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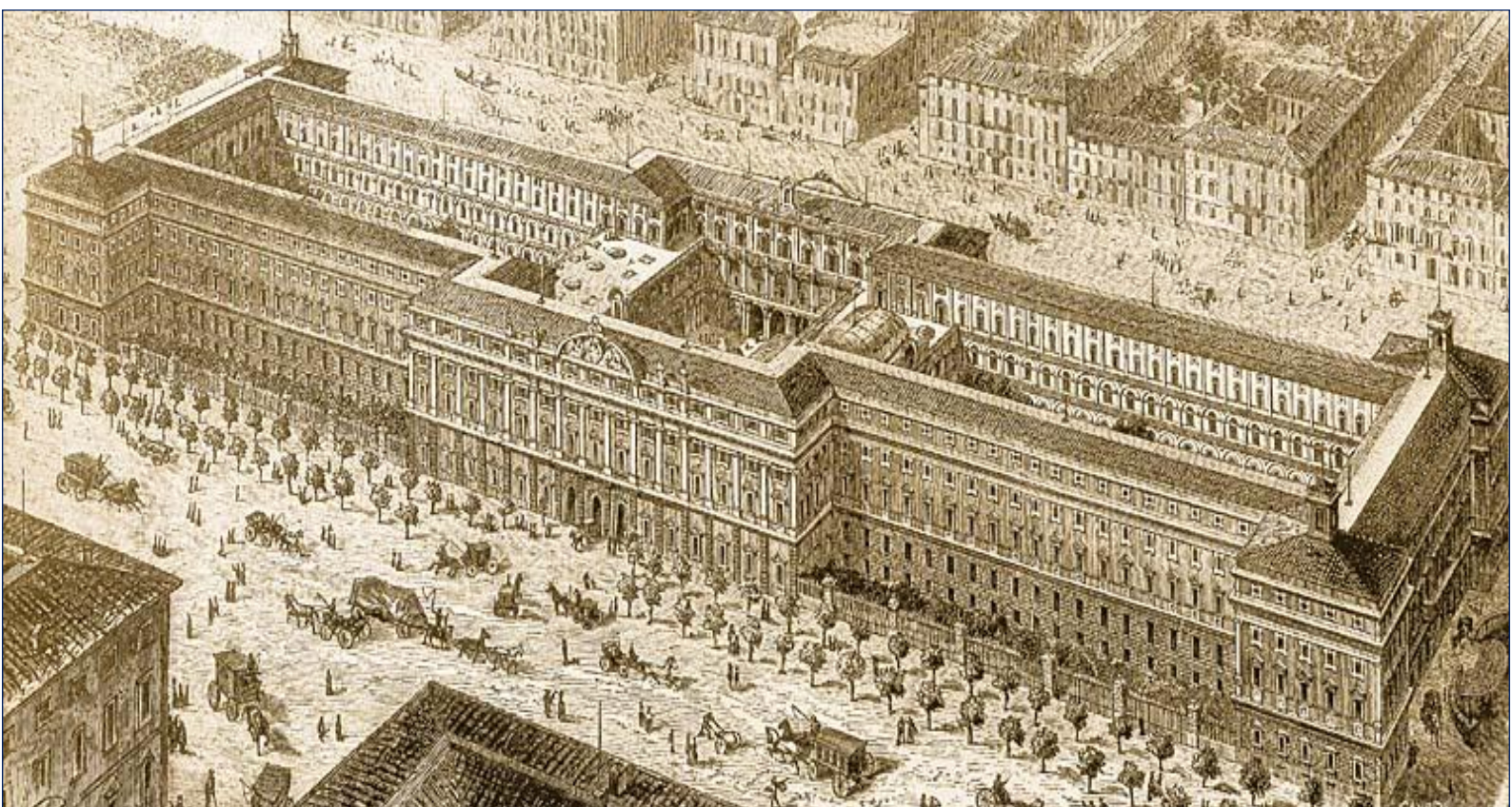
Self-employed income in the OECD countries: some consequences for functional income

E. D'Elia and S. Gabriele

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Self-employed income in the OECD countries: some consequences for functional income distribution

E. D'Elia and S. Gabriele [*]

Abstract

Functional income distribution can be an important driver of inequality. When the market remuneration of labour and capital is very uneven across individuals, as they have been in recent decades, the personal distribution of income tends to polarise, jeopardising social cohesion. This explains a renewed interest in functional distribution. Nevertheless, the role of self-employed income has been often misunderstood in estimating factor income shares. National accounts provide estimates of the compensation of employees and the operating surplus, but do not refer to self-employed workers as a specific productive factor, implicitly including their income in the 'mixed income' aggregate and in some other minor items. Most analysts estimate the income of self-employed workers by attributing to them the average unit compensation of the employees, although in fact this is not necessarily consistent with the GDP estimates. Other estimates take a fixed share of the 'mixed income', usually the same for every country. When national accounts are very detailed, as in the case of Italy, under some assumptions it is possible to accurately estimate self-employment income from sectors' non-financial accounts. In this paper we analyse four estimation approaches for self-employed incomes, since only the total amount of 'mixed income' received by households is available for most countries. We analyse the data of the OECD countries focusing mainly on eight large economies: the US, Japan, the UK, Germany, France, the Netherlands, Spain and Italy. The results are somehow unexpected. First of all, evaluating the income of the self-employed properly, the overall labour share is declining much faster than reported by the official data in some countries, and more countries showed a decrease in the 2000s. Indeed, the real unit compensation of the self-employed declined significantly in most of the eight countries (and in some of the others) after the mid or the end of the nineties, since self-employment has been used extensively to reduce the overall labour cost. Unit labour cost (ULC) also increased much slower (or even declined more) after 2000 in most countries, shedding new light on the pattern of international competitiveness and the drivers of inflation. The share of operative surplus of non-financial and financial corporations, properly recalculated, has exhibited different dynamics, whereas the component related to imputed rentals of owner occupied houses played an unexpectedly important role. Finally, the mark-up on variable production costs has been higher than expected and its evolution has been faster in most countries than what reported before, showing a lower sensitivity to the business cycle.

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CONTENTS

1. INTRODUCTION

Personal income distribution firstly depends on market remuneration of productive factors. As wages and profits are distributed very unevenly across individuals, when the share of labour on the product diminishes consistently and for a long time, redistributive policies may only attenuate income inequality. As a matter of fact, Bourguignon (2017) and Jaumotte and Papageorgiou (2013) point out how in the last decades globalization and technology have reduced the labour share and increased income inequality within most countries, although reducing income gaps across the countries. Apart from the risk that excessive disparities are perceived as socially unacceptable, the economic debate is also focused upon the negative effects of excessive inequality on growth, as remarked by Berg *et al.* (2018). Thus, international institutions also seem concerned about income inequality, particularly after the Great Recession, as proven by OECD (2011, 2018), Dabla-Norris *et al.* (2015) and IMF (2017a).

Although many studies, including Dao *et al.* (2017), point out the strict relationship between income inequality and the decline of the labour share on GDP[1], little attention has been devoted to the role of self-employment income (SEI) in this process, also because there is not a wide consensus on the methodology for estimating SEI. The main aim of this paper is to show that different measures of the compensation of self-employed workers provide very dissimilar pictures of primary income distribution in the OECD countries[2]. Estimating SEI is necessary to analyse the dynamics of *per capita* incomes received by different groups of workers, and provides an assessment on how the value added is apportioned between labour and capital in the economy and among households, financial and non-financial corporations, government and the rest of the world. Furthermore, different estimates of SEI produce different measures of some key economic indicators such as the labour share on GDP, the unit labour cost and the mark-up on production costs.

The number of self-employed workers has increased in OECD countries during recent decades, and now this group includes not only professionals, small shop owners, yeomen and craftsmen, as in the past, but also many people who actually work for one or few businesses, with a *de facto* subordinate relation. Those workers are often named 'bogus', 'fake' or, with an oxymoron, '*dependent* self-employed' and their contractual agreements are very widespread in the so-called gig economy and have become the standard way to enter the labour market for young people. Eurofound (2017) provides a classification of self-employment aiming at detecting the clusters mainly concerning the 'dependent self-employed ', and reports that the 'concealed self-employed ' account for about 8% of total self-employment and the 'vulnerable self-employed' for 17% in Europe. Together, they represent 4% of the total workforce. This issue has also been acknowledged by international institutions (see EEO, 2010, OECD, 2014, EEPO, 2014) and is discussed in many national and comparative studies, including, among others, Araújo and Malecek (2015) on the Czech labour market, McKeown (2005) on the UK case, and Schmid (2011) on the European countries.

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[1] See also Civardi, Targetti Lenti (2018) on the link between functional and personal income distribution.

[2] Even if agriculture and some outdated sectors, in which self-employment is the norm, today play only a minor role in these countries.

