# Alternative Value Bases and Prices: Evidence from the Input-Output Tables of the Swedish Economy[1]

by

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**Abstract**

This paper extends the empirical investigation of the relationships between labour values, actual prices of production and market prices to the case of alternative 'value bases' using data from the input-output tables of the Swedish economy. It is found that there exist vectors of 'commodity values' that are better approximations of prices than labour values.

## INTRODUCTION

In recent years, an increasing number of empirical studies explore the relationships between labour values, *actual* production prices and market prices.[2] The main conclusion of these studies is that the vectors of labour values and production prices are quite close to that of market prices, as this can be judged by alternative measures of deviation. These results are *usually* interpreted as giving support to the labour theory of value as an analytical tool for the understanding of the laws of motion of actual economies.

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[2] See Shaikh (1984, 1998), Petrović (1987), Ochoa (1989), Cockshott *et al*. (1995), Cockshott and Cottrell (1997), Chilcote (1997), Tsoulfidis and Maniatis (2002), Tsoulfidis and Mariolis (2007), Tsoulfidis (2008), *inter alia*.

However, it is well known that any 'basic' (*à la* Sraffa, 1960, §6) commodity can be considered as a 'value base' and, therefore, it is possible to determine the so-called 'commodity $i$ values' (Gintis and Bowles, 1981; Roemer, 1986), *i.e.*, the direct and indirect requirements of commodity $i$ necessary to produce one unit of each commodity as gross output. To our knowledge, there are two empirical studies (Cockshott and Cottrell, 1997; Tsoulfidis and Maniatis, 2002), based on input-output tables of the UK and Greek economy, respectively, which have used alternative commodities as value bases.[3] The conclusion of the aforesaid studies is that commodity values are, by and large, considerably worse approximations of prices than labour values. The purpose of this paper is to estimate the deviations of the vectors of actual production prices and market prices from the vectors of labour values and commodity values associated with the Symmetric Input-Output tables (SIOT) of the Swedish economy (for the years 1995 and 2005).[4] It is important to note that we decided to use Sweden's input-output tables mainly because there were available comparable tables of not less than ten years chronological distance, which is a sufficient time interval in order to expect differentiated results.

A crucial issue concerning the investigation of the relationships between prices and values is the choice of a theoretical appropriate measure of price-value deviation. As is well known, the results obtained on the basis of the traditional measures of deviation (such as 'correlation coefficient', 'mean absolute deviation', 'mean absolute weighted deviation', 'root-mean-square-percent-error') depend on the arbitrary choice of either the *numéraire* or the physical measurement units.[5] In the current study, we avoid the said problems by using the so-called '$d$-distance' (Steedman and Tomkins, 1998, pp. 381-382), which constitutes a measure of price-value deviation that is free from *numéraire* and measurement-unit dependence.

The remainder of the paper is organized as follows. Section 2 presents the analytic framework. Section 3 provides the results of the empirical analysis. Section 4 concludes.

[3] Cockshott and Cottrell (1997) considered as value bases the commodities 'Electricity', 'Oil products' and 'Iron and Steel', whilst Tsoulfidis and Maniatis (2002) considered the commodities 'Agricultural products', 'Electricity', 'Oil products' and 'Chemicals'.

[4] See Appendix 1 for the available input-output data as well as the construction of relevant variables.

[5] For a detailed discussion of the problem of measuring the deviation of prices from labour values, see, *e.g.*, Steedman and Tomkins (1998) and Díaz and Osuna (2005-2006, 2009). For the theoretical investigation of the relationships between prices and labour values, see Parys (1982) and Bidard and Ehrbar (2007), whilst for the so-called problem of transforming values into prices, see, *e.g.*, Pasinetti (1977, ch. 5, Appendix) and Reati (1986). Finally, for a new approach to the relationships between prices and values, see Mariolis (2010).

## THE ANALYTIC FRAMEWORK

We begin with a closed, linear system with only single-product industries, circulating capital and homogeneous labour, which is not an input to the household sector. The net product is distributed to profits and wages that are paid at the beginning of the common production period and there are no savings out of this income.[6] All commodities are basic and there are no alternative production techniques. The system is viable, *i.e.*, the Perron-Frobenius eigenvalue, $\lambda_A$, of the $n \times n$ matrix of input-output coefficients, $\mathbf{A}$, is less than 1. Finally, the givens in our analysis are (i) the technical conditions of production, *i.e.*, the pair $(\mathbf{A}, \mathbf{l})$, where $\mathbf{l}^T$ is the $1 \times n$ vector of direct labour inputs ('T' denotes the transpose of an $n \times 1$ vector); and (ii) the real wage rate, which is represented by the $n \times 1$ vector $\mathbf{b}$. On the basis of these assumptions, we can write

$$\mathbf{v}^T \equiv \mathbf{v}^T\mathbf{A} + \mathbf{l}^T \tag{1}$$

$$\omega \equiv \mathbf{v}^T\mathbf{b} \tag{2}$$

$$\mathbf{p}^T = (1 + r)(\mathbf{p}^T\mathbf{A} + w\mathbf{l}^T) \tag{3}$$

$$w \equiv \mathbf{p}^T\mathbf{b} \tag{4}$$

where $\mathbf{v}$, $\mathbf{p}$ are the vectors of labour values and production prices, respectively, $\omega$ is the labour value of the real wage bundle, *i.e.*, the direct and indirect input requirements of labour necessary to produce one unit of labour, $w$ the money wage rate, and $r$ the uniform rate of profit. Relations (1) and (3)-(4) entail that

$$\mathbf{v}^T \equiv \mathbf{l}^T[\mathbf{I} - \mathbf{A}]^{-1} \tag{5}$$

$$\mathbf{p}^T(1 + r)^{-1} = \mathbf{p}^T\mathbf{B} \tag{6}$$

where $\mathbf{B}$ $(\equiv \mathbf{A} + \mathbf{b}\mathbf{l}^T)$ represents the matrix of the 'augmented' input-output coefficients, *i.e.*, each coefficient represents the sum of the respective material and wage good input per unit of output. Thus, labour values can be estimated from (5). Each element, $v_j$, of the vector of labour values expresses the 'vertically integrated labour coefficient' (Pasinetti, 1973) for commodity $j$, *i.e.*, the direct and indirect requirements of labour necessary to produce one unit of commodity $j$. The coefficients $v_j$ or, more specifically, $1/v_j$ are considered as indices of the productivity of labour (see, *e.g.*, Okishio, 1963). Finally, since a non-positive vector of commodity prices is economically insignificant, (6) implies that $(1+r)^{-1}$ is the Perron-Frobenius eigenvalue of $\mathbf{B}$ and $\mathbf{p}^T$ is the corresponding left-hand side eigenvector.

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[6] We hypothesize that wages are paid *ante factum* (for the general case, see Steedman, 1977, pp. 103-105) and that there are no savings out of this income in order to follow most of the empirical studies on this topic (see footnote 2).

