A Contribution to the Empirics of Labour and Development Economics: Regional and Individual Unemployment Persistence, Cash Transfer Program and International Poverty Line

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List of Abbreviations

ADF	Augmented Dickey-Fuller
AR	Autoregressive
BLT	Bantuan Langsung Tunai (Direct Cash Support)
BLSM	Bantuan Langsung Sementara Masyarakat (Temporary Direct Support)
CBS	Central Body of Statistics
CCT	Conditional Cash Transfer
CIPS	Correlated Im, Pesaran, Shin
CMA	Central Moving Average
CPI	Consumer Price Index
DF	Dickey-Fuller
DFGLS	Dickey-Fuller Generalized Least Squares
ICP	International Comparison Project
ILO	International Labour Organization
IPS	Im, Pesaran, and Shin
LLC	Levin, Lin, Chu
OECD	The Organisation for Economic Co-operation and Development
PKH	Program Keluarga Harapan (Family Hope Program)
PPLS	Program Perlindingan Sosial (Data for Social Protection Program)
PPP	Purchasing Power Parity
PSE	Pendataan Sosial Ekonomi (Data Collection for Social-Economy)
RCS	Revallion, Chen, Sangraula
SAKERNAS	Survei Angkatan Kerja Nasional (National Labour Force Survey)
SKTM	Surat Keterangan Tanda Miskin (Identification Card for the Poor)
SUPAS	Survei Popolasi Antar Sensus (Inter-Censal Population Survey)
SUR	Seemingly Unrelated Regressions
SUSENAS	Survei Sosial Ekonomi Nasional (National Survey on Socio-Economy)
UCT	Unconditional Cash Transfer
ZA	Zivot-Andrews

Introduction and Overview

Poverty and unemployment are two of the greatest issues facing developing nations today. This dissertation contains four essays addressing these topics on various levels as they relate to Indonesia and the developing world. The first two essays analyse the regional and individual persistence of unemployment while the third essay explores the appropriate design and scale of the cash transfer program; the final essay presents an alternative to the international poverty line and compares it to the official "dollar a day revisited" at 1.25 dollars per day that is used by the World Bank. The first three papers focus on the Indonesian case while the last one relates to developing countries.

Essay 1 entitled "**The Hysteresis versus Persistence Hypotheses on Regional Unemployment Rates in Indonesia, 1990-2012".** It applies time-series and panel unit root frameworks during the period of 1990–2012 to prove the hysteresis or persistence hypothesis of the provincial unemployment rates in Indonesia. The analyses also consist of the provincial unemployment rates by total and categorised subgroups: gender, age, education, location in urban or rural areas, and their gaps. The results show that the changed definition of unemployment in 2001 by the Indonesian Central Body of Statistics (CBS) and the choice of using linear or quadratic trends play a significant role in the empirical results. On the one side, most of the individual provincial tests using linear trends and the CBS definition cannot reject the hysteresis hypothesis. Oppositely, there are increasing rejections of the hysteresis if the tests use quadratic trends and the old definition (U1). The main results from the tests by categorical gaps suggest rejecting the hysteresis hypothesis as well. When examining the results using panel data, the majority of the tests reject the hysteresis both using linear and quadratic trends.

This essay contributes to the empirical studies of the persistence of regional unemployment, especially in Indonesia. As a comprehensive empirical study, it analyses not only the provincial unemployment rate in total but also the unemployment rate by categories and their categorical gaps. It also includes the effects of the changed definition of unemployment. Methodologically, it compares the test choices between linear and quadratic trends on the several different methods

such as: Dickey-Fuller (1979), Elliot, *et. al.* (1996), Ayat and Burridge (2000) and Zivot and Andrews (1992) for provincial data and Im, *et. al.* (2003), Pesaran (2007) and Levin *et. al.* (2002) for panel data analysis.

Essay 2 entitled "**Persistence of Individual Unemployment in Indonesia: Dynamic Probit Analysis from Panel Susenas 2008-2010".** It compares a variety of dynamic random effects estimators, especially from the Heckman (1981) and Wooldridge (2005) approaches. This essay proves that there is strong evidence of the implications of an individual's previous unemployment experience for his/her future labour market experience which is consistent with the state dependence in unemployment or the theory of scar unemployment. In addition, the consequences of including control variables or observable heterogeneity, unobservable heterogeneity, and initial conditions in the models, the effects of the variables in the household formation and the external support become weaker or insignificant. Meanwhile the variables regarding the family support play a significant role in the current unemployment status. The probability of being unemployed increases if the individuals are males and live in urban areas and it decreases if they are married. However, the level of education is insignificant to the probability of being unemployed due to the low level of education attainment which is on average of 8 years of schooling.

This essay contributes to the empirical literature by analysing the first empirical evidence of individual persistent unemployment for the case of Indonesia through employing the first and latest round of the consistent panel data from the Susenas surveys. Even though the estimation methods are similar to those previous empirical studies in the developed countries (such as the USA, UK, and Germany), the empirical models here introduce some new variables such as: family support, household formation, and external (government or non government) support in addition to of individual's education, gender, age and marital status.

Essay 3 entitled "**Issues on Targeting and Designing the Amount of Grant for the Cash Transfer Programs in Indonesia**". This essay aims to investigate who gets the cash transfer programs in Indonesia and to provide better options for the amount of grant compared to the fixed universal grant applied by Indonesian government

recently. Despite a significant number of mis-targeting in the BLT and PKH programs, the probit estimates of these programs' recipients show that the poor households, the household characteristics relating to the poor conditions, and receiving the other social benefits, have significant effects to the probability of receiving the programs. Furthermore, this essay examines two alternative options that should be used as guidelines by decision-makers for the amount of grant compared to the government's fixed universal grant. The first is making the amount equal to the value of the poor family's income deficit plus the expected inflation. The second is making the value of the cash transfer amount equal to a province's representative value (75^{th} percentile) of the income deficit plus its expected inflation. These two options decrease the poverty rates significantly. Therefore, this essay contributes to the alternative designs for the amount of grant on the cash transfer programs in Indonesia as well as other developing countries.

The final essay or Essay 4 entitled **"Dollar a day Re-revisited".** It revisits the derivation of the new international poverty line proposed by Ravallion, Chen, and Sangraula (2009). First, we emphasize that it is critical to estimate the relationship with respect to the log of per capita consumption as only that relationship actually shows a structural break which is at the heart of the issue of an absolute international poverty line. When doing so, all our estimates generate a significantly larger reference group for the estimation of the international poverty line. Our best estimate for the threshold model stands at $1.45 per day. Of course, this would lead to a higher global poverty count than that of the new $1.25 poverty line. In fact, in 2005, we would now be looking at 1.74 billion absolutely poor in the world if we adopted that procedure for finding the new international poverty line. This essay contributes to the debate on the international poverty line by going through its methodological and statistical issues.

Policy Implications

The findings of all essays in this dissertation may have some policy implications for the local and central governments' economic policies in Indonesia. The findings in Essay I

suggest to promote the investment policies and managing the growth of real regional minimum wages to reduce the persistence of unemployment rates in the local labour markets rather than increase the local government expenditures or rely on the local economic growths.

Moreover, most of Indonesian labour force has low education or about 8 years in average of schooling and they graduated from primary and secondary general education. This makes education variable insignificantly influence the probability of being unemployed which has mentioned in the results of Essay 2. However, promoting and creating more medium and high vocational schools would be a good policy since the labour forces graduated from this kind of education have lower unemployment rates compared to general education which has mentioned in the results of Essay 1. This policy will increase the skills of the labour forces and hopefully will decrease their probability of being unemployed in the future.

The results in essay 3 support the Indonesian government to revise the database for the social protection programs in 2008, called PPLS 2008. This is the main database for the cash transfer programs in Indonesia during 2008-2010. The support for a revision is based on the facts that there is a significant number of the cash transfer recipients come from the non-poor or non-intended households. The government eventually has created the newest database for the social protection programs, called PPLS 2011. Furthermore, the results in Essay 3 also suggest the government to make a new design of the cash transfer amounts which the social-economic conditions, living costs, and locations of the targeted households are taken into account.

