

OECD Science, Technology and Industry Working Papers
2011/04

Accounting for the Self-Employed in Labour Share Estimates: The Case of the United States

Rebecca Ann Freeman

https://dx.doi.org/10.1787/5kg0w877vlwg-en

OECD

Organisation de Coopération et de Développement Économiques
Organisation for Economic Co-operation and Development

01-Dec-2011

English - Or. English

DIRECTORATE FOR SCIENCE, TECHNOLOGY AND INDUSTRY

DSTI/DOC(2011)4
Unclassified

ACCOUNTING FOR THE SELF-EMPLOYED IN LABOUR SHARE ESTIMATES: THE CASE OF THE UNITED STATES

STI Working Paper 2011/4
Statistical Analysis of Science, Technology & Industry

English - Or. English

JT03312613

Document complet disponible sur OLIS dans son format d'origine
Complete document available on OLIS in its original format

STI Working Paper Series

The Working Paper series of the OECD Directorate for Science, Technology and Industry is designed to make available to a wider readership selected studies prepared by staff in the Directorate or by outside consultants working on OECD projects. The papers included in the series cover a broad range of issues, of both a technical and policy-analytical nature, in the areas of work of the DSTI. The Working Papers are generally available only in their original language – English or French – with a summary in the other.

Comments on the papers are invited, and should be sent to the Directorate for Science, Technology and Industry, OECD, 2 rue André-Pascal, 75775 Paris Cedex 16, France.

The opinions expressed in these papers are the sole responsibility of the author(s) and do not necessarily reflect those of the OECD, the ILO or of the governments of their member countries.

---

www.oecd.org/sti/working-papers

OECD/OCDE, 2011
Applications for permission to reproduce or translate all or part of this material should be made to: OECD Publications, 2 rue André-Pascal, 75775 Paris, Cedex 16, France; e-mail: rights@oecd.org

ACCOUNTING FOR THE SELF-EMPLOYED IN LABOUR SHARE ESTIMATES: THE CASE OF THE UNITED STATES

Rebecca Ann Freeman*
(rebecca.freeman@oecd.org)

ABSTRACT

The imputation of the labour income of the self-employed typically relies upon the assumption that individuals of this group earn the same average hourly compensation as employees, either at the total economy or industry level. While this assumption is convenient in that it relies upon readily available information on the composition of the labour force and on the compensation of employees, it nevertheless remains somewhat simplistic and thus questionable in its validity. This shortcoming is addressed here by investigating a more refined method to impute the labour income of the self-employed in the United States. Imputations are based on the assumption that the labour income of the self-employed equals the average earnings of employees of the same sex and within the same age group, working in the same industry and having the same level of education. The proposed estimation of the labour income of the self-employed is followed by an analysis of how adjusted total labour income might impact the value of the labour share of output. Results for the United States show that applying this alternative methodology leads to a 2.5 percentage point rise in labour shares of output at the total economy level, led by larger increases of this indicator in sectors such as agriculture and hunting as well as professional, business and other service industries. The time profile in recent years, *i.e.* 2003-2009, of the labour share of output remains nevertheless unchanged when applying the proposed adjustment methodology.

Keywords: Self-employed, labour income, labour share of output, wage share, US Current Population Survey (CPS), ASEC Supplement.

* This Working Paper was produced through a collaborative arrangement between OECD's Directorate for Science, Technology and Industry and the International Labour Organization's Department of Statistics. The inter-organisational collaboration stems beyond the scope of this Working Paper. Indeed, the joint effort on the topic of the labour share was initiated when the two organisations worked together in 2010 to produce chapter two and technical appendix two of the ILO's *Global Wage Report 2010/2011: Wage policies in times of crisis*. This paper would not have been possible without the guidance of Colin Webb and Paul Schreyer (OECD). I would also like to thank Rafael Diez de Medina and Monica Castillo (ILO) for their support of this research. Other OECD and ILO officials that have been particularly inspiring are Mariagrazia Squicciarini and Nicolas Ruiz (OECD) and Malte Luebker (ILO). I am also very grateful to Steve Hipple of the United States Bureau of Labor Statistics and Mun Ho, visiting scholar at Resources for the Future for their willingness to answer multiple data questions and to engage in conversations and exchanges regarding the United States Current Population Survey.

PRISE EN COMPTE DES TRAVAILLEURS INDÉPENDANTS DANS LES ESTIMATIONS DE LA PART DE LA MAIN-D'ŒUVRE : LE CAS DES ÉTATS-UNIS

Rebecca Ann Freeman*
rebecca.freeman@oecd.org

RÉSUMÉ

L'imputation du revenu des indépendants s'appuie habituellement sur l'hypothèse que ceux qui font partie de ce groupe bénéficient de la même rémunération horaire que les salariés, soit au niveau de l'économie totale soit au niveau de la branche considérée. Bien que cette hypothèse soit pratique en ce sens qu'elle utilise des informations déjà disponibles sur la composition de la population active et la rémunération des salariés, elle reste quand même assez simpliste et donc sujette à caution. Cette faiblesse est traitée dans le présent document de travail où l'on examine une méthode plus affinée d'imputation du revenu du travail des indépendants aux États-Unis. Les imputations sont basées sur l'hypothèse que le revenu des indépendants est égal à la rémunération moyenne des salariés du même sexe et de la même classe d'âge, travaillant dans la même branche et possédant le même niveau d'instruction. L'estimation proposée du revenu du travail des indépendants est suivie d'une analyse permettant de savoir comment le revenu total, ajusté pour les indépendants, pourrait affecter la valeur de la part « main-d'œuvre » dans la production. Les résultats pour les États-Unis montrent que l'application de cette méthodologie alternative implique une hausse de 2.5 points de pourcentage de la part « main-d'œuvre » de la production au niveau de l'économie totale, induite par les hausses plus importantes de cet indicateur dans plusieurs secteurs, notamment l'agriculture et la chasse, les services professionnels, les services aux entreprises et autres secteurs de services. L'évolution temporelle de ces dernières années, c'est-à-dire de 2003 à 2009, de la part « main-d'œuvre » reste néanmoins inchangée quand la méthodologie d'ajustement proposée est appliquée.

Mots Clés : travailleur indépendant, revenu, part « main-d'œuvre », US Current Population Survey (CPS), Supplément ASEC

* Ce document de travail est le fruit d'une collaboration entre la Direction de la science, de la technologie et de l'industrie de l'OCDE et le Département de statistiques du Bureau International du Travail. La collaboration inter-organisationnelle n'entre pas dans le cadre de ce document. En effet, l'activité de collaboration sur le thème de la part « main-d'œuvre » a été entreprise quand les deux organisations ont travaillé ensemble en 2010 afin de produire le chapitre II et l'annexe technique II du rapport du BIT : Rapport Mondial sur les Salaires 2010/11. Politiques salariales en temps de crise. Ce document n'aurait pas vu le jour sans les orientations fournies par Colin Webb et Paul Schreyer (OCDE). J'aimerais également remercier Rafael Diez de Medina et Monica Castillo (BIT) pour leur soutien dans le cadre de cette recherche. Les autres agents de l'OCDE et de l'OIT dont nous nous sommes beaucoup inspirés sont : Mariagrazia Squicciarini et Nicolas Ruiz (OCDE) et Malte Luebker (BIT). Je remercie également Steve Hipple du United States Bureau of Labor Statistics et Mun Ho, professeur invité au Resources for the Future pour la bonne volonté dont ils ont fait preuve en répondant aux multiples questions sur les données, en nouant un dialogue et en acceptant des échanges de vues sur la Current Population Survey des États-Unis.

TABLE OF CONTENTS

ABSTRACT 3

1. Introduction 6
2. Measuring the labour income of the self-employed 8
3. Rationale to better estimate labour income of the self-employed 10
4. Adjustment procedures in place to impute the labour income of the self-employed 10
5. Data source: United States Bureau of Labor Statistics and United States Census Bureau 13
6. Applied methodology 15
7. Implications of imputed self-employed labour income on the labour share 19
8. Conclusion 25

ANNEX 1. THE SNA BREAKDOWN OF TOTAL LABOUR INCOME IN THE GENERATION OF INCOME ACCOUNT 26

ANNEX 2. TECHNICAL INFORMATION REGARDING THE CPS BASIC SURVEY 28

ANNEX 3. GENERAL CHARACTERISTICS OF THE SELF-EMPLOYED IN THE UNITED STATES 32

A3.1 Age 33

A3.2 Major industry 35

A3.3 Sex 37

A3.4 Educational attainment 38

A3.5 Average usual hours 39

BIBLIOGRAPHY 40

ACCOUNTING FOR THE SELF-EMPLOYED IN LABOUR SHARE ESTIMATES: THE CASE OF THE UNITED STATES

1. Introduction

The share of self-employed and unpaid family workers[1] in total employment tends to hover between 10 and 14% of the total labour force in advanced economies (Hurst, Li and Pugsley, 2010) and this percentage can be much higher in developing countries. In most developed economies, self-employment tends to be concentrated in areas such as agriculture, construction, retail, restaurants, hotels, real estate and certain business services (Table 1) In the United States, it has been estimated that approximately two-fifths of the workforce will have had at least one spell of self-employment by the end of their working lives (Parker, 2004).

Table 1. Share of self-employed in total employment, for select countries and industries percent, 2003-2009 average

	Total	Agriculture	Mining and quarrying	Manufacturing	Electricity, gas and water supply	Construction	Wholesale and retail trade - restaurants and hotels	Transport, storage and communications	Financial intermediation	Real estate, renting and business activities	Community, social and personal services
ISIC		*1-5*	*10-14*	*15-37*	*40-41*	*45*	*50-55*	*60-64*	*65-67*	*70-74*	*75-99*
Austria	16.5	88.2	3.4	6.5	2.4	11.1	14.6	6.8	5.9	22.1	8.7
Belgium	16.3	67.0	1.9	4.5	0.0	21.0	20.8	4.3	7.0	37.4	8.4
Canada[1]	9.4	45.9	2.4	3.1	0.4	16.3	5.1	8.6	7.3	19.1	8.4
Czech Republic	18.4	20.3	0.5	10.7	1.0	35.4	27.6	12.5	20.8	34.1	9.0
Denmark	6.3	46.5	1.7	2.3	0.0	12.6	7.4	5.7	0.0	9.8	2.2
Estonia	8.5	33.5	..	3.9	2.2	13.2	10.4	7.7	3.4	13.8	4.2
Finland	11.5	68.7	15.1	4.5	0.0	16.7	11.8	13.0	2.5	17.3	3.7
France[1]	8.9	58.9	..	4.7	0.5	14.7	12.2	4.0	4.2	5.8	5.3
Germany	11.0	47.8	1.0	4.1	0.0	19.9	14.1	6.8	11.7	15.0	8.3
Greece	35.5	84.6	4.3	18.8	0.7	32.9	47.1	37.7	7.2	43.4	9.9
Hungary	12.3	58.5	2.4	3.7	0.6	16.0	13.8	7.8	2.3	16.8	4.9
Ireland	17.3	79.6	10.7	8.8	5.2	28.0	13.7	21.0	4.4	19.8	7.3
Iceland[1]	14.5	46.5	..	9.4	1.8	32.5	12.9	12.9	3.4	21.8	7.6
Italy	24.5	48.5	10.0	15.7	1.4	33.8	42.8	14.4	12.1	37.6	10.2
Japan	13.4	73.8	6.4	6.8	0.9	17.2	..	6.9	1.8	..	..
Korea	32.6	90.5	7.9	14.9	1.9	23.9	47.4	39.2	5.8	17.4	22.8
Luxembourg	6.3	65.3	0.0	1.4	0.0	3.4	10.7	2.1	0.0	10.1	4.5
Netherlands	13.7	53.2	1.1	4.9	0.0	20.2	13.4	7.5	3.4	10.8	15.8
New Zealand[1]	7.5	11.8	2.9	5.9	0.0	17.1	10.3	5.2	4.5	9.7	3.4
Poland[1]	25.2	91.0	0.7	7.2	0.4	20.2	24.6	15.8	11.6	19.3	4.8
Slovak Republic	12.9	16.3	0.1	8.0	0.1	28.0	22.8	8.7	6.0	19.9	4.3
Slovenia	17.4	89.7	1.9	5.0	2.0	16.1	13.1	12.8	3.4	19.3	6.1
Spain	14.3	49.4	2.3	6.3	0.9	14.0	22.2	21.2	6.3	17.1	4.8
Sweden	5.6	49.7	0.9	2.0	0.0	11.2	6.9	4.4	0.4	8.3	2.8
United Kingdom[1]	13.2	45.5	10.9	8.3	0.0	41.9	8.9	14.3	5.1	14.7	10.3
United States	6.9	41.9	2.2	2.4	0.0	19.9	4.2	6.2	4.8	11.2	4.9

1. Averages exclude the year 2009
Source: OECD, Structural Analysis Database.

The income generated by the self-employed and unpaid family workers thus comprises an important component of total labour income. Yet, difficulties in accurately measuring the labour income of this group often lead to the exclusion of the self-employed in studies that address the labour income of the workforce. Alternatively, when included in economic analyses, labour income of the self-employed is often calculated on the basis of potentially overly simplistic assumptions. Doing so may result in the

1. "Unpaid family workers" is a concept used in the United States that corresponds to the "contributing family workers" defined by the Resolution on the International Classification of Status in Employment of the fifteenth International Conference of Labour Statistics (1993). The United States uses a cut-off point of 15 hours or more to define these workers.

inaccurate measurement of total labour income, and thus impinge upon the construction of some key indicators typically used to form policy recommendations. Examples of important and interrelated indicators that need to rely upon an accurate measure of labour income are the labour share of output (LS) and multi-factor productivity (MFP). These indicators are key to analysis and comparison of the productive capacity and wellbeing of societies.

The labour share of output

The labour share of output, also commonly referred to as the wage share, refers to the amount of national income accruing to labour. When unadjusted for the self-employed, this indicator is typically defined as the ratio of total compensation of employees, *i.e.* gross wages and salaries in addition to social contributions made by employers, to an output measure such as value added. Both the numerator and denominator are usually considered at current prices. Returns to other factors of production (namely, capital) are often taken as the residual of the LS.