Measuring SEI is not easy and available statistical data are still unsatisfactory. Although, in principle, details about the income of the self-employed could be taken from tax files[3], the national accounts do not recognise self-employment as a specific source of income, other than the compensation of employees and the operative surplus. According to the SNA 2008 (EC, IMF, OECD, UN and WB, 2008, particularly par. 7.31), self-employed income is included in the miscellaneous item named "mixed income" (MI), and in some minor items such as 'withdrawals from the income of quasi-corporations'[4], which mainly comprise the part of distributable income that the owner withdraws from quasi-corporations. For instance, D'Elia and Gabriele (2018) used highly detailed data on the household sector released by the Italian institute of statistics to estimate the SEI for Italy, taking into account the aforementioned items. Notably, the standard estimates based on unit compensation of employees, may produce results not necessarily consistent with the estimates of GDP as remarked also by ONS (2018), since SEI may even exceed the total amount of the mixed incomes, that rather includes SEI.

The SNA 2008 (par. 24.45 and 24.46) simply does not oblige countries to disentangle the accounts of households from those of non-profit institutions serving households (NPISH), acknowledging that it is not straightforward. What is more, the SNA 2008 (par. 4.158) allowed statistical institutes to release accounts for an aggregate sector that comprises both simple consumers and small businesses run by self-employed members of households. As a result, only few countries provide separate estimates for the two subsectors and even fewer record withdrawals from the income of quasi-corporations, making the evaluation of SEI from national accounts quite cumbersome.

Selecting an optimal estimation procedure is not straightforward, since a reliable benchmark for the SEI is not available. Thus, in this paper we follow an indirect procedure, based on the 'encompassing principle' discussed by Mizon and Richard (1986), which consists of searching for the estimate of SEI which better explains some phenomena strictly related to it. The results of the encompassing tests provide some insight into the effectiveness of the measure of labour share, ULC and mark-up derived from different assumptions on the income of the self-employed. The main finding is that the estimation of SEI proposed in this paper generally provides a better explanation of the differences across countries and the dynamics of the aforementioned variables, compared to the measures derived through the standard methodology (that simply assumes that the self-employed earn the same unit wage of employees in each sector) and the measures proposed by Atkinson (1983) and others (that allocate to self-employed a percentage of the "mixed income").

The remainder of this paper is organised in five sections. The next section provides some details on the estimation of income of self-employed workers from national accounts, disaggregated by institutional sector. The third section presents evidence on the level and dynamics of SEI and some related indicators in the OECD countries, pointing out how different

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[3] The problem with tax files is that there is a presumption of low reliability for self-employed declared income, due to the under reporting connected to the larger possibilities of tax evasion experienced by this category, in comparison with the employees, subject to withholding tax. Moreover, the rates of evasion are supposed to be different across the countries.

[4] Quasi-corporations are unincorporated enterprises (i.e. producer units that are not incorporated as a legal entity, separate from the owner) that function as if they were corporations because they are sufficiently self-contained and independent of their owners that they behave in the same way as corporations.

methods provide pictures of primary income distribution that are significantly unlike. The fourth section presents the results of the encompassing tests. A few concluding remarks close the paper.

2.   METHODS AND SOURCES

2.1.   The database

The evidence supplied in this paper is based on non-financial accounts by sectors provided by the OECD. Since some data is unavailable for a few countries and periods of time, statistical interpolation has been used to integrate missing data. In particular, the number of hours worked has been estimated for Spain prior to 2000 by regressing them onto the number of workers for the most recent years. The imputed rents in US, Australia and Japan have been estimated from actual rentals by exploiting the average statistical relationship found for the other largest OECD countries.

The estimates presented in Section 4 also use data from the World Economic Outlook of the IMF and the data on income inequality collected in the Standardized World Income Inequality Database built by Solt (2016).

2.2.   Estimating the compensation of self-employed workers from national accounts

Guerriero (2012) analyses different estimates of SEI, used to evaluate the labour share on value added (VA) at factor costs. Evidently, the methodologies that completely disregard information on the amount of mixed income are inefficient. Other estimates of SEI attribute to the self-employed a percentage of the mixed income varying from 100% to 66%, the latter being the rule of thumb proposed by Johnson (1954). As long as the percentage remains constant over time and across the countries examined, this procedure ignores possible shifts in the ratio between labour and capital income over time and differences between countries. IN this paper we take under consideration the following four methodologies:

- The method adopted by most national and international institutions (henceforth STD), advocated also by Gollin (2002), in which the number (or the hours worked) of self-employed persons is multiplied by the unit compensation of the corresponding employees, possibly taking into account the sectoral composition of employment. Notably this methodology may be inconsistent with the estimation of GDP from the supply and demand side, although this issue is seldom pointed out, with few exception such as ONS (2018). In fact, imputing to self-employed workers the same unit wage of employees may result in an overall SEI that exceeds the "mixed income", that is the sum of SEI and other components.

- The estimates of SEI fully embodying the mixed income (referenced as ALL in what follows).

- The methodology proposed by Atkinson (1983) (named ATK in this paper) who assumed that the mixed income is composed of the same combination of compensation of employees (CE) and profit as the rest of the economy, that is $CE/(VA-MI) = SEI/MI$. Of course, this hypothesis makes no difference across industries.

- A further methodology proposed by the authors (referenced as NET), that assumes that small businesses included in the household sector charge the same mark-up as non-financial corporations on their production costs. Thus, the sum of operating surplus and mixed income of households and small businesses (OSMI) would be composed of three parts: (i) the imputed rentals on owner occupied houses (IR), currently evaluated by most national statistical offices, that is a virtual revenue only included in the OSMI of households; (ii) the pure operative surplus estimated as above (OS*); and (iii) the unknown SEI. Thus SEI = OSMI – OS* – IR.

Our methodology has the advantage of letting the percentage of MI attributed to self-employed change across countries and over time depending on the profitability of non-financial corporations in the specific place and time and gives a floor to the true SEI. Indeed OS* clearly overestimates the profitability of small businesses, since the mark-up of medium and large firms is arguably larger than that of (likely less efficient and profitable) small firms.

## 3.   MAIN RESULTS

3.1.   Hourly income of the self-employed

In this section, we present the comparison among the estimates of hourly real SEI engendered by the four methods illustrated above: the standard methodology, the Atkinson methodology, the methodology attributing 100% of mixed income to the self-employed and the one based on the appraisal of the overall operating surplus of self-employed. We mainly focus on eight OECD countries: the US, Japan and some European countries (the UK, France, Germany, the Netherlands, Spain and Italy). The dynamic of real hour compensation of the self-employed (index numbers) seems very different and less flat if computed with the alternative methods, instead of the STD one, which more strictly depends on the evolution of the hourly wage (Fig. 1).

In general, with the alternative estimates a cyclical dynamic appears, proving that the remuneration of the self-employed can be much more volatile than the wage, if correctly calculated. In most countries, an increase at the beginning of the period is followed by a decrease thereafter. The maximum point is placed in some year between 2000 and 2005 (Japan, France, the Netherlands, Spain and, with some peculiarity, the UK) or before 2000 (Germany[5] and Italy). In the UK the NET estimate widely oscillated in the first decade of the 2000s and then consistently increased, largely exceeding the relative maximum of 2003; the other lines were quite flat after 2002. In Germany, for the three alternative estimates, there has been a recovery since 2010. In Japan, France, the Netherlands, Spain and Italy the self-employed hourly income roughly stabilises in the last years of the period (and even increases in the last year). In the US the real hour compensation of the self-employed, computed by the NET method, slumps until 2010, when the other alternative estimate slightly increases, and then all of them recover.

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[5] Some estimates (ALL and ATK) return for Germany a decreasing trend from the beginning of the period.

