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# Using Employment Elasticities in Analysis of Employment Trends in Indonesia

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# 1. WHY LINK EMPLOYMENT GROWTH TO GROWTH THROUGH ELASTICITIES?

Employment elasticity is an important issue for policymakers in Indonesia. Elasticities link the number of jobs generated to rates of economic growth and are watched closely by policymakers, parliament, and critics of the government. The latter believe the government is not doing enough to create jobs badly needed for young people and other job seekers.

By way of background, the “golden rule” used by technocrats in the 1980 and 1990s was that 400,000 people should get jobs for each one percent growth in GDP. This means 2 million new jobs if the economy is growing at 5 percent (e.g.,  $5 \times 400,000$ ), 3 million if the economy is growing at 7.5 percent ( $7.5 \times 400,000$ ). This latter growth rate is close to the average rate of economic growth for much of the New Order period (See Table 1).

Table 1

*Implications of Golden Rule of Job Creation for Employment and Unemployment*

	Growth Rate of GDP (% p.a.)				
	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>
Jobs Created (m)	<b>1.6</b>	<b>2</b>	<b>2.4</b>	<b>2.8</b>	<b>3.2</b>
Change in un-employment (m.) if:					
Lab. force growth=2.5%	0.9	0.5	0.1	-0.3	-0.7
Lab. force growth=1.5%	-0.1	-0.5	-0.9	-1.3	-1.7

*Note: The golden rule is that 400,000 jobs be created for each one percent growth in GDP. Here, assume a labor force of 100 million (actual labor force was approximately 110 million in 2007, 115 million in 2010).*

After the crisis in 1998, economic growth rates fell to about 4-5 percent, and employment did too. So unemployment rose, because less than the required number of new jobs were created each year, for a labor force that was growing at around 2 percent per annum.<sup>1</sup> However, we shall see that this was mainly because of lower elasticities, rather than slower growth.

Although unemployment rates rose steeply after the crisis, they began to fall again around 2006, and have done so since then through to 2011. Some still believe the government is not doing enough to find new jobs. This paper addresses this issue, first looking at some general considerations, then trends in elasticities and related employment growth in past 10 years and possible explanations for variations in these trends.

One question is whether the improved jobs situation has been largely due to a revival in economic growth—or more employment-friendly growth (higher employment elasticities). Another question is how much these changes were due to inter-sectoral shifts in employment (for example, a shift away from manufacturing and into services), rather than changes in elasticities in particular sectors. If employment is a major goal of government policy, the question is which sectors or subsectors might be promoted and what policies might be adopted.

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<sup>1</sup> A 2 percent increase in the labor force of around 100 million, meant that around 2 million people entered the job market each year (see Table 1)

This paper shows that labor absorption has been quite high in the past several years, and the elasticity of employment has also risen. More jobs are being created for each unit of growth than in the early 2000s. This is partly because of slightly higher rates of growth in output, and partly because higher rates of employment growth have been associated with each percentage change in GDP. However, we also note that it is also important to concentrate on the kind of jobs being created. The discussion focuses on

- Work status (e.g., formal, informal) in addition to sector of employment
- Patterns during more disaggregated time periods (2001-2005, 2005-2009, 2009-2011) that seem to fit with some significant turning points in overall employment performance.

## 2. ISSUES RELATED TO EMPLOYMENT GROWTH AND ELASTICITIES<sup>2</sup>

Elasticities are usually used in interpreting past trends in employment in the medium term, and in making simple projections that illustrate the implications of different growth assumptions. They can be computed for the total work force as well as for sub-groups, such as females, youth, and formal sector employees.