The last policy implication comes from Essay 4 which suggests for revising the absolute international poverty line from $1.25 to $1.45 a day. This new international poverty line would have consequences for the progress on the Millennium Development Goals (MGDs), especially the first goal, Eradicate Extreme Poverty and Hunger. It also has consequences for creating the new sustainable development goals post-2015 in which some of the goals may be related to global poverty calculation.

Essay 1: The Hysteresis versus Persistence Hypotheses on Regional Unemployment Rates in Indonesia, 1990-2012

Abstract

This paper presents the tests of hysteresis versus persistence hypotheses of provincial unemployment rates in Indonesia by applying time-series and panel unit root analyses during the past 23-year period from 1990 to 2012. The tests consist of the unemployment rates analysed in subgroups: gender, age, education, location in urban or rural areas, and their gaps. The results show that the changed definition of unemployment in 2001 by the Indonesian Central Body of Statistics (CBS) and the testing choices between linear and quadratic trends play a significant role on the empirical results. On the one side, most of the individual provincial tests using linear trends and CBS definition cannot reject the hysteresis hypothesis. On the other side, there are increasing rejections of the hysteresis if the tests use quadratic trends and the old definition (U1). The main results from the tests by categorical gaps suggest rejecting the hysteresis hypothesis as well. When examining the results using panel data, the majority of the tests reject the hysteresis both using linear and quadratic trends. Lastly, the local economic policies that can be used to promote investment and managing the growth of real regional minimum wages are more favourable than increasing local government expenditure in order reduce the unemployment rates and the adjustments to their normal levels in local labour markets.

Keywords: hysteresis, persistent unemployment, sakernas, unit root test, panel unit root test.

JEL Classification Numbers: C22, C23, J64, J68.

1.1 Introduction

Local economies in Indonesia have been extensively developed since the reform era. Larger regional autonomy in economic development policies and fiscal decentralisation has been implemented since the economic crisis of the late 1990s. However, the economic heterogeneity of these local economies seems to be a natural consequence of the geographical factor of an archipelago country and their initial development. Therefore, so-called "national economic performances" might not reflect their regional economic performances, including unemployment rates. Thus, the "national unemployment rates" may not reveal the full situation in provinces' unemployment rates. We therefore need a comprehensive study for unemployment and its persistence not only at the national level but also at the regional level.

Unemployment persistence has been a concern for many economists since the high unemployment rates in European countries in 1980s and 1990s. In aggregate unemployment, Blanchard and Summers (1986) explored the idea of the unemployment hysteresis and persistence. Barro (1988) assessed the extent of unemployment persistence using a time-series approach. Jimeno and Bentolila (1998) provided a theoretical model explaining the persistence of regional unemployment.

There are many studies about persistence of unemployment around developed countries but only few for the cases in developing countries, especially Indonesia. The persistence of unemployment in Indonesia was recently studied by Soekarni, *et. al.* (2009). The study used national and regional data. However, regional data only consisted of west and east Indonesia instead of all provinces. They concluded that there was disequilibrium persistent unemployment without self-correcting mechanisms in Indonesia from 1994 to 2006. Moreover, the west region was more persistent than the east region.

It is necessary to expand the study not only for comprehensive aggregate evidences in gender, age group, level of education, and rural urban but also for their gaps. Therefore, this shall be carried out to test the hysteresis or persistence hypotheses of regional unemployment rates in Indonesia by all divisions of unemployment rates and their gaps as mentioned previously.

1.2 Literature Review

In general, there are two definitions of unemployment persistence in macroeconomics. First, the unemployment persistence can be understood as an unemployment level that reaches higher and higher and then eventually levels off (Elmeskov, 1993). Second, it can also be said to be the slow adjustment to its equilibrium level of unemployment under the influence of its previous path of unemployment or time-dependence (Lindbeck, 1993, Panigo, *et. al.*, 2004).

The last interpretation comes from the econometric literature originally used by Blanchard and Summers (1986) which is based on a unit root test analysis of time-series variables of unemployment rate. This interpretation could be modelled as following equation:

(1.1) $$un_t = \alpha + \rho un_{t-1} + \varepsilon_t$$

where un_t is the current unemployment rate, un_{t-1} is the first lagged unemployment rate and ε_t is the error term. The coefficient $\rho \geq 0$ would be defined as the persistence effect. Based on the hysteresis hypothesis, the coefficient ρ would be equal to one or called as a unit-root in a time-series analysis. It means that the future behaviour of the unemployment would be equal to the previous value plus/minus a random variation. This would imply that the unemployment rate is also a random walk or a non stationary process (Dickey and Fuller, 1976, Panigo, *et. al.*, 2004).

The hysteresis should not be confused with persistence. Persistence implies that, even though the adjustment towards the equilibrium level is slow, unemployment still shows mean reversion then ρ should lay between zero and one. Thus, persistence might be known as a special case of the natural rate hypothesis in which unemployment is a stationary process. Therefore, macroeconomic policy would have long lasting but not permanent effects under persistence but it would have permanent effects in hysteresis (Leon-Ladesma, 2002).

The empirical studies in the 1980s found that the wage determination behaviour of insiders as a possible reason for hysteresis in European and US economies (Blanchard and Summers, 1986); unionization and the size of government had positive

effects on persistence among the economies that lacked a centralized structure of labour bargaining (Barro, 1988). From the 1990s until recently, most empirical studies stated that wage rigidities, structural shocks and institutions were usually the better explanations for the persistence in European unemployment (Elmeskov, 1993; Blanchard and Jimeno, 1995; Bianchi and Zoega, 1998; Blanchard and Wolfers, 2000, Blanchard, 2006). Long periods of unemployment would reduce an individual's employability due to the loss of human capital and productivity deterioration, then causing them to become permanently unemployed (Pissarides, 1992).

Moving to the research findings on regional unemployment persistence, Jimeno and Bentolila (1998) provided a theoretical model and empirical evidence to explain regional unemployment persistence in Spain (see also Murillo, *et al.*, 2005). They explained that a demand shock in the labour market was the main cause of the persistence of regional unemployment in the country. Other research findings were provided by Song and Wu (1997) and Leon-Ladesma (2002) for the case of US states, Leon-Ladesma and Mc Adam (2004) for the cases in European transition countries, Panigo, *et. al.* (2004) for Argentina, Bornhorst and Commander (2006) for six transition countries in Europe, Wu (2003) for China, and Soekarni, *et. al.* (2009) for Indonesia. In the two latest works, they also presented the determining factors of the persistence in regional unemployment. According to Wu (2003), the higher the share of industry output by state sector, the higher the regional unemployment persistence. The private sector was the main employment destination for the jobless and had acted to reduce unemployment persistence. On the other side, Soekarni, *et. al.* (2009) stated that the shares of manufacturing and service sectors on regional outputs were the causes of regional unemployment persistence.

Investigating the specific characteristic of unemployment, Azmat, *et al.* (2006) and Queneau and Sen (2007, 2009) explored the persistence of gender gaps in unemployment rates in OECD countries. Queneau and Sen (2009) measured the gender unemployment gap as the difference between the female and male unemployment rates. Their empirical evidence implied that any shock to the gender unemployment gaps were relatively persistent in most countries except Finland and

Italy. However, in another paper, Queneau and Sen (2007) introduced the ratio of the female to male unemployment rates as the gender gaps measurement. Their empirical evidence showed that the gender unemployment gaps were not persistent for all countries in their sample except for Australia.

Wu (2003) also proved that youth unemployment was less persistent than total unemployment in China. However, this is not quite comparable because youth unemployment is already included in total unemployment. Youth unemployment should be compared to older people's unemployment. This paper compares the comprehensive results of national and regional unemployment rates in Indonesia based on: gender, age groups, level of education, and urban or rural location.

