LABOR FLOW DETERMINANTS IN INDONESIA

Sonny Harry B Harmadi[1]

Abstract. *The dynamics of the labor market in Indonesia can be observed by measuring the labor turnover rate within a certain period of time. Between 2000 and 2004 the labor turnover rate declined and reached its lowest rate in 2003 and 2004 that was 1.5 percent and 1.96 percent, respectively. The declined labor turnover rates during these years implied that the Indonesian labor market was relatively inflexible at that time. The author divided the labor flow into different age groups and gender groups. For the young male population group, business cycle, government expenditure for education and reward of formal education are found to be the significant determinant factors and for the females of the same age group, business cycle and reward from formal education are the significant determinants factors. For the prime age group, labor flow determinants for the males were marital status and business cycle. While for females aged 25-29, the significant factors were marital status, toddler existence, return to college, and GDP per capita. Whereas for females aged 30-49, marital status and relative wage were the determinants factors. In short, this paper aims to examine both the labor flow in the labor market and the determinants of flow from the labor force to the non-labor force and vice versa. Another goal of this research was to identify the determinants of flow from unemployment to employment group and vice versa.*

Keywords: labor force; employment; turnover; flow determinants; unemployment

[1] Director, Demographic Institute Faculty of Economics University of Indonesia. Email: sonny_harmadi@yahoo.com

1. INTRODUCTION

Employment is one of the most important issues in Indonesia as the Indonesian economy is characterized by a surplus in labor supply. The National Development Program targeted that in 2004 the unemployment rate would decrease by 5.1 percent. This quantitative target was still far from the reality. In fact, the unemployment rate in 2004 was more than 9 percent.

In Indonesian case, there are several factors related to employment problems such as foreign investment inflow, investment and business ambiance, protectionist behavior of developed countries, the global market, government regulations, wage rates, and economic growth. A macroeconomic indicator shows that prior to Indonesia's economic crisis in 1997, the employment elasticity rate implied that there was 400,000 new labor force absorption for one percent increase in economic growth. During the peak of the crisis (1998-2000), the absorption of new entrants to the labor force had dropped by a considerable amount to less than 200,000 entrants for every 1 percent increment of economic growth. However, this condition has since been improved, although it still could not achieve its previous rate of labor force absorption.

According to the data from the Central Bureau of Statistics, the proportion of productive-age population (age 15-64) in both the labor force and non-labor force group had not drastically changed in the 2001-2005 time period. This condition shows that there was not much movement from the non-labor force to labor force and vice versa. In other words, the Labor Force Participation Rate (LFPR) did not significantly change each year. This also indicates that those who were in the labor force did not have much of choice to move to the non-labor force and vice versa. For instance, if one is unemployed and stays in the labor force, then he could not easily continue to study and change his status to the non-labor force. The same applies to those in the non-labor force group.

Furthermore, the Central Bureau of Statistics also notes that the labor force growth was always higher than the employment growth rate during the period of 2001-2006. This implies that there was always an unabsorbed portion of the labor force each year that accumulating to make a larger portion of unemployment. However, this does not show the flow of people who previously were in unemployment to employment status and vice versa. Hence, to get a better picture about labor market conditions in Indonesia, the turnover in the

labor force must be identified. When there are only a few people changing their status from unemployment to employment, it implies that there are only a few new job created. On the other hand, when the flow of people from being unemployed to being employed is relatively large, then the problem is not in the job creation part.

One important strategy the government needs to implement is to facilitate economic growth that can significantly absorb the labor force entrants in a relatively short time. An employment-friendly strategy should begin with garnering deeper knowledge about labor force characteristics in Indonesia. These characteristics include the turnover between the labor force and non-labor force and within the labor force itself, as there will always be people entering the labor force (new entrants and reentrants) and exiting (dropouts and retirements). Furthermore, within the labor force, there is also the turnover from unemployment to employment (new hires and recalls) and vice versa (layoffs and quits).

This research intends to observe how turnover happens in the labor force and what are the determinants causing it. Up until now, there has not been much research exploring on this issue in Indonesia. Therefore, it is hoped that this research will contribute a deeper understanding about employment problems in Indonesia. This research aims to identify the determinants of flow from the labor force to non-labor force group and from the non-labor force to labor force group as well as the determinants of flow from unemployment to employment and from employment to unemployment group within the labor force itself.

2. CONCEPTUAL BACKGROUND AND LITERATURE REVIEW

Economics is a theory about how economic agents make their best decision from many alternative choices with limited resources. From the demand side, decisions about how much labor should be hired is based on a profit maximizing assumption, whereas from the household side as the labor supplier, the decision of whether to work or not is simply based on economic rationality, that is a utility maximizing assumption. However, both the company's behavior in determining the demand for labor and the household's behavior in determining supply of labor will together influence the market equilibrium of the labor market.

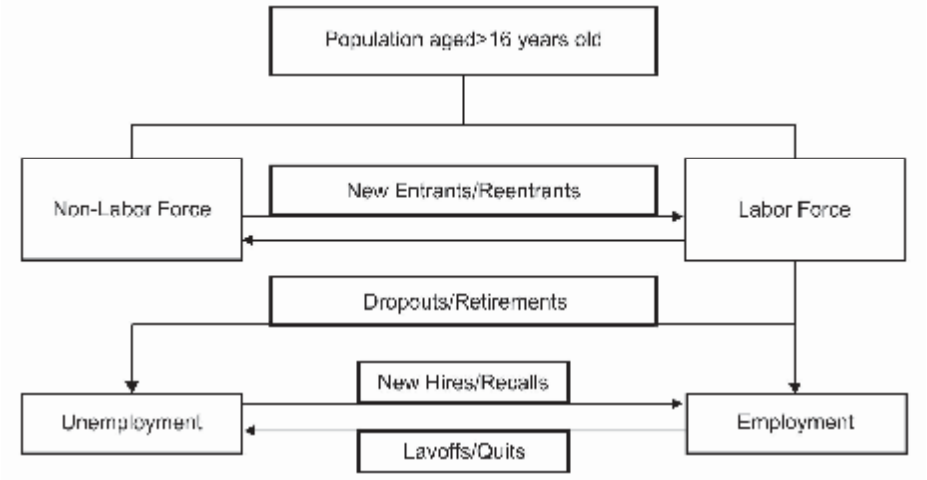
The basic principle in economic theory is resources allocation, as resources are limited. Thus we must deal with a scarcity problem. This problem makes every allocation of resources involve opportunity cost. For example, when labor allocation for production in a firm increases then there will be a reduced allocation for other production factors. The labor market has unique characteristics, one of which is that labor as one of the factors of production can only be rented for their services, not to be bought or sold. Furthermore, the price of labor (wage rate) is not the only factor determining whether one will work or not. There are many non-pecuniary factors such as working conditions, risks at work, perception about equality at work, working hour flexibility, etc, involved here.

