	..	0.636	0.622	0.592	0.648	0.590	0.663	(1995)	0.584	(2014)
Iceland	2000~2013	..	..	..	0.681	0.628	0.670	0.638	0.739	(2007)	0.578	(2009)
Ireland	1999~2014	..	..	0.550	0.535	0.505	0.540	0.496	0.583	(2008)	0.494	(2014)
Israel	N/A	..	..	..	..	..	..	..	..		..	
Italy	1995~2014	..	..	0.618	0.617	0.629	0.619	0.629	0.633	(2009)	0.608	(2001)
Japan	1994~2014	..	..	0.662	0.636	0.636	0.662	0.638	0.666	(1998)	0.616	(2007)
Mexico	2003~2013	..	..	..	0.519	0.508	0.532	0.503	0.549	(2003)	0.494	(2008)
Netherlands	1995~2014	..	..	0.638	0.622	0.606	0.637	0.608	0.642	(2000)	0.602	(2010)
New Zealand	N/A	..	..	..	..	..	..	..	..		..	
Norway	1995~2014	..	..	0.603	0.528	0.534	0.591	0.536	0.631	(1998)	0.489	(2006)
Poland	2000~2014	..	..	..	0.654	0.630	0.685	0.627	0.696	(2001)	0.622	(2014)
Portugal	1995~2014	..	..	0.673	0.666	0.643	0.672	0.638	0.676	(1996)	0.637	(2012)
Slovak Republic	1995~2014	..	..	0.568	0.568	0.570	0.562	0.569	0.584	(2009)	0.542	(1995)
Slovenia	1995~2014	..	..	0.710	0.682	0.673	0.722	0.666	0.738	(1995)	0.657	(2014)
Spain	1999~2014	..	..	0.685	0.672	0.640	0.683	0.633	0.685	(1999)	0.631	(2014)
Sweden	1995~2014	..	..	0.608	0.621	0.630	0.608	0.639	0.641	(2013)	0.593	(1995)
Switzerland	1995~2013	..	..	0.650	0.651	0.653	0.652	0.657	0.669	(2002)	0.633	(2007)
United Kingdom	1997~2014	..	..	0.660	0.687	0.683	0.660	0.677	0.702	(2001)	0.641	(1997)

Note: 1970s means an average over 1970 to 1979.

4) LSp₄

Country	Data availability	Labour share averages							Max.(year)		Min.(year)	
		1970s	1980s	1990s	2000s	2010s	Initial 3 yrs	Last 3 yrs				
Australia	1964~2014	0.721	0.720	0.699	0.668	0.652	0.653	0.656	0.772	(1982)	0.636	(2008)
France	1978~2014	0.800	0.770	0.719	0.711	0.739	0.801	0.746	0.807	(1981)	0.704	(2007)
Korea	1975~2014	0.905	0.889	0.836	0.774	0.710	0.899	0.714	0.966	(1982)	0.703	(2011)
United States	1970~2014	0.733	0.719	0.716	0.697	0.668	0.748	0.662	0.756	(1970)	0.661	(2013)
Austria	1995~2014	..	..	0.694	0.653	0.668	0.700	0.674	0.710	(1995)	0.635	(2007)
Belgium	1995~2014	..	..	0.746	0.711	0.704	0.750	0.711	0.753	(1996)	0.690	(2007)
Canada	1981~2014	..	0.653	0.666	0.622	0.616	0.661	0.616	0.697	(1992)	0.607	(2008)
Czech Republic	1995~2014	..	..	0.520	0.544	0.577	0.523	0.581	0.589	(2012)	0.511	(1995)
Denmark	1995~2014	..	..	0.677	0.689	0.700	0.668	0.696	0.735	(2009)	0.665	(2000)
Estonia	1995~2014	..	..	0.604	0.569	0.575	0.620	0.574	0.641	(1995)	0.542	(2005)
Finland	1995~2014	..	..	0.675	0.655	0.709	0.682	0.718	0.719	(2012)	0.636	(2007)
Germany	1995~2014	..	..	0.671	0.658	0.658	0.674	0.663	0.681	(2000)	0.628	(2007)
Greece	1995~2014	..	..	0.649	0.645	0.683	0.652	0.671	0.701	(2011)	0.624	(2004)
Hungary	1995~2014	..	..	0.649	0.628	0.602	0.665	0.598	0.680	(1995)	0.588	(2014)
Iceland	2000~2013	..	..	..	0.774	0.706	0.773	0.717	0.843	(2006)	0.643	(2009)
Ireland	1999~2014	..	..	0.580	0.568	0.548	0.564	0.538	0.630	(2008)	0.529	(2002)
Israel	N/A	..	..	..	..	..	..	..	..	(1950)	..	(1950)
Italy	1995~2014	..	..	0.651	0.648	0.673	0.651	0.674	0.677	(2012)	0.633	(2001)
Japan	1994~2013	..	..	0.764	0.718	0.712	0.765	0.717	0.771	(1995)	0.688	(2007)
Mexico	2003~2013	..	..	..	0.509	0.474	0.535	0.469	0.562	(2003)	0.466	(2012)
Netherlands	1995~2014	..	..	0.646	0.639	0.659	0.648	0.664	0.667	(2014)	0.622	(2006)
New Zealand	N/A	..	..	..	..	..	..	..	..	(1950)	..	(1950)
Norway	1995~2014	..	..	0.649	0.564	0.568	0.636	0.571	0.678	(1998)	0.527	(2006)
Poland	2000~2014	..	..	..	0.617	0.562	0.680	0.555	0.695	(2001)	0.552	(2014)
Portugal	1995~2014	..	..	0.784	0.769	0.717	0.780	0.705	0.795	(1998)	0.690	(2014)
Slovak Republic	1995~2014	..	..	0.511	0.495	0.508	0.504	0.509	0.528	(1998)	0.475	(2008)
Slovenia	1996~2014	..	..	0.778	0.735	0.753	0.785	0.747	0.798	(1996)	0.704	(2008)
Spain	1999~2014	..	..	0.714	0.695	0.697	0.706	0.692	0.714	(1999)	0.686	(2003)
Sweden	1995~2014	..	..	0.652	0.665	0.683	0.653	0.693	0.697	(2013)	0.634	(1995)
Switzerland	1995~2013	..	..	0.669	0.667	0.667	0.669	0.672	0.694	(2002)	0.646	(2007)
United Kingdom	1997~2014	..	..	0.710	0.738	0.743	0.710	0.738	0.758	(2010)	0.691	(1997)

Note: 1970s means an average over 1970 to 1979.

