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Peru Labor Market Study

Background Paper on Labor Productivity

Final Report

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INTRODUCTION

In the last 4 years Peruvian economic growth performance has been outstanding compared to other Latin American countries with an average real GDP and urban employment growth rates of 8.3% and 8.7% respectively in period 2005-2008 (BCRP, 2009). Despite of this impressive record, labor productivity growth during the post liberal reforms period (1991-2005) has been lower than East Asian countries and United States. Thus, according to World Bank Development Indicators (WDI, 2009), the annual average GDP per capita rate of growth in such a period were 0.9%; 0.3%; 2.7%, 1.8% for Peru, Latin America and Caribbean (LACs), East Asia and the United States[2]. This low per capita GDP rate of growth has been implied that by 2007, labor productivity[3] (or GDP per worker) of Peru were lower than other middle income (large, medium and small size) Latin American and Caribbean countries such as Brazil, Argentina, Mexico, Colombia, Chile, and Costa Rica[4]. Furthermore, productive and trade structure has not changed in the last 40 years despite of economic crisis (internal or international) or development economic policy regimes (inward and outward oriented) experienced in period 1970-2008. On the one hand, Peruvian GDP is concentrated in primary activities (e.g., agriculture, fishing and minerals), light manufacturing industries with lower degree of processing and services (Table No 1 and Tello, 2009b). On the other hand, exports are still concentrated in primary products. In 2007, primary exports represented 84% of the total export value and mining products represented 62% (BCRP, 2009).

Understanding the low dynamism of output per worker or labor productivity and its implications on productive and trade structure in Peru demands on the one hand and at the macro level, an analysis of the sectoral dynamic of labor productivity and on the other hand at micro or firm level, an analysis of productive features shared by firms throughout this dynamic. In the case of Peru, unavailability of data series at the sectoral and micro (i.e, firm or worker) levels has limited research on this area. Fortunately, since beginning of 1990s, data availability in some developing countries (including Peru) has originated an extensive literature on new theoretical models and methodologies on the micro analysis of labor productivity and structural productive changes.

Taking advantage of these new data for Peru, this paper takes these two levels of analysis with the purpose to understand the dynamic of labor productivity in Peru throughout period 1997-2007 wherein two sub-periods are identified: a deceleration or 'recession' period, 1997-2001 of slow GDP economic growth and decreasing terms of trade[5] and an acceleration or 'booming' period, 2002-2007 with relative high GDP and terms of trade rates of growth[6]. At the sectoral-macro level of analysis, the objectives of this paper are to

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[2] Similarly total factor productivity rate of growth during the post liberal reforms has been lower than Asian countries and United States (Blyde and Fernandez-Arias, 2005). It should be also added that by 2005 GDP (in 2000 US$) per capita for Peru was 4863 and the average for Latin America and Caribbean Countries and East Asia economies and United States were 8780, 2406, 71400.

[3] Labor productivity is measured by the ratio of real GDP or value added over employed labor force. Note that GDP per worker is a fraction of the output value per worker. Physical output per worker, by economic theory depends upon the capital labor ratio, other tangible factors per worker, and total factor productivity. Consequently, changes of labor productivity may be associated to changes in total factor productivity, capital labor ratios and changes of the others tangibles factors per worker.

[4] See Table No A10 from the Appendix Table.

[5] The average annual rate of change of the GDP (in $1994) was close to 1% and for the terms of trade -4.4%.

[6] These rates were 6% and 9.1% respectively.

describe the changes in employment, value added, and labor productivity throughout period 1997-2007 and to perform a sectoral decomposition analysis of such variables. At this level and in contrast to previous results (e.g., Timmer and de Vries, 2007 and 2007), it is found that in both booming and recession periods, labor productivity changes in Peruvian economy are primarily explained by reallocation of employment between sectors rather than changes in labor productivity within sectors. On the other hand, labor productivity improvement in the manufacturing sector in the booming period 2002-2007 has been more important than labor productivity growth in some low labor-productivity services sectors (e.g., household and education services and hotels and restaurants) and the agriculture sector. Conversely, in the recession period 1997-2001, the decline of labor productivity in some low-productivity services sectors and the agriculture sector (when differences between average and marginal labor productivity is taken into account) have been more important to explain the decrease of the labor productivity of the economy than the decrease of labor-productivity in the manufacturing sector.

At the firm level of analysis, this paper focus on manufacturing formal enterprises which changes their level of employment and on the estimation of the size of urban informal microenterprises from all the sectors of the economy in the booming period 2002-2007. Three are the objectives of the paper at this level of analysis. First, to estimate the rates of job gross flows of a sample of firms in the manufacturing formal sector and identify a set of firms specific productive features (such as labor productivity, capital-labor ratio, export-ratio, etc.) associated to those formal firms in the booming period. Second to estimate the contribution of the reallocation of employment effects upon labor productivity dynamic at the level of a sample of (medium and large size) firms of the manufacturing formal sector analogous to the decomposition estimated at the macro level. Third, to estimate the size of the urban informal micro-enterprise sector of Peruvian economy in term of employment, real output value and labor productivity as well as to identify a set of demographic, educational and productive characteristics (e.g., size and age) of these micro-entrepreneurs and microenterprises.

The evidence at the micro level shows, that in the booming period, the rate of growth of labor productivity of the manufacturing sector is mainly explained by the labor productivity rate of growth of formal medium and large size firms rather than for non-farm informal microenterprises of the urban sector. On the other hand, the reallocation of employment within the manufacturing formal sector also has played an important role in the labor productivity rate of growth of this sector, in particular from firms which decreased their level of employment.

With regard to the informal micro-enterprises (IME) in urban areas accounting for a significant proportion of the workforce, in the booming period 2002-2007 employment of the whole IMEs sector have grown at annual rates higher than the overall economy but the value added grown at a lower rate. As a consequence, the average product of labor (i.e. value added per worker) declined during this period. Consequently, productivity growth in the economy in this period, in contrast with the behavior of the IMEs, is a result of productivity growth in the formal sector (modern establishments with relatively larger size). As it is shown in the paper, this has been the case for the manufacturing sector.

The evidence reported in this paper is based on two sets of data. One is the National Households Survey (Encuesta Nacional de Hogares, ENAHO) available since 1997 and the other is the National Economic Survey of Manufactures (Encuesta Económica Anual

del Sector Manufacturero) available for this research for the years of 2002, 2005, 2006 and 2007. GDP figures at the sectoral level are provided by the National Institute of Statistics and Information, INEI (2009).

The paper is divided in four sections. Section I deals with the sectoral level of the analysis. Sections II and III deals with the firm level of the analysis. The former section present the association between changes in employment and labor productivity and a set of productive features of firms in the Peruvian manufacturing sector for period 2002-2007 and the latter section presents the respective associations for a sample of the Peruvian urban informal microenterprises sector. Section IV provides a summary of the main findings of the paper.

I. LABOR PRODUCTIVITY AND EMPLOYMENT DYNAMIC BY SECTORS IN PERU, 1997-2007

Recurrent acceleration and decelerations periods of growth in relative short periods of time (e.g., 10 years) rather than a sustainable and positive economic growth trend in long periods of time are more common in developing than in developed countries In this regard, understanding features of the accelerations and decelerations growth episodes may provide more information on the economic development and growth process in less developing economies than focusing on the average economic growth of longer periods in these economies (Prichett, 2000). Parallel to this change in the focus of the economic growth process, economic developers and growth researchers today have resumed to the old and long tradition represented in the contributions of Chenery and associates (Chenery *et al*, 1986) to single out, as in 1980s, the importance of sectoral development patterns and changes in their composition on the impact of labor and total factor productivity which (and eventually) may led to economic growth. Thus, Timmer and de Vries (2008) and Jones and Olken (2008) have argued that sectoral labor reallocation caused by differences in labor productivities may be associated to the ups and downs periods of per capita GDP growth of an economy. In addition, Temple and Woessmann (2006) have shown the significance of structural change in generating growth (through changes in total factor productivity) by the reallocation of labor towards sectors with higher marginal productivity[7].

Based on these developments of the economic growth literature and using the household survey data from Peru (ENAHO, National Household Survey) for period 1997-2007, the objective of this section is to estimate the sectoral changes in employment, valued added and labor productivity originated by the reallocation of labor among sectors in the economy during the recession and expansions sub-periods of the GDP occurred in those 10 years period.

I.1 Literature Review

In general, literature on Peruvian labor productivity and its estimations in relative long periods of time have been scanty as suggested by Iguiñiz y Barrantes (2004); Garavito (2008) and Yamada (2004). Among the most relevant studies are on the first place the work Timmer and de Vries (2008). Using different data sources, they estimate the

[7] Linked to this is a renewed interest in the development patterns of particular sectors such as agriculture (e.g., Gollin *et al.,* 2002; World Bank 2007) and manufacturing (Imbs and Wacziarg, 2003; Jones and Olken, 2008).

sectoral contribution on the average annual GDP per worker rate of growth in period 1960-2005, wherein GDP is composed in 4 sectors: agriculture, manufacturing, market services (which include wholesale and retail trade, transport and communication and financial services) and non-market services (which include community, social and personal services and government services). The change of GDP per worker is decomposed in two effects. The within or intra-sectors effects which measures the contribution to the overall labor productivity growth of the economy due to the changes of labor productivity within each sector. A positive within sector effect means that labor productivity has increased during the period and a negative number that it has decreased. The shift or between effects which measures the contribution to the overall labor productivity growth of the economy due to the changes of labor shares of each sector. A negative shift effect means that labor from a low labor productivity sector has been reallocated to other sectors of higher labor productivity and a positive value means that labor from other sectors of low labor productivity sectors has been reallocated to a sector of higher labor productivity.

Timmer and de Vries (2008) results indicate on the one hand, that in recession periods of relative high decreasing rates of GDP per worker growth, all Peruvian sectors decreases their respective GDP per worker level. In recessions periods of low decreasing rates of GDP per worker growth, the sectors which contribute the most to the reduction of GDP per worker are manufacturing, market and non-market services. In both cases, most of the variation of GDP per worker is explained by the within industry effect. On the other hand, in booming periods all the sectors grow, however the manufacturing and the market services are the sectors which contribute the most.

A second study is provided by the last World Development Report (World Bank, 2008). In this study is suggested that in urbanized countries such as Peru[8], for period 1993-2005, the agriculture sector (which includes hunting and forestry) contributes in a higher proportion to the increase of labor productivity than the non-agricultural sector, whereas agriculture employment growth rate is lower than the respective rate from the non-agricultural sector. Consistent with this result, Martin and Mitra (2001) reports a higher TFP rate of growth for the agriculture than the manufacturing sector for period 1967-1992 for the Peruvian economy.

A third group of studies are those of Chacaltana (2008), Chang (2007), and Villarán (2007). They report that output value per worker is positively related to firm's size. Thus, large firms have higher level of output per worker than small firms. On the other hand, in the boom period of 2002-2007, the rate of employment growth also has varied positively with firms' size (i.e, larger firms has created higher rate of employment than small firms).

I.2 Methodology and Sources of Data

This section estimates labor productivity throughout the recession and booming periods during the 1997-2007 for 11 sectors of Peruvian economy[9]. The estimations are based upon on the employment figures from National Households Survey (i.e., ENAHO) carried

[8] Urbanized countries (e.g., Latin American and Caribbean, and European and Central Asian countries) are countries with an average share of the agriculture sector value added out of total GDP of around 5% and with around 18% of labor share out of total employment.

[9] A more disaggregated level of sectors is shown in the Appendix Tables. In this case, 39 sectors are included in these tables.

out by the National Institute of Statistics and Information (INEI) during period 1997-2007. In this survey, employment is defined as the number of people from 14 years old or more who were working at least one hour during the last week compared to the day wherein the survey interview was implemented. The employed labor force includes employers, wage-earners, self-employees, unpaid family workers and housekeepers (or maids). Two employment figures are used. One are the expanded figures from ENAHO, which represents the estimated number of workers employed (denoted by L1) and the other the 'standardized employment' level of people working 40 hours per week (denoted as L2) which represents the estimated number of people working 40 hours per weeks. In general the estimated number of workers has been greater than the number of standardized workers. Labor productivity using the number of workers is denoted by LP1 and the estimated labor productivity using the number of standardized workers is denoted by LP2. Since in most of the sectors and years of period 1997-2007, the number of workers has been higher than the number of standardized workers then labor productivity per worker has been lower than the labor productivity per standardized worker[10]. Differences in the changes of those numbers of workers will mean that the people are also changing the number of hours of work per week. Value added[11] data is obtained from INEI (2009).

In the traditional methodology (summarized in the Appendix of Formulas) labor productivity growth for an economy (or a group of sectors) is decomposed into the within or intra-sectors effects and the between or shifts effects among sectors. This decomposition is expressed as an accounting identity. However, Timmer and de Vries (2008) postulate an alternative interpretation of this 'traditional or standard decomposition'. They argue that the split between within and between effects in the standard decomposition is based on the assumption that marginal and average labor productivity in a sector are equal, or put otherwise, that labor productivity growth is independent of the changes in employment. Whereas this assumption may hold for short periods of time and for most of sectors of a developing economy, this might be not the case for the agriculture sector wherein most of people are living in poverty conditions[12].

In consequence and according to Timmer and de Vries (2008), the existence of surplus labor or disguised employment in the agricultural sector is a typical phenomenon in many countries in early stages of development. Thus, as long as marginal productivity is below average productivity, a decline in the number of agricultural workers will by definition raise the average labor productivity level in agriculture and the difference between average and marginal productivity in agriculture will end up in the within-effect, whereas its effect actually arises from the shift of labor in response to the opening up of new employment opportunities elsewhere in the economy. This suggests that (part of) the within-contribution of agriculture should be allocated to the between-contribution of other sectors. To accommodate this important shortcoming, the traditional decomposition is

[10] In some sectors (e.g., Electricity and Water) people may have worked overtime and more than the 40 hours an week, consequently in these cases L2 has been higher than L1 and LP1<LP2.

[11] Value added does not include direct or indirect taxes.

[12] In the case of Peru, in 2007 the Agriculture (including Forestry and Hunting) sector contributed close to 9% of the total value added of the economy and provided employment to 34% of the labor force (i.e, the highest labor share among the sectors analyzed in this paper). Most of the activities in this sector are carried out by small productive units wherein it is estimated that around 23% of the total land cultivated in the sector are used to produce export products. Moreover, most of the families in the agriculture sector and rural areas belong to the segment of the population living in poor conditions (Tello, 2008).

modified following the steps shown in Box No 1. A detailed list of formulas is described in the Appendix of Formulas.

As it shown below, and in contrast to the role played by the agriculture sector found in previous studies, when differences between average and marginal labor productivity are taken into account, the agriculture contribution on labor productivity is lower than the respective contribution of non-agriculture sector. Moreover, its contribution is negative. Contrarily, employment contribution of the agriculture sector is positive and higher in the recession period 1997-2001 than in the booming period 2002-2007.

Box No 1

Assuming that people who leave the agriculture sector are marginal workers with a lower productivity than those who stay behind. Then the adjusted decomposition includes the following steps: i) an adjusted labor productivity of those workers who stay in the agriculture sector is estimated; ii) a new within effect of the agriculture is estimated using that adjusted labor productivity; iii) the between effect for the agriculture when workers leave this sector is imputed to be zero. No adjustment is made otherwise; iv) the remainder of the original within-contribution of the agriculture sector is distributed across those sectors that expand their labor shares in proportion to their share in total expansion. Here it is assumed that agriculture workers who leave this sector will move to those expanding sectors; v) for those sectors who shrinks their labor share the between effects are also imputed to be zero; vi) finally, the adjusted sectoral labor productivity growth decomposition assumes a ratio of marginal to average labor productivity of (ε=) 0.410 for Peru which was estimated by Timmer and de Vries (2008).

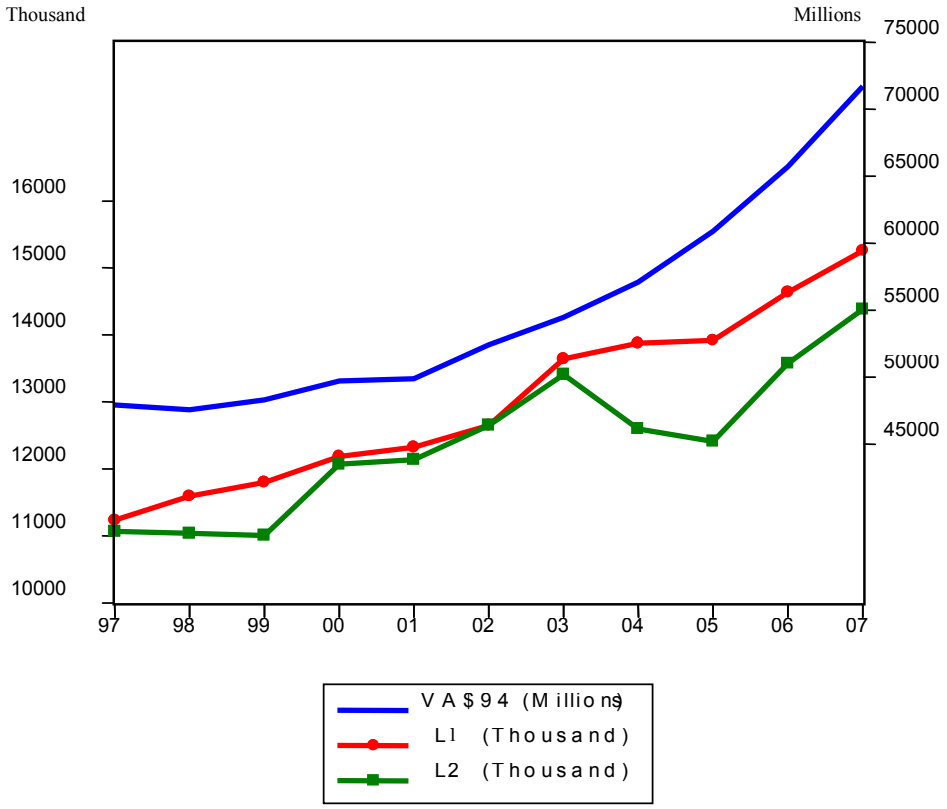
I.3 Results

Figures in Tables No I.1 (A and B) and I.2 (A and B) summarize in numbers the behavior of total valued added, employment and value added per employed worker for period 1997-2007 shown in Graphs No 1 and 2. Tables No I.2A and No I.2B indicates that the average annual rates of growth for value added and both measures of employment (i.e. L1 and L2) were respectively 0.99%, 2.3% in the recession period of 1998-2001 and 6.1%, 3.6% and 2.8% in the booming period of 2002-2007. The estimated average rates of growth of labor productivity using workers and standard workers were -1.349% and -1.383 respectively in period 1998-2001 and 2.4% and 3.1% in period 2002-2007. One important distinction between the number of workers and the standardized workers observed in Graph No 1 is that whereas the former always has increased during the 1997-2007, the latter has decreased in certain periods of time, specifically in periods 1997-1999 and 2003-2005. This indicates that in those periods the number people who worked less than 40 hours increased.

Tables No I.1A and No I.1B show the sectoral share in value added and employment for 11 sectors of Peru in period 1997-2007 and the labor productivity of each sector relative to the labor productivity for the whole economy. The figures in this table show that in both periods, the agricultural sector together with the wholesale and retail trade, and services sectors (which includes real state activities, hotels and restaurants, household services, human health, private education and government services) employed close to 80% of total occupied labor force. Manufacturing sector is the fourth most important sector in terms of employment generation: its share is around 9%. Close to 45% of the manufacturing labor force is employed in the textiles, wearing apparels, woods and

furniture sectors. Those 4 sectors with the highest employment share also explain around 80% of total real value added in both periods.

GRAPH No 1
Real Value Added and Employment of Peru, 1997-2007



GRAPH No 2 Real Value Added Per Employed Worker, Peru 1997-2007

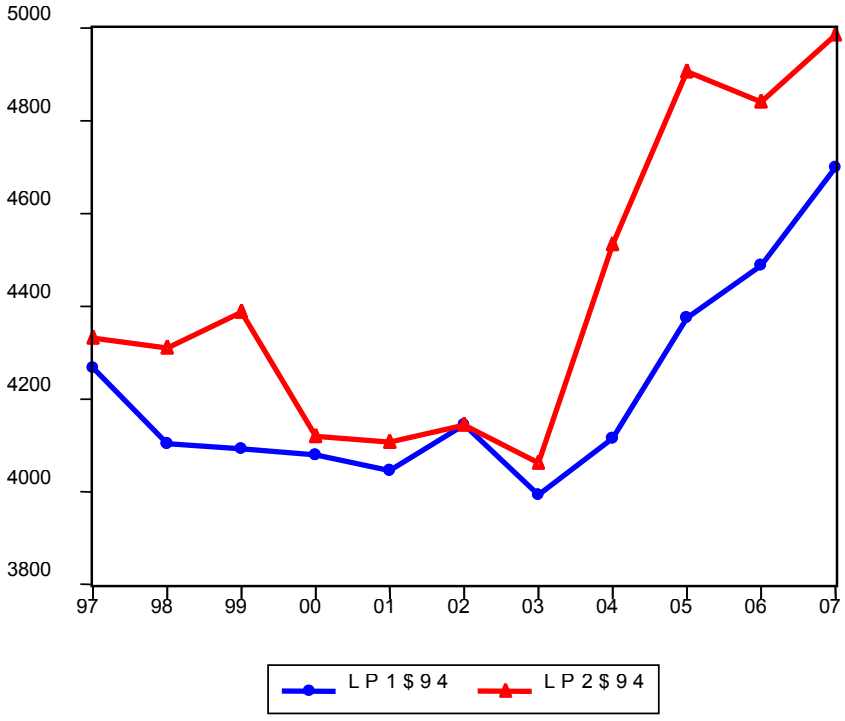


TABLE No I.1A

Average Annual Value Added (VA) and Number of Workers Shares (L1) and Relative Value Added per Worker (LP1) by Sectors, Peru, 1997-2007 (%)

Sector/Period	1997-2001			2002-2007		
	VA	L1	LP1	VA	L1	LP1
Agriculture, Hunting and Forestry	9.3	34.0	27.3	9.3	36.7	25.5
Fishing	0.6	0.6	96.8	0.6	0.6	104.6
Mining and Quarrying	5.9	0.5	1170.0	7.0	0.8	885.7
Manufacturing	16.4	9.2	179.8	16.9	9.5	179.4
Electricity and Water	2.3	0.3	906.4	2.3	0.2	1152.1
Construction	6.1	3.9	158.2	5.6	3.4	162.8
Wholesale and Retail Trade	16.0	19.4	82.4	15.8	17.1	92.2
Transport and Communications	8.7	5.3	165.8	9.0	5.5	163.2
Financial Services	2.8	0.3	1058.8	2.4	0.3	837.8
Insurance Services	0.3	0.1	616.6	0.5	0.1	783.7
Rest of Services	31.6	26.5	119.5	30.6	25.9	118.2
Total (%)	100	100	100	100	100	100
TOTAL (in million of dollars, thousand of workers, and dollar per worker respectively)	48752.9	11,827.4	4122.1	60477.5	13997.3	4320.7

Source: Authors estimations. INEI (2009), INEI (1997-2007). Shares computed using: i) Valued added (VA) in constant soles of 1994; ii) L1 number of employed workers; iii) L2 number of workers standardized by a journal work of 40 hours a week and iv) Value added per employed worker (LP) in constant soles of 1994 per worker.

TABLE No I.1B

Average Annual Value Added (VA) and Number of Standardized Workers Shares (L2) and Relative Value Added per Standardized Worker (LP2) by Sectors, Peru, 1997-2007 (%)

Sector/Period	1997-2001			2002-2007		
	VA	L2	LP2	VA	L2	LP2
Agriculture, Hunting and Forestry	9.3	28.1	33.2	9.3	30.7	30.4
Fishing	0.6	0.7	88.7	0.6	0.6	96.5
Mining and Quarrying	5.9	0.7	865.4	7.0	1.0	702.8
Manufacturing	16.4	9.4	176.4	16.9	9.9	170.9
Electricity and Water	2.3	0.3	732.4	2.3	0.2	948.1
Construction	6.1	4.2	145.9	5.6	3.7	149.9
Wholesale and Retail Trade	16.0	21.6	74.3	15.8	19.5	80.8
Transport and Communications	8.7	7.6	115.6	9.0	7.6	117.9
Financial Services	2.8	0.4	874.5	2.4	0.3	758.7
Insurance Services	0.3	0.2	426.2	0.5	0.1	820.9
Rest of Services	31.6	27.0	117.1	30.6	26.2	117.1
Total (%)	100	100	100	100	100	100
TOTAL (in million of dollars, thousand of workers, and dollar per worker respectively)	48752.9	11464.1	4252.7	60477.5	13170.8	4,591.8

Source: Authors estimations. INEI (2009), INEI (1997-2007). Shares computed using: i) Valued added (VA) in constant soles of 1994; ii) L1 number of employed workers; iii) L2 number of workers standardized by a journal work of 40 hours a week and iv) Value added per employed worker (LP) in constant soles of 1994 per worker.

TABLE No I.2A

Sectoral Average Annual Rate of Growth and Contribution in Value Added (VA), Number of Workers (L1) and Labor Productivity (LP1): Peru 1997-2007 (%)

Sector/Period	Average Annual Rate of Growth						Annual Growth Contribution			
	1997-2001			2002-2007			1998-2001		2002-2007	
	VA	L1	LP1	VA	L1	LP1	VA	L1	VA	L1
Agriculture, Hunting and Forestry	4.447	4.815	-0.227	4.124	2.518	1.735	0.398	1.591	0.375	0.903
Fishing	3.545	0.744	3.923	6.498	5.152	3.426	0.013	-0.007	0.033	0.023
Mining and Quarrying	7.283	-9.089	18.415	5.873	21.987	-10.91	0.411	-0.050	0.397	0.124
Manufacturing	0.560	1.376	-0.576	7.071	5.456	1.764	0.079	0.097	1.152	0.492
Electricity and Water	3.503	-11.39	19.541	5.754	4.604	6.986	0.077	-0.032	0.129	0.004
Construction	-5.737	-2.557	-2.556	9.435	5.505	4.183	-0.361	-0.119	0.498	0.176
Wholesale and Retail Trade	0.165	0.557	-0.093	6.579	2.418	4.253	0.017	0.090	0.998	0.389
Transport and Communications	0.819	2.769	-1.368	8.606	7.256	1.372	0.070	0.129	0.735	0.381
Financial Services	-6.179	-12.54	33.692	9.116	16.055	-1.875	-0.178	-0.070	0.209	0.032
Insurance Services	11.836	31.673	338.746	12.483	23.342	10.364	0.019	-0.014	0.047	0.008
Rest of Services	1.406	2.722	-1.181	4.930	4.109	0.905	0.441	0.700	1.479	1.028
Total (%)	0.987	2.315	-1.349	6.051	3.559	2.417	0.987	2.315	6.051	3.559

Source: Table No 1, Authors estimations. INEI (2009), INEI(1997-2007).

TABLE No I.2B
Sectoral Average Annual Rate of Growth and Contribution in Value Added (VA), Number of Standardized Workers (L2) and Labor Productivity (LP2): Peru 1997-2007 (%)

Sector/Period	Average Annual Rate of Growth						Annual Growth Contribution			
	1997-2001			2002-2007			1998-2001		2002-2007	
	VA	L2	LP2	VA	L2	LP2	VA	L2	VA	L2
Agriculture, Hunting and Forestry	4.447	5.474	-0.754	4.124	1.003	3.252	0.398	1.481	0.375	0.295
Fishing	3.545	5.840	12.861	6.498	8.124	5.337	0.013	-0.026	0.033	0.024
Mining and Quarrying	7.283	-9.008	19.037	5.873	19.157	-8.909	0.411	-0.072	0.397	0.141
Manufacturing	0.560	2.395	-0.986	7.071	5.243	2.193	0.079	0.151	1.152	0.499
Electricity and Water	3.503	-8.205	18.465	5.754	2.111	7.600	0.077	-0.031	0.129	0.002
Construction	-5.737	-2.820	-2.347	9.435	5.826	4.556	-0.361	-0.149	0.498	0.191
Wholesale and Retail Trade	0.165	2.132	-0.717	6.579	1.762	5.031	0.017	0.316	0.998	0.307
Transport and Communications	0.819	1.711	-0.175	8.606	6.781	2.524	0.070	0.116	0.735	0.472
Financial Services	-6.179	-12.22	42.865	9.116	15.289	0.918	-0.178	-0.105	0.209	0.033
Insurance Services	11.836	29.641	292.717	12.483	24.895	19.735	0.019	-0.015	0.047	0.007
Rest of Services	1.406	2.435	-0.967	4.930	3.563	1.834	0.441	0.649	1.479	0.854
Total (%)	0.987	2.314	-1.383	6.051	2.824	3.068	0.987	2.314	6.051	2.824

Source: Table No 1, Authors estimations. INEI (2009), INEI(1997-2007).

In regard to labor productivity, the sectors with the highest level of labor productivity in order of importance are: mining and quarrying, financial services, electricity and insurance services. The first two sectors decrease their relative labor productivities with respect to the average labor productivity of the economy in the booming period 2002-2007 and the other two sectors increase their respective relative labor productivities. The differences in this pattern in part can be attributed to the fact that employment shares of electricity and water, and insurance services have been decreasing throughout the period 1997-2007, whereas the respective employment shares of mining and quarrying and financial services have responded to the changes of the aggregate demand (external and internal respectively), increasing in the period of expansion 2002-2007 and decreasing in the recessive period 1997-2007

On the other end, the agriculture is the sector with the lowest level of labor productivity and its relative labor productivity with respect to the average of the economy has decreased in the booming period of 2002-2007. The next two sectors with the lowest labor productivity are fishing and wholesale and retail trade sectors. In contrast to the agriculture sector, relative labor productivity with respect to the average labor productivity of the economy in these two sectors has increased in the booming period of 2002-2007. Within the services sector, the hotel and restaurants, household and private education services are the ones with the lowest labor productivity, and their labor

productivity have been lower than the average labor productivity of the economy. Except for the private education services, relative labor productivity in the other two services sectors with respect to the average labor productivity of the economy has decreased in period 2002-2007[13].

In the last three sectors the relative level of the labor productivity ratio also differs. This ratio in the manufacturing and construction sectors seems to increase in the booming period and in the transport and communications sector is not clear its changes. These depend upon the measure of the labor productivity indicator. In terms of the number of workers, relative labor productivity decreased in the booming period and in terms of the number of standardized workers it increased.

Tables No I.2A and No I.2B show the sectoral growth contribution in value added and employment for the same 11 sectors of Peru in period 1997-2007. The behavior of these sectors in terms of output, employment and labor productivity also differs through the growth dynamic of period 1997-2007. Thus, in the booming period 2002-2007, the contribution in employment and real output (or value added) of the manufacturing sector has been higher than the respective contribution in the recession period 1997-2001. This suggests that this sector (as many others) is very sensitive to changes to internal demand: the growth rates in output and employment in this sector were higher than the respective rates for the economy in the booming period and the reverse in the recession period. Except for the agriculture and mining and quarrying sectors, the same pattern of the sectoral contribution of manufactures follows the rest of sectors (i.e., fishing, transport and communication, construction, electricity, and financial and insurance services) although at different degrees of response to the changes of (internal and external) demand.

In the case of the agriculture sector, the output and employment contribution have been higher in the recession than the booming period. This has implied that the growth rates of output and employment in this sector in the recession period have been higher than the respective rates for the economy in the booming period. This suggests that agriculture workers in the booming period might have moved to other sectors with higher wages and labor productivities and/or due to the fact there were new jobs opportunities in those other sectors originated by the increased (internal and external) demand.

On the other hand, the output contribution in the recession period was higher than in the booming period for the mining and quarrying sector whereas this pattern is reversed in terms of its employment contribution. This result comes from the fact that in the recession period the output rate of growth has been higher than the respective average for the economy whereas the employment rate of growth has been negative and lower than respective average of the economy. The reverse occurred in the booming period. The difference in output and employment behavior of the mining and quarrying sector suggests that employment is more sensitive to changes of (external or internal) demand than output. Since most of the output from this sector is exported then output level in the mining and quarrying sector seems to be less sensitive to changes in its prices[14].

[13] See Table No A1 from the Appendix Tables.
[14] Prices in this sector increased only 1.6% in period 1998-2001 and its output 7.3% whereas this rate was 20.7% in period 2002-2007 and its output 5.9%.

Tables from No I.3 to I.6[15] and their respective Graphs from No 3 to 6 show the sectoral contribution of labor productivity and its growth decomposition. Tables No I.3, I.5 and Graphs No 3 and 4 describe the labor productivity growth decomposition by sectors without taking any adjustment due to differences in average and marginal labor productivity in the agriculture and Tables No I.4, I.6 and Graph No 5 and 6 show the figures for the adjusted decomposition.

The overall figures for most of the sectors in Peruvian economy show that in contrast to Timmer and de Vries (2008) results, the between sector effects rather than the within sector effects explain in a greater proportion the labor productivity growth in the economy in period 1997-2007 regardless of the methods or employment figures (workers and standardized workers) used. This is mainly explained by the fact that Timmer and de Vries (2008) employment estimations includes only the formal sector whereas the employment figures reported in this paper includes both formal and informal sectors. This means that the reallocation of resources between the formal and informal sectors may explain the importance of the between sector effects in the economy[16].

On the other hand, there are three major differences between the standard decomposition and the adjusted one. First, a negative between sector effects for the agriculture sector may occur even when this sector expand in employment (e.g. period 2002-2007). Thus and in any period, when labor moves from shrinking sectors towards the agriculture sector (i.e., when employment in the agriculture sector increases), if the average labor productivity in this sector is lower than the labor productivity of the shrinking sector would imply that labor productivity for the economy would decrease despite of the fact that employment in the agriculture sector is increasing. In the traditional method, an expansion of employment in the agriculture sector contributes positively to labor productivity of the economy since the labor productivity in the agriculture is assumed constant when labor reallocates from other sectors to the agriculture sector.

Second, the within effect of the agriculture would be reduced compared with the traditional method only if for a period (or year) employment in the agriculture decreases (e.g., period 2001-2002 where employment in this sector decreased). This has not been the case for the number of workers for period 1998-2001. Third, the between sector effects for the non-agriculture sectors in the adjusted method will be higher (e.g., in manufactures and electricity and water in period 2002-2007) or lower (e.g., in mining and quarrying in period 2002-2007) than the respective effects of the traditional method depending upon the changes in employment of the agriculture sector and the differences between the labor productivity of a particular non-agriculture sector and the average labor productivity of the shrinking sectors.

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[15] Tables from No A3 to A6 in the Appendix Tables show the same figures for the sectoral decomposition of 39 sectors. Tables A3 and A5 presents the figures of the traditional labor productivity decomposition and Tables No A4 and A6 for the adjusted decomposition. The Mining and Quarrying sector in the tables of the text includes the Extraction of Petroleum branch. On the other hand, the Manufacturing sector in the text tables includes Refineries of Petroleum. Although the total labor productivity growth contribution of each sector does not change whenever a sector is disaggregated in several branches, the sum of the within and between effects of these disaggregated branches are not necessarily the same as the respective effects in the more aggregated sector.

[16] Saavedra *et al* (2001) show that the employment growth in the informal sector is fundamentally due to the growth of labor allocation in these traditionally informal sectors and is to a lesser extent due to the growth of informality within these sectors.

TABLE No I.3

Average Annual Growth Rate Contribution in Value Added Per Worker- L1 by Sector, Peru 1998-2007 (%)

Sector/Period	1998-2001			2002-2007		
	Within Sectors	Between Sectors	Total	Within Sectors	Between Sectors	Total
Agriculture, Hunting and Forestry	-0.042	0.226	0.184	0.130	-0.096	0.033
Fishing	0.022	-0.023	-0.001	0.009	0.003	0.012
Mining and Quarrying	0.987	-0.708	0.278	-0.885	1.029	0.144
Manufacturing	-0.106	-0.200	-0.306	0.275	0.262	0.537
Electricity and Water	0.391	-0.366	0.025	0.092	-0.047	0.045
Construction	-0.167	-0.342	-0.508	0.203	0.092	0.295
Wholesale and Retail Trade	-0.052	-0.306	-0.358	0.619	-0.195	0.424
Transport and Communications	-0.144	0.011	-0.134	0.111	0.298	0.409
Financial Services	0.571	-0.815	-0.245	-0.089	0.210	0.121
Insurance Services	0.443	-0.431	0.012	-0.010	0.040	0.030
Rest of Services	-0.401	0.105	-0.296	0.256	0.110	0.366
TOTAL	**1.501**	**-2.850**	**-1.349**	**0.711**	**1.705**	**2.417**

Source: Table No 1, Authors estimations.

TABLE No I.4

Average Annual Growth Rate Contribution in Value Added Per Worker- L1 Adjusted by Difference in Agriculture Labor Productivity by Sector, Peru 1998-2007 (%)

Sector/Period	1998-2001			2002-2007		
	Within Sectors	Between Sectors	Total	Within Sectors	Between Sectors	Total
Agriculture, Hunting and Forestry	-0.042	-1.333	-1.375	0.086	-0.412	-0.326
Fishing	0.022	-0.090	-0.068	0.009	0.008	0.017
Mining and Quarrying	0.987	0	0.987	-0.885	0.966	0.081
Manufacturing	-0.106	-0.173	-0.280	0.275	0.279	0.555
Electricity and Water	0.391	0	0.391	0.092	0.216	0.308
Construction	-0.167	-0.233	-0.399	0.203	0.105	0.308
Wholesale and Retail Trade	-0.052	-0.793	-0.845	0.619	-0.116	0.503
Transport and Communications	-0.144	-0.091	-0.236	0.111	0.140	0.252
Financial Services	0.571	0.165	0.736	-0.089	0.299	0.210
Insurance Services	0.443	0.057	0.499	-0.010	0.103	0.093
Rest of Services	-0.401	-0.357	-0.759	0.256	0.160	0.416
TOTAL	**1.501**	**-2.850**	**-1.349**	**0.667**	**1.749**	**2.417**

Source: Table No 1, Authors estimations.

TABLE No I.5

Average Annual Growth Rate Contribution in Value Added Per Worker- L2 by Sector, Peru 1998-2007 (%)

Sector/Period	1998-2001			2002-2007		
	Within Sectors	Between Sectors	Total	Within Sectors	Between Sectors	Total
Agriculture, Hunting and Forestry	-0.113	0.282	0.170	0.272	-0.170	0.102
Fishing	0.036	-0.038	-0.002	0.006	0.009	0.015
Mining and Quarrying	0.979	-0.714	0.265	-0.726	0.918	0.192
Manufacturing	-0.223	-0.079	-0.302	0.307	0.335	0.642
Electricity and Water	0.358	-0.335	0.023	0.125	-0.065	0.061
Construction	-0.145	-0.356	-0.500	0.195	0.133	0.329
Wholesale and Retail Trade	-0.223	-0.132	-0.354	0.713	-0.191	0.522
Transport and Communications	-0.040	-0.098	-0.137	0.163	0.299	0.462
Financial Services	0.740	-0.980	-0.240	-0.058	0.193	0.135
Insurance Services	0.415	-0.403	0.011	0.002	0.033	0.034
Rest of Services	-0.324	0.008	-0.316	0.453	0.123	0.576
TOTAL	**1.462**	**-2.845**	**-1.383**	**1.451**	**1.617**	**3.068**

Source: Table No 1, Authors estimations.