The data needed for the computation of the LS unadjusted for the self-employed are typically readily available in the National Accounts of many countries, but this indicator is bound to be underestimated since National Accounts exclude the income generated by the self-employed when measuring total compensation. The labour income generated by this group is generally classified under mixed income, and is frequently grouped wit**h operating surplus.**

$$Unadjusted\ Labour\ Share = \frac{Compensation\ of\ employees}{Value\ added}$$

Changes in the LS indicate the extent to which economic growth translates into higher (or lower) labour incomes for workers, and it is thus important to accurately measure this key policy-oriented indicator. The LS is also an indicator of the rate of structural unemployment within an economy. Many researchers (*e.g.* de Serres *et al*., 2002; Gollin, 2002; Guscina, 2006; and Bagnoli, 2009) have shown that the aggregate LS has declined in advanced economies since the mid-1980s. Whether this declining trend results from real wage moderation within most industries, or whether it conversely reflects the growing importance of low labour share industries (or the relative decline of high LS industries) might impact policy decisions differently. If, as de Serres *et al.* (2002) highlight, an aggregation bias is indeed the driving factor behind the decline in the labour share, compositional shifts are unlikely to lead to strong employment gains or to reductions in the structural rate of unemployment. On the other hand, real wage moderation and a rising profit share could indicate strong investment and an increase in employment growth for future years. Understanding labour shares also matters for monetary policy, as the growth of wages is considered a key indicator of short-run cost-push inflationary pressures (de Serres *et al.*, 2002). However, it is important to bear in mind that both average wage growth and the total number of employees are factors which drive the total compensation of employees, such that, for example, an increasing total wage bill may reflect increasing numbers of workers while average wages remain stagnant.

The above discussion is further pursued in the remainder of this work, which is organised as follows. Section 2 explores common issues arising when measuring the labour income of the self-employed. Section 3 explains the rationale behind attempting to better estimate this measure, and section 4 reviews previous work on self-employed labour income. Section 5 describes the dataset used for this analysis, namely the United States Annual Social and Economic Supplement to the Current Population Survey, and the motivations for choosing it. Section 6 describes the methodology applied to estimate the labour income of the self-employed and unpaid family workers. Section 7 discusses the implications of these estimates to the labour share of output and Section 8 presents conclusions.

2. Measuring the labour income of the self-employed

Correctly measuring the labour income of the self-employed is as important for computing measures of total labour income as it is challenging for the statistical community. Whereas the labour income of employees, measured as wages and salaries of workers, is relatively straightforward to capture through statistical surveys, the compilation of self-employed labour income data is a more difficult exercise, both in a National Accounts framework and when relying on any other relevant and reliable data source, such as household income modules attached to labour force surveys.

The generation of income account of the System of National Accounts

The System of National Accounts (SNA) has traditionally served as a key source of data on the labour income of the self-employed, since the generation of income account houses information on both the labour income of employees (classified under "compensation of employees") and of the self-employed (classified under "mixed income").

In the SNA, compensation of employees (COE) has two principal and distinguishable components: wages and salaries payable in cash or in kind and the value of the social contributions payable by employers (System of National Accounts, 1993, Paragraph 7.31).[2] In contrast, mixed income implicitly contains an unknown element of remuneration for work carried out by self-employed individuals (including owners of enterprises) and unpaid family members which cannot be distinguished from entrepreneurial profits. The remuneration element of mixed income can be predominant in some cases (System of National Accounts, 1993, paragraph 7.85).[3] Even in rare cases where countries are able to distinguish between net operating surplus and remuneration of the self-employed,[4] there is usually not enough information to impute self-employed labour income systematically. The disaggregation of net operating surplus and self-employed labour income is even scarcer by industrial sectors.[5]

To address this issue, researchers, economists and statisticians have used various criteria to impute the labour income generated by the self-employed and produce adjusted labour shares. The most common adjustment techniques utilised when calculating the labour income of the self-employed are addressed in Section 4, together with their possible advantages and drawbacks. Information on self-employed labour income coming from other sources that collect such data like labour force surveys, household sample surveys and censuses is rarely used to produce adjusted labour shares due to reliability concerns, as discussed below.

2. Social contributions payable by employers may be (i) actual social contributions to social security schemes; (ii) private funded social insurance schemes to secure social benefits for their employees, or; (iii) imputed social contributions by employers providing unfunded social benefits.

3. See Annex 1 for a discussion on the difference between employees and self-employed and COE and mixed income in the SNA.

4. Canada being an example.

5. More frequently, mixed income is broken down by institutional sector, as in Table 14A (non-financial accounts by sectors) in the System of National Accounts.

Income underreporting and other self-employed income issues

Several scholars have found that self-employed workers tend to underreport their income, both to survey interviewers and tax authorities, or to over-claim business tax deductions. For the United States, Hurst, Li and Pugsley (2010) estimate that self-employed workers systematically underreport their income to household surveys by about 30%. Kesselman (1989) uses data from the United States Internal Revenue Service's (IRS's) Taxpayer Compliance Measurement Program (TCMP)[6] to estimate the underreporting of non-farm proprietors. He concludes that non-farm proprietors report 78.7% of their gross income on average (compared to 97 to 99% of employee income). Further research for the United States based on the National Research Program (a modified version of the TCMP) suggests that in 2001, 57% of non-farm proprietors' income was not reported (Slemrod, 2007).

Household income surveys are also characterised by relatively higher non-response rates of self-employed individuals. Several explanations have been proposed with respect to why this group might choose not to participate in household surveys. First, many self-employed do not accurately know their incomes (Parker, 2004). Second, self-employed persons may also mistrust the claim of survey interviewers to be independent of the tax inspectorate. Finally, richer people, of whom a disproportionate number in the United States are self-employed, have a higher marginal valuation of their time, and tend to participate in fewer surveys (Parker, 2004).

Furthermore, in surveys that collect income data it is common practice to either drop negative income observations or round them up to a small positive number. This can induce upward biases to average estimates of the labour income of the self-employed. Additionally, top-coding, which entails truncating very high earnings values, may induce a negative bias in self-employed labour income estimates. Earnings-related micro data that are made publically available are often top-coded to protect the privacy of individuals with unusually high earnings.

Finally, it is highly likely that the self-employed labour income reported in household surveys (possibly inadvertently) includes returns to physical capital in what is purportedly labour income (Carrington, McCue and Pierce, 1996[7]). Specifically, reported net income may include a capital component if the cost measures that are deducted from labour income information by field interviewers do not closely track earnings of capital (assuming that interviewers make an effort to deduct capital income). If returns to capital are included in self-employed labour income, net income per hour worked no longer measures the marginal product of labour. One way around this problem is to focus on the labour income of self-employed workers who have modest capital holdings. These are often concentrated in construction, wholesale and retail trade and other service industries (Carrington, McCue and Pierce, 1996). Yet, the caveat here is that information on capital holdings of self-employed workers is seldom recorded in surveys that collect earnings data.

6. "TCMP data are compiled by teams of auditors who analyse thoroughly the tax affairs of samples of employee and self-employed taxpayers on a case-by-case basis" (Parker, 2004).

7. Carrington, McCue and Pierce (1996) closely examine efforts to separate factor returns from self-employment for two United States data sets: the Current Population Survey and the Panel Study of Income Dynamics.

3. Rationale to better estimate labour income of the self-employed

The above discussion demonstrates that there is both a policy and statistical measurement rationale to better estimate the labour income of the self-employed. Primarily, a comprehensive measure of self-employed labour income would allow for a more accurate understanding of the changes of total labour income over time and grant a deeper sense of the distribution of income between factors of production. It would also allow for a more accurate measurement of widely relied upon economic indicators.

After a review of the most common adjustment techniques, a proposed methodology for imputing the labour income for this group of workers is put forth. Following the work of Jorgenson, Ho and Samuels (2010) and Young (1995), imputations for the labour income of the self-employed are carried out under the assumption that the average hourly labour income of a self-employed worker is equal to that of an employee with the same age and sex attributes, with the same level of education, and working in the same industry. These estimates are subsequently used to adjust the labour share and provide a basis for analysis while comparing with traditional adjustment methods.

Findings indicate that the total economy level LS in the United States, when calculated on the basis of imputed self-employed labour income as described above, are on average 0.03 percentage points higher than the labour share when calculated by applying standard assumptions regarding the self-employed for the years 2003-2010. Larger increases were observed in sectors such as agriculture and hunting as well as professional, business and other service industries. The difference between the two measures of the labour share is particularly marked for industries that register a high share of self-employed in total employment. Such findings suggest that the common methodology in place to estimate self-employed labour income underestimates the labour share (overestimates the capital share) in the United States. This finding raises the question of the adequacy of the common methodology used for computing the labour income of the self-employed in this country and argues for continued research into alternate methodologies such as the one discussed here applied to a larger set of countries. While the level of the LS is adjusted upward, the trend over time of the labour share of output remains unchanged when applying the proposed adjustment methodology.

4. Adjustment procedures in place to impute the labour income of the self-employed

The most widely applied technique for imputing the labour income of the self-employed is to assume that this group earns the same average compensation as employees. This implies adjusting for the self-employed by multiplying COE by the ratio of total employment to total employees. Thus, the expression for total labour compensation (expressed on a person-basis)[8] becomes:

$$Total\ labour\ compensation = \left(\frac{\sum Employees + \sum Self employed}{\sum Employees}\right) * COE$$

8. The preferable quantity measure for total employment and total employees is hours worked. However, where hours worked data are not available, persons data (headcount) are often used instead. If data on hours worked are available, the formula relating to hour-based total compensation of labour would be: $Total\ abour\ compensation = \frac{\sum Hours\ worked\ by\ employees + \sum Hours\ worked\ by\ self-employed}{\sum Total\ hours\ worked\ by\ employees} * COE.$

The above methodology[9] is applied by the OECD in their calculation of total labour cost, a variable used to capture COE plus the extra income generated by the self-employed and by the EU KLEMS project.[10]

Yet, while this assumption is convenient in that it relies upon readily available information on the composition of the labour force and the compensation of employees, avoiding the problem of how to divide mixed income and net operating surplus, it nevertheless remains somewhat simplistic and thus questionable in its validity (Gollin, 2002). Indeed, the OECD notes that this assumption may be more or less valid across different countries and industries[11] and the EU KLEMS Growth and Productivity Accounts relate that this assumption is "very rough" (EU KLEMS, 2007, page 28).

Askenazy and Timbeau (2003) and Arpaia *et al.* (2009) also question the validity of this assumption in the context of long time series because of the changing composition of the self-employed labour force over time. Whereas the self-employed were mainly low-income farmers earning less than the average employee in Europe in the 1970s, in more recent years the majority of self-employed Europeans are high-income earners. As such, this assumption ignores differences between the patterns of employment across sectors, and the specific characteristics of self-employed workers and employees (Bagnoli, 2009). Lastly, it is generally accepted that some small business owners have a lower average compensation than that for employees because of long working hours and below-average remuneration (OECD, 2001).

Therefore, a more sophisticated method to imputing the labour income of the self-employed is suggested and applied by Askenazy and Timbeau (2003), de Serres *et al*. (2002) and Arpaia *et al.* (2009). Because the labour income of the self-employed versus that of employees is likely to vary between sectors, they advocate attributing the compensation of an average employee in a particular industry branch to the self-employed working in the same industry. Indeed, de Serres *et al*. (2002) call attention to the fact that in recent decades, "the self-employed include a growing proportion of highly skilled professionals (especially in some of the expanding service sectors) which are likely to have remuneration above the sectoral average" (page 10). For the United States, the Bureau of Labor Statistics (2008) also follows the same technique to impute self-employed labour income.

Although this particular hypothesis is a step in the right direction, the statistical concept selected to measure labour input and used to make the adjustment still poses a problem. Ideally, "hours worked" would be the preferred concept of labour input as a simple headcount of employed persons can hide changes in average hours worked, caused by the evolution of part-time work or the effect of variations in overtime, absence from work or shifts in normal hours. However, the quality of working time estimates is not always clear, and such estimates are not necessarily comparable across countries. When working time data are not readily available, total employment (measured in persons) can be used as the statistical concept of labour input. The advantage is that the latter is easier to measure than the total number of hours worked and typically is more widely available. Yet, it neither reflects changes in the average work time per employee nor changes in multiple job holdings and the role of self-employed persons (nor in the

9. Christensen and Cummings (1981) also estimate self-employed earnings in Korea based on employee compensation in the private sector only (*i.e*. they exclude public sector employee earnings in their estimates) and additionally posit that the labour income of unpaid family workers is one-fourth of the average annual wage of a business sector employee.

10. The EU KLEMS database includes measures of economic growth, productivity, employment creation, capital formation and technological change at the industry level for all EU member states from 1970 onwards. The EU KLEMS project was funded by the European Commission Research Directorate and involved 15 institutions from across the EU (*www.euklems.net*).

11. OECD Main Economic Indicators: *stats.oecd.org/mei/*.

quality of labour) (OECD, 2001). Nonetheless, labour force survey estimates can be analysed according to a worker's main job.

Other researchers such as Johnson (1954), Krueger (1999), Gollin (2002) and Guscina (2006) have applied alternate hypotheses based on various divisions of mixed income or reported operating surplus in the national accounts to estimate the labour income of the self-employed.

One common approach, first implemented by Johnson (1954), has been to allocate two-thirds of the income of proprietors of unincorporated household enterprises (*i.e.* of mixed income) to labour and one-third to capital. More recently, this method has been advocated by Krueger (1999) and Guscina (2006) to measure what the latter calls the "employment share in national income."

Gollin (2002) suggests two further ways of treating the reported operating surplus of private unincorporated enterprises (OSPUE) in the United States National Income and Product Accounts (NIPAs). First, he proposes attributing *all* of the OSPUE to labour income (and thus essentially ignoring any capital that might be present in the businesses of self-employed). The obvious downside to this method is that it assumes that OSPUE is not made up of any capital income. Second, he suggests "treat[ing] OSPUE as comprising the same mix of labor and capital income as the rest of the economy" (page 468). Although the latter method is more realistic than the first in that it is logical to assume that OSPUE is comprised of both capital and labour income, it implicitly attributes the same income share to unincorporated enterprises that differ significantly in size and structure from larger establishments. It very well may be that private unincorporated enterprises are either more labour-intensive or capital-intensive than large corporations.