***When is an elasticity high or low?*** The “normal” range from international comparisons is usually 0.3-0.5 for countries where the labor force is growing between 1-2 percent per annum, which is similar to Indonesia’s experience. In Europe and in East Asia, it is closer to 0.2-0.3, although mostly for different reasons: employment growth was slow in Europe, whereas economic growth was rapid in East Asia in the 2000s. In much of Latin America, it has been closer to 0.5, and even higher than that during the recovery period in the 1990s. Overall the following holds true:

- ***High elasticities.*** An elasticity of 0.5 is high, and an elasticity of 1.0 is very high for any sector.
- ***Low elasticities.*** An elasticity of below 0.2 is quite low and likely to indicate rising unemployment, unless the labor force is also growing very slowly.
- ***Negative*** elasticities usually arise when employment growth is negative and economic growth is positive. This occurs most commonly in countries where economic growth is low. Across sectors, elasticities are often negative in the agricultural sector. This is often a positive sign, since labour generally moves from low productivity agriculture to other sectors, as countries modernize.<sup>3</sup>

***Time frame and short-term variations in elasticities.*** Elasticities are not very helpful as short-term estimates (e.g., year on year) for policy analysis. Because elasticities are a product of two growth rates, they can fluctuate quite widely for relatively small movements in growth rates of output (as the denominator), and especially if employment growth moves in the opposite direction.

***Interpreting elasticities (why a high elasticity is not always good, nor a low one always bad?).*** A high or rising elasticity signifies that more jobs are being created per unit of output growth, which is often a good sign in countries where incomes are low and jobs scarce. It can also signify low or

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<sup>2</sup> See ILO, KILM 19 (2010).

<sup>3</sup> A negative elasticity usually signals that employment is falling absolutely in agriculture. This is one of the criteria that early scholars of Japan saw as a precondition for reaching the turning point in economic development, when productivity and real wages begin to rise in agriculture or the traditional sector.

falling rates of labor productivity. Low productivity might merely be a reflection of underdevelopment

Conversely *low or falling elasticities* signify fewer jobs created per unit of output growth. This could signify a problem if unemployment or underemployment rises. A fall in an employment elasticity may represent difficulties in finding better and more productive jobs. But it may also be a positive sign if most of surplus labor is already employed, and the main challenge is to raise labor productivity through higher levels of human and physical capital, and technological change.

Table 2 (below) indicates the potential range in elasticities for different combinations of economic growth and employment expansion. Slow growth, for example, can mean high elasticities, and conversely high growth can mean low elasticities. In both cases, if employment is also high or low, then the effect on elasticity will be smaller.

*Elasticities and the absolute number of jobs created as a measure of “success” in development policy* (e.g., the target or golden rule of 400,000 jobs created per one percent growth rate). Over longer time periods, calculations of the absolute number of people employed per unit of output growth, based on elasticity calculations, may not be very useful for policy purposes. This is especially so if labor force growth rates decline, as they have in many developing countries (and in Indonesia), with the demographic transition.

Thus, for example, the rate of economic growth needed to be higher in the 1990s than in the 2000s, just to ensure that the number of unemployed did not increase. The last two rows in Figure 1 (below) demonstrate the point. When the labor force grew at 2.5 percent in the 1990s, Indonesia needed to record a rate of growth of between 6 and 7 percent to ensure no increase in unemployment. In the 2000s, when labor force growth was closer to 1.5 percent per annum an economic lower growth rate might ensure unemployment fell.<sup>4</sup> In the 1990s, a growth rate of 4 percent would have contributed to a rise in unemployment but by the 2000s even a 4 percent growth rate may have been sufficient to reduce unemployment.<sup>5</sup>