The operation mechanism of the labor market is not only determined by the employers and the households. It is also affected by the government regulations. Various distortions in the labor market potentially will cause an imperfect labor market and this in turn will have a negative impact on the economy as a whole. This is due to the interrelation of the labor market with other markets in forming a general equilibrium. Thus, labor market stability is essential in order to prevent any possible negative impact on the economy as a whole.

In the labor market, employers and workers act as the demanders and suppliers of labor, respectively. A question that arises was who actually could be categorized as supplier? The basic concept in labor economics defines a labor supplier as any citizen aged 15-64 years old who belongs to the productive age population. Then, the productive age population can also be classified into two groups, labor force and non-labor force. Those who belong to the labor force group are those in the productive age and are working or are searching for work, while the non-labor force group includes those who are studying and are household workers.

Another interesting thing to be observed here is the tendency of people to move from one group to another. Ehrenberg and Smith (2000) explained that there are at least four types of flow in the labor market. These flows can be seen in Figure 1 below:

Figure 1
FLOWS IN THE LABOR MARKET



Source: Ehrenberg and Smith (2000) with modification.

1. Individual flow from the non-labor force group to the labor force. Individuals in the labor force are divided into 2 groups, i.e. new entrants and re-entrants. The new entrants group consists of those who never were in the labor force, while the re-entrants group consists of those who were in the labor force before, but then move to the non-labor force group and finally decided to go back into the labor force.

2. Individual flow from the labor force to non-labor force group. Those who belong to this category are divided into two groups, dropouts and retirements. The dropouts chose to leave the labor force for certain reasons such as school, or a fulltime housewife, etc. The retirements left the labor force due to age limitation.

3. Individual flow from the unemployment group to employment group. There are also two groups for this category, i.e. new hires and recalls. The new hires group consists of those who never worked before, while recalls consists of individuals who were temporarily laid off.

4. Individual flow from the employment group to unemployment group. There are two groups that belong to this category; those are people who

were fired (layoffs) and who voluntarily quitted in order to get another job (quits).

These flows create a turnover in the labor market, which then develop changes in labor allocation. On one side, the changes in allocation of labor can encourage efficiency in the labor market, while on the other side it can also create inefficiency at the same time. The inefficiency resulted from the turnover in the labor market would be a transaction cost. The bigger the individual flow from one group to another within a period of time, the bigger the transaction cost would be.

According to Vilfredo Pareto, efficient allocation is attained when in certain conditions there is no economic agent that can be made better off without causing another to become worse off. At household level, it assumes that every household can determine whether a condition is worse or better off according to its own interpretation. There are two main assumptions for exchange efficiency, i.e. utility maximization and a condition where there is no transaction cost. In fact, the turnover in the labor market causes transaction cost and creates high-cost economy.

According to Pries and Rogerson (2005), efficient labor allocation involves two forms of reallocation in the modern labor market: (1) reallocation from an inefficient job to an efficient one (job turnover) and (2) worker reallocation from one job to another job (worker turnover). Empirical evidence suggests that the volume of these turnovers is relatively big. Also, the turnover in the labor market affects the welfare of the people. From the labor demand side, employers' hiring decisions will be influenced by the condition in three markets - labor market, output market, and capital market. In short, the determinants of demand for labor include changes in the labor market, capital market, and output market. This argument looks more suitable to analyze labor turnover from unemployment to employment group and vice versa.

On the other hand, labor supply is the result of household decisions. Basically, household decisions on whether to work or not are divided into two stages. The first stage is whether one will participate in the labor force and how many hours will be allocated for work. The next stage is in what sector and what kind of job one will be working in. In labor economics, Labor Force Participation Rate (LFPR) is defined as the percentage of population that is working and is looking for a job. The bigger the percentage of LFPR, the smaller the percentage of the population in the non-labor force group.

Further, in order to analyze a person's incentive to work the analysis of demand for leisure could be employed. Just like the demand for normal goods, demand for leisure is determined by three important factors (Ehrenberg and Smith, 2000):

1. The opportunity cost that arises when one chooses leisure over work is the wage rate.

2. Wealth is measured by wage level and return from productive assets. The problem is that data on wealth is unavailable.

3. The individual preference of whether to work or to have leisure time. Since individual preference is difficult to measure, the observation of supply of labor based on preference can barely be done.

An analysis on the supply of labor can explain the phenomena of flow from the non-labor force to labor force group and vice versa. Theoretically, individual labor can move from one job to another, from one firm to another firm, from one area to another area, from being unemployed to being employed, and from the labor force to non-labor force.

Many literature about labor flow explains that on one hand, the size of the flow is determined by job creation and reduction as a result of the business cycle (Boeri, 1996), while on the other hand, the business cycle is caused by changes in the output market. The higher the labor turnover, the more flexible the labor market. For example, the easier an individual moves from being unemployed to being employed and vice versa, the easier it is for a firm to hire and fire its employees. This flexibility is affected by institutional arrangement and policies in the economy. In an economy with many regulations about employer-employee relationships and the significant role of labor unions, the labor market becomes more rigid and thus, lowers the labor turnover rate.

According to Burgess, Lane, and Stevens (1996), one of the standard approaches in modeling the labor flow is by using a matching approach. The existence of asymmetric information in the labor market leads to natural consequences on the length of time needed for labor reallocation. However, unemployment arising due to a labor market mismatch is trivial. In labor economics, this type of unemployment is called frictional unemployment.

Theoretically, the size of labor flow in an economy is determined from two sides, labor demand and labor supply. Job creation and reduction are

determined by business activities that need labor as an essential factor in production activities. Thus, the changes in labor demand mainly determine the labor flow between unemployment and employment. Meanwhile, the size of labor flows between the labor force and non-labor force depicts changes in labor supply. The entrance of the young age population who have just finished school to the labor force is one example of an addition of labor supply in the labor market. The problem will arise if the additional labor supply is not accompanied by sufficient job creation and even worse if job destruction is relatively greater than job creation.

Many researches show that job creation and job destruction are essential issues in observing labor turnover. The static equilibrium framework explains that a firm's hiring and firing decision as an adjustment decision is inappropriate due to independency between firing and hiring decisions (Ballot, 1994). At the macroeconomic level, equilibrium is reached if the level of job creation is equal to the level of job destruction. This implies that at the industrial level, some firms create new jobs and some other firms destruct jobs. In fact, equilibrium can also be reached if several companies simultaneously create new jobs and lay off their workers by the same amount, though the reason why they hire and fire by the same amount cannot empirically be explained.

According to the Schumpeterian, the discussion of job creation and job destruction in a theoretical framework is helpful in order to know the various determinants in dismissal and recruitment of workers (Ballot, 1994). Both job destruction and job creation are closely related to innovation in production processes. Innovation in technology or products increase the need for new labor. The changes in technology and products may lead to the lay-off of old workers who can only produce old products with old technology. On one hand, a firm can provide training for its workers to adapt to new technology. However, if the training cost is very high, a firm would tend to lay off its workers and hire those who can cope with the new technology.