Another, more refined, approach to imputing the self-employed labour income is that of Jorgenson (1991) and Jorgenson, Ho and Samuels (2010) for the United States and Young (1995) for Hong Kong, China; Chinese Taipei; South Korea; and Singapore. Indeed, these scholars assume that the self-employed and unpaid family workers have labour incomes which can be considered an implicit wage equal to that of their employee counterparts of the same sex, working in the same industry, with a similar age and similar level of education. Young (1995) computes estimates of hourly compensation of employees based on census data, cross-tabulated by industry, sex, age and educational attainment level. He then uses these compensation data and national estimates of hours of work cross tabulated by industry, sex, age, educational attainment level and class of worker to estimate the compensation of employees and the implicit labour compensation of employers, unpaid family workers, and other self-employed workers.

Similarly, Jorgenson (1991) measures labour input by constructing employment, hours worked and labour compensation matrices based on both census and household survey data cross-classified by sex, age, educational attainment and status in employment.[12] Imputed self-employed labour income is then distributed on the basis of wage differentials among employees in the corresponding industrial sector. Jorgenson, Ho and Samuels (2010) build upon this work for the United States by also using demographic and social groups of sex, class of worker, age and educational attainment for specific industries to measure labour input and assuming that the average labour income of the self-employed are equal to the compensation of an employee that has the same demographic characteristics as mentioned previously.

The method described above is arguably the most comprehensive when it comes to imputing the labour income of the self-employed and unpaid family workers. One drawback is that it does not control for unobservable differences in entrepreneurial ability (Gollin, 2002). Nevertheless, when the necessary

12. Control totals for annual labour compensation and hours worked are taken from the United States national income accounts. Employment matrices are controlled to employment totals for each sector on the basis of establishment surveys from the US NIPAs.

micro data are available to construct the compensation matrices necessary to impute self-employed labour income, this method greatly improves upon the common assumption that is widely implemented for estimating self-employed labour income.

Therefore, following the work of Jorgenson, Ho and Samuels (2010) and Young (1995), the selected social and demographic characteristics used in the present analysis to impute the labour income of the self-employed are:

- Age
- Educational attainment
- Industry
- Sex

Additionally, variables for annual earnings, usual weeks worked per year and usual hours worked per week are used to construct hourly earnings estimates for employees.

5. Data source: United States Bureau of Labor Statistics and United States Census Bureau

Public individual record files extracted from the Annual Social and Economic (ASEC) Supplement to the United States Current Population Survey (CPS) were used in the following analysis for the period 2003-2010.[13] The CPS is a household survey that is jointly sponsored by the United States Census Bureau and the United States Bureau of Labor Statistics (BLS). The CPS, which has existed since 1940, is administered by the United States. Census Bureau using a probability selected sample of approximately 72 000 occupied households.[14] Its core survey - the CPS Basic Survey - provides basic monthly labour force data for the United States, which is augmented by various supplements that expand the breadth of the CPS Basic Survey through additional questions.[15]

The ASEC Supplement, formerly known as the March Supplement, is the most widely used supplement to the CPS Basic Survey. It has existed since 1947 and covers a sample of roughly 99 000 occupied households. As its name suggests, it is an annual survey, conducted every March.[16] March was chosen as the survey month to obtain more reliable annual earnings data, which are recorded for all sample survey participants. Indeed, March falls one month prior the deadline for filing federal income tax returns in the United States[17] and survey respondents are thus likely to have recently prepared or be in the midst of preparing their tax returns. The fact that the earnings question is asked to all survey participants differs from the procedure carried out in the CPS Basic Survey, where earnings questions are asked of only 25% of the sample (see Annex 2).

The ASEC collects data on work experience, sources of income, and other key labour force, demographic and family characteristic variables, in addition to the questions encompassed by the CPS Basic Survey. Relevant variables to the current analysis relate to employment status, income, occupation

13. In 2003, the CPS went through a major revision and adopted the 2002 North American Industry Classification System (NAICS). It is for this reason that we use 2003 as the first year in this analysis.

14. See the CPS homepage (*www.census.gov/cps*) for more extensive information regarding the CPS.

15. Interested readers should refer to the BLS CPS webpage (*www.bls.gov/cps*) for more information.

16. Since 2001, some interviews have taken place during February and April to accommodate a larger sample size (see Annex 2 for more details).

17. The traditional tax return filing deadline in the United States is 15 April of each year.

and industry of persons aged 16 and over.[18] Data for persons aged 16 and older are also available concerning weeks worked, hours per week worked, reasons for not working full time, total income and supplemental income (Current Population Survey: ASEC Supplement Survey, 2007). Annex 2 contains further information on the CPS in addition to key similarities and differences among the CPS Basic Survey and the CPS ASEC Supplement.

Box 1. Measurement of the self-employed in the CPS

Employed respondents in the CPS Basic Survey are asked: "Last month, were you employed by government, by a private company, a nonprofit organization, or were you self-employed?" Those who do not respond that they were self-employed are classified as wage and salary workers. Individuals who respond as being self-employed are subsequently asked: "Is this business incorporated?" Those who respond "yes" are treated as employees of their own businesses and classified as wage and salary workers who are self-employed, incorporated. Those who respond "no" are classified as unincorporated self-employed (Hipple, 2010).

Data Considerations

Earnings data are "topcoded" in both the CPS Basic Survey and the ASEC, implying that the true value of earnings is not publically available for individuals whose earnings fall above a certain amount. For this analysis, topcode record amounts for related earnings fields have remained the same across the period 2003-2010. However, the CPS introduced a new methodology to calculate topcode cell values in 2004. Instead of a topcoded cell containing the "simple" topcode amount (used when the individual's earnings exceed the topcode threshold), the cell value is replaced by the average earnings of all individuals exceeding the topcode amount, controlling for twelve demographic and socioeconomic cells encompassing the stratification variables for sex, race/origin and work experience/time at work.[19] The introduction of average topcoded earnings values rather than a single cut-off point into the CPS increases the recorded earnings values.

An additional consideration is that annual earnings data (gross earnings before deductions but after expenses) in the ASEC refer to the previous calendar year whereas all other data refer to a more recent reference period close to the time of the survey. Estimates of hourly earnings that are based on annual earnings values[20] should therefore be treated with consideration. Such estimates could contain a potential bias because usual weeks worked per year or usual hours worked per week in the sample year may differ from those worked during the previous year (*i.e.* those that correspond to the reported annual earnings values). For example, an upward bias in hourly earnings estimates could be present during the years coinciding with the global economic crisis where the adjustment mechanism to decreased labour demand in the United States was primarily associated with job losses, which have been particularly high among youth whose average earnings are lower than those of adults, and to a lesser extent through reduced hours. A final point of concern is the relationship between past income and current industry. If the survey respondent worked in a different industry in the previous year the annual earnings data in the ASEC would not refer to the recorded industry.

A data trade-off is therefore present. On the one hand, combining annual earnings data that refer to the previous period with other data pertaining to time spent at work or industry that refer to the current

18. Other variables included in the ASEC Supplement pertain to poverty, marital status, foreign born population, health insurance coverage, geographic mobility/migration and work experience.

19. For further information, interested readers should consult the CPS User Guide (Current Population Survey, Annual Social and Economic Supplement) for corresponding years.

20. See section 6 for the calculation method used in this analysis.

period may present, among others, the problems alluded to above. On the other hand, using reported weekly earnings data from the CPS Basic Survey - even if we accept all of its caveats - to generate estimates of hourly labour income of the self-employed limits the treatable CPS sample size to 25% (see Annex 2 for an in-depth discussion of CPS "rotation groups"). The availability of reported hourly earnings data is even sparser because of high non-response rates to earnings questions.

The ASEC's main asset in the context of this analysis is that it requires the annual earnings question to be asked of all survey participants, allowing for a total sample size of roughly 90 000 observations (compared to less than 18 000 observations if using the earnings data found in the CPS Basic Survey). This reason, in addition to a higher likelihood of reliable earnings data than in the CPS Basic Survey, leads to the use of earnings data from the ASEC in the present analysis.

Lastly, there are various reasons why individuals covered within the scope of the CPS universe might be misclassified. For instance, it is possible that self-employed persons and employees working in industries that are seasonal in nature (such as agriculture, tourism, construction, etc.) work in various industries throughout the year. When this is the case, their individual person record will reflect the industry in which they spend the most time working.

6. Applied methodology

All individual record files from the ASEC were extracted through DataFerrett (**F**ederated **E**lectronic **R**esearch, **R**eview, **E**xtraction & **T**abulation **T**ool),[21] a free data extraction interface provided by the BLS.[22] Tables 2 and 3 summarise the demographic and social variables selected from the ASEC in addition to the underlying CPS variables that comprise the annual earnings values.

Table 2. ASEC variables used in analysis

Variable	Description	Corresponding ASEC Information
A_AGE	Age	n/a
A_CLSWKR	Class of worker	Private; federal government; state government; local government; self-employed, incorporated; self-employed, not incorporated, and; without pay.
A_HGA	Educational attainment	n/a
A_LFSR	Labour force status recode	Working; with job, not at work; unemployed, looking for work; unemployed, on layoff; not in the labour force.
A_MJIND	Major industry	n/a
A_SEX	Sex	n/a
HRSWK	Hours worked per week	In the weeks that ... worked, how many hours did ... usually work per week?
MARSUPWT	March supplement final weight	Population value represented by individual observations.
WKSWORK	Weeks worked per year	During (year) in how many weeks did ... work even for a few hours? Include paid vacation and sick leave as work.
WSAL_VAL[1,2]	Total annual wage and salary earnings	Combined amounts in ERN_VAL[1] and WS_VAL[1,2] (if ERN_SRCE=1[1]).

(1) Variables subject to topcoding; (2) See Table 3.

21. DataFerrett must be downloaded and installed on the user's hard drive. It can be accessed through the following US. Census Bureau webpage: *dataferrett.census.gov*.

22. Particularly, DataFerrett allows for the extraction and formatting of micro data, aggregate, time series and longitudinal data.

Table 3. Underlying ASEC variables to WSAL_VAL

Variable	Description	Corresponding ASEC Question
ERN_VAL	Earnings before deductions, value	How much did ... earn from this employer before deductions in (year) ? (Gross earnings before deductions but after expenses).
ERN-SRCE=1	Source of earnings from longest job	1 = Wage and salary workers.
WS_VAL	Other wage and salary earnings, amount	Other wage and salary earnings of the previous year.

(1) Year-specific average (replacement) values for earnings fields above, classified by sex, race/origin and work experience can be found in the CPS User Guide for corresponding years, starting in 2004.

Hourly earnings estimates for employees were calculated based on variables downloaded for hours worked per week, weeks worked per year and total annual wage and salary earnings. It was assumed that hourly earnings of employees equal annual earnings divided by weeks worked per year and again by usual hours worked per week.

Hourly earnings estimates for self-employed and unpaid family workers were computed following the methodology described in section 4. Specifically, employees and self-employed/unpaid family workers were cross classified by five groups of demographic and social characteristics: sex, class of worker, age, educational attainment and industry. In total, there were a total of 2 912 (2_{sex} * $2_{class\ of\ worker}$ * $7_{age\ group}$ * $8_{edu\ group}$ *$13_{industry}$) possible groups (referred to as "bins") per year for employees and self-employed and unpaid family workers. Table 4 provides a detailed breakdown of the different groupings of characteristics.[23]

23. An example of one particular bin of employees is, for example, females aged 45-54 with a Masters degree who work in the financial activities industry. The corresponding bin would be self-employed females aged 45-54 with a Masters degree who work in the financial activities industry.

Table 4. Categories used for imputation groups

Variable Name	Number of Categories	Categories
Sex	2	Male
		Female
Class of worker	2	Employees (including private; federal, state and local government)
		Self-employed incorporated; self-employed not incorporated; and unpaid family workers
Age groups	7	16-17
		18-24
		25-34
		35-44
		45-54
		55-64
		65+
Educational attainment	8	0-8 years of school
		9-12 years of school, no diploma
		High school graduate
		Associates degree
		Some college, no Bachelors degree
		Bachelors degree
		Masters degree
		More than Masters degree
Industry	13	Agriculture, forestry, fishing, and hunting
		Mining
		Construction
		Manufacturing
		Wholesale and retail trade
		Transportation and utilities
		Information
		Financial activities
		Professional and business services
		Educational and health services
		Leisure and hospitality
		Other services
		Public administration

The hourly labour incomes of the self-employed were assigned to equal the average earnings of employees in the bin with corresponding demographic and educational criteria. For example, *if* there were 78 observations for the bin (call it bin number 1) comprised of male employees aged 45-54 with a high school diploma working in leisure and hospitality and 15 observations for the bin (call it bin number 2) comprised of male self-employed workers aged 45-54 with a high school diploma working in the same industry, then the assigned hourly earnings to all 15 observations in bin number 2 would equal the *average* of the hourly earnings for the 78 observations in bin number 1.

It should be noted that several of the bin pairs contain neither employees nor self-employed workers. One example for the year 2010 would be the bins for male employees and self-employed workers, respectively, aged 16-17 with 0-8 years of school in the mining industry. In contrast, there are some bins for which employees fulfil the required demographic and educational criteria but not self-employed workers, and vice versa. This problem was addressed by allowing self-employed hourly earnings to equal the average earnings of employees in the bin with corresponding educational and demographic criteria *except* that for age. This implies using the same educational attainment, sex and industry criterion while allowing the age group to vary. For all age groups under "65+," the next *older* age group was used. For the age group "65+," average earnings data were taken from the previous (*i.e.* next *younger*) age group (ages 55-64).