5) LS_{P5}

Country	Data availability	Labour share averages							Max.(year)		Min.(year)	
		1970s	1980s	1990s	2000s	2010s	Initial 3 yrs	Last 3 yrs				
Australia	1964~2014	0.668	0.664	0.648	0.626	0.617	0.601	0.622	0.711	(1982)	0.592	(1964)
France	1978~2014	0.733	0.712	0.679	0.679	0.702	0.735	0.708	0.742	(1981)	0.666	(1989)
Korea	1975~2014	0.653	0.676	0.679	0.643	0.611	0.639	0.616	0.713	(1982)	0.603	(2010)
United States	1970~2014	0.698	0.686	0.686	0.672	0.645	0.711	0.640	0.717	(1970)	0.639	(2013)
Austria	1995~2014	..	..	0.646	0.610	0.624	0.650	0.629	0.659	(1995)	0.591	(2007)
Belgium	1995~2014	..	..	0.678	0.658	0.653	0.680	0.658	0.682	(1996)	0.639	(2007)
Canada	1981~2014	..	0.621	0.630	0.592	0.588	0.630	0.589	0.661	(1992)	0.579	(2008)
Czech Republic	1995~2014	..	..	0.486	0.500	0.525	0.491	0.528	0.535	(2012)	0.478	(1998)
Denmark	1995~2014	..	..	0.645	0.658	0.669	0.636	0.665	0.701	(2009)	0.635	(2000)
Estonia	1995~2014	..	..	0.580	0.545	0.549	0.597	0.548	0.619	(1995)	0.521	(2005)
Finland	1995~2014	..	..	0.625	0.612	0.661	0.630	0.669	0.670	(2012)	0.596	(2007)
Germany	1995~2014	..	..	0.635	0.619	0.621	0.637	0.626	0.644	(2000)	0.590	(2007)
Greece	1995~2014	..	..	0.504	0.525	0.560	0.503	0.549	0.576	(2010)	0.498	(1996)
Hungary	1995~2014	..	..	0.594	0.585	0.566	0.605	0.564	0.619	(1995)	0.556	(2014)
Iceland	2000~2013	..	..	..	0.717	0.661	0.707	0.672	0.783	(2007)	0.604	(2009)
Ireland	1999~2014	..	..	0.524	0.518	0.502	0.511	0.492	0.576	(2008)	0.481	(2002)
Israel	N/A	..	..	..	..	..	..	..	..		..	
Italy	1995~2014	..	..	0.556	0.560	0.588	0.556	0.590	0.592	(2012)	0.544	(2001)
Japan	1994~2013	..	..	0.695	0.663	0.663	0.694	0.668	0.701	(1998)	0.640	(2007)
Mexico	2003~2013	..	..	..	0.420	0.394	0.438	0.390	0.459	(2003)	0.387	(2012)
Netherlands	1995~2014	..	..	0.607	0.600	0.605	0.608	0.609	0.613	(1995)	0.583	(2006)
New Zealand	N/A	..	..	..	..	..	..	..	..		..	
Norway	1995~2014	..	..	0.621	0.542	0.548	0.608	0.550	0.650	(1998)	0.504	(2006)
Poland	2000~2014	..	..	..	0.538	0.499	0.585	0.494	0.598	(2001)	0.493	(2014)
Portugal	1995~2014	..	..	0.672	0.669	0.638	0.669	0.630	0.680	(2003)	0.622	(2014)
Slovak Republic	1995~2014	..	..	0.493	0.467	0.468	0.488	0.469	0.510	(1998)	0.442	(2008)
Slovenia	1996~2014	..	..	0.707	0.677	0.688	0.713	0.682	0.731	(1996)	0.654	(2007)
Spain	1999~2014	..	..	0.638	0.631	0.636	0.633	0.630	0.648	(2010)	0.622	(2002)
Sweden	1995~2014	..	..	0.617	0.631	0.647	0.617	0.657	0.661	(2013)	0.599	(1995)
Switzerland	1995~2013	..	..	0.623	0.627	0.632	0.624	0.637	0.650	(2002)	0.608	(2007)
United Kingdom	1997~2014	..	..	0.661	0.689	0.688	0.661	0.681	0.705	(2001)	0.641	(1997)

Note: 1970s means an average over 1970 to 1979.