In recent years, the flow approach of the labor market has become important, both in theoretical and empirical discussions (Blanchard and Diamond, 1989). Long before the preceding research, an analysis on interactions between flow and stock in the labor market had been conducted by Holt and David (1966).

3. RESEARCH METHODOLOGY

3.1 Determinants of Labor Flow in the Labor Force

3.1.1 *Determinants of Flow between the Labor Force and Non-Labor Force*

The flow of productive age population between the labor force and non-labor force can be observed from the changes of the Labor Force Participation Rate (LFPR), proportion of the productive age population belonging to the labor force to the total productive age population (over 15 years-old). The increase in LFPR can be interpreted as an increase in the flow of the productive age population from non-labor force to labor force.

Welch (1979), Aaronson, et.al (2006), and Wachter (1977) considered two factors in analyzing determinants of change in LFPR: 1) business cycle that affects the level of unemployment, 2) demographic factors. Changes in business cycle, which can be observed through changes in unemployment rate, can influence the decision of the productive age population whether to enter or exit the labor force. Wachter (1977) used the discourage-worker model in equation (1) to explain the dynamics in employment.

$$LFPR_i = f\left(U, T_i, LFPR_{t-1,i}\right), f_u < 0 \quad (1)$$

In the above equation, LFPR denotes the labor force participation rate, U denotes the unemployment rate and T denotes the time trend. From that equation, the unemployment rate is negatively related to LFPR, which means an increase in unemployment rate will encourage the productive age population to exit the labor force. Meanwhile, Aaronson, S. et.al (2006) found that the drivers of change in LFPR vary across demographic groups. A demographic group of young labor force (15-24 years old) tends to be influenced by changes in school enrollment, tuition fees, scholarship programs and education tax benefits, improvement in family wealth, and the wage rate of unskilled workers.

Aaronson, Park, and Sullivan (2006) suggested that a shift in the number of young labor force can lead to an expected rise or downturn of productivity in the future. If the decrease in young labor force is followed by an increase in time spent for school, then a rise of productivity in the future is

likely to happen. The increased reward of formal education in the form of higher income level in the future is the main factor that influences the change in LFPR. Such increased reward of formal education will reduce young employment due to the increased preference for continuing school rather than being in the young labor force. Another factor that might influence young employment is the increased government investment in education, which will encourage the young population to go to school.

Moreover, the LFPR for the demographic group of prime age labor force (24-49 years old) is more affected by education, reproduction and contraceptive factors, changes in preferences and social behavior, changes in wealth, development of a pension-wealth-financial system and education attainment (Aaronson et.al., 2006). In terms of education, the percentage of productive age population who return to college can be used as an indicator to observe the effects of education on the changes of prime age LFPR (age 20-24). The higher the rate of return to college the lower the LFPR will be.

Meanwhile, factors affecting the LFPR for the older labor force (>50 years old) include life expectancy and changes in pension policy (Aaronson, S. et.al. 2006), which are related to the readiness of the older labor force to enter pension age. Life expectancy is closely related to the range of non-productive ages that must be supported by the income accumulated during the productive ages. The higher the life expectancy, the higher the range of nonproductive ages that must be supported. Thus, it will raise the LFPR of the older labor force (>62 years old) for both males and females.

Aaronson et.al (2006) developed a model to describe factors influencing the change in Labor Force Participation Rate as follows:

$$LFPR_{a,t} = \acute{\alpha}_a X_t^{\acute{\tau}_a} \beta_{b=t-a} exp\left(\varepsilon'_{a,t}\right) \quad (2)$$

$$logLFPR_{a,t} = log\alpha_a^* + \tau_a^* logX_t + log\beta_{b=t-a} + \varepsilon_{a,t}^* \quad (3)$$

$\alpha a*$ denotes age-specific fixed effect, λ is vector of age-specific coefficient, $\boldsymbol{X}$ is vector of explanatory variables that include factors influencing the changes in LFPR in every age group, β denotes birth year cohort-specific fixed effect, $\boldsymbol{a}$ is age group, $\boldsymbol{b}$ is year of birth, and $\boldsymbol{t}$ is calendar year. Parameters α and β are assumed to be constant across time. For Indonesia, it is impossible to obtain the value of β due to the unavailability of data. Thus, the model used in this research is as given below.

$$logLFPR_{a,t} = log\alpha_a^* + \tau_a^* logX_t + \varepsilon_{a,t}^* \quad (4)$$

Due to the difference in factors that influence LFPR in each age group and gender, this analysis will be conducted based on age and gender groups. The breakdown of age groups that will be used here are young labor force (15-19 years old), prime age labor force, and older labor force (>50 years old). Factors that influence LFPR for each age group and gender are listed below:

Table 1
VARIABLE DESCRIPTION OF DETERMINANTS OF FLOW BETWEEN THE LABOR FORCE AND NON-LABOR FORCE

Labor Force Group	Sex	Age Group	Influencing Factors	Description
Young Labor Force	Male Female	15-24 years old	Business cycle	Number of employment
			Government expenditure in the education sector	Local Government expenditure for education
			Reward for formal education	Wage rate for population aged 15-19 years old/wage rate of population over 24 years old that graduated from university.
Prime Age Labor Force	Male	25-49 years old	Marital Status	Number of married male population aged 25-49 years old.
			Return to college education	Number of males aged 25-49 years old studying in university
			Business cycle	Number of unemployment
	Female	25-29 years old.	Business cycle	Number of unemployment
			Marital status	Number of married females aged 25-29.
			Wealth indicator	GDP per capita
			Toddler presence	Number of toddlers
			Return to college education	Number of females aged 25-29 studying in university
			Relative female wage rate to male.	Average wage of females to males
		30-49 years old	Business cycle	Number of unemployment
			Marital status	Married female population aged 30-49 years old.
			Relative female wage rate to male	
Older Labor Force	Male/Female	50-59 years old	Undergraduate labor force	Number of undergraduate labor force aged 50-59.
			Life expectancy	Life expectancy at 1944-1951

3.1.2 Determinants of Flow within the Labor Force (Employment and Unemployment)

An analysis of determinants of flow within the labor force can be observed from both the supply and demand side. Bean, Layard and Nickell (1986) constructed four equations to explain this model.

Labor Demand Function (5)

$$\frac{N}{L} = f^1\left(\frac{W}{P}, A, \sigma\right)$$

Price-Setting (6)

$$\frac{P}{W} = f^2\left(\frac{K}{L}, A, \sigma, \frac{W}{W^e}\right)$$

Wage-Setting (7)

$$\frac{W}{P} = f^3\left(\frac{N}{L}, \frac{K}{L}, A, \frac{P}{P^e}, Z^s\right)$$

Aggregate Demand (8)

$$\sigma = f^4\left(\frac{M}{P}, \frac{eP^*}{P}, Z^d\right)$$

N denotes the employed labor force, *L* denotes the labor force, *K* is the capital stock, *W* is the labor cost, *P* is the GDP deflator, *A* denotes the index of technical progress which is calculated by using a simple linear and quadratic time trend approach, σ denotes the aggregate demand index, *M* represents the money stock, *eP** is the competitor price in domestic currency, Z^s denotes the wage determinants, and Z^d denotes the determinants of shift in demand.