### **3. EMPLOYMENT ELASTICITY OF GROWTH IN INDONESIA 1993-2011**

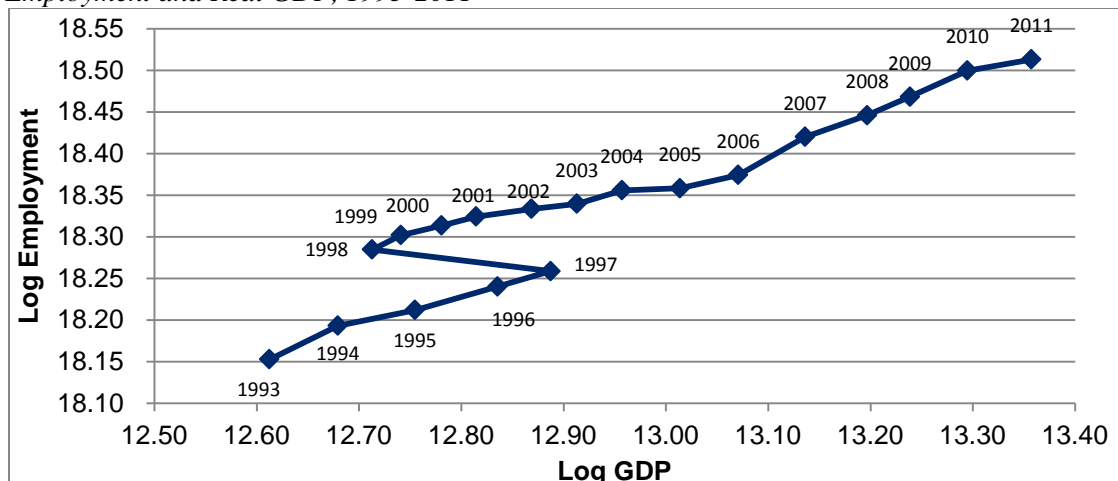
Employment elasticity, the rate of growth of employment relative to output growth, has varied quite significantly over the 1993-2011 period. Figure 1 plots level of employment against real GDP (at constant 2000 prices) in logarithmic scale, so that the shape of the graph represents the changing value of employment elasticity over time.

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<sup>4</sup> The size of the population on which absolute employment numbers is based is also relevant in interpreting the absolute number of jobs created per unit of growth; in Indonesia, it was 50 percent larger in 2010 than three decades earlier, in 1980.

<sup>5</sup> The outcome in terms of unemployment depends on a great many other factors, however, including access to the informal sector as a supply-side response to slow generation of jobs associated with growth of the economy.

Figure 1  
*Employment and Real GDP, 1993-2011*



From the graph we can distinguish roughly three periods in term of different employment elasticity value. First is the 1993–1997 period with high GDP growth and moderate employment elasticity of 0.38. Second is the 1998–2005 period of "jobless growth," when employment elasticity was really low (with an average value of 0.24). And third is the recovery period of 2005–2011 which saw a recovery of the employment elasticity to a new high of 0.44, slightly higher than the value attained before the economic crises in 1998. The data are presented in Table 2.

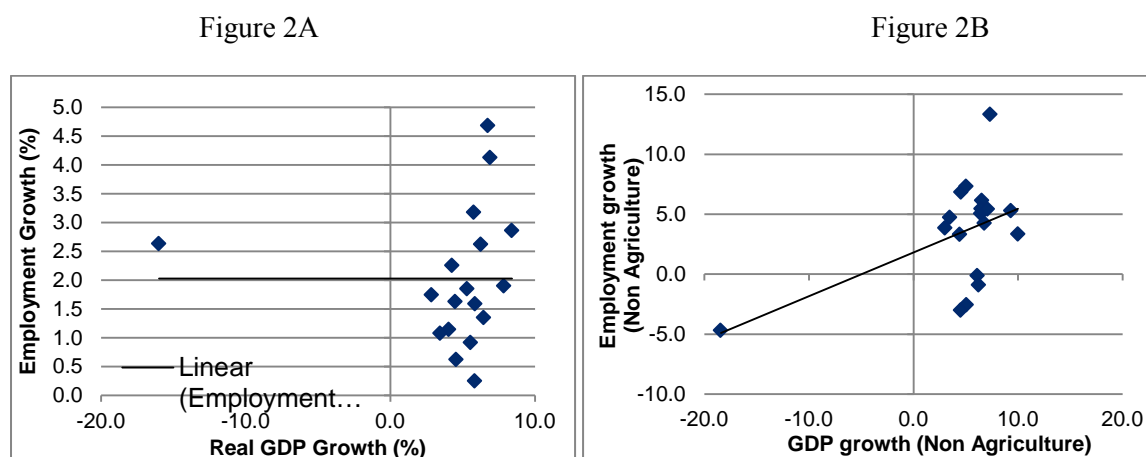
Table 2  
*Real GDP Growth, Employment, and Elasticities*