Now define the 'extended' $m \times m$ ($m=n+1$) matrix $\mathbf{C} \equiv [c_{ij}]$ (see, *e.g.*, Okishio, 1963) as

$$\mathbf{C} \equiv \begin{pmatrix} \mathbf{A} & \mathbf{b} \\ \mathbf{l}^{\mathrm{T}} & 0 \end{pmatrix}$$

This matrix is also known as the 'complete' or 'full' matrix (Bródy, 1970).[7] On the basis of the above matrix, the vector of labour values is defined by

$$\mathbf{v}^{\mathrm{T}} \equiv \mathbf{v}^{\mathrm{T}}\mathbf{C}_{(m)} + \mathbf{c}_m^{\mathrm{T}} \tag{7}$$

where $\mathbf{C}_{(m)}$ denotes the matrix derived from $\mathbf{C}$ by extracting its $m$ th row and column and $\mathbf{c}_m^{\mathrm{T}}$ denotes the $m$ th row of $\mathbf{C}$ if we extract its $m$ th element. Therefore, it can be easily seen that $\mathbf{C}_{(m)} = \mathbf{A}$ and $\mathbf{c}_m^{\mathrm{T}} = \mathbf{l}^{\mathrm{T}}$. Furthermore, the labour value of the real wage bundle is given by

$$\omega \equiv \mathbf{c}_m^{\mathrm{T}}(\mathbf{I} - \mathbf{C}_{(m)})^{-1}\mathbf{c}^m \tag{8}$$

where $\mathbf{c}^m$ denotes the $m$ th column of $\mathbf{C}$ if we extract its $m$ th element, *i.e.*, $\mathbf{c}^m = \mathbf{b}$. However, labour is just one of the $m$ production inputs that can be considered as a value base. In general, the vector of commodity $i$ values (Gintis and Bowles, 1981, Appendix 1; Roemer, 1986, pp. 24-26) is defined as follows

$$\mathbf{v}_i^{\mathrm{T}} \equiv \mathbf{v}_i^{\mathrm{T}}\mathbf{C}_{(i)} + \mathbf{c}_i^{\mathrm{T}} \tag{9}$$

where $\mathbf{v}_i^{\mathrm{T}} \equiv (v_1^i, v_2^i, \ldots, v_{i-1}^i, v_{i+1}^i, \ldots, v_m^i)$, $v_j^i$ denotes the commodity $i$ value of commodity $j$, *i.e.*, the total (direct and indirect) requirements of commodity $i$ necessary to produce one unit of gross output of commodity $j$,[8] $\mathbf{C}_{(i)}$ denotes the matrix derived from $\mathbf{C}$ by extracting its $i$ th row and column (just as we extracted the $m$ th row and column in order to define the vector of labour values in relation (7) above), and $\mathbf{c}_i^{\mathrm{T}}$ denotes the $i$ th row of $\mathbf{C}$ if we extract its $i$ th element (and, therefore, represents the vector of direct input requirements of commodity $i$). For example, assume that $n = 2$ and, therefore, $\mathbf{C}$ is a 3x3 matrix, *i.e.*,

$$\mathbf{C} = \begin{pmatrix} a_{11} & a_{12} & b_1 \\ a_{21} & a_{22} & b_2 \\ l_1 & l_2 & 0 \end{pmatrix}$$

Then, the vector of 'commodity 1 values' is given by

$$\mathbf{v}_1^{\mathrm{T}} = \mathbf{v}_1^{\mathrm{T}}\mathbf{C}_{(1)} + \mathbf{c}_1^{\mathrm{T}} \tag{10}$$

where $\mathbf{v}_1^{\mathrm{T}} = (v_2^1, v_3^1)$, $\mathbf{C}_{(1)} = \begin{pmatrix} a_{22} & b_2 \\ l_2 & 0 \end{pmatrix}$ and $\mathbf{c}_1^{\mathrm{T}} = (a_{12}, b_1)$. From relation (10) we obtain

[7] Due to our assumption that labour is not an input to the household sector, the $(m, m)$th element of matrix $\mathbf{C}$ equals zero. However, there is not an analogous assumption for the other production inputs, *i.e.*, the on diagonal elements of matrix $\mathbf{A}$ can be positive.

[8] It has been argued (see Mariolis and Rodousaki, 2008) that the concept of total requirements for gross output was introduced by Vladimir K. Dmitriev in his essay, published in 1898, on the theory of value in Ricardo (see Dmitriev, 1974, Essay 1).

$$v_2^1 = v_2^1 a_{22} + v_3^1 l_2 + a_{12} \tag{11}$$

and

$$v_3^1 = v_2^1 b_2 + b_1 \tag{12}$$

Relation (11) gives the direct and indirect requirements of commodity 1 necessary to produce one unit of commodity 2 as gross output, whilst relation (12) gives the direct and indirect requirements of commodity 1 necessary to produce one unit of labour. Analogously, one may obtain the vector of 'commodity 2 values' by extracting the second row and column of matrix **C**. Finally, by extracting the third row and column of **C** we may obtain the vector of labour values. Thus, in general, the vector of commodity $i$ values is obtained from relation (9) as follows (see also Manresa *et al*., 1998, p. 359)

$$\mathbf{v}_i^{\mathrm{T}} \equiv \mathbf{c}_i^{\mathrm{T}}(\mathbf{I} - \mathbf{C}_{(i)})^{-1} \tag{13}$$

whilst the total input requirements of commodity $i$ necessary to produce one unit of itself is given by

$$\omega_i \equiv \mathbf{v}_i^{\mathrm{T}}\mathbf{c}^i + c_{ii} \tag{14}$$

where $\mathbf{c}^i$ denotes the $i$ th column of **C** if we extract its $i$ th element, and $\varepsilon_i \equiv (1-\omega_i)/\omega_i$ may be defined as the 'rate of exploitation' of commodity $i$ (see also Gintis and Bowles, 1981, p. 18). Finally, it can be shown that the conditions

$$r > 0, \ \ \omega_i < 1, \ \ \lambda_{\mathrm{C}} < 1 \tag{15}$$

where $\lambda_{\mathrm{C}}$ denotes the Perron-Frobenius eigenvalue of **C**, are all equivalent (see Bródy, 1970, Part 1; Manresa *et al*., 1998, pp. 358-360).[9]

Although the empirical relationships between prices and labour values have been intensively investigated, the relationships between commodity values and prices have not been examined to the same extent.[10] In the next section we estimate the deviations of actual prices from labour values and commodity values for the case of the Swedish economy.

## RESULTS AND THEIR EVALUATION

The results from the application of the previous analysis to the input-output tables of the Swedish economy for the years 1995 and 2005 are reported in Table 1 and Figures 1-2. Table 1 reports the largest and smallest deviations of prices from values. The vec-

[9] Note that the aforesaid condition constitutes a general profitability condition, which includes the well known 'Fundamental Marxian Theorem' (see, *e.g*., Okishio, 1963).