The first three equations above represent the supply side that are related to each other in this mechanism: a firm will set the price, then the output produced will be matched with the demand in the market which depends on the relative price of output to aggregate real demand. The number of labor employed will depend on the production technology assumed to be a constant return to scale.

Equation (7) is actually a representation of the labor supply curve that is related to the proportion of labor force with certain reservation wages and other shifting factors such as tax, relative price of imported goods and other variables influencing the intensity of job-seeking, for example the availability of unemployment benefits. An increase in wage will create profit for a firm and

part of this profit is then offset by costs. The increase in wage might also decrease the number of quits, increase work effort, and in general show the attractiveness of other alternative choices such as alternative wages, unemployment rate, and benefit rate. If labor demand is influenced by labor unions, then the wage rate setting will be determined by all labor demand determinants, the employment rate and bargaining power of labor unions.

Equation (8) represents the aggregate demand equation, which is determined by real money balance, competitor prices in local currency (IDR) relative to the price of local goods, and other demand shift variables (Z^d). There are four factors that belong to demand shift variables, i.e. government expenditure, tax wedge, foreign output, and competitiveness. Those factors are assumed to have a linear relationship with variable σ.

3.1.2 Employment Rate Determinants

To observe the determinants of labor flow from being unemployed to employed and vice versa, Bean, Layard and Nickell (1986) constructed a mathematical manipulation on equation (5), (6) and (7) to obtain a new equation below:

$$\frac{N}{L} = g^2\left(\frac{K}{L}, A, \frac{P}{P^e}, \frac{W}{W^e}, \sigma, Z^s\right) \quad (9)$$

The equation above implies that the employment rate will be influenced by capital-labor ratio, technical progress, and shift factors (Z^s). Variables identified as (Z^s) include income tax, consumption tax, prices of imported goods, and import proportion. Another research observing employment rate determinants is the one conducted by Holden and Peel (1979). It revealed that LFPR is influenced by real output, time trend as a proxy of technical progress, increase in unemployment benefits relative to income, and lag of employment which is formally written as follows:

$$(e) = f(e, Q_t, B_t, t, \varepsilon_t) \quad (10)$$

e[2] denotes the employment rate, Q is the real output, t is the time trend used to capture technical progress, and B is the ratio of unemployment benefits to income. The use of the lag of employment rate variable is necessary to capture

[2] Variable e in this model is unemployment to labor force ratio (N/L) in a model constructed by Bean, Layard, and Nickell (1986).

the fact that adjustment costs will drive distribution lag effects on the employment rate.

In this research, an analysis is conducted using data from provincial level for the period of 2000-2006. This calls for essential adjustment due to the suitability of data to be applied at provincial level and the availability of the data itself. To accommodate several employment rate determinants, the estimation model used in this research is formally written as follows:

$$\frac{N}{L} = g(A, P, W, \sigma) \quad (11)$$

The main factor in determining the employment rate is the technological progress (which is proxy by ratio of undergraduate labor), the price level (Consumption Price Index), wage rate (W), and the aggregate demand σ (real GDRP).

Ideally, tracking the determinants of labor flow from being employed to being unemployed is done by using the number of inflow to unemployment and outflow from unemployment as dependent variables. Inflow and outflow of unemployment each have their own determinant factors (Dmitrijeva and Hazans, 2005; Burgess, 1992). Observing the flow to and from unemployment can be done by using basic models with matching function using approaches for standard matching function and stock-flow matching function.

Standard matching function is a function that connects outflow from unemployment to the unemployed labor force $(U_{i,t})$ and availability of job vacancies $(V_{i,t})$ by assuming that (1) the unemployment group is homogenous, (2) the stock of unemployment and job vacancies in the beginning of the month determines the outflow to employment, and (3) firms and the unemployed meet randomly. The specifications of the standard matching function are given below:

$$M_{i,t} = A_{i,t} m(U_{i,t}, V_{i,t}) \quad (12)$$

$M_{i,t}$ denotes the outflow from unemployment. The specification by using the Cobb-Douglas function is as follows:

$$M_{i,t} = A_{i,t} (U_{i,t})^{\propto U} (V_{i,t})^{\propto V} \quad (13)$$

$$lnM_{i,t} = \alpha_0 + \alpha u \, lnU_{i,t} + \alpha v \, lnV_{i,t} + \mu_i + \delta_t + \varepsilon_{i,t} \quad (14)$$

Unlike the standard matching function, the stock-flow matching approach observes that outflow from unemployment is determined by stock and flow of unemployment[3] (which are denoted by $U^S_{i,t}$ and $U^F_{i,t}$) and stock and flow of job vacancy[3] which are denoted by $V^S_{i,t}$ and $V^F_{i,t}$

$$M_{i,t} = A_{i,t}\left(U^S_{i,t}\right)^{\alpha SU}\left(U^F_{i,t}\right)^{\alpha FU}\left(V^S_{i,t}\right)^{\alpha SV}\left(V^F_{i,t}\right)^{\alpha FV} \quad (15)$$

$$lnM_{i,t} = \alpha_0 + \alpha_{su}\, lnU^S_{i,t} + \alpha_{sV}\, lnV^S_{i,t} + \alpha_{su} lnU^F_{i,t} + \alpha_{sV}\, lnV^F_{i,t} + \mu_i + \delta_t + \varepsilon_{i,t} \quad (16)$$

$M_{i,t}$ is the outflow from unemployment.

4. DATA SOURCES

In this research, the author employed data on unemployment rates, proportion of the schooling population, reward for formal education, undergraduate labor force, marital status, relative wage of females' to males', life expectancy rate, modernization indicators, toddler existence, and government expenditure in education. This data was obtained from the Central Bureau of Statistics (BPS) and the Ministry of Finance.

Table 2

[3] Stock of unemployment is the number of unemployment at the beginning of a period (e.g at the beginning of a month), whereas flow of unemployment is the number of unemployed individuals in a time period (e.g unemployed for a month).

[3] Stock of job vacancy is number of job vacancy that is already listed in state employment agency. Flow of job vacancy is news-listed job vacancy in a month period.

VARIABLES AND DATA SOURCES

Determinants	Sources
FLOW DETERMINANTS OF LABOR FORCE AND NON-LABOR FORCE	
- Unemployment	BPS
- Schooling Population	BPS
- Government expenditure in education	Ministry of Finance
- Wage	BPS
- Undergraduate labor force	BPS
- Married population	BPS
- GDP per capita	BPS
- Number of toddlers	BPS
FLOW DETERMINANTS OF THE EMPLOYED AND UNEMPLOYED	
- number of highly-educated labor	BPS
- real wage	BPS
- price (GDP deflator)	BPS
- GDP	BPS

The data used in this analysis is taken from the provincial level from the period of 2000-2006. For the newly-formed provinces, the data used will be taken from the former main provinces, thus there are 26 provinces included in the analysis.