**Fig. 1**   Hourly income in real term
(index numbers)
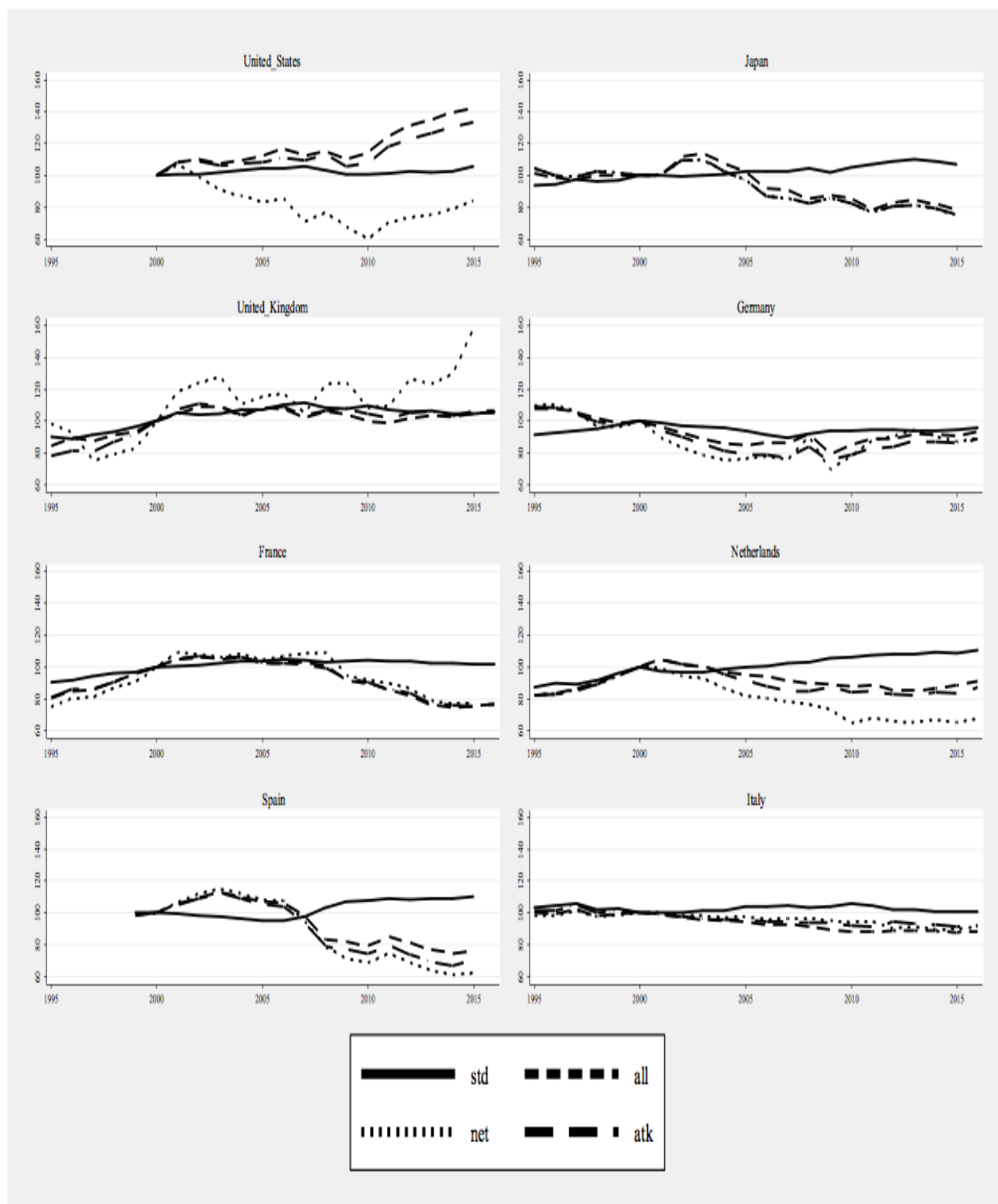
Alternative estimates in most countries, compared to the STD one, definitely indicate that the compensation of the self-employed had a more unfavourable dynamic than the hourly wage in the 2000s. It seems that this phenomenon is not only the consequence of the Big Recession, but in some countries it is mainly due to a progressive erosion which started before 2005. That could be due to two main reasons, which can balance differently in different countries. The first is, possibly, the stronger competition in some professions, also related to the effects of new technologies and the enlargement of the activity scale (big distribution chains and big professional studies). The second reason is the diffusion of a number of precarious jobs, masked by independent jobs, that in fact represent some sort of fake dependent job. In the US (and in the UK according to the NET estimate), conversely, the hourly income of the self-employed has grown since the end of the first decade of the present millennium (but if calculated with the NET method it had previously decreased). An explication could be found in the features of the US labour market, where the flexibility of dependent workers is very high and makes fake dependent labour useless. In that case, the self-employed are likely to be true independent workers, whose remuneration is very sensitive to the cycle, and, after having been hit by the crisis, consistently recovers. The NET estimate is the one that better catches this phenomenon, because it reflects the dynamic of profits. Figure 1 is in some way puzzling for the UK, where the widespread presence of the concealed self-employed is acknowledged[6], because the alternative estimates, compared with the STD one, do not make that phenomenon apparent. It is possible that the relevant increase of profits has sustained the income of the self-employed (and those with mixed income), in spite of an unfavourable dynamic of the remuneration of the fake self-employed .

The comparison is extended to a broader set of countries (25) in figure 2, which represents the average annual growth of real hourly compensation of the self-employed since 2000, returned both by the average (AVG) among the alternative estimates presented above (ALL, NET and ATK) and by the STD estimate, and their difference. The countries are ranked according to the last variable. The STD methodology seems to overestimate, and in some cases strongly overestimate, the dynamic of SEI for a lot of countries. Besides the ones already analysed, a strong gap is shown for Estonia, the Czech Republic and Greece. On the other side, some countries exhibit higher growth if the average among the alternative estimates is used (specially Poland and Switzerland, besides the US).

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[6] According to Eurofoud (2017), the percentage of concealed self-employed is highest in the UK.

Fig. 2   Real hourly compensation of the self-employed
**(average annual growth, after 2000)**
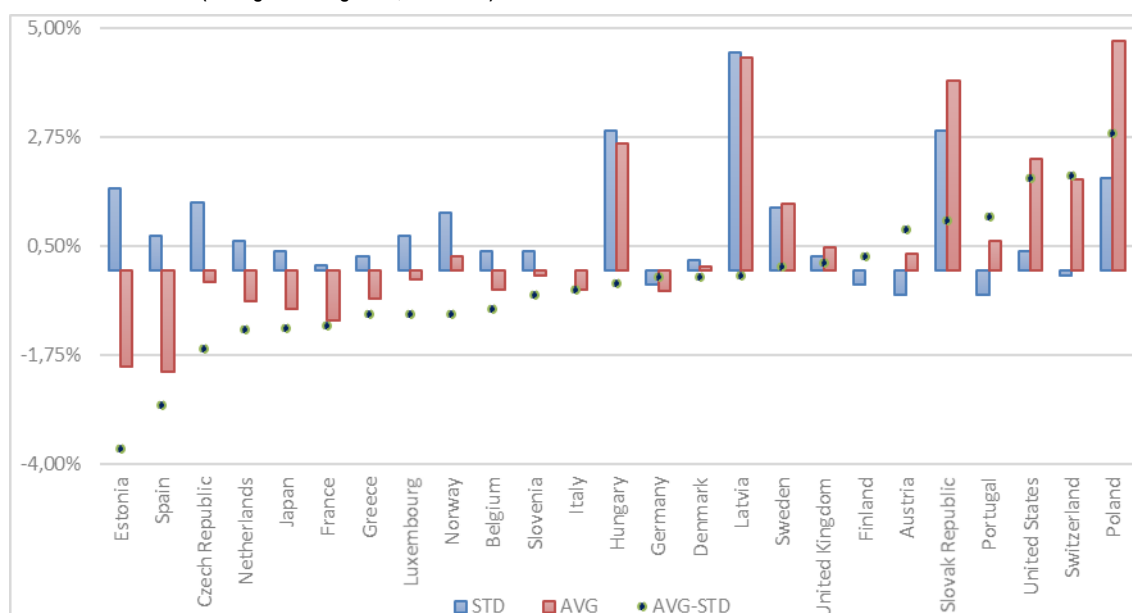
3.2.   Labour share

Figure 3 shows the dynamic of the labour share in the eight selected countries. Generally speaking, and not surprisingly (see IMF, 2017b), the share shows a decreasing (the US, Japan, Germany, the Netherlands and Spain), or an oscillating, trend (France and Italy) in all of the considered countries except the UK, where it is increasing.

It is important to underline that the differences in the results ensued from the different methodologies depend on the different assessment of the average income of the self-employed, as the income of employees and the number of workers (employees and self-employed) do not change. The divergences are particularly relevant for some countries. For example, the results are very interesting for Spain, where one can observe the major differences among the estimates. As the STD share lost 3.2 points between 1999 and 2015[7], the other estimates, taking into account the specific dynamic of self-employed income, showed a higher decrease, equal to 8.0 (ALL), 7.8 (NET) or 5.8 (ATK) points, mostly due to a different dynamic in the years when the crisis broke out. It is likely that the nominal income of professionals, small shop owners and craftsmen has been more strongly hit by the crisis than that of employees (see also the dynamic of the real hourly SEI in Fig. 1). Indeed the latter fell less than the VA at factor costs in 2008-10, thanks to the known mechanisms of labour hoarding. At the same time, the 'fake employee' portion of employment is more likely to have lost a job or to have had working hours and remuneration diminished in a period of crisis.

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[7] Data are only available from 1999 to 2015.