	1993-1997	1998-2005	2005-2011
Real GDP growth (%)	7.11	4.39	5.89
Employment growth (%)	2.68	1.06	2.61
Elasticity	0.38	0.24	0.44

While we could see a positive employment elasticity from the graph, different perceptions might be arise if we used growth of employment and GDP instead of taking the natural logarithms, as can be seen in Figures 2A and 2B. Figure 2A reveals that total GDP growth seems to have a no effect on the growth of total employment. However, if we exclude the agricultural sector and focus on the growth of GDP and employment in nonagricultural sectors, it can be seen that the GDP growth is likely to have a positive effect on employment growth (Figure 2B). This suggests that the agriculture sector is likely to act as a sponge that absorbs employment during a downturn and a source of workers for other sectors in periods of high GDP growth.



Figure 2  
*Employment and Real GDP Growth for All Sectors and Nonagricultural Sectors, Indonesia 1993-2011*



These computations of elasticities also reveal that employment elasticity is sensitive to the time periods over which computations are made, as argued by Islam and Nazara (2000). The number is likely to fluctuate more if we compute it on a year-to-year basis, which makes it difficult to interpret.

## Elasticity Estimation

Using data for the period of 1993-2011, the employment elasticity of growth is estimated using the following equations:

$$\ln \text{Employment}_t = \beta_0 + \beta_1 \ln \text{GDP}_t + \varepsilon \quad (1)$$

$$\ln \text{Employment}_t = \beta_0 + \beta_1 \ln \text{GDP}_t + \beta_2 \text{D9805} + \beta_3 \text{D0511} + \varepsilon \quad (2)$$

where D9805 and 0511 are dummy variables for the two time periods 1998-05 and 2005-11.

The results in Table 3 (column 3), shows a significant and positive elasticity of 0.44, which means that an average 10 percent increase in GDP is expected to increase total employment by 4.4 percent. Although still positive, the employment elasticity estimates for agriculture (column 2) are much lower compared to those for nonagriculture (column 3). Those results are quite robust even if we include dummies to capture different period in Indonesia as in equation 2.

Table 3  
*Elasticity Estimates in Indonesia, 1993-2011*

	(1)	(2)	(3)	(4)	(5)	(6)
GDP Agriculture	0.266***			0.278*		
	(0.072)			(0.143)		
GDP Non agriculture		0.619***			0.608***	
		(0.052)			(0.120)	
GDP total			0.443***			0.422***
			(0.035)			(0.077)
Dummy Periods	No	No	No	Yes	Yes	Yes
Adjusted R2	0.404	0.895	0.864	0.644	0.907	0.926

Note: \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

These results indicate the importance of separating agriculture in the calculation and estimation of employment elasticities, as employment in that sector has quite different patterns than other sectors.

#### 4. TRENDS IN EMPLOYMENT AND ELASTICITIES BY MAIN SECTOR IN THE 2000s

We now present trends in labor force, employment, output, and employment elasticities in Indonesia for the 2001-2011 period. Given the limited time period and the small number of observations in the data set, calculations are based on point-to-point estimates rather than a regression model. The economy is broken into four categories: agriculture and nonagriculture and, within nonagriculture, “other” tradables (besides agriculture), and service industries (Figure 3), as well as by major economic sector, and formal and informal employment. Employment growth and elasticities are compared over three distinct phases of labor market change: 2001-2005, 2005-2009 and 2009-2011 over the ten-year period (Figure 4).