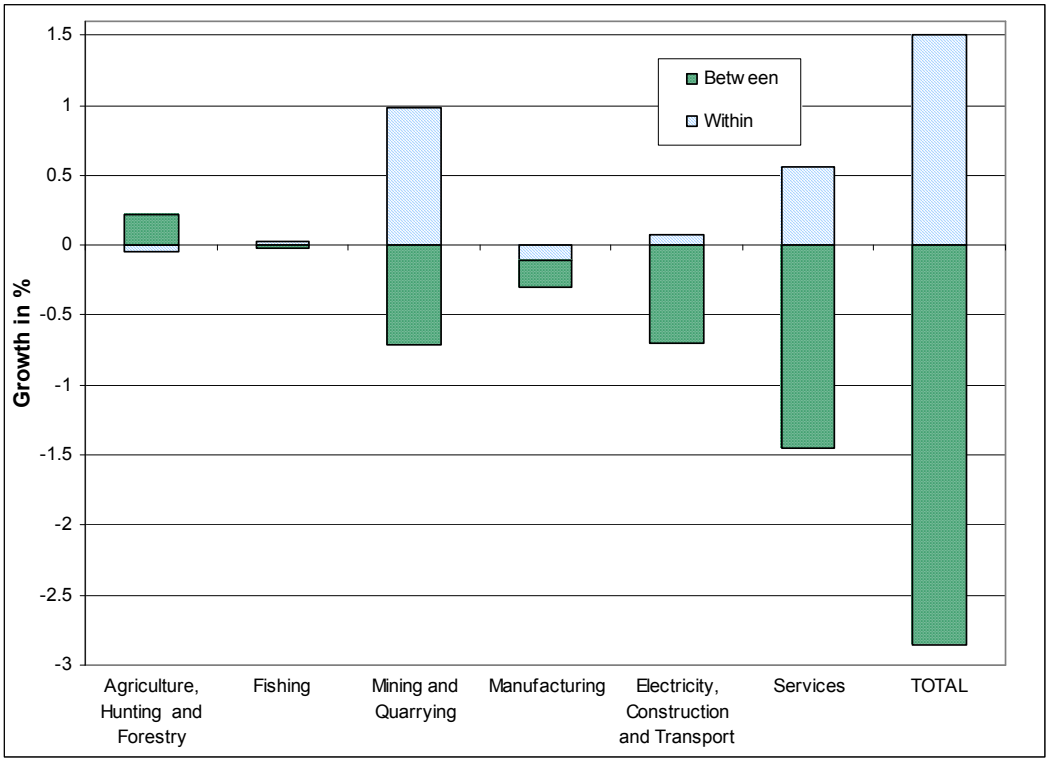
TABLE No I.6

Average Annual Growth Rate Contribution in Value Added Per Worker- L2 Adjusted by Difference in Agriculture Labor Productivity by Sector, Peru 1998-2007 (%)

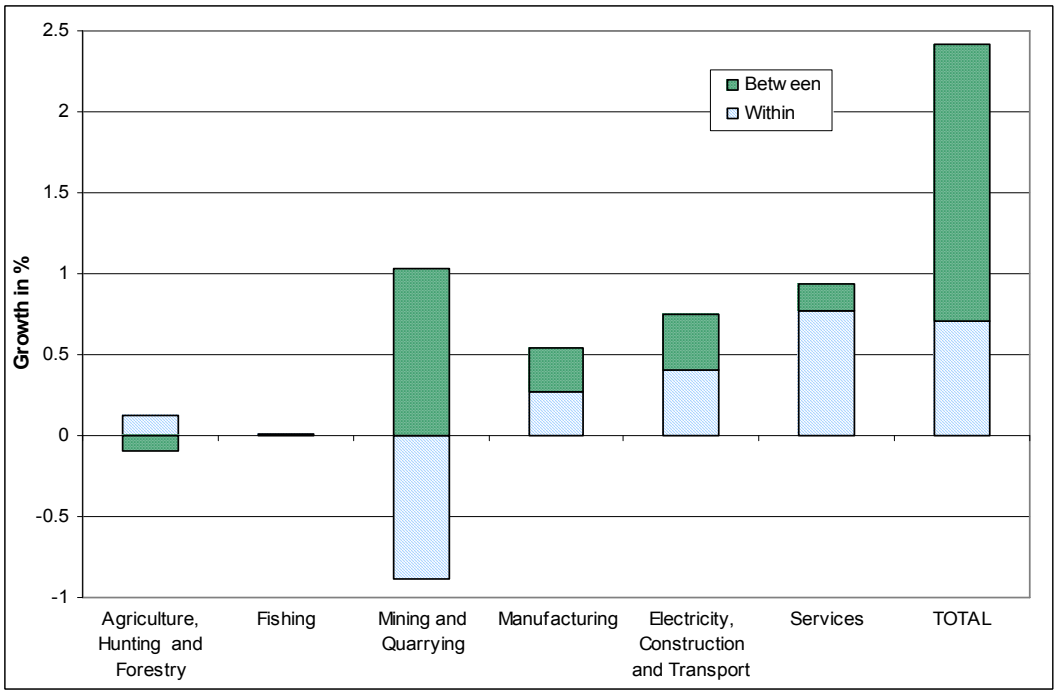
Sector/Period	1998-2001			2002-2007		
	Within Sectors	Between Sectors	Total	Within Sectors	Between Sectors	Total
Agriculture, Hunting and Forestry	-0.115	-0.757	-0.872	0.196	-0.426	-0.230
Fishing	0.036	-0.208	-0.172	0.006	0.010	0.016
Mining and Quarrying	0.979	0.000	0.979	-0.726	0.922	0.196
Manufacturing	-0.223	0.023	-0.200	0.307	0.327	0.634
Electricity and Water	0.358	0.051	0.408	0.125	0.173	0.298
Construction	-0.145	-0.037	-0.182	0.195	0.147	0.342
Wholesale and Retail Trade	-0.223	-1.660	-1.882	0.713	-0.021	0.692
Transport and Communications	-0.040	-0.161	-0.201	0.163	0.065	0.228
Financial Services	0.740	0.219	0.959	-0.058	0.313	0.255
Insurance Services	0.415	0.016	0.430	0.002	0.116	0.118
Rest of Services	-0.324	-0.327	-0.651	0.453	0.066	0.519
TOTAL	**1.459**	**-2.842**	**-1.383**	**1.375**	**1.693**	**3.068**

Source: Table No 1, Authors estimations.

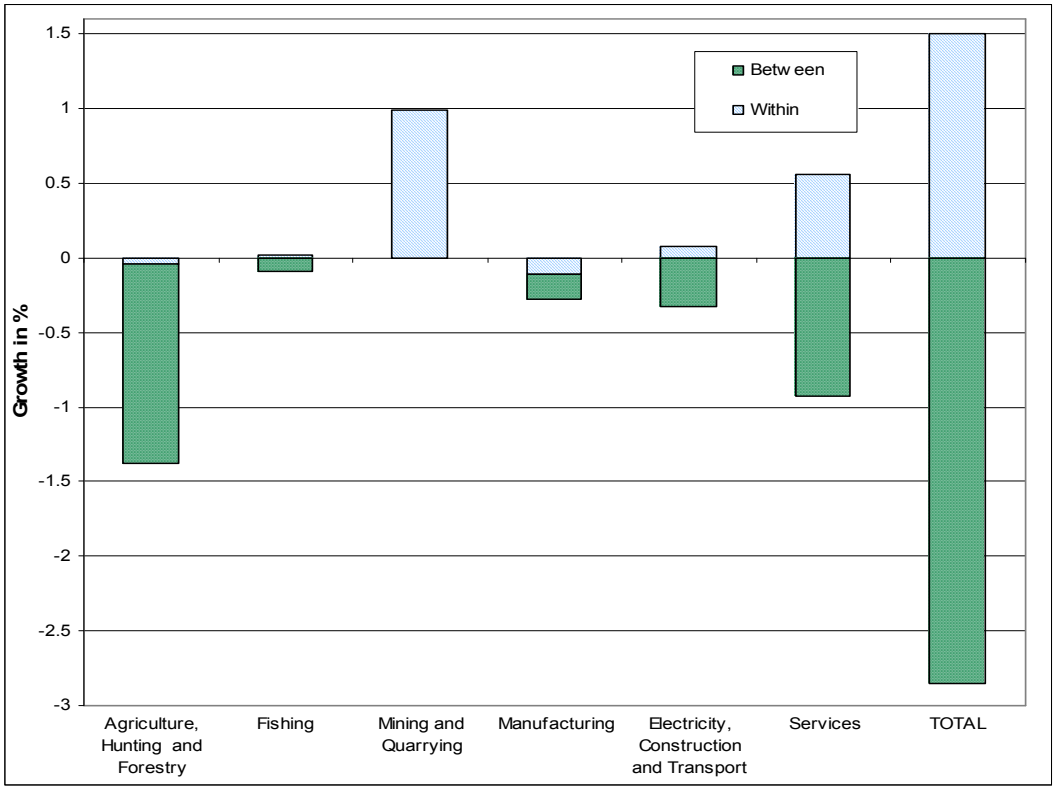
Graph No 3
Average Annual Growth Rate Contribution in Value Added Per Worker (LP1)
1998-2001



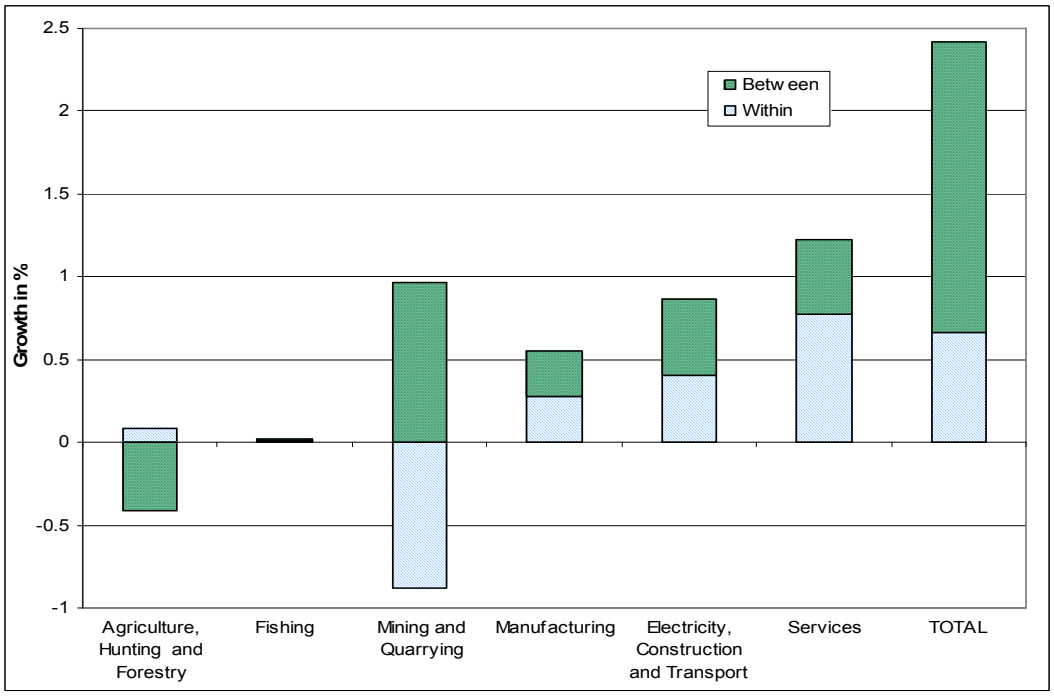
2002-2007



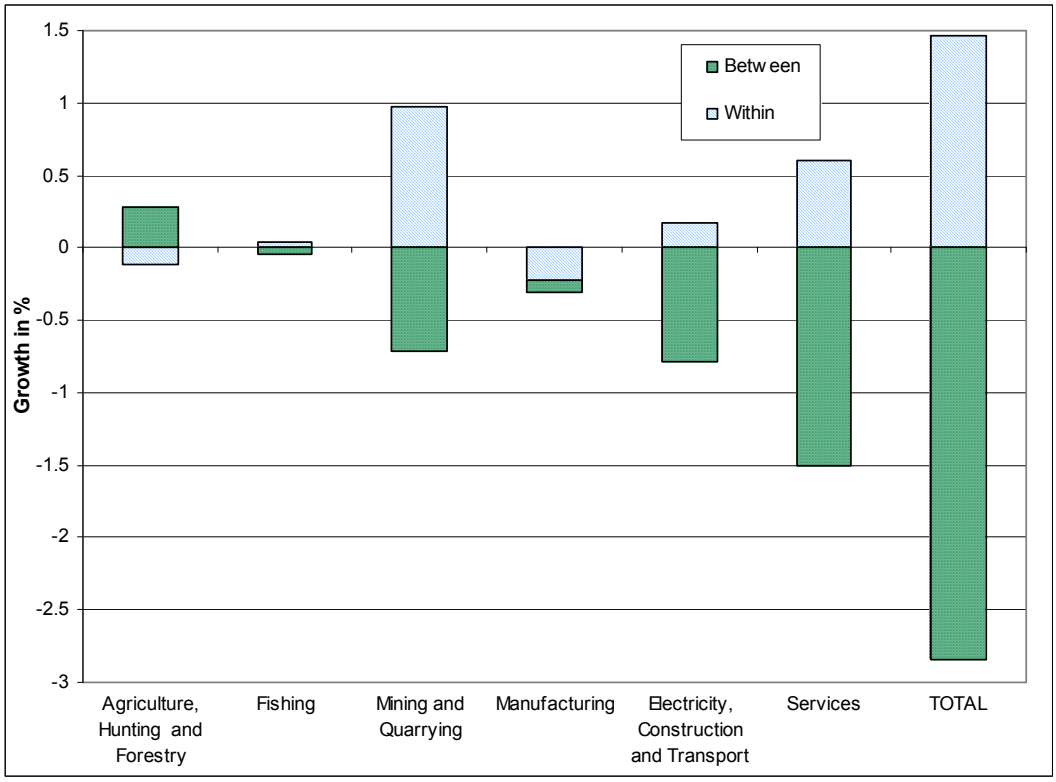
Graph No 4
Average Annual Growth Rate Contribution in Value Added Per Worker (LP1)
Adjusted Method, 1998-2001



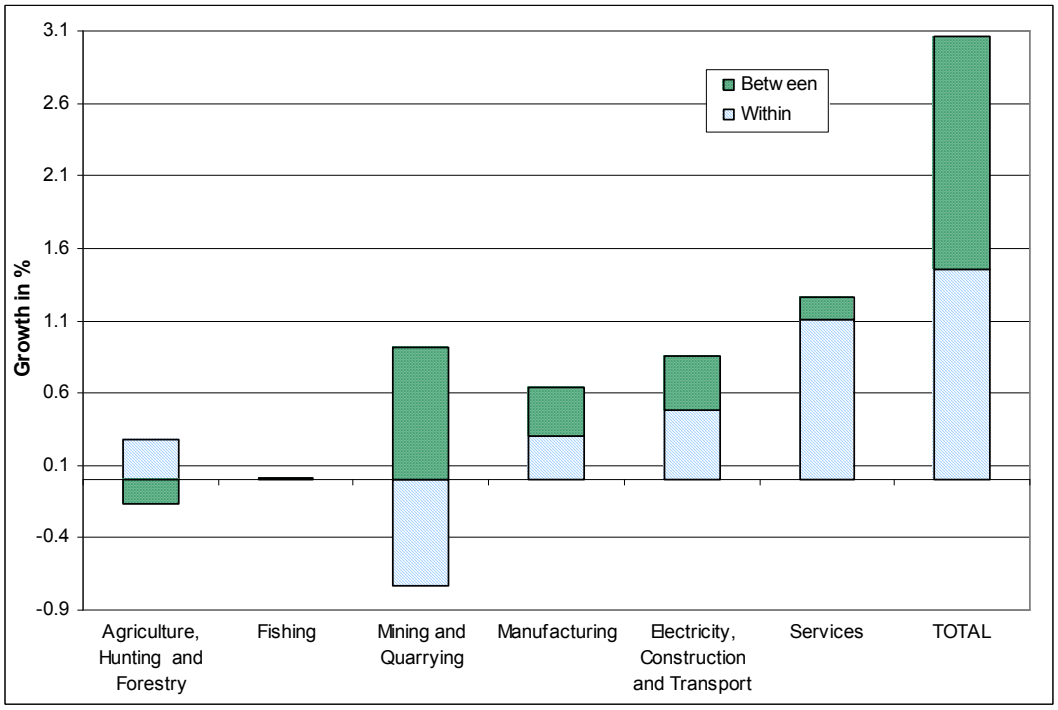
2002-2007



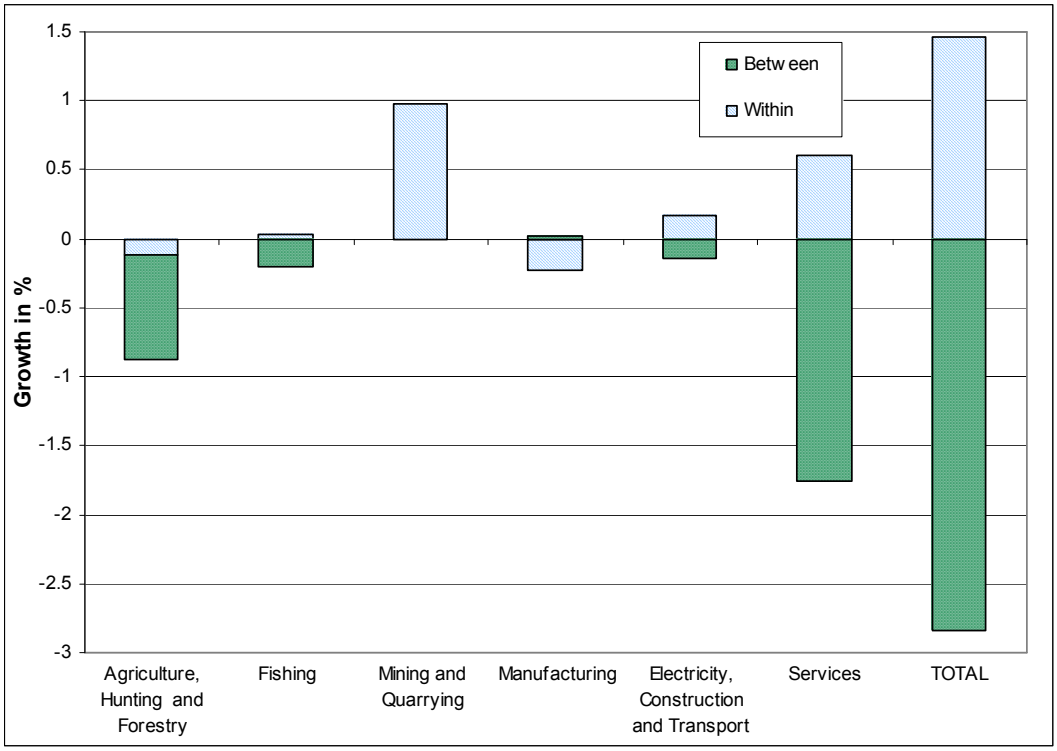
Graph No 5
Average Annual Growth Rate Contribution in Value Added Per Standardized Worker (LP2), 1998-2001



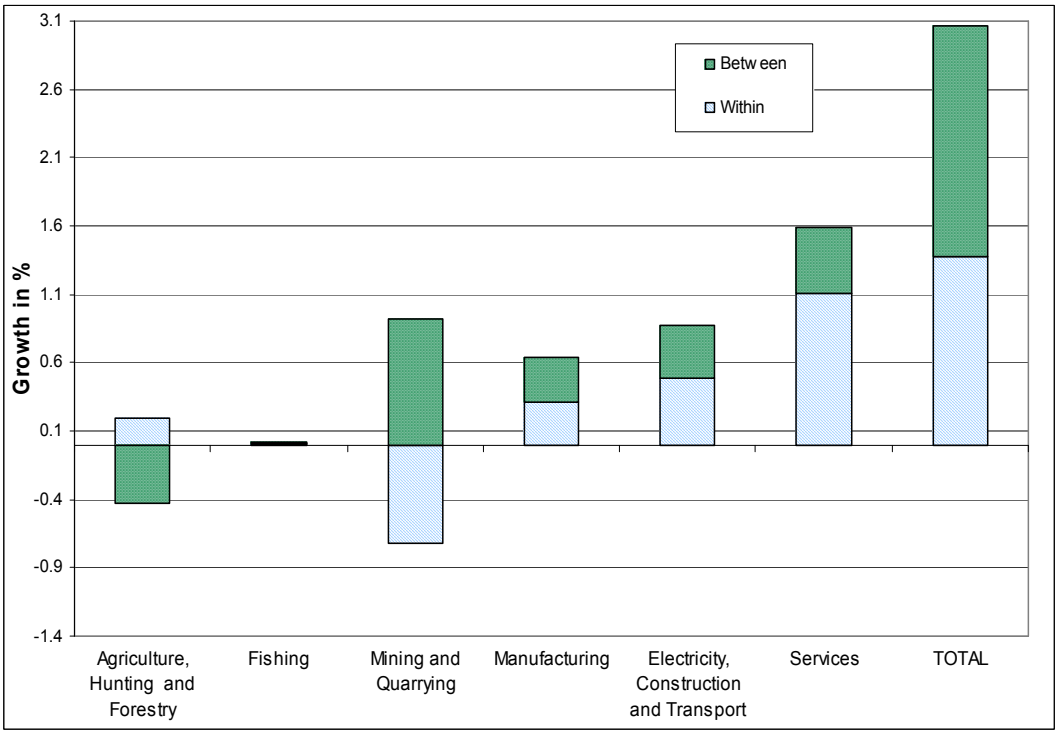
2002-2007



Graph No 6
Average Annual Growth Rate Contribution in Value Added Per Standardized Worker (LP2) Adjusted Method, 1998-2001



2002-2007



Taking these differences into account, the figures by sectors in the tables indicate that in the booming period 2002-2007, the between sectors effect for the agriculture and the wholesale and retail trade sectors were negative, regardless the employment indicator and methods (standard and adjusted) used. This effect may indicate that in such a period workers from these sectors either have moved to the other sectors because they found new job opportunities or jobs with higher wages and labor productivities, or both. In the case of the adjusted decomposition, as indicated above the higher level of the negative between sector effects of the agriculture sector is due to the lower level of labor productivity of workers of this sector compared with the rest of the sectors. The within effect for these sectors was positive suggesting that labor productivities may have increased in these two sectors during this period[17]. These increases, however, may well be at lower rate than the increase of the labor productivity of the economy implicated by the lower relative level of the labor productivity in this period.

Contrarily, in the recession period both within effects (traditional and adjusted) were negative in these sectors which indicates that the annual average level of labor productivity decreased in this period. On the other hand, whereas the traditional between effect was positive, the adjusted between effect was negative. The within effect suggest that the agriculture and wholesale and retail trade sectors act as a buffer in hard times and absorb labor which is put out of employment in other sectors of the economy. But this effect is short term rather than long term, given that in the booming period the (traditional) within and between effects are reverted. The between effects indicate that despite of the higher employment rates of growth in the recession period than in the booming period, labor productivity levels in the agriculture and the wholesale and retail trade sectors and were still lower than in the average labor productivity of the rest of sectors, in particular in those which labor shares decreased in the recession period.

The hotel and restaurants, household and private education services sectors have similar decomposition patterns than the agriculture and wholesale and retail trade sectors in both periods as it is shown in Tables from No A3 to A6 in the Appendix Tables.

The behavior of the rest of sectors can be divided in two types of behavioral relationship between labor productivity and employment. In the first type of sectors, labor productivity is inversely related to the employment levels in recession and booming periods. In the second type, labor productivity and employment are positive related in both periods. Mining and quarrying, financial, human health and government services[18] are sectors of the first type. The within effect in these sectors was negative in the booming period of 2002-2007 and positive in the recession period 1997-2001. This means that labor productivity decreased in the former period and increased in the recession period. Contrarily, the employment level of both sectors increased in the last period compared to that of the first period.

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[17] The average labor productivity level of the whole trade and retail sector increased in period 2002-2007. However, this average decreased in the agriculture sector. It should be noted during this period, labor productivity decreased in period 2002-2004 and increased from 2004 to 2005. The higher productivity in this period overcompensated the lower productivity in period 2002-2004 so that the within effect in the agriculture sector in period 2002-2007 was positive, which is consistent with the positive rate of growth of this in the booming period (see Table No I.2A and Graph No 3).

[18] The figures for these last two sectors are shown in the Appendix Tables.

Except for electricity and water, the rest of sectors (such as manufacturing, construction, transport and communications) have had a positive relationship. That is, labor productivity and employment levels have increased in the booming period 2002-2007 compared to the recession 1998-2007. In these sectors both the within and between effects were positive in the former period and negative or negligible in the latter period.

Although the employment and real value added shares of the compound electricity and water sector out of GDP is low, its dynamic of employment and labor productivity throughout the period 1997-2007 provides a special case of the negative relationship between labor productivity and employment level. Along this period, labor productivity level has been growing whereas employment level has decreased constantly (Graph No 7i). It should be also noted that the positive average rate of growth of employment in the booming period has not compensated the higher and negatives rates in the recession period. Standard labor productivity growth decomposition indicates that the within effect has been positive in both periods (1998-2001 and 2002-2007) and the shift effect has been negative in both periods regardless of the type of the level of employment (L1 and L2). In the adjusted decomposition case, all these effects have been non negative in both periods, suggesting either that workers with low labor productivity are leaving the sector or workers with a high labor productivity has been recruited into the sector.

I.4 Sectoral Differences in the Behavior of Labor Productivity and the Cyclical Behavior of the Peruvian GDP Per Capita, 1997-2007: Some Hypothesis and Final Remarks

As a methodological note, it should be mentioned that for each of the 11 sectors used in this section, real value added and employment include the formal and the informal sectors. In Section III, Table No III.2 presents the estimation of the size of urban informal sector of Peru in the booming period, 2002-2007 in terms of value added and employment. This sector is decomposed in 5 sectors: primary sector, manufactures construction, services and trade. Value added and employments of the formal sector are estimated using the total values of these variables minus the respective values from the estimated informal sector. Thereafter, the valued added per employed are computed. These calculations are done for three sectors: manufactures (Graph No 7 c and d); the aggregated services and trade sector (Graph No 7 f and g) and the construction sector (Graph No 7 i and j). The formal and informal decomposition for the rest of sector were not feasible due to data limitations. Taking this into account, there might be some plausible hypotheses that may cause the sectoral differences in the dynamic behavior of labor productivity and employment in Peruvian economy in period 1997-2007.

The firs type of behavior refers to the low- productivity agriculture sector (or traditional agriculture and micro-farmers oriented primarily to the production of non-tradable goods, Tello, 2009a) and the informal sector[19]. As it shown in Graph No 7(a), (e) and (g) and figures in Table I.2A, employment trend in these sectors has been positive regardless of the cyclical behavior of the GDP per worker of the economy. However, their labor productivity trend has been negative also regardless of the cyclical behavior of the GDP per worker of the economy.

[19] Broadly speaking, the small-scale, semi-legal, often low productivity frequently family-based, perhaps pre-capitalistic enterprise which continues to employ between 30% and 70% of the urban work force in Latin America (Maloney, 2003, Maloney *et al*, 2007).

The dynamic of the agriculture sector shown in Graph No 7(a) includes the dynamic of the informal, traditional micro-farm sector and the modern large sized firms (and mainly agro-exporters) sector. Whereas the average rate growth of the export value of the agro-exporter (traditional and not traditional) sector in period 1998-2003 was 0.5%, the respective rate for period 2004-2007 was 24.9%. This higher rate of growth in this period may explain the higher rate of growth of the real valued added per worker of the agriculture sector in that period. In the recession period up to 2003, the decreasing rate of labor productivity in this sector can be explained by the low growth of the export value of the agriculture sector and the probable negative rate of growth of labor productivity of the informal and micro-farm sectors.

In the booming period 2002-2007, the compound services-trade informal and formal sectors show clearly the differences in the behavior of labor productivity between the formal and informal sectors of Peruvian economy. The formal services-trade sector with a procyclical labor productivity behavior as a response to internal (and/or external) demand shocks and the informal sector with limited capacity (in terms of small size, low level of human capital, absence of innovation processes, and lower probabilities of capital accumulation[20]) which labor force constantly increases producing a negative trend of its labor productivity.

As pointed out above, the informal and the traditional agriculture sectors act as a buffer in both recession and expansion times and absorb labor which is put out of employment in other sectors of the economy. Partly this is shown in next section, wherein manufacturing formal firms not only generate new jobs in booming periods but also reduce jobs in this period. Thus, fired workers may move either to other manufacturing sub-sectors or to the informal sector. This higher and continuous employment growth in these low-productivity sectors, under limited productive capacity generate a decreasing trend in labor productivity as observed in Graph No 7(a) and (g). Due to large size of these two sectors in terms of employment, their negative labor productivity growth limits to a certain extent the labor productivity growth of the economy even in periods of expansion.

The second type of sectoral behavior is due to sectors highly sensitive to changes in aggregate internal demand, such as the manufacturing sector. In this type of sectors labor productivity is positively associated to employment because of: the procyclical behavior of installed capacity utilization rate[21], the absence of substantial change in total factor productivity, and firms' changes in (technical, economic and/or organizational) efficiency.

According to PRODUCE (2009) and INEI(2009), installed capacity utilization rate decreased from 65.3% in 1997 to 53.8% in 2001 and then increased up to 58.7% in 2007[22]. Thus, when installed capacity utilization rate is less than 100% (i.e, the current level of output is lower than the potential output that can be produced by a firm plant) then as demand increases firms may have the propensity to hire more workers in order to

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[20] See more details in Section III.

[21] The installed capacity utilization rate measure the percentage of output produced from the potential output when all their production factors all fully employed.

[22] If Y/L=LP=TFP. F(θv); Y, is the output level, v=V/L; wherein, θ is the installed capacity rate (wherein, θ is between zero and one), V is the vector of primary factors and v, the vector primary factors per-worker. Maintaining constant total factor productivity (TFP), LP will increase (or decrease) even if L increases (or decreases) if θ increase (or decrease).

take advantage the idle plant capacity. In consequence as the utilization of this capacity increases then labor productivity may well increase. However, as it is shown in Section II, although employment in the manufacturing sector has increased (due to the employment increases in both microenterprises from the informal sector and medium and large size firms from the formal sector) the increase in labor productivity in the manufacturing formal sector was in part due to a higher level of the utilization rate of installed capacity and another due to a more efficient use of the plant capacity of firms that reduced their level of employment. The fact the installed capacity utilization rate is lower than 100% for both for the total manufacturing sector and for a sample of medium and large firms from the manufacturing formal sector (as it is shown in Table No A7) may indicate the absence of the substantial change of the total factor productivity in this sector.

Graph No 7 (b), (c) and (d) show the positive relationship between labor productivity and employment in the manufacturing sector. Given the large differences in labor productivities and employment shares between the formal and informal sector, the behavior of the former is dominated by the formal sector and that of employment by the respective behavior of the informal sector. Graph 7(b) show the procyclical dynamic behavior of labor productivity of the total manufacturing sector and the estimated employment of the formal sector using data from De vries and Hofman (2007). Graph 7(c) and (d) show the differences in labor productivity behavior between the formal and informal manufacturing sector. These graphs suggest that the cyclical behavior of the GDP per worker of Peruvian economy partly can be attributed to the procyclical behavior of the labor productivity in the manufacturing formal sector. A similar behavior as the manufactures has the construction sector as shown in Graph No 7 (h), (i) and (j).

The third type of sectoral labor productivity behavior comes from sectors that works at full capacity and that increase in its output is originated by higher level of investment or an intensive use of its fixed factors. In this type of sectors, such as mining, there is a negative relationship between labor productivity and employment. Some stylized facts may support this hypothesis: i) investment in the mining sector dropped from an average of 1252 millions of dollars in period 1998-2001 to 880.7 in period 2002-2006 (MINEN, 2004, 2006); ii) similarly the rate of growth of real value added from the mining sector decreased from 7.3% in period 1998-2001 to 5.9% in period 2002-2007 (Table I.2A) despite of the increasing rate of growth of mining prices from 1.6% in period 1998-2001 to 20.7% in period 2002-2007; iii) employment growth rate have increased from the negative rate in period 1998-2007 of -9.0% to 22% (or 19.% in terms of standardized workers) in period 2002-2007. Thus, in the presence of fixed factors, labor productivity would be inversely related to employment level[23]. In this type of sector employment is pro-cyclical and labor productivity respond to the cycle of investment. Labor productivity increased in the recession period due to higher level of investment and lower level of employment and decreased in the expansion period, due to lower level of investment and higher level of employment. This dynamic is shown is Graph No 7 (k).

The fourth type of behavior may be originated by positive changes in total factor productivity of a sector. The modern electricity sector may have followed this behavior. Thus, whereas investment in this sector[24] dropped from an average of 596 millions of

[23] In this case, changes in labor productivity ('Y/L') is positively related to changes in the size of the fixed factors per worker (v=V/L) and negatively related to changes in L for fixed factors (V). Higher level of investment means higher level of physical capital (or mining resources) and higher level of v.
[24] Firms' activities in this sector include: distribution, generation and transmission of electricity.

dollars in period 1997-2001 to 387 millions of dollar in period 2002-2007[25], the installed power per worker (in mega watts per worker) rose from 2.8 in 1998 to 2.93 in 2006 (at annual average rate of growth of 0.6% in period 1998-2006) with an annual average employment rate of growth of 0.4% in period 1998-2007. The rate of growth[26] of physical output of the (formal and informal) electricity sector were 5.4% and 6.1% in the recession and booming period respectively and for employment -18.4% and -4.7%. The respective rates for the water sector were 0.6% and 0.2% for output and -10.7% and -1.6% for employment. The physical output rate of growth for the compound (formal and informal) electricity and water sector were 3.3% and 5.4% and -14.5% and -2.6% for employment. That is, whereas output growth of this compound sector is dominated by the rate of growth of electrical sector output, employment changes have been affected for both the electricity and waters sectors.

Consequently, the sustainable labor productivity growth shown in Graph No 7(l) in this sector throughout the period 1997-2007, despite the decreasing rate of investment in the modern electrical sector and employment in both the electrical and water formal and informal sectors may be explained by an increased total factor productivity associated to the structural reforms implemented in the electrical sector since beginning of 1990s (MINEM, 1998, 2008).

Summing up, the evidence of the sectoral differences on the dynamic behavior of output, employment and labor productivity and their contribution on the rate of growth of labor productivity in Peru in period 1997-2007 may explain the cyclical and low performance of the GDP per worker in such a period. In recessive periods (such as that of 1997-2001), the decreasing trend of GDP per worker is explained by: i) the decreasing trend and low labor productivity sectors such as traditional agriculture, wholesale trade and retail, household services and the informal sector as a whole; and ii) the decreasing trend of the labor productivity of the formal and informal sectors highly demand sensitive such as manufacturing; construction, and transport and communications. Out of total decreasing rate of growth of -1.349% of the GDP per worker, these sectors[27] contributed in -1.325%.

In expansion periods, the increasing trend of GDP is explained by the formal firms of the same sectors. The labor productivity of the relative small size sectors such as mining and the low levels of labor productivity of the informal sector and micro-farms of the agriculture sector (whose labor productivity behavior have been opposed to those highly sensitive to internal demand) did not compensated the increasing rate of the labor productivity of the demand sensitive sectors, although they reduced the rate of change of the labor productivity of the economy.

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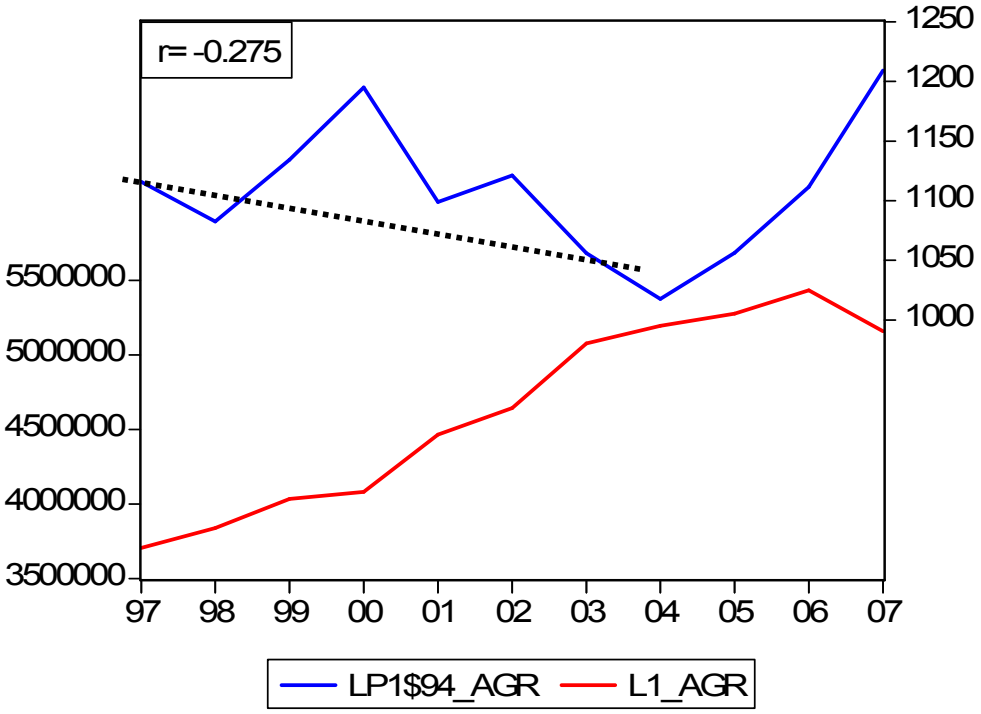
[25] In the formal water sector also investment decreased from average of US $ 250 millions between 1998 and 2001 to 130 millions in period 2002-2007 (SUNASS, 2009).

[26] These rates are exponential rates of growth.

[27] Excluding the traditional agriculture sector since the contribution of the agriculture as whole (i.e., the modern and traditional sector) was positive in the recession period of 1997-2001. When differences between average and marginal labor productivity is taken into account the contribution of the agriculture sector is negative and of the same size of the negative rate of growth of labor productivity for Peruvian economy.