6) LS_{D1}

Country	Data availability	Labour share averages							Max.(year)		Min.(year)	
		1970s	1980s	1990s	2000s	2010s	Initial 3 yrs	Last 3 yrs				
Australia	1959~2014	0.643	0.613	0.590	0.572	0.573	0.579	0.579	0.683	(1974)	0.558	(2008)
France	1978~2014	0.635	0.628	0.599	0.609	0.637	0.639	0.640	0.654	(1982)	0.587	(1989)
Korea	1970~2014	0.366	0.448	0.514	0.518	0.538	0.358	0.547	0.554	(2014)	0.342	(1974)
United States	1970~2014	0.655	0.656	0.650	0.653	0.633	0.658	0.632	0.674	(1982)	0.631	(2013)
Austria	1995~2014	..	..	0.592	0.564	0.576	0.596	0.581	0.607	(1995)	0.543	(2007)
Belgium	1995~2014	..	..	0.598	0.609	0.633	0.597	0.638	0.641	(2013)	0.595	(1997)
Canada	1981~2014	..	0.613	0.609	0.588	0.605	0.629	0.609	0.643	(1982)	0.573	(2005)
Czech Republic	1995~2014	..	..	0.505	0.502	0.519	0.509	0.522	0.528	(2013)	0.493	(2007)
Denmark	1995~2014	..	..	0.605	0.622	0.635	0.599	0.630	0.675	(2009)	0.596	(2000)
Estonia	1995~2014	..	..	0.560	0.525	0.540	0.577	0.536	0.613	(1995)	0.502	(2006)
Finland	1995~2014	..	..	0.576	0.573	0.612	0.584	0.616	0.624	(2009)	0.560	(2007)
Germany	1995~2014	..	..	0.628	0.608	0.611	0.632	0.616	0.636	(1995)	0.573	(2007)
Greece	1995~2014	..	..	0.342	0.390	0.421	0.337	0.412	0.437	(2010)	0.333	(1996)
Hungary	1995~2014	..	..	0.535	0.530	0.515	0.542	0.512	0.549	(1995)	0.503	(2014)
Iceland	2000~2013	..	..	..	0.623	0.612	0.611	0.621	0.665	(2007)	0.573	(2009)
Ireland	1999~2014	..	..	0.446	0.454	0.460	0.437	0.452	0.513	(2009)	0.416	(2002)
Israel	2000~2014	..	..	..	0.549	0.519	0.564	0.517	0.576	(2001)	0.515	(2013)
Italy	1995~2014	..	..	0.449	0.452	0.486	0.455	0.487	0.488	(2012)	0.433	(2000)
Japan	1994~2014	..	..	0.666	0.645	0.655	0.664	0.656	0.673	(1998)	0.626	(2004)
Mexico	2003~2013	..	..	..	0.319	0.308	0.326	0.307	0.337	(2003)	0.304	(2011)
Netherlands	1995~2014	..	..	0.594	0.588	0.596	0.596	0.597	0.607	(2009)	0.563	(2007)
New Zealand	1971~2012	0.598	0.567	0.489	0.493	0.508	0.549	0.508	0.648	(1975)	0.469	(2001)
Norway	1995~2014	..	..	0.559	0.505	0.531	0.545	0.535	0.586	(1998)	0.464	(2006)
Poland	2000~2014	..	..	..	0.445	0.421	0.480	0.421	0.491	(2001)	0.416	(2011)
Portugal	1995~2014	..	..	0.559	0.566	0.551	0.558	0.541	0.575	(2009)	0.533	(2014)
Slovak Republic	1995~2014	..	..	0.524	0.471	0.467	0.522	0.470	0.539	(1997)	0.432	(2007)
Slovenia	1995~2014	..	..	0.631	0.616	0.641	0.646	0.636	0.662	(1995)	0.594	(2007)
Spain	1999~2014	..	..	0.560	0.569	0.586	0.560	0.577	0.609	(2009)	0.558	(2004)
Sweden	1995~2014	..	..	0.519	0.542	0.566	0.524	0.576	0.578	(2013)	0.508	(1998)
Switzerland	1995~2013	..	..	0.707	0.720	0.730	0.712	0.736	0.751	(2002)	0.691	(2007)
United Kingdom	1997~2014	..	..	0.584	0.612	0.587	0.584	0.578	0.625	(2001)	0.564	(2014)

Note: 1970s means an average over 1970 to 1979.

7) LS_{D2}

Country	Data availability	Labour share averages							Max.(year)		Min.(year)	
		1970s	1980s	1990s	2000s	2010s	Initial 3 yrs	Last 3 yrs				
Australia	1959~2014	0.708	0.661	0.632	0.613	0.612	0.693	0.617	0.738	(1974)	0.600	(2008)
France	1978~2014	0.682	0.666	0.632	0.638	0.659	0.685	0.662	0.694	(1981)	0.622	(1998)
Korea	1975~2014	0.613	0.602	0.617	0.584	0.579	0.616	0.587	0.632	(1996)	0.563	(2010)
United States	1970~2014	0.701	0.699	0.693	0.700	0.680	0.704	0.682	0.721	(2001)	0.677	(2010)
Austria	1995~2014	..	..	0.632	0.600	0.611	0.637	0.615	0.650	(1995)	0.579	(2007)
Belgium	1995~2014	..	..	0.636	0.642	0.660	0.636	0.665	0.668	(2013)	0.627	(2005)
Canada	1981~2014	..	0.670	0.667	0.643	0.658	0.683	0.661	0.696	(1982)	0.628	(2005)
Czech Republic	1995~2014	..	..	0.582	0.569	0.574	0.586	0.575	0.597	(1997)	0.554	(2007)
Denmark	1995~2014	..	..	0.638	0.644	0.652	0.635	0.647	0.690	(2009)	0.622	(2000)
Estonia	1995~2014	..	..	0.621	0.575	0.575	0.634	0.571	0.657	(1995)	0.547	(2006)
Finland	1995~2014	..	..	0.602	0.598	0.634	0.611	0.637	0.647	(2009)	0.586	(2007)
Germany	1995~2014	..	..	0.677	0.649	0.649	0.682	0.654	0.687	(1995)	0.614	(2007)
Greece	1995~2014	..	..	0.523	0.545	0.539	0.521	0.528	0.562	(2009)	0.518	(1996)
Hungary	1995~2014	..	..	0.600	0.581	0.554	0.610	0.551	0.618	(1995)	0.542	(2014)
Iceland	2000~2013	..	..	..	0.635	0.620	0.629	0.629	0.673	(2007)	0.581	(2009)
Ireland	1999~2014	..	..	0.499	0.497	0.494	0.489	0.485	0.550	(2009)	0.458	(2002)
Israel	N/A	..	..	..	..	..	..	..	..		..	
Italy	1995~2014	..	..	0.551	0.545	0.566	0.560	0.566	0.572	(2009)	0.532	(2000)
Japan	1994~2014	..	..	0.691	0.664	0.669	0.691	0.670	0.696	(1998)	0.644	(2007)
Mexico	2003~2013	..	..	..	0.440	0.435	0.447	0.432	0.458	(2003)	0.427	(2007)
Netherlands	1995~2014	..	..	0.643	0.631	0.634	0.645	0.636	0.652	(1995)	0.604	(2007)
New Zealand	N/A	..	..	..	..	..	..	..	..		..	
Norway	1995~2014	..	..	0.565	0.510	0.535	0.552	0.540	0.592	(1998)	0.469	(2006)
Poland	2000~2014	..	..	..	0.573	0.545	0.607	0.546	0.619	(2001)	0.540	(2011)
Portugal	1995~2014	..	..	0.634	0.631	0.605	0.635	0.595	0.641	(2001)	0.588	(2014)
Slovak Republic	1995~2014	..	..	0.591	0.565	0.569	0.588	0.572	0.606	(1997)	0.536	(2007)
Slovenia	1995~2014	..	..	0.674	0.657	0.674	0.687	0.669	0.701	(1995)	0.639	(2007)
Spain	1999~2014	..	..	0.642	0.639	0.630	0.642	0.620	0.655	(2009)	0.616	(2014)
Sweden	1995~2014	..	..	0.534	0.555	0.578	0.540	0.587	0.589	(2013)	0.523	(1998)
Switzerland	1995~2013	..	..	0.766	0.771	0.776	0.771	0.781	0.802	(2002)	0.742	(2007)
United Kingdom	1997~2014	..	..	0.615	0.642	0.618	0.615	0.610	0.654	(2001)	0.597	(2014)

Note: 1970s means an average over 1970 to 1979.