1.3 Labour Situation in Indonesia

1.3.1 Change in Definition and Its Consequence

The labour market situation in developing countries, especially in Indonesia, is quite different from the labour market in developed countries. Let us begin with the definition of unemployment and how it has changed in Indonesia during the period of 1990-2012. Table 1.1 presents the major change of the CBS definition of unemployment prior and since 2001. Prior to 2001, unemployment was defined as not working and actively looking for a job in the previous week (U1) which is relatively similar to the standard International Labour Organization's (ILO) definition that is followed by most of developed countries. But since 2001 three additional groups have been included in the unemployment definition, namely: a person establishing a new business (U2), discouraged (U3), and those who have a job but have not yet started (U4).

Some claimed that CBS has changed the definition of unemployment from a well-defined period as "not working and looking for a job during the previous week" to "not working and looking for a job" since Sakernas 1994 (see for example: Manning and Junankar, 1998, Dhanani, 2004, and Suryadarma, *et. al.,* 2007). This is not entirely true due to the following reasons. First, the question on "have you been looking for a job" on the questionnaire of Indonesian National Labour Force Survey (Sakernas) is not

explicitly followed by the phrase “during the previous week” because there is a heading statement with capital letters "the activities during the previous week" as the title of Part IV section B. This has been especially noted since Sakernas 2001. Second, the question on "activities during the previous week" is explicitly and consistently asked for “working”. Because unemployment is a sub-division from working, the exact definition of unemployment by CBS would be “not working --*in the previous week*-- and actively looking for a job --*either in the previous week or longer*--. Thus, this implicit meaning of “during the previous week” should be included in the question of “have you been looking for a job”. However, such claims by Manning and Junankar (1998) and others could be true if the surveyors in the field do not inform this to the respondents so that the interpretation of the question "have you been looking for a job" is no longer in the context of "during the previous week" meanwhile the implicit answer for “not working” is always in the context of “during the previous week”[1].

Table 1.1 Changes on Unemployment Definition by Indonesia’s CBS

Prior to 2001	Since 2001
U1= Not working and actively looking for a job	U1 = Not working and actively looking for a job U2 = Not working and not looking for a job but establish a new business U3 = Not working and not looking for a job, and not establish a new business but reason for not looking for job is “discouraged” U4 = Not working and not looking for a job and not establish a new business but reason for not looking for job is have a job but have not started yet

Note: Reasons for not looking for job: the actual answer for discouraged is “feel that it is impossible to get a job”. The same answer could be traced back to Sakernas 1999-2000. The similar answer could be also noticed on Sakernas 1995-1998 as “hopeless”. Since 2007: CBS explicitly wrote a footnote what is the explanation for the answer in the questionnaire as “a reason for looking job many times but do not get a job. Or for those who feel impossible to get a suitable job due to the situation/condition/climate/seasonal”.

Prior to 1994 and using the old definition, national unemployment rates were relatively stable at 2-3 percent. In 1994, unemployment rates increased quite significantly from 2.79 percent to 4.36 percent. In 1995, CBS used the Inter-Censal Population Survey (SUPAS) instead of Sakernas data since it had more than twice as

[1] There are two questions about looking for a job in Sakernas 2007. One is an alternative answer for the question “what did you do during the previous week” besides working, schooling, housekeeping, and other activities. The other is an independent question for “have you been looking for job” which is the based question for calculating unemployment by CBS.

many observations and resulted in the unemployment rate jumping to 7.02 percent. After 1995, CBS used Sakernas data again and unemployment rates remained stable at 4-6 percent until 2000. In 2001 with the new definition, the unemployment rate increased by more than 2 percent to 8.10 percent. This would correspond to 5.54 percent using the old definition. However, only the definition of discouraged labour forces (U3) could be traced back until 1995. Using the combination of the old definition (U1) plus U3, the unemployment rate in 2001 was 7.58 percent, lower than the highest at 13.90 percent in 2000. So, the new CBS definition is dominated by U1 and U3 while U2 and U4 could be accounted as the differences between CBS and (U1+U3) on the Figure 1.1.

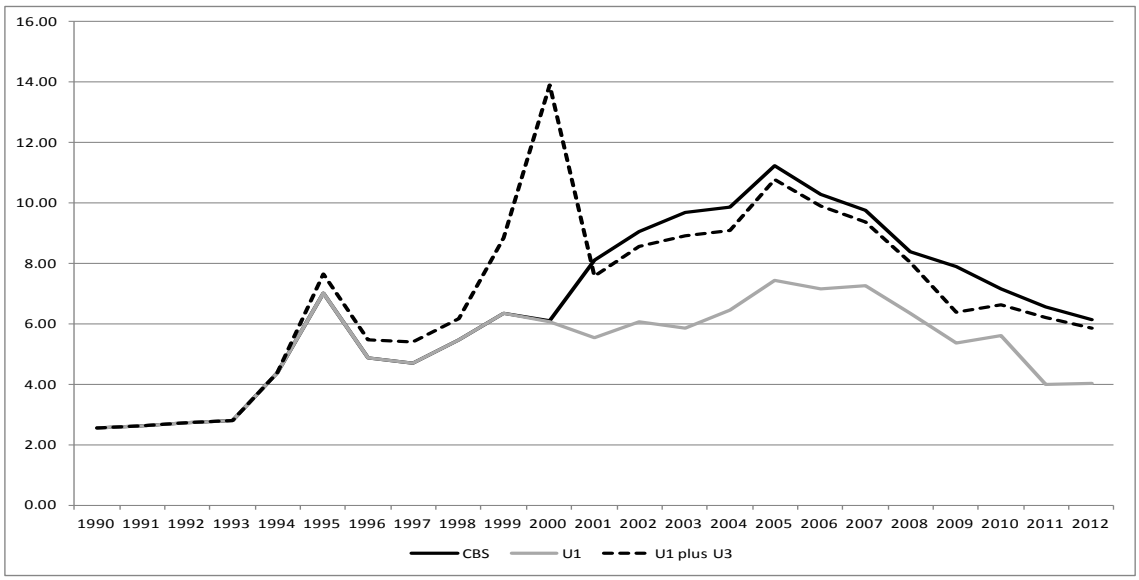

Figure 1.1 National Unemployment Rates, 1990-2012

1.3.2 Unemployment in the Period of Economic Crisis

A question might also be emerged, especially during the economic crisis period particularly in year 1998, when the economic growth sunk to -13.1 percent but why was unemployment rate relatively low at 5.46 percent by CBS definition or 6.18 percent by U1 plus U3 definition? The answers for this could be explained in Table 1.2. The table shows the changes in the working population from 1997 to 2000. Compared to 1997, the total working population in 1998 increased by 3.46 million with employment change at 2.25 million and unemployment change at 0.86 million. A

closer look showed that all employment sectors decreased except for the agriculture, transportation and communication sectors. In total, about 2.39 million were displaced because of the crisis in which the manufacturing sector suffered most at 1.07 million unemployed. On the other hand, there were about 4.6 million additional absorptions in agricultural, livestock, forestry, and fishing sectors. It could be concluded that the economic crisis did not greatly affect unemployment rates because of the increase of employment absorption in the agriculture, livestock, forestry, and fishing sectors. However the displaced workers might also have gone to school to pursue higher skills or simply became discouraged labour force.