Fig. 3   Labour share
(percentage of value added at factor costs)
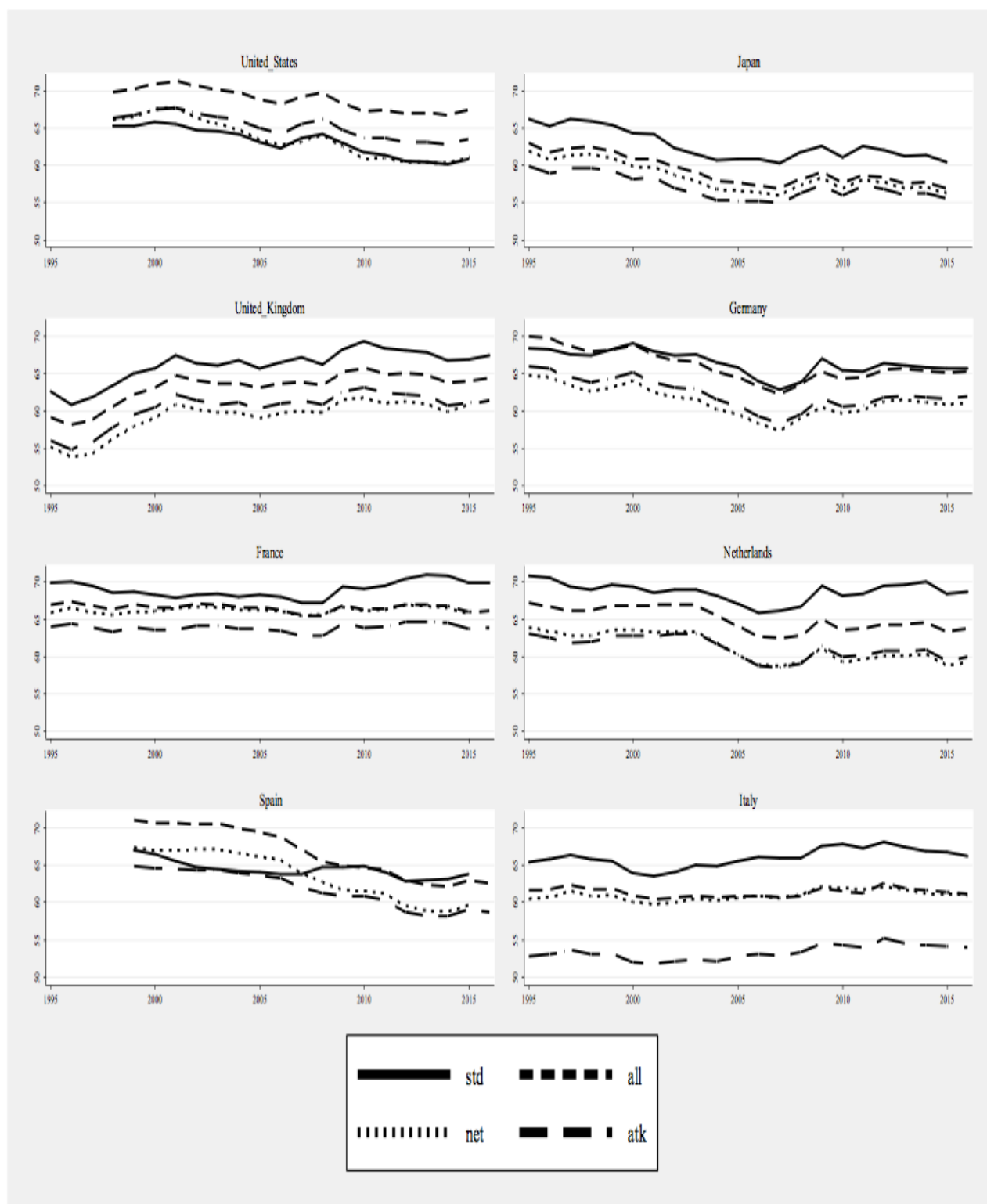
The effect is minor in France, the Netherlands and Italy, and less concentrated in the years when the crisis broke out. In these countries, the drop of the STD labour share was followed by a recovery (with a minimum in 2007, 2006 and 2001, respectively), ending between 2010 and 2015 (2013, 2014 and 2012, respectively). That result, especially for Italy, where the growth lasted longer, seems to contrast to the dynamic of most countries (IMF, 2017). With the alternatives ALL and NET, estimates of growth have been replaced by an almost flat trend. In France the STD share has increased by 2.7 points since 2007 (until 2015[8]), the ALL share by 0.4, the NET share by 0.25 and the ATK share by 0.96. In the Netherlands an increase of 2.7 points of the STD share between 2006 and 2016 faced a growth equal to 1.1 points of the ALL share, 0.3 of the NET share and 1,2 of the ATK share. In Italy, where the growth starts in advance, the STD share gained 2.6 points between 2001 and 2016, the ALL share gained 0.7 points, the NET share 1.2 and the ATK share 2.3. For this country, where the share of independent workers is high and includes a lot of fake-dependent workers, a diminishing labour share has even been found in the 2000s with the more accurate estimates allowed by ISTAT data (D'Elia e Gabriele, 2018).

In addition, in the three countries - France, the Netherlands and Italy - like in Spain, the increase in the STD labour share is due to the dynamic of the employees' share, that has dragged the STD share upwards, increasing more than the VA (or decreasing less, during the recession).

For the US, Japan and Germany, the alternative ALL and NET estimates, in most cases, deliver higher variation rates than the STD estimates, for the whole period. The STD share decreases by 4.4 points in the US (1998-2015), 5.2 in Japan (1994-2015) and 2.7 in Germany (1995-2016), as the NET share drops by 5.1, 6.4 and 3.7. The ALL share slump is the highest in Japan and Germany, but is the lowest in the US.

It is interesting that only in the US the ALL estimate provides the highest labour share for the whole period, as in most countries, and for most of the years this is true for the STD share. That could depend on the fact that in the US the hourly remuneration of independent workers is always higher than that of employees, consistently with the assumption that self-employment in that country actually represents independent work. Then we have the STD share, which attributes the average salary of the employees to the self-employed, underestimates their remuneration.

For the UK the increase in the labour share is larger if calculated with the ALL (4.8 points), the NET (5.6 points) or the ATK (5.1 points) methodology, compared to the STD one (4.3 points).

Figure 4 (referring to 25 OECD countries) shows that after 2000 the annual change in the labour share is more often negative if computed with the AVG methodology compared to the STD one. Furthermore, the AVG estimate shows a more unfavourable dynamic in the share of labour in all the Mediterranean countries, but not in Portugal, the other country of southern Europe.

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[8] Data is not available for 2016.

Fig. 4   **Labour share**
(average annual changes after 2000, percentage points)
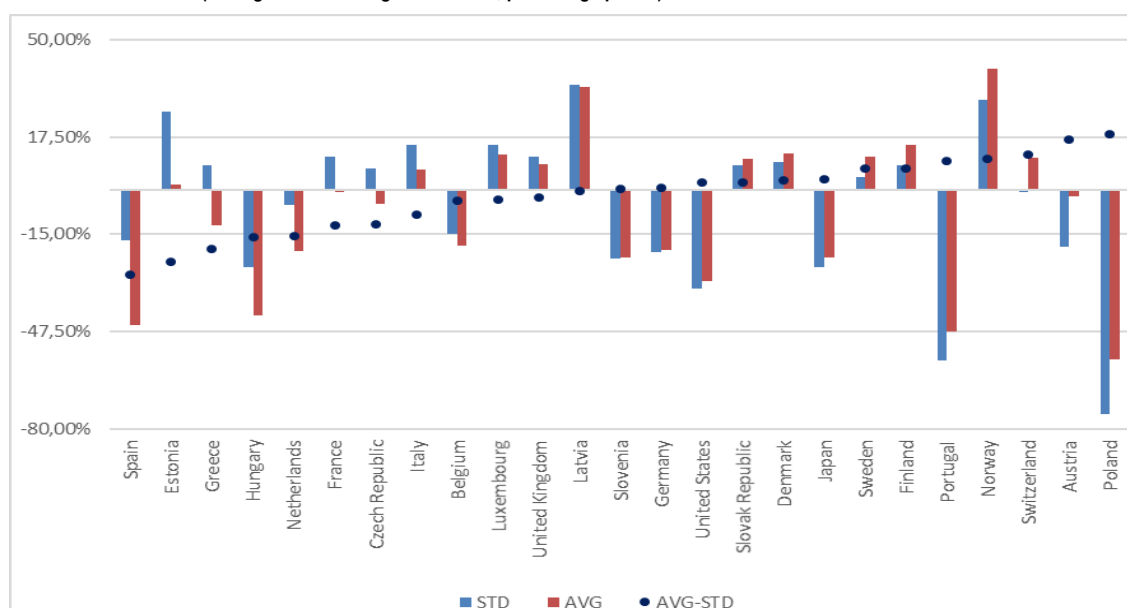
### 3.3.   Operating surplus, imputed rentals and depreciation of capital

As for the share of operating surplus on VA, it is possible to split it between financial corporations and non–financial firms (non-financial corporations plus household business as professionals, small shop owners, yeomen and craftsmen)[9], as in Figure 5. The surplus of financial and non–financial corporations are available in the database. To assess household business we have deducted the SEI, calculated using the AVG estimate, from the operating surplus and mixed income of households (and non-profit institutions serving households). For those countries where the AVG estimate presents a more unfavorable trend for SEI than STD, this operation implies a specular effect on the non-financial firms operating surplus; the estimate of SEI has an impact on the distribution of profits between the financial and the non-financial sector as well.