8) LS_{D3}

Country	Data availability	Labour share averages							Max.(year)		Min.(year)	
		1970s	1980s	1990s	2000s	2010s	Initial 3 yrs	Last 3 yrs				
Australia	1959~2014	0.740	0.686	0.653	0.633	0.632	0.751	0.637	0.766	(1974)	0.620	(2008)
France	1978~2014	0.706	0.686	0.649	0.653	0.671	0.708	0.673	0.713	(1981)	0.637	(1998)
Korea	1975~2014	0.731	0.679	0.668	0.616	0.600	0.744	0.608	0.760	(1975)	0.584	(2010)
United States	1970~2014	0.724	0.720	0.715	0.724	0.704	0.726	0.706	0.746	(2001)	0.699	(2010)
Austria	1995~2014	..	..	0.652	0.618	0.628	0.658	0.632	0.671	(1995)	0.597	(2007)
Belgium	1995~2014	..	..	0.655	0.658	0.673	0.655	0.678	0.681	(2009)	0.643	(2005)
Canada	1981~2014	..	0.698	0.695	0.670	0.685	0.711	0.687	0.722	(1982)	0.656	(2005)
Czech Republic	1995~2014	..	..	0.620	0.603	0.602	0.624	0.602	0.634	(1997)	0.585	(2007)
Denmark	1995~2014	..	..	0.654	0.654	0.660	0.654	0.656	0.697	(2009)	0.634	(2000)
Estonia	1995~2014	..	..	0.651	0.599	0.593	0.662	0.588	0.679	(1995)	0.569	(2006)
Finland	1995~2014	..	..	0.615	0.611	0.645	0.624	0.648	0.658	(2009)	0.599	(1998)
Germany	1995~2014	..	..	0.702	0.670	0.669	0.707	0.673	0.712	(1995)	0.635	(2007)
Greece	1995~2014	..	..	0.613	0.623	0.598	0.613	0.586	0.635	(2003)	0.581	(2014)
Hungary	1995~2014	..	..	0.632	0.607	0.574	0.643	0.570	0.652	(1995)	0.561	(2014)
Iceland	2000~2013	..	..	..	0.642	0.624	0.639	0.633	0.678	(2007)	0.585	(2009)
Ireland	1999~2014	..	..	0.525	0.519	0.511	0.516	0.501	0.568	(2009)	0.480	(2002)
Israel	N/A	..	..	..	..	..	..	..	..		..	
Italy	1995~2014	..	..	0.601	0.591	0.606	0.612	0.606	0.615	(2009)	0.581	(2000)
Japan	1994~2014	..	..	0.704	0.673	0.676	0.704	0.677	0.710	(1994)	0.652	(2007)
Mexico	2003~2013	..	..	..	0.501	0.498	0.507	0.494	0.522	(2009)	0.486	(2007)
Netherlands	1995~2014	..	..	0.667	0.652	0.654	0.669	0.656	0.676	(1995)	0.625	(2007)
New Zealand	N/A	..	..	..	..	..	..	..	..		..	
Norway	1995~2014	..	..	0.568	0.512	0.538	0.555	0.542	0.595	(1998)	0.471	(2006)
Poland	2000~2014	..	..	..	0.636	0.608	0.670	0.608	0.683	(2001)	0.603	(2011)
Portugal	1995~2014	..	..	0.672	0.663	0.633	0.673	0.623	0.677	(1996)	0.615	(2014)
Slovak Republic	1995~2014	..	..	0.625	0.611	0.620	0.621	0.622	0.639	(1997)	0.588	(2007)
Slovenia	1995~2014	..	..	0.695	0.677	0.691	0.708	0.686	0.721	(1995)	0.661	(2007)
Spain	1999~2014	..	..	0.683	0.674	0.651	0.682	0.641	0.683	(2002)	0.637	(2014)
Sweden	1995~2014	..	..	0.542	0.562	0.584	0.548	0.593	0.594	(2013)	0.530	(1998)
Switzerland	1995~2013	..	..	0.795	0.797	0.799	0.801	0.803	0.828	(2002)	0.768	(2007)
United Kingdom	1997~2014	..	..	0.630	0.657	0.634	0.630	0.626	0.668	(2009)	0.614	(2014)

Note: 1970s means an average over 1970 to 1979.