Table 1.2 Changes in Working Population during the Period of Economic Crisis

	1997		1998		1999		2000	
	CBS	Alternative	CBS	Alternative	CBS	Alternative	CBS	Alternative
Population 15+	134,548,441		138,003,713		141,096,417		141,170,805	
Employed:	85,047,007		87,292,541		88,816,859		89,837,730	
Sector 1	34,536,947		39,144,556		38,378,133		40,680,229	
Sector 2	875,125		674,597		725,739		451,931	
Sector 3	10,993,530		9,918,990		11,515,955		11,641,756	
Sector 4	232,479		147,849		188,321		70,629	
Sector 5	4,174,289		3,516,940		3,415,147		3,497,232	
Sector 6	16,936,348		16,786,274		17,529,099		18,489,005	
Sector 7	4,120,829		4,147,206		4,206,067		4,553,855	
Sector 8	655,380		617,722		633,744		882,600	
Sector 9	12,522,080		12,338,407		12,224,654		9,570,493	
Unemployed:	4,183,971	4,842,759	5,045,260	5,751,888	6,030,319	8,606,247	5,813,231	14,560,159
U1	4,183,971	4,183,971	5,045,260	5,045,260	6,030,319	6,030,319	5,813,231	5,813,231
U3		658,788		706,628		2,575,928		8,746,928
Schooling	10,775,591	10,675,574	11,240,506	11,199,841	10,934,731	10,910,452	10,763,473	10,143,115
House Keeping	25,804,437	25,477,734	25,173,849	24,998,444	25,857,621	24,753,385	25,275,187	19,699,558
Others	8,737,435	8,505,367	9,251,557	8,760,999	9,456,887	8,009,474	9,481,184	6,930,243

Note: One province (Maluku) in Sakernas 2000 was not surveyed. Sector 1-9: (1) agriculture, livestock, forestry, and fishing; (2) mining and quarrying; (3) manufacture; (4) electricity, gas, and water; (5) construction, (6) trade, hotel, and restaurant; (7) transportation and communication; (8) financial, real estate and business services; (9) services.
Sources: Sakernas, 1997-2000 (author's calculation).

In 1999 when the effects of crisis had been tackled, the manufacturing sector had recovered and absorbed an additional 1.6 million workers. This was more than half a million higher than its displaced number in 1998 while the agriculture sector absorption was reduced by about 0.77 million. It seemed that the workers who were displaced in 1998 had come back to manufacturing sector in 1999. However, the number of discouraged labour force increased to 1.87 million. This reached the highest peak at 8.75 million in 2000. As it is noticed in Figure 2.1, the unemployment rates by U1 plus U3 definition in 2000 would be the highest unemployment rate in history at 13.90 percent. The highest U3 in 2000 was also temporary if we compare it to the

following's year data in 2001 at 2.12 million. Around 6.63 million of discouraged unemployed went back to be employed or became actively looking for a job. Basically, the U3 calculation came from schooling, women who were housekeepers and other activities (such as: retirees and handicapped persons). In 2000, if we included U3 as the labour force then 8.7 million of U3 came from schooling (0.6 million), housekeeping (5.6 million), and others (2.5 million).

1.3.3 Characteristics of Labour Force in Indonesia

Table 1.3 presents the characteristics of the labour force in Indonesia during the period 1990-2012. The composition of the employment rate based on gender was not very different from the male employment share at 59.70 percent of the total labour force in 1990 and became 58.51 percent in 2012. The female employment share however, reduced from 37.75 percent to 35.36 percent in the same period. Employment rates by age were also relatively stable during the same period. In 1990, the youth employment share was at 21.20 percent and with a decreasing trend became 14.13 percent in 2012 while adult employment share ranged between 76.25 – 79.73 percent.

A very different trend was found for the employment rate based on education. For more than 20 years of the surveys, the employment rate for low education decreased from 75.72 percent in 1990 to only 45.64 percent in 2012 while the employment rate for medium education increased from 19.90 percent to 39.80 percent in the same period. The employment rate of high education also increased from 1.82 percent in 1990 to 8.43 percent in 2012. It was noticed in 2012 that workers with medium and high education have dominated the employment market. Even though this is a quite good achievement, there is still the great challenge of increasing the number of educated and skilled workers in the near future.

It was also found that there was significant mobility in the labour force, especially for workers moving from rural to urban areas. In 1990, there were 73.33 percent of workers living in rural areas but only 49.27 percent in 2012. This would be consistent with the employment rate by sector in which sector 1 (agriculture, livestock, forestry, and fishing) dominated the labour market in 1990 at 53.70 percent but

became less dominant at 32.94 percent in 2012. Meanwhile the employment rate for manufacturing, trade, and service sectors (sector 3, 6, and 9) increased by about 11 percent during the period of 1990-2012.

Table 1.3 Characteristics of Labour Force in Indonesia

Labour Force	1990	1994	1998	2001	2005	2008	2012
Employment Rate	**97.45**	**95.64**	**94.54**	**91.90**	**88.76**	**91.61**	**93.86**
by gender:							
Male	59.70	58.72	58.12	57.82	58.04	57.08	58.51
Female	37.75	36.91	36.42	34.08	30.72	34.53	35.36
by age							
Youth, 15-24	21.20	19.83	17.62	15.63	14.03	14.79	14.13
Adult, 25+	76.25	75.80	76.91	76.27	74.73	76.82	79.73
by education:							
Less and Primary School	75.72	68.87	61.90	56.23	49.18	49.43	45.64
Junior/Senior High School - Vocational	6.20	7.20	7.54	7.57	6.92	6.91	8.85
Junior/Senior High School - General	13.70	16.92	21.34	23.67	27.75	29.00	30.95
Diploma	0.75	1.18	1.98	2.41	2.84	3.71	5.91
University	1.07	1.47	1.79	2.01	2.07	2.57	2.52
by location:							
Urban	24.12	28.82	32.79	36.53	35.41	37.74	44.59
Rural	73.33	66.81	61.75	55.37	53.35	53.87	49.27
by status [A)]:							
Informal	69.72	63.54	63.41	65.00	64.17	66.43	59.73
Formal	27.73	32.09	31.13	26.90	24.59	25.18	34.13
by sector [B)]:							
Sector 1	53.70	43.49	42.39	40.22	39.02	36.92	32.94
Sector 2	0.68	0.87	0.73	0.96	0.85	0.96	1.36
Sector 3	9.94	12.69	10.74	12.23	11.29	11.21	13.02
Sector 4	0.18	0.22	0.16	0.14	0.18	0.18	0.21
Sector 5	2.72	4.24	3.81	3.88	4.31	4.86	5.75
Sector 6	14.43	16.45	18.18	17.68	16.92	18.96	19.61
Sector 7	3.07	4.02	4.49	4.50	5.34	5.52	4.23
Sector 8	0.64	0.75	0.67	1.14	1.08	1.30	2.26
Sector 9	12.08	12.90	13.36	11.14	9.76	11.70	14.49
Unemployment Rate	**2.55**	**4.36**	**5.46**	**8.10**	**11.24**	**8.39**	**6.14**
by definition:							
U1	2.55	4.36	5.46	5.39	7.14	6.22	3.93
U2				0.16	0.06	0.15	0.11
U3				2.15	3.58	1.78	1.91
U4				0.40	0.45	0.25	0.19
by gender:							
Male	1.51	2.37	3.09	4.08	5.94	4.69	3.57
Female	1.04	2.00	2.38	4.02	5.30	3.71	2.57
by age							
Youth, 15-24	1.84	3.13	3.65	4.95	7.05	4.49	3.44
Adult, 25+	0.71	1.24	1.82	3.14	4.19	3.90	2.70
by education:							
Less and Primary School	0.66	1.08	1.26	2.78	3.46	2.36	1.72
Junior/Senior High School - Vocational	0.51	0.81	1.05	1.24	1.55	1.32	0.93
Junior/Senior High School - General	1.22	2.10	2.69	3.54	5.56	3.85	2.95
Diploma	0.08	0.21	0.27	0.29	0.37	0.53	0.37
University	0.08	0.16	0.19	0.25	0.29	0.32	0.17
by location:							
Urban	1.54	2.57	3.35	4.51	5.87	4.63	3.70
Rural	1.01	1.79	2.11	3.59	5.37	3.76	2.44

Notes: all values as a percentage of total labour forces at respective year.

[A)] Informal: (1) own account workers, employer assisted by temporary, unpaid and permanent workers; (2) unpaid workers; (3) casual employee in agriculture; (4) casual employee in non-agriculture.

[B)] Sector 1-9: (1) agriculture, livestock, forestry, and fishing; (2) mining and quarrying; (3) manufacture; (4) electricity, gas, and water; (5) construction, (6) trade, hotel, and restaurant; (7) transportation and communication; (8) financial, real estate and business services; (9) services.