As the household surplus includes the imputed rents of owner-occupied housing, it is necessary to single out this item. Conversely, it is not possible to calculate the net operating surplus of financial corporations and non–financial corporations plus household business because the capital consumption is not split by institutional sector in the database. Nevertheless, Fig. 5 shows the dynamic of overall consumption of fixed capital, besides the one of imputed rents and of operating surplus.

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[9] Most household business is located in the non-financial sector, even if some small businesses producing auxiliary financial services can actually be included in the household sector.

Fig. 5 Operating surplus, imputed rentals and amortisation of capital

(non-financial corporations and consumption of capital on the left scale, financial corporations and imputed rents on the right scale)
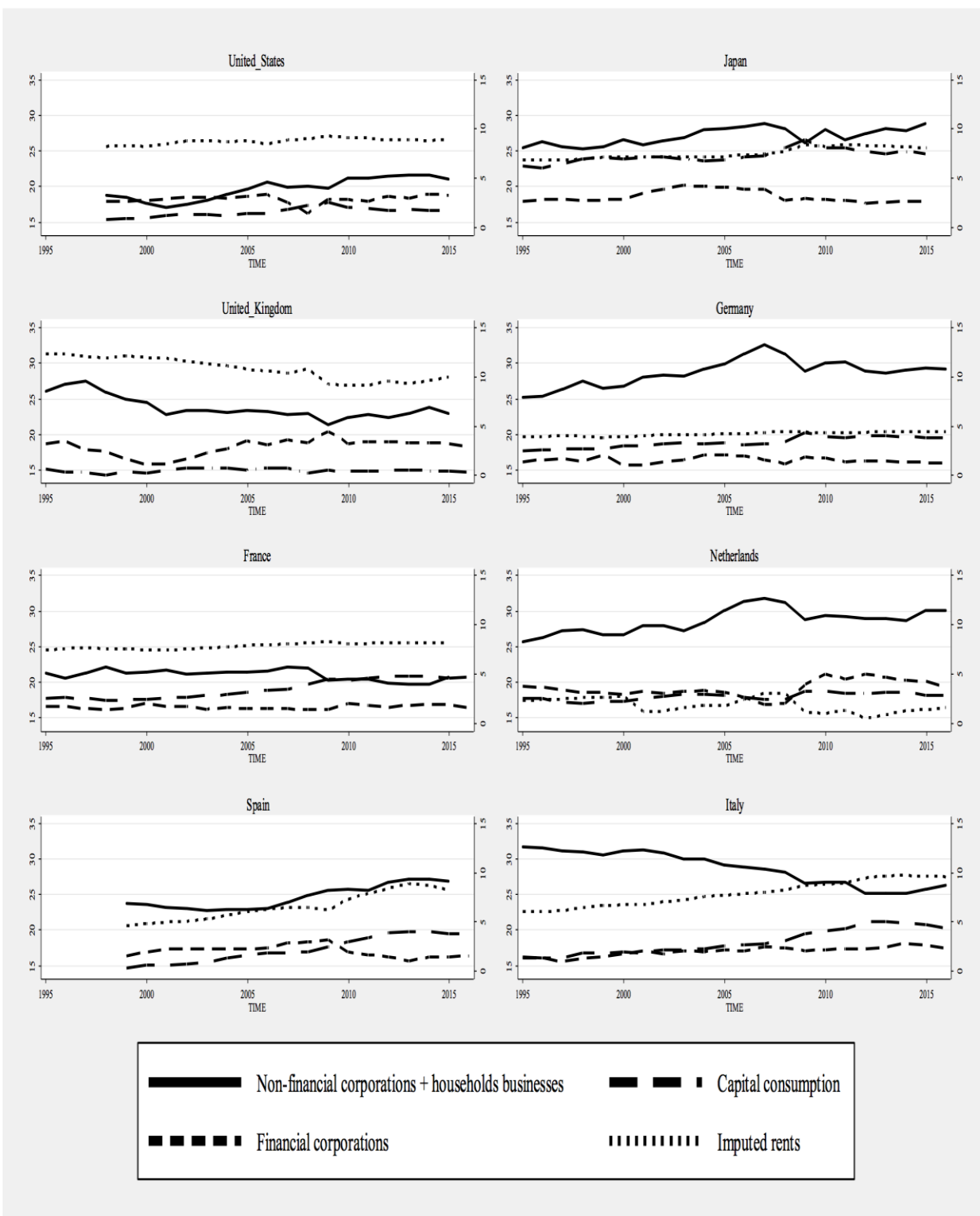
In most countries, a part of the VA lost by workers translates as an increase of imputed rents (right scale), relevant in Spain and Italy[10]. Only in UK and the Netherlands, imputed rents are decreasing, while they are quite stagnant in France and Germany. Consumption of capital (left scale) is also generally increasing, except in the Netherlands and the UK, where it is rather flat.

The gross operating surplus of financial corporations (right scale) oscillates around an almost flat trend in many countries. Among them were France, Germany and Japan. In Japan an increase from 2.8% of VA in 2000 to 4.3% in 2003 was followed by a decrease thereafter, especially in 2008, when 1 point was lost in one year. In Spain a maximum was reached in 2009 and a minimum in 2013. A wider cycle took place in the UK and in the Netherlands: the UK shows a minimum in 2000 and a maximum in 2009, losing 0.3 points throughout the whole period, while the Netherlands shows a minimum in 2007 and a maximum in 2010. In the other countries, an increase of the financial corporations' share emerges: in the US, after a loss of more than one point in 2008, a recovery took place (+1.4 points in 2009, + 1.8 in 2015), in Italy a gain of one point was achieved during the whole period.

These results show that the crisis hit the operating surplus of financial corporations in very different ways depending on the country: in some case the loss was quickly overcome, probably thanks to State aid (e.g. the US, Germany, the Netherlands), in some cases it was not (Spain, Japan), in other cases the impact was minor (the UK, Italy).

As for the gross operating surplus of non-financial firms (left scale), the overall trend is rather different depending on the country. In the US, Japan, Germany, the Netherlands and Spain it is growing, in the UK, France and Italy it is decreasing. The crisis implies a drop almost everywhere, but, after that, in some countries the operating surplus of non-financial firms goes back to the previous path (the US, the UK), whereas in most of them it descends a step and then restarts from a lower point (Japan) or roughly maintains this lower position (Germany, France, the Netherlands). In Italy, two main slumps occurred, in 2009 and in 2012, because the country has been hit by a double-dip recession. Spain has shown an almost continuous growth after the minimum in 2003, the reason of which will be discussed later.

3.4.   Unit labour costs and mark-ups

International institutions and most national research centres evaluate the unit labour cost (ULC) as the ratio between the nominal compensation per employee divided by the real GDP per person employed (including all the workers), as recommended by OECD (2007). This computation method (STD) implicitly assumes that the average income of the self-employed is equal to the average compensation of employees. That could be true in the past, but not nowadays. It turns out that the official figures on ULC arguably provide a biased picture of the competitiveness of each country.

Generally speaking, whichever method is used, the ULC trend (Fig. 6, index numbers, base year 2000) increased in all countries, except Japan, and Spain after the crisis (from 2010 to 2015). Germany showed a flat dynamic until 2005, then a slight drop, followed by a lasting

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[10] Imputed rents for US and Japan have been estimated by the authors (see the section 2.1).

recovery. The UK showed the highest increase in the ULC. Nevertheless, for four countries, France, the Netherlands, Spain and Italy, the ULC growth estimated with the AVG methodology was significantly lower than the one assessed with the STD process in the last part of the examined period.