4.1 Data Processing Method

The analysis of flow determinants from the labor force to non-labor force group and from employment to unemployment group is done by using a panel data analysis with fixed effects that enable the interception of variations in the cross section and at the same time assumes that the slope coefficients are constant in cross section as illustrated below:

$$Y_{it} = \alpha_1 + \alpha_2 D_{2i} + \alpha_3 D_{3i} + \alpha_4 D_{4i} + \beta_1 X_{1it} + \beta_2 X_{2it} + e_{it} \quad (17)$$

The model is then generalized as follows:

$$Y_{it} = \alpha_i + \beta X_{it} + e_{it} \quad (18)$$

5. RESULTS ANALYSIS

The dynamics of the labor market in Indonesia can be captured by measuring the labor turnover rate within a certain period of time. The labor turnover rate measures the magnitude and rate of labor flow in the labor market. Labor turnover consists of all the new labor contracts and disclosed labor contracts, while the labor turnover rate is calculated based on the ratio of new and disclosed contracts to the number of employed labor force. New contracts/hires consist of newly employed labor without considering their previous status, whereas disclosed contracts comprise those who are unemployed. Furthermore, the Indonesian labor turnover rates for the period of 2000-2006 is presented in Table 3 below.

Table 3
LABOR TURNOVER IN INDONESIA, 2000-2006

Year	New Contracts	Disclosed Contracts	Labor Turnover	Labor Turnover Rate
2000	3,987,073	1,589,803	5,576,876	6.33 %
2001	2,034,238	1,642,641	3,676,879	4.05 %
2002	1,424,162	1,605,190	3,029,352	3.31 %
2003	285,005	1,109,290	1,394,295	1.50 %
2004	511,114	1,325,343	1,836,457	1.96 %
2005	2,787,335	1,628,141	4,415,476	4.70 %
2006	1,958,725	1,418,304	3,377,029	3.55 %

Source: processed from BPS, SAKERNAS 2000-2006.

From 2000 until 2004, the labor turnover rate declined and reached its lowest in 2003 and 2004 with a rate of 1.5 percent and 1.96 percent, respectively. This decline occurred because the number of disclosed contracts dropped slightly while the number of new contracts decreased significantly. The declining labor turnover rates during these years implied that the Indonesian labor market was relatively inflexible at that time.

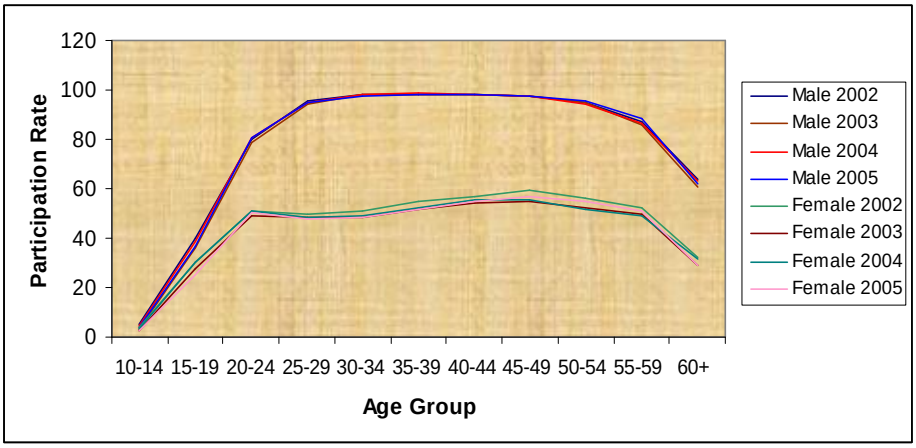
There were several factors causing the rigidity in the Indonesian labor market, one of which was the rising Regional Minimum Wage (UMR) by 30 percent in 2002. The significant increase in unemployment during that period was also caused by other factors including the unstable economic condition due

to crises and the Bali bomb tragedy in 2002. The implementation of fiscal decentralization in 2001 also has contributed to the low job creation since the local governments were given the authority to determine their regional minimum wage. This resulted in the substantial increase of wage rates in several provinces (e.g. DKI Jakarta, Tangerang, Bogor, and Bekasi) and some even increased by more than 30 percent (Deuster, 2002). These factors have increased the business risks faced by firms and thus eroded their competitiveness.

5.1 Analysis of Flow Determinants within the Labor Force and Non-labor Force

Figure 2 below shows that the LFPR of males had different patterns compared to females. The male population had a unimodal pattern of LFPR (i.e. inverted U-shaped) while the female population had bimodal patterns of LFPR (i.e. M-shaped). This implies that the LFPR of the male population increases until they reach prime age, and then decreases in older ages (>50 years old). Meanwhile, for the female population, the LFPR increases during the young age, declines in the first stage of prime age (25-29 years old), increases again in the age range of 30-49 years, and finally decreases in the older ages (>50 years old). The varied LFPR between gender and age groups has proven the hypothesis that there are differences of LFPR in each age and gender groups.

Figure 2
LABOR FORCE PARTICIPATION RATES BY AGE AND GENDER, 2002-2005



Source: Proccessed from Sakernas Data 2002-2005.

In addition, the estimation output of flow determinants from the labor force to non-labor force is shown in table 4 below.

Table 4
ESTIMATION OUTPUT OF FLOW DETERMINANTS FROM THE LABOR FORCE TO NON-LABOR FORCE

Labor Force Group	Gender	Age Group	Determinants	Coefficient	
Young Labor Force	Male	15-24 years old	Business cycle	0.360553***	R^2 = 0.99
			Government expenditure in education	-0.002875***	Adj R^2 = 0.99
					Fstat = 13769.57
					Prob. Fstat = 0.000
			Reward for formal education	0.011846***	DW Stat = 2.38
	Female	15-24 years old	Business cycle	0.614061***	R^2 = 0.99
			Government expenditure in education	-0.000886	Adj R^2 = 0.99
					Fstat = 23338.56
					Prob. Fstat = 0.000
			Reward for formal education	0.031541***	DW Stat = 2.26
Prime age labor force	Male	25-49 years old	Marital status	4.958815**	R^2 = 0.989
			Return to college education	-0.052102	Adj R^2 = 0.989
					Fstat = 526.727
			Business cycle	-0.152635***	Prob. Fstat = 0.000
					DW Stat = 2.146
	Female	25-29 years old	Business cycle	0.008437*	R^2 = 0.998
			Marital status	-1.770150***	Adj R^2 = 0.998
			Modernization indicator	-0.117459***	Fstat = 4600.616
					Prob. Fstat = 0.000
			Toddler existence	-0.064339***	DW Stat = 2.11
			Return to college education	-0.046977***	
			Relative wage of females to males	0.015889***	
		30-49 years old	Business cycle	-0.005970	R^2 = 0.983
			Marital status	5.094027***	Adj R^2 = 0.979
			Relative wage of females to males	0.059042**	Fstat = 307.902
					Prob. Fstat = 0.000
					DW Stat = 2.010
Older Labor Force	Male/ Female	50-59 years old	Graduate labor force	-	-
			Life expectancy	-	-

Source: processed by author.