Figure 3

*Growth of Employment and Output [% p.a], and Elasticity, Indonesia 2001-2011*

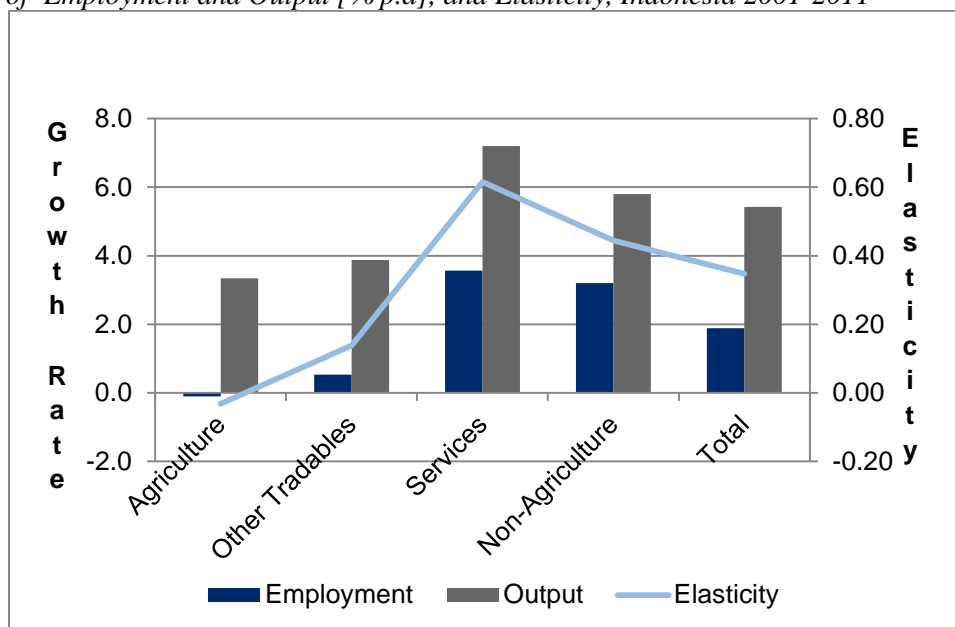
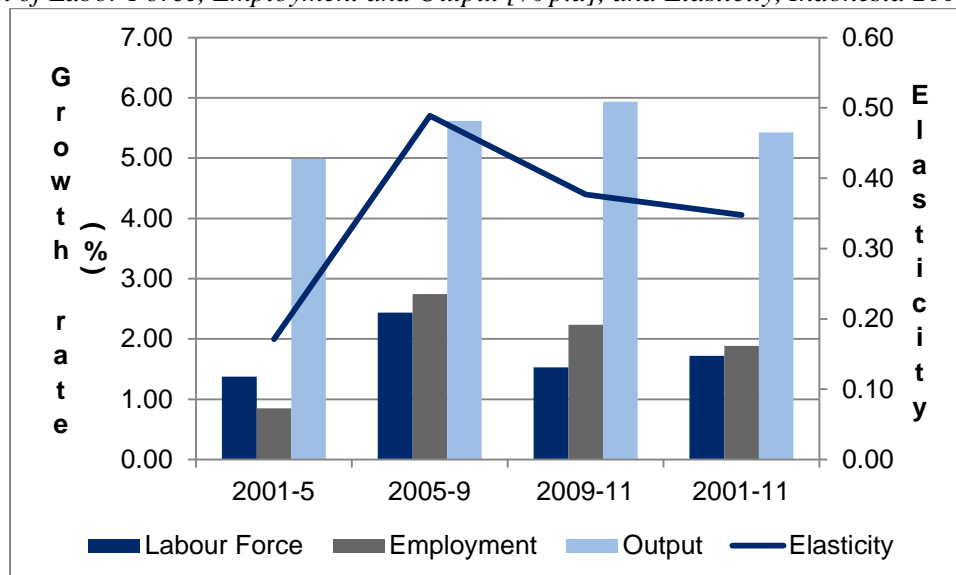


Figure 4

*Growth of Labor Force, Employment and Output [% p.a], and Elasticity, Indonesia 2001-2011*



In Figure 3, which presents data for the entire period by major sector, the main patterns are immediately clear. Economic growth varied across sectors, from a low average of 3.3 percent in agriculture to just over 7 percent per annum in services. However, employment varied even more. Employment in agriculture and to a lesser extent in other tradables (mining and manufacturing) hardly grew in the 2000s. On the other hand, services employment grew much faster (3.6 percent per annum) than the two other main major sectors.