GRAPH No 7

(a)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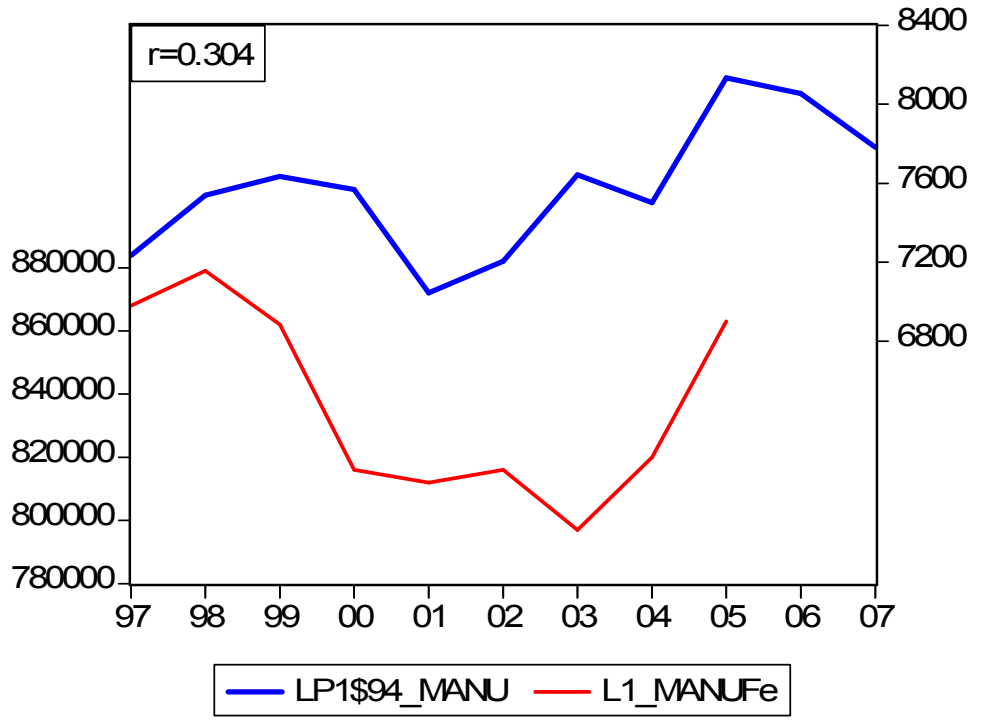
(b)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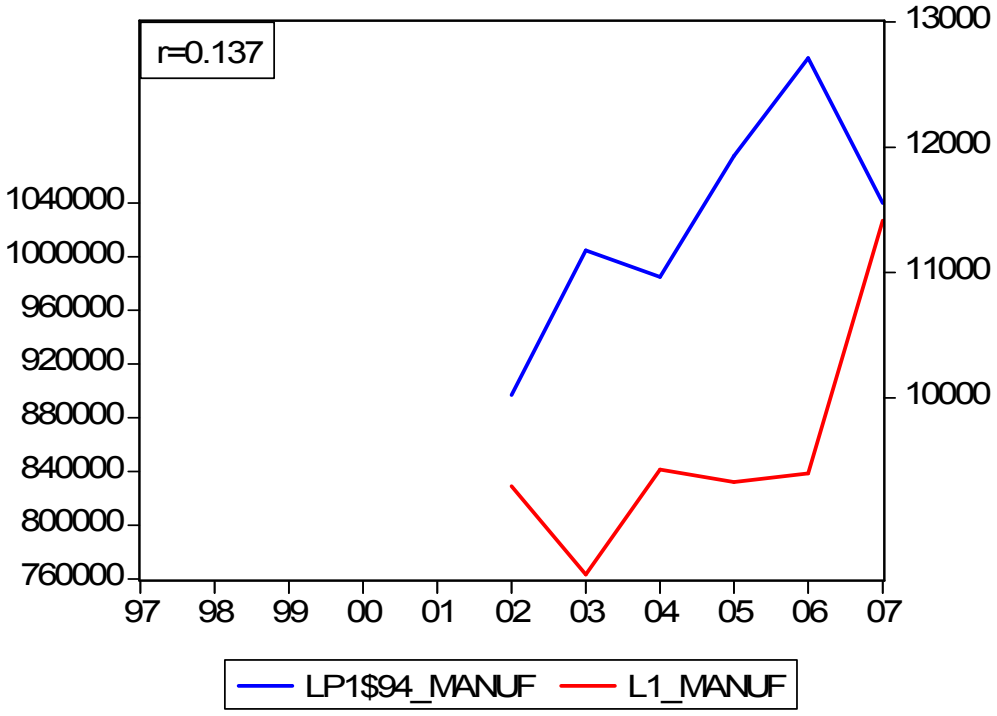
L1_MANUFe

GRAPH No 7

(c)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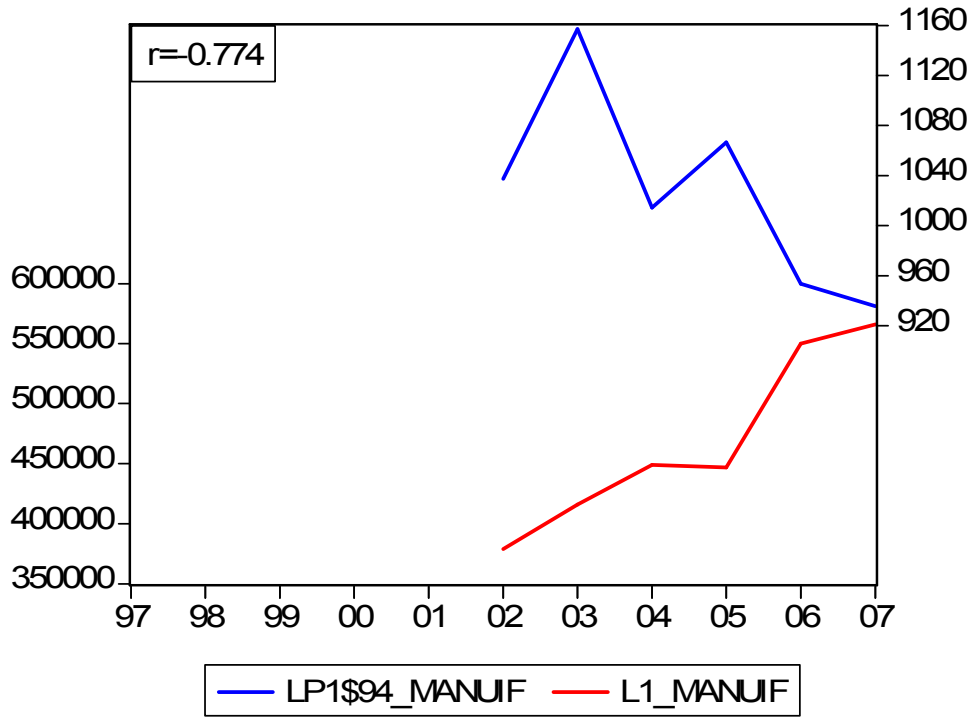
(d)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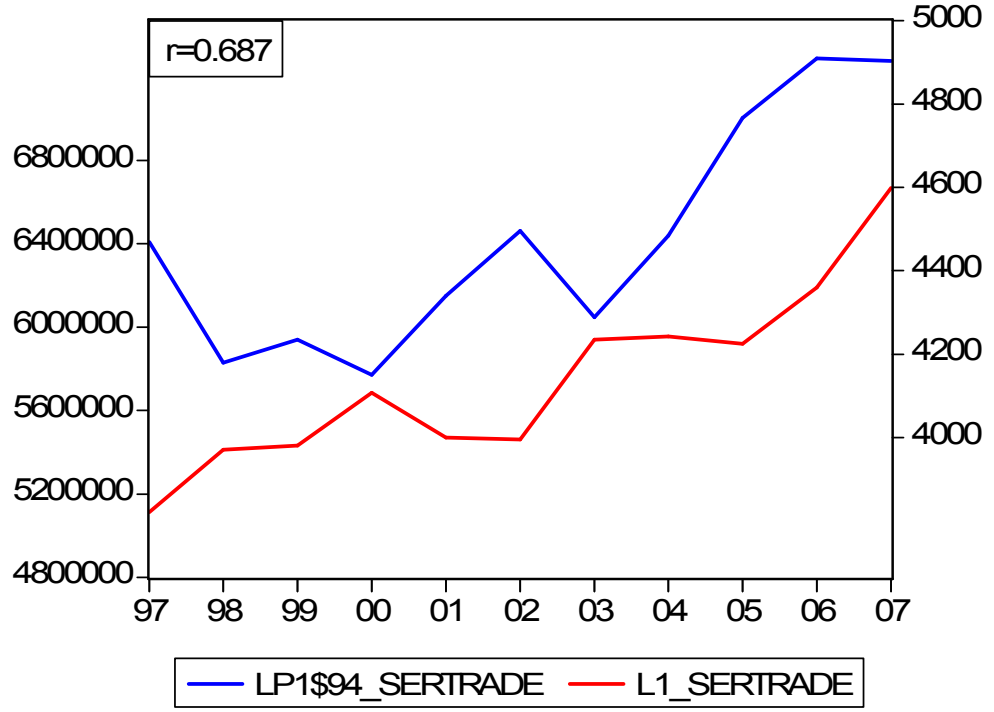
L1_MANUIF

GRAPH No 7

(e)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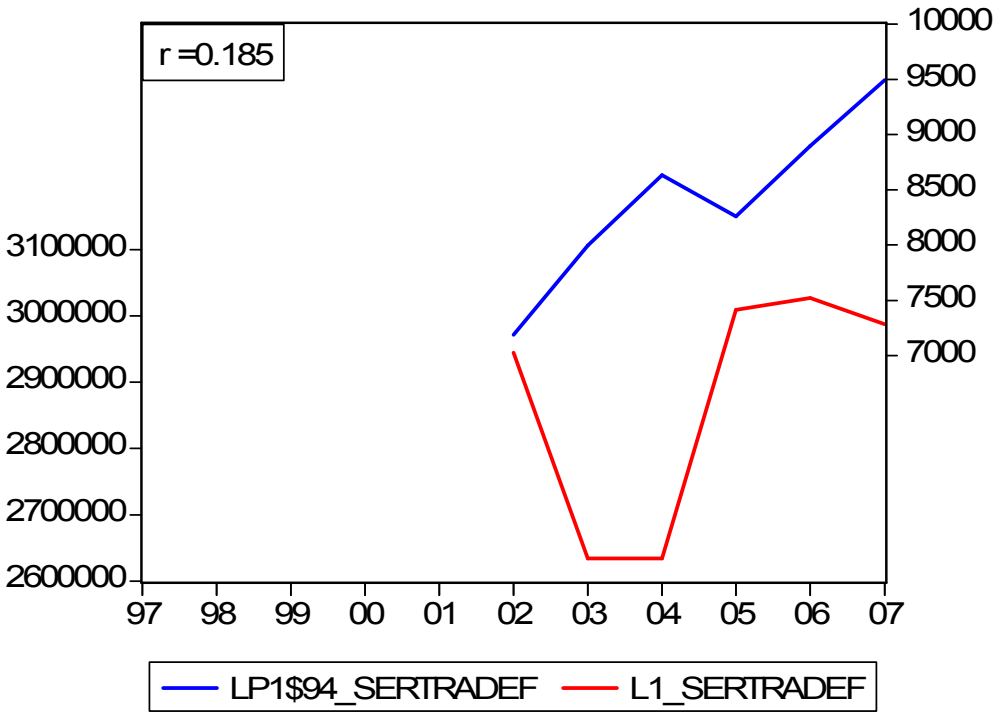
(f)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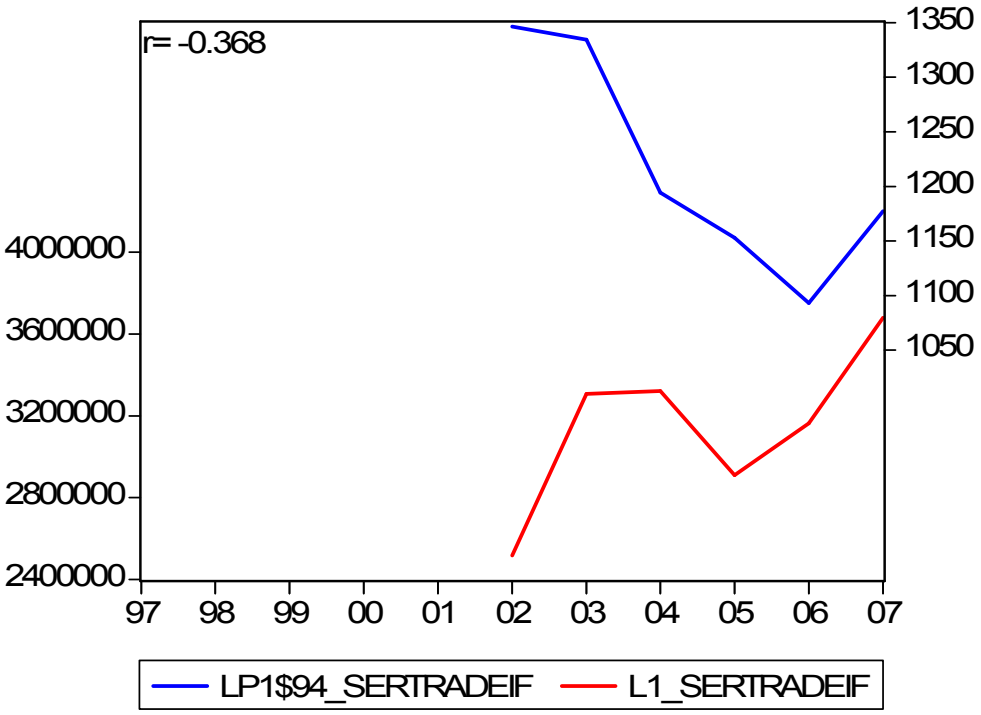
GRAPH No 7

(g)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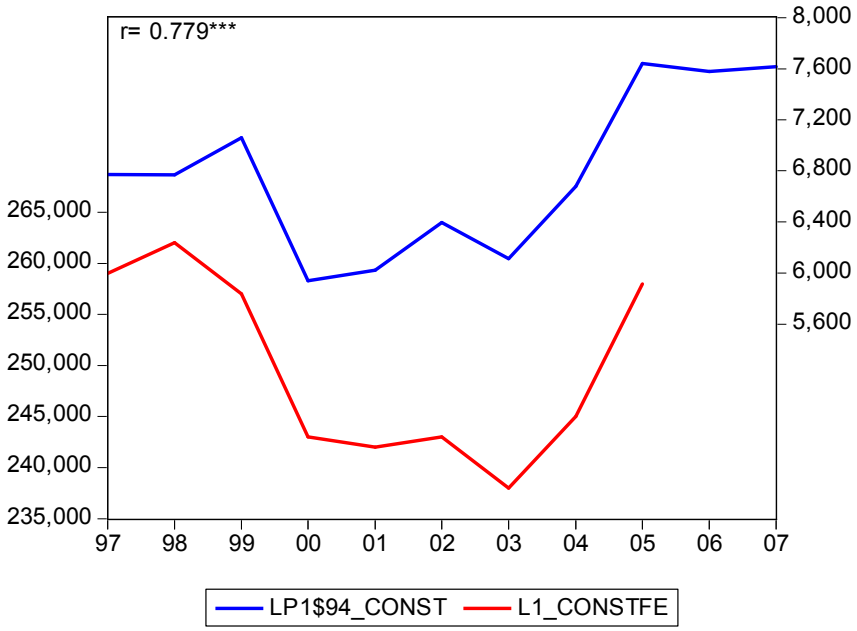
(h)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6,000
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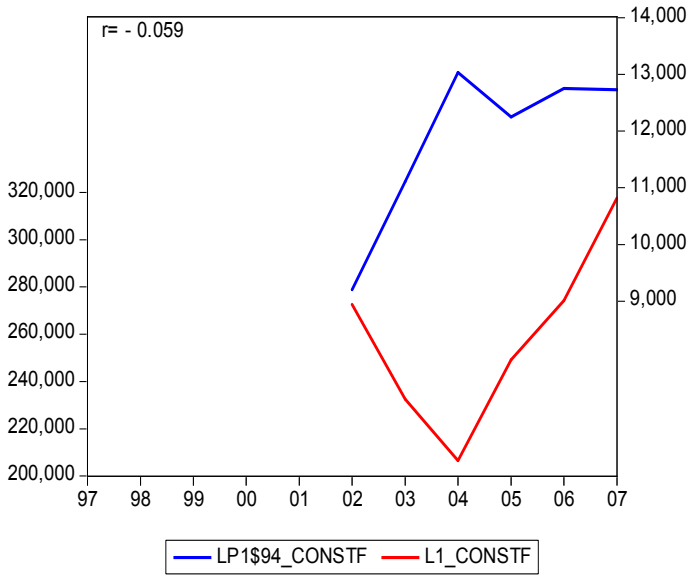
L1_CONSTFE

GRAPH No 7

(i)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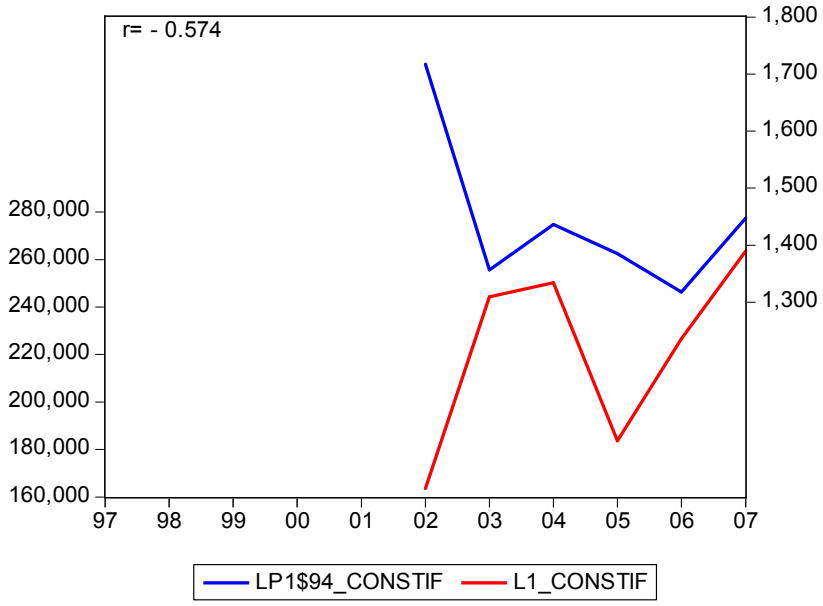
(j)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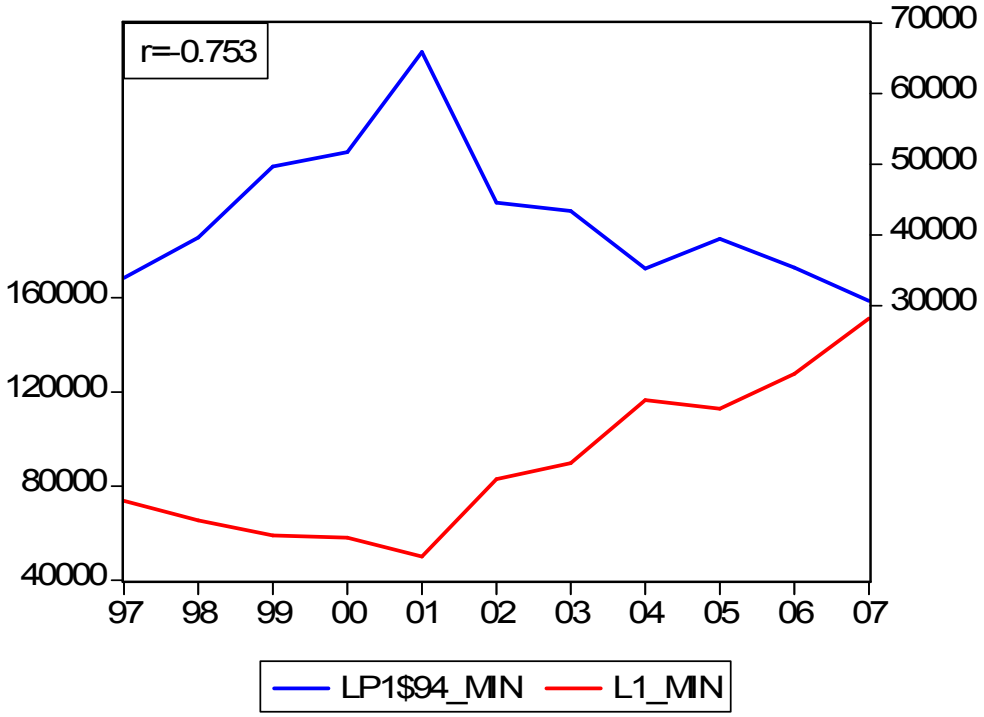
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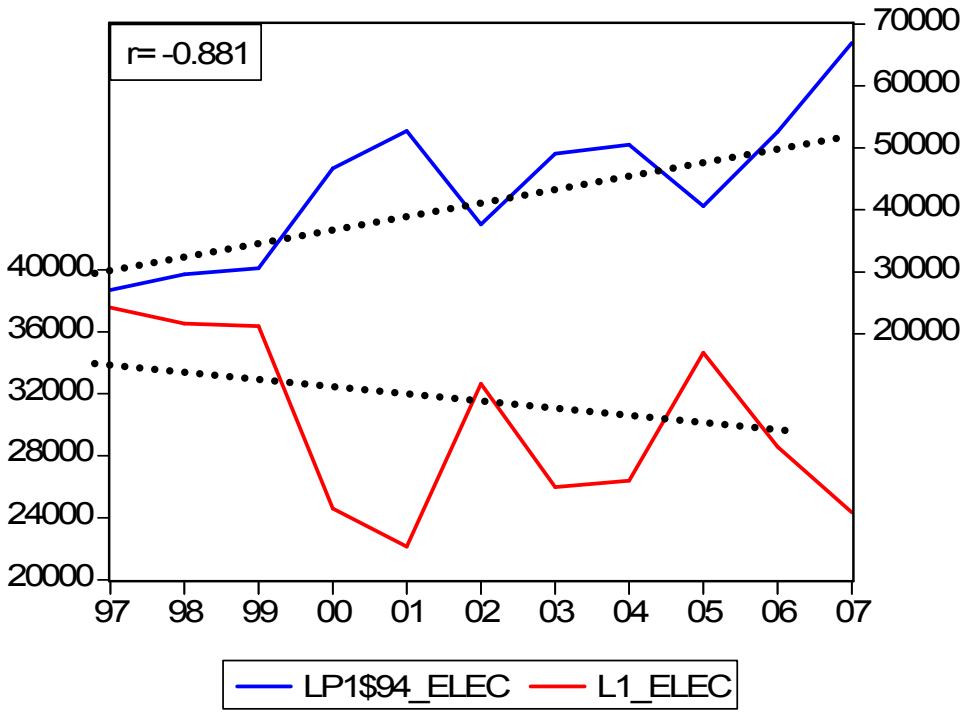
(l)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L1_ELEC

To change the cyclical behavior of the Peruvian GDP per worker in relative short periods of time would demand a set of 'reforms' designed to transform the productive structure in a way that their dynamic on the one hand absorb the labor force of the informal and traditional agriculture sectors and on the other, generate a continuous and sustainable positive rate of growth of total factor productivity of all the sectors in the economy, regardless of the potential (internal or external) shocks that economy may face in the future.

II. JOB CREATION AND JOB DESTRUCTION, LABOR PRODUCTIVITY, AND ENTERPRISES PRODUCTIVE FEATURES FROM A SAMPLE MANUFACTURING FIRMS OF PERU, 2002-2007

The previous section has shown the important role of the reallocation of employment between sectors in determining the rate of growth of labor productivity in Peruvian economy in both the recession and booming period. In the case of the manufacturing sector, in the booming period, close to a half of the labor productivity rate of growth was explained by those reallocation effects. When this sector is disaggregated in 23 manufacturing branches (shown in Table No A3[28]) in 61% (i.e, 14) of these branches the reallocation effects contributed positively to the rate of the labor productivity of these branches and in 57% (i.e, 13) of the branches the within branch effect was positive. Also in that period, labor productivity increased in 19 out of 23 branches.

Based upon the National Economic Survey of Manufactures provided by the INEI, this section focus on the reallocation effects within those 23 ISIC branches of the manufacturing sector and estimates the rates of labor job flows of formal firms during the booming period 2002-2007. Then a set of productive features (such as labor productivity, capital-labor ratio, export-ratio, etc.) of these firms are identified. Finally, this section estimates the labor productivity dynamics of a sample of (medium and large size) firms of the formal manufacturing sector analogous to the decomposition estimated in the former section to measure the contribution of labor job flows on labor productivity changes.

II.1 Methodology and Features of the Sample of Firms

Following Davis and Hartinwanger (1999), firms which increased their total (temporal plus permanent) number of workers between any pair of years are called job creating firms, and firms which decreased their total number of workers between any pair of years are called job destructing firms. For both group of firms distributed in 23 ISIC sub-sectors, the rate of change of the number of workers are computed. These rates are denominated job creation and destruction rates (see the Appendix of Formulas). The reallocation rate is the sum of these two rates.

A striking result of the job gross flows literature is the heterogeneity of the reallocation rates by industry. Given that this fact also applies to the manufacturing sector in Peru (as it shown below.), we take the Davis and Haltiwanger (1999) argument which postulate the dominant role of plant-specific and firm-specific factors (i.e, idiosyncratic factors) in accounting for the large observed magnitudes of gross job flows. Thus, identification of

[28] Manufacturing branches in the Appendix Tables are from Dairy Products to Rest of Manufactures.

firms' productive factors or features may provide worthwhile information on explaining job flows heterogeneity in Peruvian manufacturing sector.

Similar to the descriptive analysis reported in Foster *et al* (2006b), Haltinwanger *et al* (2008) and Davis and Haltinwanger (1999) the set of productive indicators chosen and identified for jobs creating and destructing firms are: i) labor productivity (i.e., gross output real value per worker, Lp1 and real value added per worker, Lp2) ii) firms size (Lave); iii) capital-labor ratios, one based in total assets of the firms (k1) and the other on the real value of machinery and equipment (k2); iv) export-ratio (i.e, Sx, the share of export value out of the total gross output value, Sx), v) imported-input ratio (i.e., Sm, the share of imported input value out of total input value); vi) value-added ratio (i.e., Sva, the share of value added out of total gross output value); and vii) utilization installed capacity index (i.e., IC, the average current output over potential output of the set of goods produced by a firm)[29].

The methodology of the labor productivity decomposition to measure the contribution of gross jobs flow rates follows that of Foster *et al* (2006) described in the Appendix of Formulas. According to this method, labor productivity changes in period 2002-2007 are divided in 5 components or sources of change. The first term in this decomposition represents a within firm component based on firm labor productivity-level changes, weighted by labor shares in the 'industry'. The second term represents a between-firm component that reflects changing shares, weighted by the deviation of initial firm labor productivity from the initial average labor productivity of the 'industry'. Also this term is decomposed in the respective terms for job creating and destructing firms. The third term represents a cross term that tells us whether businesses with large positive labor productivity changes are more likely to have decreased employment and vice versa. The evidence reported below is consistent with this fact for both types of firms. Each of these three components is divided in two terms associated to the changes in labor productivity of job creating and job destructing firms. The last two terms represent the contribution of entering and exiting establishments, respectively.

The data source used in this section is the National Economic Survey of Manufactures (from the formal sector) carried out by INEI for the years 2002, 2005, 2006 and 2007 which consider 2911, 1078, 1002 and 5081 firms respectively, mainly of medium (between 21 and 49 workers) and large size (greater than 49 workers) [30].

The 'industry' for the purpose of the decomposition of the changes of labor productivity is defined by the sample of firms of 2007 plus the firms which did not report in this year but did it in 2002. The size of this simulated 'universe' sample-based is 7096 firms. The number of firms which reported changes in employment between 2002 and 2007 were 842 firms (558 job creating firms and 284 job destructing firms) and 54 firms did not change their level of employment in these two years. This means that 6200 firms reported information in one year of the survey, in 2002 2015 firms which were assumed exiting in 2007 and in 2007, 4181 firms which were assumed entering in this year.

[29] The formulas of these indicators are shown in the Appendix of Formulas.
[30] The original sample size of firms of the INEI Survey were 5039, 1273, 1201, and 7872 for years 2002, 2005, 2006 and 2007 respectively. Firms with missing data and data errors were eliminated from this original size and reduced to the ones shown in Table II.1.

Table No II.1 show the representativity of the sample of firms considered for the analysis. Figures of this table show that the sample representativity of firms (considered for the analysis) is higher in terms of value added than in term of employment. When the total universe of the manufacturing formal sector[31] is considered then the representativity of the sample in terms of the employment increases for the years 2002, 2005, 2006 and 2007 to 18.7%, 13.8%, 14.2%, 30.4% respectively. On the other hand, the representativity in terms of value added increase to 25.1%, 22.2%, 20.8% and 64.0% for the same years. For all survey's years the average firm size is higher than 50 workers considered as a large firm. Only few sectors and in some years[32] the average firm size was lower than 20 workers, i.e., these are defined small firms. In 2007 the sample of manufacturing firms represented 2.0% of the total employment of Peru and 10.6% of its total real value added.

Table No A7 in the Appendix Table summarizes the productive indicators for the 23 ISIC branches and all the years considered. Figures from this table show the simple average of the each productive indicator. The figures indicate that the sample average labor productivity for a firm in the formal sector is between 2 and 3 times higher than the (weighted) average labor productivity of the total universe (formal and informal) of manufacturing firms. Although the labor productivity and capital-labor ratio varies by groups of ISIC sectors and the year of the survey, there are sectors such as bakery and grain mills products, other food products, and printing materials (and to lower extent textiles and apparels) that consistently had labor productivity and capital-labor ratios lower than the average firm from the sample of all the periods considered. On the other hand, the sample of firms seems to have a high imported-input ratio (i.e., higher than 40%), low export-ratio (i.e, about 28%) and low degree of value-added ratio (i.e., between 37% and 51.4%). Further, the utilization installed capacity index slightly increased between 2002 and 2006.

II.2 Job Creation and Job Destruction Rates and Firms Specific Idiosyncratic Factors: Some Results and Working Hypothesis

Tables No II.2 and II.3 shows the productive indicators of job creating and destructing firms for a set of sub-periods considered due to absence of continuing data for firms throughout the four survey's years[33]. These sub-periods are: 2002-2005; 2002-2006; 2002-2007; 2005-2006 and 2006-2007. Table No II.2 apart from the periods column, has 12 columns. The first two (from the left side) show the job (JC) and destruction rates (JD) for each period. The next six columns shows the real output value per worker (Lp1) and the real valued per worker (Lp2) for both job creating and destructing firms as well as the 't-student' difference of means statistics of these two indicators at the initial year (t-k) of each period. The last two columns show the rate of growth of both labor productivity indicators (i.e., gLp1 and gLp2). Table No II.3 reports the same indicators by period and by manufacturing ISIC sectors. The letter 'n or N' in the tables represent the number of firms.

---

[31] According to the estimations of the informal manufacturing sector provided in Section III, the manufacturing formal sector represented 68.6%, 65.6%, 60.4% and 64.5% out the total employment in this sector for years 2002, 2005, 2006 and 2007 respectively. In terms of value added the numbers are 95.5%, 95.4%, 95.3%, and 95.7% for the same years.

[32] For example, in 2002, bakery and grain mills products and other food products; in 2006, leather products and in 2007, leather, manufacture of footwear, wood and furniture, electrical machinery and transport equipment.

[33] There were 306 firms with 4 years of validated data, and 452 and 820 with 3 and 2 years of validated data respectively.

The figures of these tables indicate in the first place, that more than a half of the sample of firms did create (i.e.,, increased their number of workers) and destroy (i.e., decreased their number of workers) jobs in 2006 with and close to a fifth of the sample of firms did it in 2007 with respect to the firms employment in the year 2002[34]. These reallocations of workers between sectors took place practically in all the manufacturing ISIC sectors during the period 2002-2007 as it is shown in Table No II.3. On the other hand, for all the firms in the sample in almost all the periods[35] the average job creation rate has been higher than the job destruction rate[36]. These figures are consistent with the results found in the former section wherein employment level in the manufacturing has increased in the booming period. Analogously, it is expected that in recession periods the job destruction rates would be higher than the job creating rates.

Second, 'industry (branch)' job flow rate heterogeneity is shown in Table No II.3. The branches with high job creation rates (i.e, higher than the respective average of the sample for each sub-period) for most of the periods were: wearing apparels, wood and furniture and to less extent manufacture of footwear. The rest of the sectors in some periods their job creation rates were higher than the respective average for all the firms (e.g, leather products, period 2006-2007; printing materials, period 2005-2007; beverages and tobacco, period 2005-2006; textiles, period 2005-2007; and rest of manufactures, period 2005-2007). The sub-sectors with high destruction job rates (i.e, higher than the respective average of the sample) in at most 66% of the periods were printing materials, in 4 periods; wearing apparels and electrical machinery, in three periods; and manufactures of footwear, leather, non-metallic minerals and rest of manufactures in two periods. For such subsectors, between one and two periods, the job destruction rates were higher than their respective job creation rates.

In third place and as shown in Tables II.2 and II.4, from the five productive indicators (representing idiosyncratic firm-specific factors), the labor productivity and the size indicators resulted as the most important ones in statistical relevance and degree of association with the job creation and destruction rates. Although firms' capital intensity or capital labor, installed capacity utilization, import, export and value added ratios were less relevant, they showed a defined pattern of association with the job flow rates.

Specifically, in all the periods considered, job creating firms had at the initial year of each period (i.e., year t-k) a higher level of labor productivity than their respective labor productivity indicator of job destructing firms. Test of differences of means between the labor productivities measures yielded statistical significant differences in 5 out of 6 periods for the real gross value per worker and in 4 out of 6 periods for the real value added per worker. Thus for example, in period 2002-2007 average labor productivity in 2002 for job creating and destructing firms were 21,941 and 13,761 constant dollars of 1994 respectively. However, the (simple) average rate of growth of labor productivity of job creating firms decreased in most of periods[37] considered whereas the respective rate

[34] Job creating and destructing firms were 344 and 184 respectively in period 2002-2006 (Table No II.2). The number of firms in this year was 1002 (Table No II.1). The respective numbers for period 2002-2007 were 558 and 284. The sample of firms in 2007 was 5.081.

[35] The exception was period 2006-2007, both rates were similar in magnitude.

[36] Employment creation or destruction includes permanent and temporal workers. Gross jobs flows of permanent workers are reported in Table No A8 in the Appendix of Tables.

[37] The exceptions were for period 2002-2006 for the real gross output value per worker and period 2006-2007 for the real value added per worker.

of job destructing firms increased in all periods. These results may imply that although firms with relative high level of labor productivity have a higher propensity to hire new workers once they employ them their labor productivity decreases. The reverse occurs for firms that reduces their level of employment and with a relative lower level of labor productivity.

Figures in Table No II.2 also show a higher level of capital intensity and the utilization installed capacity index of job creating firms (at the initial year of the period) than the respective ones of job destructing firms, in almost all the periods[38]. However, in only two periods (i.e., 2002-2006 and 2006-2007) tests of differences of means of capital intensity ratios were statistical significant for both labor productivity measures and in one period (i.e., 2002-2006) for the utilization installed capacity index.

For the rest of productive indicators, statistical and significant means differences of those indicators between job creating and destructing firms were in general rare. Thus, in 4 periods (out of the six) the average number of workers of job destructing firms at the initial year of the period was higher than the respective number of job creating firms and only in period 2005-2006 this difference was statistical significant. However, it should be noted that in general, firms which created and destroyed jobs were in average large sized firms (i.e., firms with 50 or more workers). For the value added ratio, job destructing firms had a higher ratio than job creating firms in all the periods although the difference of means of this ratio was statistical significant in only two periods (i.e., 2002-2006 and 2005-2007). Job destructing firms had a higher export ratio than job creating firms in 4 out of 6 periods although the differences in this ratio were not statistical significant. For the imported input ratio, the job creating firms had a higher level than the respective ratio of job destructing firms in 4 out of 6 periods. However, in two periods (i.e, 2005-2007 and 2005-2006) the difference of means of this ratio was statistical significant and in period 2002-2006, the import ratio was higher for job creating firms than for job destructing firms and the difference of the ratio was also statistical significant.

The correlation coefficients between the rate of both gross job flows and the selected productive indicators for all the periods considered shown in Table No II.4 reinforce some of the associations found in the analysis of differences of the simple means of those indicators in particular for labor productivity measures and firms size. The statistical significance for the rest of correlation coefficients is weaker. Thus, in periods of 2 to 5 years of difference, most of the correlation coefficients between jobs flows rates (i.e., creation and destruction rates) and the labor productivity measures at the initial year of the period (i.e., year t-k) were statistical significant. These coefficients show that there is a positive association between job creation rate and labor productivity and a negative association between job destruction rate and labor productivity. In periods of one year of difference the statistical relevance of the association is weaken. In contrast for all the periods, all the correlations coefficients between the jobs flows rates and the rate of growth of labor productivity measures were statistical significant indicating that firms which increase their level of employment would decrease their labor productivity and firms which decrease their level of employment would increase their labor productivity. On the other hand, firms' size seems more important for the rate of growth of job creating firms than the respective for job destructing firms. Most of the correlation coefficients

[38] The exception was period 2005-2007.

were negative and statistical significant for the former and of ambiguous sign for the latter, although all the correlation coefficients were not significant.

Correlation coefficients between job creation rates and capital intensity were statistical significant and positive ones for the three periods of 3 to 4 years of differences but for permanent jobs rather than for total employment (i.e, permanent and temporal workers). Only in period 2002-2007, the correlation coefficient between job creation of total employment and capital intensity was statistical significant and positive. In the case of the correlation coefficient between job destruction rates and capital intensity, they were statistical significant and negative only for periods 2002-2005 (for both total and permanent job rates), 2002-2006 for total employment and for the real total asset value per permanent worker, and 2005-2007 for this capital intensity ratio. The statistical significance of the correlation coefficients for the index of the utilization of the installed capacity and value added ratios are weaker. They were negative for value added ratio and positive for installed capacity utilization for job creating firms and statistical significant only for periods 2002-2005 (for both total and permanent job rates) and 2002-2006 for permanent job rates.

The correlation coefficients between job creation and destruction rates and the export ratio were positive and statistical significant for periods 2002-2005 (for total and permanent job creation rates), 2005-2006 and 2006-2007 for permanent job destruction rates. Finally, most of the correlation coefficients between the import ratio and both jobs flows rates were negative and not statistical significant, except in period 2005-2006 with job creation rate which was statistical significant and negative.

Finally, exploratory 'ad-hoc' multivariate regressions estimations[39] are reported in Table No A9 from the Appendix Tables. The sign and the statistical significance of most of the estimated coefficients are consistent with the signs and statistical significance of the reported correlation coefficients. Moreover, labor productivity and firm size were the most statistical robust factors associated with firms' gross jobs flows.

The results, thus far, suggest some working hypothesis on the role of selected factors on the jobs flow rates of manufacturing formal medium and large size firms of Peru in the booming period 2002-2007. The first hypothesis comes from the previous section which postulates that, the manufacturing sector is highly sensitive to changes in the internal demand increasing employment and output in periods of demand expansion using the idle installed capacity. This sector seems to be limited by the size of market domestic demand and unchangeable level of total factor productivity. Thus, in expansion periods when firms see the demand for their products rise, they respond by expanding production. If total factor productivity is constant, then typically they would need to hire more workers to do this. Further, under idle installed capacity (i.e., lower utilization rate), the higher the level of total factor productivity for a firm, the higher would be its labor productivity and job creation rates. This firm would also find a decrease in its labor productivity thereafter of the employment expansion as long as installed capacity is reaching its maximum level under the absence of higher levels of investment and total factor productivity.

[39] Specifications reported in this table may be consistent with a structural firm labor demand equation which incorporates idiosyncratic firm factors.

For firms with increasing total factor productivity or those who are attempting to improve their level of (technical, economic or organizational) efficiency, given the existence of idle capacity, they could reduce employment because the firm may be able to satisfy demand using fewer workers. Such firm thereafter would increase its labor productivity after firing or lying off worker. This possibility may explain the behavior of job destructing firms.

In general, the literature has been concentrated upon the effects of reallocation of employment upon labor productivity rather than the other way around (e.g., Davis and Haltinwanger, 1999). Recently, Pissarides and Vallanti (2006) postulate the reverse causality hypothesis on the effect of total factor productivity (which affect positively to labor productivity) upon the level of employment. These authors point out that: "when new technology arrives a firm may be able to upgrade an existing job and keep the same worker, or it may have to destroy the job and fire the worker. In the former case faster productivity growth implies higher demand for labor and permanently lower unemployment because of "capitalization" effects. These effects are essentially due to the fact that the cost of job creation is paid up-front and recovered from the revenues over the life of the job. With faster growth future revenues are discounted at a lower rate but costs are sunk and so are unaffected. If the firm cannot adopt the new technology in its existing jobs faster productivity growth leads to "creative destruction" and more entry into unemployment, implying permanently higher unemployment in the steady state".

Under the cyclical behavior of firms' utilization rate of their installed capacity and the absence of evidence on total factor productivity changes by sectors in period 1997-2007 in Peruvian economy, then hypotheses on the relation between job flow rates and labor productivity need to be based upon efficiency adjustment at the level of the firms and the response of these to demand changes.