Note: * significant at 90% of confidence level; ** significant at 95% of confidence level; *** significant at 99% of confidence level.

5.2 Flow Determinants of the Young Labor Force

There are three factors suggested as the flow determinants from the labor force to non-labor force for the young age population (15-24 years old) for both males and females. They are business cycle, government expenditure for education, and reward of formal education. The author also found that there are different impacts of these determinants factors affecting the labor flow in terms of gender. For males, those three factors are significant in increasing the LFPR, while only government expenditure in education is insignificant in increasing the LFPR of young females.

The positive and significant effects of business cycle on LFPR show that the employment absorbed by the business sector positively affects the willingness of the young population to work. The increase in employment absorption by the business sector induces greater expectations and the probability for the labor force to get jobs and thus they will voluntarily offer their labor services by entering the labor force. The business cycle factor is significant for both the young male and female populations.

The effects of education differ between the male and female population. Based on the estimation output presented in table 4 above, it is found that education did not have a significant effect on female LFPR while it significantly affected the decline of male LFPR. Ideally, government expenditure in education such as School Operational Assistance (BOS), government scholarship programs, and 20 percent allocation of government budget for education will encourage people to take formal education (which is implied by a decrease in LFPR). Yet, in reality these policies have only succeeded for the male population as suggested from the negative and significant coefficients of government expenditure in education for young male LFPR.

It is a common observed situation that although the opportunity to obtain formal education is the same for both males and females, especially for the higher education level, there will be smaller number of females getting formal education compared to males. This occurred because of the limited number of schools and increasing tuition fees for the higher level of formal education. Also, the lack of reward/return of educational investment that parents of females can directly get by paying tuition fees for their daughters is considered as one reason of the lower number of females in the formal education.

Mostly higher level education institutions in Indonesia are concentrated in the cities so it is difficult for female students who live far away in rural areas to reach the school. Financial factors are also suspected to contribute to preventing the female population obtaining formal education. Financial constraints will encourage families to prioritize male education over females. This is also driven by the lower benefit the parents can expect to get when providing formal education for their daughters since females tend to stay home and do not get job after they got married. These conditions have been considered as factors that made government policies on increasing the female LFPR unsuccessful.

The last factor found to be significant in determining the LFPR for the young population is the incentive of formal education. One of the expected outcomes from attaining higher education levels is the higher income in the future. Formal education normally ends when one has reached the age of 22-24 years after obtaining the undergraduate degree. The younger population tends to consider what level of income they would receive after completing their formal education before making a decision on whether or not to continue studying at a higher level.

To observe the effects of formal education incentives on the LFPR of the young population, one can use a comparison between the income of the population aged 15-19 (i.e. young population before entering higher education) and the income of population aged 22 who are already graduated. It was found that the incentive for those in the productive age to exit from the labor force and continue studying decreases along with the higher ratio of income received by people who do not take higher education to the income of those who are with undergraduates degree. This condition applies for both young males and females.

5.3 Flow Determinants of the Prime Age Labor Force

An analysis of flow determinants of the prime age labor force (25-49 years old) was carried out by applying different age groups for both male and female groups. For the male group, the analysis was focused only on one age group that is 25-49 years. On the other hand, females in the prime age population were divided into two groups, i.e. 25-49 years old and 30-49 years old. The difference in grouping the gender by age is useful for obtaining more intensive observation about the difference in LFPR patterns between male and female groups.

5.3.1 *Prime Age Male (Age 25-49)*

For male population aged 25-49, marriage is proven to be a significant variable that drives them to enter the labor force. The rising number of married males in the labor force is statistically significant for the prime age male population LFPR. This condition might be due to the male's responsibility as the breadwinner of the family. Another factor that significantly influences the flow of male population in the prime age labor force is the business cycle, which is proxy by unemployment rate. There is a negative relationship between unemployment rates and LFPR, meaning that the higher the unemployment rate, the higher the incentive for the prime age male population to exit from the labor force, which implies a decrease in LFPR.

Borjas (1996) suggested that high unemployment rates may lead to the loss of hope among unemployed people for getting jobs. Staying in the labor force will impose unnecessary costs for people so that they will likely exit the labor force in the end. Moreover, being in the age ranging from 25 to 49 years old, male population usually tries to further continue their education in order to get better positions and income in their future job. The return-to-college rate for males is found to be insignificant in affecting the LFPR of the prime age male population. This implies that those who return to college tend to not discard their current jobs while continuing their study and thus the decrease in LFPR does not seems to happen.

5.3.2 *Prime Age Female (Age 24-29)*

Female LFPR tends to decline at the age of 25-29 due to several significant factors such as marriage, toddler existence, return-to- college, business cycle, GDP per capita, and relative wages of females compared to males. The marital status of females has an opposite effect as compared to males in affecting the LFPR. Married status for males encourages them to enter the labor force whereas the married status for females becomes a discouraging factor for them to enter the labor force. This situation was indicated by the significant and negative effects of the number of married prime age female population to LFPR.

Along with that, toddler existence was also a significant factor in driving females aged 25-29 to exit the labor force. This empirical findings is in

line with the fact that most females in Indonesia are married in their 20s and have children at the age of 25-29. This condition shifts females' preferences to taking care of their family instead of getting work.

GDP per capita is also found to have a significant and negative effect on the changes of LFPR. The increase in GDP per capita by 1 percent will urge females aged 25-29 to leave the labor force. In other word, the LFPR of females aged 25-29 will decline by 11.7 percent. The significant and negative relationship between GDP per capita and female LFPR shows that the role of Indonesian female labor is actually as a buffer in the economy.

Furthermore, the unemployment rate is positively related to the LFPR of females aged 25-29. Worsened financial conditions of a family as perceived by declining income and rising unemployment rates will encourage females to enter the labor force to support their families. As financial conditions improved, female workers will tend to leave the labor force.

The decision to return to college and obtain a higher education is negatively related to the female LFPR, which means that females tend to discard their jobs when they decide to continue studying. This situation differs from the males' who decide to stay in the labor force while they pursue their higher education. This possibly has something to do with the role of males as the breadwinners for the family. As for females, there is no obligation to be the breadwinner of the family. Thus, there is more flexibility to exit the labor force when they decide to take higher education.

Another factor that is also significant in affecting the female LFPR is the relative wages of females' compared to males'. An increase in the relative income of females to males creates an incentive for females to enter the labor force. An analysis at household level will lead us to a conclusion that the rise in wages of the husbands will lead to a decrease in the LFPR of wives. This findings is in line with Ashenfelter and Heckman's (1974) findings.