[10] For the theoretical relationships between prices and values, see Appendix 2 (which is based on Mariolis, 2000; 2001).

**Table1. Deviations of prices from values; Swedish economy, 1995 and 2005**

| $d$-distance (%) / 'Value bases' | Actual prices of production vs. values for the year 1995 (2005) | Market prices vs. values for the year 1995 (2005) |
|---|---|---|
| Labour | 14.0 (13.6) | 32.0 (21.8) |
| 'Products of forestry' CPA:02 | 29.0 (30.0) | **31.5** (32.2) |
| 'Wearing apparels; furs' CPA: 18 | 17.2 (16.0) | **29.8** (23.0) |
| 'Basic metals' CPA: 27 | 33.4 (30.8) | 47.1 (38.1) |
| 'Secondary raw materials' CPA: 37 | 31.0 (30.6) | 46.9 (39.8) |
| 'Energy products' CPA: 40 | 14.8 (14.2) | **31.8 (19.2)** |
| 'Services of water' CPA: 41 | 20.1 (19.8) | 35.9 **(19.8)** |
| 'Construction work' CPA: 45 | 22.1 (21.0) | **23.1 (16.6)** |
| 'Wholesale and retail trade services' CPA: 50⊕51⊕52 | **10.9 (10.3)** | 34.7 (23.0) |
| 'Financial intermediation services' CPA: 65 | 15.0 (15.4) | **26.6 (15.7)** |
| 'Insurance services' CPA: 66 | 17.4 (16.6) | **28.9 (17.9)** |
| 'Real estate services' CPA: 70 | 18.8 (17.2) | 33.9 **(20.9)** |
| Average deviation of prices from 'commodity values' | 21.6 (20.4) | 37.7 (27.3) |

tors of values are estimated from the relation (13), whilst the vectors of actual prices of production are estimated from the eigenequation (6).[11] In order to assess the proximity of actual production prices to values, we use a normalization bias-free measure of deviation that has been proposed by Steedman and Tomkins (1998) and is known as the '$d$- distance'. The '$d$- distance' is defined as $d \equiv \sqrt{2(1-\cos\theta)}$, where $\theta$ is the Euclidean angle between the vectors $\pi_i^{\mathrm{T}}(\hat{\mathbf{v}}_i)^{-1}$ and $\mathbf{e}$, $\hat{\mathbf{v}}_i$ a diagonal matrix formed from the elements of $\mathbf{v}_i$ and $\pi_i^{\mathrm{T}}(\hat{\mathbf{v}}_i)^{-1}$ the ratio of prices to values.[12]

The first row of Table 1 refers to the deviations of prices from labour values,[13] whilst the remaining rows report the deviations of prices from commodity values.[14] The last

[11] *Mathematica 7.0* is used in the calculations. The analytical results are available on request from the author.

[12] Note that for $i \neq m$ we get $\pi_i^{\mathrm{T}} = (p_1, p_2, \ldots, p_{i-1}, p_{i+1}, \ldots, w)$, whilst for $i = m$ we get $\pi_i^{\mathrm{T}} = \pi_m^{\mathrm{T}} = \mathbf{p}^{\mathrm{T}}$. Furthermore, the '$d$- distance' between market prices and values is estimated on the basis of the Euclidean angle between the vectors $(\pi_i^{\mathrm{M}})^{\mathrm{T}}(\hat{\mathbf{v}}_i)^{-1}$ and $\mathbf{e}$, where $(\pi_i^{\mathrm{M}})^{\mathrm{T}} \equiv (p_1^{\mathrm{M}}, p_2^{\mathrm{M}}, \ldots, p_{i-1}^{\mathrm{M}}, p_{i+1}^{\mathrm{M}}, \ldots, p_m^{\mathrm{M}})$ denotes the vector of market prices. Since market prices are taken to be equal to 1 (see Appendix 1), it follows that for $i \neq m$ we get $(\pi_i^{\mathrm{M}})^{\mathrm{T}} = (1,1,1,1,\ldots,w_{\min}^{\mathrm{M}})$, whilst for $i = m$ we get $(\pi_m^{\mathrm{M}})^{\mathrm{T}} = \mathbf{e}^{\mathrm{T}}$. I am grateful to Theodore Mariolis for an enlightening discussion on this point.

[13] The vectors of labour values and actual prices of production for the year 1995 (2005) are reported in Appendix 3, Tables 3.1-3.2 (3.3-3.4). Note that we report the 'complete' *à la* Bródy (1970) vectors, *i.e.*, we include the value/price of the real wage bundle as the last element of the vectors.

[14] The price-commodity value deviations that are found to be less than the corresponding price-labour value deviations are indicated by bold characters.

row refers to the average deviations of prices from commodity values, *i.e.*, the sum of the deviations divided by the total number of commodities that are used as value bases.

In order to get a complete picture of the price-value deviations, in Figure 1 (2) we display the deviations of the vector of production (market) prices from each vector of commodity values for both years of our analysis. The deviations for the year 1995 (2005) are measured in the vertical (horizontal) axis, whilst the price-labour value deviations are taken as the origin of the axes.

The points below (above) the horizontal axes indicate price-commodity value deviations less (greater) than the price-labour value deviations for the year 1995, whilst the points on the left (right) side of the vertical axes indicate price-commodity value deviations less (greater) than the price-labour value deviations for the year 2005. Thus, the points on the lower-left (upper-right) quadrants of the figures indicate vectors of commodity values that are better (worse) approximations of prices than labour values for both years of our analysis.

From the Table 1, Figures 1-2, and the associated numerical results, we arrive at the following conclusions:
(i). The deviation of the vector of actual production (market) prices from the vector of labour values for the year 1995 is almost 14% (32%), whilst that for the year 2005 is almost 13.6% (21.8%). Furthermore, the actual 'relative rate of profit', $\rho(\equiv r/R)$, where $R$ $(\equiv (\lambda_A)^{-1} - 1)$ denotes the maximum rate of profit, is almost 39.1% ($r \simeq$ 33.6%, $R \simeq$ 85.9%) for the year 1995 and almost 36.8% for the year 2005 ($r \simeq$