9) LS_{D4}

Country	Data availability	Labour share averages							Max.(year)		Min.(year)	
		1970s	1980s	1990s	2000s	2010s	Initial 3 yrs	Last 3 yrs				
Australia	1964~2014	0.754	0.724	0.690	0.654	0.641	0.709	0.645	0.800	(1974)	0.631	(2008)
France	1978~2014	0.763	0.740	0.675	0.669	0.708	0.766	0.713	0.779	(1981)	0.654	(1998)
Korea	1970~2014	0.886	0.856	0.823	0.783	0.745	0.919	0.754	0.950	(1973)	0.729	(2010)
United States	1970~2014	0.725	0.723	0.710	0.705	0.679	0.732	0.677	0.746	(1982)	0.675	(2013)
Austria	1995~2014	..	..	0.688	0.650	0.665	0.695	0.669	0.711	(1995)	0.629	(2007)
Belgium	1995~2014	..	..	0.731	0.717	0.740	0.735	0.748	0.755	(2013)	0.701	(2007)
Canada	1981~2014	..	0.679	0.682	0.651	0.665	0.695	0.667	0.711	(1982)	0.633	(2005)
Czech Republic	1995~2014	..	..	0.581	0.600	0.633	0.580	0.638	0.645	(2012)	0.565	(1995)
Denmark	1995~2013	..	..	0.668	0.684	0.698	0.661	0.696	0.744	(2009)	0.656	(2000)
Estonia	1995~2014	..	..	0.608	0.574	0.592	0.624	0.589	0.663	(2009)	0.546	(2005)
Finland	1995~2014	..	..	0.677	0.658	0.708	0.689	0.713	0.723	(2009)	0.641	(2007)
Germany	1995~2014	..	..	0.705	0.689	0.690	0.708	0.695	0.714	(2000)	0.651	(2007)
Greece	1995~2014	..	..	0.618	0.621	0.658	0.621	0.647	0.676	(2012)	0.598	(2001)
Hungary	1995~2014	..	..	0.645	0.613	0.583	0.660	0.578	0.670	(1995)	0.565	(2014)
Iceland	2000~2013	..	..	..	0.730	0.702	0.737	0.711	0.774	(2006)	0.651	(2009)
Ireland	1999~2014	..	..	0.553	0.550	0.555	0.538	0.545	0.622	(2009)	0.507	(2002)
Israel	2000~2014	..	..	..	0.633	0.594	0.654	0.591	0.666	(2001)	0.589	(2013)
Italy	1995~2014	..	..	0.633	0.620	0.649	0.644	0.649	0.652	(2012)	0.606	(2000)
Japan	1994~2013	..	..	0.812	0.760	0.757	0.814	0.763	0.821	(1994)	0.729	(2007)
Mexico	2003~2013	..	..	..	0.491	0.465	0.511	0.461	0.531	(2003)	0.458	(2011)
Netherlands	1995~2013	..	..	0.676	0.671	0.710	0.680	0.714	0.718	(2013)	0.645	(2006)
New Zealand	1986~2012	0.698	0.688	0.617	0.605	0.610	0.661	0.610	0.784	(1980)	0.585	(2001)
Norway	1995~2014	..	..	0.611	0.548	0.573	0.598	0.577	0.639	(1998)	0.508	(2006)
Poland	2000~2014	..	..	..	0.601	0.542	0.665	0.538	0.682	(2001)	0.537	(2014)
Portugal	1995~2014	..	..	0.782	0.767	0.705	0.781	0.688	0.790	(1998)	0.666	(2014)
Slovak Republic	1995~2014	..	..	0.562	0.533	0.553	0.558	0.556	0.576	(1997)	0.498	(2007)
Slovenia	1996~2014	..	..	0.762	0.730	0.774	0.771	0.768	0.791	(2010)	0.706	(2008)
Spain	1999~2014	..	..	0.713	0.697	0.709	0.705	0.701	0.733	(2009)	0.681	(2004)
Sweden	1995~2014	..	..	0.582	0.602	0.632	0.588	0.643	0.646	(2013)	0.568	(1998)
Switzerland	1995~2013	..	..	0.819	0.818	0.816	0.823	0.822	0.860	(2002)	0.785	(2007)
United Kingdom	1997~2014	..	..	0.678	0.706	0.690	0.678	0.683	0.722	(2009)	0.666	(1997)

Note: 1970s means an average over 1970 to 1979.

10) LS_{D5}

Country	Data availability	Labour share averages							Max.(year)		Min.(year)	
		1970s	1980s	1990s	2000s	2010s	Initial 3 yrs	Last 3 yrs				
Australia	1964~2014	0.699	0.669	0.640	0.613	0.607	0.653	0.612	0.742	(1974)	0.595	(2008)
France	1978~2014	0.699	0.684	0.637	0.639	0.672	0.703	0.676	0.717	(1981)	0.622	(1998)
Korea	1970~2014	0.626	0.652	0.669	0.651	0.641	0.639	0.650	0.697	(1996)	0.599	(1975)
United States	1970~2014	0.690	0.690	0.680	0.679	0.656	0.695	0.655	0.710	(1982)	0.653	(2013)
Austria	1995~2014	..	..	0.640	0.607	0.620	0.646	0.625	0.659	(1995)	0.586	(2007)
Belgium	1995~2014	..	..	0.665	0.663	0.687	0.666	0.693	0.698	(2013)	0.649	(2005)
Canada	1981~2014	..	0.646	0.646	0.620	0.635	0.662	0.638	0.677	(1982)	0.603	(2005)
Czech Republic	1995~2014	..	..	0.543	0.551	0.576	0.545	0.580	0.586	(2013)	0.532	(1995)
Denmark	1995~2013	..	..	0.636	0.653	0.666	0.630	0.664	0.709	(2009)	0.626	(2000)
Estonia	1995~2014	..	..	0.584	0.550	0.566	0.601	0.563	0.636	(1995)	0.524	(2005)
Finland	1995~2014	..	..	0.626	0.616	0.660	0.637	0.665	0.674	(2009)	0.600	(2007)
Germany	1995~2014	..	..	0.666	0.649	0.650	0.670	0.656	0.675	(2000)	0.612	(2007)
Greece	1995~2014	..	..	0.480	0.505	0.539	0.479	0.530	0.555	(2010)	0.473	(1996)
Hungary	1995~2014	..	..	0.590	0.572	0.549	0.601	0.545	0.609	(1995)	0.534	(2014)
Iceland	2000~2013	..	..	..	0.676	0.657	0.674	0.666	0.718	(2007)	0.612	(2009)
Ireland	1999~2014	..	..	0.500	0.502	0.507	0.488	0.498	0.567	(2009)	0.461	(2002)
Israel	2000~2014	..	..	..	0.591	0.556	0.609	0.554	0.621	(2001)	0.552	(2013)
Italy	1995~2014	..	..	0.541	0.536	0.568	0.550	0.568	0.570	(2012)	0.520	(2000)
Japan	1994~2013	..	..	0.739	0.703	0.706	0.739	0.710	0.744	(1998)	0.678	(2007)
Mexico	2003~2013	..	..	..	0.405	0.386	0.418	0.384	0.434	(2003)	0.381	(2011)
Netherlands	1995~2013	..	..	0.635	0.629	0.653	0.638	0.655	0.659	(2012)	0.604	(2006)
New Zealand	1986~2012	0.646	0.627	0.553	0.549	0.559	0.599	0.559	0.713	(1980)	0.527	(2001)
Norway	1995~2014	..	..	0.585	0.526	0.552	0.571	0.556	0.613	(1998)	0.486	(2006)
Poland	2000~2014	..	..	..	0.523	0.481	0.572	0.480	0.587	(2001)	0.477	(2011)
Portugal	1995~2014	..	..	0.671	0.666	0.628	0.669	0.615	0.679	(2003)	0.599	(2014)
Slovak Republic	1995~2014	..	..	0.543	0.502	0.510	0.540	0.513	0.557	(1997)	0.465	(2007)
Slovenia	1996~2014	..	..	0.692	0.673	0.707	0.700	0.702	0.723	(2010)	0.650	(2007)
Spain	1999~2014	..	..	0.636	0.633	0.648	0.633	0.639	0.671	(2009)	0.620	(2004)
Sweden	1995~2014	..	..	0.550	0.572	0.599	0.556	0.610	0.612	(2013)	0.538	(1998)
Switzerland	1995~2013	..	..	0.763	0.769	0.773	0.767	0.779	0.805	(2002)	0.738	(2007)
United Kingdom	1997~2014	..	..	0.631	0.659	0.638	0.631	0.630	0.672	(2009)	0.617	(2014)

Note: 1970s means an average over 1970 to 1979.