5.3.3 *Prime Age Female (Age 30-49)*

For females aged 30-49, the decision on whether or not to stay in the labor force is mainly determined by marital status and relative income. In this age group, a married status will increase the LFPR, which shows that in this age group, marriage is no longer encouraging for female population to leave the labor force. The family pressure of taking care of toddlers at the age of 30-49 has decreased since toddlers have already grown up. Hence, female

population have more time to work. Besides marital status, relative income also plays an important role. The rise in relative income of females' as compared to males' will encourage female population to enter the labor force.

6. ANALYSIS OF FLOW DETERMINANTS BETWEEN EMPLOYMENT AND UNEMPLOYMENT

The results of estimation show that all coefficient signs are in line with the hypothesis, except for the price variable. There are two variables that have opposite signs, i.e. technology and price.

Table 5
ESTIMATION OUTPUT: FLOW DETERMINANTS BETWEEN EMPLOYMENT AND UNEMPLOYMENT

Variable	Coefficient	Hypothesis
TECH	-0.021476	_
W	-1.64E-07 ***	_
PRICE	-0.111660 ***	+
PDRB	1.26E-11	+
R^2	0.997	
Adj R^2	0.996	
Fstat	1361.020	
Prob. Fstat	0.000	
DW Stat	1.951	

Source: Author's calculation

The estimation output above shows that significant factors in influencing the flow between labor force and non-labor force are income level and price level. Meanwhile, variables such as technology and aggregate demand are found to be insignificant in affecting employment dynamics.

a. Technology Variable

Exploring further the estimation output obtained, it is apparent that production technology that was approached through ratio of high educated labor does not have any significant effects on employment rate. By assuming production technology of constant return to scale, it is expected that employment rate and technology are negatively related. In the period of 2000-2006, labor and technology were substitutes for each other; the advancement in technology lowers the demand for labor. Yet, the insignificancy of higher education to employment rate shows the inflexibility of the labor market in Indonesia. The substitution of labor for technology is not easily applied due to the existence of labor unions and rigid labor contracts.

b. Wage Variable

Regression output shows that there is a significant effect of real income to employment rate. The relationship between real income and employment rate is already in accordance with the standard neoclassic theory, which predicts the negative relationship between them. From the demand side, if real income increase then the employment rate will decrease. The rise of real income during years 2000-2006 was caused by a supply shock. Estimation output shows that the rise of real income by 1 percent will result in the decrease of employment rate by 1.64E-07.

c. Price Variable

The negative relationship between price and employment rate can be explained through the existence of cost-push inflation. The rise in price level, which is induced by the increasing input price, will be responded by the industry by reducing output production. This will eventually lead to a lower demand for labor by industries (decrease of employment rate).

d. GDP Variable

Basic economic theories suggested that output and labor are positively related. When the economy is in a booming condition, there will be a rise in output production and thus labor demand will increase. Yet, fundamental identity (output is equal to labor (employment) multiplied by

productivity) suggests that labor will increase along with the decreasing marginal productivity of labor. So, the positive correlation between output and employment rate occurs only when there are no changes in productivity. Yet in this case, GDRP growth does not significantly affect employment rate. There is an indication that the flow of employment only happens from less productive jobs to more productive jobs. This means that in line with fundamental identity, the employment rate will not change significantly due to the higher output caused by an increase in labor productivity.

7. CONCLUSION

This research intends to identify and analyze what are the determinants of labor force turnover in Indonesia by using SAKERNAS data for the period of 2000-2006. Flow determinants from and to the labor force are found to be significantly different within gender and age groups. For young males (15-24 years old), significant factors that affect labor force turnover are business cycle, government expenditure in education, reward of formal education. For young females, the significant factors are business cycle and reward from formal education.

Prime Age Population (Age 25-49)

- For males aged 25-49, the significant factors in driving the non-labor force to enter the labor force are marital status and business cycle (unemployment rate), in which marriage is proven to be an encouraging factor for males to enter the labor force while unemployment rate is the discouraging factor. The factor of return to college is insignificant in affecting LFPR. This means that most males study and work at the same time.

- For females aged 25-49, the analysis is divided into two age groups. This separation is done to accommodate the bimodal characteristics of LFPR of females. For females aged 25-29, the significant factors are marital status, toddler existence, return to college and GDP per capita. Those factors are proven to be the drivers for females to leave the labor force, whereas relative wages of females' compared to males' is the driver for females to enter the labor force. For females aged 30-49, the decision of whether or not to stay in the labor force is mainly influenced by marital status and relative wages.

Factors that are identified as significant in determining the flow between employment to unemployment are wage level and price. Technology and GDP variables are found to be insignificant in determining the dynamic flow of employment in Indonesia.

REFERENCES

Aaronson, Stephanie, B. Fallick, A. Figura, J. Pingle, dan W. Wascher. 2006. "The Recent Decline in Labor Force Participation and Its implications for Potential Labor Supply". Spring Meeting 2006 of the Brooking Panel on Economic Activity.

Aaronson, D., Kyung-Hong Park, Sullivan, Daniel. 2006. "The Decline in Teen Labor Force Participation" Federal Reserve Bank of Chicago Economic Perspective 30(1) pp. 2-18.

Adioetomo, S.M., D. Handayani, N. Wiyono, and S.H. Hatmadji. 2000. Gender dimension of the economic crisis and employment in urban informal and rural sectors in Indonesia. South East Asia and the Pacific Multidisciplinary Advisory Team. Working Paper 6. Manila: International Labor Office (ILO).

Anker, R. 1998. Gender and Jobs: Sex Segregation of Occupations in the World. Geneva: International Labor Office (ILO)

Agrawal N., 1995. Indonesia Labor Market Policies and International Competitiveness. Policy Research Working Paper No. 1515. The World Bank. September.

Anwar, M. A., 1997, Transformasi Ketenagakerjaan menurut Jenis Pekerjaan di Indonesia, 1985-1995. Pp 951-973 in M. A, Anwar, A. Ananta, and A. Kuncoro, (eds.). Widjojo Nitisastro 70 tahun. Pembangunan Nasional: Teori Kebijakan dan Pelaksanaan. Jakarta: Fakultas Ekonomi Universitas Indonesia.

Ashenfelter, Orley dan James J. Heckman. 1974. "The Estimation of Income and Substitution Effect in a Model of Family Labor Supply." Econometrica 42.

Ballot, G. 1994. "Continuing Education and Schumpeterian Competition: Elements for a Theoretical Framework." In: R. Asplund, ed., *Human Capital Creation in an Economic Perspective*. Berlin: Physica Verlag.

Bean, C. R.and Layard, Richard and Nickell, S.J. 1986. "The Rise in Unemployment: A Multi-country Study". Economica, New Series, Vol. 53 no. 210.

Blanchard, Olivier Jean and Diamond, Peter. 1989. "The Aggregate Matching Function." Working Paper Department of Economics No.538. MIT.

Boeri, T., 1995 "Cyclical Patterns of Gross Job Flows and the Macroeconomic Relevance of Job Turnover", in Schettkat, R. (ed.) The Flow Analysis of Labour Markets, Kluwer Academic Press.