**Figure 1. Deviations of actual production prices from values; Swedish economy, 1995 and 2005**

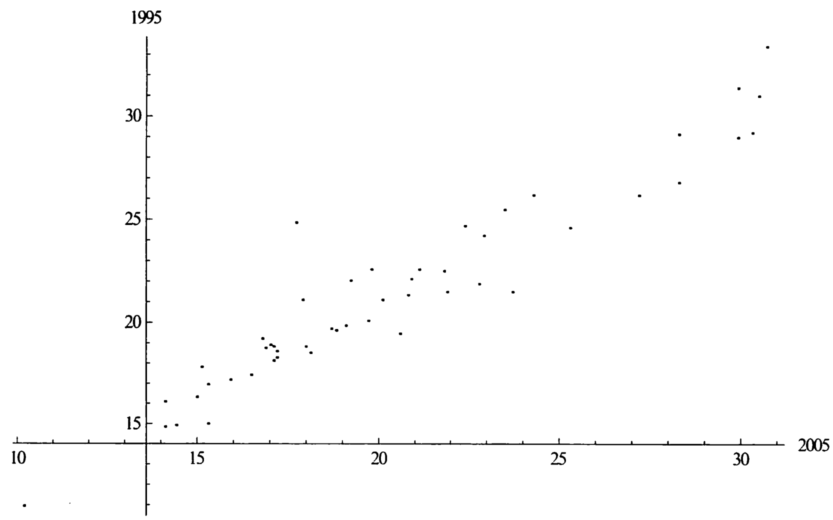
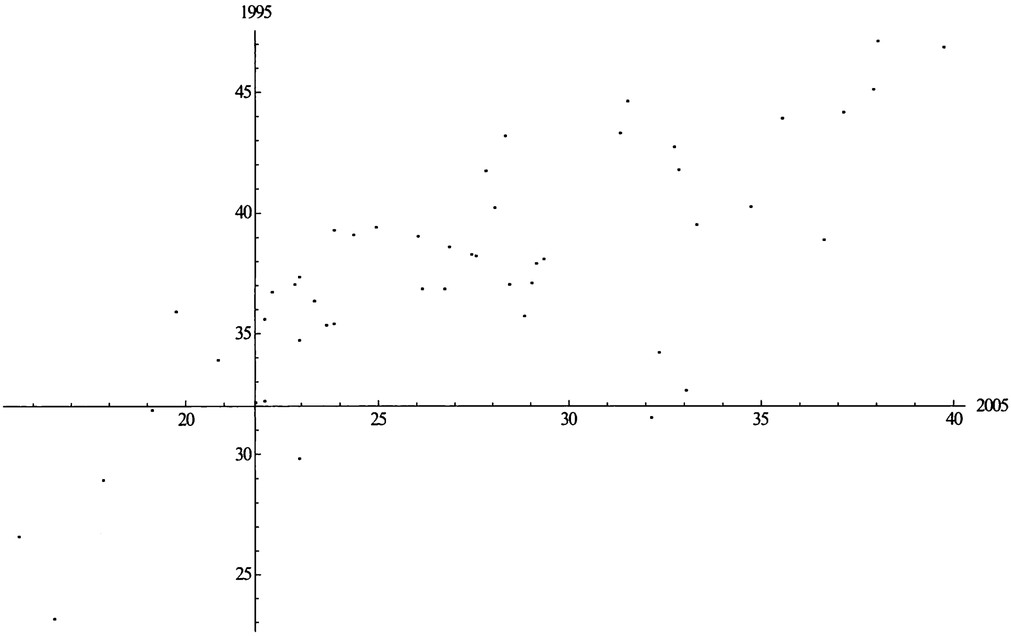


**Figure 2. Deviations of market prices from values; Swedish economy, 1995 and 2005**




29.7%, $R \simeq$ 80.7%).[15]

(ii). The average deviations of actual production (market) prices from commodity values are in the area of 21.6% (37.7%) for the year 1995 and in the area of 20.4% (27.3%) for the year 2005.

(iii). The deviation of actual production prices from the vector of commodity values associated with the aggregate commodity of sectors[16] 50 ('Trade, maintenance and repair services of motor vehicles and motorcycles; retail sale of automotive fuel'), 51 ('Wholesale trade and commission trade services, except of motor vehicles and motorcycles') and 52 ('Retail trade services, except of motor vehicles and motorcycles; repair services of personal and household goods') is less than the corresponding actual production price-labour value deviation for both years of our analysis.

(iv). The deviations of market prices from the vectors of commodity values associated with commodities 40 ('Energy products'), 45 ('Construction work'), 65 ('Financial intermediation services') and 66 ('Insurance services') are less than the corresponding market price-labour value deviation for both years of our analysis. Furthermore, the deviations of market prices from the vectors of commodity values associated with commodities (a) 02 ('Products of forestry') and 18 ('Wearing apparels') for the year 1995;

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[15] It should be noted that these results are in accordance with the findings of all the relevant empirical studies (see footnote 2), where the relative rate of profit is in the range of 17%-40%, the actual production price-labour value deviation is in the range of 6%-20% and the market price-labour value deviation is in the range of 7%-37%.

[16] For the degree of sectoral disaggregation of Sweden's input-output tables, see Appendix 1.

and (b) 41 ('Services of water') and 70 ('Real estate services') for the year 2005 are less than the corresponding market price-labour value deviations.
(v). The smallest actual production price-value deviation for the year 1995 (2005) is 10.9% (10.3%) and corresponds to the vector of commodity values associated with the aggregate commodity of the sectors 50, 51 and 52, whilst the smallest market price-value deviation for the year 1995 (2005) is almost 23.1% (15.7%) and corresponds to the vector of commodity values associated with the commodity 'Construction work' ('Financial intermediation services').[17]
(vi). The largest actual production price-value deviation for the year 1995 (2005) is 33.4% (30.8%) and corresponds to the vector of commodity values associated with the commodity 'Basic metals', whilst the largest market price-value deviation for the year 1995 (2005) is 46.9% (39.8%) and corresponds to the vector of commodity values associated with the commodity 'Basic metals' ('Secondary raw materials').

## CONCLUDING REMARKS

This paper explored the relationships between the labour values, actual prices and commodity values of the Swedish economy for the years 1995 and 2005. Regarding the deviations of prices from labour values, our results are in absolute accordance with the findings of other empirical studies. However, it has been found that there exist vectors of commodity values that are better approximations of actual prices than labour values. The results of this study do not (or, more precisely, cannot) provide support to an alternative value theory; on the contrary, cast doubts on the logic of the so-called 'empirical labour theory of value' (Stigler, 1958, p. 361), in the sense that the empirical investigation of the relationships between values and prices should not *a priori* neglect alternative value bases. Future research efforts should use more disaggregated input-output data from various countries and concretize the model by including the presence of fixed capital and the degree of its utilization, depreciation, turnover times, taxes and subsidies, and joint-product activities.

## APPENDIX 1: A NOTE ON THE DATA

The SIOT and the corresponding levels of sectoral employment of the Swedish economy (for the years 1995, 2000 and 2005) are available via the Eurostat website (http://ec.europa.eu/eurostat). Given that technical change over time could be considered as rather 'slow', we have chosen to apply our analysis to the tables of the years 1995 and 2005. As is well known, the SIOT are derived from the 'System of National Accounts'

[17] The aforesaid vectors of commodity values are reported in Appendix 4, Tables 4.1-4.4. The direct and indirect requirements of a commodity necessary to produce one unit of itself are indicated by bold characters.