Sources: Sakernas, 1990-2012 (author's calculation).

Moreover, flexibility and mobility of workers were not only noticed from location but also from worker's employment status. Informal workers have continued to dominate the labour market since 1990. In 1990, 69.72 percent of employees worked in the informal sector and continued to dominate until 2012 at 59.73 percent. The flexibility of workers' movement was also found in time of economic crisis as mentioned previously, especially from the manufacturing to agricultural sectors, from formal paid to informal jobs, and from urban to rural areas.

Table 1.3 also shows unemployment rate by definition, gender, age, education and location. The new definition begun in 2001 in which U1 and U3 dominated the unemployment rate at 5.39 percent and 2.15 percent respectively. The unemployment rate reached its peak at 11.24 in 2005 in which U1 at 7.14 percent an U3 at 3.58 percent. In 2012, the unemployment rate decreased as well as U1 at 3.93 percent and U3 at 1.91 percent of total labour force. As a summary, in 2012 the unemployment rate was dominated by males, youth, those with a middle education especially for general education, and urban areas.

As a developing country, there is no unemployment benefit scheme in Indonesia even though after the Social Safety Net Law in 2004 (Law No. 40/2004) and the law for Social Safety Net Agencies in 2011 (Law No. 24/2011) in which a social safety net agency for labour force was introduced. The social safety net agency for labour force insures employees against accident, death, and retirement but not against being unemployed. In the post economic crisis, the central government mandated the regional government to regulate regional minimum wages. This development in the labour market coincided with the passing of others labour laws such as the Trade Union Law (No. 21/2000) for basic labour rights and freedom to create and become a member of a trade union. The Manpower Law (No. 13/2003) was passed for governing severance pay, minimum wage and contract work. The Industrial Disputed Resolution Law (No. 2/2004) was created to manage industrial disputation. The Law of Migrant Workers Overseas (No. 39/2004) was created to protect Indonesian workers overseas. In 2012, Indonesia passed the Law No. 6/2012 to ratify the international convention on the protection of rights of all migrant workers and members of their families.

1.4 Methodology

1.4.1 Data

The data used in this study consist of unemployment rates based on gender, age group, level of education, location (urban or rural) and their gaps. The gaps are calculated as the ratios not as the differences. The unemployment data will also be divided into national and provincial data which contain 26 or 33 provinces. The main source of data is the National Labour Force Survey (Sakernas) from the Central Body of Statistics-Indonesia (CBS) except for in 1995 in which we use the Inter-Censal Population Survey (SUPAS). There are changes of the definition for unemployment rates by CBS, especially in 2001. Thus for the empirical analysis, the data consider both the old and the new definition. The time periods are 1990-2012 for 26 provinces and 2001-2012 for 33 provinces.

1.4.2 Method

1.4.2.1 Time-Series –Unit Root Test

At an aggregate macroeconomic level, the concept of persistent unemployment is known, with the idea that if an unexpected shock would increase or reduce the unemployment rate above or below its natural or normal level, the variable may stay above or below this level for an indeterminate period of time even when the causes of the change in the current level of unemployment have disappeared (Panigo, *et al*., 2004).

Testing for unemployment persistence is originally based on the idea of Blanchard and Summers (1986) as mentioned in equation (1.1). It uses an first-order autoregressive process or AR(1) to carry out the level of persistence. The coefficient of the AR(1) process will assume to be below one (persistence) or one (hysteresis). This method is exactly the same as the Dickey-Fuller (DF) test from Dickey-Fuller (1979). Dickey and Fuller formulated their test for the unit root by subtracting the left and right side in equation (1.1) by the lag of its dependent variable, or:

(1.2) $un_t - un_{t-1} = \alpha + \rho un_{t-1} - un_{t-1} + \varepsilon_t$

(1.3) $\Delta un_t = \alpha + \beta un_{t-1} + \varepsilon_t$

where, un_t is the variable of interest or unemployment rates at time-period *t*, Δ is the first-difference operator, $\beta = \rho$-1 and ε is white noise disturbances. Then, we perform the DF test using t-statistics (called tau-statistics) to test if *H0:*β*=0* which is equal to test ρ*=1* (hysteresis) and *H1:* β*<0* which is equally a test for ρ*<1* (persistence). The model could also include a linear trend to DF test in equation (1.3). However, if we look back to Figure 1.1 and the other figures (see Appendix 1.1) which depict unemployment rates across provinces, then we see that most of the graphs do not follow linear but rather quadratic trends. Therefore, the unit root tests would follow these models:

(1.4) $\Delta un_t = \alpha + \beta un_{t-1} + \gamma_1 trend + \varepsilon_t$

(1.5) $\Delta un_t = \alpha + \beta un_{t-1} + \gamma_1 trend + \gamma_2 trend^2 + \varepsilon_t$

(1.6) $\Delta un_t = \alpha + \beta un_{t-1} + \gamma_1 trend + \gamma_2 trend^2 + \sum_{j=1}^{p} \gamma_p \Delta un_{t-p} + \varepsilon_t.$

The included lags of the dependent variable on the right hand side of the model are to avoid serial correlation. It may appear that the test can be implemented by performing a t-statistics on the estimated coefficient of un_{t-1} or β. However, the t-statistics under the null hypothesis of a unit root does not have the conventional t-distribution as showed by Dickey and Fuller (1979). They also simulated the critical values for selected sample sizes and tabulated, so called Dickey-Fuller t-statistics. MacKinnon (1991), however, implemented a larger set of simulations than those by Dickey and Fuller and approximated the response surface function using the simulation results. His tabulation allowed the calculation of Dickey-Fuller critical values for any sample size and for any number of right-hand variables.

Nevertheless, Dickey-Fuller and MacKinnon distributions apply only for equation (1.3) and (1.4). Therefore, we have to make another Monte Carlo simulation by following a t-distribution for equation (1.5). We apply the tests by calling t-statistics as *DF-c, DF-t, and DF-q* from equation (1.3), (1.4), and (1.5) respectively.

1.4.2.2 Panel Unit Root Test

This paper also applies the panel unit root test that is proposed by Im, Pesaran and Shin (2003) to test for unemployment persistence because of regional

unemployment rates in Indonesia as mentioned before are various. The IPS method is basically based on the Dickey-Fuller test. Let $un_{i,t}$ be the unemployment rate by province *i* = 1, 2, 3, ….., N at time *t* = 1, 2, ..., *T* . Then the dynamics of unemployment can be tested with the following Dickey-Fuller regression without a trend in term of panel data as:

(1.7) $un_{i,t} = \alpha_i + \rho_i un_{i,t-1} + \varepsilon_{i,t}$

Again, if $\rho_i = 1$ then we call it hysteresis for each *i*. On the other hand, if $\rho_i < 1$ then it will be called persistence. To be clear, if ρ almost reaches 1, for example 0.9, then the unemployment rate is persistent. The dynamic process in equation (1.7) could also be rewritten by including lags of dependent variable and all deterministic parts: constant, linear trend and quadratic trend, called Augmented Dickey-Fuller (ADF) as:

(1.8) $\Delta un_{i,t} = \alpha_i + \beta_i un_{i,t-1} + \gamma_{1i} trend_i + \gamma_{2i} trend_i^2 + \sum_{j=1}^{p} \gamma_p \Delta un_{i,t-p} + \varepsilon_{i,t}$

where $\beta_i = (\rho - 1)_i$. The IPS panel tests the null hypothesis of unit root or *H0:* $\beta_i = 0$ for each *i*, while the alternative hypothesis is *H1:* $\beta_i < 0$ also for each *i*. Testing $(\rho - 1)_i$ in equation (1.8) is equivalent to the test of $\rho_i = 1$ in equation (1.7) for each province with additional linear and quadratic trends. Note that the IPS test does not assume that all cross-sectional units converge towards the equilibrium value at the same speed, i.e. $\rho_1 = \rho_2 = \rho_3 = \cdots = \rho_i < 0$. On the other hand, Levin, Lin and Chu (2002) test for the common coefficient, $\rho_i = \rho$. To avoid cross-sectional correlation (CIPS) and unobserved heterogeneity, Pesaran (2007) and Pesaran, *et. al.* (2013) proposed the model with additional variables: averages of current lag and its lagged difference. The final test then with additional quadratic trend could be modelled as follows:

(1.9) $\Delta un_{i,t} = \alpha_i + \beta_i un_{i,t-1} + \gamma_{1i} trend_i + \gamma_{2i} trend_i^2 + \gamma_{3i} \overline{un_{t-1}} + \gamma_{4i} \overline{\Delta un_{t-1}} + \varepsilon_{i,t}$

where $\overline{un_{t-1}}$ and $\overline{\Delta un_{t-1}}$ are averages of current lag of unemployment rate and its lagged difference.