APPENDIX D. ECONOMETRIC ANALYSIS – FULL SET OF RESULTS

1) Based on 22 countries (1995 – 2014)

Fixed Effect Model (FEM)							
	t	P value ¹⁾		Std.Error	Marginal R-squared ²⁾	Conditional R-squared ³⁾	AIC ⁴⁾
LSD1	0.0487	0.0035	***	0.0166	0.929	NA	1878.154
LSD2	-0.0383	0.0097	***	0.0147	0.909	NA	1774.967
LSD3	-0.0817	0.0000	***	0.0148	0.901	NA	1780.133
LSD4	-0.0432	0.0338	**	0.0203	0.894	NA	2047.564
LSD5	0.0028	0.8738		0.0176	0.904	NA	1921.484
LSP1	-0.0040	0.7901		0.0151	0.927	NA	1797.799
LSP2	-0.0940	0.0000	***	0.0133	0.884	NA	1687.004
LSP3	-0.1390	0.0000	***	0.0136	0.862	NA	1704.232
LSP4	-0.1074	0.0000	***	0.0193	0.889	NA	2005.409
LSP5	-0.0559	0.0007	***	0.0163	0.895	NA	1855.761
Random Effect Model (REM)							
	t	P value ¹⁾		Std.Error	Marginal R-squared ²⁾	Conditional R-squared ³⁾	AIC ⁴⁾
LSD1	0.0486	0.0038	***	0.0167	0.001	0.929	1982.108
LSD2	-0.0384	0.0106	**	0.0150	0.001	0.909	1873.123
LSD3	-0.0818	0.0000	***	0.0151	0.007	0.901	1876.133
LSD4	-0.0433	0.0352	**	0.0205	0.001	0.894	2141.974
LSD5	0.0026	0.8819		0.0178	0.000	0.904	2018.284
LSP1	-0.0040	0.7898		0.0151	0.000	0.926	1900.818
LSP2	-0.0940	0.0000	***	0.0133	0.013	0.882	1778.567
LSP3	-0.1390	0.0000	***	0.0136	0.033	0.860	1790.860
LSP4	-0.1075	0.0000	***	0.0193	0.008	0.887	2098.124
LSP5	-0.0559	0.0007	***	0.0163	0.003	0.894	1950.098
Fixed Effect Model with AR(1) errors							
	t	P value ¹⁾		Std.Error	Marginal R-squared ²⁾	Conditional R-squared ³⁾	AIC ⁴⁾
LSD1	0.0366	0.3666		0.0405	0.001	0.876	1588.747
LSD2	-0.0410	0.2450		0.0352	0.002	0.848	1531.941
LSD3	-0.0802	0.0302	**	0.0369	0.007	0.817	1524.072
LSD4	-0.0617	0.2515		0.0538	0.002	0.760	1749.708
LSD5	-0.0115	0.7891		0.0429	0.000	0.830	1653.768
LSP1	0.0053	0.9239		0.0549	0.000	0.001	1480.999
LSP2	-0.0756	0.0270	**	0.0341	0.009	0.770	1405.711
LSP3	-0.1130	0.0026	***	0.0373	0.023	0.649	1392.262
LSP4	-0.1006	0.0750	*	0.0564	0.007	0.612	1647.653
LSP5	-0.0491	0.2501		0.0426	0.002	0.775	1546.601

Notes: 1) One, two, and three asterisks indicate parameter significance at the 10, 5, and 1% level.

2) Marginal R-squared = $\text{Var}(\text{Fixed effect}) / \text{Var}(\text{Total})$

3) Conditional R-squared = $(\text{Var}(\text{Fixed effect}) + \text{Var}(\text{Random effect})) / \text{Var}(\text{Total})$

4) The smaller AIC, the better model

2) Based on 28 countries (2000 – 2014)

Fixed Effect Model (FEM)							
	t	P value ¹⁾		Std.Error	Marginal R-squared ²⁾	Conditional R-squared ³⁾	AIC ⁴⁾
LSD1	0.1074	0.0000	***	0.0214	0.940	NA	1745.103
LSD2	0.0110	0.5720		0.0195	0.920	NA	1668.046
LSD3	-0.0371	0.0571	*	0.0195	0.914	NA	1665.706
LSD4	0.0437	0.1241		0.0284	0.893	NA	1972.721
LSD5	0.0756	0.0019	***	0.0242	0.912	NA	1839.622
LSP1	0.0274	0.1731		0.0201	0.939	NA	1690.384
LSP2	-0.0734	0.0001	***	0.0184	0.905	NA	1619.905
LSP3	-0.1280	0.0000	***	0.0186	0.892	NA	1629.147
LSP4	-0.0523	0.0565	*	0.0273	0.891	NA	1941.608
LSP5	-0.0127	0.5791		0.0229	0.909	NA	1795.930
Random Effect Model (REM)							
	t	P value ¹⁾		Std.Error	Marginal R-squared ²⁾	Conditional R-squared ³⁾	AIC ⁴⁾
LSD1	0.1073	0.0000	***	0.0216	0.004	0.938	1872.991
LSD2	0.0109	0.5797		0.0197	0.000	0.918	1787.427
LSD3	-0.0373	0.0580	*	0.0196	0.001	0.912	1782.959
LSD4	0.0434	0.1307		0.0287	0.001	0.889	2082.971
LSD5	0.0753	0.0022	***	0.0245	0.002	0.910	1956.097
LSP1	0.0273	0.1748		0.0201	0.000	0.937	1817.740
LSP2	-0.0735	0.0001	***	0.0185	0.004	0.901	1733.599
LSP3	-0.1239	0.0000	***	0.0187	0.012	0.887	1738.455
LSP4	-0.0524	0.0564	*	0.0274	0.001	0.887	2051.052
LSP5	-0.0129	0.5767		0.0230	0.000	0.905	1911.017
Fixed Effect Model with AR(1) errors							
	t	P value ¹⁾		Std.Error	Marginal R-squared ²⁾	Conditional R-squared ³⁾	AIC ⁴⁾
LSD1	0.0821	0.0766	*	0.0463	0.002	0.887	1561.447
LSD2	-0.0025	0.9507		0.0408	0.000	0.864	1500.701
LSD3	-0.0458	0.2673		0.0413	0.001	0.848	1487.986
LSD4	-0.0003	0.9961		0.0640	0.000	0.753	1734.709
LSD5	0.0422	0.4192		0.0522	0.001	0.831	1635.693
LSP1	0.0208	0.6165		0.0416	0.000	0.896	1506.957
LSP2	-0.0686	0.0651	*	0.0371	0.003	0.848	1440.865
LSP3	-0.1130	0.0035	***	0.0384	0.010	0.813	1429.461
LSP4	-0.0719	0.2314		0.0600	0.002	0.765	1693.573
LSP5	-0.0251	0.6009		0.0479	0.000	0.838	1586.692