(SNA) framework of the Supply and Use tables (SUT) (see, *e.g.*, United Nations, 1999, chs 2-4; Eurostat, 2008, ch. 11), whilst the level of sectoral disaggregation depends on the statistical practices of the relevant national offices (*e.g.*, some European Union member states compile tables that, initially, include 2000 to 3000 products (see Eurostat, 2008, p. 43)). The SIOT published by Eurostat describe 59 products, which are classified according to CPA ('Classification of Product by Activity'). The described products of the Swedish economy and their correspondence to CPA are reported in Table A1 below. However, all the elements associated with the product 12 ('Uranium and thorium ores') equal zero and, therefore, we remove them from our analysis. Furthermore, Statistics Sweden has aggregated, due to confidentiality reasons, the products 14 ('Other mining and quarrying products') and 16 ('Tobacco products') with the products 13 ('Metal ores') and 15 ('Food products and beverages'), respectively, whilst the products 51 ('Wholesale trade and commission trade services, except of motor vehicles and motorcycles') and 52 ('Retail trade services, except of motor vehicles and motorcycles; repair services of personal and household goods') are aggregated with the product 50 ('Trade, maintenance and repair services of motor vehicles and motorcycles; retail sale of automotive fuel'). Additionally, for the year 2005, the products 32 ('Radio, television and communication equipment and apparatus') and 74 ('Other business services') are aggregated with the products 31 ('Electrical machinery and apparatus n.e.c.') and 73 ('Research and development services'), respectively. Finally, since the labour input that corresponds to the production of the product 11 ('Crude petroleum and natural gas; services incidental to oil and gas extraction excluding surveying') equals zero for both of the years, we aggregate the product 11 with the product 13. Thus, we derive SIOT of dimensions 53×53 for the year 1995 and 51×51 for the year 2005. It goes without saying that statistical practices, such as (i) the method used to convert SUT into SIOT (for a review of these methods see, *e.g.*, ten Raa and Rueda-Cantuche (2003, pp. 441-447)); and (ii) the level of sectoral disaggregation, can bias the empirical results of our analysis.

The market prices of all products are taken to be equal to 1; that is to say, the physical unit of measurement of each product is that unit which is worth of a monetary unit (see, *e.g.*, Miller and Blair, 1985, p. 356). Thus, the matrix of input-output coefficients, **A**, is obtained by dividing element-by-element the inputs of each sector by its gross output.

It need hardly be said that, in the real world, labour is not homogeneous and, therefore, the levels of sectoral employment derived from the SIOT correspond to heterogeneous labour. However, in the case of economic systems with heterogeneous labour, any attempt to explore the price-value deviation(s) is devoid of economic sense. Thus, in accordance with most of the relevant empirical studies, we use wage differentials to homogenize the sectoral employment (see, *e.g.*, Sraffa, 1960, §10; Kurz and Salvadori, 1995, pp. 322-325), *i.e.*, the vector of inputs in direct homogeneous labour, $\mathbf{l} \equiv [l_j]$, is determined as follows: $l_j = (L_j / x_j)(w_j^{\mathrm{M}} / w_{\min}^{\mathrm{M}})$, where $L_j$, $x_j$, $w_j^{\mathrm{M}}$ denote the total employment, gross output and money wage rate, in terms of market prices, of the $j$ th sector, respectively, and $w_{\min}^{\mathrm{M}}$ the minimum sectoral money wage rate in terms of market prices. Alternatively, the homogenization of employment could be achieved, *for example*, through the economy's average wage; in fact, the empirical results are robust to alternative normalizations with respect to homogenization of labour inputs. The described reductions of course are only meaningful when the relative wages express with precision the differences in skills and intensity of labour that is employed by each sector of the economy (*ibid.*). In any other case the choice of homogenization procedure is, of necessity, arbitrary. Furthermore, by assuming that workers do not save and that their consumption has the same composition as the vector of the final consumption expenditures of the household sector, $\mathbf{h}_{ce}$, directly obtained from the input-output tables, the vector of the real wage rate, $\mathbf{b} \equiv [b_i]$, is determined as follows: $\mathbf{b} = (w^{\mathrm{M}}_{\min}/\mathbf{e}^{\mathrm{T}}\mathbf{h}_{ce})\mathbf{h}_{ce}$, where $\mathbf{e}^{\mathrm{T}} \equiv [1,1,...,1]$ denotes the row summation vector identified with the vector of market prices (see also, *e.g.*, Okishio and Nakatani, 1985, pp. 66-67). Finally, it must be noted that the available input-output tables do not include inter-industry data on fixed capital stocks and on non-competitive imports. As a result, our investigation is restricted to a closed economy with circulating capital.

**Table A1. Product Classification**

| No | CPA | Nomenclature |
|---|---|---|
| 1 | 01 | Products of agriculture, hunting and related services |
| 2 | 02 | Products of forestry, logging and related services |
| 3 | 05 | Fish and other fishing products; services incidental of fishing |
| 4 | 10 | Coal and lignite; peat |
| 5 | 11 | Crude petroleum and natural gas; services incidental to oil and gas extraction excluding surveying |
| 6 | 12 | Uranium and thorium ores |
| 7 | 13 | Metal ores |
| 8 | 14 | Other mining and quarrying products |
| 9 | 15 | Food products and beverages |
| 10 | 16 | Tobacco products |
| 11 | 17 | Textiles |
| 12 | 18 | Wearing apparel; furs |
| 13 | 19 | Leather and leather products |
| 14 | 20 | Wood and products of wood and cork (except furniture); articles of straw and plaiting materials |
| 15 | 21 | Pulp, paper and paper products |
| 16 | 22 | Printed matter and recorded media |
| 17 | 23 | Coke, refined petroleum products and nuclear fuels |
| 18 | 24 | Chemicals, chemical products and man-made fibres |
| 19 | 25 | Rubber and plastic products |
| 20 | 26 | Other non-metallic mineral products |
| 21 | 27 | Basic metals |
| 22 | 28 | Fabricated metal products, except machinery and equipment |
| 23 | 29 | Machinery and equipment n.e.c. |
| 24 | 30 | Office machinery and computers |
| 25 | 31 | Electrical machinery and apparatus n.e.c. |