The research continues to find out the determining factors that affect the persistence via the models of Wu (2003) and Soekarni, *et. al.* (2009). However, the final model will be adjusted to the Indonesian economic situation and the feasibility of data. The Wu's model can be written as follows:

(1.10) $\Delta un_{i,t} = \alpha_i + \beta_i un_{i,t-1} + b_i X_{i,t} u_{i,t-1} + c_i Y_{i,t} u_{i,t-1} + d_i Grow_{i,t} + \varepsilon_{i,t}$

where X_{it} is the share of industry output by the state sector and Y_{it} is the share of industry output by the collective (semi-private) sector. They expect that X_{it} and Y_{it} have significant effects on regional unemployment persistence. However, in Soekarni, *et. al.* (2009), X_{it} and Y_{it} are referred to the share of industry output by the manufacture sector and service sector. In this, research X_{it} will be defined as the policy variables: the share of government in local economies and real minimum wages, Y_{it} will be other variables which are suspected to have a significant effect to unemployment persistency and $Grow_{it}$ represents provincial economic growth. If we assume common estimated coefficients for all provinces in equation (1.10) then we may apply a pooled estimation or the Arellano and Bond (1991). However, if we assume that the estimated coefficients vary across provinces, then it applies Seemingly Unrelated Regressions (SUR) estimation by Zellner (1962) or random coefficient estimation by Swamy (1970).

1.5 Empirical Evidence

1.5.1 National Data

Table 1.4 shows national unemployment persistent tests based on the Dickey-Fuller approach. The data are divided by period 1990-2012 and 2001-2012, then by CBS version and old version (U1) and also by gender, age, education, location, and their gaps. We apply a DF test with constant and trend (*DF-t*) and constant, trend, and quadratic trend (*DF-q*) for national unemployment and their categories and constant only (*DF-c*) for the gaps.

The majority of the tests can not reject the null hypothesis of hysteresis for total unemployment rates, by CBS or U1 in all periods or 2001-2012. This is a different result compared to the finding of Soekarni, *et. al.* (2009) in which the persistence hypothesis is accepted for the period of 1991-2006 using the CBS definition. The hysteresis hypotheses are not rejected for the gender and location categories. In the age category, except for adults on the CBS version and the period 2001-2012, by using the DF with quadratic trend all tests can not reject the hysteresis. The *DF-q* statistics = -6.566 is significant at the 1% critical value (DF-*q*, $_{p\text{-}value=0.01}$ = 3.978 for N=12). We also

find another significant value for the education category with quadratic trend. The hysteresis hypothesis is rejected at the 10% and 5% level respectively for low-medium and high educated unemployed in the period 1990-2012 according to the U1 definition. A similar result is also found in the period 2001-2012 for high education which rejects the hypothesis at a 10% critical value.

Table 1.4 DF-Unit Root Test for National Unemployment Rates

National	1990 – 2012				2001 – 2012			
	CBS		U1		CBS		U1	
	DF-t	***DF-q***	***DF-t***	***DF-q***	***DF-t***	***DF-q***	***DF-t***	***DF-q***
Unemployment Rate	-0.557	-2.166	-1.356	-3.329	-2.098	-1.123	-1.267	-3.005
By Gender:								
Female	-0.813	-2.217	-1.764	-3.497	-2.000	-1.312	-1.435	-3.755
Male	-0.506	-2.257	-1.095	-3.136	-2.017	-1.747	-1.313	-2.125
By Age:								
Youth, 15-24	-0.807	-2.361	-1.350	-3.345	-2.230	-0.961	-1.880	-1.187
Adult, 25+	-0.623	-1.880	-1.944	-3.132	-1.138	-6.566***	-1.267	-3.425
By Education:								
Low and Medium	-0.563	-2.101	-1.658	-3.949*	-2.311	-0.823	-1.523	-2.624
High	-1.583	-1.636	-3.158	-4.434**	-0.762	-1.292	-2.756	-4.582*
By Location:								
Urban	-0.649	-2.760	-1.071	-3.555	-2.039	-2.140	-1.403	-3.266
Rural	-0.630	-1.880	-1.831	-3.223	-2.102	-0.901	-1.228	-2.826
By Gaps:	***DF-c***		***DF-c***		***DF-c***		***DF-c***	
Gender gap	-2.916*		-2.764*		-1.515		-2.506	
Age gap	-1.132		-1.695		-1.236		-1.435	
Education gap	-1.754		-3.603**		-0.941		-1.968	
Urban-rural gap	-2.083		-3.168**		-0.788		-2.365	

Notes: ***, **, * significant at level 1%, 5%, and 10%, respectively. Simulation with Monte Carlo replications at 50,000 produce the Dickey-Fuller critical value for 0.01, 0.05 and 0.1 at: N=12: -4.289, -3.200, and -2.738 (DF-*c:* constant only), -5.169, -3.942, and -3.417 (*DF-t*: constant and trend), -6.027, -4.597, and -3.978 (*DF-q:* constant, trend and quadratic trend). N=23: -3.736, -3.000, and -2.636 (*DF-c*: constant only), -4.408, -3.607, and -3.245 (*DF-t*: constant and trend), -4.966, -4.110, and -3.721 (*DF-q*: constant, trend and quadratic trend).

The gaps are calculated by ratios: female/male, youth/adult, low and medium/high, and urban/rural. By using these ratios in the DF test, linear trend and/or quadratic trend should disappear. The appropriate method for this would be without linear and quadratic trends (*DF-c*). The results show that we cannot reject the hysteresis hypothesis for age gap neither by CBS or U1 definition in all sample periods. However, we can reject the hypothesis for gender gap at least 10% of critical value and at 5% of critical value for education and location gaps by using the U1 definition.

1.5.2 Provincial Data

Table 1.5 shows the tests for persistent unemployment by individual province. There is a quite significant difference between the DF-test using the CBS and U1 definitions. All DF tests with a linear trend for all provinces are not significant when using the CBS definition in the period 1990-2012. Only three provinces are significant: DKI Jakarta, Central Kalimantan and East Kalimantan (column 3) when using quadratic trend. Therefore, almost all provinces cannot reject the hysteresis hypothesis.