In order to eliminate outliers and control for other elements that would affect the imputations to self-employed labour income, employees whose hourly earnings were estimated at a level below USD 5.15 (nominal dollars) were excluded from the sample. This amount was chosen because it represents the United States federal minimum wage for the years 2003-2007.[24] Although the federal minimum wage increased to USD 5.85 in 2008, USD 6.55 in 2009 and USD 7.25 in 2010, the specification was not changed in the analysis because $5.15 still represented one of the lowest state minimum wages for these three years. In addition to this earnings requirement for employees, individuals aged under 16 years old were excluded from the analysis and the number of hours worked per week for both employees and self-employed were limited to a minimum of 20, the equivalent of half-time in the United States.

Imposing the earnings and hours worked specifications mentioned above still allows us to capture roughly 90% of employees at the total economy level for all years 2003 – 2010 (Table 5). The industries most affected by this restriction are "leisure and hospitality" and "other services."

24. Wage and Hour Division, US Department of Labor (*http://www.dol.gov/whd/state/stateMinWageHis.htm*).

Table 5. Employees with hourly earnings greater than or equal to USD 5.15 and who usually work 20or more hours per week

(as a percentage of all employees)

Industry	2003	2004	2005	2006	2007	2008	2009	2010	Average 2003-2010
Total	89.4	89.4	89.7	90.2	90.8	91.4	91.0	91.4	90.4
Agriculture, forestry, fishing and hunting	84.4	84.1	85.0	79.7	81.3	84.7	83.2	86.1	83.6
Mining	96.8	98.1	97.2	96.2	97.4	96.8	98.8	98.7	97.5
Construction	93.6	94.6	94.4	94.2	94.5	95.1	96.1	95.3	94.7
Manufacturing	95.8	96.0	95.9	96.5	96.9	97.0	97.0	97.2	96.5
Wholesale and Retail Trade	86.3	85.8	86.8	87.1	87.6	88.7	88.2	87.6	87.3
Transportation and Utilities	94.5	95.0	95.4	94.9	95.5	95.2	95.4	95.7	95.2
Information	92.9	91.6	92.2	92.1	93.3	93.9	94.0	92.8	92.9
Financial Activities	93.8	94.4	93.5	94.6	95.0	95.6	95.1	95.2	94.6
Professional and Business Services	91.9	92.0	92.0	91.6	92.9	93.7	93.5	94.4	92.7
Educational and Health Services	88.6	88.3	88.8	89.7	90.0	90.3	90.3	90.9	89.6
Leisure and Hospitality	73.9	73.5	73.3	75.9	77.1	79.0	78.2	79.7	76.3
Other Services	80.8	80.7	82.2	82.7	84.2	85.3	82.3	85.0	82.9
Public Administration	96.1	96.7	96.8	97.1	97.0	96.6	96.8	97.2	96.8

Source: Author's Calculations based on ASEC Supplement of Current Population Survey, 2010.

7. Implications of imputed self-employed labour income on the labour share

Comparisons between various measures of the labour share

The imputed labour income of the self-employed was used to adjust the "raw" labour share at both the total economy and industry levels. These adjusted labour shares, denoted LS*, were then compared with the labour shares calculated using the common assumption that all self-employed earn the same average compensation as employees, denoted LS.

In calculating LS*, the desired measure for the imputed labour income of the self-employed should reflect the compatible rate of compensation for employees in the National Income and Product Accounts (NIPAs). Here, the compatible rate of compensation for employees in the NIPAS is denoted w_i. Put differently: $\sum w_i E_i$ represents compensation of employees in the NIPAs, where E_i denotes an employee of type *i*, also in the NIPAs. The target measures for the labour income of the self-employed and the labour share adjusted for self-employed labour income can therefore be written as:

Total labour income of self-employed: $$\boldsymbol{LI^* = \sum w_i S_i} \qquad (\mathbf{1a})$$

Total labour share: $$\boldsymbol{LS^* = \frac{(\sum w_i S_i + \sum w_i E_i)}{VA}} \qquad (\mathbf{1b})$$

In equations (1a) and (1b), LI^* represents the labour income for the self-employed and LS^* represents the adjusted labour share (here, the numerator is comprised of both self-employed earnings and compensation of employees as measured in the NIPAs). S_i denotes the number of self-employed individuals of type *i* as available from the NIPAs (the income of all S_i constitutes mixed income), and VA denotes value added at current prices as available from the NIPAs.

If the variable w_i was available from the NIPAs, the above target measures could easily be compared with the common method of computing the labour income of the self-employed and the labour share adjusted for the self-employed, shown in equations (2a) and (2b), respectively. Indeed, this common procedure assumes that the labour income of the self-employed is the same as the average compensation of employees:

$$LI = \frac{\sum w_i E_i}{E} S, \quad where\ E = \sum E_i \ and\ S = \sum S_i \tag{2a}$$

$$LS = \frac{\frac{\sum w_i E_i}{E} S + \sum w_i E_i}{VA} = \frac{(\sum w_i E_i)\left(\frac{S}{E} + 1\right)}{VA} \tag{2b}$$

But, since LI^* and LS^* are unknown, a further step is necessary to estimate them. The target measure for LI^* (equation (1a)) is therefore rewritten as:

$$LI^* = \sum w_i S_i = \sum v_i S_i^* \frac{w_i}{v_i} \frac{S_i}{S_i^*} = \frac{w}{v} \frac{S}{S^*} \sum v_i S_i^* \tag{3}$$

where v_i denotes total imputed labour income for self-employed of type *i* (based on total earnings for employees of type *i* in the ASEC micro data set). Put differently, $\sum v_i S_i^*$ represents total imputed labour income for the set of self-employed $\{S_i^*\}$ included in this research exercise, where S_i^* represents the self-employed of type *i* that have been included in the set of self-employed from the micro data.

Equation (3) assumes that $\frac{w_i}{v_i} = \frac{w}{v}$, and that $\frac{S_i}{S_i^*} = \frac{S}{S^*}$. Specifically, this implies that the ratio of compensation of employees over total labour income is independent of the type of worker, as is the ratio of the "true" number of self-employed (*i.e.* the number of self-employed recorded in the NIPAs) and the number of self-employed included in the estimation procedure. In such, $\frac{w}{v}$ can be estimated as:

$$\frac{w}{v} = \frac{\sum w_i E_i}{\sum v_i E_i^*} \tag{4}$$

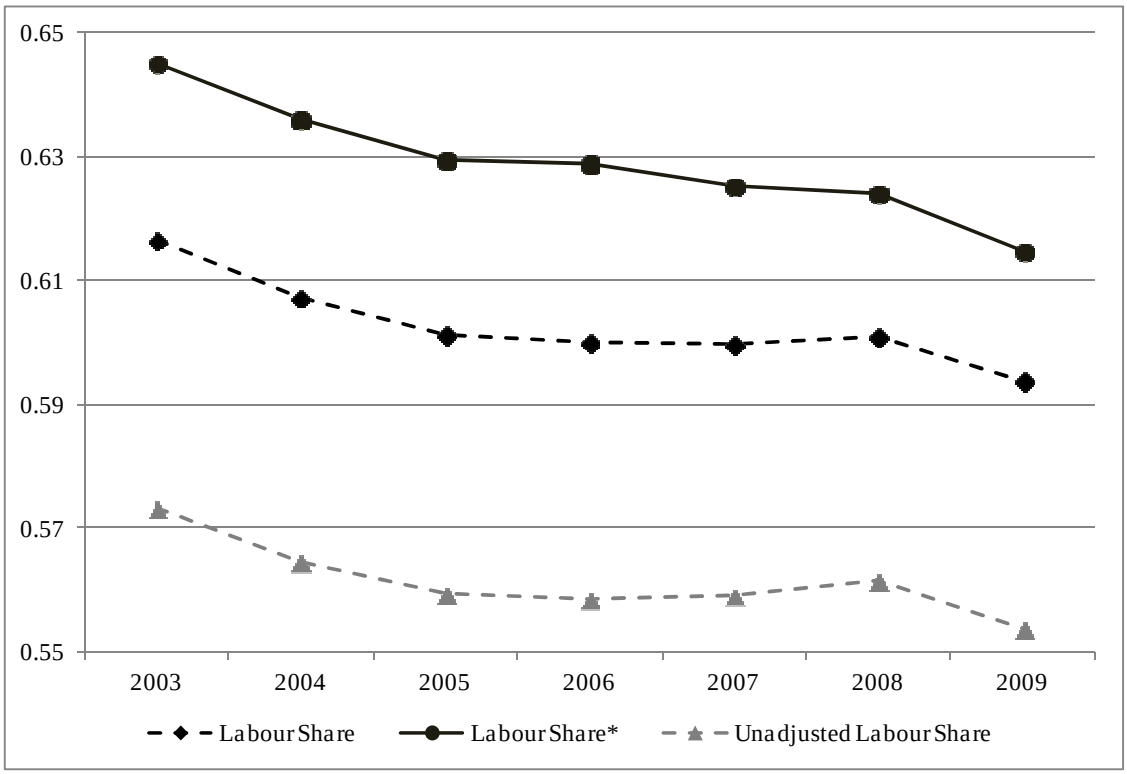
The denominator, $\sum v_i E_i^*$, represents the total compensation of employees from the micro data set. Additionally, E_i^* denotes an employee of type *i* as recorded in the micro data set. $\sum E_i^*$ varies slightly from the $\sum E_i$ in the national accounts. The ratio $\frac{S}{S^*}$ is known as is $\sum v_i S_i^*$, *i.e.* the figure derived from imputing earnings as described in section 6 (based on characteristics for age, sex, industry and educational attainment) to the set of self-employed $\{S_i^*\}$. Therefore, the desired imputation for $LI^* = \sum w_i S_i$ in (3) can be estimated as can (1b), thus permitting the desired comparison of (1b) and (2b) (the desired comparison of LS* and LS).

Case study of the United States: An illustration at the total economy and industry levels

On average in the United States for the years 2003-2009, the total economy labour share of output calculated by adjusting for self-employed labour income based on the micro data set (LS*) registered 2.5 percentage points higher than the standard calculation of the adjusted LS. This result—although low at the total economy level—is primarily driven by marked differences in the labour share for industries registering the highest shares of self-employment in total employment, namely agriculture, professional and business services and other services.

Figure 1 below shows the labour shares for the United States that correspond to equations (1b) and (2b) at the total economy level. We notice that while the **Labour Share*** (corresponding to equation (1b)) registers a higher level than the **Labour Share** corresponding to equation (2b), the overall time profile of the two measures for the years in question is unaffected. This finding is particularly important in the framework of trend analysis. The lower bound of the graph represents the unadjusted labour share that does not take the self-employed into account.

Figure 1. United States: Comparison between two adjusted Labour Shares (standard and new approach) and the unadjusted Labour Share



Sources: Labour Share and Unadjusted Labour Share: United States National Income and Product Accounts; Labour Share*: author's calculations based on CPS ASEC & NIPAs.

Table 6 shows that, while the Labour Share* calculated using the new approach was greater than or equal to the Labour Share calculated using the standard adjustment method across industries, differences between these two measures at the total economy level in the United States are mainly attributed to large labour share differences in industries that register a high share of self-employment. Specifically, the average difference for the years 2003-2009 between the Labour Share* and the Labour Share in the agriculture, forestry, fishing and hunting industry (where the share of self-employed registers 41.9%) is 19.3 percentage points. There is also a difference of 9.8 percentage points between Labour Share* and Labour Share in the professional and business services industry, which has a share of self-employed of 10.3%. The Labour Share* in the other services sector, for which the share of self-employed in total employment equals 13.0%, is 6.6 percentage points higher than the LS estimated under the standard assumption.

Table 6. Labour Share* in value added

	Labour Share* in Value Added *percent*							Difference between Labour Share* and Labour Share[1]	Share of self-employed in total employment[2]	Employment share in total economy[3]
Industry Title	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**Percentage Points, 2003-2009 average**	**Percent, 2003-2009 average**	**Percent, 2003-2009 average**
Total Economy	64.5	63.6	62.9	62.9	62.5	62.4	61.5	2.6	6.9	100.0
Agriculture, forestry, fishing, and hunting	64.2	59.0	76.7	75.9	68.1	64.1	74.5	19.3	41.9	1.7
Mining, quarrying, and oil and gas extraction	28.6	27.4	25.3	25.7	25.4	23.5	27.7	0.1	2.2	0.5
Construction	84.4	84.0	82.2	85.0	85.6	90.1	89.5	2.5	19.9	7.3
Manufacturing	65.7	61.0	58.8	57.7	56.8	58.3	55.7	0.2	2.3	11.2
Wholesale and retail trade	61.8	60.7	60.8	60.0	60.4	61.7	60.5	2.4	5.1	17.7
Transportation and utilities	55.2	54.6	54.7	52.3	52.2	51.1	51.0	-0.2	7.6	4.3
Information	47.6	44.3	42.1	43.5	42.8	41.8	41.0	0.4	4.3	2.5
Financial Activities	27.1	28.0	27.9	28.4	28.1	27.0	24.4	0.8	8.6	7.1
Professional and business services	88.0	88.8	88.4	90.0	87.0	84.9	84.3	9.8	10.3	15.2
Education and health services	89.7	89.3	89.4	89.6	88.7	87.9	87.2	0.9	5.8	15.2
Leisure and hospitality	69.3	69.4	68.1	67.5	69.3	70.2	69.9	4.5	4.9	10.9
Other services	84.3	84.4	82.4	82.5	82.8	87.1	86.5	6.6	13.0	6.4

1. The difference between the Labour Share* and the Labour Share was found by subtracting the value of the Labour Share from the Labour Share*. 2. Share of self-employment in total employment is calucalted as the total number of self-employed in a particular industry, divided by the total number of employed in the same industry. 3. Employment share in total economy is calculated as the total number employed (self-employed and employees) in a particular indistry, divided by the total number employed in the total economy

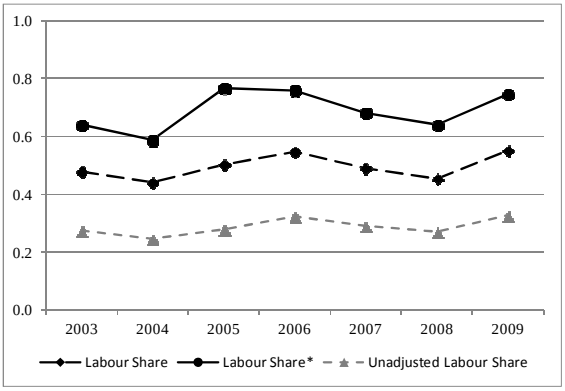
Sources: Author's calculations based on data from the United States National Income and Product Accounts and the United States Current Population Survey ASEC Supplement. The share of self-employed in total employment and the employment share in the total economy was calculated based on data from the NIPAs..