| | | |
|---|---|---|
| 26 | 32 | Radio, television and communication equipment and apparatus |
| 27 | 33 | Medical, precision and optical instruments, watches and clocks |
| 28 | 34 | Motor vehicles, trailers and semi-trailers |
| 29 | 35 | Other transport equipment |
| 30 | 36 | Furniture; other manufactured goods n.e.c. |
| 31 | 37 | Secondary raw materials |
| 32 | 40 | Electrical energy, gas, steam and hot water |
| 33 | 41 | Collected and purified water, distribution services of water |
| 34 | 45 | Construction work |
| 35 | 50 | Trade, maintenance and repair services of motor vehicles and motorcycles; retail sale of automotive fuel |
| 36 | 51 | Wholesale trade and commission trade services, except of motor vehicles and motorcycles |
| 37 | 52 | Retail trade services, except of motor vehicles and motorcycles; repair services of personal and household goods |
| 38 | 55 | Hotel and restaurant services |
| 39 | 60 | Land transport; transport via pipeline services |
| 40 | 61 | Water transport services |
| 41 | 62 | Air transport services |
| 42 | 63 | Supporting and auxiliary transport services; travel agency services |
| 43 | 64 | Post and telecommunication services |
| 44 | 65 | Financial intermediation services, except insurance and pension funding services |
| 45 | 66 | Insurance and pension funding services, except compulsory social security services |
| 46 | 67 | Services auxiliary to financial intermediation |
| 47 | 70 | Real estate services |
| 48 | 71 | Renting services of machinery and equipment without operator and of personal and household goods |
| 49 | 72 | Computer and related services |
| 50 | 73 | Research and development services |
| 51 | 74 | Other business services |
| 52 | 75 | Public administration and defence services; compulsory social security services |
| 53 | 80 | Education services |
| 54 | 85 | Health and social work services |
| 55 | 90 | Sewage and refuse disposal services, sanitation and similar services |
| 56 | 91 | Membership organisation services n.e.c. |
| 57 | 92 | Recreational, cultural and sporting services |
| 58 | 93 | Other services |
| 59 | 95 | Private households with employed persons |

# APPENDIX 2: ON THE RELATIONSHIPS BETWEEN PRICES AND VALUES

The system of production prices (see relations (3)-(4)) can be rewritten on the basis of the complete matrix, **C**, as follows

$$\pi^T = \pi^T\mathbf{C} + \mathbf{k}^T \tag{A.1}$$

where $\pi^T \equiv (\mathbf{p}^T, w)$ is the 'complete' *à la* Bródy (1970) price vector, $\mathbf{k}^T \equiv \pi^T\mathbf{CD}$ is the vector of sectoral profit coefficients, $\mathbf{D} \equiv \begin{pmatrix} \hat{\mathbf{r}} & 0 \\ 0 & 0 \end{pmatrix}$ and $\hat{\mathbf{r}}$ is an $n \times n$ diagonal matrix formed by the sectoral profit rates. Relation (A.1) may be written as

$$\pi_i^T = \pi_i^T\mathbf{C}_{(i)} + p_i\mathbf{c}_i^T + \mathbf{k}_i^T \tag{A.2}$$

$$p_i = \pi_i^T\mathbf{c}^i + p_i c_{ii} + k_i \tag{A.3}$$

where $\pi^T \equiv (p_1, p_2,..., p_{i-1}, p_{i+1},...,p_m)$ $(\mathbf{k}_i^T \equiv (\pi_i^T\mathbf{C}_{(i)} + p_i\mathbf{c}_i^T)\mathbf{D}_{(i)})$ is the vector derived from $\pi^T(\mathbf{k}^T)$ if we extract its $i$ th element, $\mathbf{D}_{(i)}$ is the $n \times n$ diagonal matrix derived from **D** by extracting its $i$ th row and column, and $p_i$ $(k_i)$ is the $i$ th element of $\pi^T$ $(\mathbf{k}^T)$. Relations (A.2)-(A.3) may be interpreted as the reduction of the 'production costs' (or, more precisely, the prices; see Sraffa, 1960, §7) to the 'production cost' (the price) of the commodity $i$ (see Dmitriev, 1974, pp. 61-64). From relation (A.2) we obtain

$$\pi_i^T = p_i\mathbf{c}_i^T(\mathbf{I} - \mathbf{C}_{(i)})^{-1} + \mathbf{k}_i^T(\mathbf{I} - \mathbf{C}_{(i)})^{-1}$$

or, recalling relation (13),

$$\pi_i^T = p_i\mathbf{v}_i^T + \mathbf{k}_i^T(\mathbf{I} - \mathbf{C}_{(i)})^{-1} \tag{A.4}$$

Substituting $\mathbf{k}_i^T \equiv (\pi_i^T\mathbf{C}_{(i)} + p_i\mathbf{c}_i^T)\mathbf{D}_{(i)}$ in (A.4) and after rearrangement we obtain

$$\pi_i^T = \mathbf{v}_i^T\mathbf{T}_{(i)} \tag{A.5}$$

where $\mathbf{T}_{(i)} \equiv p_i(\mathbf{I} - \mathbf{C}_{(i)})(\mathbf{I} + \mathbf{D}_{(i)})[\mathbf{I} - \mathbf{C}_{(i)}(\mathbf{I} + \mathbf{D}_{(i)})]^{-1}$ is a linear operator 'transforming' commodity $i$ values into prices. If $\pi_i^T = \pi_m^T = \mathbf{p}^T$, *i.e.*, prices are reduced to the price of labour, then we obtain $\mathbf{p}^T = \mathbf{v}^T\mathbf{T}_{(m)}$, where $\mathbf{T}_{(m)} \equiv w(\mathbf{I} - \mathbf{A})(\mathbf{I} + \hat{\mathbf{r}})[\mathbf{I} - \mathbf{A}(\mathbf{I} + \hat{\mathbf{r}})]^{-1}$ is the well known linear operator 'transforming' labour values into prices (see Pasinetti, 1977, ch. 5, Appendix; Reati, 1986).

When $\hat{\mathbf{r}} = \mathbf{0}$ and, therefore, $\mathbf{k}^T = \mathbf{0}^T$, relation (A.4) implies that

$$\pi_i^T = p_i\mathbf{v}_i^T \tag{A.6}$$

Thus, commodity $i$ values are proportional to prices. Finally, in the *special* case where the vectors of sectoral profit coefficients, $\mathbf{k}_i^T$, and direct input requirements of commodity $i$, $\mathbf{c}_i^T$, are linearly dependent, *i.e.*, $\mathbf{k}_i^T = z\mathbf{c}_i^T$, where $z$ is a positive real number, then from relation (A.4) we obtain

$$\pi_i^T = (p_i + z)\mathbf{v}_i^T \tag{A.7}$$

Therefore, commodity $i$ values are proportional to prices.