Overall, the employment elasticity was just under 0.4. This is around average for developing countries. Variations were large across sectors. It ranged from negative and close to negative for agriculture and other tradables, to 0.6 in service industries. Not only was growth higher in services, but each percentage increase in value added resulted in more jobs.

Bearing in mind that labor is expected to move outside agriculture, the figure for nonagricultural sectors is probably the most useful general indicator of labor market developments. Here, the elasticity was above 0.4, with employment growing more than 2.5 percent per annum, whereas value added rose by close to 6 percent. From this perspective, the performance in Indonesia has been moderately good by international standards.

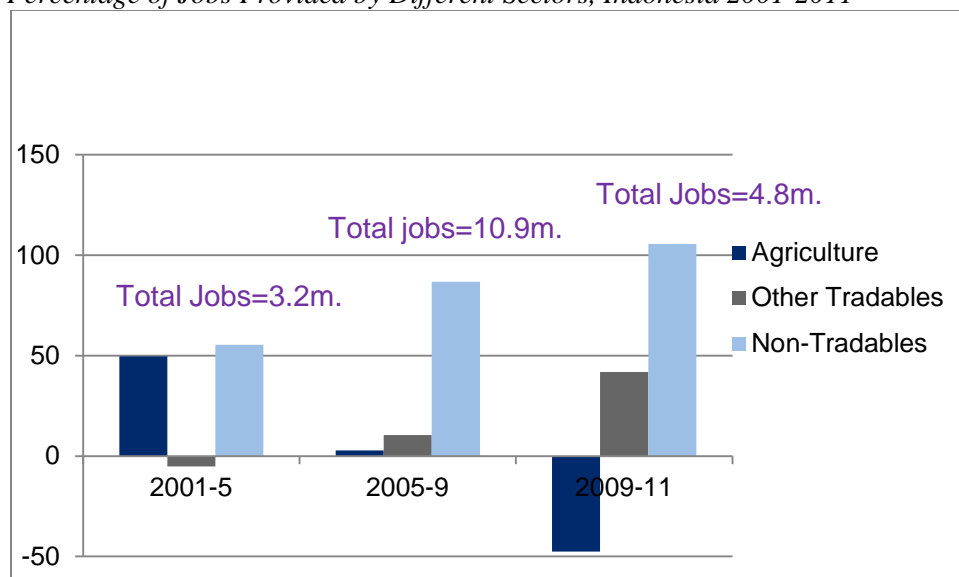
## **2001-2011: Different Time Periods**

Turning to sub-periods over the past 10 years, two patterns stand out (Figure 4). The elasticity of employment was quite low during the period of recovery 2001-2005. It has increased since then, and remained in the range 0.3-0.4. If this level is maintained, then the present trend towards declining unemployment should continue. This means each one percent growth in GDP can be expected to create around 300-400,000 jobs per annum.

Indeed, employment growth has been more than 2 percent in the past few years, faster than growth in the labor force, which is (usually) a necessary condition for unemployment to fall. It was nearly 3 percent in the period 2005-9, when Indonesia was catching up after the slow growth in employment in the early part of the 2000s.

Figure 5 shows *the net percentage of jobs* created in the three groups of sectors over the same time period. The powerful role of the services sector is very clear compared with the small role of agriculture and other tradables sectors. The shift of jobs away from agriculture, accompanied by some recovery in the tradable goods sectors in 2009-2011, stand out. We focus on the nonagricultural sectors in the rest of this paper.