The industries that have the smallest differences in the levels of the Labour Share and Labour Share* are also those that register a relatively low share of self-employment in total employment (mining, information and transportation and utilities industries).This relationship is causal because adjusting for self-employed income will make little difference for industries with a small share of self-employed.

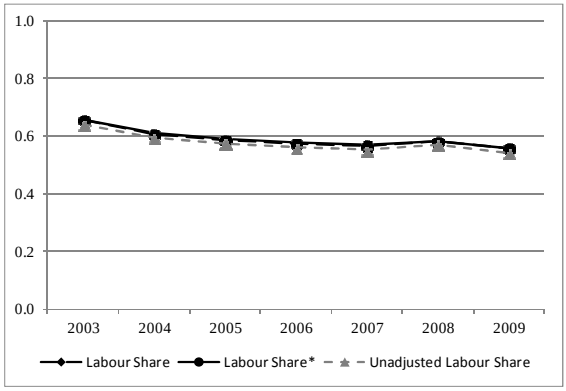
The figures below show the Labour Share* and Labour Share that correspond to equations (1b) and (2b) for the broad industry groups in addition to the unadjusted labour share excluding the self-employed. The latter measure was included to demonstrate the extent to which the labour share is underestimated when the self-employed are excluded for each industry.

Figure 2. United States: Comparison between two LS adjustments and the unadjusted LS by industry

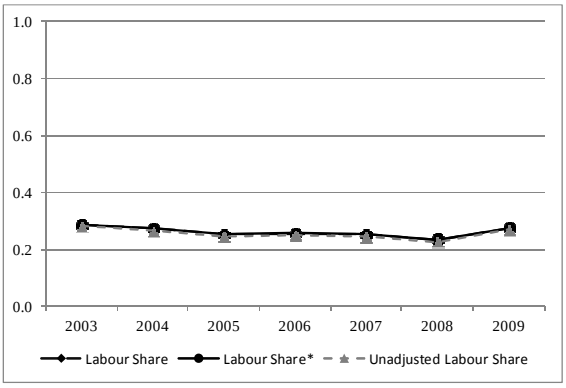
Agriculture, forestry, fishing, and hunting
ratio



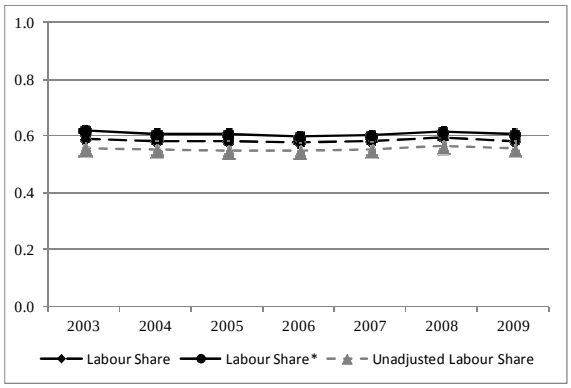
Manufacturing
ratio



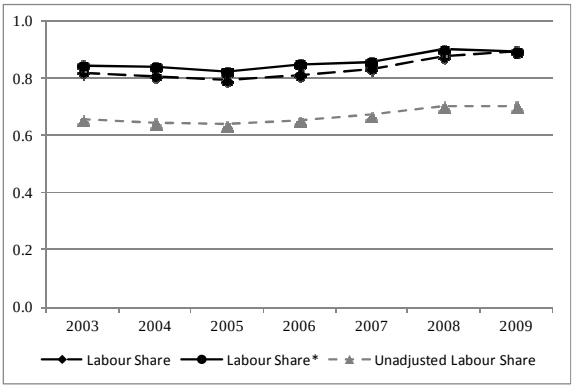
Mining, quarrying, and oil and gas extraction
ratio



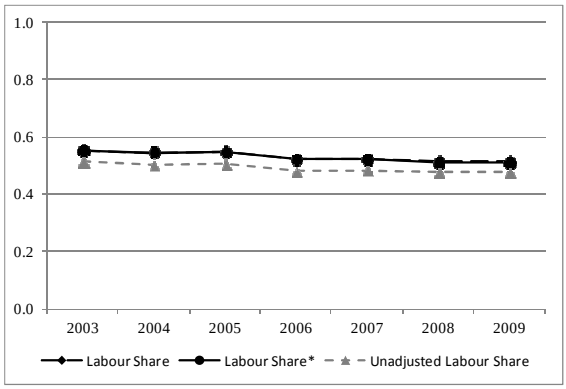
Wholesale and retail trade
ratio



Construction
ratio



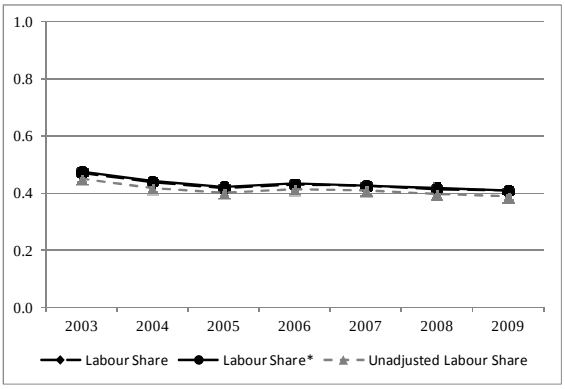
Transportation and utilities
ratio



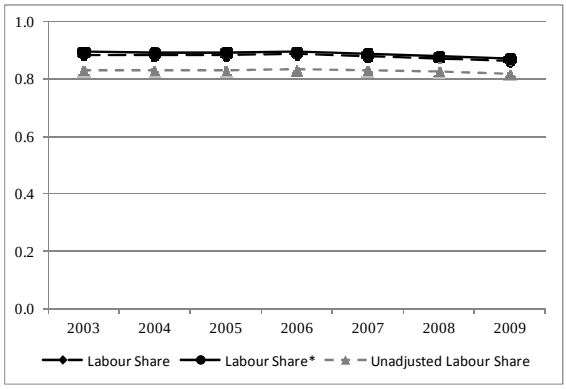
Sources: LS and Unadjusted LS: United States NIPAs; LS*: author's calculations based on CPS ASEC & NIPAs.

Figure 3. United States: Comparison between two LS adjustments and the unadjusted LS by industry

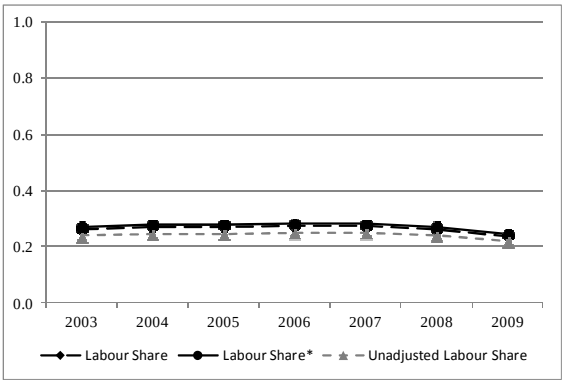
Information
ratio



Education and health services
ratio



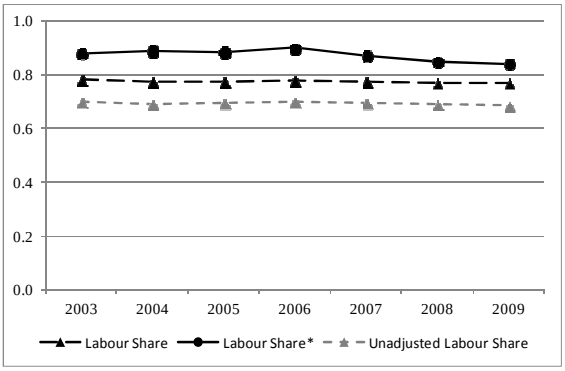
Financial activities
ratio



Leisure and hospitality
ratio



Professional and business services
ratio



Other services
ratio



Sources: LS and Unadjusted LS: United States NIPAs; LS*: author's calculations based on CPS ASEC & NIPAs.

8. Conclusion

Accurately measuring the labour income generated by the self-employed and unpaid family workers is important because it is a direct input to the computation of key policy-related economic indicators. The current work has highlighted the labour share of output in particular because changes in the indicator can be used to determine the extent to which economic growth translates into higher labour income for workers.

Given the problems with commonly accepted assumptions used to impute the labour income generated by the self-employed and unpaid family workers, this paper puts forth and applies a more refined technique to imputing the labour income of this group in the United States. When assuming that the self-employed and unpaid family workers earn an implicit wage equal to that of their employee counterparts with the same sex, age, education level and who work in the same industry, the value of the labour share rose by 2.5 percentage points at the total economy level. Although this difference is relatively small, it is more accentuated for industries that have a higher share of self-employment.

Another important finding of this research is that the trend of the labour share over the period 2003-2009 remained relatively unchanged, regardless of the adjustment technique applied in comparison with the unadjusted labour share. This indicates that, in the case of the United States, the two methods used to adjust the labour share do not influence trend analysis. Rather, these adjustment techniques may be more relevant for analysis of the level of the labour share and in calculations of multi-factor productivity which require information on the relative shares of capital and labour.

Concerning the measurement of the labour share, this work might serve as a recommended approach for researchers to impute the labour income of the self-employed, provided they have access to similar micro data in other countries. This is particularly pertinent for emerging market or developing countries which tend to have much higher numbers of self-employed and also contributing family workers as a proportion of the total self-employed. Among other insights stemming from this type of work, similar analyses for other countries would allow for more accurate cross-country comparisons of the labour share of output in addition to a richer data set at the disposal of researchers and the statistical community.

ANNEX 1.

THE SNA BREAKDOWN OF TOTAL LABOUR INCOME IN THE GENERATION OF INCOME ACCOUNT

In the United Nations System of National Accounts (SNA), data pertaining to both compensation of employees (COE) and self-employed income (described below) are housed in the generation of income account. Overall, the generation of income account is comprised of data on COE and the (residual) capital income data which "include the mixed income of the self-employed, consumption of fixed capital and the operating surplus of the corporate sector, net of taxes on production minus subsidies" (OECD, 2001, page 44).

Table A1.1. Generation of income account for households

Uses	Resources
D1. Compensation of employees	B1N. Value added, net
D11. Gross wages and salaries	
D121. Employers' social contributions	
D29. Net taxes on production	
B2N. Operating surplus, net	
B3N. Mixed income, net	

Source: Lequiller and Blades (2006).

In the SNA, an employee is defined as a person who works voluntarily for an enterprise in return for remuneration in cash or in kind. The remuneration received by employees is normally based on time spent at work or a different indicator of outputs produced. In such, COE is defined in the SNA as "the total remuneration, in cash or in kind, payable by an enterprise to an employee in return for work done by the latter during the accounting period" (System of National Accounts, 1993, chapter 7.21).

In contrast, self-employed workers are defined in the SNA as *persons who work for themselves, on their own account*. They are the sole or joint owners of the unincorporated enterprises in which they work.[25] In the SNA's generation of income account, self-employed income is classified as mixed income, formally defined as the income that accrues to unincorporated enterprises owned by members of households. Table A1.2 resumes the differences between employees and own account workers in the SNA.

25. The SNA definition of self-employed also encompasses unpaid family workers, including those working in unincorporated enterprises engaged wholly or partly in market production, and some outworkers (see Box A1).

Box A1. The case of outworkers

A special exception within the SNA is the treatment of outworkers, as they might be considered either employees or self-employed depending on the basis for their remuneration. Outworkers are defined as: "persons who are hired to supply a certain quantity of goods or services to a particular enterprise, …but whose place of work is not within any of the establishments which make up that enterprise" (System of National Accounts, 1993, Paragraph 7.25).

Specifically, an outworker is classified as an employee if s/he is remunerated based on the amount of work done (*i.e*. by the amount of labour input, typically measured in hours worked). Conversely, an outworker is classified as self-employed (an own-account worker) if s/he is remunerated on the basis of the value of the outputs, regardless of how much or how little work or effort was put into the production process. Needless to say, the status of a worker is not always obvious, despite the important implications for national accounting.

Nevertheless, in the case of outworkers, even if one is able to decipher if the worker is an employee or self-employed, the income of the latter is frequently difficult to measure. This can cause uncertainty in the measures of self-employed income in the generation of income account.

Table A1.2 Employees and self-employed: definitions and accounting implications in the SNA

	Employees	**Self-employed**
Employer to employee relationship	Consists of an agreement between an enterprise and a person, whereby the person (voluntarily) works for the enterprise in return for remuneration (either in cash or kind).	No employer to employee relationship. Rather, the term self-employed encompasses those persons who work for themselves, *i.e*. the sole or joint owners of the unincorporated enterprises for which they work.
Basis of remuneration	Based on the *amount* of work done, irrespective of the outputs produced. Labour input is normally measured by time spent at work or another objective indicator of the amount of work done.	Based on the *value* of the outputs (products) from some process of production for which the person is responsible, regardless of however much or little work or effort was put into the production process.
SNA income classification	Compensation of employees (cash and payments in kind).	Mixed income.
Particular case of outworkers	When remunerated on the basis of the work done (*i.e*. when the outworker is considered an employee) payment constitutes COE and is paid out of the value added of the enterprise.	When the earnings depends on the value of the goods or services (*i.e*. when the outworker is considered self-employed), the payment from the enterprise to the outworker constitutes a purchase of intermediate goods or services.