Consistent with the results found on the literature (e.g., Haltinwanger *et al,* 2008), firms size is associated to job flows rates, smaller size and/or labor intensive firms would have a higher propensity to create jobs rather than large firms either because they are in process of growing or because they wish to exploit their idle installed capacity. The results for the Peruvian manufacturing firms from the formal sector seem to support this hypothesis.

The literature on the relationship between capital-labor ratio (i.e, capital intensity) and gross job flows rates is not clear. Dave and Haltiwanger (1999) and Figura (2009) present evidences that point out a negative (positive) relationship between capital intensity and job creation (destruction) rates, and the differences in the volatility between job destruction and creation rates. Samson *et al* (2001) argue a negative relationship between capital intensity and job creation of unskilled worker but a positive one with job creation of skill and more educated workers. On the other hand, Sen and Farzin (2000) show a theoretical model wherein changes in labor productivity produce larger variations in employment for a firm which has higher capital intensity. The evidence reported has not yielded a definitive relationship between capital intensity and gross jobs flows rates although it may be consistent with the theoretical model of Sen and Farzin (2000). This model follows the creative destruction hypothesis (modeled by Caballero and Hammour, 1996) that job reallocation results from product and process innovations. As new production processes replace old processes, job creation in new processes and job destruction in old processes becomes necessary outcomes in an evolving economy. In this

sense, innovations which increases total factor productivity and labor productivity in capital intensive industries may create employment as well as destroy it.

The positive (negative) relationship between labor productivity and job creation (destruction) rates can be explained according to Basu (1996) and Figura (2009) also due to the positive relationship between the use of the installed capacity (or factor utilization rate) and job creation rates. Thus, Basu (1996) offers three explanations for the productivity procyclical behavior. First, measured fluctuations in productivity might reflect exogenous changes in production technology. Second, productivity (appropriately measured) may be procyclical because of increasing returns to scale: in this case the economy endogenously becomes more efficient by moving to higher levels of activity. Third, if inputs are systematically mismeasured, measured productivity may be procyclical even if true productivity does not change. The gap between actual and measured productivity most likely comes from cyclical errors in measuring inputs: unobserved changes in capital utilization or in the intensity of work effort. The evidence reported in this paper seems to be consistent with the third hypothesis: higher job creation rates may have occurred due to availability of idle installed capacity, under absence of total factor productivity changes.

The last three firms' productive features are related to firms degree of processing or generation of valued added, the degree of export orientation of the firms' output and the propensity to use imported inputs. No systematic literature has been found upon the relationship between gross job flows and these firms' indicators. The results founds thus far have not yield defined degree of association between these variables and gross job flows. Higher degree of processing may be oriented to capital intensive as well as labor intensive processes so that this degree may be negative or positive related to the job creation rates. Higher export share of firms may contribute to either increase job destruction or creation rates and firms import propensity seems to be unrelated to gross flow jobs rates.

II.3. Gross Jobs Flows and Labor Productivity in the Manufacturing Formal Sector of Peru, 2002-2007

A lot of work has been done on the employment reallocation effects on labor productivity. Table No II.5 presents the estimations of these reallocation effects within the Peruvian manufacturing formal sector following the decomposition of Foster *et al* (2006).

According to the figures shown in Table No A7 in period 2002-2007: i) the size of job creating firms was lower than the respective size of job destructing firms, ii) labor productivity and capital-labor ratio were higher for the former, and iii) the (simple) average rate of growth of labor productivity was negative for job creating firms and positive for job-destructing firms. Taken into account these features of these firms, figures in Table No II.5 indicate in the first place, that the rate of labor productivity growth from formal large sized firms in the survey has been much higher than the respective rate for the total (formal and informal) manufacturing sector. This means that labor productivity growth in the informal sector composed mainly by small size firms (i.e., between 11 and 19 workers) and microenterprises (i.e, less than 11 workers) in the booming period has been lower than the average for the manufacturing sector. The results

reported in the next section show the labor productivity rate of growth in the informal sector was negative for period 2002-2007.

Second, job destructing firms contributed in a greater proportion to labor productivity growth than job creating firms in both components, i.e., in the within and between sub-sectors effects. Firms within sub-sectors effect explains less than a half of the labor productivity growth and the between sub-sectors effect less than 3%. Third, the labor productivity contribution of firms which did not create or destroy jobs was negligible. Fourth, the negative cross term effect for the three types of firms is consistent with fact shown in previous tables that firms which create jobs decrease their labor productivity and firms which destroy jobs increase their labor productivity. For firms which did not change their level of employment, the negative cross terms as well as the positive within sub-sector effect suggest these firms slightly increased their level of labor productivity. Finally, the last two terms indicate that entering firms in 2007 had a higher level of productivity than the (simple) average of the sample of firms of the year 2002 and their contribution to the labor productivity growth was positive. On the other hand, exiting firms (i.e, they did not report information) in 2007 (and reported information in 2002) had a lower level of productivity than the (simple) average of the sample of firms of the year 2002. Their decreased level of labor productivity implied a positive contribution to labor productivity growth for the universe sample based manufacturing sector.

Summing up, the evidence at the micro level reported in this section shows that the gross jobs flows of medium and large firms from the formal manufacturing sector seem to have played an important role in the labor productivity rate of growth of the manufacturing sector, in particular from firms which decreased their level of employment.

TABLE No II.1
Representativity of the Sample of Firms from the National Economic Survey of Manufactures in Peru by Sectors, 2002-2007

Sector	2002				2005			
	N	%VA	%L	Lave	N	%VA	%L	Lave
Dairy Products	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a
Processed Fish meals	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a
Bakery and Grain Mills products	303	4.8	3.8	16	79	3.6	1.9	31
Other food products	4	0.0	0.2	10	2	0.7	6.7	397
Bev. and Tobacco	63	24.1	13.1	99	26	27.0	20.9	168
Textiles	275	38.6	16.4	120	140	37.0	10.5	166
Wearing Apparels	396	20.5	11.9	52	116	23.8	8.2	156
Leather products	42	43.2	5.9	11	10	17.2	1.7	21
Manufacture of footwear	93	19.4	2.7	12	22	25.6	1.3	25
Wood and Furniture	181	20.6	3.4	32	50	14.9	1.5	50
Paper Products	50	38.1	34.8	70	26	33.3	62.3	147
Printing Materials	294	51.6	15.1	20	78	34.6	13.7	70
Basic Chemicals and Pharmaceutical products	120	27.1	100.0	79	64	13.1	100.0	104
Other Chemical products	128	41.2	55.3	80	69	27.2	33.8	78
Rubber and Plastic	184	46.0	34.4	40	111	49.2	31.0	63
Non-Metallic Minerals	90	49.0	17.0	106	41	43.9	11.9	146
Iron and Steel	24	30.7	25.9	123	12	28.8	26.7	183
Non-Ferrous Metals[1]	26	6.6	100.0	63	12	20.0	100.0	646
Metallic Products	240	21.8	12.1	42	92	17.5	5.4	50
No Electrical Machinery	71	31.7	21.1	20	22	54.2	7.1	66
Electrical Machinery	61	43.6	33.7	45	32	42.8	46.2	75
Transport Equipment	46	44.5	19.2	44	23	31.2	11.4	69
Rest of Manufactures	220	54.2	16.2	38	51	11.5	3.7	43
Total	**2,911**	**24.0**	**12.8**	**51**	**1,078**	**21.2**	**9.0**	**101**

Continuation…

TABLE No II.1

Representativity of the Sample of Firms from the National Economic Survey of Manufactures in Peru by Sectors, 2002-2007

Sector	2006				2007			
	N	%VA	%L	Lave	N	%VA	%L	Lave
Dairy Products[2]	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a
Processed Fish meals	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a
Bakery and Grain Mills products	56	2.9	1.6	37	346	30.1	14.2	57
Other food products	1	0.2	1.5	231	226	35.4	100.0	269
Bev. and Tobacco	19	18.5	7.7	191	49	100.0	13.1	136
Textiles	134	36.4	10.5	182	346	75.8	12.3	101
Wearing Apparels	98	29.4	10.2	218	474	53.6	13.6	76
Leather products	18	21.9	4.3	15	47	46.4	2.8	11
Manufacture of footwear	19	48.5	1.3	31	168	97.6	4.1	11
Wood and Furniture	48	16.2	2.1	72	456	34.9	5.3	19
Paper Products	26	17.4	23.4	125	150	30.0	53.3	36
Printing Materials	83	34.6	11.3	73	369	41.8	17.1	25
Basic Chemicals and Pharmaceutical products[3]	59	13.5	100.0	104	174	100.0	100.0	75
Other Chemical products	78	28.7	35.4	99	231	93.8	60.8	58
Rubber and Plastic	106	58.2	26.0	77	377	84.7	74.7	41
Non-Metallic Minerals	33	37.1	14.3	185	221	56.2	16.3	45
Iron and Steel	12	32.9	37.9	212	80	31.4	49.2	33
Non-Ferrous Metals	10	13.2	52.9	173	67	63.6	100.0	103
Metallic Products	83	15.8	5.3	55	399	23.3	12.0	29
No Electrical Machinery	22	50.6	3.8	71	120	98.5	8.0	27
Electrical Machinery	34	21.1	26.2	65	190	30.3	15.7	17
Transport Equipment	28	34.2	16.4	99	253	37.8	22.9	17
Rest of Manufactures	35	12.0	3.8	75	224	14.5	6.1	22
Total	**1,002**	**19.8**	**8.6**	**111**	**5,081**	**61.3**	**19.6**	**57**

Source: National Economic Survey of Manufactures, INEI (2002, 2005, 2006, 2007). Author's work. [1] A firm has more than 50% of the employment in this sector. n.a, not available. [2] The value added of one firm s about 100% of the total value added of this sector. [3] The value added of one firm in the Petroleum and Refineries sub-sector s covers the total value added of this sector.

TABLE No II.2

Total Job Creation (JC) and Destruction (JD) Rates by Labor Productivity (Lp) and Selected Indicators for a Sample of Manufacturing Firms, 2002-2007

Period (t-k)-t	JC rate (n)	JD rate (n)	Lp1 (t-k)			Lp2 (t-k)			gLp1 (t-k)		gLp2 (t-k)	
			JC (n)	JD (n)	Test (df)	JC (n)	JD (n)	Test (df)	JC (n)	JD (n)	JC (n)	JD (n)
2002-05	17.26 (375)	7.53 (259)	69,394 (375)	47,217 (259)	3.03*** (632)	22,155 (375)	16,233 (259)	3.2*** (632)	-2.0 (375)	17.0 (259)	-3.73 (375)	16.46 (259)
2002-06	13.25 (344)	8.89 (184)	65,310 (344)	49,688 (184)	1.85* (526)	22,839 (344)	16,118 (184)	3.33*** (526)	1.54 (344)	16.39 (184)	-0.68 (344)	12.60 (184)
2002-07	12.86 (558)	7.84 (284)	70,058 (558)	38,907 (284)	2.34** (840)	21,941 (558)	13,761 (284)	3.86*** (840)	-3.57 (558)	6.20 (284)	-1.96 (558)	8.54 (284)
2005-07	14.33 (448)	10.02 (190)	66,797 (448)	54,523 (190)	1.87* (636)	19,973 (448)	18,786 (190)	0.49 (636)	-4.34 (448)	1.73 (190)	-1.55 (448)	5.14 (190)
2005-06	24.98 (295)	16.52 (164)	69,903 (295)	69,873 (164)	0.0 (457)	20,763 (295)	19,928 (164)	0.7 (457)	-2.9 (295)	29.3 (164)	-5.12 (295)	25.66 (164)
2006-07	16.20 (416)	17.00 (132)	72,936 (416)	47,023 (132)	5.36*** (546)	21,474 (416)	15,492 (132)	4.5*** (546)	-14.1 (416)	12.8 (132)	12.44 (416)	47.51 (132)

Period (t-k)-t	Average Size (t-k)			Value Added Ratio (t-k)			Export Ratio(t-k)			Import Ratio(t-k)		
	JC (n)	JD (n)	Test (df)	JC (n)	JD (n)	Test (df)	JC (n)	JD (n)	Test (df)	JC (n)	JD (n)	Test (df)
2002-05	124 (375)	100 (259)	1.1 (632)	38.4 (375)	41.2 (259)	-1.9 (632)	31.8 (135)	32.5 (70)	-0.1 (203)	53.9 (76)	53.6 (42)	0.1 (116)
2002-06	129 (344)	103 (184)	1.25 (526)	39.5 (344)	42.5 (184)	-1.7* (161)	23.7 (344)	21.9 (47)	0.34 (171)	20.3 (158)	43.2 (35)	-3.9*** (191)
2002-07	93 (558)	117 (284)	-0.99 (284)	41.9 (558)	43.7 (284)	-1.2 (284)	26.6 (558)	26.4 (63)	0.04 (234)	52.7 (112)	43.4 (45)	1.61 (155)
2005-07	132 (448)	182 (190)	-1.18 (253)	36.1 (448)	39.5 (190)	-2.1** (253)	26.8 (448)	31.1 (59)	-0.92 (212)	53.6 (79)	43.3 (43)	1.7* (120)
2005-06	147 (295)	211 (164)	-1.73* (457)	34.6 (295)	36.4 (164)	-1.1 (457)	27.1 (121)	34.7 (61)	-1.5 (180)	57.3 (59)	46.8 (49)	1.7* (106)
2006-07	142 (416)	149 (132)	-0.3 (546)	35.7 (416)	37.1 (132)	-0.9 (546)	29.3 (159)	33.9 (39)	-0.8 (196)	54.9 (85)	58.4 (27)	-0.4 (110)

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TABLE No II.2

Total Job Creation (JC) and Destruction (JD) Rates by Labor Productivity (Lp) and Selected Indicators for a Sample of Manufacturing Firms, 2002-2007

Period (t-k)-t	Capital-Labor ratio 1 (t-k)			Capital Labor ratio 2 (t-k)			Inst. Capacity C (t-k)		
	JC (n)	JD (n)	Test (df)	JC (n)	JD (n)	Test (df)	JC (n)	JD (n)	Test (df)
2002-05	56,313 (373)	44,698 (255)	1.5 (626)	36,059 (347)	36,742 (287)	-0.1 (632)	63.1 (243)	60.6 (169)	1.0 (410)
2002-06	57,245 (343)	42,800 (183)	1.86* (524)	36,668 (322)	27,229 (170)	1.73* (490)	64.2 (212)	57.7 (112)	2.27** (322)
2002-07	53,350 (551)	41,032 (284)	1.50 (833)	34,875 (487)	26,618 (254)	1.46 (739)	62.2 (328)	58.6 (180)	1.53 (506)
2005-07	55,863 (447)	68,148 (190)	-0.95 (635)	33,578 (434)	43,810 (184)	-1.16 (616)	68.1 (303)	70.8 (121)	-0.94 (422)
2005-06	62,354 (295)	66,050 (164)	-0.3 (457)	36,742 (287)	41,714 (160)	-0.6 (445)	66.3 (190)	65.9 (105)	0.1 (293)
2006-07	56,389 (415)	37,443 (132)	2.49** (545)	33,777 (401)	22,270 (124)	2.34*** (523)	65.1 (257)	64.7 (86)	0.1 (341)

Source: Table No II.1. Author´s work. The mean test is t-statistics with degree of freedom (df). *, **, *** significant at 10%, 5% and 1%. The period (t-k) refers to the year of the indicator. 'n' is the number of firms for each indicator and period.

TABLE No II.3

Total Job Creation (JC) and Destruction (JD), Labor Productivity (Lp) and Selected Indicators for a Sample of Manufacturing Firms, 2002-2007

Sector	2002-2005									
	JC	N	Lp1 (t-k)	Lp2 (t-k)	JD	N	Lp1 (t-k)	Lp2 (t-k)	Test 1	Test 2
Dairy Products	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a
Processed Fish meals	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a
Bakery and Grain Mills products	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a
Other food products	13.5	23	34,419	14,213	8.4	21	15,197	5,963	2.350**	2.097**
Bev. and Tobacco	2.3	2	68,486	32,990	9.7	5	33,986	9,644	1.262	1.520*
Textiles	17.5	63	59,958	16,935	7.7	37	28,411	9,244	3.679***	3.175***
Wearing Apparels	30.7	44	66,209	15,657	9.0	22	26,355	9,747	2.700**	2.031**
Leather products	14.5	1	157,916	89,436	11.8	3	297,359	41,841	-0.662	1.928
Manufacture of footwear	15.7	5	61,505	11,636	7.1	5	86,541	14,891	-0.597	-0.562
Wood and Furniture	20.4	10	150,388	32,012	7.4	8	168,741	34,558	-0.136	-0.193
Paper Products	18.8	10	78,804	24,358	5.9	5	53,366	20,178	1.455	0.584
Printing Materials	24.0	17	58,017	28,912	7.0	13	40,271	19,473	1.704*	1.510
Basic Chemicals and Pharmaceutical products and	13.8	38	72,253	20,286	5.6	33	40,549	16,073	2.970***	1.378
Other Chemical products	13.3	9	56,425	19,512	4.8	8	62,428	21,711	-0.318	-0.266
Rubber and Plastic	14.0	46	85,405	27,257	9.6	23	45,323	12,283	1.625	2.413**
Non-Metallic Minerals	9.9	17	92,300	41,482	6.4	10	119,135	57,215	-0.658	-0.721
Iron and Steel	9.4	7	43,608	19,271	2.5	6	95,876	33,369	-1.977*	-1.255
Non-Ferrous Metals	16.7	4	183,109	45,545	11.9	2	38,365	18,156	3.089**	1.533
Metallic Products	18.4	30	62,110	19,412	7.0	25	32,585	13,077	1.706*	1.920*
No Electrical Machinery	12.1	11	47,004	20,659	14.5	1	52,016	27,488	-0.613	-1.554
Electrical Machinery	16.7	7	79,635	22,949	7.1	13	52,085	26,859	0.988	-0.424
Transport Equipment	5.5	9	36,273	14,480	7.7	5	19,150	8,916	2.073*	1.882
Rest of Manufactures	17.0	22	73,031	28,795	8.8	14	20,096	7,187	3.418***	2.914***
Total	17.3	375	69,394	22,155	7.5	259	47,217	16,233	3.04***	3.2***

Continuation…

TABLE No II.3
Total Job Creation (JC) and Destruction (JD), Labor Productivity and Selected Indicators for a Sample of Manufacturing Firms, 2002-2007

Sector	2002-2006									
	JC	N	Lp1 (t-k)	Lp2 (t-k)	JD	N	Lp1 (t-k)	Lp2 (t-k)	Test 1	Test 2
Dairy Products	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a
Processed Fish meals	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a
Bakery and Grain Mills products	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a
Other food products	16.3	16	45,188	20,551	8.83	11	15,020	6,304	0.651	0.625
Bev. and Tobacco	-	0	-	-	13.85	2	27,522	10,579	0.000	0.000
Textiles	13.2	66	53,641	15,136	7.48	23	32,074	12,975	0.389	0.090
Wearing Apparels	14.8	31	46,657	13,086	14.01	7	32,588	9,062	0.272	0.238
Leather products	9.3	3	51,628	25,548	9.12	5	181,955	26,453	-0.411	-0.022
Manufacture of footwear	18.5	5	60,946	16,525	16.94	5	59,498	14,875	0.017	0.095
Wood and Furniture	22.9	9	116,001	49,813	8.93	7	176,449	26,801	-0.167	0.273
Paper Products	15.4	11	61,089	17,752	6.74	2	56,152	19,039	0.089	-0.087
Printing Materials	13.8	18	51,386	25,669	11.65	19	32,352	16,398	0.467	0.411
Basic Chemicals and Pharmaceutical products and	10.9	35	65,504	20,365	5.47	27	52,812	19,553	0.199	0.040
Other Chemical products	12.9	11	68,783	25,493	5.08	4	55,764	8,788	0.201	0.886
Rubber and Plastic	14.3	36	92,385	27,950	8.02	22	52,672	17,782	0.231	0.230
Non-Metallic Minerals	7.4	15	120,153	59,378	8.69	5	79,730	27,682	0.273	0.464
Iron and Steel	6.7	9	60,402	23,662	2.68	4	110,753	40,977	-0.834	-0.685
Non-Ferrous Metals	18.2	3	202,835	50,791	9.64	1	123,952	43,465	0.872	0.187
Metallic Products	14.7	30	51,497	18,141	10.22	17	27,390	13,263	0.501	0.366
No Electrical Machinery	8.9	13	47,002	19,279	7.23	2	29,839	26,188	0.428	-0.248
Electrical Machinery	12.0	8	63,052	24,004	15.99	7	33,616	11,725	0.685	0.753
Transport Equipment	9.0	9	42,167	15,934	4.33	2	12,726	5,470	1.588	1.678
Rest of Manufactures	14.4	16	80,431	29,539	7.96	12	18,973	8,213	0.847	0.726
Total	13.2	344	65,310	22,839	8.89	184	49,688	16,118	1.853*	3.326***

Continuation…

TABLE No II.3
Total Job Creation (JC) and Destruction (JD), Labor Productivity and Selected Indicators for a Sample of Manufacturing Firms, 2002-2007

Sector	2002-2007									
	JC	N	Lp1 (t-k)	Lp2 (t-k)	JD	N	Lp1 (t-k)	Lp2 (t-k)	Test 1	Test 2
Dairy Products	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a
Processed Fish meals	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a
Bakery and Grain Mills products	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a
Other food products	11.8	29	38,448	14,731	7.62	21	24,287	7,763	0.278	0.463
Bev. and Tobacco	5.1	3	80,389	35,615	12.63	4	20,797	6,177	2.873**	2.131*
Textiles	11.5	73	42,897	14,109	6.41	36	29,442	8,908	0.292	0.419
Wearing Apparels	18.1	58	54,715	14,767	9.20	19	19,706	7,319	0.407	0.411
Leather products	17.9	6	28,332	20,398	10.66	6	160,054	25,146	-0.450	-0.126
Manufacture of footwear	28.1	17	96,656	28,980	14.28	9	32,090	10,888	0.381	0.378
Wood and Furniture	11.9	12	67,532	24,729	5.75	11	27,401	10,989	0.953	0.606
Paper Products	11.3	13	66,137	23,082	13.71	6	48,040	13,870	0.346	0.438
Printing Materials	13.0	31	44,720	21,350	10.10	24	33,309	20,673	0.215	0.017
Basic Chemicals and Pharmaceutical products and	10.2	56	59,190	19,709	6.82	37	53,002	18,360	0.058	0.045
Other Chemical products	12.1	13	61,551	19,818	8.49	9	58,821	17,535	0.045	0.100
Rubber and Plastic	10.8	72	68,551	22,199	7.53	26	39,684	14,584	0.224	0.224
Non-Metallic Minerals	11.8	23	104,563	48,989	6.91	9	83,309	34,546	0.144	0.200
Iron and Steel	7.4	12	49,195	19,714	4.09	6	65,816	25,183	-0.235	-0.197
Non-Ferrous Metals	6.4	4	87,663	19,967	3.09	4	109,555	21,412	-0.196	-0.136
Metallic Products	15.1	52	55,687	19,205	7.44	19	23,004	9,919	0.434	0.531
No Electrical Machinery	11.6	25	317,080	50,093	6.29	8	30,300	15,326	0.213	0.222
Electrical Machinery	8.9	19	58,561	21,832	8.83	9	21,811	7,175	0.629	0.693
Transport Equipment	10.4	12	42,635	17,618	5.32	6	15,941	6,482	1.004	0.839
Rest of Manufactures	14.0	28	61,368	23,885	6.92	15	20,481	8,861	0.623	0.582
Total	12.9	558	70,058	21,941	7.84	284	38,907	13,761	2.337**	3.86***

Continuation…

TABLE No II.3
Total Job Creation (JC) and Destruction (JD), Labor Productivity and Selected Indicators for a Sample of Manufacturing Firms, 2002-2007

Sector	2005-2007									
	JC	N	Lp1 (t-k)	Lp2 (t-k)	JD	N	Lp1 (t-k)	Lp2 (t-k)	Test 1	Test 2
Dairy Products	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a
Processed Fish meals	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a
Bakery and Grain Mills products	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a
Other food products	11.1	29	28,029	9,846	6.97	10	33,068	9,482	-0.116	0.029
Bev. and Tobacco	4.3	3	94,364	31,681	9.65	2	61,024	37,459	0.658	-0.200
Textiles	16.1	64	55,127	15,143	6.81	41	53,587	19,926	0.019	-0.116
Wearing Apparels	24.3	35	44,109	13,890	16.19	14	26,823	9,418	0.458	0.263
Leather products	5.8	1	42,976	9,204	8.78	2	37,556	9,734	0.204	-0.105
Manufacture of footwear	9.6	7	30,593	10,575	10.50	2	158,993	28,407	-0.993	-1.608*
Wood and Furniture	16.3	14	78,709	25,478	3.73	3	46,204	13,886	0.505	0.860
Paper Products	9.4	14	67,323	16,369	15.44	5	93,567	32,207	-0.310	-0.502
Printing Materials	18.6	21	50,173	21,049	10.83	18	50,151	15,640	0.000	0.195
Basic Chemicals and Pharmaceutical products and	10.6	51	71,145	19,872	8.54	20	46,045	16,097	0.402	0.208
Other Chemical products	10.1	18	78,259	23,156	10.13	3	110,123	35,154	-0.422	-0.342
Rubber and Plastic	14.1	59	102,096	25,603	8.57	20	67,695	18,111	0.198	0.249
Non-Metallic Minerals	9.8	20	117,619	44,425	16.54	8	150,840	73,450	-0.141	-0.298
Iron and Steel	9.5	13	58,940	16,923	5.39	1	11,414	7,407	0.710	0.455
Non-Ferrous Metals	10.2	2	115,071	15,414	12.46	3	97,990	12,635	0.157	0.488
Metallic Products	12.9	43	48,584	14,148	11.49	16	35,000	12,847	0.226	0.083
No Electrical Machinery	9.4	9	56,889	23,993	9.36	4	53,284	15,041	0.078	0.490
Electrical Machinery	18.4	18	113,007	33,212	10.79	4	32,339	11,385	0.431	0.596
Transport Equipment	13.9	10	51,095	17,896	2.94	3	35,518	12,221	0.533	0.636
Rest of Manufactures	22.2	17	49,782	18,803	15.14	11	27,770	10,883	0.535	0.483
Total	14.3	448	66,797	19,973	10.02	190	54,523	18,786	1.872*	0.495

Continuation…

TABLE No II.3
Total Job Creation (JC) and Destruction (JD), Labor Productivity and Selected Indicators for a Sample of Manufacturing Firms, 2002-2007

Sector	2005-2006									
	JC	N	Lp1 (t-k)	Lp2 (t-k)	JD	N	Lp1 (t-k)	Lp2 (t-k)	Test 1	Test 2
Dairy Products	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a
Processed Fish meals	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a
Bakery and Grain Mills products	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a
Other food products	20.7	21	37,203	10,168	7.3	5	41,913	14,148	-0.208	-0.774
Bev. and Tobacco	38.1	2	65,923	33,301	6.7	1	49,100	13,562	1.545	3.132
Textiles	21.8	45	54,673	14,295	14.4	37	46,294	14,015	0.957	0.123
Wearing Apparels	33.8	20	39,957	13,181	22.0	14	40,259	12,747	-0.026	0.078
Leather products	2.4	1	42,976	9,204	11.8	2	35,427	12,292	7.176*	-0.732
Manufacture of footwear	26.5	3	49,397	12,000	25.0	5	125,377	23,825	-1.438	-1.533
Wood and Furniture	29.3	8	112,899	24,446	11.9	8	139,563	25,522	-0.289	-0.117
Paper Products	20.8	10	78,579	21,063	1.9	1	177,044	36,604	-5.04***	-3.5***
Printing Materials	26.0	13	49,522	18,386	19.5	14	58,110	17,670	-0.524	0.165
Basic Chemicals and Pharmaceutical products and	29.0	36	78,804	23,121	15.0	21	51,000	16,894	2.287**	1.559
Other Chemical products	11.5	8	93,779	38,240	26.2	1	47,661	8,913	2.721**	3.213**
Rubber and Plastic	28.1	39	94,007	25,071	17.8	15	156,178	35,052	-1.261	-1.161
Non-Metallic Minerals	12.3	15	130,953	49,766	16.6	4	204,626	88,617	-0.646	-0.815
Iron and Steel	20.9	8	56,913	14,115	4.0	4	73,536	28,526	-0.324	-0.886
Non-Ferrous Metals	23.0	3	111,445	20,005	-	0	-	-	0.000	0.000
Metallic Products	26.1	24	65,214	17,475	23.9	10	48,257	15,026	0.947	0.491
No Electrical Machinery	8.3	5	63,264	30,108	14.1	4	54,798	16,800	0.393	1.346
Electrical Machinery	21.7	10	85,124	28,225	24.0	4	46,923	13,158	1.409	2.009*
Transport Equipment	40.8	10	56,027	17,150	8.4	4	26,214	9,950	2.051*	1.647
Rest of Manufactures	28.3	14	44,604	13,454	19.3	10	55,081	18,714	-0.571	-0.871
Total	25.0	295	69,903	20,763	16.5	164	69,872	19,928	0.03	0.358

Continuation…

TABLE No II.3
Total Job Creation (JC) and Destruction (JD), Labor Productivity and Selected Indicators for a Sample of Manufacturing Firms, 2002-2007

Sector	2006-2007									
	JC	N	Lp1 (t-k)	Lp2 (t-k)	JD	N	Lp1 (t-k)	Lp2 (t-k)	Test 1	Test 2
Dairy Products	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a
Processed Fish meals	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a
Bakery and Grain Mills products	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a
Other food products	21.6	20	29,891	10,821	10.2	8	32,196	8,850	-0.17	0.579
Bev. and Tobacco	21.4	1	50,586	11,641	10.2	2	48,995	18,961	0.134	-3.85
Textiles	16.5	58	49,409	14,693	14.8	25	34,572	10,340	1.767	2.124*
Wearing Apparels	17.0	26	60,475	16,150	20.5	9	27,684	5,941	2.483**	3.06***
Leather products	19.6	6	61,443	12,896	11.4	2	35,552	28,359	0.986	-0.845
Manufacture of footwear	37.7	10	68,415	13,982	-	0	-	-	0.000	0.000
Wood and Furniture	8.6	12	106,365	22,671	7.4	3	40,303	17,027	2.306**	1.625
Paper Products	11.6	9	78,616	19,217	7.0	4	63,467	21,784	0.395	-0.234
Printing Materials	10.1	37	52,115	16,633	22.3	7	21,289	11,171	4.115***	2.353**
Basic Chemicals and Pharmaceutical products and	14.4	58	67,235	19,712	19.0	14	66,159	20,200	0.065	-0.118
Other Chemical products	14.1	12	89,726	21,862	31.2	7	84,105	30,480	0.213	-0.961
Rubber and Plastic	13.6	46	105,434	29,737	16.1	17	56,161	15,602	2.048**	2.74***
Non-Metallic Minerals	10.6	17	150,676	60,830	10.4	4	56,688	20,229	1.792*	1.847*
Iron and Steel	6.7	11	142,401	37,455	1.9	2	51,283	12,412	1.434	1.611
Non-Ferrous Metals	23.8	3	129,588	24,965	-	0	-	-	0.000	0.000
Metallic Products	25.7	33	60,259	19,184	12.3	12	46,218	11,871	0.913	1.835*
No Electrical Machinery	18.5	11	53,472	23,383	35.6	4	92,166	49,647	-0.702	-0.857
Electrical Machinery	16.4	16	62,112	19,405	24.4	3	31,168	11,866	1.483	1.004
Transport Equipment	7.4	5	44,685	18,436	27.9	5	23,987	8,452	1.786	2.524**
Rest of Manufactures	21.8	23	48,139	15,604	12.7	4	51,860	16,258	-0.185	-0.158
Total	16.3	414	70,762	21,073	17.0	132	47,023	15,492	3.983***	2.789***

Source: Tables No II.1 and II.2. Author´s work.

TABLE No II.4

Correlation Coefficients between Job Creation, and Destruction Rates (JCr, JDr) of Total (Tot.) and Permanent Workers (Perm.), and Selected Indicators of the Sample of Manufacturing Firms, 2002-2007

Indicator At year (t-k)	2002-2005				2002-2006				2002-2007			
	Tot.		Perm.		Tot.		Perm.		Tot.		Perm.	
	JCr	JDr	JCr	JDr	JCr	JDr	JCr	JDr	JCr	JDr	JCr	JDr
Lp1	0.38***	-0.14**	0.46***	-0.13**	0.24***	-0.11	0.50***	-0.05	0.18***	-0.12*	0.43***	-0.09
(n)	(375)	(259)	(304)	(313)	(344)	(184)	(283)	(232)	(558)	(284)	(464)	(356)
Lp2	0.13**	-0.2***	0.28***	-0.16***	0.16***	-0.18**	0.34***	-0.11	0.23***	-0.14**	0.39***	-0.13
(n)	(375)	(259)	(304)	(313)	(344)	(184)	(283)	(232)	(558)	(284)	(464)	(356)
gLp1	-0.3***	0.51***	-0.35***	0.69***	-0.36***	0.49***	-0.52***	0.74***	-0.49***	0.36***	-0.55***	0.61***
(n)	(375)	(259)	(304)	(313)	(344)	(184)	(283)	(232)	(558)	(284)	(464)	(356)
gLp2	-0.18***	0.45***	-0.26***	0.63***	-0.25***	0.42**	-0.43***	0.69***	-0.37***	0.28***	-0.44***	0.52***
(n)	(375)	(259)	(304)	(313)	(344)	(184)	(283)	(232)	(558)	(284)	(464)	(356)
SVa	-0.15***	-0.03	-0.16***	-0.06	-0.13**	0.06	-0.15**	-0.11	-0.01	-0.01	0.02	-0.06
(n)	(375)	(259)	(304)	(313)	(344)	(184)	(283)	(232)	(558)	(284)	(464)	(356)
Sx	0.24***	0.04	0.18*	0.17*	0.03	0.03	0.14	0.14	0.07	0.06	0.10	0.03
(n)	(135)	(70)	(99)	(96)	(126)	(47)	(97)	(74)	(173)	(63)	(128)	(104)
Sm	-0.08	-0.05	-0.18	-0.05	-0.03	-0.10	-0.09	-0.08	-0.01	-0.012	-0.15	-0.04
(n)	(76)	(42)	(63)	(56)	(158)	(35)	(58)	(48)	(112)	(45)	(89)	(66)
k1	0.01	-0.21***	0.19**	-0.18***	-0.01	-0.13*	0.19**	-0.01	0.14**	-0.06	0.17**	-0.03
(n)	(373)	(255)	(302)	(309)	(343)	(183)	(282)	(231)	(551)	(284)	(458)	(355)
k2	0.06	-0.17***	0.17**	-0.15***	0.04	-0.09	0.16*	-0.04	0.20***	-0.05	0.19**	-0.02
(n)	(347)	(242)	(280)	(295)	(322)	(170)	(263)	(222)	(487)	(254)	(398)	(327)
IC	0.18***	0.01	0.21***	0.06	0.11	-0.05	0.18*	-0.07	0.06	-0.08	0.12	0.06
(n)	(240)	(169)	(198)	(201)	(212)	(112)	(172)	(144)	(328)	(180)	(277)	(219)
L	-0.11**	-0.07	-0.14**	0.05	-0.15***	-0.12*	-0.14**	0.01	-0.15***	-0.10	-0.14**	-0.02
(n)	(375)	(259)	(304)	(313)	(344)	(184)	(283)	(232)	(558)	(284)	(464)	(356)
gIC	-0.05	-0.06	0.03	0.05	-0.01	-0.013	-0.03	-0.04	-	-	-	-
(n)	(185)	(133)	(150)	(166)	(153)	(76)	(126)	(32)	(-)	(-)	(-)	(-)

Continuation…

TABLE No II.4
Correlation Coefficients between Job Creation, and Destruction Rates of Total (Tot.) and Permanent Workers (Perm.), and Selected Indicators of the Sample of Manufacturing Firms, 2002-2007

Indicator at year (t-k)	2005-2007				2005-2006				2006-2007			
	Tot.		Perm.		Tot.		Perm.		Tot.		Perm.	
	JCr	JDr	JCr	JDr	JCr	JDr	JCr	JDr	JCr	JDr	JCr	JDr
Lp1	0.02	-0.15**	0.32***	-0.05	-0.01	-0.05	0.45***	0.03	0.00	-0.08	0.47***	-0.06
(n)	(448)	(190)	(409)	(208)	(295)	(164)	(260)	(180)	(414)	(132)	(387)	(129)
Lp2	0.10**	-0.14*	0.37***	-0.08	-0.03	-0.11	0.49***	-0.02	0.00	0.01	0.72***	-0.07
(n)	(448)	(190)	(409)	(208)	(295)	(164)	(260)	(180)	(414)	(132)	(387)	(129)
gLp1	-0.50***	0.55***	-0.62***	0.78***	-0.42***	0.62***	-0.46***	0.66***	-0.37***	0.5***	-0.16***	0.63***
(n)	(448)	(190)	(409)	(208)	(295)	(164)	(260)	(180)	(414)	(132)	(387)	(129)
gLp2	-0.34***	0.28***	-0.40***	0.63***	-0.23***	0.51	-0.36***	0.59***	-0.16***	0.2**	-0.07	0.61***
(n)	(448)	(190)	(409)	(208)	(295)	(164)	(260)	(180)	(414)	(132)	(387)	(129)
SVa	0.06	0.11	0.06	0.07	-0.06	-0.02	0.00	0.02	0.05	0.07	0.00	0.01
(n)	(448)	(190)	(409)	(208)	(295)	(164)	(260)	(180)	(414)	(132)	(387)	(129)
Sx	-0.01	0.12	0.09	0.29	-0.01	0.05	0.05	0.29**	-0.04	0.12	0.07	0.39**
(n)	(155)	(59)	(104)	(68)	(121)	(61)	(102)	(73)	(159)	(39)	(144)	(42)
Sm	0.03	-0.11	-0.08	-0.21	-0.24*	0.11	-0.20	0.03	-0.05	-0.01	-0.14	-0.04
(n)	(79)	(43)	(74)	(47)	(59)	(49)	(52)	(49)	(85)	(27)	(84)	(26)
k1	-0.07	-0.14*	0.27***	-0.10	-0.05	-0.06	0.47***	-0.03	-0.03	-0.11	0.07	-0.11
(n)	(447)	(190)	(408)	(208)	(295)	(164)	(260)	(180)	(414)	(132)	(387)	(129)
k2	-0.03	-0.11	0.25**	-0.10	-0.02	-0.02	0.46***	-0.02	-0.03	-0.11	0.08	-0.09
(n)	(434)	(184)	(397)	(202)	(287)	(216)	(287)	(178)	(401)	(124)	(376)	(122)
IC	-0.02	0.11	0.07	-0.02	0.05	0.14	0.05	0.04	0.06	-0.03	-0.01	-0.01
(n)	(303)	(121)	(281)	(128)	(194)	(101)	(205)	(164)	(247)	(179)	(408)	(216)
L	-0.16***	-0.02	-0.10	0.01	-0.18***	-0.14**	-0.09	-0.09	-0.12**	-0.19**	-0.08	0.06
(n)	(448)	(190)	(409)	(208)	(295)	(164)	(260)	(180)	(414)	(132)	(387)	(129)
gIC	-	-	-	-	0.10	-0.03	0.03	-0.06	-	-	-	-
(n)	(-)	(-)	(-)	(-)	(172)	(82)	(97)	(85)	(-)	(-)	(-)	(-)

Source: Tables No II.1 and II.2. Author´s work. (t-k) initial year of period (t-k), t. gIC is the rate of growth of the installed capacity index for the periods considered in the table.