# APPENDIX 3: LABOUR VALUES (LV) AND PRICES OF PRODUCTION (POP) OF THE SWEDISH ECONOMY

**Table 3.1. LV; 1995**

| CPA | LV | CPA | LV |
|---|---|---|---|
| 01 | 0.0096 | 45 | 0.0143 |
| 02 | 0.0046 | 50⊕51⊕52 | 0.0132 |
| 05 | 0.0100 | 55 | 0.0128 |
| 10 | 0.0124 | 60 | 0.0121 |
| 11⊕13⊕14 | 0.0111 | 61 | 0.0117 |
| 15⊕16 | 0.0116 | 62 | 0.0126 |
| 17 | 0.0137 | 63 | 0.0104 |
| 18 | 0.0145 | 64 | 0.0124 |
| 19 | 0.0135 | 65 | 0.0085 |
| 20 | 0.0101 | 66 | 0.0123 |
| 21 | 0.0089 | 67 | 0.0156 |
| 22 | 0.0129 | 70 | 0.0061 |
| 23 | 0.0112 | 71 | 0.0113 |
| 24 | 0.0102 | 72 | 0.0144 |
| 25 | 0.0126 | 73 | 0.0150 |
| 26 | 0.0123 | 74 | 0.0143 |
| 27 | 0.0108 | 75 | 0.0143 |
| 28 | 0.0133 | 80 | 0.0164 |
| 29 | 0.0134 | 85 | 0.0173 |
| 30 | 0.0139 | 90 | 0.0109 |
| 31 | 0.0136 | 91 | 0.0184 |
| 32 | 0.0135 | 92 | 0.0131 |
| 33 | 0.0137 | 93 | 0.0125 |
| 34 | 0.0130 | 95 | 0.0219 |
| 35 | 0.0140 | REAL WAGE | 0.4693 |
| 36 | 0.0173 | | |
| 37 | 0.0114 | | |
| 40 | 0.0060 | | |
| 41 | 0.0077 | | |

**Table 3.2. POP; 1995**

| CPA | POP | CPA | POP |
|---|---|---|---|
| 01 | 0.1194 | 45 | 0.1448 |
| 02 | 0.0414 | 50⊕51⊕52 | 0.1236 |
| 05 | 0.1232 | 55 | 0.1360 |
| 10 | 0.1436 | 60 | 0.1218 |
| 11⊕13⊕14 | 0.1222 | 61 | 0.1597 |
| 15⊕16 | 0.1585 | 62 | 0.1388 |
| 17 | 0.1540 | 63 | 0.1120 |
| 18 | 0.1690 | 64 | 0.1217 |
| 19 | 0.1655 | 65 | 0.0799 |
| 20 | 0.1115 | 66 | 0.1088 |
| 21 | 0.1062 | 67 | 0.1407 |
| 22 | 0.1391 | 70 | 0.0697 |
| 23 | 0.1596 | 71 | 0.1212 |
| 24 | 0.1224 | 72 | 0.1480 |
| 25 | 0.1459 | 73 | 0.1475 |
| 26 | 0.1348 | 74 | 0.1445 |
| 27 | 0.1519 | 75 | 0.1333 |
| 28 | 0.1527 | 80 | 0.1345 |
| 29 | 0.1551 | 85 | 0.1410 |
| 30 | 0.1568 | 90 | 0.1118 |
| 31 | 0.1582 | 91 | 0.1535 |
| 32 | 0.1717 | 92 | 0.1281 |
| 33 | 0.1502 | 93 | 0.1259 |
| 34 | 0.1742 | 95 | 0.1476 |
| 35 | 0.1622 | REAL WAGE | 5.0518 |
| 36 | 0.1841 | | |
| 37 | 0.1458 | | |
| 40 | 0.0659 | | |
| 41 | 0.0872 | | |

**Table 3.3. LV; 2005**

| CPA | LV | CPA | LV |
|---|---|---|---|
| 01 | 0.0057 | 50⊕51⊕52 | 0.0057 |
| 02 | 0.0042 | 55 | 0.0056 |
| 05 | 0.0044 | 60 | 0.0049 |
| 10 | 0.0055 | 61 | 0.0049 |
| 11⊕13⊕14 | 0.0041 | 62 | 0.0052 |
| 15⊕16 | 0.0055 | 63 | 0.0046 |
| 17 | 0.0058 | 64 | 0.0051 |
| 18 | 0.0052 | 65 | 0.0041 |
| 19 | 0.0054 | 66 | 0.0042 |
| 20 | 0.0050 | 67 | 0.0068 |
| 21 | 0.0048 | 70 | 0.0028 |
| 22 | 0.0059 | 71 | 0.0047 |
| 23 | 0.0041 | 72 | 0.0058 |
| 24 | 0.0041 | 73⊕74 | 0.0057 |
| 25 | 0.0055 | 75 | 0.0059 |
| 26 | 0.0054 | 80 | 0.0069 |
| 27 | 0.0049 | 85 | 0.0072 |
| 28 | 0.0055 | 90 | 0.0047 |
| 29 | 0.0058 | 91 | 0.0075 |
| 30 | 0.0059 | 92 | 0.0052 |
| 31⊕32 | 0.0055 | 93 | 0.0043 |
| 33 | 0.0055 | 95 | 0.0089 |
| 34 | 0.0056 | REAL WAGE | 0.5037 |
| 35 | 0.0060 | | |
| 36 | 0.0071 | | |
| 37 | 0.0047 | | |
| 40 | 0.0029 | | |
| 41 | 0.0041 | | |
| 45 | 0.0062 | | |

**Table 3.4. POP; 2005**

| CPA | POP | CPA | POP |
|---|---|---|---|
| 01 | 0.1558 | 50⊕51⊕52 | 0.1315 |
| 02 | 0.0999 | 55 | 0.1402 |
| 05 | 0.1280 | 60 | 0.1245 |
| 10 | 0.1594 | 61 | 0.1571 |
| 11⊕13⊕14 | 0.1119 | 62 | 0.1573 |
| 15⊕16 | 0.1657 | 63 | 0.1332 |
| 17 | 0.1499 | 64 | 0.1346 |
| 18 | 0.1468 | 65 | 0.0879 |
| 19 | 0.1504 | 66 | 0.0872 |
| 20 | 0.1430 | 67 | 0.1414 |
| 21 | 0.1416 | 70 | 0.0774 |
| 22 | 0.1551 | 71 | 0.1162 |
| 23 | 0.1432 | 72 | 0.1343 |
| 24 | 0.1164 | 73⊕74 | 0.1359 |
| 25 | 0.1482 | 75 | 0.1309 |
| 26 | 0.1481 | 80 | 0.1367 |
| 27 | 0.1600 | 85 | 0.1399 |
| 28 | 0.1513 | 90 | 0.1230 |
| 29 | 0.1659 | 91 | 0.1522 |
| 30 | 0.1589 | 92 | 0.1269 |
| 31⊕32 | 0.1588 | 93 | 0.0979 |
| 33 | 0.1465 | 95 | 0.1505 |
| 34 | 0.1880 | REAL WAGE | 12.9749 |
| 35 | 0.1630 | | |
| 36 | 0.1892 | | |
| 37 | 0.1347 | | |
| 40 | 0.0784 | | |
| 41 | 0.1057 | | |
| 45 | 0.1503 | | |