Notes: 1) One, two, and three asterisks indicate parameter significance at the 10, 5, and 1% level.

2) Marginal R-squared = $\text{Var}(\text{Fixed effect}) / \text{Var}(\text{Total})$

3) Conditional R-squared = $(\text{Var}(\text{Fixed effect}) + \text{Var}(\text{Random effect})) / \text{Var}(\text{Total})$

4) The smaller AIC, the better model

3) Hausman test to discriminate between Random and Fixed Effects Models

H_0 : Random effects model to be preferred to Fixed Effects Model

Model	Time range	Chi-sq	df	p-value ¹⁾
LSD1	1995~	0.0007	1	0.9787
LSD2	1995~	0.0012	1	0.9729
LSD3	1995~	0.0014	1	0.9706
LSD4	1995~	0.0024	1	0.9608
LSD5	1995~	0.0023	1	0.9615
LSP1	1995~	0.0008	1	0.9781
LSP2	1995~	0.0012	1	0.9724
LSP3	1995~	0.0016	1	0.9685
LSP4	1995~	0.0020	1	0.9642
LSP5	1995~	0.0018	1	0.9657
LSD1	2000~	0.0020	1	0.9642
LSD2	2000~	0.0027	1	0.9582
LSD3	2000~	0.0028	1	0.9576
LSD4	2000~	0.0060	1	0.9383
LSD5	2000~	0.0050	1	0.9438
LSP1	2000~	0.0019	1	0.9653
LSP2	2000~	0.0031	1	0.9553
LSP3	2000~	0.0039	1	0.9501
LSP4	2000~	0.0053	1	0.9420
LSP5	2000~	0.0044	1	0.9473

Note: 1) If p-value is less than 0.05, which is the confidence level for the test, then we can reject the null hypothesis.

4) Breusch-Godfrey/Wooldridge test for serial correlation

H_0 : No serial correlation in idiosyncratic errors

Model	Time range	Chi-sq	df	p-value ¹⁾
LSD1	1995~	236.33	19	0.0000
LSD2	1995~	231.39	19	0.0000
LSD3	1995~	238.10	19	0.0000
LSD4	1995~	242.94	19	0.0000
LSD5	1995~	231.74	19	0.0000
LSP1	1995~	235.23	19	0.0000
LSP2	1995~	234.72	19	0.0000
LSP3	1995~	247.03	19	0.0000
LSP4	1995~	256.32	19	0.0000
LSP5	1995~	238.01	19	0.0000
LSD1	2000~	195.61	14	0.0000
LSD2	2000~	191.47	14	0.0000
LSD3	2000~	191.62	14	0.0000
LSD4	2000~	202.88	14	0.0000
LSD5	2000~	196.71	14	0.0000
LSP1	2000~	199.42	14	0.0000
LSP2	2000~	200.68	14	0.0000
LSP3	2000~	203.71	14	0.0000
LSP4	2000~	204.64	14	0.0000
LSP5	2000~	198.95	14	0.0000

Note: 1) If p-value is less than 0.05, which is the confidence level for the test, the null hypothesis is rejected.

APPENDIX E. NOTE ON ELASTICITIES OF SUBSTITUTION

Equation (21) is derived from a cost function $C(Q, W, U_K, U_Z)$ with three inputs, labour L , produced capital K and land Z with input prices W , U_K and U_Z respectively:

$$C(Q, W, U_K, U_Z) = \min_{L, K, Z} \{WL + U_K K + U_Z Z \mid Q \text{ can be produced with } (L, K, Z)\} \quad (\text{E.1})$$

In (E.1), $U_K = P_K(r^*(1 + \rho) + d)$ are the user costs of produced capital with the purchase price of produced capital P_K , depreciation rate d and the deflator ρ ; $U_Z = P_Z(r^*(1 + \rho))$ are the user costs of land³⁹; r^* is the real balancing rate of return; selected so that the remuneration to capital equals gross operating surplus. Under appropriate regularity conditions, $C(Q, W, U_K, U_Z)$ is non-decreasing in its elements, concave and linear homogenous in (W, U_K, U_Z) ⁴⁰. We are interested in the change of the labour share $LS(Q, W, U_K, U_Z) \equiv \frac{WL(Q, W, U_K, U_Z)}{C(Q, W, U_K, U_Z)}$ in response to a change of relative input prices.