Fig. 6   **Unit labour cost (ULC)**
         (Index numbers)
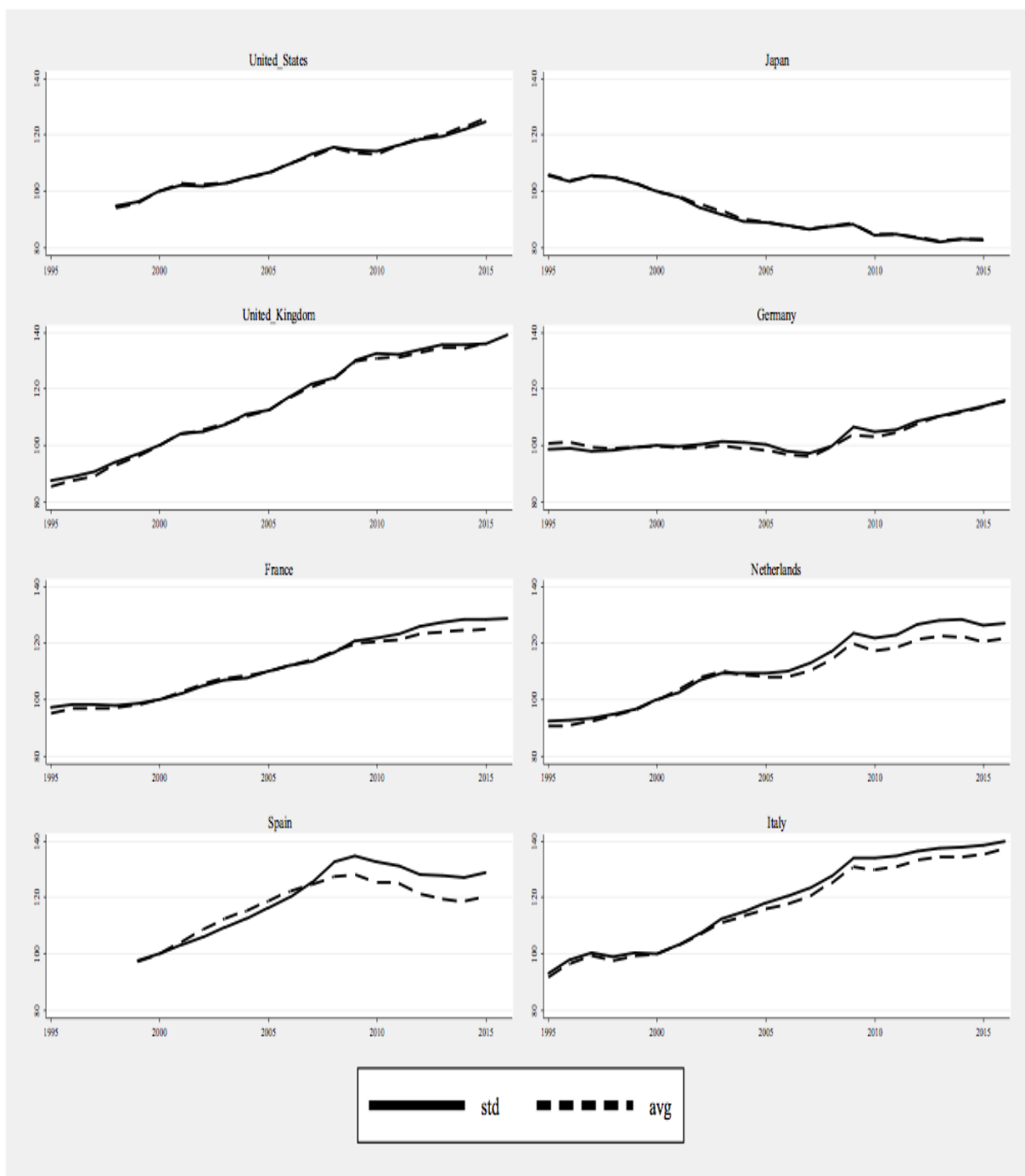
When also extending the number of countries (Fig. 7), Japan is the only one where the ULC decreased after 2000. The ULC average annual growth after 2000 was lower if calculated with the AVG methodology in 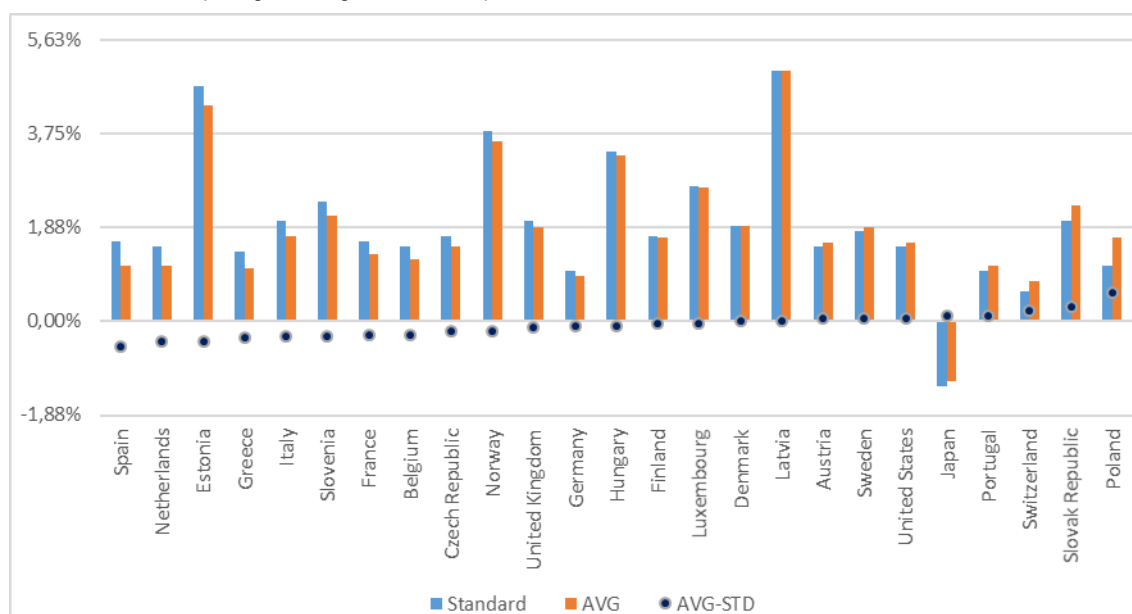most countries. For Spain, the Netherlands, Estonia, Greece, Italy and Slovenia the annual difference is 0.3 percentage points or more. On the other hand, besides Japan, in Austria, Sweden, the US, Portugal, Switzerland, the Slovak Republic and Poland the AVG ULC growth is higher.

Fig. 7   Unit labour cost

(average annual growth after 2000)

In most of the eight countries (apart from the US and Spain until the outbreak of the crisis), the AVG estimate of the mark-up almost always returns a higher level than the one calculated with the STD methodology. As for the dynamic, the AVG estimate shows (Fig. 9) a lower increase for a few countries (especially some Eastern European Countries, like the Slovak Republic, Poland and Hungary) and a faster growth for most of them (the difference in the percentage change of total mark-up between AVG and STD is 0.8 or more for Belgium, Italy, Norway, Austria and Finland). It is still interesting to compare the trend of the mark-up in the eight countries, because this analysis provides some important pieces of the puzzle of the economic systems under examination. First of all, the case of Spain is plain to see: during the crisis the mark-up was widely increased. This is likely to have been made possible by the relevant slump in the cost of labour (Fig. 1, 2 and 8). That is why the operating surplus could keep growing after the break out of the crisis. Whereas, in the UK the ULC increase was balanced with a strong reduction of the mark-up until 2010 (only after a slight growth appeared), and that could explain the decline in the operating surplus. In Italy, the mark-up trend is much flatter (it decreases less overall and its cycle is softer). It seems that the decision to stabilise the mark-up, instead of adapting it to the phase of the cycle, has not had a positive impact on the operating surplus of non-financial firms, which has probably suffered due to the lack of demand. France seems to have similar, less severe, problems. In the US and Japan (and to a lesser

extent in Germany and the Netherlands) the mark-up trend is growing; in these countries it seems to better fit the cycle.

4. ASSESSING THE EXPLANATORY CAPACITY OF ALTERNATIVE ESTIMATES OF SEI

Reliable estimates of SEI are relevant per se, but are even more interesting if they help to better explain some phenomena strictly related to the SEI, particularly: (i) income inequality, which strictly depends on the labour share; (ii) the dynamics of inflation, which is arguably also driven by unit labour cost (which includes the compensation of the self-employed); (iii) the dynamics of export, which is partly driven by the difference among national unit labour costs. Of course, other economic relationships involving the SEI can be used to test the reliability of different estimates.

4.1. Methodology

A statistical tool to compare the estimates of SEI is given by the 'encompassing tests', discussed by Mizon and Richard (1986), which verify the null hypothesis that a model including a given estimate of SEI is able to explain the results of the others but not the other way round. In practice, the tests can be run through a set of auxiliary regressions in which each variable listed above, say y, is regressed against the corresponding fitted values $\hat{y}_{i,m}$ of the model including the m-th proxy of SEI, that is

$$y_i = \lambda_1 \hat{y}_{i,1} + \ldots + \lambda_n \hat{y}_{i,n} + u_i \qquad [1]$$

where u_i is a stochastic disturbance, not necessarily IID. If $\lambda_m \neq 0$, the model based on the m-th estimate of SEI gives a contribution to the explanation of y_i that goes beyond the contribution already provided by the other models, so that it beats, makes redundant, or 'encompasses' the others. Since the regressors in [1] are fitted values of other regressions, the OLS variance of the parameters λ_j is biased (and generally underestimated), Mizon and Richard (1986) suggest augmenting the regression [1] with the explanatory variables included in each model. In practice, this solution is feasible only for pairwise comparisons between models, because of the loss of degrees of freedom, when the auxiliary (linear) regression model reads

$$y = \lambda_0 \hat{y}_{i,0} + \sum \beta_j z_j + v_i \qquad [2]$$

where $\hat{y}_{i,0}$ are the fitted values of the benchmark model and z_j are the explanatory variables included in the competing m-th model. If $\lambda_0 = 1$ (and ideally = 0) the benchmark model

encompasses the *m*-th model, while $\lambda_0 = 0$ means that the reference model is fully outperformed by the other.