ANNEX 2.
TECHNICAL INFORMATION REGARDING THE CPS BASIC SURVEY

Unlike other surveys administered by the United States Bureau of Labor Statistics (such as the Current Employment Statistics Survey), the CPS reports data on the self-employed, agricultural workers and unpaid workers in family businesses. The inclusion of the self-employed and unpaid workers in family businesses in the CPS is the main reason that this data source was chosen for the present analysis. Additionally, the United States Census Bureau sponsors many supplements to the CPS Basic Survey that provide further information on various topics.

Data collection in the CPS

Each month, interviewers collect data from sample housing units. The household rotations are carried out as follows: a specific housing unit is interviewed (included in the survey) for four months, then excluded from the sample for the following eight months, and then interviewed again in the following four months before permanently leaving the survey. As each sample housing unit is interviewed eight times in total, this creates eight "rotation groups" in the CPS Basic Survey. The specific rotation scheme ensures that in any single month, one-eighth of the housing units are interviewed for the first time, another eighth for the second time, and so on. This procedure guarantees that there will always be a 75% month-to-month overlap and a 50% year-to-year overlap among sample participants. As explained in United States Census Bureau (2006), "this rotation scheme upholds the scientific tenets of probability sampling and each month's sample produces a true representation of the target population. The rotation system makes it possible to reduce sampling error by using a composite estimation procedure and...by increasing the representation in the sample of [small groups of housing units] with unusually large numbers of housing units" (page 3-2).

The fieldwork for the CPS Basic Survey is conducted during the calendar week that includes the nineteenth of each month (*e.g.* 16–22 August 2010). The questions refer to activities during the prior week that includes the twelfth of each month (*e.g.* 9–15 August 2010). Households from all 50 states and the District of Columbia are included in the survey sample.

It is important to note that in the CPS Basic Survey, information on people's earnings from their main job is only collected for those individuals who are receiving their fourth or eighth monthly interviews (rotation groups four and eight). This implies that earnings questions are only asked of a subset of 25% of the survey respondents each month (unemployed and persons not in the labour force are not asked about earnings), which is problematic for the current analysis. Data are collected for wage and salary workers and for the self-employed whose businesses are incorporated. No data on labour income are collected for self-employed persons whose businesses are unincorporated.

Supplemental inquires are in place to augment the more standard labour force information found in the CPS Basic Survey. Three main supplemental inquiries include:

(1) The Housing Vacancy Survey (HVS) Supplement, which provides current information on the rental and homeowner vacancy rates, home ownership rates, and characteristics of units available for occupancy in the United States;
(2) The American Time Use Survey (ATUS), which provides monthly information on how Americans spend their time; and
(3) The Annual Social and Economic (ASEC) Supplement, which supplements the CPS Basic Survey's labour force data and also provides more reliable earnings data.

Only data from the ASEC are pertinent to the present analysis and the following section will therefore address only this specific CPS Supplement. Interested readers should refer to United States Census Bureau (2006) for additional information on all three CPS supplements.

Key differences between the CPS Basic Survey and the ASEC Supplement

Like the CPS Basic Survey, the ASEC is sponsored jointly by the United States Bureau of Labor Statistics and the United States Census Bureau. The Census Bureau has collected data in the ASEC since 1947 using a probability selected sample of approximately 99,000 occupied households. In 2003 the supplement's name was changed from the March Supplement to the ASEC. Prior to 2001 all data collection took place in March.

An important year for the ASEC is 2001. Indeed, a sample increase was implemented in this year, implying the need for additional time to collect ASEC data. Although additional interviews now take place in February and April, the majority of data collection still occurs during March.

As mentioned in section 5, the ASEC Supplement relies upon both the CPS Basic Survey questions and its own set of supplemental questions. Main topics (for individuals aged 16+) included in the ASEC are:

- Family characteristics;
- Household composition;
- Marital status;
- Educational attainment;
- Health insurance coverage;
- Foreign-born population;
- Time spent at work;
- Reasons for not working full time;
- Work experience;
- Income from all sources;
- Receipt of noncash benefits;
- Poverty;
- Program participation; and
- Geographic mobility.

The primary reason that the ASEC Survey is conducted in March is to obtain more reliable annual earnings data since March falls one month prior the deadline for filing federal income tax returns in the United States. Unlike in the CPS Basic Survey, earnings data are collected for individuals from all eight rotation groups. Nevertheless, it is important to note that all annual earnings data collected in the ASEC refer to the previous year. Table A2.1 describes the key differences between the CPS Basic Survey and the ASEC Supplement.

Table A2.1 Comparison between the CPS Basic Survey and the CPS ASEC Supplement

	CPS Basic Survey	CPS ASEC Supplement
Sponsors	• US Census Bureau and BLS.	• US Census Bureau and BLS.
Initiation	• 1940.	• 1947.
Frequency	• Monthly.	• Annual.
Sample Size	• ~72,000 assigned housing units; • ~112,000 person records.	• ~99 000 assigned housing units; • ~200 000 person records.
Universe	• Civilian noninstitutional population of the US living in housing units.	• Civilian noninstitutional population of the US living in housing units; • Armed forces living in civilian housing units on a military base.
Class of Worker	• Total employment (farm and nonfarm); • Nonfarm self-employed persons; • Domestics and unpaid workers in nonfarm family enterprises; • Wage and salary employees; • Unemployed persons.	• Total employment (farm and nonfarm); • Nonfarm self-employed persons; • Domestics and unpaid workers in nonfarm family enterprises; • Wage and salary employees; • Unemployed persons.
Rotations	• Interviews conducted for 4 months and interviewees dropped from sample for the subsequent 8 months. Interviewees then re-included for 4 more months; • Rotation scheme ensures a 75% month-to-month overlap between survey groups and a 50% year-to-year overlap.	• Only includes data from March portion of CPS Basic Survey; • Augmented with additional questions, particularly questions pertaining to earnings.
Data Collection	• All months per year.	• Primarily March; • Since April 2001, some interviews take place in February and April.
Subjects	• Monthly labour force data.	• Monthly labour force data; and *Additional data on* • Employment status; • Educational attainment; • Work experience; • Income from all sources; • Receipt of noncash benefit; • Time spent at work (weeks worked per year & hours worked per week).
Earnings Data	• Weekly earnings (rotations 4 & 8); • Hourly earnings (rotations 4 & 8).	• Weekly earnings(rotations 4 & 8); • Hourly earnings (rotations 4 & 8); • Annual earnings (all rotation groups).
Other Notes	• Earnings data are topcoded.	• Earnings data are topcoded. • Employment and income data refer to the proceeding year while all other data refer to the survey year.

Sources of sampling and nonsampling error

Lastly, as with any survey, the CPS is subject to both sampling and nonsampling error. Sampling error is the difference between an estimate based on a sample and the estimate that would result if the sample were to include the entire population. Standard errors (available publically by the US Census Bureau) are used to measure the magnitude of sampling error. Nonsampling error is defined by the US Census Bureau as the "difference between the estimate that would result if the sample were to include the entire population and the true population value being estimated" (US Census Bureau (2009), page G-5). In general, four common nonsampling errors are present:

(1) *Measurement error*: arises when the interviewer records the wrong answer, the respondent provides incorrect information, the respondent estimates the requested information, or an unclear survey question is misunderstood by the respondent.
(2) *Coverage error*: arises when individuals who should have been included in the survey frame were missed.
(3) *Nonresponse error*: occurs when responses are not collected from the entire sample or the respondent is not willing to provide information (for example survey respondents refusing to answer questions relating to earnings questions).
(4) *Processing error*: can occur if forms are lost or if data are incorrectly keyed, coded or recoded.

ANNEX 3.
GENERAL CHARACTERISTICS OF THE SELF-EMPLOYED IN THE UNITED STATES[26]

This annex addresses the general characteristics of the self-employed in the United States for the demographic and social variables that are accounted for in the present analysis (age, industry, sex and educational attainment). Average usual hours for the self-employed are also considered. The source for all data and quoted figures in this annex is the Current Population Survey. In such, specific figures regarding the number or the share of self-employed in total employment may differ slightly from those quoted previously in the analysis as the data presented in Table 5 on the share of self-employed in total employment were calculated using data from the United States National Income and Product Accounts.

Over the period 2003-2010, the number of incorporated and unincorporated self-employed and unpaid family workers in the United States has hovered around 15 million. The incidence of self-employment has remained pretty stable over this period, with approximately two-thirds of this group representing unincorporated self-employed, and the other one-third representing self-employed who have incorporated their businesses (Tables A3.1 and A3.2).

Table A3.1 shows that the percent of unincorporated self-employed and unpaid family workers has fallen slightly since 2003, primarily reflecting declines in unincorporated self-employment in the agriculture sector. Hipple (2010) relates that this can be attributed to (*i*) the emergence of large farming operations coupled with a subsequent decrease in smaller family farms; and (*ii*) a higher likelihood of the self-employed to incorporate their businesses. Concerning the latter, the most predominant reasons that the self-employed might choose to incorporate their business are "to receive traditional benefits of the corporate structure, including limited liability, tax considerations, and the enhanced opportunity to raise capital through the sale of stocks and bonds" (Hipple, 2010, page 18). It follows, as Table A3.2 shows, that the percentage of incorporated self-employment has slightly risen since 2003, and this rise was concentrated in the years 2007-2009.

26. This annex draws heavily upon Hipple (2010) and Hipple (2004).

Table A3.1 Incidence of unincorporated self-employment and unpaid family workers in the United States, annual averages, 2003-2010

Numbers in thousands

Year	All industries			Nonagricultural industries			Agriculture		
	Total employed	Self-employed and unpaid family workers	Percent	Total employed	Self-employed and unpaid family workers	Percent	Total employed	Self-employed and unpaid family workers	Percent
2003	137 736	10 421	7.6	135 461	9 445	7.0	2 275	976	42.9
2004	139 252	10 548	7.6	137 020	9 557	7.0	2 232	991	44.4
2005	141 730	10 587	7.5	139 532	9 602	6.9	2 197	985	44.8
2006	144 427	10 691	7.4	142 221	9 772	6.9	2 206	919	41.7
2007	146 047	10 544	7.2	143 952	9 669	6.7	2 095	875	41.8
2008	145 362	10 200	7.0	143 194	9 312	6.5	2 168	888	41.0
2009	139 877	9 922	7.1	137 775	9 061	6.6	2 103	861	40.9
2010	139 064	9 798	7.0	136 858	8 944	6.5	2 206	854	38.7

Source: US Census Bureau Current Population Survey, 2010.

Table A3.2 Incidence of incorporated self-employment and unpaid family workers in the United States, annual averages, 2003-2010

Numbers in thousands

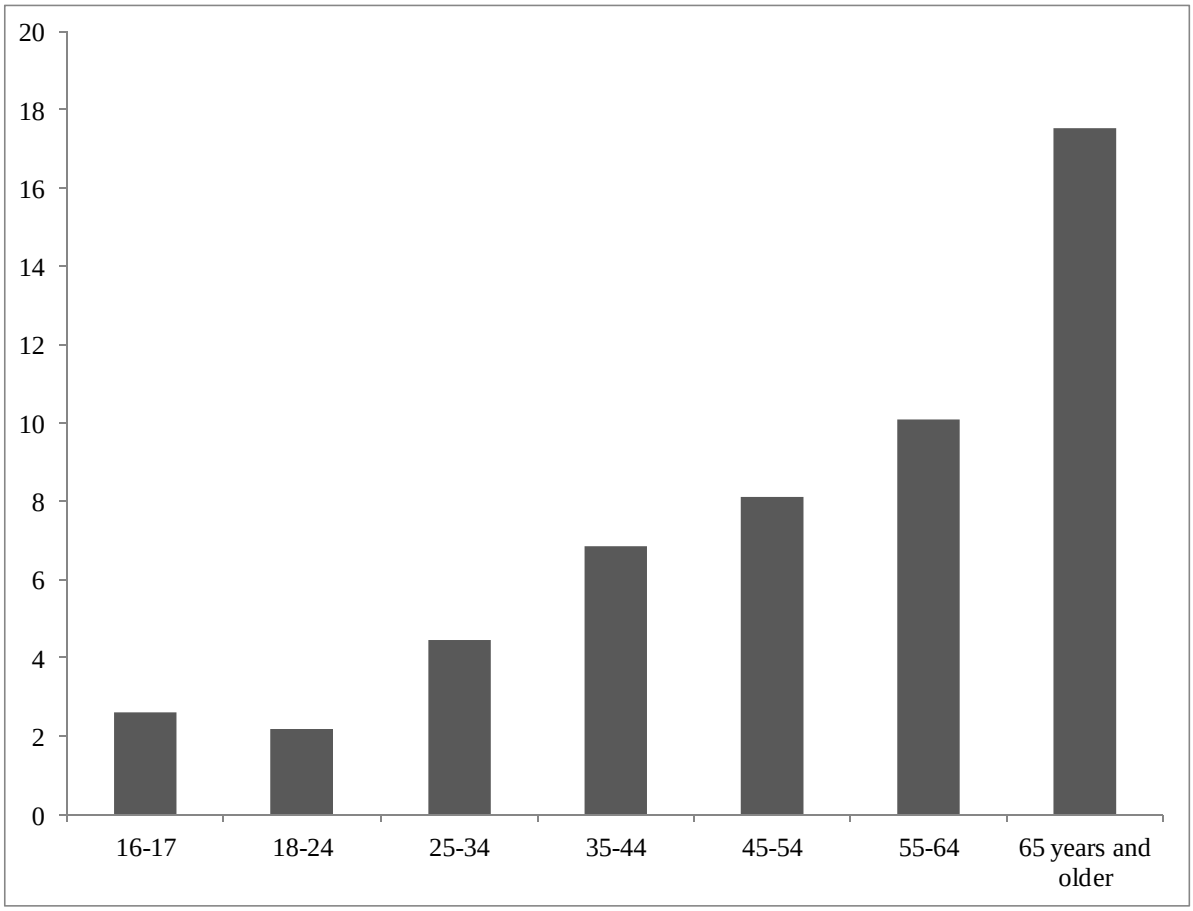
Year	All industries			Nonagricultural industries			Agriculture		
	Total employed	Self-employed and unpaid family workers	Percent	Total employed	Self-employed and unpaid family workers	Percent	Total employed	Self-employed and unpaid family workers	Percent
2003	137 736	4 956	3.6	135 461	4 810	3.6	2 275	146	6.4
2004	139 252	5 151	3.7	137 020	5 020	3.7	2 232	131	5.9
2005	141 730	5 254	3.7	139 532	5 116	3.7	2 197	138	6.3
2006	144 427	5 499	3.8	142 221	5 334	3.8	2 206	165	7.5
2007	146 047	5 736	3.9	143 952	5 591	3.9	2 095	145	6.9
2008	145 362	5 784	4.0	143 194	5 621	3.9	2 168	163	7.5
2009	139 877	5 466	3.9	137 775	5 315	3.9	2 103	151	7.2
2010	139 064	5 191	3.7	136 858	5 023	3.7	2 206	168	7.6

Source: US Census Bureau Current Population Survey, 2010.