By Shepard's lemma⁴¹ we have $L(Q, W, U_K, U_Z) = \frac{\partial C(Q, W, U_K, U_Z)}{\partial W} \equiv C_W(Q, W, U_K, U_Z)$ so that $LS(Q, W, U_K, U_Z) \equiv \frac{WC_W(Q, W, U_K, U_Z)}{C(Q, W, U_K, U_Z)}$. Next, differentiate the labour share with respect to the price of produced capital⁴²:

$$\frac{\partial LS(Q, W, U_K, U_Z)}{\partial U_K} = W \left[\frac{C_{WU_K C} - C_{U_K C} C_W}{C^2} \right] = \left[\frac{C_{WU_K C}}{C_{U_K C} C_W} - 1 \right] \frac{WC_{U_K C} C_W}{C^2} = [\sigma_{LK} - 1] \frac{WL K}{C} \quad (\text{E.2})$$

where $\sigma_{LK} \equiv \frac{C_{WU_K C}}{C_{U_K C} C_W}$ is the Allen-Uzawa partial elasticity of substitution⁴³. One notes also that the Allen-Uzawa elasticity of substitution is equivalent to the share-adjusted cross-price elasticity of a factor:

$$\sigma_{LK} = \frac{C_{WU_K C}}{C_{U_K C} C_W} = \frac{C_{WU_K C}}{C_W} \frac{C}{C_{U_K C} U_K} = \varepsilon_{LK} / KS \quad (\text{E.3})$$

³⁹ For descriptions of the relevant data set see Cho, T., B. Choi, K. Jang and E. Kim (2015a), "Estimating the value of land for Korea since 1964" (originally in Korean but available in English translation upon request), Discussion Paper Series 2015-6, the Bank of Korea and Cho, T., J. Kim and P. Schreyer (2015), "Measuring the evolution of Korea's material living standards, 1980-2012", Journal of Productivity Analysis, Vol. 44 (2), pp.157-173.

⁴⁰ For a full treatment of the properties of the cost function see Diewert, W. E. (1982); "Duality Approaches to Microeconomic Theory" in K.J. Arrow and M.D. Intriligator (eds.) Handbook of Mathematical Economics, Amsterdam, North Holland Publishing Co. pp. 535-599.

⁴¹ Shepard, R.W. (1953), *Cost and Production Functions*, Princeton University Press.

⁴² The following notation is used for partial derivations: $\frac{\partial C(X, \dots)}{\partial X} \equiv C_X(X, Y, \dots)$, $\frac{\partial^2 C(X, Y)}{\partial X \partial Y} \equiv C_{XY}(X, Y, \dots)$ etc. For simplicity of presentation, we suppress the indication of functional dependence and simply use C_X, C_{XY} , etc.

⁴³ The partial elasticity of substitution was first defined by Allen (1938) in terms of a production function. Uzawa (1962) showed that there is an equivalent dual expression based on the cost function.

where $\varepsilon_{LK} \equiv \frac{\partial \ln L}{\partial \ln U_K} = \frac{\partial \ln C_W}{\partial \ln U_K} = \frac{C_{WU_K} U_K}{C_W}$ is the cross-price elasticity of labour with respect to the user cost of produced capital and $KS \equiv \frac{U_K K}{C}$ is the capital share. By the same token, other cross price elasticities and elasticities of substitution can be defined:

$$\varepsilon_{LZ} \equiv \frac{\partial \ln L}{\partial \ln U_Z} = \sigma_{LZ} ZS \text{ and } \varepsilon_{LL} \equiv \frac{\partial \ln L}{\partial \ln W} = \sigma_{LL} LS. \quad (\text{E.4})$$

We now make use of the homogeneity property of the cost function in its price arguments to ascertain that the labour share is a function of relative input prices only. Denote relative input prices, normalized to wages by small letters, by

$$u_K \equiv \frac{U_K}{W}, \quad u_Z \equiv \frac{U_Z}{W} \text{ and note that the labour share can be written as: } LS(Q, W, U_K, U_Z) \equiv \frac{W C_W(Q, W, U_K, U_Z)}{C(Q, W, U_K, U_Z)} = \frac{W C_W(Q, 1, u_K, u_Z)}{W C(Q, 1, u_K, u_Z)} = \frac{C_W(Q, 1, u_K, u_Z)}{C(Q, 1, u_K, u_Z)}.$$

Further, the partial elasticities of the labour share with respect to individual prices equal the elasticities of the labour share with respect to price *ratios*: as $U_K \equiv u_K W$, we have $\frac{\partial U_K}{\partial u_K} = W$ and it follows that

$$\frac{\partial \ln LS}{\partial \ln u_K} = \frac{\partial LS}{\partial u_K} \frac{u_K}{LS} = \frac{\partial LS}{\partial U_K} \frac{\partial U_K}{\partial u_K} \frac{U_K}{LS} = \frac{\partial LS}{\partial U_K} \frac{U_K}{LS} = \frac{\partial \ln LS}{\partial \ln U_K} \quad (\text{E.5})$$

With these relationships we may now derive the logarithmic change of the labour share, for a given output, as a function of changes in relative prices:

$$\begin{aligned} d \ln LS(Q, u_K, u_Z)|_Q &= \frac{\partial \ln LS}{\partial \ln u_K} d \ln u_K + \frac{\partial \ln LS}{\partial \ln u_Z} d \ln u_Z = \frac{\partial \ln LS}{\partial \ln U_K} d \ln u_K + \frac{\partial \ln LS}{\partial \ln U_Z} d \ln u_Z \quad \text{and, using (E.2),} \\ d \ln LS(Q, u_K, u_Z)|_Q &= [\sigma_{LK} - 1] \frac{U_K K}{C} d \ln u_K + [\sigma_{LZ} - 1] \frac{U_Z Z}{C} d \ln u_Z. \end{aligned} \quad (\text{E.6})$$

This is the expression in equation (21) of the main text. Finally, we recall that, again by virtue of homogeneity of degree zero of the labour (and other factor) demand function(s) $L(Q, W, U_K, U_Z) = C_W(Q, W, U_K, U_Z)$ in factor prices (W, U_K, U_Z) it follows through Euler's theorem for homogenous functions that:

$$\begin{aligned} \frac{\partial L}{\partial W} W + \frac{\partial L}{\partial U_K} U_K + \frac{\partial L}{\partial U_Z} U_Z &= 0 \text{ and therefore} \\ \frac{\partial L}{\partial W} \frac{W}{L} + \frac{\partial L}{\partial U_K} \frac{U_K}{L} + \frac{\partial L}{\partial U_Z} \frac{U_Z}{L} &= \varepsilon_{LL} + \varepsilon_{LK} + \varepsilon_{LZ} = 0. \end{aligned}$$

Thus, the own- and cross price elasticities of the each factor add to zero. Similar relations hold of course for $K(Q, W, U_K, U_Z) = C_{U_K}(Q, W, U_K, U_Z)$ and $Z(Q, W, U_K, U_Z) = C_{U_Z}(Q, W, U_K, U_Z)$.