TABLE No II.5

Labor Productivity Rate of Growth Decomposition for a Sample of Firms from the National Economic Survey of Manufactures in Peru, 2002-2007 (%)

Sector	Within Effects			Between Effects			Cross Term			Entering Firms	Exit Firms	Total
	JC	JD	NC	JC	JD	NC	JC	JD	NC			
Universe Simulated from Sample- of Formal Firms (N=7096)	2.575 (558)	3.726 (284)	0.1120 (54)	0.0919 (558)	0.225 (284)	0.0074 (54)	-0.201 (558)	-0.470 (284)	-0.011 (54)	3.194 (4185)	-5.282 (2015)	14.531 (7096)
	6.4125			0.3247								
Sample of Formal Firms												13.306
Universe (Formal and Informal Firms)	0.903			0.861								1.764

Source: Table II.1. Author's work. JC, job creating firms; JD, job destructing firms and NC firms which did not change their level of employment.

III. LABOR PRODUCTIVITY AND EMPLOYMENT IN THE INFORMAL MICRO-ENTERPRISES SECTOR IN URBAN AREAS OF PERU.

This section of the document aims to: (i) estimate the size of the urban informal sector in terms of employment and production, (ii) describe this sector considering some characteristics of the micro-entrepreneurs, the microenterprises and their workers, and (iii) to calculate the productivity of these sector and evaluate some of the characteristics to which are associated the differences in productivity as well as with the evolution of productivity along the period of economic growth from 2002 to 2007.

The information used for this section comes mainly from ENAHO from 2002 to 2007. Starting in year 2002 the survey includes 2 special questionnaires with the particular objective to collect information about "informal" economic activities.[40] For the purposes of those questionnaires, informal activities are considered as such if those activities: (i) are not functioning by registered entrepreneur for tax purposes, or (ii) are managed by entrepreneurs that do not keep any system of business accounting.

We will occupy ourselves here only with the information of questionnaire that registers non-farm economic activities in urban areas.[41] Henceforth we will refer to the information in this questionnaire as the one relating to *informal micro entreprises* (IME) in urban areas. The questionnaire is to be answered by all those people that are part of the occupied labour force (according to module 500 of labour activities of the ENAHO survey) and comply with the following characteristics: (i) are employers or independent workers in the principal or secondary occupation and, as was mentioned above, (ii) the enterprises or firms that they conduct are not registered as legal persons or keep a system of business accounting.

Diagram III.1 helps us identify the universe of informal enterprises that have been identified from the ENAHO survey. Taking as a reference the survey for year 2007, it can be observed that out of the 15.3 million people occupied in the labour force approximately 6.0 million are employers or self-employed in the main occupation. In the secondary occupation other 700 thousand are employers and self-employed. Out of these 6.7 million people (60% of them are in urban areas, i.e. around 4.0 million), there is a group that manages their own business without being registered for work on such activity[42]. Considering only those non-registered entrepreneurs in urban areas they represent 3.0 million of *informal entrepreneurs in urban areas* who manage 3.2 million firms and that employ 1.5 million workers (in addition to the entrepreneur).

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[40] *Ingreso del Trabajador Independiente* in non-farm activities (questionnaire 02) and in farm activities (questionnaire 04). The information collected with these questionnaires has been scarcely and recently used. Among the few works that used it are: Herrera (2003), Hidalgo et. al (2004), Chacaltana (2008), The World Bank (2008), Yamada (2009) and Díaz and Trivelli (2009).

[41] The questionnaire related to the "informal economic activities" are organized in 5 sections: (i) basic characteristics of the enterprise or firm, that includes information about the infraestructure, equipment and labour force, (ii) information about the productive and extractive activities (sales, self-consumption and expenses in inputs: product, quantity, price and frequency), (iii) information about the commercial activities (similar to that in production), (iv) information about the services' activities (similar to that in production), and (v) other general expenses apart from inputs.

[42] They are not registered as a legal business nor as a "natural" person at the SUNAT meaning that, for practical purposes, are not subject to supervision from the tax system and do not pay taxes.

In the following section we will describe the characteristics of these enterprises that, as we will see later on, are small since the majority of them are single-person activity or employ one or two workers. In that sense, this is the universe of the *informal micro enterprises* (henceforth IMEs) in urban activities of Peru.

III.1. General characteristics of the urban IMEs of Peru

Considering the characteristics of the entrepreneurs of the urban IME sector (see Table III.1), it has been found that women predominate lightly over men, they are approximately 40 years of age and have 9 years of school education (approximately third grade of secondary education). More than 40% of the micro entrepreneurs are household heads and almost 30% are spouses of the head. On average, micro entrepreneurs work between 33 and 37 hours per week. This represents somewhat less than a full-time working week of 40 hours. Some of these characteristics contrast with those of all the occupied EAP in urban areas of Peru and in particular with those of the entrepreneurs (see Figure III.1). For example, women's participation in the informal sector exceeds the one of the total urban occupied EAP and also those in the 2 categories from the entrepreneurs come (i.e. employers and self-employees). They also are relatively younger than employers (but do not of the whole occupied EAP). In terms of schooling, informal micro-entrepreneurs have fewer years of education than all the self-employees. Finally, they work shorter shifts per week than any other occupational category except UFW.

Urban micro-enterprises tend to specialize in one of 3 large types of economic activities: production (including manufacture, construction and extraction), trade and services (see Table III.1). It is very rare to find micro enterprises that combine 2 if not 3 activities. An important proportion of the IMEs (between 24 and 32%) have less than one year of age. On the other hand, between 36 and 41% have 5 years and more since they were created. These results suggest a high rotation, since the presence of firms with less than one year of age is important. Between 69% and 78% of the micro enterprises do not utilize more workers than the entrepreneur himself. Between 20 and 27% have one or two workers and less than 5% have 3 or more workers[43].

The labour force that the IMEs employ (without counting the micro entrepreneur and considering only the group of micro enterprises that do utilize additional workers) is slightly more masculine and with an average age of approximately 27 years (see Table III.1)[44]. It is not possible to calculate the average years of schooling but it is indeed possible to observe that somewhat less than a third of them have complete primary education at most. Those that do have complete or incomplete secondary education represent the majority group: between 54 and 60%. According to the ENAHO survey of 2007 that does collect information about the kinship relationship with the entrepreneur, it can be observed that 81% of the workers are relatives of the micro entrepreneur. Given the high proportion of micro entrepreneurs that are heads of households or spouses of the head, what can be concluded is that the micro enterprises are *family production units*.

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[43] The questionnaire allows on the most the registration of detailed information about 10 workers, but does allow the registration of the global number of workers (without further details apart from the differentiation if they receive remuneration or not).

[44] It is important to mention that around 10% of the labor force in urban IME is less than 14 years old, below the minimum working age according to Peruvian laws. The figures mentioned here of the whole EAP come from the module 500 of the ENAHO which include only people with 14 and more years. So, figures from the IME and the whole economy are not strictly comparable.

The comparison of the employees by the IMEs with the whole occupied EAP and in particular with similar categories (i.e. wage-earners and unpaid family workers) shows once again that women have greater participation, they are younger and have lower levels of education (see Figure III.2). Working hours are shorter and quite likely associated with it, they received lower wages (considering only those who receive positive wages) are than the whole group of wage-earners.

III.2. Production and employment in the IMEs

During the period for which there is information available in the ENAHO survey about the IMEs, it has been found that this sector of enterprises is relatively important from different point of views. First, according to the information for year 2007, somewhat less than half of the Peruvian households report some non-farm business activity that presents signs of informality. Second, as shown in Diagram III.1, out of the total number of urban entrepreneurs identified in 2007 (3,560 plus 489 thousand), somewhat less than 75% are informal (2,993 thousand).[45] Third, as we will see later on, the volume of employment related to the sector of the urban IMEs represent 30% of the total economically active population actually employed in the country or 47% of the occupied EAP in urban areas[46]. In this section, the absolute and relative size of the sector of the IMEs in terms of production and employment will be shown. For that purpose, different measures will be used for both variables.

Taking as a reference the year 2007, it can be observed in Table III.2 that the number of IMEs that dedicate only to one activity was almost 3.2 million[47]. The largest number of enterprises (80%) dedicates to trade and services activities during all the years included between 2002 and 2007. The number of people that work in the IMEs (including the employer) was 4.6 million in 2007; however, when the working week of 40 hours is standardized that number gets reduced to 3.7 million. In any of those 2 cases, trade and services absorb approximately 80% of the total of the employment in this sector of the IMEs. Manufacturing employs on average between 12% of IME´s labour force and construction 6%. Regarding production, on Table III.2 gross output and valued added are reported. Gross output tends to be a little more concentrated in trade and services (on average 87%) in comparison with the value added (approximately 82%). On the other hand, the relative importance of trade in the value added is almost 20 percentage points below the value added compared to gross output.

The evolution of production and employment level along the period 2002 and 2007 show annual growth rates relatively high. In the first place, the annual rate of growth of the number of enterprises was 6.4%. Secondly, total employment (including the employers) grew at an annual rate of 8.2% (non-standardized employment) and 6.0% (standardized employment). Thirdly, gross output grew at an annual rate of 6.4% while the value added

[45] Without considering the employers and the employees who work in informal farm activities in rural areas.
[46] These percentages are higher if we in addition consider agricultural and cattle-ranching activities reported in the rural areas. These, as explained in the Appendix, are collected in another questionnaire of the ENAHO.
[47] The micro enterprises that dedicate themselves to 2 or more activities are excluded. These represent less than 5% of the total of enterprises. Additionally, the enterprises in the primary sector have been excluded since the largest share of them dedicates themselves to agricultural and cattle-ranching activities, activities that should be registered in a different, special form for these purposes. Some few enterprises pertaining to this primary sector dedicate themselves to mining and fishing activities, but the number is very small and it was preferred to exclude them from the analysis.

at a rate of 5.2%. It is clear, however, that when the number of enterprises and the employment grow more rapidly than the gross output and the value added, the ratios of production per firm fall between 2002 and 2007 (see Table III.3), as well as was the case with the gross output and the value added per worker. We will analyze this with more detail later on.

Table III.2 also evaluates the performance of the IME by major types of economic activities. The activity with its value added highest annual growth rate between 2002 and 2007 was the construction. In the same way it was the sector where employment grew more rapidly (either standardized or not). At the other extreme, with the lower growth rates both in value added and employment was trade. In any case, the value added of any of the 4 economic sectors in the IMEs grew at rates below the value added at national scale (which grew in the same period at annual rates of 6.5%, see Table III.4a later). Unlike what was observed with the value added, employment in these 4 sectors grew faster than aggregated employment and also in comparison with the correspondent economic sector.

On Table III.3 some ratios and percentages are presented that help us understand the description shown above. First, the ratio of standardized employment to the non-standardized employment shows that for the whole sector of the urban IMEs, each worker works between 80 and 90% of a working week of 40 hours. This ratio presents notorious differences between sectors of economic activity. While in manufacturing the ratio lies between 70 and 78%, in construction it lies much closer to 100%; in services between 82 and 88%; and in trade presents great variability since it varies between 81 and 98%. Second, the gross output per firm also presents important differences between sectors. The trade activity presents the highest values for all the years, while manufacturing and construction the lowest ones. On the other hand, the value added per firm presents a rather different behaviour. In this case it is construction that presents the highest value added per firm, while trade is the second lowest. This change in behaviour of gross output and value added is associated with the proportion of the gross output that value added represents. As can be seen from Table III.3, construction has the largest proportion while trade has the lowest, and the difference between these proportions can reach up to 60 percentage points (e.g. 28% in trade versus 98% in construction in 2007).

III.3 Value added per worker in the sector of the IMEs

For the calculation of the value added per worker it has been preferred to employ the number of workers (including the employer) standardized in shifts of 40 hours. The effect that this has on the ratio of value added per worker is to raise it in relation to a ratio that does take into account the number of non-standardized workers. This is so because, as was already mentioned, in the sector of IMEs workers on average work less than a working week of 40 hours. The calculations for the sector of the IMEs are presented as well as for the economy as a whole in order to do the proper comparisons. On Table III.4a the volume of employment and the value added for the whole of the economy is reported, while in Table III.4b the value added per standardized worker is reported for the IME sector and the whole economy (see also Figure III.4). Both tables include the relative importance of the sector of the IMEs in relation to the total of the economy.

Let us start pointing out the relative importance of the sector of the urban IMEs in relation to the overall economy regarding employment and value added in the period

between 2002 and 2007. In terms of employment, the overall sector of the IMEs represents on average 25.9% of total employment and 7.5% of value added.[48] The comparison between the 4 large groups of economic activity shows important differences. Trade is the one that presents the largest share of IMEs in employment with an average of 52%, while manufacturing and services have lesser shares in employment of 25 and 30%. In construction that share amounts to 42%. In terms of value added, again trade has the greatest share in the IMEs with 15%, while manufacturing has the smallest with 4%. Construction and services have intermediate values of 9 and 8%, respectively (see Figure III.3).

Regarding the evolution of employment and value added, and comparing the initial and final year of the period from 2002 to 2007, it can be observed in Figure III.5 that employment in the economy in its totality grew at a rate lower (2.6% per year) than the rate of growth of the sector of the IMEs (6.0%). In general in each of the 4 sectors, the EMI employment grows at higher rates compared to the overall economy. The sector with the highest rate of annual change in employment is the construction (9.5%) and lowest trade (3.3%).

With respect to value added, contrary to what was observed with the employment, value added, the whole IME sector grew at lower rates (5.2%) in comparison with the whole of the economy (6.5%) as is shown in Figure III.6. The comparison between sectors of activity also shows that each IME activity sector grew less than the respective aggregated sector in the whole economy. Only in services activities annual rates are very close (but not equal).

The combination of the dynamics of value added and employment in the economy as a whole and in the sector of the IMEs, produce growth in the value added per worker in the economy as a whole (3.8% of annual growth) while a decrease in the IMEs (-0.7% annually) (see Figure III.7). In the economy as a whole it is the trade sector that grows more rapidly (5.4%), followed by construction (4.3%). Services and manufacture are, in that order, the ones that grow least (2.4% and 1.9%, respectively). In the sector of the IMEs, all economic activities, except trade, show negative rates of variation. Construction and services are the ones that decrease the most (-2.9 and -1.7%, respectively), while manufacture decreases at -0.6%. The combination of high rates of growth of employment, even higher than the rates of growth of value added, between the IMEs has caused the average productivity of labour to decrease during this period.

To measure the contribution of the within and between effects on productivity changes in the informal sector we follow the methodology explained in Appendix of Formulas (section A). The decomposition was made for each pair of years from 2002 and 2007, and the mean of them is reported in Figure III.8. As was mentioned above, the productivity of the whole informal sector here considered decreased from 2002 to 2007. Most of this decrease was due to the within effect (changes in productivity within the 4 sectors) than between effects (or shifts of labour force between sectors). Services is the mayor contributor to the within effect, while Services and Trade tend to compensate their contribution to the between effect. Manufacture and Construction do not contribute much to the changes of the productivity of the whole informal sector, probably because is not

[48] It should be remembered that these percentages will be higher if the IMEs in rural areas are also considered besides the extractive industries (mainly farm production i.e. agricultural and cattle-ranching production).

easy to have reallocation of labour force from/to these sectors to services and trade. This results suggest that, given what we have shown before, increase of productivity in the informal sector will be difficult because there is no room to productivity gains from reallocation of labour force among sectors.[49] Increases of productivity in the informal sector must be a result of a general improvement in the whole sector.

The gaps in value added per worker between the whole economy and the sector of the IMEs can be observed in Table III.4a as well as in Figure III.4. On average, value added per worker in the economy as a whole was 10,072 constant soles of 1994, while it was 3,072 in the sector of the IMEs, that is, the average product in the sector of the IMEs is less than one third (30.5%) of the level in the economy as a whole. The largest gap can be observed in manufacture (17.5%) and the smallest in commerce (29.5%). Construction and services lie between those ranges (20.8 and 26.5%, respectively). It is noticeable that the 4 sectors of activity here analyzed show large differences on a global economy scale. For example, the average product per worker in manufacture is 17,178 soles of 1994 while in trade it is only 8,142, that is, a difference of more than 100%. In the IMEs sector, you cannot observe relative differences that are so big and, consequently, it is relatively more homogeneous in terms of value added per worker than in the whole economy.

III.4. Exploring the differences in productivity

It has been shown that there are differences in value added per worker between the 4 big types of economic activity inside the IMEs (i.e. manufacturing, construction, trade and services). Those differences are not so pronounced as those that can be observed at the aggregate level but even so they are important. For example, among the IMEs the services' activity is the one that presents the highest productivity and it is somewhat more than 40% higher that the one for commerce which is the activity with the least productivity. On the other hand, on an aggregate scale, the difference between the most and least productive (i.e. manufacturing and trade, respectively) is more than 100%. With the goal of trying to identify the characteristics to which the differences in productivity inside the IMEs are associated, in this section we will present the characteristics of the IMEs according to their belonging to the big sectors of activity (the 4 mentioned above), and according to the levels of productivity inside each one of the sectors. For these exercises the average information for the whole period 2002 to 2007 has been utilized. In the case of the levels of productivity, the IMEs are segmented according to whether they belong to the quartile of highest productivity or the quartile with least productivity inside the corresponding sector of activity.

Table III.5 presents the average characteristics of the IMEs for the period 2002-2007, distinguishing between the 4 big sectors of activity. It can be observed that, in relation to the characteristics of the micro entrepreneurs, construction and trade tend to show a specialization by gender: while in construction there are practically no women, in trade the great majority are women. In manufacture and services the participation by gender is more balanced. Regarding schooling, it can be observed that construction and services tend to present an average of years of schooling slightly higher (between one year and one year an half more) in comparison to the other 2 sectors. With respect to the relationship between the micro entrepreneur, be it he or she, and the head of household, it

[49] We already mentioned the difference in productivity heterogeneity between activities in informal sector compared with the formal sector. The former is less heterogeneous than the last one.

can be observed in all the sectors that the micro entrepreneur usually is the head of household or the spouse of the head. Finally, with respect to the average of work per week, trade presents an average that is rather close to a full-time working week of 40 hours, while manufacturing has an average of less than ¾ parts of a full time working week.

With respect to the characteristics of the micro enterprise itself, it can be observed that manufacturing and construction tend to have enterprises of a higher age (see Table III.5). In any of these 2 cases, more than 50% (if not 60%) have more than 5 years of existence. On the other hand, in trade and services, without being the largest part, an important fraction has one if not 2 years of age. This is a suggestion of higher relative rotation in these 2 activities in comparison to manufacture and construction. Regarding the size of the enterprises, even if it is true that there are differences in the proportion of the single-person enterprises (i.e. only the micro entrepreneur), in general, the proportion of the IMEs that have more than 2 workers is very low (beside the micro entrepreneur).

With respect to the characteristics of the workers in the IMEs (excluding the micro entrepreneurs), the most noticeable is that also in construction the manpower is concentrated in men, the average is between 26 and 29 years of age and the levels of schooling are not very different between sectors, with the highest concentration in secondary education (see Table III.5). Regarding remunerations, it is rare to see workers in constructions without a monetary wage, while in trade, on the contrary, it is very frequent that that is the case. Finally, the highest real wages are paid out in construction (with large working hours per week) and the lowest ones in manufacturing and trade, but in all of these cases they are below the minimum wage.

The analysis of the IMEs according to the level of productivity in each sector reinforces some of the findings already mentioned and gives us additional elements to identify variables associated with the differences in productivity. In Table III.6 the results of these comparisons are reported. The regularities that can be observed can be summarized in the following points. First, the women micro entrepreneurs are systematically overrepresented in the quartiles of less productivity, while the men micro entrepreneurs are so in the quartiles of highest productivity. This happens not only in construction where there are a lot less women as entrepreneurs. Secondly, the years of schooling are notably higher for the entrepreneurs whose enterprises present higher levels of productivity. The only exception could be construction where the difference is very small to be significant. Third, the proportion of the entrepreneurs that are household heads tends to be higher in the group of enterprises with high productivity in comparison with the ones with low productivity. Fourth and last characteristic of the entrepreneur, the work shifts per week in the high productivity group are shorter than in the low productivity one.

Regarding the characteristics of the enterprise itself that has been considered, it can be observed that, on the one hand, amongst the ones with the highest productivity those with 5 or more years of age are overrepresented, while amongst the ones with the least productivity enterprises with 2 or less years of age have a bigger relative importance. On the other hand, a systematic behaviour in the number of workers cannot be found. Given that there are very few enterprises with more than 3 workers, the comparison practically limits itself to the participation of the single-person enterprises (only the entrepreneur without any worker) versus those that have 1 or 2 additional workers. Even in these cases

a clear pattern where the higher productivity is associated with one of these 2 types of enterprises cannot be observed.

Regarding the characteristics of the workers, what can be observed is that the enterprises with the highest productivity tend to have more men than women amongst its workers. Second, the distribution of the workers according to their schooling levels shows a greater participation of workers with higher levels of education in the enterprises with higher productivity. Third, in the enterprises with higher productivity there is a lesser relative participation of workers that do not receive a monetary wage. Fourth, the differences in the real remunerations are very strong between the 2 quartiles of productivity.

Summing up the findings so far, it can be said that the differences in productivity have a gender dimension (both of the employer as well as of the employees) that could be associated in some measure with the differences in human capital, as reflected in the differences in the years and levels of schooling. It is noticeable, on the other hand, that the enterprises with more years of existence are overrepresented in the segment with the highest productivity. A possible interpretation is that the experience gained with the passing of time allows for gains of productivity. The other possibility is that precisely because they are productive they tend to have a longer life. This is something that requires more analysis. Finally it is noticeable how the differences in productivity are associated with the presence of paid workers and with the wage levels. These results suggest that the more productive ones are less "family production units" because they tend to recur to more conventional market labour relationships.

III.5.Why does the labor productivity in the urban informal sector decreases?

Considering the evolution of the value added between 2002 and 2007, it was observed that while the economy grew at an annual rate of 6.5%, the informal sector did at 5.2%. This probably implies that the formal sector grew at rates even higher than 6.5%. Moreover, the aggregate employment grew at an annual rate of 2.6% while employment in the informal sector did so at an annual rate of 6.0% suggesting that most likely the formal sector employment grew at rates below 2.6 %. In this scenario, the average productivity across the economy grew at an annual rate of 3.8% and in the informal sector shrank at an annual rate of -0.7%.[50] Again most likely the growth of productivity in the modern formal sector has been increased at rates higher than 3.8%.

How can we explain the poor performance of productivity in the informal sector during the boom that the whole economy experienced? Some points that may be taken into account in the construction off a complete answer are the following.

First, it has been noted before (in sections I and II of this document) and other works (see for instance Diaz, 2009 and Chacaltana, 2008) that employment always is growing, with a recession, stagnation or growth. Between 1997 and 2001 the economy grew less than 1% per year while between 2002 and 2007 grew at just over 6%. In these periods of employment grew 2.4% and 2.9% respectively. During the stagnation from 1997 to 2001 employment grew because more workers were absorbed by sectors with higher participation of informal or traditional activities: small and micro enterprises, low-skills

[50] In the analysis of each of the 4 sectors in the urban informal economy only one of them showed a positive growth rate but very small (0.4%), whereas in the other 3 were negative.

self-employees, domestic workers and unpaid family workers. Instead those sectors withy lower presence of informality -like medium and large enterprises and high-skills self-employees- grew at negative rates. During the boom from 2002 to 2007, however, employment grew in all sectors –formal and informal- but grew more rapidly among medium and large enterprises (Chacaltana, 2008). Clearly, the informal sector is operating as a shelter or residual especially in times of recession and stagnation.

Second, differences in productivity between the informal sector and the economy as a whole are quite large. The scarce evidence of these differences (Chacaltana, 2008, Villarán (2007) and Sierra and Sato (2004)) suggests that the productivity gap between the micro and small enterprises and large ones are far greater than we have here shown between the informal sector and the overall economy. The comparison between the modern formal sector and the informal one within manufacturing industries analyzed earlier in this paper shows a gap of almost 18 times the size of the informal sector productivity.[51]

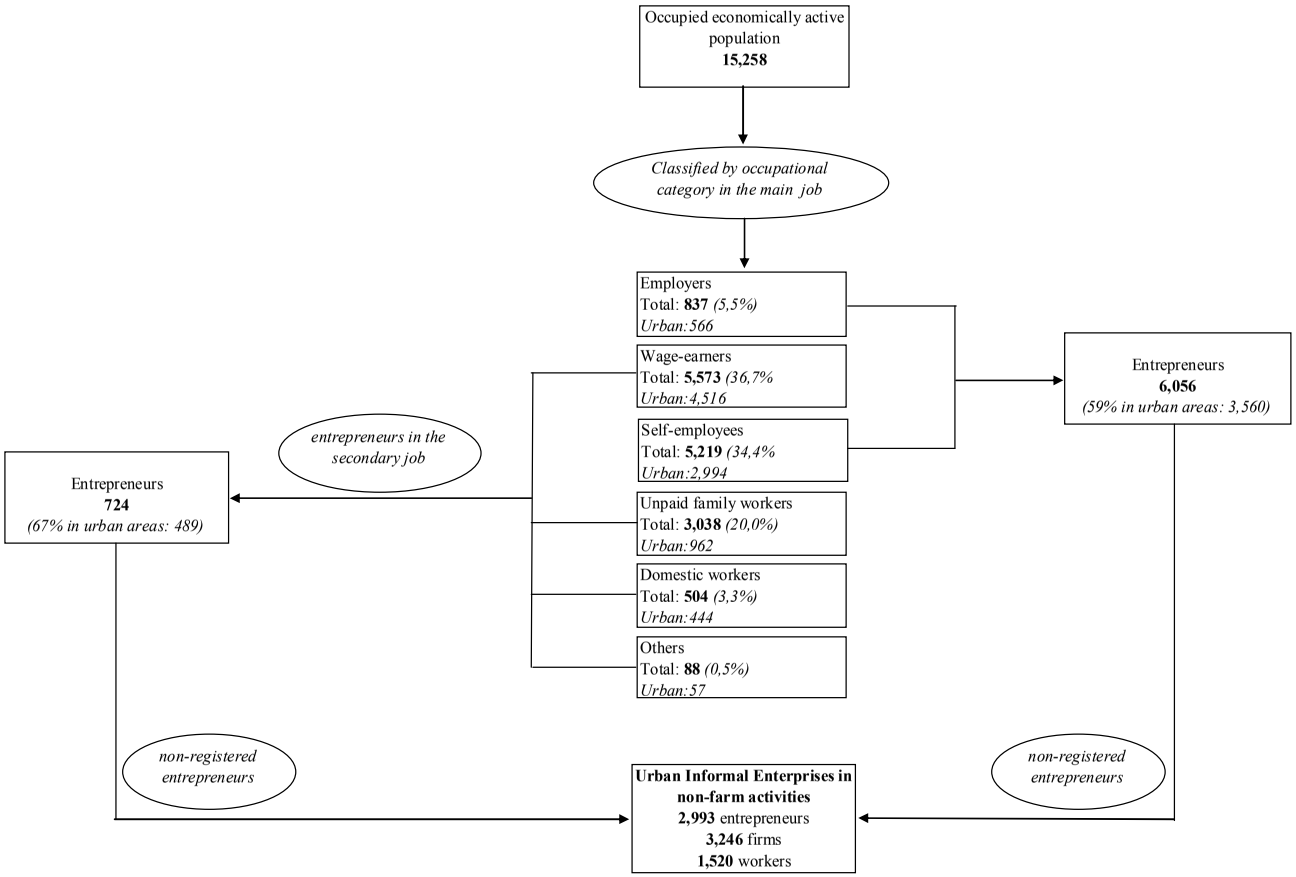
Part of the differences in productivity may be associated with the attributes of micro-entrepreneurs, enterprises and their workforce. We have seen that indicators of human capital (schooling and experience) show that micro-entrepreneurs and informal workers have lower levels of education when compared to similar occupational categories. The comparison of IMEs by productivity also showed the expected difference in human capital, also shows that the age of the enterprise –proxy of experience accumulated over time- is associated with higher levels of productivity. None of these variables showed substantial changes during the period 2002 to 2007 which implies that to these variables can not be attributed any contribution to the evolution of productivity. In contrast, the absence of changes in these variables to suggest that the total factor productivity has not been altered in a context in which the sector has continued to absorb labor.

Third, although no information was provided on the capital stock or the capital-labor ratio, the low value added per worker and per firm suggest that the possibilities of capital accumulation thru net investment must have been very small but non-existent. If this was so, the capital-labor ratio may have tended to decrease throughout the period of analysis and hence the productivity of labor should have declined as the results show indeed.

[51] In section II of this report the value added per worker in manufacture in 2007 is around 25.310 US$ of 1994 (see Table II.2). At the exchange rate of 1994 this value represents 55.682 soles of 1994. Therefore manufacturing productivity in the modern sector is around 56 thousand soles while in the informal sector is 3 thousand soles (see Table III.4b). On average manufacturing productivity are 17 thousand soles of 1994.

Diagram N° III.1

Peru 2007: Informal entrepreneurs according to household surveys *(thousands)*



Source: ENAHO 2007. Authors' calculations.

Table III.1

Peru 2002 - 2007: Characteristics of the Informal Micro-enterprises in non-farm activities[1]

	2002	2003	2004	2005	2006	2007	Average 2002 to 2007
Number of IME *(thousands)*	2,345	2,888	2,900	2,526	2,836	3,246	
Characteristics of the micro entrepreneurs							
Gender - female *(%)*	51.6	51.1	52.5	53.6	53.9	54.5	52.9
Age - average years	40	40	41	42	42	42	41
Schooling - average years	9.0	9.4	9.3	9.2	9.5	9.5	9.3
Relationship with the household head *(%)*							
He or she is the household head	46.9	43.6	43.4	44.4	44.6	42.6	44.2
Spouse	27.9	26.7	28.1	29.7	29.1	30.3	28.6
Sons and daughters	18.9	22.1	21.3	18.5	18.9	19.1	19.8
Other	6.3	7.7	7.2	7.5	7.3	8.0	7.3
Working hours per week	37	37	37	37	36	34	36
Characteristics of the micro enterprises							
Economic activity *(%)*							
Only production	15.9	14.9	16.1	15.7	17.2	16.5	16.0
Only trade	39.0	37.9	36.1	38.1	37.1	35.2	37.2
Only services	43.7	45.3	45.5	43.4	42.8	44.7	44.2
Production and trade	0.3	0.4	0.5	0.5	0.4	0.9	0.5
Others	1.2	1.5	1.8	2.3	2.5	2.7	2.0
Age of the microenterprise							
One year at most	24.2	25.1	26.6	25.8	26.3	32.2	26.7
More than 1 year to 2 years	14.1	12.9	11.6	12.7	11.9	11.4	12.4
More than 2 year to 3 years	8.7	9.1	8.8	8.9	9.3	9.1	9.0
More than 3 year to 4 years	6.4	6.9	6.8	5.9	5.2	5.3	6.1
More than 4 year to 5 years	6.6	6.5	6.5	6.8	6.2	6.2	6.5
More than 5 years	39.8	39.4	39.7	39.9	41.0	35.7	39.2
Enterprise size (# of workers excluding the employer)							
Without workers	77.5	73.3	71.7	70.4	71.1	70.4	72.4
1 and 2 workers	19.9	23.5	24.9	26.0	25.3	25.6	24.2
3 and 4 workers	2.3	2.7	3.0	3.0	3.3	3.4	2.9
5 an more workers	0.4	0.5	0.4	0.6	0.3	0.5	0.5
Characteristics of the workers (excluding the employer)							
Number of workers *(thousands)*	785	1,185	1,264	1,168	1,285	1,520	
Gender - males *(%)*	53.3	51.3	54.0	52.7	51.8	51.5	52.4
Age - average	28	27	27	28	27	28	27
Schooling *(%)*							
Primary or less	28	25	23	27	25	26	26
Secondary	59.0	60.5	61.7	57.4	58.3	56.4	58.9
Tertiary	12.7	14.5	15.7	15.1	16.3	18.0	15.4
Relationship with the employer: relative *(%)*	na	na	na	na	na	81.0	81.0
Working hours per week - average	26.8	28.4	28.7	26.3	26.7	24.9	27.0
Wages							
Workers without monetary paid	72.4	74.3	73.9	73.7	73.0	74.0	73.5
Monthly wage *(1994 soles)*	180	177	163	164	158	177	170

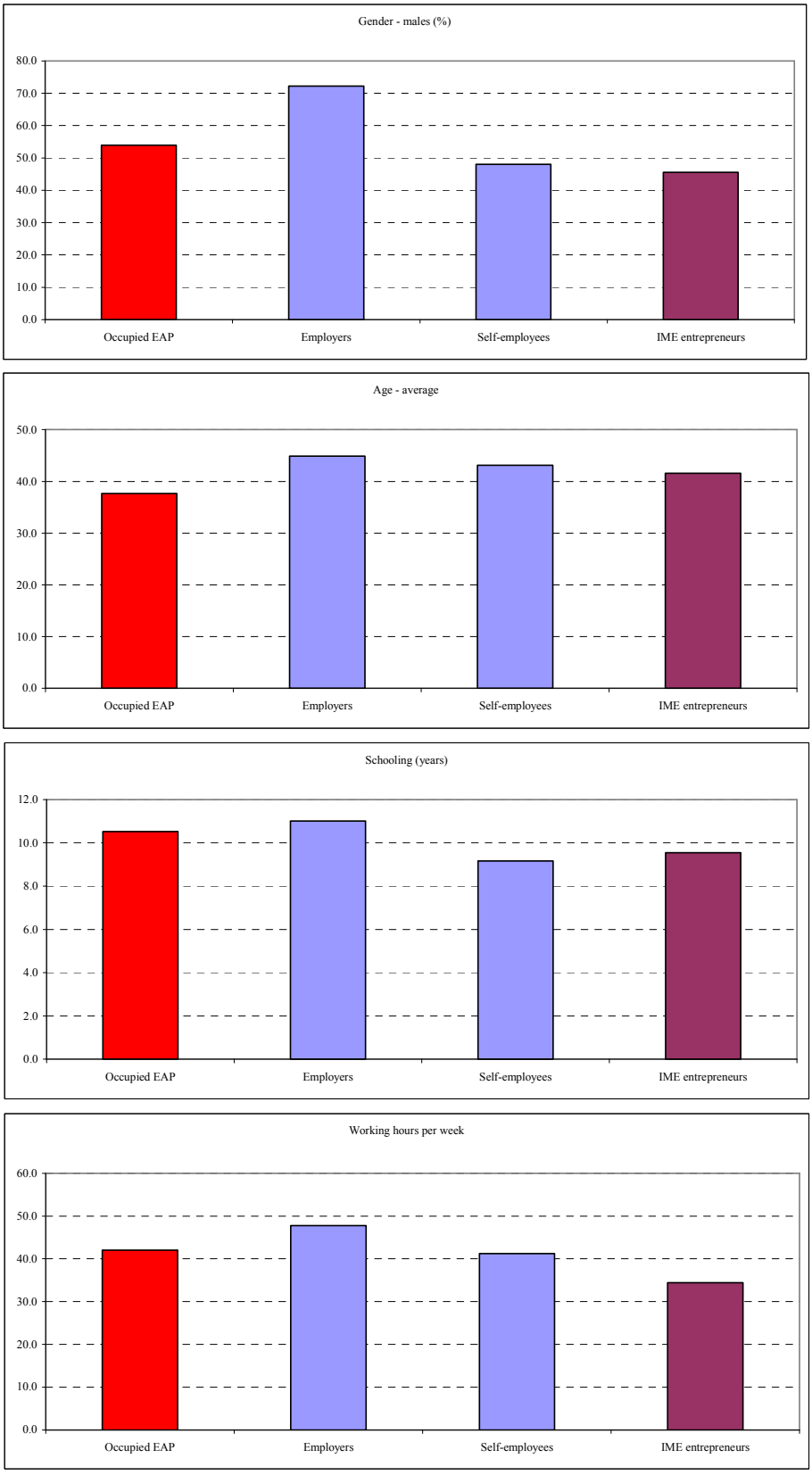
Notes

[1] Weighted figures using module 500 weights

Source: Questionnaire Enaho-04. Authors' calculations.

Figure III.1

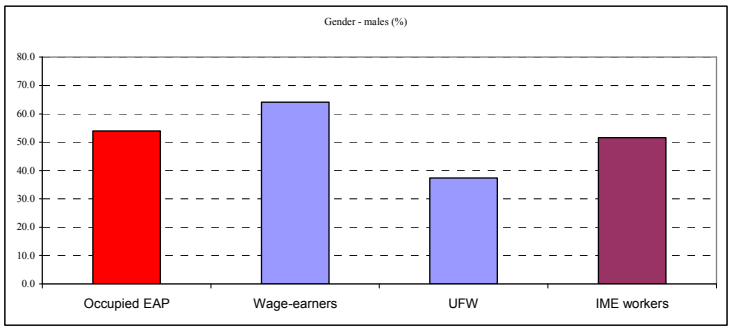
Peru 2007: Characteristics of IME entrepreneurs and urban occupied EAP

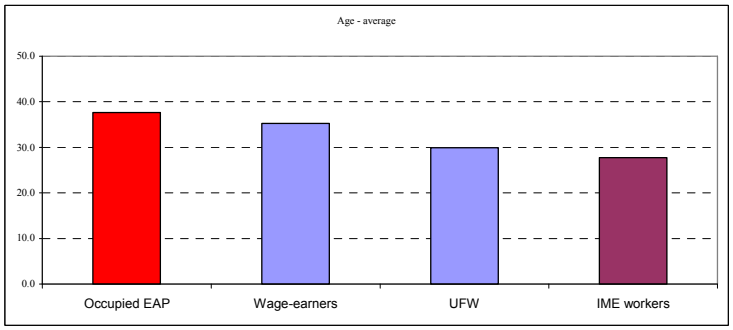


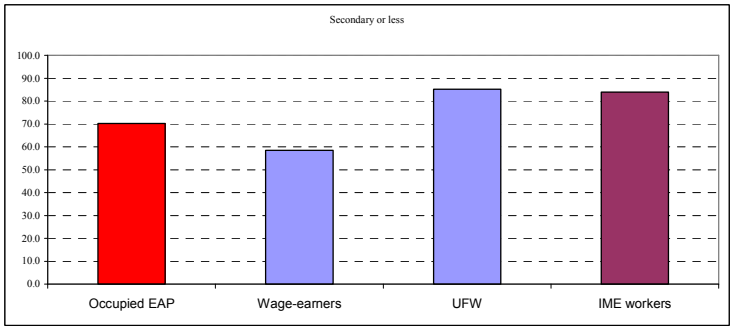
Source: ENAHO 2007. Authors' calculations

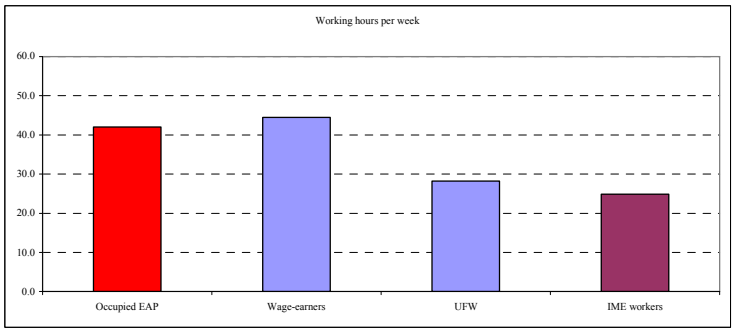
Figure III.2

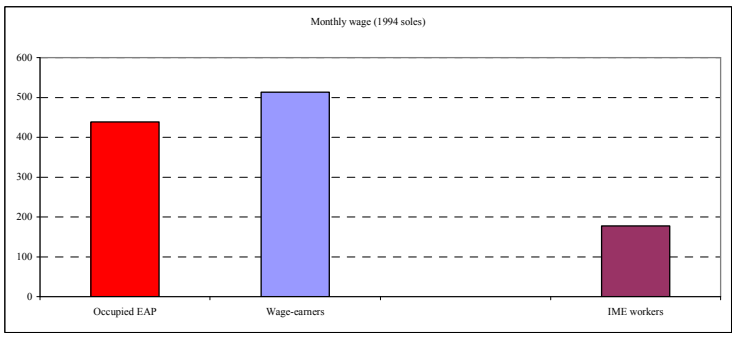
Peru 2007: Characteristics of IME workers and urban occupied EAP











Source: ENAHO 2007. Authors' calculations

Table III.2

Peru 2002-2007: Enterprises, Gross product, Employment and Value added in the IME sector[1]

Economic sector	2002	2003	2004	2005	2006	2007	Distribution by sectors 2002 to 2007 *(%)*	Annual rate of growth 2002 to 2007 *(%)*
Number of Informal Micro Enterprises *(thousands)*								
Manufacture	256	276	305	289	350	383	11.3	8.4
Construction	116	155	161	112	140	155	5.1	6.0
Trade	913	1,091	1,044	961	1,051	1,141	37.6	4.6
Services	1,021	1,306	1,316	1,091	1,211	1,445	44.9	7.2
TOTAL	2,333	2,859	2,855	2,480	2,775	3,178	100.0	6.4
Gross Output *(1994 million soles)*								
Manufacture	1,537	1,939	1,813	1,968	2,483	2,005	8.3	5.5
Construction	655	753	805	583	680	857	3.0	5.5
Trade	11,055	13,233	11,910	11,938	12,808	13,824	52.6	4.6
Services	7,047	9,301	8,943	7,164	7,947	9,036	34.8	5.1
TOTAL	20,578	25,593	23,760	22,107	24,084	26,055	100.0	4.8
Number of workers including the employer *(thousands)*								
Manufacture	379	416	449	447	550	566	12.0	8.3
Construction	164	244	250	184	227	264	5.7	10.0
Trade	1,241	1,593	1,572	1,455	1,574	1,750	39.3	7.1
Services	1,277	1,713	1,749	1,455	1,589	1,929	41.5	8.6
TOTAL	3,103	4,029	4,079	3,608	3,974	4,603	100.0	8.2
Numbrer of standardized workers including employer *(40 hours per week; thousands)*								
Manufacture	285	321	351	345	404	395	10.4	6.7
Construction	161	226	247	184	219	254	6.4	9.5
Trade	1,210	1,463	1,434	1,310	1,371	1,422	40.6	3.3
Services	1,086	1,505	1,536	1,213	1,366	1,582	41.0	7.8
TOTAL	2,789	3,572	3,619	3,113	3,392	3,732	100.0	6.0
Value Added *(1994 million soles)*								
Manufacture	865	1,059	1,002	1,049	1,154	1,165	10.1	6.1
Construction	618	729	791	560	657	839	6.8	6.3
Trade	3,224	3,774	3,365	3,423	3,200	3,870	33.6	3.7
Services	4,235	5,933	5,360	3,959	4,408	5,658	47.6	6.0
TOTAL	9,150	11,698	10,677	9,239	9,491	11,792	100.0	5.2

Notes:

[1] Weighted figures using module 500 weights

Source: Questionnaire Enaho.04. Authors' calculations.