Borjas. 1996. *Labor Economics.* McGraw-Hill, New York.

Burgess, S., Lane, J. and Stevens, D. 1996. "Worker and Job Flows, Economics Letters 51, 109-113.

BPS. Various issues. Survei Angkatan Kerja Nasional.

BPS. 2008. Labor Force Situation in Indonesia. <http:// www.bps.go.id/releases/files/eng-tenaker-15mei07.pdf?>. Jakarta. Accessed 25 March 2008.

BPS and ORC Macro. 2003. Indonesian Demographic and Health Survey 2002-2003. Calverto, Maryland, USA: BPS and ORC Macro.

Burgess, Simon M. 1992. "The Flow into Unemployment in Britain". The Economic Journal Vol. 102 No. 413. Pp. 888-895.

Cazes S and A. Nesporova, 2001, Labour market flexibility in the transition countries: How much is too much?. International Labour Review; 140, 3; ABI/INFORM Global, pg. 293.

Dasvarma, G.L. 2002. Research note: Contribution of mortality decline to longer working life: the case of Indonesian males 1980-1995. Journal of Population Research, 19 (1), pp.75-84.

Deuster, P. R. 2002. Survey of Recent Developments. Bulletin of Indonesian Economic Studies 38(1): 5-37.

Dmitrijeva, Jekaterina, dan Mihails Hazans. 2005. A Stock-Flow matching Approach to evaluation of public training program in a high unemployment environment.

Ehrenberg, R. G., and R. S. Smith. 2000. Modern Labor Economics: Theory and Public Policy. Boston: Pearson-Addison Wesley.

Fujita N. and W. E. James. 1997. Employment Creation and Manufactured Exports in Indonesia, 1980-90. Bulletin of Indonesian Economic Studies 33(1): 103-115.

Fullerton, H.N., and J.J. Byrne. 1976. Length of Working Life for Men and Women 1970. Special Labor Force Report 187 (revision). Washington: Bureau of Labor Statistics.

Goldstein, Morris. (1972). "The Trade-off Between Inflation and Unemployment:A Survey of the Econometric Evidence for Selected Coutries". Staff Papers-International Monetary Fund , Vol. 19, No.3 , pp.647-698.

Gujarati, Damodar N. (2003). *Basic Econometrics*. Boston: McGraw Hill.

Hadiz, V. R. 1997. Workers and the State in New Order Indonesia, London: Routledge.

Holden,K. dan D.A. Peel. "Determinant of the Unemployment Rate: Some Empirical Evidence". The Statistician, Vol. 28 no.2 (Jun. 1979), pp. 101-107.

Holt, C. and David, M. "The Concept of Job Vacancies in a Dynamic Theory of the Labor Market." *In The Measurement and Interpretation of Job Vacancies*, edited by R. Ferber. New York: Nat. Bur. Econ. Res., 1966.

Iro, M. 1976. The main features of a working life table of the female labor force in Nigeria. Journal of the Royal Statistical Society. Series A (General). 139 (2), pp.258-264.

Jones, G. 1981. Labour Force Developments since 1961. Pp 218-261 in A. Booth and P. McCawley (eds.). The Indonesian Economy During the Soeharto Era. Kuala Lumpur: Oxford University Press.

Kpedekpo, G.M. 1969. On working life tables in Ghana with particular reference to the female working population. Journal of the Royal Statistical Society. Series A (General), 132 (3), pp.431-441.

---------. 1969. Working life tables for males in Ghana 1960. Journal of the Royal Statistics Society: Series A (General). 64 (325), pp. 102-110.

Leonard, J. S. 1997. Institutional Influences on Job and Labor Turnover. Pp 37-65 in R. Schettkat (ed.), The Flow Analysis of Labour Markets. London: Routledge. (1996).

Manning, C. 1998. Indonesian Labor in Transition: An East Asian Success Story?. Cambridge: Cambridge University Press.

Manning, C. 2004. 40 Million Unemployed? Pp 158-159 in S. V. Marks. Survey of Recent Developments. Bulletin of Indonesian Economic Studies 40(2): 151-175.

Mantra, I.B. 2000. Demografi Umum. Yogyakarta: Pustaka Pelajar.

McLaughlin, K.J. 1991, A Theory of Quits and Layoffs with Efficient Turnover The Journal of Political Economy, Vol. 99, No. 1. Februari, p 1-29.

Oey-Gardiner, M. 1993. A gender perspective in Indonesia labor market transformation. Pp.203 in C. Manning and J. Hardjono (eds), Indonesia Assessment 1993, Labour: Sharing in the Benefits of Growth? Canberra: Department of Political and Social Change Research School of Pacific Studies, Australian National University.

Parker S. and P. Hutabarat. Survey of Recent Developments. Bulletin of Indonesian Economic Studies 32(3): 3-31.

Pries, M. and R.Rogerson. 2005. Hiring Policies, Labor Market Institutions, and Labor Market Flows, The Journal of Political Economy; Agustus; 113, 4; ABI/INFORM Global pg. 811.

Phang, H.S. 2002. Work-Life Profiles of Korean Workers: Life-Table Analysis. Working Paper Korean Labor Institute 2002 (5).

Parewangi, Andi Alfian. "Analisis Data Panel". Makalah tidak diterbitkan.

Schettkat, R. 1996. "The Flow Approach to Labor Market Analysis: Introduction" in R. Schettkat (ed.), The Flow Analysis of Labour Markets. London: Routledge. (1996).

Silalahi, P.R. 2007. Tuntutan Menggerakkan Sektor Riil. Analisis CSIS 36(3): 268-277.

Schoen, R., and K. Woodrow. 1980. Labor Force Status Life Tables for the United States 1972. Demography, 17 (3), pp.297-322.

Suryadarma, D., A. Suharyadi, and S. Sumarto. 2007. Reducing Unemployment in Indonesia: Results from a Growth-Employment Elasticity Model. SMERU Working Paper. January.

Soesastro, H. and R. Atje. 2005. Survey of Recent Developments. Bulletin of Indonesian Economic Studies 41(1): 5-34.

Shryock, H.S., J.S. Siegel, and associates. 1971. Methods and Materials of Demography, vol.2. Washington: US Department of Commerce Bureau of the Census.

Swee-Hock,S. 1965. Malaya: Tables of male working life 1957. Journal of the Royal Statistical Society, Series A (General), 128 (3), pp 421-438.

Timmer, M.P. 1999. Indonesia's Ascent on the Technology Ladder. Bulletin of Indonesian Economic Studies 35(1): 75-97.

Wachter, Michael L. 1977. "Intermediate Swings in Labor-Force Participation". Brooking Paper on Economic Activity, Vol. 1977 no. 2, pp 545-576.

Welch, Finis. 1979. "Effects of Cohort Size on Earnings: The baby boom babies' financial bust."*Journal of Political Economy* 87, No.5, pt. 2: S65-S97.