Figure 5  
*Percentage of Jobs Provided by Different Sectors, Indonesia 2001-2011*



## Elasticities in Nonagricultural Sectors in the 2000s

We have seen that services played a major role in job creation and other tradables did not perform so well. Here we look at elasticities in the main non-agricultural sectors: manufacturing, construction, trade, transport and communications and services (not including banking and finance).<sup>6</sup>

The first thing to notice is that there is no clear pattern among the sectors. Growth rates in employment were highest in the smaller sectors of mining, finance and real estate, and construction (see Figure 6). They were low in manufacturing and transport and communications. Differences in GDP rates played only a minor role in these variations: only in manufacturing were low growth rates also associated with low rates of employment growth and hence low elasticities.

The experience of mining and transport and communications capture some of the industry-specific idiosyncrasies that underlie these variations:

- **Elasticities were extremely high in mining** (3.38) largely due to quite high employment growth rates combined with very slow growth in output. The high employment rates appear to be associated with high rates of labour absorption from 2006, when the coal and small scale gold mining activities took off in Kalimantan and on other islands.
- **Elasticities were very low in transport and communications**, largely because employment hardly grew at all, even though output growth was more than double the national average.

New activities, mainly in communications, appear to be much more capital-intensive than traditional land and sea transport activities that have dominated employment in the past.

Manufacturing is worthy of special mention. Employment growth was low by standards of rapidly growing export-oriented countries. This was partly because growth was slow and partly because elasticities were well below average. It is true that employment growth has been low in several Southeast Asian countries for some time, which has been mainly attributed to the monopoly of labor

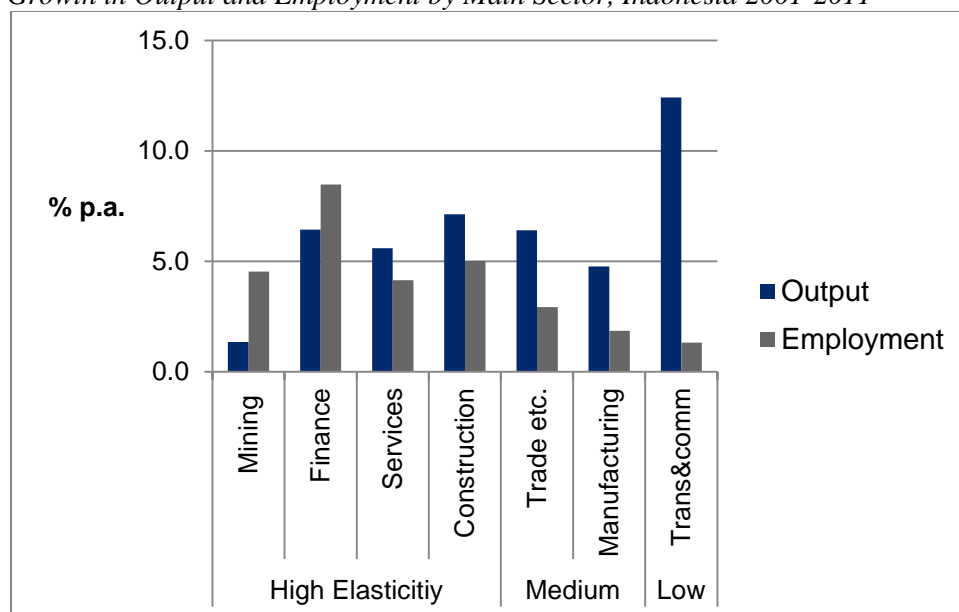
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<sup>6</sup> Mining and public utilities are also excluded. Partly because of their size, banking and finance, and mining employment data showed large fluctuations from year to year, while utilities is still very small (around 150,000 jobs nation-wide).

intensive manufacturing exports by China and several low wage countries in Asia.<sup>7</sup> Nevertheless this is an issue of major policy concern for decision-makers.

Figure 6

*Growth in Output and Employment by Main Sector, Indonesia 2001-2011*



In between the two extremes, the large service sectors of trade, hotels and restaurants and other services (private, government and community services), continued to account for more than 60 percent of all jobs created outside agriculture, and more than half the number in the economy as a whole. Elasticities were much higher in other services than they were in trade, however. Nevertheless, one important issue is the extent to which these sectors have been absorbing people into better jobs or have they been mainly in the informal sector.