Table III.3

Peru 2002-2007: Ratio of standardized to unstandardized workers, gross output and value added per firm, and value added as a percentage of gross output[1]

	2002	2003	2004	2005	2006	2007	Average 2002 to 2007
Standarized to unstandarized workers ratio							
Manufacture	0.75	0.77	0.78	0.77	0.74	0.70	0.75
Construction	0.99	0.92	0.99	1.00	0.97	0.96	0.97
Trade	0.98	0.92	0.91	0.90	0.87	0.81	0.89
Services	0.85	0.88	0.88	0.83	0.86	0.82	0.85
TOTAL	0.90	0.89	0.89	0.86	0.85	0.81	0.86
Gross Output per firm *(1994 soles)*							
Manufacture	6,003	7,024	5,940	6,811	7,104	5,241	6,320
Construction	5,647	4,846	5,006	5,205	4,870	5,531	5,166
Trade	12,115	12,131	11,408	12,421	12,181	12,116	12,058
Services	6,899	7,121	6,797	6,565	6,563	6,252	6,689
TOTAL	8,821	8,953	8,323	8,915	8,679	8,199	8,628
Value Added per firm *(1994 soles)*							
Manufacture	3,377	3,836	3,283	3,632	3,301	3,046	3,387
Construction	5,330	4,693	4,915	4,999	4,707	5,416	5,000
Trade	3,533	3,459	3,223	3,561	3,043	3,391	3,363
Services	4,146	4,542	4,074	3,628	3,640	3,915	3,999
TOTAL	3,922	4,092	3,740	3,726	3,420	3,710	3,765
Value Added as a percentage of Gross Product *(%)*							
Manufacture	56.3	54.6	55.3	53.3	46.5	58.1	53.6
Construction	94.4	96.8	98.2	96.1	96.7	97.9	96.8
Trade	29.2	28.5	28.3	28.7	25.0	28.0	27.9
Services	60.1	63.8	59.9	55.3	55.5	62.6	59.8
TOTAL	44.5	45.7	44.9	41.8	39.4	45.3	43.6

Notes:

[1] Weighted figures using module 500 weights

Source: Questionnaire Enaho.04. Authors' calculations.

Table III.4a

Peru 2002-2007: Employment and Value added in the whole economy and the participation of the IME sector[1]

	2002	2003	2004	2005	2006	2007	Annual rate of growth 2002 to 2007 *(%)*
Number of standardized workers[2] in the whole economy *(thousands)*							
Manufacture	1,244	1,234	1,217	1,194	1,364	1,615	5.4
Construction	477	508	442	414	506	612	5.1
Trade	2,535	2,677	2,432	2,412	2,605	2,760	1.7
Services	4,319	4,653	4,192	4,154	4,718	5,228	3.9
Total	**12,650**	**13,409**	**12,595**	**12,412**	**13,575**	**14,384**	2.6
% of the labour force in the IME sector							
Manufacture	22.9	26.0	28.9	28.9	29.7	24.5	
Construction	33.8	44.4	55.9	44.3	43.3	41.5	
Trade	47.7	54.6	59.0	54.3	52.6	51.5	
Services	25.1	32.3	36.7	29.2	29.0	30.3	
Total	**22.1**	**26.6**	**28.7**	**25.1**	**25.0**	**25.9**	
Value Added in the whole economy *(1994 thousand soles)*							
Manufacture	19,147	19,830	21,300	22,887	24,607	27,265	7.3
Construction	6,136	6,413	6,712	7,276	8,350	9,737	9.7
Trade	18,013	18,453	19,604	20,821	23,248	25,495	7.2
Services	51,776	54,163	56,552	60,124	64,308	70,438	6.3
Total	**115,323**	**119,828**	**125,608**	**133,961**	**144,547**	**157,733**	6.5
% of the value added in the IME sector							
Manufacture	4.5	5.3	4.7	4.6	4.7	4.3	
Construction	10.1	11.4	11.8	7.7	7.9	8.6	
Trade	17.9	20.5	17.2	16.4	13.8	15.2	
Services	8.2	11.0	9.5	6.6	6.9	8.0	
Total	**7.9**	**9.8**	**8.5**	**6.9**	**6.6**	**7.5**	

Notes:

[1] Weighted figures using module 500 weights. IME figures excludes enterprises that combine two or more economic activities.

[2] 40 hours per week.

Source: Questionnaire Enaho.04, ENAHO module 500 and national accounts from INEI. Authors' calculations.

Table III.4b

Peru 2002-2007: Value Added per standardizred worker in the whole economy and IME sector[1]

	2002	2003	2004	2005	2006	2007	Average 2002 to 2007
Value Added per standardized worker in the IME sector *(1994 soles)*							
Manufacture	3,032	3,297	2,853	3,039	2,853	2,949	3,004
Construction	3,832	3,230	3,200	3,046	2,996	3,307	3,269
Trade	2,664	2,579	2,346	2,612	2,334	2,721	2,543
Services	3,899	3,941	3,489	3,264	3,226	3,577	3,566
Total	**3,280**	**3,275**	**2,950**	**2,968**	**2,798**	**3,159**	**3,072**
Value Added per standardized worker in th whole economy *(1994 soles)*							
Manufacture	15,394	16,073	17,501	19,170	18,045	16,884	17,178
Construction	12,857	12,623	15,177	17,559	16,492	15,906	15,102
Trade	7,105	6,892	8,061	8,632	8,924	9,237	8,142
Services	11,987	11,640	13,491	14,475	13,632	13,473	13,116
Total	**9,116**	**8,936**	**9,973**	**10,793**	**10,648**	**10,966**	**10,072**
Ratio of the value added per worker in the economy and in the IME sector *(%)*							
Manufacture	19.7	20.5	16.3	15.9	15.8	17.5	17.5
Construction	29.8	25.6	21.1	17.3	18.2	20.8	21.6
Trade	37.5	37.4	29.1	30.3	26.2	29.5	31.2
Services	32.5	33.9	25.9	22.5	23.7	26.5	27.2
Total	**36.0**	**36.6**	**29.6**	**27.5**	**26.3**	**28.8**	**30.5**

Notes:

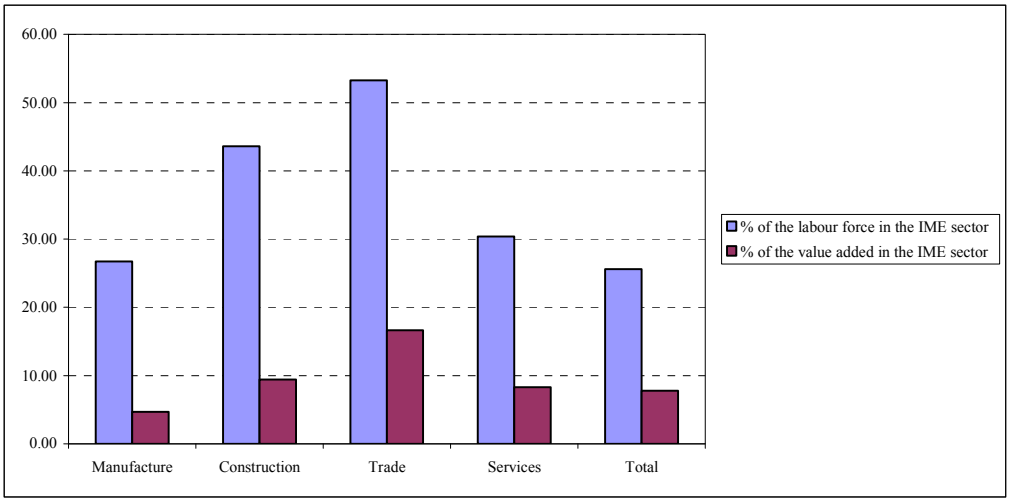
[1] Weighted figures using module 500 weights. IME figures excludes enterprises that combine two or more economic activities.

[2] 40 hours per week.

Source: Questionnaire Enaho.04, ENAHO module 500 and national accounts from INEI. Authors' calculations.

Figure III.3

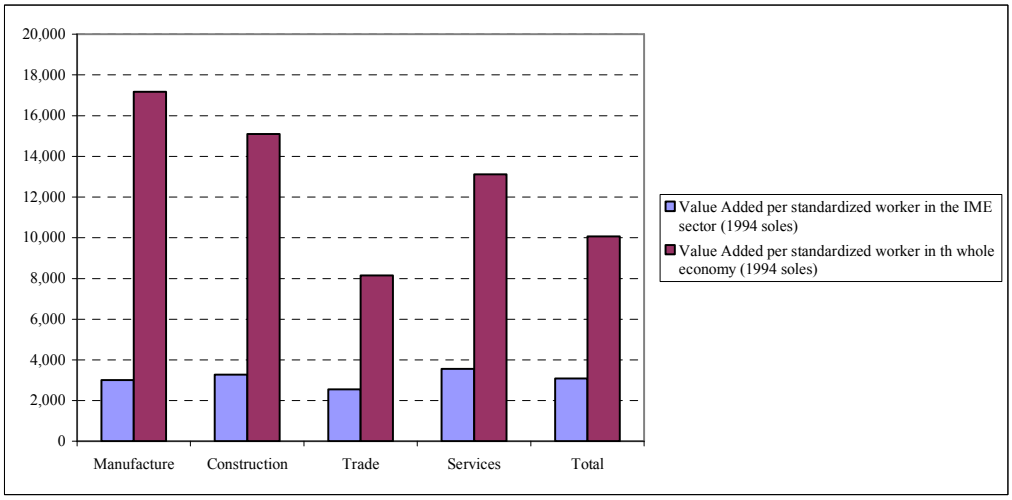
Peru 2002 to 2007: Participation of Urban IME sector in employment and value added by economic activity(%)



Source: ENAHO 2002 to 2007. Authors' calculations

Figure III.4

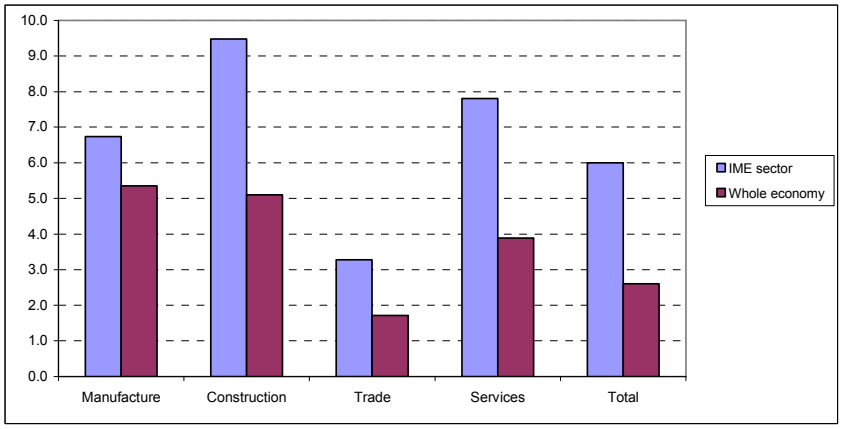
Peru 2002 to 2007: Value added per standardized worker by economic activity (1994 soles)



Source: ENAHO 2002 to 2007. Authors' calculations

Figure III.5

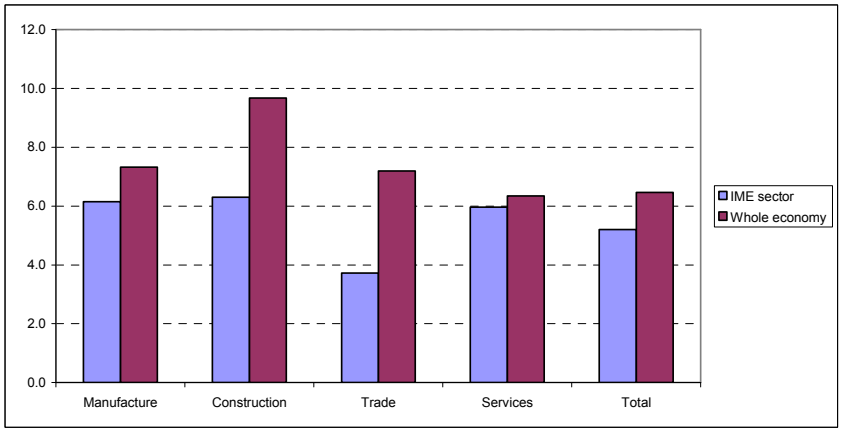
Peru 2002 to 2007: Annual growth rates of employment in the urban IME sector and the whole economy by economic activitiy (%)



Source: ENAHO 2002 to 2007. Authors' calculations

Figure III.6

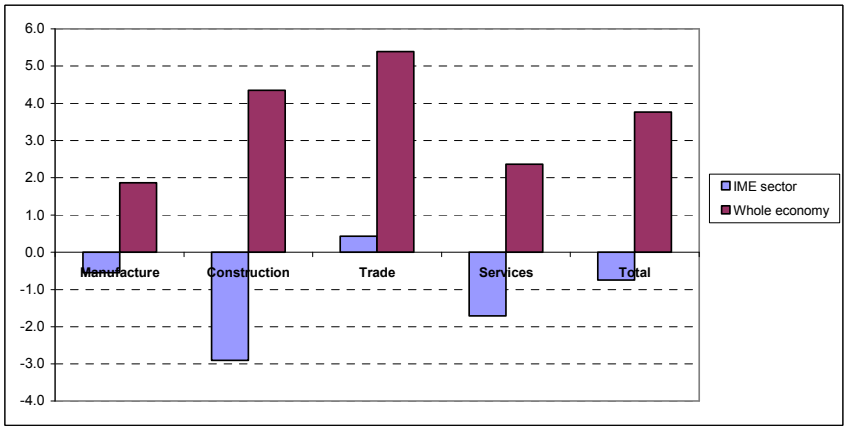
Peru 2002 to 2007: Annual growth rates of value added in the urban IME sector and the whole economy by economic activitiy (%)



Source: ENAHO 2002 to 2007. Authors' calculations

Figure III.7

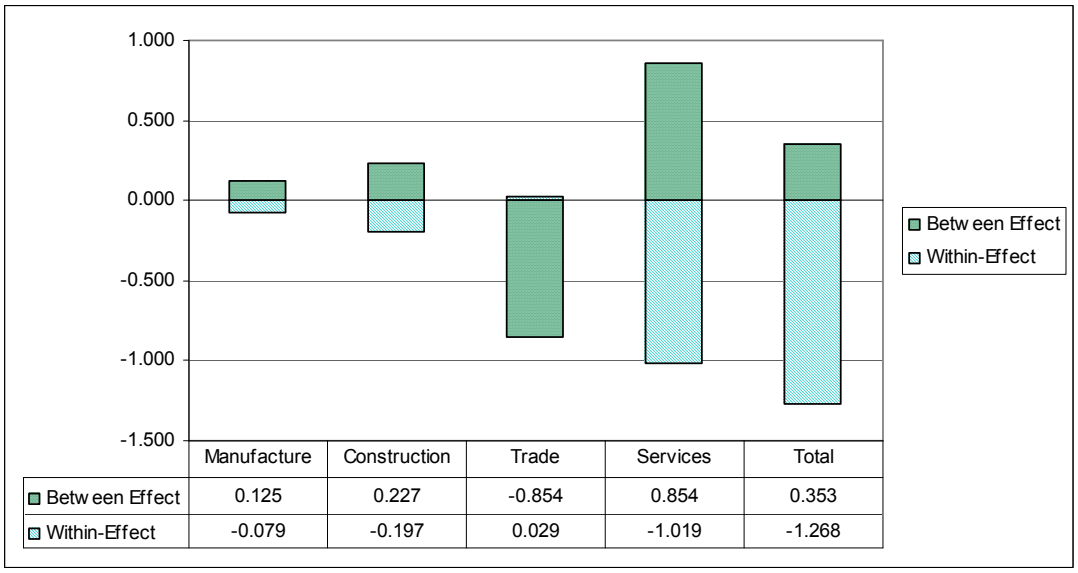
Peru 2002 to 2007: Annual growth rates of value added per standardirez worker in the urban IME sector and the whole economy by economic activitiy (%)



Source: ENAHO 2002 to 2007. Authors' calculations

Figure III.8

Average annual growth rate contribution in Value Added per full-time worker in the informal sector, 2002-2007



	Manufacture	Construction	Trade	Services	Total
Between Effect	0.125	0.227	-0.854	0.854	0.353
Within-Effect	-0.079	-0.197	0.029	-1.019	-1.268

Table III.5

Peru 2002 - 2007: Characteristics of the Informal Micro-enterprises by Economic Sector[1]

	Manu-facture	Construc-tion	Trade	Services
Characteristics of the micro entrepreneurs				
Gender - female *(%)*	56.5	0.1	71.5	43.7
Age - average years	43.4	42.3	41.6	39.7
Schooling - average years	8.0	9.6	8.4	9.6
Relationship with the household head *(%)*				
He or she is the household head	48.3	70.5	36.9	45.4
Spouse	30.2	2.3	41.0	23.3
Sons and daughters	15.5	20.0	15.7	23.5
Other	6.0	7.3	6.4	7.7
Working hours per week	28.1	34.4	37.6	34.7
Characteristics of the micro enterprises				
Age of the microenterprise				
One year at most	19.9	17.5	28.7	28.9
More than 1 year to 2 years	8.6	6.4	13.1	13.3
More than 2 year to 3 years	7.7	5.6	9.6	9.5
More than 3 year to 4 years	4.8	3.8	5.9	6.7
More than 4 year to 5 years	6.3	6.3	6.8	6.4
More than 5 years	52.8	60.4	36.0	35.1
Enterprise size (# of workers excluding the employer)				
Without workers	70.6	66.9	64.3	77.7
1 and 2 workers	24.5	26.6	31.9	19.5
3 and 4 workers	4.0	4.9	3.4	2.4
5 an more workers	0.9	1.5	0.3	0.4
Characteristics of the workers (excluding the employer)				
Gender - males *(%)*	53.3	98.2	47.8	48.3
Age - average	27.7	29.2	27.0	26.6
Schooling *(%)*				
Without schooling	3.7	1.1	2.5	2.4
Pre-school and primary	28.5	33.6	28.1	22.7
Secondary	55.9	59.7	54.8	58.1
Tertiary	11.9	5.6	14.6	16.8
Relationship with the employer: relative *(%)*	na	na	na	na
Working hours per week - average	25.1	42.5	23.0	25.9
Wages				
Workers without monetary paid	69.1	7.3	90.4	71.1
Monthly wage *(1994 soles)*	138	216	131	160

Notes

[1] Weighted figures using module 500 weights

Source: Questionnaire Enaho-04. Authors' calculations.

Table III.6

Peru 2002 - 2007: Characteristics of the Informal Micro-enterprises by value added per worker level and economic activities[1]

	Manufacture		Construction		Trade		Services	
	Low	High	Low	High	Low	High	Low	High
Characteristics of the micro entrepreneurs								
Gender - female *(%)*	81.7	36.9	0.2	0.4	76.8	64.3	52.7	35.6
Age - average years	43.4	42.7	41.8	41.8	44.4	39.0	39.7	40.3
Schooling - average years	5.2	10.3	9.1	10.5	6.7	10.3	8.1	11.1
Relationship with the household head *(%)*								
He or she is the household head	30.3	61.1	62.8	66.8	33.0	39.1	38.6	51.6
Spouse	41.7	18.8	2.3	2.7	45.4	34.3	27.8	18.6
Sons and daughters	19.5	15.3	24.4	25.7	14.7	19.5	25.5	21.6
Other	8.5	4.7	10.5	4.8	6.9	7.1	8.0	8.2
Working hours per week	26.0	26.1	35.9	23.5	44.7	24.5	32.5	28.8
Characteristics of the micro enterprises								
Age of the microenterprise								
One year at most	21.4	20.4	28.3	13.1	33.8	28.1	35.7	24.6
More than 1 year to 2 years	7.1	8.0	5.8	6.1	14.2	12.5	12.3	13.7
More than 2 year to 3 years	8.5	6.6	6.8	6.3	10.4	8.0	9.6	9.7
More than 3 year to 4 years	4.4	4.4	3.9	4.2	5.4	5.6	4.8	6.7
More than 4 year to 5 years	6.4	6.1	6.8	6.7	5.9	6.5	6.0	6.9
More than 5 years	52.1	54.6	48.4	63.6	30.4	39.1	31.4	38.4
Enterprise size (# of workers excluding the employer)								
Without workers	69.6	72.1	63.0	70.0	65.8	65.2	78.6	78.7
1 and 2 workers	26.1	22.8	30.9	22.7	30.8	31.2	18.8	19.0
3 and 4 workers	3.6	3.9	5.6	4.5	3.1	3.2	2.4	1.8
5 an more workers	0.6	1.1	0.4	2.8	0.3	0.5	0.2	0.4
Characteristics of the workers (excluding the employer)								
Gender - males *(%)*	40.8	62.9	97.0	99.0	45.2	52.2	42.4	57.3
Age - average	27.7	28.0	26.5	30.7	26.9	28.4	25.9	27.7
Schooling *(%)*								
Primary or less	41.6	25.1	30.6	23.3	37.0	29.0	40.0	18.9
Secondary	49.0	63.6	62.4	70.3	50.9	54.9	48.2	60.4
Tertiary	9.5	11.3	7.0	6.4	12.1	16.2	11.8	20.7
Working hours per week - average	21.8	24.4	41.3	38.6	22.9	21.6	22.0	28.0
Wages								
Workers without monetary paid	88.4	55.6	16.6	3.3	98.2	77.5	85.5	46.9
Monthly wage *(1994 soles)*	50	178	100	318	63	144	67	206

Notes

[1] Weighted figures using module 500 weights

Source: Questionnaire Enaho-04. Authors' calculations.

IV. CONCLUSIONS AND FINAL REMARKS

This paper has reported a set of new evidences at the macro-sectoral and micro levels on the dynamics of labor productivity in Peru for periods 1997-2007 and 2002-2007 respectively.

At the macro level, and in contrast to previous results (e.g., Timmer and de Vries, 2007 and 2007), it is found that in both periods of 1997-2001 and 2002-2007, labor productivity changes in Peruvian economy seem to be primarily explained by reallocation of employment between sectors rather than changes in labor productivity within sectors. On the other hand, labor productivity improvement in the manufacturing sector in the booming period 2002-2007 has been more important than labor productivity growth in some low labor-productivity services sectors (e.g., household and education services and hotels and restaurants) and the agriculture sector. Conversely, in the recession period 1997-2001, the decline of labor productivity in some low-productivity services sectors and the agriculture sector (when difference between marginal and average labor productivity is taken into account) have been more important to explain the decrease of the labor productivity of the economy than the decrease of labor-productivity in the manufacturing sector.

At the micro level, using the National Economic Survey of Manufactures for the years 2002, 2005, 2006 and 2007, the evidence shows that the rate of job creation has been higher than the job destruction rate for most of the sectors of the sample. Thus, medium and large size firms may have contributed to the employment expansion of the manufacturing sector in the booming period 2002-2007. These firms have also contributed to the rate of growth of labor productivity although the main contribution comes more from jobs destructing firms rather than from the jobs creating firms. The evidence at the micro level also shows, that the labor productivity rate of growth of the manufacturing sector in the booming period is mainly explained by the labor productivity rate of growth of formal medium and large size firms rather than for informal microenterprises. On the other hand, sub-sectors jobs flows rates heterogeneity in the manufacturing sector in the booming period in Peru seems to be associated to a set of selected productive features at firm level, in particular labor productivity, size, capital intensity, and utilization installed capacity.

The data from the informal micro-enterprises in urban areas brings additional and interesting results. The entrepreneurial activities are highly extended in Peru. Almost half of the families at national level have some member that is an employer or is self-employed, and they represent around of 44% of the EAP actually occupied in the country in 2007. On the other hand, the informal economic activities are highly extended. Solely considering urban areas the informal employers represent almost 45% of the total of the employers in these areas, and informal self-employed represent approximately 80% of urban self-employed. These percentages will be higher if one additionally considers farm activities of the rural areas.

The urban IMEs are about 3.0 million and absorb approximately 4.6 million people that standardized in working weeks of 40 hours amount to 3.7 million. The greater share of those enterprises dedicate themselves to activities in the sectors of services and trade; manufacturing and construction are also present but in a lesser proportion. Total employment (including employers and employees) associated with the urban IMEs

represents 20% of the EAP occupied nationally and 31% of the urban EAP. In terms of the value added 7.5% comes from urban IME with respect to the national value added in those economic activities conducted in urban areas.

On average, value added per worker in the economy as a whole was 10,072 constant soles of 1994, while it was 3,072 in the sector of the IMEs, that is, the average product in the sector of the IMEs is less than one third (30.5%) of the level in the economy as a whole. In terms of the evolution of productivity across time, it has been found that both the whole of the IMEs as well as each one of the 4 sectors analyzed, productivity has decreases at average rates of -0.7%. In the economy as a whole, however, productivity grew at annual rates of 3.8%. This implies that productivity in the formal sector must have grown at rates that are even higher.

The exploratory and descriptive analysis of the differences in value added per worker shows some evidence and opens paths for a more detailed and deeper analysis. Three sets of characteristics were analyzed: characteristics of the micro entrepreneurs (related to demography, education and labor), characteristics of the micro enterprises (age and size), and characteristics of the employers (when they exist).

The comparison between the 4 sectors, that represent different levels of productivity, gave us the following findings. In the sectors with higher productivity (i.e. services and construction according the average from 2002 to 2007), firstly, there is a stronger presence of men amongst the employers as well as amongst the employees; secondly, the employers tender to have higher schooling and in some measure also the employees; thirdly, the employees tend to work in somewhat longer shifts; and fourthly, the wages tend to be higher.

On the other hand, from the comparison of the higher and lower strata of productivity within each of the 4 sectors, much clearer findings appear. In the strata of the IMEs that belong to the quartile with higher productivity, it can be found that: (i) men are overrepresented both as employers and as employees, (ii) the years of schooling of the employers and employees is higher, (iii) the employer is also the head of household, (iv) the hours of work are longer both for the employer as well as for the employee, (v) there are more enterprises with a longer age, (vi) the presence of employees that receive no remuneration is less frequent, (vii) the monetary salaries, amongst those that do receive them, are higher.

It is not surprising that human capital (i.e., the years or levels of schooling) is associated with higher levels of productivity. What does cause surprise is that there is a systematic gender relationship. This can be due, at least in part, to the fact that gender and education are associated one with the other. It is possible that is women that have lower levels of schooling. The greater relative presence of enterprises with a higher age amongst the most productive corresponds to the fact that enterprises with less years of existence amongst those with lower productivity have more relative importance. This suggests that the newest enterprises or the ones recently created are less productive than the average of already existing enterprises. Finally, it is noticeable that the differences in productivity are associated to the relative presence of salaried workers, on the one hand, and to the level of the wages. Although we do not have direct evidence of the case, what could be happening is that the low levels of productivity make the payment of wages non-viable

and, in consequence, the only way to produce, employing additional workers, is utilizing the labor force of the own family under the form of family workers without remuneration.

The macro and micro evidence presented in this paper lead to two plausible conclusions for economic policy. The first one comes from the fact the cyclical behavior of Peruvian GDP per capita in the last 10 years (which is also true in the last 50 years). As it was shown in this paper, this cyclical behavior seems to be associated to the Peruvian productive structure existent in the last 50 years and to the sectoral differences in the dynamic of labor productivity among sectors which under an absence of continuous and sustainable positive changes in total factor productivity of the sectors produce the cyclical behavior of the GDP per capita. In consequence, regardless of the short run internal or external shocks that Peruvian economy is facing o may face in the future what is needed are long run structural reforms oriented to change the productive structure that produces continuous and sustainable total factor productivity growth in all the sectors of the economy[52]. Concentration upon short run tailored economic policies to face external o internal crisis would not change the cyclical behavior of the economy. Second, these structural long run policies need to incorporate into the productive structure the informal and low productive agriculture sectors which contribute a large share of the total employment in Peru, have low labor productivity, real wages and wherein most people in these sectors lives in poverty conditions. These reforms need to go beyond issues on legal status of the informal sector or granting land property rights[53].

[52] Guidelines of these reforms are reported in the Barcelona Development Agenda (2004), World Bank (2005) and Serra and Stiglitz (2008).

[53] A recent book of Maloney *et al* (2007) deals with this kinds of reforms. In their book's overview they postulate: *"Achieving significant reductions in present informality levels will require, first and foremost, actions to increase the aggregate productivity in the economy. A more enabling investment climate will permit formal firms to expand and pay higher wages. Raising human capital levels, especially for the poor, will permit more workers to find remunerative jobs in a more dynamic formal sector. Without such improvements in aggregate productivity, we will continue to find a very large number of micro-firms, characterized by high turnover, weak growth prospects, and low productivity, that would see little benefit in engaging with formal institutions".*

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APPENDIX TABLES

TABLE No A1
Average Annual Value Added and Employment Share and Relative Value Added per Worker by Sectors, Peru, 1997-2007 (%)

Sector/Period	1997-2001					2002-2007				
	VA	L1	L2	LP1	LP2	VA	L1	L2	LP1	LP2
Agriculture, Hunting and Forestry	9.3	34.0	28.1	27.3	33.2	9.3	36.7	30.7	25.5	30.4
Fishing	0.6	0.6	0.7	96.8	88.7	0.6	0.6	0.6	104.6	96.5
Extraction of crude petroleum and Petroleum Refineries	1.4	0.1	0.1	2802.0	2152.4	1.2	0.1	0.1	1910.6	1419.2
Mining and Quarrying	5.3	0.5	0.6	1158.0	865.1	6.5	0.8	0.9	879.3	724.9
Dairy Products	0.3	0.1	0.1	253.9	282.9	0.4	0.1	0.1	274.5	280.1
Processed Fish meals	0.8	0.2	0.2	564.2	407.2	0.7	0.2	0.2	361.1	300.0
Bakery and Grain Mills products	1.2	0.9	0.9	133.2	137.6	1.1	0.9	0.9	127.4	120.1
Other food products	2.0	0.4	0.5	519.5	426.9	2.1	0.5	0.6	410.2	338.9
Bev. and Tobacco	0.7	0.4	0.4	216.6	216.7	0.7	0.3	0.3	315.7	286.7
Textiles	1.1	1.6	1.2	70.8	92.5	1.2	1.6	1.3	79.2	96.2
Wearing Apparels	1.2	1.4	1.4	85.9	91.8	1.2	1.5	1.6	79.0	77.2
Leather products	0.1	0.1	0.1	94.8	101.0	0.0	0.1	0.1	55.6	47.3
Manufacture of footwear	0.2	0.3	0.4	63.5	60.1	0.1	0.3	0.4	19.3	16.4
Wood and Furniture	0.5	1.2	1.3	46.7	42.3	0.5	1.2	1.4	45.6	40.7
Paper Products	0.5	0.1	0.1	574.1	454.7	0.6	0.1	0.1	940.6	760.9
Printing Materials	0.5	0.3	0.3	189.0	184.0	0.6	0.3	0.4	181.7	158.5
Basic Chemicals and Pharmaceutical products	0.5	0.1	0.1	3006.3	1980.9	0.6	0.1	0.1	482.0	474.4
Other Chemical products	1.0	0.1	0.1	1314.5	1315.9	1.1	0.1	0.1	829.1	764.6
Rubber and Plastic	0.5	0.1	0.2	501.3	422.0	0.5	0.2	0.2	315.3	248.9
Non-Metallic Minerals	1.2	0.5	0.5	278.5	259.1	1.4	0.4	0.4	375.7	343.0
Iron and Steel	0.5	0.0	0.0	5352.0	4320.3	0.5	0.1	0.1	1160.8	876.0
Non-Ferrous Metals	0.9	0.0	0.0	7631.4	13061.1	1.0	0.0	0.0	3888.8	3748.6
Metallic Products	0.7	0.7	0.8	108.4	92.2	0.8	0.6	0.7	124.4	110.9
No Electrical Machinery	0.2	0.1	0.1	368.7	482.4	0.1	0.2	0.2	117.9	103.1
Electrical Machinery	0.3	0.1	0.1	476.6	397.8	0.3	0.1	0.1	425.6	336.3
Transport Equipment	0.2	0.1	0.1	284.1	244.3	0.2	0.1	0.1	158.7	134.2
Rest of Manufactures	0.5	0.5	0.5	106.5	106.8	0.4	0.5	0.5	95.1	96.4
Electricity and Water	2.3	0.3	0.3	906.4	732.4	2.3	0.2	0.2	1152.1	948.1
Construction	6.1	3.9	4.2	158.2	145.9	5.6	3.4	3.7	162.8	149.9
Wholesale and Retail Trade	16.0	19.4	21.6	82.4	74.3	15.8	17.1	19.5	92.2	80.8
Trans. and Communications	8.7	5.3	7.6	165.8	115.6	9.0	5.5	7.6	163.2	117.9
Financial Services	2.8	0.3	0.4	1058.8	874.5	2.4	0.3	0.3	837.8	758.7
Insurance Services	0.3	0.1	0.2	616.6	426.2	0.5	0.1	0.1	783.7	820.9
Real State and Other Contract Services to firms	10.5	4.7	5.3	223.6	199.3	10.3	4.5	5.0	228.5	205.9
Hotels and Restaurants	4.4	5.2	5.3	86.4	85.0	4.2	5.4	5.5	77.9	76.9
Household services	4.6	7.1	7.4	64.6	62.1	4.2	7.0	7.5	60.9	56.9
Private Human Health services	1.7	1.6	1.5	107.3	115.3	1.7	1.4	1.4	121.0	126.3
Private Education services	3.6	4.8	3.8	74.4	94.4	3.4	4.6	3.2	74.1	105.2
Government Services	6.8	3.0	3.7	225.0	183.7	6.8	3.1	3.6	224.8	188.9
TOTAL [1]	**48752.9**	**11,827.4**	**11464.1**	**4122.1**	**4252.7**	**60477.5**	**13997.3**	**13170.8**	**4320.7**	**4591.8**

Source: Authors estimations. INEI (2009), ENAHO (1997-2007). Table No 1. [1] VA in million of dollars; L(1) and L(2) in thousand of workers, and LP1 and LP2 in dollars per worker respectively. The branches of the manufacturing sector are from dairy products to the rest of manufactures.

TABLE No A2

Average Annual Growth Rate Contribution in Value Added and Employment by Sector, Peru 1998-2007 (%)

Sector/Period	1998-2001			2002-2007		
	VA	L1	L2	VA	L1	L2
Agriculture, Hunting and Forestry	0.40	1.591	1.481	0.38	0.903	0.29
Fishing	0.01	-0.007	-0.026	0.03	0.023	0.02
Extraction of crude petroleum and Petroleum Refineries	-0.02	-0.004	-0.014	0.06	0.003	0.00
Mining and Quarrying	0.44	-0.048	-0.059	0.36	0.121	0.14
Dairy Products	0.03	0.018	0.016	0.04	0.007	0.01
Processed Fish meals	-0.01	-0.006	-0.020	0.04	0.007	0.01
Bakery and Grain Mills products	0.07	0.013	-0.013	0.02	0.018	0.03
Other food products	0.08	0.033	0.050	0.15	0.071	0.08
Bev. and Tobacco	0.01	-0.048	-0.056	0.05	0.031	0.02
Textiles	0.00	-0.058	0.000	0.09	0.123	0.08
Wearing Apparels	-0.03	0.032	0.067	0.06	0.095	0.12
Leather products	-0.01	-0.014	-0.021	0.00	0.012	0.02
Manufacture of footwear	-0.02	0.012	0.026	-0.02	-0.003	0.00
Wood and Furniture	-0.05	0.016	0.015	0.04	0.021	0.03
Paper Products	0.05	-0.005	-0.010	0.07	0.002	0.00
Printing Materials	0.00	0.008	0.001	0.06	0.021	0.02
Basic Chemicals and Pharmaceutical products	0.01	-0.030	-0.043	0.05	0.014	0.01
Other Chemical products	-0.02	0.018	0.019	0.10	0.004	0.00
Rubber and Plastic	0.04	-0.005	-0.011	0.03	0.009	0.01
Non-Metallic Minerals	-0.04	-0.010	0.009	0.15	0.000	-0.01
Iron and Steel	0.00	0.000	-0.001	0.05	0.003	0.00
Non-Ferrous Metals	0.04	-0.002	-0.006	0.03	0.003	0.00
Metallic Products	0.00	0.079	0.085	0.07	-0.025	-0.03
No Electrical Machinery	-0.02	0.030	0.031	-0.01	0.023	0.03
Electrical Machinery	-0.02	-0.002	-0.005	0.02	0.014	0.02
Transport Equipment	-0.01	0.006	0.007	0.03	0.014	0.02
Rest of Manufactures	-0.01	0.015	0.012	0.03	0.027	0.02
Electricity and Water	0.08	-0.032	-0.031	0.13	0.004	0.00
Construction	-0.36	-0.119	-0.149	0.50	0.176	0.19
Wholesale and Retail Trade	0.02	0.090	0.316	1.00	0.389	0.31
Trans. and Communications	0.07	0.129	0.116	0.73	0.381	0.47
Financial Services	-0.18	-0.070	-0.105	0.21	0.032	0.03
Insurance Services	0.02	-0.014	-0.015	0.05	0.008	0.01
Real State and Other Contract Services to firms	0.18	-0.120	-0.167	0.52	0.205	0.19
Hotels and Restaurants	0.02	0.315	0.232	0.22	0.233	0.22
Household services	-0.01	0.364	0.534	0.19	0.174	0.12
Private Human Health services	0.08	-0.042	-0.028	0.06	0.083	0.07
Private Education services	0.08	0.220	0.194	0.12	0.132	0.02
Government Services	0.09	-0.038	-0.116	0.38	0.200	0.23
TOTAL	**0.99**	**2.315**	**2.314**	**6.05**	**3.559**	**2.82**

Source: Table No 1, Authors estimations.