# APPENDIX 4: COMMODITY VALUES (CV) OF THE SWEDISH ECONOMY

**Table 4.1. 'Wholesale and retail trade services values'; 1995**

| CPA | CV | CPA | CV |
|---|---|---|---|
| 01 | 0.2175 | 45 | 0.2672 |
| 02 | 0.0786 | **50⊕51⊕52** | **0.2190** |
| 05 | 0.2028 | 55 | 0.2454 |
| 10 | 0.2339 | 60 | 0.2269 |
| 11⊕13⊕14 | 0.2146 | 61 | 0.1998 |
| 15⊕16 | 0.2356 | 62 | 0.2114 |
| 17 | 0.2505 | 63 | 0.1804 |
| 18 | 0.2591 | 64 | 0.2002 |
| 19 | 0.2593 | 65 | 0.1309 |
| 20 | 0.1865 | 66 | 0.1846 |
| 21 | 0.1882 | 67 | 0.2360 |
| 22 | 0.2175 | 70 | 0.1105 |
| 23 | 0.2241 | 71 | 0.2174 |
| 24 | 0.1876 | 72 | 0.2440 |
| 25 | 0.2380 | 73 | 0.2569 |
| 26 | 0.2542 | 74 | 0.2366 |
| 27 | 0.2926 | 75 | 0.2330 |
| 28 | 0.2722 | 80 | 0.2503 |
| 29 | 0.2767 | 85 | 0.2656 |
| 30 | 0.2853 | 90 | 0.2033 |
| 31 | 0.2701 | 91 | 0.2906 |
| 32 | 0.2851 | 92 | 0.2502 |
| 33 | 0.2622 | 93 | 0.2377 |
| 34 | 0.2823 | 95 | 0.3063 |
| 35 | 0.2722 | REAL WAGE | 14.0095 |
| 36 | 0.3250 | | |
| 37 | 0.3091 | | |
| 40 | 0.1070 | | |
| 41 | 0.1447 | | |

**Table 4.2. 'Wholesale and retail trade services values'; 2005**

| CPA | CV | CPA | CV |
|---|---|---|---|
| 01 | 0.3042 | **50⊕51⊕52** | **0.2450** |
| 02 | 0.1982 | 55 | 0.2793 |
| 05 | 0.2557 | 60 | 0.2597 |
| 10 | 0.2603 | 61 | 0.2277 |
| 11⊕13⊕14 | 0.2166 | 62 | 0.2617 |
| 15⊕16 | 0.2815 | 63 | 0.2185 |
| 17 | 0.2664 | 64 | 0.2236 |
| 18 | 0.2384 | 65 | 0.1611 |
| 19 | 0.2547 | 66 | 0.1639 |
| 20 | 0.2416 | 67 | 0.2667 |
| 21 | 0.2486 | 70 | 0.1312 |
| 22 | 0.2542 | 71 | 0.2227 |
| 23 | 0.2162 | 72 | 0.2429 |
| 24 | 0.1918 | 73⊕74 | 0.2459 |
| 25 | 0.2651 | 75 | 0.2434 |
| 26 | 0.2737 | 80 | 0.2768 |
| 27 | 0.3048 | 85 | 0.2903 |
| 28 | 0.2782 | 90 | 0.2560 |
| 29 | 0.2972 | 91 | 0.3118 |
| 30 | 0.2942 | 92 | 0.2425 |
| 31⊕32 | 0.2637 | 93 | 0.1986 |
| 33 | 0.2655 | 95 | 0.3335 |
| 34 | 0.2986 | REAL WAGE | 37.4016 |
| 35 | 0.2916 | | |
| 36 | 0.3337 | | |
| 37 | 0.2245 | | |
| 40 | 0.1363 | | |
| 41 | 0.1876 | | |
| 45 | 0.2930 | | |

**Table 4.3. 'Construction work values'; 1995**

| CPA | CV | CPA | CV |
|---|---|---|---|
| 01 | 0.0679 | **45** | **0.0697** |
| 02 | 0.0303 | 50⊕51⊕52 | 0.0637 |
| 05 | 0.0476 | 55 | 0.0725 |
| 10 | 0.0676 | 60 | 0.0623 |
| 11⊕13⊕14 | 0.0709 | 61 | 0.0592 |
| 15⊕16 | 0.0671 | 62 | 0.0666 |
| 17 | 0.0657 | 63 | 0.0639 |
| 18 | 0.0685 | 64 | 0.0830 |
| 19 | 0.0689 | 65 | 0.0472 |
| 20 | 0.0547 | 66 | 0.0788 |
| 21 | 0.0497 | 67 | 0.0812 |
| 22 | 0.0647 | 70 | 0.1209 |
| 23 | 0.0731 | 71 | 0.0607 |
| 24 | 0.0537 | 72 | 0.0687 |
| 25 | 0.0632 | 73 | 0.0756 |
| 26 | 0.0657 | 74 | 0.0704 |
| 27 | 0.0618 | 75 | 0.0894 |
| 28 | 0.0665 | 80 | 0.0872 |
| 29 | 0.0648 | 85 | 0.0834 |
| 30 | 0.0650 | 90 | 0.0667 |
| 31 | 0.0674 | 91 | 0.0972 |
| 32 | 0.0649 | 92 | 0.0759 |
| 33 | 0.0645 | 93 | 0.0650 |
| 34 | 0.0622 | 95 | 0.0814 |
| 35 | 0.0684 | REAL WAGE | 3.7240 |
| 36 | 0.0851 | | |
| 37 | 0.0611 | | |
| 40 | 0.0502 | | |
| 41 | 0.0990 | | |

**Table 4.4. 'Financial intermediation services values'; 2005**

| CPA | CV | CPA | CV |
|---|---|---|---|
| 01 | 0.0976 | 50⊕51⊕52 | 0.0895 |
| 02 | 0.0709 | 55 | 0.0910 |
| 05 | 0.0809 | 60 | 0.0762 |
| 10 | 0.0897 | 61 | 0.0904 |
| 11⊕13⊕14 | 0.0657 | 62 | 0.0846 |
| 15⊕16 | 0.0903 | 63 | 0.0754 |
| 17 | 0.0895 | 64 | 0.0852 |
| 18 | 0.0827 | **65** | **0.1001** |
| 19 | 0.0850 | 66 | 0.1201 |
| 20 | 0.0830 | 67 | 0.1065 |
| 21 | 0.0797 | 70 | 0.0921 |
| 22 | 0.0916 | 71 | 0.0744 |
| 23 | 0.0701 | 72 | 0.0887 |
| 24 | 0.0666 | 73⊕74 | 0.0881 |
| 25 | 0.0851 | 75 | 0.0912 |
| 26 | 0.0850 | 80 | 0.0962 |
| 27 | 0.0828 | 85 | 0.0972 |
| 28 | 0.0864 | 90 | 0.0847 |
| 29 | 0.0921 | 91 | 0.1111 |
| 30 | 0.0951 | 92 | 0.0860 |
| 31⊕32 | 0.0885 | 93 | 0.0725 |
| 33 | 0.0853 | 95 | 0.1109 |
| 34 | 0.0939 | REAL WAGE | 12.3952 |
| 35 | 0.0927 | | |
| 36 | 0.1109 | | |
| 37 | 0.0766 | | |
| 40 | 0.0522 | | |
| 41 | 0.0720 | | |
| 45 | 0.0925 | | |

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