For our purposes, the models explaining inequality, inflation and net export in volume can be quite unsophisticated, since our main objective is to get comparable residuals from the regressions, rather than the best fit of data. For instance, the labour share can be explained simply by the labour share, the unemployment rate, the inflation rate and the share of public expenditure on GDP, as in the model estimated by Glyn (2009) and Green (2016), intentionally disregarding other relevant factors exerting only very long-run effects, such as education, considered a powerful equalising factor as pointed out by Goldin and Katz (2008). Furthermore, here income inequality is measured only by the Gini index computed on disposable income, that does not take into account the intensity of poverty and the social preferences considered by Atkinson (1983).

The inflation rate here is only explained by the dynamics of the cost of labour, the mark-up on production costs, the price of imports (separately for commodities and other goods and services) and the exchange rate, following the papers of Galı́, Gertler, and Lopez-Salido (2001) and Banerjee and Russell (2001). Admittedly, this model does not consider the role of money, unemployment, expectations, output gap and other relevant factors considered, for instance, by Dwyer and Hafer (1999) and Neiss and Nelson (2005).

Finally, the share of net export on GDP in volume is explained by a model that only comprises the cost of labour, the nominal effective exchange rate and the potential market for each country, as in Carlin, Glyn, and Van Reenen (2001), but pays no attention to other influential factors, such as the composition of exports, the pressure of domestic demand and the balance of payment, etc. pointed out by Yalcinkaya, Calantone and Griffith (2007) and Bobeica *et al.* (2016) among others.

As for the dynamic specification of models, they are based on a simple error correction mechanism (ECM), in which the dynamics of inequality, inflation and export are driven by their short run elasticity compared to some selected influencing factors and by the deviation from a long run relationship, that is

$$\Delta y_{it} = \sum_j \alpha_j \Delta x_{jit} - \beta_0 (y_{it-1} - \sum_j \beta_j x_{jit-1}) + \delta_i + \theta_t + u_{it} \qquad [3]$$

where the annual changes of the endogenous variable *y* measured on the *i*-th individual of the panel at time *t* is explained by the changes of a number of explanatory variables x_j whose short-run impact on is measured by the parameters αj; the past deviation of y_i from the long run relationship; a set of country dummies δi representing time invariant country specific omitted variables, and time dummies θ_t representing common time-varying factors not included in the model; the idiosyncratic term u_{it}. Assuming that no explanatory variable is endogenous, the model [3] can be estimated consistently by running a standard fixed effects GLS, as shown by Westerlund (2007).

4.2. Empirical results

The main results of estimating the models for inequality, inflation and net exports are summarised in Table A1-A3 in the Appendix. For the aims of this paper, they deserve only a few comments. The first general remark is that the estimated parameters for the labour share, the ULC and the mark-up vary significantly depending on the assumptions on the income of the self-employed , despite the differences among the corresponding indicators seeming to be relatively small, as argued in the previous section. For instance, in the model for inequality only one measure of the labour share (that obtained by attributing the whole mixed income to the self-employed) has a significant effect in the short run. In the model for inflation only the standard measure of the ULC has a long run impact on prices. Also net exports seem to react only to the ULC computed by reducing the mixed income by an estimate of the profit made by the smallest companies. Of course, the latter results could be explained by pure sample effects, but they still remain surprising. However, the capacity of models to explain the dynamics of the endogenous variables is almost the same, regardless of the hypothesis made to measure the labour share, the ULC and the mark-up, as shown by the values of the R^2 statistics, that only suggest a modest advantage of the 'profit-net' indicators in the export regression. As for the other estimated parameters, they generally have the expected sign and size, with few exceptions, like the non-significance of inflation and unemployment rate (the latter only for the long-run trend) in the inequality model; the scarce impact of international prices of commodities in the inflation model; the negligible impact of the size of the potential market in the net export model (but the effect could be large in a model separating out export and import). Although the three models are intentionally simple, serving mainly to build the encompassing tests, they have a reasonable capacity to track the dynamics and the variability across the OECD countries of inequality, inflation and net exports, as witnessed by the high values of the R^2 statistics for panel regressions, that pick up to 0.8 in the case of inflation rate.

The results of the encompassing tests, reported in Table 1, provide some insight into the effectiveness of the measure of labour share, ULC and mark-up derived from different assumptions on the income of the self-employed . Maybe the most surprising result is that the standard methodology, that attributes the same hourly compensation of employees to the self-employed , is "encompassed" (i.e.: outperformed) by any other alternative measure considered here. Indeed, the upper four rows of Table 1 show that the standard indicators are never capable of improving the explanation of inequality, inflation and net exports based on alternative measures, since the hypothesis that $\lambda_0=1$ in [2] when $\hat{y}_{i,0}$ is derived from the standard indicators can be rejected at a very high confidence level (ranging from 33% to virtually 100%). It follows that whatever the measure of labour share, ULC and mark-up based on estimated mixed income should be preferred to the standard indicators in analysing key facts on inequality, inflation and international trade performances. Notably, encompassing tests seldom provide such clear-cut results and it is recognised that they suggest that ultimately all alternative models have some informative value. Apparently, this is not the case.

As for the measures built by attributing the whole mixed income to the self-employed , the results summarised in the 5th to the 8th rows of Table 1 suggest that they cannot be discarded in at least 6 cases at a confidence level as low as the 10%. Furthermore, this assumption seems to be outperformed only by the standard and the average indicators in explaining net export.

However, the superiority of the average indicator is very common in encompassing tests, so that averaging the results of different models is often recommended when the true data generating process is uncertain.

Table 1   The results of the pairwise encompassing tests

(Tests against $\beta_0 = 1$ for the "encompassing" hypothesis in the regression [2])

Encompassing hypothesis	Encompassed hypothesis	Inequality		Inflation		Net export on GDP	
		F	p	F	p	F	p
All	Standard	0.127	0.722	0.003	0.957	0.237	0.627
Net		0.002	0.967	0.511	0.475	0.209	0.648
Atkinson		0.042	0.839	0.131	0.717	0.952	0.330
Average of non-standard		0.055	0.815	0.000	0.989	0.136	0.712
Standard	All	0.879	0.349	8.578	0.004	3.861	0.050
Net		3.407	0.066	9.078	0.003	0.875	0.350
Atkinson		6.778	0.010	6.629	0.011	0.260	0.610
Average of non-standard		4.426	0.036	3.426	0.065	9.601	0.002
Standard	Net	0.738	0.391	3.676	0.056	8.347	0.004
All		1.100	0.295	1.813	0.179	6.182	0.013
Atkinson		1.695	0.194	0.133	0.716	0.919	0.338
Average of non-standard		0.123	0.726	3.989	0.047	1.649	0.200
Standard	Atkinson	0.374	0.542	4.863	0.028	12.147	0.001
All		2.717	0.100	1.163	0.282	6.657	0.010
Net		0.159	0.690	1.908	0.168	1.461	0.227
Average of non-standard		2.609	0.107	0.242	0.624	1.071	0.301
Standard	Average of non-standard	0.737	0.391	7.191	0.008	6.683	0.010
All		2.631	0.106	1.058	0.305	15.472	0.000
Net		0.714	0.399	9.387	0.002	0.004	0.948
Atkinson		4.859	0.028	3.118	0.079	0.164	0.685

Our tentative estimation of the profit made by the self-employed gives quite deceiving results. The rows from the 9th to the 12th of Table 1 show that this methodology only outperforms the standard practice in two cases (but not in analysing inequality), and perhaps is preferred to the imputation of the whole mixed income purely in the export model. Surprisingly, almost the same happens for Atkinson's conjecture, whose results are presented in the following 4 rows of the table. A possible explanation of this failure is that the profitability of very small businesses typically run by the self-employed differs from the average, mainly because of the special sectoral composition (usually concentrated in less productive branches of activity) and the lack

of economy of scale that gives a structural advantage to the medium and large companies. Further investigation of this issue is necessary, but is far beyond the scope of this paper.