A3.1 Age

The share of unincorporated self-employed in total employment has been consistently higher than that for individuals aged 55-64 years old and 65 years and older for the entire period 2003-2010. In 2010, these shares were 10.1% and 17.5%, respectively. In contrast, the shares of unincorporated self-employed for workers aged 16-17 and18-27 were a mere 2.6% and 2.2%, respectively (Table A3.3). Over the same period, the average share of unincorporated self-employed aged 65 years and older was 18.7%, compared to 2.6% for those aged 18-24.

Figure A3.1. Share of self-employment in total employment in the United States, by age group, 2010
Percent



Self-employment shares in total employments are calculated by dividing the number of self-employed workers in a specified age group by total employment in the same age group. Excludes incorporated self-employed and includes unpaid family workers.

Source: US Census Bureau Current Population Survey, 2010.

The principal reason that higher shares of self-employment in total employment are found among older workers is that they have had the time to acquire the resources, managerial skills and capital to start a successful business while this may not be the case for younger workers (Hipple, 2010). Indeed, younger workers are less likely to become self-employed because they might be lacking in skills, experience and financial resources that are necessary to build a successful business with a strong foundation. It is also likely that many older and retired workers enter self-employment as a second career after formally leaving their wage and salary job. What was once considered a side business (and thus not explicitly recorded in household surveys which assign the class of worker based on one's primary activity) becomes the primary employment when people retire from their wage and salary job (Bregger, 1996; Hipple, 2010).

It is interesting to note-in addition to a higher share of self-employment among agricultural workers in general-that the share of self-employment among unincorporated self-employed and unpaid family workers is much less varied in the nonagricultural sector than it is in the agricultural sector. For instance, the difference between the self-employment share in total employment for unincorporated self-employed and unpaid family workers aged 55-64 and 25-34 was only 4.90 percentage points for workers in the nonagricultural sector in 2010. In contrast, the difference was 39.33 percentage points for individuals in the same age groups who work in the agricultural sector in this same year (see Table A3.3).

Table A3.3 Incidence of unincorporated self-employment and unpaid family workers in the United States, by age group, annual average, 2010

Numbers in thousands

Age	All industries			Nonagricultural industries			Agriculture		
	Total employed	Self-employed and unpaid family workers	Percent	Total employed	Self-employed and unpaid family workers	Percent	Total employed	Self-employed and unpaid family workers	Percent
16-17	1 418	37	2.6	1 376	27	2.0	42	10	23.8
18-24	15 659	342	2.2	15 425	312	2.0	234	30	12.8
25-34	30 229	1 352	4.5	29 861	1 287	4.3	367	65	17.7
35-44	30 663	2 096	6.8	30 302	2 009	6.6	361	87	24.1
45-54	33 191	2 691	8.1	32 721	2 502	7.6	470	189	40.2
55-64	21 636	2 183	10.1	21 238	1 956	9.2	398	227	57.0
65 years and older	6 268	1 098	17.5	5 935	853	14.4	333	245	73.6

Source: US Census Bureau Current Population Survey, 2010.

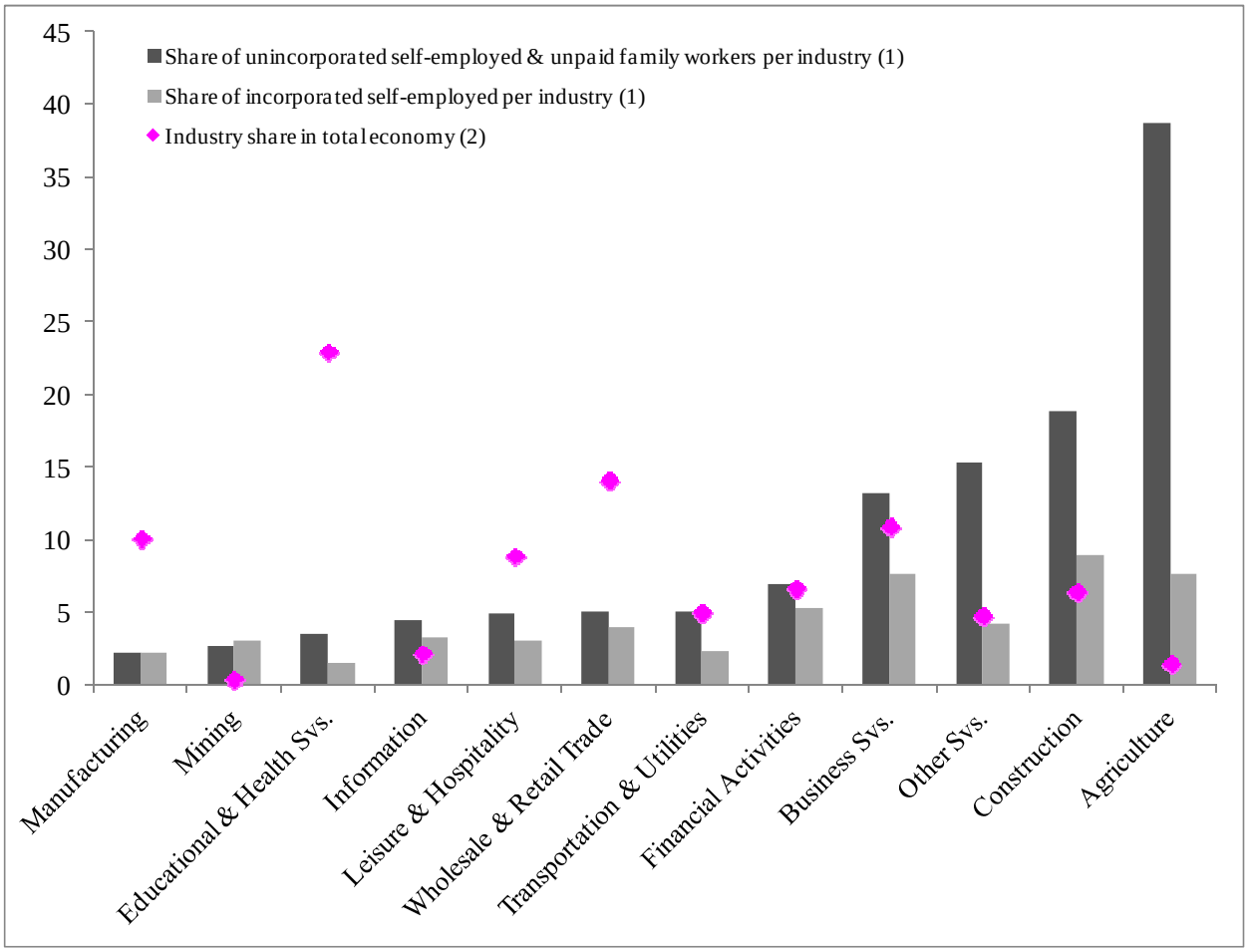
A3.2 Major industry

In terms of industry, with the exception of the professional and business services industry, there tends to be an inverse relationship between the industry share in the total economy[27] and the share of self-employed per industry.[28] In particular, the industries that, in 2010, had the highest share of self-employed per industry (especially agriculture, forestry, fishing and hunting, construction and other services) were some of the least important industries in terms of the industry share in the total economy. The industries with the highest industry shares were educational and health services, manufacturing and professional and health services.

27. Measured as the total employed in a particular industry divided by total employed in all industries.

28. Measured as the number of self-employed in a particular industry divided by total employed in the same industry.

Figure A3.2. Self-employed industry share in total economy in the United States, 2010 annual averages, *percent*

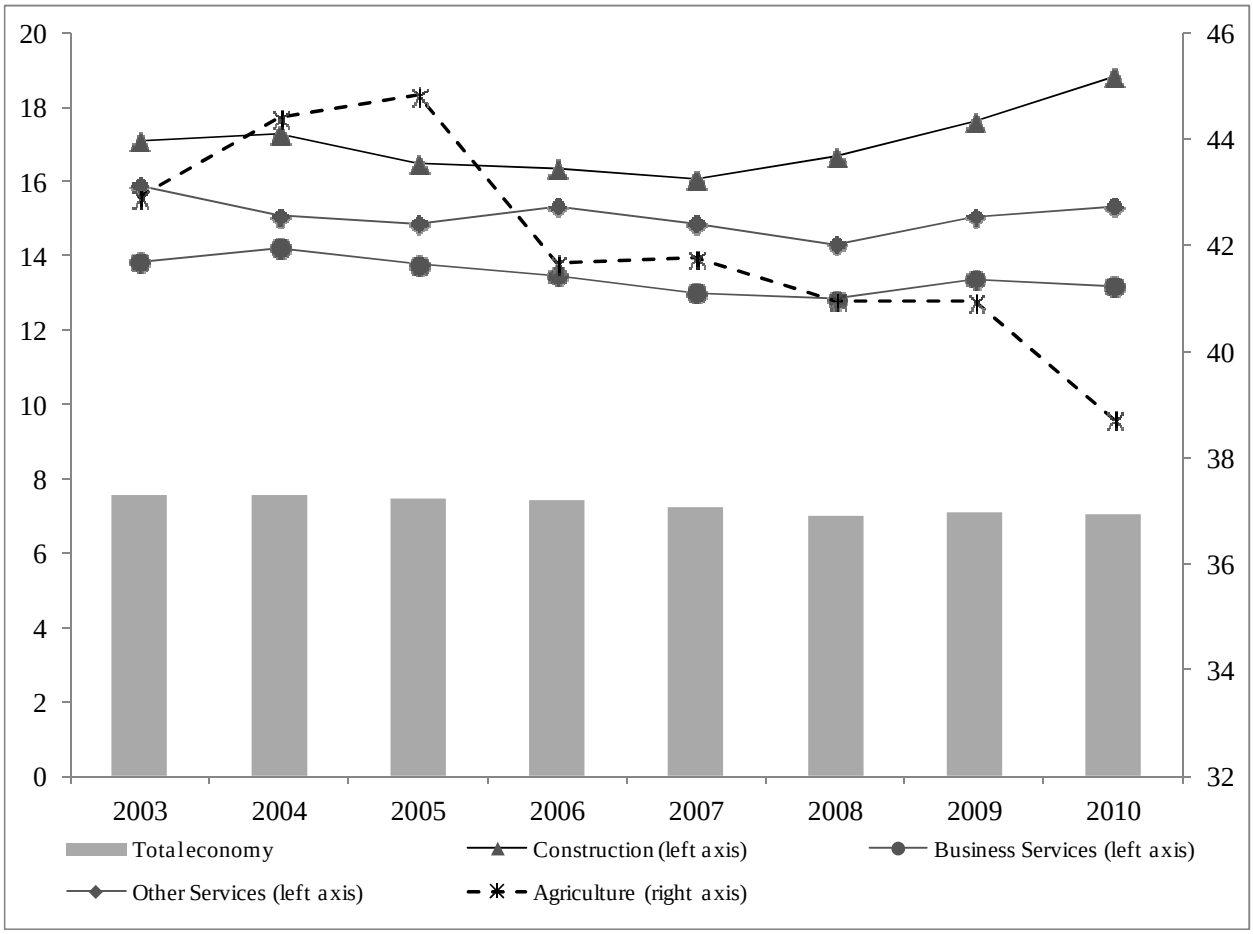


(1) Share of self-employed per industry is calculated as total self-employed in an individual industry divided by total employed in the same industry; (2) Industry share in total economy is calculated as total employed persons in an individual industry divided by total employed persons in the total economy.

Source: US Census Bureau Current Population Survey, 2010.

For the entire period 2003-2010 (as was the case for 2010 alone), the highest shares of unincorporated self-employment and unpaid family workers in total employment registered in the construction, professional and business services, other services and agriculture, forestry fishing and hunting industries. Yet, whereas the unincorporated self-employment rate remained roughly constant in professional and business services and other services, it has been increasing since 2007 in the construction industry. In contrast (for reasons alluded to above) it has slightly decreased in the agriculture, forestry, fishing and hunting industry (Figure A3.3).

Figure A3.3. Share of self-employed in total employment in selected industries in the United States, 2003-2010 annual averages, *percent*



Includes unpaid family workers. Share of self-employment in total employment is calculated by dividing the number of self-employed workers in a specified industry by total employment in the same industry. Shares exclude incorporated self-employed.

Source: US Census Bureau Current Population Survey, 2010.

A3.3 Sex

In nonagricultural sectors, the incidence of male unincorporated self-employment surpasses that for females by slightly over two percentage points for the period 2003-2010. According to Hipple (2010), "unincorporated self-employed men are more likely than their female counterparts to be working in occupations that employ large proportions of self-employed workers—for example, construction and extraction" (page 21). Yet, in the agricultural sector, the incidence of female unincorporated self-employment surpasses that for males for all years 2003-2010 by an average of 7.2 percentage points and a maximum of 10.5 percentage points in 2007.