## Growth Effects and Elasticity Effects

Changes in employment growth rates can be broken down into two main effects: what we might call “elasticity” effects and “output” effects. The former measures how much change in the growth output of a particular sector influences changes in the growth of employment over two time periods (the direct output effect). The latter accounts for compositional changes in products or changes in technology and management that affect employment in the sector. In the case of Indonesia, the examination of two time periods during the 2000s help us quantify these effects. For this purpose, we divide this decade into two periods that fit broadly with growth rates in employment: in the first period (2001-2005) employment grew quite slowly, in the second (2005-2011) it accelerated quite significantly.

The main thing to notice is the very small growth effects for the major sectors identified. Only in services was the effect close to 20 percent of the total change in employment (see the last two columns of the table in the appendix).<sup>8</sup> Changes in elasticities played a much bigger role, especially in

<sup>7</sup> Aswicahyono et al. (2011) found this in comparing Thailand, Malaysia, and the Philippines with Indonesia.

<sup>8</sup> The formula for the decomposition of growth and elasticity effects to explain differences in employment growth rates is as follows:  $N_2 - N_1 = e_2(Y_2 - Y_1) + Y_1(e_2 - e_1)$ . The first element represents the income effect and the second the elasticity effect ( $N$ =growth of employment [in the second period compared with the first];  $e$ =elasticity and  $Y$ =growth of output).

agriculture and other tradables, but they were important for all sectors. Of course, if we disaggregated further, we would expect the direct changes in growth to play a bigger role.

## 5. POLICY IMPLICATIONS AND ISSUES

This paper shows that employment elasticities were higher in Indonesia before the crisis, then fell and finally rose again during the 2000s. The measurement of employment elasticities is quite fragile. Estimates that include the agricultural sector show no relationship with growth. Many leave agriculture when the economy picks up in response to growth in the nonagricultural sector, then crowd into agriculture when the economy slows. Even faster agricultural growth rates appear to have little impact on employment growth or elasticities. This is probably also true of the informal sector, although we have not measured this effect here.

In nonagricultural sectors, elasticities have been low partly because some rapidly growing sectors, such as mining and financial services, do not create many jobs. They have been particularly low in manufacturing, which seems do to both national and international factors. They have been much higher in services (although not uniformly so in services), particularly in construction, financial services and “other” services. It seems likely that employment growth and elasticities are likely to remain high as long as the service sector continues to grow. However, it is important to examine the extent to which lower paid, informal jobs in services are accounting for some of the gains in employment (and falls in unemployment).

Three policy implications might be drawn from the data presented here.

- **Services.** Support for the service sector seems to be an important priority for job creation. This is the main sector for jobs among young and more educated people. Much more needs to be known about this sector to promote growth and better jobs. But policies that contribute to financial inclusion, better skills, and more competition need to be examined carefully, from the point of view of employment.
- **Manufacturing.** The employment record of the manufacturing sector has been particularly poor and needs careful examination. While international factors have played a role, domestic constraints seem to have been particularly severe for creation of jobs in this sector.
- **Agriculture.** While agriculture output growth is important for welfare through provision of lower priced and better food, this sector is unlikely to create many *net* jobs in the future. Some subsectors, however, such as palm oil, and ancillary activities in food processing and marketing, have created more jobs and better jobs.

# Appendix. Output and Elasticity Effects on Changes in Employment Rate

*2005-2011 compared with 2001-2005*

Sector	Rate of Growth in Employment			Employment Growth Factors		Contribution to Change in Employment Growth (%)	
	2001-2005	2005-2011	Change	Output Effect	Elasticity Effect	Output	Elasticity
Agriculture	1.0	-0.8	-1.8	-0.1	-1.7	4	96
Other-Tradables	-0.3	3.7	4.0	0.1	3.9	3	97
Services	1.1	5.2	4.1	0.7	3.4	17	83
Nonagriculture	0.8	4.8	4.0	0.6	3.4	15	85
Total	0.9	2.6	1.7	0.3	1.4	19	81