Table 1.5 DF-Unit Root Test for Individual Provincial Unemployment

Province	1990 – 2012				2001 – 2012			
	CBS		U1		CBS		U1	
	DF-t	*DF-q*	*DF-t*	*DF-q*	*DF-t*	*DF-q*	*DF-t*	*DF-q*
Aceh Darussalam	-2.358	-3.267	-2.838	-3.262	-2.560	-2.510	-2.488	-3.224
North Sumatera	0.110	-2.131	-1.155	-4.371**	-2.712	-0.208	-2.084	-3.401
West Sumatera	-1.111	-1.973	-2.280	-3.056	-1.913	-0.732	-1.590	-2.236
Riau	-0.995	-2.164	-2.011	-3.390	-2.444	-2.365	-2.146	-5.053**
Jambi	-2.189	-3.077	-2.872	-3.456	-2.440	-3.529	-2.106	-4.115*
South Sumatera	-1.581	-2.421	-2.452	-3.408	-2.430	-3.617	-1.459	-3.149
Bengkulu	-1.764	-2.616	-3.103	-3.886*	-3.138	-3.350	-2.563	-3.615
Lampung	-0.758	-2.424	-1.557	-3.202	-3.159	-2.903	-1.746	-2.084
DKI Jakarta	-1.457	-5.297***	-1.279	-4.743**	-4.191**	-4.325*	-2.865	-5.871**
West Java	-0.769	-2.355	-1.491	-3.413	-1.667	-1.598	-1.278	-2.495
Central Java	-1.007	-2.440	-1.137	-3.254	-1.562	-2.604	-1.216	-4.816**
DI Yogyakarta	-1.275	-2.309	-1.924	-2.537	-1.475	-3.058	-1.464	-3.095
East Java	-0.743	-2.164	-1.028	-2.622	-2.014	-1.553	-1.425	-1.237
Bali	-1.737	-2.783	-2.727	-3.528	-2.899	-2.001	-1.847	-2.724
West Nusa Tenggara	-2.284	-2.968	-3.792**	-4.703**	-1.844	-1.611	-1.291	-2.688
East Nusa Tenggara	-1.264	-3.424	-2.003	-2.880	-2.719	-3.718	-2.172	-1.847
West Kalimantan	-1.229	-2.569	-1.908	-3.757*	-3.886*	-4.110*	-1.562	-4.148*
Central Kalimantan	-1.912	-3.927*	-2.448	-3.521	-3.865*	-3.971	-2.672	-2.438
South Kalimantan	-2.071	-2.734	-3.283*	-4.506**	-4.055**	-3.561	-2.373	-2.279
East Kalimantan	-2.251	-3.911*	-3.422*	-4.324**	-3.044	-3.966*	-3.067	-4.562*
North Sulawesi	-1.333	-2.279	-2.235	-2.900	-1.278	-1.900	-1.442	-2.845
Central Sulawesi	-2.322	-3.259	-3.047	-3.352	-1.972	-2.250	-2.352	-2.902
South Sulawesi	-1.020	-1.959	-3.008	-3.707	-2.998	-1.816	-2.073	-3.596
South-East Sulawesi	-1.344	-2.105	-2.802	-3.153	-2.375	-0.985	-1.681	-2.245
Maluku	-1.444	-2.512	-2.327	-3.617	-1.646	-5.052**	-2.086	-4.708**
Papua	-1.894	-3.687	-3.466*	-5.083***	-2.669	-2.539	-3.512*	-3.280
Split Province								
Bangka Belitung					-1.527	-5.107**	-1.468	-3.426
Riau Islands					-3.337	-2.828	-4.052**	-5.682**
Banten					-0.788	-2.549	-1.274	-3.034
Gorontalo					-4.102**	-3.258	-4.062**	-4.179*
West Sulawesi					-2.569	-3.075	-2.479	-3.670
North Maluku					-5.892***	-5.624***	-4.986**	-4.872**
West Papua					-1.654	-2.420	-0.774	-2.274

Notes: See Table 1.4. Bangka Belitung Islands is a split province from South Sumatera, the Riau Islands from Riau, Banten from West Java, Gorontalo from North Sulawesi, West Sulawesi from South Sulawesi, North Maluku from Maluku, and West Papua from Papua. We use district/city codes from CBS to track and re-calculate the data period 2001-2012 for those provinces that split after 2001. Data for Maluku in 2000 were calculated via central moving average (CMA).

However, using the U1 definition and a quadratic trend, there are a substantial number of provinces which become significant and prove the hypothesis for persistence of unemployment compared to the test with a linear trend. These include North Sumatera, DKI Jakarta, West Nusa Tenggara, West Kalimantan, South Kalimantan, East Kalimantan, and Papua. The other remaining provinces cannot reject the hysteresis unemployment rates. Similar results are also found in the period 2001-2012 and using U1 definition in which three out of seven split provinces proved the persistence of unemployment. In total there are ten provinces out of 33 provinces which prove the persistence of unemployment rates.

Table 1.6 Alternative Unit Root Tests

Province	DFGLS-Trend		DFGLS-Quadratic		ZA, Breaks(const, trend)			
	CBS	U1	CBS	U1	CBS		U1	
					min-t	year	*min-t*	year
Aceh Darussalam	-2.501	-2.909	-3.497	-3.530	-5.009*	2005	-4.074	1997
North Sumatera	-0.472	-1.425	-2.141	-4.663**	-4.095	2005	-3.112	2000
West Sumatera	-1.355	-2.427	-2.103	-3.302	-3.595	2004	-3.899	2005
Riau	-1.374	-2.281	-2.416	-3.716	-4.805	2004	-3.505	2006
Jambi	-2.459	-3.086*	-3.375	-3.765	-5.745***	2005	-4.332	2005
South Sumatera	-1.841	-2.702	-2.622	-3.701	-4.971*	2005	-4.723	2005
Bengkulu	-1.945	-3.203**	-2.798	-4.188*	-4.431	2001	-4.548	2005
Lampung	-1.110	-1.708	-2.555	-3.428	-3.584	2002	-3.074	2006
DKI Jakarta	-1.699	-1.546	-5.182***	-4.798**	-4.523	2003	-4.673	1999
West Java	-1.186	-1.781	-2.569	-3.696	-4.285	2005	-3.729	2005
Central Java	-1.372	-1.519	-2.623	-3.502	-5.253**	2005	-3.962	2007
DI Yogyakarta	-1.622	-2.197	-2.581	-2.829	-3.458	2005	-3.543	2005
East Java	-1.055	-1.292	-2.228	-2.750	-3.690	2003	-3.995	2005
Bali	-1.981	-2.926	-2.992	-3.820	-3.716	2005	-3.820	2006
West Nusa Tenggara	-2.480	-4.000***	-3.174	-5.073***	-4.184	2005	-5.602***	1995
East Nusa Tenggara	-1.537	-2.003	-3.614	-3.121	-5.367**	2001	-4.141	1995
West Kalimantan	-1.524	-2.157	-2.713	-3.990**	-4.541	2002	-3.969	2006
Central Kalimantan	-2.098	-2.536	-4.118*	-3.807	-4.049	2001	-6.249***	1994
South Kalimantan	-2.266	-3.343**	-2.948	-4.868**	-4.787	2002	-4.624	1995
East Kalimantan	-2.504	-3.597**	-4.254**	-4.677**	-4.650	2006	-4.517	2001
North Sulawesi	-1.546	-2.337	-2.474	-3.128	-3.020	2005	-3.368	1994
Central Sulawesi	-2.499	-3.069*	-3.514	-3.646	-3.893	2006	-4.752	1994
South Sulawesi	-1.280	-3.093*	-2.096	-3.994*	-4.107	2003	-4.110	1995
South-East Sulawesi	-1.524	-2.947*	-2.230	-3.408	-4.024	2001	-4.575	2005
Maluku	-1.730	-2.538	-2.731	-3.909*	-4.140	2005	-5.421**	2005
Papua	-2.137	-3.671**	-3.770	-5.334***	-6.315***	2004	-5.202**	2004
INDONESIA	-0.964	-1.635	-2.292	-3.578	-3.894	2005	-3.427	2005

Notes: ***, **, * significant at 1%, 5%, and 10% respectively. Critical values at 1%, 5%, and 10% for DFGLS Trend: -3.770, -3.190, -2.890 from Elliot, et. al. (1996), DFGLS-Quadratic: -5.040, -4.220, -3.840 from Ayat and Burridge (2000), ZA: -5.570, -5.080, -4.820 from Zivot and Andrews (1992). Sample period 1990-2012.

The alternatives to the DF tests are presented in Table 1.6. It compares the test methods from Elliot *et. al*. (1996), Ayat and Burridge (2000), and Zivot and Andrews

(1992). Most of the tests cannot reject the hysteresis using the CBS version and completely reject of the hypothesis for all provinces using the DFGLS-trend. Compared to the trend model, some of the quadratic model tests reject the hysteresis, especially when using the U1 definition. Furthermore, we find that the majority of the breaking points from the Zivot-Andrews tests are in the year of 2005 not 2001 as expected. This confirms the turning point of unemployment rate in 2005 on Figure 1.1.