Table A3.4 Incidence of unincorporated self-employment and unpaid family workers, by sex, annual averages, 2003-2010, *numbers in thousands*

Year	All industries						Nonagricultural industries						Agriculture					
	Total employed		Self-employed and unpaid family workers		Percent		Total employed		Self-employed and unpaid family workers		Percent		Total employed		Self-employed and unpaid family workers		Percent	
	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women
2003	73 332	64 404	6 471	3 952	8.8	6.1	71 636	63 824	5 766	3 681	8.0	5.77	1 695	580	705	271	41.6	46.7
2004	74 524	64 728	6 604	3 944	8.9	6.1	72 838	64 182	5 887	3 670	8.1	5.72	1 687	546	717	274	42.5	50.2
2005	75 973	65 757	6 679	3 908	8.8	5.9	74 319	65 213	5 974	3 628	8.0	5.56	1 654	544	705	280	42.6	51.5
2006	77 502	66 925	6 701	3 990	8.6	6.0	75 838	66 382	6 027	3 745	7.9	5.64	1 663	543	674	245	40.5	45.1
2007	78 254	67 792	6 583	3 961	8.4	5.8	76 65	67 302	5 952	3 717	7.8	5.52	1 604	490	631	244	39.3	49.8
2008	77 486	67 876	6 418	3 784	8.3	5.6	75 836	67 358	5 765	3 548	7.6	5.27	1 650	518	653	236	39.6	45.6
2009	73 670	66 208	6 176	3 746	8.4	5.7	72 062	65 712	5 546	3 515	7.7	5.35	1 607	496	630	231	39.2	46.6
2010	73 359	65 705	6 120	3 908	8.3	5.9	71 694	65 164	5 505	3 439	7.7	5.28	1 665	541	615	239	36.9	44.2

Source: US Census Bureau Current Population Survey, 2010.

A3.4 Educational attainment

The share of unincorporated self-employment in total employment for the year 2010 was highest among individuals with less than a high school diploma. Compared to the beginning of the sample period, this share for individuals with this level of education was the only one to surpass its 2003 level (the share of unincorporated self-employment declined over the period 2003-2010 for all other education levels). In contrast, the share of incorporated self-employment increased, albeit slightly, for both high school graduates and persons with associate's degrees. The highest rate of self-employment for this group is found among individuals with advanced degrees: the share of self-employment for those with this educational attainment level was over three times that for individuals with less than a high school diploma (see Table A3.5).

Table A3.5 Share of self-employment in total employment, by educational attainment, 2003 and 2010 annual averages, *percent*

Educational attainment	Unincorporated self-employed		Incorporated self-employed	
	Total		Total	
	2003	2010	2003	2010
Total, 25 years and over	8.4	7.7	4.1	4.2
Less than high school diploma	9.2	10.0	2.1	1.9
High school graduates, no college	8.7	8.2	3.1	3.3
Some college, no degree	8.6	7.9	4.2	4.1
Associate's degree	7.5	6.5	3.2	3.6
Bachelor's degree	8.0	6.7	5.9	5.3
Advanced degree	9.2	7.2	6.5	6.4

Shares of self-employment in total employment are calculated by dividing the number of self-employed workers in a specified educational attainment group by total employment in the same educational attainment group.

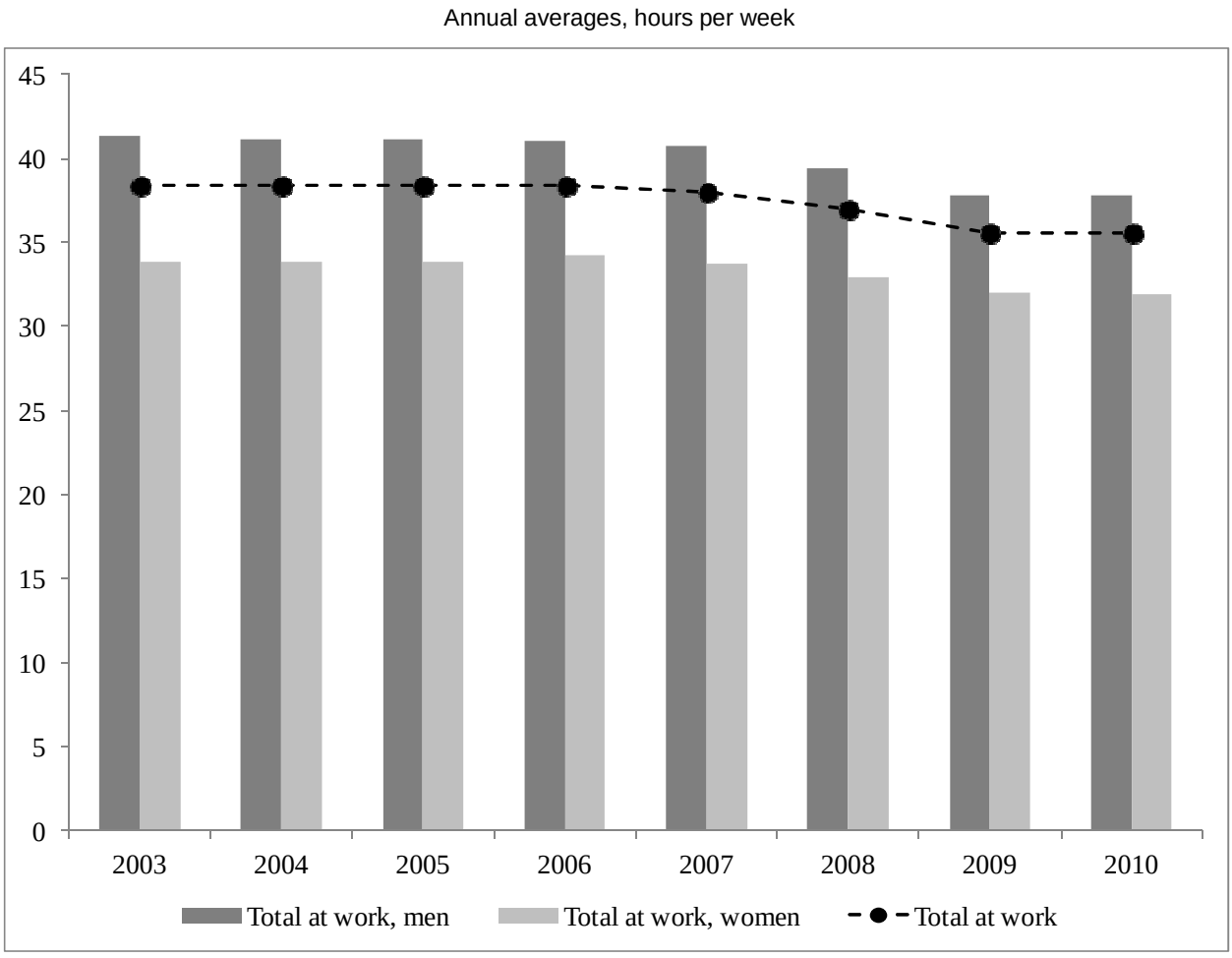
Source: US Census Bureau Current Population Survey, 2010.

In 2010, the share of male unincorporated self-employed was higher than that for females for all levels of educational attainment. Yet, whereas it was quite variable for men—the largest gap being 4 percentage points between males with educational attainment levels of "less than a high school diploma" and "associate's degree" or "bachelor's degree"—it was roughly constant for females. Indeed, the largest difference between shares of unincorporated self-employment for females was 1.6 percentage points, between females with educational attainment levels of "less than a high school diploma" and "bachelor's degree."

A3.5 Average usual hours

Figure A3.4 below shows that the average usual hours of work for unincorporated self-employed at work in nonagricultural industries declined by 2.8 hours over the period 2003-2010, from 38.4 hours in 2003 to 35.6 hours in 2010. This change was more marked for males than for females, registering a decline of 3.5 hours and 1.9 hours, respectively, over this same time period.

Figure A3.4. Average usual hours at work of unincorporated self-employed in nonagricultural industries in the United States, by sex, 2003-2010



Source: US Census Bureau Current Population Survey, 2010.

BIBLIOGRAPHY

Andreoni, J., B. Erard and J. Feinstein (1998). "Tax Compliance." Journal of Economic Literature. Vol. 36, No. 2, pp. 818-860.

Arpaia, A., E. Pérez and K. Pichelmann (2009). "Understanding Labour Income Share Dynamics in Europe." European Commision Economic Papers 379.

Askenazy, P. and X. Timbeau (2003). "Partage de la valeur ajoutée et rentabilité du capital en France et aux États-Unis : une réévaluation ; suivi d'un commentaire." Économie et statistique, N°363-365. Les entreprises sur les marchés mondiaux, pp. 167-189.

Bureau of Labour Statistics (2008). Technical Information about the BLS Major Sector Productivity and Costs Measures.

Bregger, J. E. (1996). "Measuring self-employment in the United States." Monthly Labour Review. Vol. 119 Nos 1 & 2, pp 3-9.

Bagnoli, P. [OECD] (2009). "Real Wages, Productivity and the Determinants of the Labour Share: A Structural Approach," Working Party No. 1 on Macroeconomic and Structural Policy Analysis. ECO/CPE/WP1.

Carrington, W. J., K. McCue and B. Pierce (1996). "The role of employer.employee interactions in labour market cycles: evidence from the self-employed. Journal of Labour Economics, Vol. 14, pp. 571-602.

Carson, C. S. (1984). "The Underground Economy: an introduction." Survey of Current Business, Vol. 64, pp. 21-37.

Christensen, L. R., and D. Cummings (1981), "Real Product, Real Factor Input, and Productivity in the Republic of Korea, 1960-1973" Journal of Development Economics, Vol. 8, pp. 285-302.

Comin, D. (2008). "Total Factor Productivity," in S.N. Durlauf and L.E. Blume, eds., The New Palgrave Dictionary of Economics, New York, NY: Second Edition, Palgrave Macmillan.

de Serres, A., S. Scarpetta and C. de la Maisonneuve (2002), "Sectoral Shifts in Europe and the United States: How they Affect Aggregate Labour Shares and the Properties of Wage Equations", OECD Economics Department Working Paper No. 326.

EU KLEMS (2007). "EU KLEMS Growth and Productivity Accounts Version 1.0 PART 1 Methodology." Prepared by Timmer, M., van Moergastel, T., Stuivenwold, G. Y., O'Mahony, M., and Kangasniemi, M.

Freeman, R. (2008) Labour productivity indicators: Comparison of two OECD databases productivity differentials & the Balassa-Samuelson Effect. Retrieved from OECD Statistics Directorate Web site: http://www.oecd.org/dataoecd/57/15/41354425.pdf.

Gollin, D. (2002), "Getting Income Shares Right" Journal of Political Economy, Vol. 110, No. 2 pp. 458-474.

Guscina, A. (2006). IMF Working Paper: "Effects of Globalization on Labor's Share in National Income." WP/06/294.

Haber, S. E., E. J. Lamas and J. Lichtenstein (1987). "On their own: the self-employed and other in private businesses." Monthly Labour Review, 110, pp. 17-23

Hamilton, B. H. (2000). "Does entrepreneurship pay? An empirical analysis of the returns to self-employment." Journal of Political Economy, Vol. 108, pp. 604-631.

Hipple, S (2004). "Self-employment in the United States: an update." Monthly Labour Review. Vol 127, No. 7. , pp 13-23.

Hipple, S (2010). "Self-employment in the United States." Monthly Labour Review. Vol 133, No. 9. , pp 17-32.

Hurst, E., G. Li, and B. Pugsley (2010). "Are Household Surveys Like Tax Forms: Evidence from Income Underreporting of the Self Employed", NBER Working Paper No. 16527.

Johnosn, D. G. (1954). "The Functional Distribution of Income in the United States, 1850-1952" The Review of Economics and Statistics. Vol. 36, No. 2, pp. 175-182.

Jorgenson, D. W., M. Ho and J. Samuels (2010) "New Data on US Productivity Growth by Industry." WORLD KLEMS Conference, August 19-20, 2010.

Jorgenson, D. W. (1991). "Productivity and Economic Growth." Chapter from Fifty Ears of Economic Measurement: The Jubilee of the Conference on Research in Income and Wealth. University of Chicago Press, pp. 19-118.

Kesselman, J. R. (1989). "Income tax evasion: and inter-sectoral analysis." Journal of Public Economics, Vol. 38, pp. 137-182.

Krueger, A. B. (1999). "Measuring Labor's Share." NBER Working Paper No. 7006.

Lequiller and Blades (2006). Understanding National Accounts. OECD Publications.

OECD (2001). "Measuring Productivity. OECD Manual: Measurement of Aggregate and Industry-Level Productivity Growth." Organisation for Economic Co-Operation and Development.

OECD Main Economic Indicators: http://stats.oecd.org/mei/.

Parker, S. C. (2004). "The Economics of Self-Employment and Entrepreneurship", Cambridge University Press, 2004).

Slemrod, J. (2007). "Cheating Ourselves: The Economics of Tax Evasion," Journal of Economic Perspectives, Vol. 21, No. 1, pp. 25-48.

System of National Accounts, 1993.

Tschetter, J. and J. Lukasiewicz (1983). "Employment changes in construction: secular, cyclical and seasonal." Monthly Labour Review. Vol. 106, No.3 pp 11-17.

Young, A. (1995). "The Tyranny of Numbers: Confronting the Statistical Realities of the East Asian Growth Experience." The Quarterly Journal of Economics. Vol. 110, No. 3, pp. 641-680.

US Census Bureau (2006). "Current Population Survey Design and Methodology Technical paper 66."

US Census Bureau (2009). "Current Population Survey, 2009 ASEC Technical Documentation."

US Census Bureau (2003). "Current Population Survey, 2003 Annual Social and Economic Supplement."

US Census Bureau (2004). "Current Population Survey, 2004 Annual Social and Economic Supplement."

US Census Bureau (2005). "Current Population Survey, 2005 Annual Social and Economic Supplement."

US Census Bureau (2006). "Current Population Survey, 2006 Annual Social and Economic Supplement."

US Census Bureau (2007). "Current Population Survey, 2007 Annual Social and Economic Supplement."

US Census Bureau (2008). “Current Population Survey, 2008 Annual Social and Economic Supplement.”
US Census Bureau (2009). “Current Population Survey, 2009 Annual Social and Economic Supplement.”
US Census Bureau (2010). “Current Population Survey, 2010 Annual Social and Economic Supplement.”
US.Department of Labour. Wage and Hour division. “Changes in Basic Minimum Wages in Non-Farm Employment Under State Law: Selected Years 1962-2011” *dol.gov/whd/state/stateMinWageHis.htm*.