TABLE No A3

Average Annual Growth Rate Contribution in Value Added Per Worker- L1 by Sector, Peru 1998-2007 (%)

Sector/Period	1998-2001			2002-2007		
	Within Sectors	Between Sectors	Total	Within Sectors	Between Sectors	Total
Agriculture, Hunting and Forestry	-0.042	0.226	0.184	0.130	-0.096	0.033
Fishing	0.022	-0.023	-0.001	0.009	0.003	0.012
Extraction of crude petroleum and Petroleum Refineries	0.075	-0.130	-0.055	-0.006	0.022	0.016
Mining and Quarrying	0.985	-0.668	0.317	-0.888	1.019	0.132
Dairy Products	-0.019	0.041	0.022	0.017	0.005	0.022
Processed Fish meals	-0.112	0.079	-0.033	0.015	-0.006	0.010
Bakery and Grain Mills products	0.046	-0.007	0.039	0.000	-0.024	-0.024
Other food products	-0.101	0.140	0.039	-0.133	0.210	0.077
Bev. and Tobacco	0.134	-0.140	-0.006	-0.039	0.059	0.021
Textiles	0.034	-0.064	-0.030	-0.006	0.048	0.043
Wearing Apparels	-0.055	-0.006	-0.061	-0.017	0.030	0.013
Leather products	0.007	-0.018	-0.012	-0.007	0.004	-0.002
Manufacture of footwear	-0.028	-0.001	-0.029	-0.017	-0.004	-0.022
Wood and Furniture	-0.050	-0.009	-0.060	0.029	-0.011	0.018
Paper Products	0.081	-0.036	0.045	0.060	-0.009	0.051
Printing Materials	-0.014	0.004	-0.010	0.021	0.017	0.038
Basic Chemicals and Pharmaceutical products	3.249	-3.280	-0.031	-0.050	0.081	0.031
Other Chemical products	-0.136	0.118	-0.018	0.055	-0.001	0.053
Rubber and Plastic	0.074	-0.050	0.025	-0.007	0.015	0.008
Non-Metallic Minerals	0.001	-0.069	-0.069	0.130	-0.031	0.099
Iron and Steel	0.025	-0.034	-0.009	0.008	0.020	0.028
Non-Ferrous Metals	-0.033	0.054	0.021	-0.099	0.096	-0.003
Metallic Products	-0.073	0.059	-0.015	0.088	-0.043	0.045
No Electrical Machinery	-0.110	0.080	-0.030	-0.007	-0.006	-0.013
Electrical Machinery	-0.008	-0.018	-0.027	-0.033	0.038	0.005
Transport Equipment	-0.042	0.025	-0.017	0.004	0.017	0.021
Rest of Manufactures	-0.033	0.008	-0.025	0.006	0.009	0.016
Electricity and Water	0.391	-0.366	0.025	0.092	-0.047	0.045
Construction	-0.167	-0.342	-0.508	0.203	0.092	0.295
Wholesale and Retail Trade	-0.052	-0.306	-0.358	0.619	-0.195	0.424
Trans. and Communications	-0.144	0.011	-0.134	0.111	0.298	0.409
Financial Services	0.571	-0.815	-0.245	-0.089	0.210	0.121
Insurance Services	0.443	-0.431	0.012	-0.010	0.040	0.030
Real State and Other Contract Services to firms	0.465	-0.532	-0.067	0.029	0.112	0.141
Hotels and Restaurants	-0.263	0.176	-0.086	0.030	0.032	0.062
Household services	-0.246	0.132	-0.114	0.078	-0.045	0.033
Private Human Health services	0.137	-0.095	0.042	-0.037	0.036	-0.001
Private Education services	-0.086	0.084	-0.003	0.021	-0.027	-0.007
Government Services	0.175	-0.243	-0.068	-0.053	0.190	0.137
TOTAL	**5.099**	**-6.448**	**-1.349**	**0.260**	**2.156**	**2.417**

Source: Table No 1, Authors estimations.

TABLE No A4
Average Annual Growth Rate Contribution in Value Added Per Worker- L1 Adjusted by Difference in Agriculture Labor Productivity by Sector, Peru 1998-2007 (%)

Sector/Period	1998-2001			2002-2007		
	Within Sectors	Between Sectors	Total	Within Sectors	Between Sectors	Total
Agriculture, Hunting and Forestry	-0.042	-3.177	-3.220	0.086	-0.489	-0.403
Fishing	0.022	-0.297	-0.275	0.009	-0.001	0.008
Extraction of crude petroleum and Petroleum Refineries	0.075	0.107	0.182	-0.006	0.127	0.121
Mining and Quarrying	0.985	0.000	0.985	-0.888	0.930	0.042
Dairy Products	-0.019	-0.113	-0.132	0.017	0.010	0.027
Processed Fish meals	-0.112	0.178	0.066	0.015	0.032	0.048
Bakery and Grain Mills products	0.046	-0.139	-0.093	0.000	-0.033	-0.033
Other food products	-0.101	0.116	0.015	-0.133	0.150	0.017
Bev. and Tobacco	0.134	-0.084	0.050	-0.039	0.114	0.076
Textiles	0.034	-0.016	0.019	-0.006	-0.060	-0.066
Wearing Apparels	-0.055	-0.425	-0.480	-0.017	-0.046	-0.063
Leather products	0.007	-0.115	-0.108	-0.007	-0.014	-0.021
Manufacture of footwear	-0.028	-0.071	-0.099	-0.017	-0.016	-0.034
Wood and Furniture	-0.050	-0.342	-0.392	0.029	-0.031	-0.003
Paper Products	0.081	-0.063	0.018	0.060	0.112	0.172
Printing Materials	-0.014	0.009	-0.004	0.021	0.002	0.023
Basic Chemicals and Pharmaceutical products	3.249	1.077	4.326	-0.050	0.163	0.113
Other Chemical products	-0.136	0.147	0.012	0.055	0.078	0.133
Rubber and Plastic	0.074	-0.025	0.049	-0.007	0.043	0.036
Non-Metallic Minerals	0.001	-0.011	-0.011	0.130	0.079	0.209
Iron and Steel	0.025	0.763	0.788	0.008	0.126	0.134
Non-Ferrous Metals	-0.033	0.867	0.834	-0.099	0.396	0.298
Metallic Products	-0.073	-0.396	-0.469	0.088	-0.012	0.076
No Electrical Machinery	-0.110	0.013	-0.096	-0.007	-0.035	-0.042
Electrical Machinery	-0.008	0.000	-0.008	-0.033	0.053	0.020
Transport Equipment	-0.042	-0.023	-0.066	0.004	-0.001	0.002
Rest of Manufactures	-0.033	-0.049	-0.082	0.006	-0.018	-0.012
Electricity and Water	0.391	0.000	0.391	0.092	0.202	0.294
Construction	-0.167	-0.190	-0.356	0.203	0.067	0.270
Wholesale and Retail Trade	-0.052	-0.684	-0.736	0.619	-0.095	0.525
Trans. and Communications	-0.144	-0.993	-1.137	0.111	0.058	0.170
Financial Services	0.571	0.164	0.735	-0.089	0.279	0.191
Insurance Services	0.443	-0.037	0.406	-0.010	0.096	0.086
Real State and Other Contract Services to firms	0.465	-0.025	0.440	0.029	0.107	0.136
Hotels and Restaurants	-0.263	-1.096	-1.359	0.030	-0.180	-0.150
Household services	-0.246	-0.842	-1.088	0.078	-0.061	0.018
Private Human Health services	0.137	-0.323	-0.186	-0.037	-0.007	-0.044
Private Education services	-0.086	-0.370	-0.457	0.021	-0.019	0.001
Government Services	0.175	0.014	0.189	-0.053	0.093	0.040
TOTAL	**5.099**	**-6.448**	**-1.349**	**0.216**	**2.200**	**2.417**

Source: Table No 1, Authors estimations.

TABLE No A5

Average Annual Growth Rate Contribution in Value Added Per Worker- L2 by Sector, Peru 1998-2007 (%)

Sector/Period	1998-2001			2002-2007		
	Within Sectors	Between Sectors	Total	Within Sectors	Between Sectors	Total
Agriculture, Hunting and Forestry	-0.113	0.282	0.170	0.272	-0.170	0.102
Fishing	0.036	-0.038	-0.002	0.006	0.009	0.015
Extraction of crude petroleum and Petroleum Refineries	0.203	-0.257	-0.055	0.016	0.006	0.022
Mining and Quarrying	0.914	-0.610	0.304	-0.731	0.908	0.177
Dairy Products	-0.017	0.038	0.021	0.004	0.020	0.024
Processed Fish meals	-0.047	0.012	-0.035	0.003	0.010	0.013
Bakery and Grain Mills products	0.070	-0.034	0.037	-0.015	0.000	-0.015
Other food products	-0.154	0.190	0.036	-0.117	0.209	0.091
Bev. and Tobacco	0.140	-0.146	-0.006	-0.020	0.045	0.026
Textiles	-0.007	-0.023	-0.030	0.017	0.033	0.050
Wearing Apparels	-0.086	0.028	-0.058	-0.029	0.051	0.022
Leather products	0.017	-0.028	-0.011	-0.007	0.005	-0.002
Manufacture of footwear	-0.034	0.006	-0.028	-0.016	-0.005	-0.021
Wood and Furniture	-0.048	-0.009	-0.058	0.025	-0.004	0.021
Paper Products	0.128	-0.085	0.043	0.045	0.008	0.053
Printing Materials	-0.003	-0.007	-0.010	0.024	0.017	0.041
Basic Chemicals and Pharmaceutical products	1.890	-1.920	-0.030	-0.033	0.069	0.036
Other Chemical products	-0.159	0.142	-0.017	0.066	-0.008	0.058
Rubber and Plastic	0.056	-0.032	0.024	-0.001	0.013	0.012
Non-Metallic Minerals	-0.040	-0.027	-0.067	0.159	-0.053	0.106
Iron and Steel	0.105	-0.114	-0.009	-0.006	0.036	0.030
Non-Ferrous Metals	-0.015	0.035	0.020	-0.042	0.047	0.005
Metallic Products	-0.066	0.051	-0.014	0.095	-0.045	0.049
No Electrical Machinery	-0.212	0.183	-0.028	-0.006	-0.006	-0.012
Electrical Machinery	0.005	-0.031	-0.026	-0.047	0.053	0.006
Transport Equipment	-0.048	0.032	-0.016	0.001	0.021	0.021
Rest of Manufactures	-0.028	0.004	-0.024	0.013	0.005	0.018
Electricity and Water	0.358	-0.335	0.023	0.125	-0.065	0.061
Construction	-0.145	-0.356	-0.500	0.195	0.133	0.329
Wholesale and Retail Trade	-0.223	-0.132	-0.354	0.713	-0.191	0.522
Trans. and Communications	-0.040	-0.098	-0.137	0.163	0.299	0.462
Financial Services	0.740	-0.980	-0.240	-0.058	0.193	0.135
Insurance Services	0.415	-0.403	0.011	0.002	0.033	0.034
Real State and Other Contract Services to firms	0.528	-0.601	-0.073	0.084	0.127	0.211
Hotels and Restaurants	-0.187	0.099	-0.087	0.036	0.055	0.091
Household services	-0.335	0.219	-0.115	0.111	-0.048	0.063
Private Human Health services	0.106	-0.069	0.038	-0.018	0.030	0.012
Private Education services	-0.107	0.102	-0.005	0.101	-0.084	0.018
Government Services	0.290	-0.364	-0.074	-0.032	0.213	0.181
TOTAL	**3.888**	**-5.272**	**-1.383**	**1.098**	**1.970**	**3.068**

Source: Table No 1, Authors estimations.

TABLE No A6

Average Annual Growth Rate Contribution in Value Added Per Worker- L2 Adjusted by Difference in Agriculture Labor Productivity by Sector, Peru 1998-2007 (%)

Sector/Period	1998-2001			2002-2007		
	Within Sectors	Between Sectors	Total	Within Sectors	Between Sectors	Total
Agriculture, Hunting and Forestry	-0.115	-1.575	-1.690	0.196	-0.492	-0.296
Fishing	0.036	-0.437	-0.401	0.006	-0.004	0.001
Extraction of crude petroleum and Petroleum Refineries	0.203	0.200	0.402	0.016	0.150	0.166
Mining and Quarrying	0.914	0.003	0.917	-0.731	0.821	0.089
Dairy Products	-0.017	-0.087	-0.104	0.004	0.022	0.026
Processed Fish meals	-0.047	0.104	0.057	0.003	0.031	0.034
Bakery and Grain Mills products	0.070	0.022	0.092	-0.015	-0.014	-0.029
Other food products	-0.154	0.152	-0.002	-0.117	0.134	0.017
Bev. and Tobacco	0.140	-0.067	0.073	-0.020	0.069	0.049
Textiles	-0.007	-0.127	-0.134	0.017	-0.034	-0.017
Wearing Apparels	-0.086	-0.393	-0.479	-0.029	-0.046	-0.075
Leather products	0.017	-0.112	-0.095	-0.007	-0.019	-0.027
Manufacture of footwear	-0.034	-0.074	-0.108	-0.016	-0.033	-0.049
Wood and Furniture	-0.048	-0.290	-0.338	0.025	-0.026	-0.001
Paper Products	0.128	-0.075	0.053	0.045	0.136	0.181
Printing Materials	-0.003	0.016	0.013	0.024	0.005	0.029
Basic Chemicals and Pharmaceutical products	1.890	1.053	2.943	-0.033	0.159	0.126
Other Chemical products	-0.159	0.253	0.094	0.066	0.065	0.131
Rubber and Plastic	0.056	0.050	0.105	-0.001	0.024	0.023
Non-Metallic Minerals	-0.040	0.015	-0.025	0.159	0.064	0.224
Iron and Steel	0.105	0.735	0.840	-0.006	0.105	0.099
Non-Ferrous Metals	-0.015	1.470	1.455	-0.042	0.410	0.368
Metallic Products	-0.066	-0.275	-0.341	0.095	-0.011	0.083
No Electrical Machinery	-0.212	0.212	0.000	-0.006	-0.033	-0.038
Electrical Machinery	0.005	-0.005	0.000	-0.047	0.058	0.011
Transport Equipment	-0.048	-0.015	-0.063	0.001	-0.001	0.000
Rest of Manufactures	-0.028	-0.076	-0.105	0.013	-0.017	-0.004
Electricity and Water	0.358	0.015	0.372	0.125	0.163	0.289
Construction	-0.145	-0.040	-0.185	0.195	0.089	0.284
Wholesale and Retail Trade	-0.223	-1.636	-1.858	0.713	-0.033	0.680
Trans. and Communications	-0.040	-1.567	-1.607	0.163	-0.017	0.146
Financial Services	0.740	0.216	0.957	-0.058	0.295	0.237
Insurance Services	0.415	-0.079	0.335	0.002	0.107	0.109
Real State and Other Contract Services to firms	0.528	-0.042	0.487	0.084	0.111	0.195
Hotels and Restaurants	-0.187	-0.641	-0.828	0.036	-0.158	-0.122
Household services	-0.335	-1.752	-2.087	0.111	-0.084	0.027
Private Human Health services	0.106	-0.175	-0.068	-0.018	0.012	-0.006
Private Education services	-0.107	-0.275	-0.382	0.101	-0.007	0.095
Government Services	0.290	0.030	0.320	-0.032	0.048	0.015
TOTAL	**3.886**	**-5.269**	**-1.383**	**1.022**	**2.047**	**3.068**

Source: Table No 1, Authors estimations.

TABLE No A7

Labor Productivity and Selected Productive Indicators of the Sample of Firms from the National Economic Survey of Manufactures in Peru by Sectors, 2002-2007

Sector	2002							
	Lp1	**Lp2**	**SVa**	**Sx**	**Sm**	**k1**	**k2**	**IC**
Dairy Products	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a
Processed Fish meals	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a
Bakery and Grain Mills products	69.7	84.2	52.4	8.6	67.0	32.9	28.9	69.1
Other food products	105.6	75.7	42.0	0.0	53.7	52.6	12.7	35.9
Bev. and Tobacco	64.3	61.6	54.5	13.3	42.4	145.2	127.2	63.6
Textiles	102.0	80.1	43.8	31.4	42.2	117.5	114.5	65.2
Wearing Apparels	109.4	134.8	48.0	62.9	35.3	43.7	41.4	69.5
Leather products	138.7	100.1	45.7	69.4	39.5	95.9	83.0	51.3
Manufacture of footwear	100.7	89.4	49.6	19.1	27.6	98.6	113.2	68.4
Wood and Furniture	112.1	106.1	56.7	58.8	31.6	57.4	57.8	68.6
Paper Products	127.6	116.3	42.9	5.0	45.6	209.0	181.3	62.9
Printing Materials	66.5	89.0	60.2	11.7	73.2	70.0	80.6	62.3
Basic Chemicals and Pharmaceutical products	92.4	97.1	50.4	17.4	54.2	184.9	140.8	58.9
Other Chemical products	135.0	110.0	45.3	11.4	45.2	96.6	54.6	58.6
Rubber and Plastic	116.6	100.9	42.2	21.7	58.9	160.2	139.8	58.8
Non-Metallic Minerals	101.2	113.1	54.6	15.8	41.4	301.5	302.7	58.2
Iron and Steel	107.5	102.2	47.5	13.4	73.6	263.8	221.0	58.1
Non-Ferrous Metals	134.5	107.6	47.5	47.5	7.2	199.5	184.9	50.4
Metallic Products	84.1	87.2	54.9	18.2	54.2	77.4	80.1	53.4
No Electrical Machinery	283.8	157.6	58.8	25.6	58.3	214.0	186.6	57.6
Electrical Machinery	87.0	90.5	50.5	14.1	37.9	143.2	110.5	56.6
Transport Equipment	66.9	70.6	52.1	17.9	70.2	102.4	53.8	52.8
Rest of Manufactures	86.4	98.5	57.8	31.2	64.3	67.6	53.5	64.9
Total	**100.0**	**100.0**	**51.4**	**28.7**	**50.0**	**100.0**	**100.0**	**67.0**
Weighted Average (US$ 94)	**37,646**	**13,553**				**54,573**	**31,211**	
Simple Average (US$ 94)	**48,172**	**20,402**				**28,060**	**27.005**	
Labor Productivity of the Manufacturing Sector (US$ 94)		**7,218**						

Continuation…

TABLE No A7

Labor Productivity and Selected Productive Indicators of the Sample of Firms from the Annual Survey of Manufactures in Peru by Sectors, 2002-2007

Sector	2005							
	Lp1	**Lp2**	**SVa**	**Sx**	**Sm**	**k1**	**k2**	**IC**
Dairy Products	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a
Processed Fish meals	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a
Bakery and Grain Mills products	45.8	61.5	42.1	6.4	27.4	26.2	22.7	76.7
Other food products	81.3	56.2	22.0	28.7	-	34.7	28.9	69.8
Bev. and Tobacco	102.0	127.3	37.3	2.9	33.0	157.7	127.5	68.3
Textiles	87.2	78.7	34.1	35.9	44.1	97.9	105.3	68.7
Wearing Apparels	74.2	92.9	41.7	47.6	25.1	50.4	60.4	75.0
Leather products	230.9	160.9	34.6	51.2	46.0	194.4	230.2	68.8
Manufacture of footwear	130.3	83.4	36.0	22.9	28.2	51.8	59.3	72.3
Wood and Furniture	121.5	124.2	40.3	73.1	36.3	67.4	52.5	72.8
Paper Products	126.2	108.4	28.8	7.5	49.0	177.2	167.2	59.1
Printing Materials	68.8	90.3	47.2	18.0	90.0	81.1	100.3	74.6
Basic Chemicals and Pharmaceutical products	75.6	82.8	42.8	27.4	36.5	125.6	112.9	61.8
Other Chemical products	120.9	107.9	32.4	17.5	58.0	84.8	57.2	66.2
Rubber and Plastic	141.9	112.2	33.6	16.9	56.6	141.8	148.8	79.8
Non-Metallic Minerals	155.5	202.4	41.1	29.4	51.6	328.9	317.9	67.7
Iron and Steel	95.6	101.9	41.6	31.4	16.1	195.9	186.1	70.0
Non-Ferrous Metals	113.8	72.5	35.2	67.1	47.6	140.7	141.3	62.5
Metallic Products	93.8	79.5	40.0	16.5	55.0	61.1	64.7	64.3
No Electrical Machinery	113.7	127.7	40.0	10.9	49.4	67.8	49.9	74.6
Electrical Machinery	130.9	121.4	42.2	11.9	50.1	81.5	62.4	61.2
Transport Equipment	116.9	132.8	42.8	26.2	65.3	142.7	40.4	57.2
Rest of Manufactures	94.3	109.0	41.2	30.1	75.6	87.0	103.4	73.2
Total	**100.0**	**100.0**	**38.8**	**28.7**	**49.3**	**100.0**	**100.0**	**70.3**
Weighted Average (US$ 94)	**59,514**	**18,739**				**78,124**	**48,156**	
Simple Average (US$ 94)	**63,310**	**20,167**				**52,057**	**33,895**	
Labor Productivity of the Manufacturing Sector (US$ 94)		**8,148**						

Continuation…

TABLE No A7

Labor Productivity and Selected Productive Indicators of the Sample of Firms from the Annual Survey of Manufactures in Peru by Sectors, 2002-2007

Sector	2006							
	Lp1	**Lp2**	**SVa**	**Sx**	**Sm**	**k1**	**k2**	**IC**
Dairy Products	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a
Processed Fish meals	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a
Bakery and Grain Mills products	42.4	59.3	40.0	6.3	59.4	23.0	17.8	72.1
Other food products	73.8	67.9	26.1	23.7	-	34.4	30.1	55.9
Bev. and Tobacco	78.2	80.6	34.8	2.4	7.9	96.1	67.2	65.9
Textiles	79.4	81.1	34.7	31.3	52.8	101.7	110.2	71.0
Wearing Apparels	57.8	65.2	36.6	73.3	36.6	33.1	28.5	76.8
Leather products	141.7	116.0	34.0	40.3	42.2	108.0	127.2	68.2
Manufacture of footwear	160.1	107.1	31.5	19.6	25.1	163.0	191.4	73.0
Wood and Furniture	124.6	105.3	34.9	55.5	13.9	64.7	53.3	72.1
Paper Products	106.2	101.7	33.1	11.4	57.6	130.8	124.1	70.4
Printing Materials	74.0	96.6	42.6	13.7	55.8	80.6	97.6	68.4
Basic Chemicals and Pharmaceutical products	77.4	99.6	42.8	18.6	58.8	120.6	103.8	68.2
Other Chemical products	126.2	108.7	33.2	16.5	48.3	90.7	70.9	64.2
Rubber and Plastic	151.0	135.8	33.6	24.2	71.9	136.9	150.6	78.5
Non-Metallic Minerals	170.6	221.9	35.5	30.1	43.2	310.3	304.2	62.6
Iron and Steel	102.8	118.4	33.4	25.2	36.6	198.9	168.0	73.1
Non-Ferrous Metals	189.9	136.0	28.3	48.4	87.3	212.5	186.4	71.2
Metallic Products	144.1	105.8	36.1	14.4	66.0	126.4	126.6	69.4
No Electrical Machinery	89.3	136.6	44.7	18.4	74.6	53.5	56.0	70.7
Electrical Machinery	66.0	77.9	40.5	8.4	52.1	96.0	89.6	66.9
Transport Equipment	74.9	84.6	37.0	12.3	52.9	52.6	30.9	68.1
Rest of Manufactures	58.4	72.1	42.2	24.0	76.0	58.7	47.0	69.3
Total	**100.0**	**100.0**	**36.8**	**29.7**	**54.0**	**100.0**	**100.0**	**70.9**
Weighted Average (US$ 94)	**56,078**	**17,695**				**65,118**	**37,604**	
Simple Average (US$ 94)	**67,947**	**19,272**				**49,800**	**32,863**	
Labor Productivity of the Manufacturing Sector (US$ 94)		**8,069**						

Continuation…

TABLE No A7

Labor Productivity and Selected Productive Indicators of the Sample of Firms from the Annual Survey of Manufactures in Peru by Sectors, 2002-2007

Sector	2007							
	Lp1	**Lp2**	**SVa**	**Sx**	**Sm**	**k1**	**k2**	**IC**
Dairy Products	135.8	138.7	43.8	n.a	29.7	116.5	79.1	n.a
Processed Fish meals	121.7	120.9	41.3	n.a	8.0	566.8	305.7	n.a
Bakery and Grain Mills products	75.6	65.3	36.2	n.a	45.7	78.1	57.1	n.a
Other food products	178.5	152.9	39.6	n.a	27.6	134.2	55.2	n.a
Bev. and Tobacco	141.5	196.8	48.6	n.a	20.9	379.2	200.5	n.a
Textiles	89.5	86.3	40.5	n.a	32.7	117.5	90.1	n.a
Wearing Apparels	77.5	80.1	42.1	n.a	23.4	38.0	17.6	n.a
Leather products	136.4	124.0	40.0	n.a	14.6	103.4	271.1	n.a
Manufacture of footwear	87.8	90.8	40.0	n.a	24.0	49.6	47.2	n.a
Wood and Furniture	81.3	80.2	41.0	n.a	25.4	32.8	30.9	n.a
Paper Products	108.1	87.6	37.2	n.a	48.7	147.1	92.2	n.a
Printing Materials	63.8	79.9	45.9	n.a	61.3	75.7	77.2	n.a
Basic Chemicals and Pharmaceutical products	221.4	229.3	48.9	n.a	54.3	300.6	270.8	n.a
Other Chemical products	123.0	118.4	42.3	n.a	39.5	100.0	72.7	n.a
Rubber and Plastic	169.3	141.3	36.8	n.a	61.3	150.4	130.7	n.a
Non-Metallic Minerals	101.4	136.3	46.1	n.a	39.5	159.1	211.2	n.a
Iron and Steel	123.1	154.4	42.2	n.a	43.1	146.0	242.4	n.a
Non-Ferrous Metals	109.9	81.5	39.7	n.a	13.5	104.1	123.3	n.a
Metallic Products	74.2	74.2	40.6	n.a	51.4	63.5	52.7	n.a
No Electrical Machinery	96.5	127.2	50.2	n.a	39.2	53.9	40.1	n.a
Electrical Machinery	70.1	91.3	41.1	n.a	48.1	61.1	78.4	n.a
Transport Equipment	65.0	61.1	40.2	n.a	49.1	44.1	49.0	n.a
Rest of Manufactures	58.8	56.4	43.9	n.a	53.2	35.2	32.5	n.a
Total	**100.0**	**100.0**	**41.5**	**n.a**	**41.9**	**100.0**	**100.0**	**n.a**
Weighted Average (US$ 94)	**59,948**	**25,310**				**58,789**	**32,499**	
Simple Average (US$ 94)	**32,919**	**12,603**				**50,207**	**30,651**	
Labor Productivity of the Manufacturing Sector (US$ 94)		**7,796**						

Source: Table No II.1. Author´s work.

TABLE No A8
Permanent Job Creation (JC) and Destruction (JD), Labor Productivity and Selected Indicators for a Sample of Manufacturing Firms, 2002-2007

Year/ Period	JC (n)	JD (n)	LP1 (t-k)			LP2 (t-k)			gLP1 (t-k)		gLP2 (t-k)	
			JC (n)	JD (n)	Test (df)	JC (n)	JD (n)	Test (df)	JC (n)	JD (n)	JC (n)	JD (n)
2002-05	20.52 (304)	8.72 (313)	111,062 (304)	65,515 (313)	3.4*** (615)	35,340 (304)	21,554 (313)	3.3*** (615)	1.6 (304)	25.0 (313)	0.6 (304)	25.4 (313)
2002-06	16.51 (77)	7.36 (84)	68,945 (77)	57,411 (84)	1.0 (159)	25,017 (77)	22,873 (84)	0.5 (159)	-0.38 (77)	21.21 (84)	-0.63 (77)	19.30 (84)
2002-07	17.87 (147)	6.2 (126)	75,741 (147)	41,658 (126)	2.5** (271)	29,097 (147)	14,411 (126)	4.2*** (271)	-2.77 (147)	7.5 (126)	-1.23 (147)	10.36 (126)
2005-07	28.43 (153)	13.56 (91)	83,685 (153)	53,886 (91)	1.6 (242)	24,497 (153)	21,256 (91)	0.7 (242)	-9.99 (153)	28.44 (91)	0.22 (153)	37.89 (91)
2005-06	44.95 (260)	19.05 (180)	121,256 (260)	133,546 (180)	-0.5 (438)	36,937 (260)	40,633 (180)	-0.5 (438)	-7.99 (260)	63.1 (180)	-5.02 (260)	70.42 (180)
2006-07	24.26 (387)	28.3 (129)	118,622 (387)	82,311 (129)	2.2** (514)	36,164 (387)	26,066 (129)	1.9** (514)	-19.44 (387)	43.98 (129)	21.55 (387)	100.31 (129)

Period	L ave (t-k)			Sva (t-k)			Sx (t-k)			Sm (t-k)		
	JC (n)	JD (n)	Test (df)	JC (n)	JD (n)	Test (df)	JC (n)	JD (n)	Test (df)	JC (n)	JD (n)	Test (df)
2002-05	92 (304)	95 (313)	-0.17 (615)	39.0 (304)	39.5 (313)	-0.32 (615)	32 (99)	25 (96)	1.35 (193)	56 (63)	50 (56)	1.04 (117)
2002-06	46 (77)	41 (84)	0.41 (159)	43.2 (77)	45.7 (84)	-0.76 (159)	31 (16)	34 (23)	-0.21 (37)	54 (11)	48 (16)	0.50 (25)
2002-07	22 (147)	56 (126)	-1.36 (271)	49.2 (147)	46.9 (126)	0.83 (271)	37 (22)	33 (19)	0.43 (39)	46 (25)	44 (23)	0.06 (46)
2005-07	57 (153)	59 (91)	-0.07 (242)	38.2 (153)	42.8 (91)	-1.7* (242)	37 (42)	44 (24)	-0.66 (64)	38 (17)	47 (15)	-0.71 (30)
2005-06	111 (260)	127 (180)	-0.59 (438)	35.5 (260)	35.0 (180)	0.31 (438)	26 (102)	33 (73)	-1.50 (173)	53 (52)	52 (49)	0.17 (99)
2006-07	112 (387)	84 (129)	1.7* (514)	35.7 (387)	36.7 (129)	-0.59 (514)	28 (144)	34 (42)	-0.88 (184)	57 (84)	55 (26)	0.31 (108)

Continuation…

TABLE No A8
Permanent Job Creation (JC) and Destruction (JD), Labor Productivity and Selected Indicators for a Sample of Manufacturing Firms, 2002-2007

Period	k1 (t-k)			k2 (t-k)			IC (t-k)		
	JC (n)	JD (n)	Test (df)	JC (n)	JD (n)	Test (df)	JC (n)	JD (n)	Test (df)
2002-05	88,767 (302)	58,098 (309)	**2.3 (609)	55,200 (280)	38,105 (295)	*1.8 (573)	62.2 (198)	61.6 (201)	0.23 (397)
2002-06	40,887 (77)	83,312 (84)	*-1.8 (159)	28,380 (68)	46,336 (78)	-1.44 (144)	59.7 (40)	54.6 (52)	0.91 (90)
2002-07	47,936 (143)	38,332 (126)	0.83 (267)	40,122 (96)	25,260 (102)	1.43 (196)	61.8 (70)	63.4 (74)	-0.38 (142)
2005-07	57,565 (152)	68,749 (91)	-0.70 (241)	37,896 (143)	43,982 (87)	-0.46 (228)	60.3 (99)	68.5 (58)	**-2.0 (155)
2005-06	106,820 (260)	183,670 (180)	-1.18 (438)	61,606 (287)	118,121 (178)	-1.23 (463)	65.2 (205)	61.8 (164)	1.29 (367)
2006-07	113,841 (387)	72,656 (129)	1.19 (514)	69,043 (376)	46,421 (122)	0.91 (496)	63.2 (408)	65.0 (216)	-0.84 (622)

Source: Table No II.3

TABLE No A9
Gross Job Flows Estimations in a Sample of Peruvian Manufacturing Firms, 2002-2007

Independent Variables	JC		JD		JC		JD		JC		JD		JC		JD	
Constant	12.0 (0.9)	13.2 (0.7)	8.7 (0.5)	8.5 (0.5)	13.0 (0.7)	11.5 (0.7)	8.2 (0.5)	8.0 (0.5)	9.3 (1.8)	10.2 (1.9)	10.8 (1.8)	10.4 (1.8)	10.9 (3.1)	10.8 (3.1)	10.4 (2.2)	10.8 (2.3)
Size (No Workers)	-0.01 (0.002)	-0.01 (0.002)	-0.002 (0.001)	-0.002 (0.001)	-0.01 (0.003)	-0.01 (0.002)	-0.002 (0.001)	-0.002 (0.001)	-0.01 (0.002)	-0.01 (0.002)	-0.001 (0.002)	-0.001 (0.002)	-0.01 (0.002)	-0.01 (0.002)	-0.001 (0.002)	-0.001 (0.002)
Value-Added p. Worker (10E-05)	3.6 (1.7)		-2.3 (0.7)						2.4 (0.6)		-3.8 (1.0)		2.4 (0.6)		-3.8 (1.0)	
Output Value. p. Worker (10.E-06)		3.9 (2.0)		-5.3 (1.6)						2.8 (0.7)		-6.1 (2.5)		2.7 (0.7)		-6.4 (2.6)
Asset Value - Labor Ratio (10.E-06)					6.5 (3.8)		-2.0 (1.7)									
Machinery Value -Labor Ratio (10.E-06)						13.5 (7.5)		-2.3 (2.4)								
Inst. Capac. Util.									0.05 (0.03)	0.05 (0.03)	-0.02 (0.03)	-0.02 (0.03)	0.04 (0.03)	0.04 (0.03)	-0.02 (0.03)	-0.02 (0.03)
Value added Share													-0.03 (0.06)	-0.01 (0.06)	0.01 (0.03)	-0.01 (0.03)
R^2 Adj.	0.07	0.05	0.02	0.01	0.04	0.06	0.005	0.003	0.05	0.04	0.02	0.005	0.05	0.04	0.02	-0.000
F	22.3	15.7	4.1	3.0	12.7	16.0	1.7	1.4	6.5	5.7	2.4	1.3	5.0	4.3	1.8	1.0
N	558	558	284	284	551	487	284	254	328	328	180	180	328	328	180	180

Continuation..

TABLE No A9
Gross Job Flows Estimations in a Sample of Peruvian Manufacturing Firms, 2002-2007

Independent Variables	JC		JD		JC		JD		JC		JD		JC		JD	
Constant	10.4 (4.9)	9.8 (4.9)	6.0 (4.0)	5.9 (4.1)	10.7 (5.0)	10.6 (5.0)	5.4 (4.7)	5.9 (4.4)	12.7 (2.6)	11.6 (3.1)	9.3 (2.2)	10.8 (2.4)	11.6 (5.0)	11.1 (4.9)	5.8 (4.4)	5.6 (4.8)
Size (No Workers)	-0.01 (0.002)	-0.01 (0.002)	0.001 (0.002)	0.001 (0.002)	-0.01 (0.002)	-0.01 (0.002)	0.001 (0.002)	0.001 (0.002)	-0.01 (0.002)	-0.01 (0.002)	-0.001 (0.002)	-0.001 (0.002)	-0.01 (0.002)	-0.01 (0.002)	0.001 (0.002)	0.001 (0.002)
Value-Added p. Worker (10E-05)	1.5 (0.3)		-1.8 (1.5)						2.8 (0.9)		-5.7 (2.5)		2.5 (0.7)		-1.8 (1.6)	
Output Value. p. Worker (10.E-06)		2.0 (0.3)		-2.4 (2.0)						5.3 (1.7)		-5.8 (3.5)		3.6 (0.6)		-3.1 (2.1)
Asset Value - Labor Ratio (10.E-06)					3.0 (2.1)		-1.0 (3.4)			-6.6 (3.1)		-0.6 (2.7)		-3.9 (1.4)		1.4 (3.8)
Machinery Value -Labor Ratio (10.E-06)						5.4 (4.3)		-5.0 (5.1)	-5.0 (4.7)		6.4 (6.5)		-6.2 (4.7)		0.4 (4.2)	
Inst. Capac. Util.	0.01 (0.04)	0.02 (0.05)	-0.01 (0.04)	-0.02 (0.04)	0.01 (0.05)	0.0004 (0.04)	-0.02 (0.04)	-0.02 (0.05)	0.02 (0.02)	0.04 (0.03)	-0.02 (0.03)	-0.03 (0.03)	-0.002 (0.05)	0.006 (0.05)	-0.01 (0.05)	-0.02 (0.04)
Value Added Share	-0.02 (0.08)	0.01 (0.08)	0.02 (0.03)	0.01 (0.04)	-0.005 (0.08)	0.01 (0.08)	0.02 (0.04)	0.01 (0.05)	-0.06 (0.04)	-0.01 (0.06)	0.03 (0.03)	-0.009 (0.03)	-0.02 (0.08)	0.002 (0.08)	0.02 (0.05)	0.02 (0.04)
Export Share	0.07 (0.02)	0.06 (0.02)	0.02 (0.03)	0.03 (0.03)	0.06 (0.02)	0.06 (0.02)	0.03 (0.04)	0.03 (0.04)					0.06 (0.02)	0.05 (0.02)	0.03 (0.04)	0.03 (0.03)
R^2 Adj.	0.09	0.09	-0.08	-0.1	0.05	0.05	-0.1	-0.1	0.05	0.05	0.04	-0.01	0.08	0.09	-0.14	-0.13
F	3.2	3.4	0.4	0.4	2.3	2.1	0.3	0.3	4.2	4.1	1.5	0.8	2.6	2.9	0.3	0.3
N	116	116	37	37	113	113	37	35	312	325	180	180	113	115	35	37

Source: INEI (2009). Author's work. Number in parenthesis are robust White standard errors. F value lower or equal than 1.7 is statistically not significant. All values are in real terms. Shares indicators are with respect to total output value.

Table No A10

GDP Per Worker (2000 US $) for A Sample of Upper and Middle Income Latin American, Caribbean and Asian Countries, 2002-2007

Countries	2007	Rate of Growth, 2002-07
1. South America		
Peru	5430	3.3
Brazil	8282	1.2
Argentina	20248	3.6
Colombia	5943	3.4
Chile	14557	2.5
2. Other LACs		
Mexico	15529	1.0
Costa Rica	11455	3.4
Jamaica	6966	0.3
Dominican Republic	6671	
3. Asian Countries		
People Republic of China	3039	9.7
Philippines	2892	3.3
Thailand	4727	4.6

Source: WDI (2009). Author's work.