Finally, the expected advantage of the average measure of the income of the self-employed is questionable, as shown by the last four rows of the table. Possibly, averaging among the non-standard measures of labour share, ULC and mark-up analysed here is worthwhile only in explaining inflation and net export, but other indicators seem to be at least on par with the favoured competitor. The disappointing performance of the average indicator likely depends on the scarce variability of the information set behind the alternative measures of self-employed income. Nevertheless, at the moment, national accounts and official statistics only provide little data on the activity of the self-employed , and even less data is comparable across the countries.

5. CONCLUDING REMARKS

In recent decades, the relevant changes and transformations that have taken place in the product and labour markets have produced new forms of working relations, somewhere between dependent employment and self-employment. In order to secure more flexibility in the workforce, many workers are hired today through formal, independent, individual agreements, providing fewer protections than those ensured by collective bargaining, even if a substantial subordination is implied. The gig economy is spreading, and in some countries the new working relations have become the new standard way of being hired, especially for young people entering the labour market for the first time. This new framework seems common in most OECD countries.

It seems that both temporary market difficulties and structural transformation due to the introduction of labour saving technologies, outsourcing, and different skills requirements have impacted these weaker categories. This has had an impact on hourly remunerations and on the hours worked. However, looking at the midterm outcomes, the positive relationship between labour market flexibility and labour productivity, previously taken for granted and also endorsed by the international institutions, has recently been called into question. Therefore, the expansion of 'dependent' self-employment could be considered as one of the reasons of the stagnation of productivity in some countries.

In any case, self-employment is crucial to understanding the functional distribution of income, as well as the evolution of economic systems. Hence, the standard estimates of labour input and of its share on GDP, which only take into account the dynamic of salaries, have to be refined. In fact, self-employment, if carefully evaluated, brings greater income volatility – also due to a greater variability of the hours worked - and, in most countries, a greater weakness of work earned income, which is likely to generate more inequality.

As shown in the previous sections, the standard estimates of SEI may be unsatisfactory and even not consistent with GDP estimates. Using different estimates of self-employed income, unrelated to wage trends, the labour share presents a more unfavourable dynamic in a group of countries, including Spain, France, the Netherlands and Italy, while in other countries the contrary is true. In the former group of countries, the spread of fake self-employment could likely explain the labour share trend, together with other phenomena which have hit the SEI, such as

the impact of technological and organisational transformations and the Great Recession. In the four countries mentioned above and in many others, the ULC, computed with the alternative methods, is less dynamic than the one calculated with the standard methodology, showing a different picture of international price competitiveness and inflation dynamics compared to the usual narrative.

In some other countries, like the US, the income of the self-employed probably better reflects the increase in the remuneration of actual independent workers, as the existing strong flexibility of wages has not required the recourse to fake contracts.

The composition of profits between financial and non-financial corporations also changes according to the SEI estimate used, because this income is deducted from the surplus and mixed income of non-financial firms.

As for capital consumption and imputed rents, it is interesting to observe that they seem to have not been hit by the crisis in most countries. Apart from possible measurement problems, this could suggest a change in distribution, in favour of rents.

The new estimates also provide a higher mark-up and a faster dynamic of the same variable in most of the largest OECD countries. The trend has been growing in the US, Japan, Germany, the Netherlands and Spain during the crisis, while it has been decreasing in the UK. In Italy and in France it seems that the mark-up does not adjust with the business cycle, contributing to amplifying both the crises and the booms.

Finally, it has to be underlined that the alternative estimates seem to have a stronger explanatory power with regard to competitiveness, inequality and inflation, as shown by simple encompassing tests run on very standard models. Perhaps the most surprising result is that the standard methodology, which attributes to the self-employed the same hourly compensation of employees, is 'encompassed' (i.e.: outperformed) by any other alternative measure considered here.

This evidence should stimulate increased attention on the estimate of SEI when studying the distribution of the product among the productive factors, and should encourage the statistical offices to release better estimates of self-employment income.

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APPENDIX

Table A1   Estimates of the model for inequality

VARIABLES	(1) std	(2) all	(3) net	(4) atk
D.lab	0.0249	-0.0943**	-0.0649	-0.000710
	(0.0517)	(0.0442)	(0.0415)	(0.000472)
L.lab	-0.0751*	-0.137**	-0.125**	-0.00126**
	(0.0407)	(0.0529)	(0.0555)	(0.000572)
D.YRGTQ	-0.0485	-0.0207	-0.0271	-0.0252
	(0.0311)	(0.0252)	(0.0248)	(0.0276)
D.UNR	0.0331***	0.0313***	0.0308***	0.0333***
	(0.00644)	(0.00601)	(0.00561)	(0.00602)
CPIH_YTYPCT	-0.0517	-0.00191	-0.0183	-0.0367
	(0.0773)	(0.0733)	(0.0733)	(0.0732)
L.gini_disp	-0.0924**	-0.103**	-0.106**	-0.105**
	(0.0342)	(0.0365)	(0.0384)	(0.0375)
L.YRGTQ	-0.0867**	-0.0620*	-0.0662**	-0.0667**
	(0.0297)	(0.0300)	(0.0302)	(0.0308)
L.UNR	0.00416	0.000781	0.000584	0.00142
	(0.00246)	(0.00238)	(0.00258)	(0.00239)
Constant	0.250**	0.190**	0.191*	0.191*
	(0.0940)	(0.0887)	(0.0929)	(0.0958)
Observations	313	313	307	313
R-squared	0.363	0.382	0.376	0.371
Number of cod	17	17	17	17
Country FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
rho	0.777	0.811	0.804	0.788

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table A2 Estimates of the model for inflation

VARIABLES	(1) std	(2) all	(3) net	(4) atk
D.ulc	0.0921**	0.165***	0.131***	0.283***
	(0.0349)	(0.0423)	(0.0404)	(0.0859)
L.ulc	-0.0208***	-0.00721	-0.0113	-0.0221
	(0.00611)	(0.00857)	(0.00821)	(0.0150)
D.mar	-0.00516	0.0549	0.0494	0.0535
	(0.0695)	(0.0550)	(0.0592)	(0.0538)
L.mar	-0.0863**	-0.0776**	-0.0916***	-0.0672**
	(0.0307)	(0.0278)	(0.0309)	(0.0284)
D.PMNW	0.0563***	0.0628***	0.0647***	0.0613***
	(0.0172)	(0.0165)	(0.0171)	(0.0167)
D.PMGSX	0.00482	0.00553	0.00952	0.000518
	(0.0310)	(0.0290)	(0.0286)	(0.0284)
D.EXCHEB	-0.00741	0.00313	0.00889	-0.00287
	(0.0285)	(0.0255)	(0.0263)	(0.0270)
L.CPIH_YTYPCT	0.359***	0.314***	0.320***	0.351***
	(0.0586)	(0.0578)	(0.0542)	(0.0583)
L.PMNW	0.00808	0.0120	0.0131	0.0112
	(0.0122)	(0.0120)	(0.0116)	(0.0124)
L.PMGSX	-0.00789	-0.0145	-0.0148	-0.0156*
	(0.00856)	(0.00881)	(0.00928)	(0.00883)
L.EXCHEB	-0.0423***	-0.0428***	-0.0414***	-0.0424***
	(0.0111)	(0.0107)	(0.0103)	(0.0119)
Constant	0.0108	0.0225	0.0237	0.0355**
	(0.0165)	(0.0165)	(0.0164)	(0.0149)
Observations	314	315	307	315
R-squared	0.812	0.826	0.818	0.822
Number of cod	16	16	16	16
Country FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
rho	0.356	0.360	0.401	0.355

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table A3   Estimates of the model for net export on GDP

VARIABLES	(1) std	(2) all	(3) net	(4) atk
D.ulc	-0.172***	-0.173***	-0.229***	-0.358***
	(0.0381)	(0.0407)	(0.0436)	(0.0741)
L.ulc	-0.00551	-0.00909	-0.0400***	-0.0106
	(0.00868)	(0.0101)	(0.0120)	(0.0191)
D.XMKT	-0.0583	-0.0580	-0.162*	-0.0627
	(0.0441)	(0.0422)	(0.0922)	(0.0435)
D.EXCHEB	0.0125	0.0109	0.0135	0.0113
	(0.0103)	(0.00962)	(0.0166)	(0.00960)
L.ne_gdp	-0.163***	-0.157***	-0.167***	-0.154***
	(0.0295)	(0.0269)	(0.0399)	(0.0280)
L.XMKT	-0.000590	-0.00360	-0.00534	-0.000212
	(0.0144)	(0.0148)	(0.0215)	(0.0133)
L.EXCHEB	-0.0285***	-0.0300***	-0.0185*	-0.0300***
	(0.00730)	(0.00727)	(0.00983)	(0.00717)
Constant	0.0142	0.0915	0.121	0.0126
	(0.380)	(0.388)	(0.570)	(0.360)
Observations	580	610	490	610
R-squared	0.302	0.289	0.409	0.298
Number of cod	31	32	26	32
Country FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
rho	0.624	0.604	0.783	0.612

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

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