Table N° A11
Value added per full-time workers OLS estimation

Independent variables	Coefficient	t	P>|t|
Age of the enterprise (years)	0.1973	12.63	0.00
Gender of the entrepreneur (0=male,1=female)	-0.7182	-23.43	0.00
Relationship with the household head (1=HH, 0=otherwise)	0.2303	7.82	0.00
Age of the entrepreneur (years)	0.0503	11.09	0.00
(Age of the entrepreneur)2	-0.0007	-13.49	0.00
Schooling years of the entrepreneur	0.0478	15.35	0.00
Working hours of the entrepreneur	-0.0079	-12.66	0.00
Number of full-time workers	-0.2332	-15.89	0.00
Ln(capital stock per worker)	0.0903	18.45	0.00
Manufacture (=1, 0=otherwise)	-0.5617	-14.79	0.00
Construction (=1, 0=otherwise)	0.2001	3.28	0.00
Trade (=1,0=otherwise)	-0.2249	-7.79	0.00
Year 2004	-0.0327	-0.99	0.32
Year 2005	0.0104	0.31	0.76
Year 2006	0.1230	3.76	0.00
Constant	4.5497	44.13	0.00
Adjusted R^2		0.3691	
F(15,9922)		388.55	
Number of observations		9938	

Source: Authors estimation using the ENAHO 2003 to 2006.

Appendix of Formulas

A. Output, Employment and Labor Productivity Sectoral Decomposition

This section is based on the methodology described in Timmer and de Vries (2008 and 2007) and Timmer and Ark (2003). Let Xit be the variable X to be analyzed from sector 'i' in period t. Three Xit variables will be analyzed: Lit, VAit and LPit. Wherein Lit is the employment in sector 'i' at period t, VAit is the real value added of sector 'i' and Pit=VAit/Lit is the labor productivity of sector 'i'at period t. Then:

[I.1] $Xt= \sum_{i=1}^{N} \omega it.Xit;\quad 0\leq \omega it \leq 1;\quad \sum_{i=1}^{N} \omega it=1;$ for Lit and VAit, ωit=1; and for LPit, ωit=Lit/Lt

[I.2] $\Delta kXit= Xit-Xi(t-k);\ Xdi(t-k)= 0.5*(Xit+Xi(t-k))$ and $gkXit= [\Delta kXit/(Xdi(t-k)]/k$
gkXit is the growth rate of Xit.

[I.3] $\Delta kXt= (\sum \omega it.Xit- \sum \omega i(t-k).Xi(t-k))+(\sum \omega it.Xi(t-k) -\sum \omega it.Xi(t-k))$;
$= (\sum \omega it.Xit- \sum \omega i(t-k).Xi(t-k))+ (\sum \omega i(t-k).Xit - \sum \omega i(t-k).Xit)$

[I.4] $\Delta kXt= \sum (Xit-Xi(t-k)).\omega it+ \sum (\omega it-\omega i(t-k)).Xi(t-k);$
$= \sum (Xit-Xi(t-k)).\omega i(t-k)+ \sum (\omega it-\omega i(t-k)).Xit;$

[I.5] $\Delta kXt= \sum (Xit-Xi(t-k)).\omega ia+ \sum (\omega it-\omega i(t-k)).Xia;$
Where $\omega iat= [\omega it+\omega i(t-k)]*0.5;$
$Xiat= [Xit+Xi(t-k)]*0.5.$

[I.6] $\Delta kXt= \sum (Cwit+ Cbit);\ Cwit=(Xit-Xi(t-k)).\omega ia;\ Cbit= (\omega it-\omega i(t-k)).Xia;$

In rate of growth I.6 is transformed in:

[I.6]' $gkXt= \sum (Cwit/Xiat).(Xiat/Xat)+ \sum (Cbit/Xiat).(Xia/Xa);$

Equation [I.6] (or [I.6]') decompose the change of Xt (i.e., ΔkXt) in two components the within sectoral change (the first term on the right-hand side which we call the ''within-effect'', also known as ''intra-effect'') and the effects of changes in the sectoral allocation of labor (the second term, which we call the 'between-effect'', also known as the ''shift-effect'')[54].

[54] A number of criticisms can be raised against this type of decomposition when Xit is labor productivity. Firstly, this decomposition is based upon a labor productivity model and as such non-labor inputs are ignored. Ideally, sectoral productivity measures should treat all inputs symmetrically and take into the inputs of capital, materials and service inputs along with labor. Unfortunately, lack of capital data at industry level precludes this type of analysis for a wide range of countries. Secondly, the decomposition into shift effects and intra sectoral effects depends crucially on the selected price base year of the output series. When price developments vary across sectors decomposition based on, for example, 1985 prices will differ from a decomposition based on 1995 prices. Especially for developing countries, these differences can be large. During the process of industrial development, manufacturing prices generally decline rapidly relative to prices in the traditional part of the economy. Hence given an increasing labor share in manufacturing, the shift effect will be bigger with earlier base years than with later. This problem can be remedied by applying the decomposition presented in (I.6) to shorter time intervals and/or rebasing sectoral series each period or even annually. The third and fourth criticism, which dealt with the issue of surplus labor and the distribution of shift effects across sectors respectively, can be also taken into account by

An adjusted methodology to estimate the contribution of each sector to the changes of labor productivity (i.e., when Xt=LPt) is reported in Timmer and Ark (2003). These authors propose two adjustments. The first adjustment assumes that marginal and average in the agriculture sector are identical and the second assumes that marginal labor productivity is lower than average productivity in the agriculture sector. In both cases, sectors are divided in two sets. The first set of 'K' expanding sectors defined as sectors which their labor shares increases between period t and t-k, and the second set 'J' of shrinking sectors defined as sectors which theirs labor shares decrease between two time periods. Since the agriculture sector (i.e, when i=1) in the development process may decline its employment share then its respective shift effect will always will be negative. Since it is not clear how to interpret this negative shift effect from an analytical perspective, Timmer and Ark (2003) suggested that all shift (or between industry) effects from sectors that experienced shrinking labor shares be reallocated to sectors that expanded their share in total labor. The implication of this reallocation of sectors is that the sectors that grow get credited for the shift effect. This 'adjusted' shift effect is positive when an expanding sector's productivity is higher than the average productivity of the shrinking sectors. But it can also be negative when the expanding sector's productivity is lower than the average productivity of the shrinking sectors. The adjusted 'shift effect' to allocated to the expanding sectors will depend upon the difference between average and marginal labor productivity. Let ε be the ratio between marginal to average labor productivity, which Timmer and Ark (2003) estimate is 0.410 for Peru. Then:

[I.7] $X^*_{1(t-k)} = [VA_{1(t-k)} - \varepsilon.X_{1(t-k)}.(L_{1(t-k)} - L_{1t})]/L_{1t}$, when $L_{1(t-k)} - L_{1t} > 0$ and

$X^*_{1(t-k)} = X_{1(t-k)}$; otherwise or when $\varepsilon=1$

For the set J of shrinking sectors (which may or may not include the agriculture sector), the shift effects components are zero, i.e, Cbi=0. If ε<1 then the shift effect is also zero for the agriculture sector. The within effect for the agriculture for ε≤1 is:

[I.8] $Cw_{1t} = (X_{1t} - X^*_{1(t-k)}).\omega_1 a$; wherein $X^*_{1(t-k)} = X_{1(t-k)}$ if $\varepsilon=1$.

The within effect for the rest of (shrinking and expanding) sectors (i.e, for i=2,…N) is the same as the unadjusted case using equation. That is:

[I.9] $Cwit = (Xit - Xi(t-k)).\omega ia$;

The adjusted shift effects for the set K of expanding sectors are given by the following equations:

[I.10] $Cbi = [\omega it - \omega i(t-k)].(Xia - Xa_J)$; $Xa_J = [\sum_{i \in J}(\omega it - \omega i(t-k)).Xia]/[\sum_{i \in J}(\omega it - \omega i(t-k))]$;

for $\forall\, i \in K$ and $[L_1 t - L_1(t-k)] \geq 0$;

$Cbi = [\omega it - \omega i(t-k)].(Xia - Xa_J) + (\omega it - \omega i(t-k)).(X^*_{1t} - X_{1(t-k)}).\omega_1 a/[\sum_{i \in K}(\omega it - \omega i(t-k))]$;

for $\forall\, i \in K$ and $[L_1 t - L_1(t-k)] < 0$;

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adjusting the decomposition by the la labor surplus. This adjustment is presented in Timmer and De Vries (2008).

B. Labor Productivity Decomposition at the Firm Level

The data source for the labor productivity decomposition at the firm level is the National Manufacturing Economic Survey (Encuesta Económica Annual del Sector Manufacturera) available for this research for the years of 2002, 2005, 2006 and 2007. The gross sample sizes of these surveys are 5039, 1273, 1201, and 7872 respectively. The validated sample size after a cleaning process is shown in Table II.1. The changes and decomposition of the labor productivity estimated are carried out for six different periods. These are: 2002-2005, 2002-2006, 2002-2007, 2005-2006 and 2006-2007. For each final year, t, of these periods the sample of firms (St) is assumed to be the data registered by firms in both years, the initial and final year of each period. For example, for period 2002-2005 the number of firms registered in 2002 was 2911 and 276 'new' firms were registered in year 2005. Consequently, the 'universe' in 2005 would be 3187 firms. From this 'universe' only 1078 firms responded the survey of 2005.

A firm that increases its level of employment from period t-k to period t, is called job generating firm and its rate of change, job creation rate. A firm that decreases its level of employment from period t-k to period t, is called job destructing firms and its rate of change, job destruction rate. The relevant methodology akin to this terminology was developed by Davis, Hartiwanger and associates (e.g., Davis, *et al,* 1996; Davis and Hartinwanger, 1999, and Davis *et al*, 2006).

According to Davis, *et al,* (1996), the job creation and destruction rates or gross job flows rates at the level of the firms reflects a myriad of economic events faced by workers and business such as: i) the diffusion of new products and technologies, ii) the success or failure of research and marketing efforts, iii) negotiations with employees and labor organizations, iv) learning by doing on the part of managers and workers, v) the costs of hiring, training and firing workers, vi) the costs of adjusting co-operating factors of production, vii) changes in the availability of inputs, viii) competition from rivals, ix) access to financial backing, x) ownership changes and corporate restructurings, xi) regulatory and tax law changes, and xii) the growth and decline of particular markets, xii) the effects of business cycle, and xiii) the reallocation of worker from low labor productivity rate to higher levels of labor productivity. As this list suggests, job creation and destruction are part of a larger process of adjustment, reallocation and growth.

Following Davis and Hartinwanger (1999), let Lijt denote the number of workers at firm (employer) 'i' in sector 'j' at time t. Nt denotes the set of firms with positive employment in 't' or 't-k'. Kt denotes the subset of firms that expand or enter between t-k and t, and Jt denotes the subset that contract or exit. Gross job creation in sector j at time t is defined by:

$$[II.1] \qquad \Delta kLjt^{C} = \sum_{i \in Kt \text{ (and St)}} \Delta kLijt \qquad ; \qquad \Delta kLijt = Lijt - Lij(t-k)$$

Gross job destruction in sector j at time t is defined by:

$$[II.2] \qquad \Delta kLjt^{D} = \sum_{i \in J \text{ (and St)}} /\Delta kLijt/ \qquad ; \qquad \Delta kLijt = Lijt - Lij(t-k)$$

Gross flows rates can be expressed in rates of growth using as denominator Ldijt= 0.5*(Lijt+Lij(t-k)). Ldjt is the employment size of the sector j at period t. In terms of this notation, the time-t growth rates can be written gijt=ΔkLijt/Ldij for firm i, and gjt = =ΔkLjt/Ldjt for sector j. These growth rate measures lie in the closed interval [-2,2], with endpoints corresponding to exit and entry. An alternative denominator is Ldijt=Lij(t-k), in this case the average rate of growth for period t-k, t would be gijt=ΔkLijt/[k.Lij(t-k)].

Rates of growth for period t-k, t of selected indicators including labor productivity shown in Tables from No II.3 to II.6 are computed using the following formula:

[II.3] $g_{ijt} = [(\Delta_k X_{ijt}/X_{dij})+1\ ]^{1/k} - 1$; where Xijt is the productive indicator and Xdijt is any of two alternative denominators. In the text, Xdijt=Xij(t-k) and in the appendix tables Xdijt= 0.5*(Xijt+Xij(t-k) is used.

The labor productivity (Lp) decomposition follows the methodology of Foster *et al* (2006). For each set of firms, Nt, Kt, or Jt and for the survey at period, St, the formulas for the labor productivity decomposition are:

$$[II.4]\quad \Delta_k Lp_{jt} = \sum_{i \in C} \theta_{ij(t-k)} * \Delta_k Lp_{ijt} + \sum_{i \in C} \Delta_k \theta_{ijt} * [Lp_{ij(t-k)} - Lp_{j(t-k)}] + \sum_{i \in C} \Delta_k \theta_{ijt} * \Delta_k Lp_{ijt} + \sum_{i \in Ne} \theta_{ijt} * [Lp_{ijt} - Lp_{j(t-k)}] - \sum_{i \in Ex} \theta_{ij(t-k)} * [P_{ij(t-k)} - P_{j(t-k)}]$$

Equation [II.4] can be transformed in terms of rate of growth dividing all the components of the equation by Ldijt.

In [II.4], Lpjt is the average labor productivity for the branch 'j' at period 't'; Lpijt is the labor productivity for firm 'i' from sector j at period t, and θijt is the share of employment (output value and/or revenues) out of the respective totals of firm i for sector j at period t. The sets C, Ne, and Ex respectively represent the set of continuing, entering, and exiting firms between period t and (t-k). The first term in this decomposition represents a within firm component based on firm-level changes, weighted by initial shares in the branch. The second term represents a between-firm component that reflects changing shares, weighted by the deviation of initial firm labor productivity from the initial sector index. The third term represents a cross term that tells us whether businesses with large positive labor productivity changes are more likely to have decreased employment and vice versa. The last two terms represent the contribution of entering and exiting establishments, respectively.

The set of selected productive features considered in this paper that these two set of measures (gross job flows and labor productivity rates at the level of firms and sectors) may be correlated are:

$$[II.5]\quad Svaijt = VAijt/GPVijt;\ Sx = XVijt/GPVijt;\ Sm = IVijt/GPVijt$$

$$k1 = TAVijt/Lijt,\ k2 = KVijt/Lijt,\ ICijt = \sum_{s} [\Sigma Qijt(s)/MaxQijt(s)]/nsijt$$

Where, VAijt is the real value added of firm 'i', sector 'j' at period 't', GPVijt is the real gross product value; XVijt is the export value; IVijt is the imported input value, TAVijt is the real value of total assets of the firm 'i', KVijt is the real value of machinery and equipment of the firm, and Qijt(s) is the quantity of firm 'i' of product 's' and its respective maximum quantity that firm 'i' may produce at period 't' and nsijt is the number of products of firm 'i'. All real values are computed using the price index of INEI (2009) of the sector 'j' which belong the firm 'i'.

Appendix of Labor Force Data of Peru, 1997-2007

Classification of the Employed Economic Active Population (EAP) by 45 Sectors of Economic Activity

The Peruvian Institute for Statistics (INEI in Spanish) uses a 45 economic sectors classification to report the GDP. This annual series is available on the website of the INEI from 1991 until 2007.55 The economic activities are classified in 45 sectors using the 4-digit ISIC Rev. 3 in most cases. However, in some others INEI uses a larger breakdown including another 2 digits.

The National Household Survey (ENAHO in Spanish) registers the economic activity of the labor force which is classified using the 4-digit ISIC Rev. 3. Since it is not the same level of disaggregation used for the GDP (4-digit for the labor force in the ENAHO versus 6-digit for the GDP in the national accounts) in few cases the whole 4-digit activity was included in one sector and do not split it in two different sectors.

Table N° A12 shows the 45 sectors and the correspondent 4-digit ISIC codes used to the classification. Sectors number 38 and 39 share the same code 7010 (in fact, 38 is compound only by 7010 and 39 has this code among others). That is that reason, in this case to merge both sectors in one. Another reason to combine some of these 45 actions is that the number of cases in the sample of people in the labor force is too small to keep it separated. The number of cases for each one of the 45 sectors is reported en Table N° A13 where we used the ENAHO from 1997 to 2007. Note that the sample for the period 1997 to 2002 was collected along the 4th Quarter (October to December). On the other hand starting in 2003 the fieldwork for sample was conducted during 12 months. Starting in 2004 the interviews were made from January to December. Given that the 12 month continuous sampling started by May 2003 this year the sample was completed in April 2004.

The total number of cases varies from 7,7 to 48,2 thousands. The sample size is smaller in most the 4th Quarter sample than in those which use the continuous 12-month sampling. Depending on the sample size, the disaggregation in 45-sectors results in few cases in some of them. For example, production of sugar (sector 9) and transport equipment (sector 30) had fewer cases in the late nineties ENAHO than in recent ones. There are also other situations where the number of cases is very little along all the ENAHO reported here. This is the case of the production of fish meal (sector 7) and refined petroleum (sector 22).

55 See www.inei.gob.pe. Contents reviewed on March 29, 2009.

Table No A12
Economic activities classified in 45 sectors according to Peruvian National Accounts

Number	Economic activity description	International Standard Industrial Classification of all Economic Activities (ISIC Rev. 3)
1	Agriculture, hunting and forestry	0111; 0112; 0113; 0121; 0122; 0130; 0150; 0200
2	Fishing	500
	Mining, quarrying, extraction of crude petroleum and natural gas	
3	Mining and quarrying	1110; 1120
4	Extraction of crude petroleum and natural gas	1010; 1020; 1030; 1200; 1310; 1320; 1410; 1421; 1422; 1429
	Manufacturing	
	Manufacture of food products, beverages and tobacco	
5	Manufacture of dairy products	1520
6	Production of fish	1512
7	Production of fish meal	1515
8	Bakery and grain mill products	1531; 1541; 1544
9	Sugar	1542
10	Manufacture of other food products	1511; 1513; 1514; 1532; 1533; 1543; 1549
11	Manufacture of beverages and tobacco products	1551; 1552; 1553; 1554; 1600
	Manufacture of textiles and leather	
12	Manufacture of textiles	0140; 1711; 1712; 1721; 1722; 1723; 1729; 1730
13	Manufacture of wearing apparel	1810; 1820
14	Tanning and dressing of leather; manufacture of luggage, handbags	1911; 1912
15	Manufacture of footwear	1920
16	Manufacture of wood and of products of wood and cork, except furniture	2010; 2021; 2022; 2023; 2029; 3610
	Manufacture of pulp, paper and paper products, and Publishing and printing	
17	Manufacture of pulp, paper and paper products	2101; 2102; 2109
18	Publishing, printing and reproduction of recorded media	2211; 2212; 2219; 2221; 2222; 2230
	Manufacture of chemicals	
19	Manufacture of basic chemicals	2411; 2412; 2413; 2421; 2430
20	Manufacture of pharmaceutical products and medicines	2423
21	Manufacture of other non-metallic mineral products	2422; 2424; 2429
22	Manufacture of refined petroleum products	2310; 2320
23	Manufacture of rubber and plastic products	2511; 2519; 2520
24	Manufacture of other non-metallic mineral products	2610; 2691; 2692; 2693; 2694; 2695; 2696; 2699
	Manufacture of basic metals	
25	Manufacture of basic iron and steel	2710; 2731
26	Manufacture of basic precious and non-ferrous metals	2720; 2732
	Manufacture of metal products	
27	Manufacture of fabricated metal product, except machinery and equipment	2811; 2812; 2813; 2891; 2892; 2893; 2899
28	Manufacture of non-electric machinery and equipment n.e.c.	2911; 2912; 2913; 2914; 2915; 2919; 2921; 2922; 2923; 2924; 2925; 2926; 2927; 2929; 3000
29	Manufacture of electrical machinery and apparatus n.e.c.	2930; 3110; 3120; 3130; 3140; 3150; 3190; 3922
30	Manufacture of transport equipment (motor vehicles, ships, aircrafts, etc)	3410; 3420; 3430; 3511; 3512; 3520; 3530; 3591; 3592; 3599
31	Other manufacture products	2213; 3210; 3220; 3230; 3311; 3312; 3313; 3320; 3330; 3691; 3692; 3693; 3694; 3699
32	Electricity, gas and water supply	4010; 4020; 4030; 4100
33	Construction	4510; 4520; 4530; 4540; 4550
34	Wholesale and retail trade	5010; 5030; 5050; 5110; 5121; 5122; 5131; 5139; 5141; 5142; 5143; 5149; 5150; 5190; 5211; 5219; 5220; 5231; 5232; 5233; 5234; 5239; 5240; 5251; 5252; 5259; 5270
35	Transport, storage and communication	6010; 6021; 6022; 6023; 6030; 6110; 6120; 6210; 6220; 6301; 6302; 6303; 6304; 6309; 6411; 6412; 6420; 7111; 7112; 7113
36	Financial intermediation	6219; 6511; 6519; 6591; 6592
37	Insurance and pension funding, except compulsory social security	6601; 6602; 6603
38	Real estate activities with own or leased property[1]	7010
39	Real estate on a fee or contract basis, renting and business activities	3710; 3720; 5020; 5040; 6599; 6711; 6712; 6719; 6720; 7010; 7020; 7121; 7122; 7123; 7129; 7130; 7210; 7220; 7230; 7240; 7290; 7310; 7320; 7411; 7412; 7413; 7414; 7421; 7422; 7430; 7491; 7492; 7493; 7495; 7499; 9000; 9111; 9112; 9213; 9220; 7250
40	Hotels and restaurants	5510; 5520
41	Household services provided by profit-seeking organisations[2]	5260; 7494; 9211; 9212; 9214; 9219; 9231; 9232; 9233; 9241; 9249; 9301; 9302; 9303; 9309
42	Household services provideb by non-profit organisations[3]	8531; 8532; 9120; 9191; 9192; 9199; 9500; 9900
43	Human health servicies provided by private institutions	8511; 8512; 8519; 8520
44	Education provided by private institutios	8010; 8021; 8022; 8030; 8090
45	Public administration and defence; compulsory social security	7511; 7512; 7513; 7514; 7521; 7522; 7523; 7530

Notes

[1] Peruvian national accounts distinguish code 7010 into 2 subcategories (including a fifth digit to the ISIC), but household surveys at most considerer 4-digit clasification. That is the reason why 7010 is this activity and also in the next one.

[2] Recreational, cultural and sporting activities (92), Other service activities (93)

[3] Social work activities category division Detailed description group (853), Activities of trade unions (912), Activities of other membership organizations (919), Private households with employed persons (95)

Table No A13

Number of cases (sample size) of the Labor Force (occupied economically active population) in the ENAHO 1997-2007

Number	Economic activity description	Economic activity short name	1997 4th Quarter	1998 4th Quarter	1999 4th Quarter	2000 4th Quarter	2001 4th Quarter	2002 4th Quarter	2003 May 03 to April 04	2004 Annual	2005 Annual	2006 Annual	2007 Annual
1	Agriculture, hunting and forestry	Agriculture	5,443	6,072	3,000	2,898	13,701	15,804	17,273	18,368	18,944	19,618	18,677
2	Fishing	Fishing	91	86	47	57	262	260	282	292	274	280	319
	Mining, quarrying, extraction of crude petroleum and natural gas	Minning											
3	Mining and quarrying	Minning	6	8	5	4	22	28	14	25	21	23	30
4	Extraction of crude petroleum and natural gas	Crude petroleum	116	95	45	51	214	322	310	370	353	405	9
	Manufacturing	Manufacturing											
	Manufacture of food products, beverages and tobacco	Food, beverage and tobacco											
5	Manufacture of dairy products	Dairy products	10	12	14	18	48	47	49	55	44	59	66
6	Production of fish	Fish	40	22	6	17	85	63	125	129	94	105	113
7	Production of fish meal	Fish meal	0	0	0	0	0	1	0	0	0	0	0
8	Bakery and grain mill products	Bakery	132	123	70	65	339	375	323	304	367	390	447
9	Sugar	Sugar	4	13	5	0	17	40	18	31	23	29	48
10	Manufacture of other food products	Other foods	24	35	20	35	103	104	136	133	135	181	241
11	Manufacture of beverages and tobacco products	Beverages and tobacco	57	66	31	36	74	146	62	76	53	122	122
	Manufacture of textiles and leather	Textiles											
12	Manufacture of textiles	Textiles	246	245	95	126	445	567	489	545	556	585	748
13	Manufacture of wearing apparel	Wearing apparel	165	152	85	100	376	431	419	447	468	484	576
14	Tanning and dressing of leather; manufacture of luggage, handbags	Leather	10	5	4	5	8	21	17	18	20	14	40
15	Manufacture of footwear	Footwear	30	41	20	13	97	94	99	126	92	98	88
16	Manufacture of wood and of products of wood and cork, except furniture	Wood	173	175	92	94	408	470	463	530	488	485	546
	Manufacture of pulp, paper and paper products, and Publishing and printing	Paper and printing											
17	Manufacture of pulp, paper and paper products	Pulp and paper	8	7	7	4	14	21	13	18	10	23	18
18	Publishing, printing and reproduction of recorded media	Publishing ad printing	21	16	13	16	81	80	83	86	67	104	103
	Manufacture of chemicals	Chemicals											
19	Manufacture of basic chemicals	Basic chemicals		4		0	10	7	9	3	3	8	4
20	Manufacture of pharmaceutical products and medicines	Pharmaceutical	14	8	1	4	10	20	13	20	19	23	36
21	Manufacture of other chemicals	Other chemicals	8	7	2	5	40	33	36	57	53	32	43
22	Manufacture of refined petroleum products	Refined petroleum	1	0	0	0	2	0	13	6	1	0	5
23	Manufacture of rubber and plastic products	Rubber	13	4	7	5	25	29	33	42	33	38	34
24	Manufacture of other non-metallic mineral products	Other non-metallic mineral	59	56	24	29	131	134	138	118	127	113	157
	Manufacture of basic metals	Basic metals											
25	Manufacture of basic iron and steel	Iron and steel	5	3	2	1	11	19	13	12	28	16	12
26	Manufacture of basic precious and non-ferrous metals	Non-ferrous metals	2	3	1	2	9	7	10	16	10	6	15
	Manufacture of metal products	Metal products											
27	Manufacture of fabricated metal product, except machinery and equipment	Metal products (non-machinery)	62	69	45	57	247	208	190	225	182	215	249
28	Manufacture of non-electric machinery and equipment n.e.c.	Non-electrical machinery	7	6	6	3	34	13	22	26	39	80	85
29	Manufacture of electrical machinery and apparatus n.e.c.	Electrical machinery	5	8	6	2	16	13	17	14	7	17	33
30	Manufacture of transport equipment (motor vehicles, ships, aircrafts, etc)	Transpor equipment	5	6	5	5	19	23	36	31	34	50	55
31	Other manufacture products	Other manufactures products	43	73	31	28	132	132	123	150	144	154	192
32	Electricity, gas and water supply	Electricity, gas and water	42	47	21	16	70	106	88	77	90	88	83
33	Construction	Construction	554	546	252	263	1,092	1,224	1,246	1,217	1,151	1,341	1,718
34	Wholesale and retail trade	Trade	2,523	2,825	1,454	1,522	5,774	6,417	6,875	7,176	6,980	7,312	8,087
35	Transport, storage and communication	Transport and communication	578	672	375	394	1,620	1,884	1,990	2,119	2,021	2,352	2,817
36	Financial intermediation	Finance	43	36	20	11	51	63	81	76	72	114	116
37	Insurance and pension funding, except compulsory social security	Insurance	8	10	7	1	15	15	12	23	9	29	26
38 and 39	Real estate, renting and business activities[1]	Real state	518	537	319	316	1,234	1,437	1,385	1,620	1,451	1,546	1,781
40	Hotels and restaurants	Hotels	582	635	365	384	1,705	1,845	2,246	2,218	2,179	2,366	2,823
41	Household services provided by profit-seeking organisations[2]	Household servicies	400	467	222	251	1,119	1,113	908	1,089	1,099	1,088	1,264
42	Household services provideb by non-profit organisations[3]	Household servicies by NGO	350	399	262	227	1,015	1,096	1,398	1,477	1,308	1,448	1,677
43	Human health servicies provided by private institutions	Private health	204	192	106	128	403	512	501	561	472	591	661
44	Education provided by private institutios	Private education	680	742	360	474	1,704	1,945	1,842	1,980	1,837	1,947	2,294
45	Public administration and defence; compulsory social security	Government	429	455	236	232	993	1,267	1,185	1,258	1,327	1,482	1,756
Total - all sectors			13,711	14,983	7,688	7,899	33,775	38,436	40,585	43,164	42,685	45,461	48,214

Appendix of Sample size of microenterprises data by economic sectors

Table A14

Number of Informal Micro Enterprises (non weighted) per year and classified according to 45 economic activities

# of Sector of Activity[1]	ISIC codes (revision 3)	Name of Economic Activities	Number of Informal Micro-Enterprises								
			2002	2003	2004	2005	2006	2007	# min.	# max.	mean
1	0111; 0112; 0113; 0121; 0122; 0130; 0150; 0200	Agriculture, hunting and forestry	10	14	36	46	81	146	10	146	56
2	500	Fishing	61	70	154	210	197	230	61	230	154
3	1110; 1120	Extraction of crude petroleum and natural gas	0	0	0	0	0	0	0	0	0
4	1010; 1020; 1030; 1200; 1310; 1320; 1410; 1421; 1422; 1429	Mining and quarrying (except crude petroleum and natural gas)	29	23	59	86	59	98	23	98	59
5	1520	Manufacture of dairy products	13	12	14	24	26	32	12	32	20
6	1512	Production, processing and preservation of fish	0	0	0	1	0	1	0	1	0
7	1515	Production, processing and preservation of fish's oils and fats	0	0	0	0	0	0	0	0	0
8	1531; 1541; 1544	Manufacture of grain mill products, bakery and farinaceous products	87	76	97	130	170	195	76	195	126
9	1542	Manufacture of sugar	0	0	0	1	0	2	0	2	1
10	1511; 1513; 1514; 1532; 1533; 1543; 1549	Manufacture of other food products	12	18	29	39	72	93	12	93	44
11	1551; 1552; 1553; 1554; 1600	Manufacture of beverages and tobacco products	39	7	9	9	65	70	7	70	33
12	0140; 1711; 1712; 1721; 1722; 1723; 1729; 1730	Manufacture of textiles	173	190	338	445	455	670	173	670	379
13	1810; 1820	Manufacture of wearing apparel, dressing and dyeing of fur	212	204	239	258	303	294	204	303	252
14	1911; 1912	Tanning and dressing of leather; manufacture of luggage, handbags, saddlery and harness	9	9	7	12	11	20	7	20	11
15	1920	Manufacture of footwear	28	17	19	16	27	27	16	28	22
16	2010; 2021; 2022; 2023; 2029; 3610	Manufacture of wood and of products of wood and cork, including furniture	195	182	248	299	270	260	182	299	242
17	2101; 2102; 2109	Manufacture of pulp, paper and paper products	3	1	1	0	4	4	0	4	2
18	2211; 2212; 2219; 2221; 2222; 2230	Publishing, printing and reproduction of recorded media	19	15	13	15	22	20	13	22	17
19	2411; 2412; 2413; 2421; 2430	Manufacture of basic chemicals, agrochemical products and man-made fibres	1	0	0	0	0	1	0	1	0
20	2423	Manufacture of pharmaceuticals, medicinal chemicals and botanical products	4	1	1	5	9	10	1	10	5
21	2422; 2424; 2429	Manufacture of other chemicals	5	4	18	36	17	10	4	36	15
22	2310; 2320	Manufacture of refined petroleum products	0	0	0	0	0	0	0	0	0
23	2511; 2519; 2520	Manufacture of rubber and plastic products	1	4	4	2	4	6	1	6	4
24	2610; 2691; 2692; 2693; 2694; 2695; 2696; 2699	Manufacture of other non-metallic mineral products	31	30	29	53	48	59	29	59	42
25	2710; 2731	Manufacture and casting of basic iron and steel	1	0	0	0	0	0	0	1	0
26	2720; 2732	Manufacture of basic precious and non-ferrous metals	1	1	1	0	0	1	0	1	1
27	2811; 2812; 2813; 2891; 2892; 2893; 2899	Manufacture of fabricated metal products, except machinery and equipment	83	80	100	90	97	96	80	100	91
28	2911; 2912; 2913; 2914; 2915; 2919; 2921; 2922; 2923; 2924; 2925; 2926; 2927; 2929; 3000	Manufacture of machinery and equipment (excluding electrical), manufacture of office, accounting and computing machinery	3	8	6	2	17	15	2	17	9
29	2930; 3110; 3120; 3130; 3140; 3150; 3190; 3922	Manufacture of electrical machinery and apparatus; radio, television and communication equipment and apparatus	1	5	4	1	4	5	1	5	3
30	3410; 3420; 3430; 3511; 3512; 3520; 3530; 3591; 3592; 3599	Manufacture of motor vehicles, trailers and semi-trailers, and other transport equipment	3	10	8	6	12	16	3	16	9
31	2213; 3210; 3220; 3230; 3311; 3312; 3313; 3320; 3330; 3691; 3692; 3693; 3694; 3699	Other instruments, furniture, etc. products	59	66	90	81	92	143	59	143	89
32	4010; 4020; 4030; 4100	Electricity, gas and water supply; sewage and refuse disposal, sanitation and similar activities	9	4	5	7	5	3	3	9	6
33	4510; 4520; 4530; 4540; 4550	Construction	331	415	437	374	444	572	331	572	429
34	5010; 5030; 5050; 5110; 5121; 5122; 5131; 5139; 5141; 5142; 5143; 5149; 5150; 5190; 5211; 5219; 5220; 5231; 5232; 5233; 5234; 5239; 5240; 5251; 5252; 5259; 5270	Wholesale and retail trade	3,360	3,715	4,163	4,572	4,712	5,572	3,360	5,572	4,349
35	6010; 6021; 6022; 6023; 6030; 6110; 6120; 6210; 6220; 6301; 6302; 6303; 6304; 6309; 6411; 6412; 6420; 7111; 7112; 7113	Transport, storage and communication	1,028	1,198	1,313	1,294	1,562	2,033	1,028	2,033	1,405
36	6219; 6511; 6519; 6591; 6592	Financial intermediation, except insurance and pension funding	0	0	0	0	0	0	0	0	0
37	6601; 6602; 6603	Insurance and pension funding, except compulsory social security	0	1	2	0	0	1	0	2	1
38 y 39[2]	3710; 3720; 5020; 5040; 6599; 6711; 6712; 6719; 6720; 7010; 7020; 7121; 7122; 7123; 7129; 7130; 7210; 7220; 7230; 7240; 7290; 7310; 7320; 7411; 7412; 7413; 7414; 7421; 7422; 7430; 7491; 7492; 7493; 7495; 7499; 9000; 9111; 9112; 9213; 9220; 7250	Real estate activities	480	521	593	537	539	800	480	800	578
40	5510; 5520	Services for entrepeneurs	886	1,069	1,129	1,246	1,320	1,609	886	1,609	1,210
41	5260; 7494; 9211; 9212; 9214; 9219; 9231; 9232; 9233; 9241; 9249; 9301; 9302; 9303; 9309	Hotels and restaurants	806	703	844	915	936	1,160	703	1,160	894
42	8531; 8532; 9120; 9191; 9192; 9199; 9500; 9900	Private households services (include personal, household and community servicies)	1	223	162	22	51	161	1	223	103
43	8511; 8512; 8519; 8520	Private health services	89	118	121	102	122	161	89	161	119
44	8010; 8021; 8022; 8030; 8090	Private education services	125	158	103	131	152	181	103	181	142
45	7511; 7512; 7513; 7514; 7521; 7522; 7523; 7530	Public services (health and education), administration and defence; compulsory social security	1	0	0	0	0	0	0	1	0
Total[3]	**Todos**	**Total**	**8,199**	**9,172**	**10,396**	**11,067**	**11,905**	**14,777**	**8,199**	**14,777**	**10,919**

Notas:

[1] Correspond to INEI's classification in 45 economic activies.

[2] It is not possible to distinguish between households and enterprises in Renting because ENAHO- ISIC classification uses only 4 digits.

[3] We miss some cases because there is no information to classify them in economic activities based on ISIC.

Table A15

Economic Activities Gathered for Informal Micro-Enterprises Analysis

Economic Activities gathered using ISIC codes		INEI Classification		Name of Economic Activities (45 sectors)	Number of Micro-Enterprises (non weighted)					
		11 Sectors	45 Sectors		2002	2003	2004	2005	2006	2007
A - Extractive Industry	I -Extractive Industries	1	1	Agriculture	10	14	36	46	81	146
		1	2	Fishing	61	70	154	210	197	230
		1	3	Petroleum	-	-	-	-	-	-
		1	4	Minning	29	23	59	86	59	98
B - Manufacture Industry	II - Food Industry	2	5	Dairy products	13	12	14	24	26	32
		2	6	Fish products	-	-	-	1	-	1
		2	7	Fish's oil and fats products	-	-	-	-	-	-
		2	8	Grain mill	87	76	97	130	170	195
		2	9	Sugar	-	-	-	1	-	2
		2	10	Other foods	12	18	29	39	72	93
		2	11	Beverages and tobacco	39	7	9	9	65	70
	III - Textil and Leather Industry	2	12	Textiles	173	190	338	445	455	670
		2	13	Clothes	212	204	239	258	303	294
		2	14	Leather	9	9	7	12	11	20
		2	15	Footwear	28	17	19	16	27	27
	IV - Wood and Furniture Industry	2	16	Wood	195	182	248	299	270	260
	V - Other Manufacture Industries	2	17	Paper	3	1	1	-	4	4
		2	18	Publishing	19	15	13	15	22	20
		2	19	Basic Chemicals	1	-	-	-	-	1
		2	20	Pharmaceuticals	4	1	1	5	9	10
		2	21	Other chemicals	5	4	18	36	17	10
		2	22	Refined petroleum	-	-	-	-	-	-
		2	23	Rubber and plastic	1	4	4	2	4	6
		2	24	Mineral Non-metalic	31	30	29	53	48	59
		2	25	Iron and steel	1	-	-	-	-	-
		2	26	Non-ferrous	1	1	1	-	-	1
		2	27	Metal products	83	80	100	90	97	96
		2	28	Machinery and equipment	3	8	6	2	17	15
		2	29	Electrical machinery	1	5	4	1	4	5
		2	30	Trasnport equipment	3	10	8	6	12	16
		2	31	Other manufactured products	59	66	90	81	92	143
C - Construction	VI - Construction	3	33	Construction	331	415	437	374	444	572
D - Trade	VII - Trade	4	34	Trade	3,360	3,715	4,163	4,572	4,712	5,572
E - Services	VIII - Hotels and Restaurants	5	40	Hotel and restaurant	886	1,069	1,129	1,246	1,320	1,609
	IX - Transport and Communication	6	35	Transport	1,028	1,198	1,313	1,294	1,562	2,033
	X - Real Estate and Business	8	38 y 39	Real estate and Services for entrepreuners	480	521	593	537	539	800
	XI - Private Health	9	43	Private health	89	118	121	102	122	161
	XII - Education	9	44	Private education	125	158	103	131	152	181
	XIII - Other Services	7	36	Financial intermediation	-	-	-	-	-	-
		7	37	Insurance	-	1	2	-	-	1
		9	45	Public services	1	-		-	-	-
		11	32	Electricity and water	9	4	5	7	5	3
	XIV - Household Services	10	42	Private household services	1	223	162	22	51	161
		11	41	Private household services	806	703	844	915	936	1,160
TOTAL					**8,199**	**9,172**	**10,396**	**11,067**	**11,905**	**14,777**

Source: Questionnaire Enaho.04 and INEI's industrial classification based on ISIC