Tables 1.7 through 1.10 show the test results for each province by categories and their gaps. In Table 1.7, we see the tests by gender and their gap. Again, most of the tests cannot reject the hysteresis using the CBS or U1 definition. Nevertheless, the tests for gender gaps generate different results. Almost all DF-*c* statistics are significant using the CBS version except for West Sumatera and DKI Jakarta. Additionally, all statistics are significant using the U1 version. Therefore, the majority of the tests by the gender category cannot reject the hysteresis but not for the gender gaps. Comparable results are also found in the age category in which most of the tests are not rejected as the hysteresis, except for the adult category using the U1 definition and quadratic trend. On the other hand, the majority of the tests for the age gaps follow the persistence hypothesis (Table 1.8).

Different results have emerged from the education category as explained in Table 1.9. The different definition and the DF test choices with a linear or quadratic trend seem to play a significant role in the results. Most of the tests for the low-medium education cannot reject the hysteresis using the CBS definition and linear trend version. On the other hand, most of the tests agree with the persistence hypothesis using U1 and the quadratic trend. However, the majority of the tests for the education gaps reject the hysteresis in both the CBS and U1 definitions. The last table explain the test for hysteresis by location: urban and rural, and its gaps. Most of the tests cannot reject the hysteresis using the CBS definition, either in urban or rural areas. Nevertheless, most of the tests reject the hysteresis using the U1 definition and particularly including the quadratic trend in the DF model (Table 1.10). Similar to other categories, most of the tests for the urban/rural gap also reject the hysteresis and therefore favour for the persistence hypothesis.

Table 1.7 Test for Individual Province of Unemployment Hysteresis by Gender and Gender Gap, 1990-2012

Province	Male				Female				Gender Gap	
	CBS		U1		CBS		U1		CBS	U1
	DF-t	*DF-q*	*DF-t*	*DF-q*	*DF-t*	*DF-q*	*DF-t*	*DF-q*	*DF-c*	*DF-c*
Aceh Darussalam	-4.147**	-4.441**	-3.944**	-4.162**	-1.646	-2.574	-2.248	-2.744	-3.579**	-4.610***
North Sumatera	-0.906	-2.883	-1.577	-5.314***	0.307	-2.001	-1.190	-3.469	-3.499**	-3.299**
West Sumatera	-1.961	-2.510	-2.496	-2.999	-0.973	-1.919	-2.307	-3.262	-2.479	-3.514**
Riau	-0.990	-1.927	-1.621	-2.660	-1.553	-2.726	-2.856	-4.349**	-3.145**	-4.409***
Jambi	-3.349*	-3.645	-4.335**	-4.395**	-1.750	-2.853	-2.337	-3.255	-2.637*	-3.645**
South Sumatera	-1.643	-2.456	-2.218	-3.216	-1.857	-2.559	-2.803	-3.517	-3.481**	-3.444**
Bengkulu	-1.317	-2.157	-2.592	-3.327	-2.613	-3.555	-4.515***	-5.195***	-8.506***	-6.957***
Lampung	-0.871	-2.686	-1.613	-3.621	-1.784	-3.181	-1.958	-3.222	-4.982***	-4.434***
DKI Jakarta	-1.428	-5.053***	-1.587	-5.155***	-1.795	-4.227**	-1.420	-4.216**	-2.169	-4.104***
West Java	-1.001	-2.737	-1.435	-3.520	-0.894	-2.240	-1.923	-3.471	-2.986*	-3.590**
Central Java	-0.729	-2.350	-0.338	-2.610	-1.904	-2.862	-2.313	-3.835*	-3.300**	-2.842*
DI Yogyakarta	-1.904	-2.513	-2.295	-2.617	-1.626	-2.736	-2.543	-3.289	-3.483**	-3.583**
East Java	-0.465	-1.975	-1.092	-2.407	-1.258	-2.525	-1.272	-3.134	-4.034***	-2.833*
Bali	-1.659	-3.060	-2.429	-3.603	-2.177	-2.841	-3.401*	-3.754*	-3.213**	-4.380***
West Nusa Tenggara	-2.448	-2.936	-3.371*	-4.447**	-2.452	-3.143	-4.067**	-4.588**	-3.841***	-3.555**
East Nusa Tenggara	-2.073	-3.531	-2.376	-3.123	-1.231	-3.554	-2.390	-3.490	-4.050***	-4.001***
West Kalimantan	-1.378	-3.017	-2.310	-4.781**	-1.423	-2.446	-2.030	-3.159	-4.389***	-4.275***
Central Kalimantan	-2.022	-4.384**	-2.329	-3.984	-2.302	-4.015*	-2.890	-3.616	-6.135***	-5.677***
South Kalimantan	-2.914	-3.346	-3.402*	-4.159**	-1.742	-2.502	-3.281*	-4.610**	-4.023***	-3.267***
East Kalimantan	-4.840***	-5.785***	-3.488*	-4.367**	-2.230	-3.917*	-3.616**	-4.483**	-4.817***	-5.460***
North Sulawesi	-2.814	-4.110*	-2.886	-3.859*	-1.609	-2.635	-2.425	-3.062	-6.640***	-4.378***
Central Sulawesi	-3.125	-3.888*	-3.188	-3.174	-2.481	-3.452	-3.189	-3.742*	-4.458***	-3.928***
South Sulawesi	-1.439	-2.251	-3.070	-3.422	-1.187	-2.128	-3.122	-3.995*	-4.041***	-4.100***
South-East Sulawesi	-1.371	-2.311	-3.047	-3.634	-1.579	-2.229	-3.216	-3.425	-5.006***	-5.656***
Maluku	-2.388	-3.517	-2.386	-3.754*	-0.944	-1.892	-2.498	-3.497	-4.065***	-4.617***
Papua	-3.740**	-5.231***	-4.428***	-5.511***	-1.496	-3.068	-3.280*	-4.962***	-3.076**	-4.309***

Note: see Table 1.4.

Table 1.8 Test for Individual Province of Unemployment Hysteresis by Age and Age Gap, 1990-2012

Province	Youth				Adult				Age Gap	
	CBS		U1		CBS		U1		CBS	U1
	DF-t	*DF-q*	*DF-t*	*DF-q*	*DF-t*	*DF-q*	*DF-t*	*DF-q*	*DF-c*	*DF-c*
Aceh Darussalam	-2.701	-3.657	-2.630	-2.744	-2.332	-2.964	-3.269*	-3.860*	-2.637*	-2.578
North Sumatera	-0.500	-2.153	-1.168	-4.563**	-0.344	-2.249	-2.093	-3.367	-2.819*	-3.208**
West Sumatera	-1.593	-2.363	-2.319	-3.189	-0.935	-1.679	-2.846	-3.418	-2.386	-3.645**
Riau	-1.062	-2.236	-1.780	-3.136	-1.381	-2.043	-3.191	-3.683	-2.088	-3.160**
Jambi	-1.868	-2.860	-2.518	-3.196	-3.461	-3.856*	-4.497***	-4.466**	-3.962***	-4.189***
South Sumatera	-1.433	-2.133	-2.313	-2.941	-3.626	-4.170**	-4.679***	-6.039***	-3.867***	-4.716***
Bengkulu	-2.053	-2.820	-3.185	-3.856*	-2.035	-2.868	-3.962**	-4.690**	-2.952*	-3.990***
Lampung	-1.162	-2.803	-1.670	-3.196	-2.069	-2.826	-2.482	-3.707	-5.145***	-6.228***
DKI Jakarta	-1.183	-3.680	-1.336	-3.744*	-2.680	-4.986***	-2.009	-3.867*	-0.999	-1.376
West Java	-1.061	-2.721	-1.494	-3.531	-0.618	-1.694	-2.307	-3.210	-1.245	-1.940
Central Java	-0.953	-2.534	-1.190	-3.181	-2.493	-2.876	-2.430	-3.594	-1.519	-2.575
DI Yogyakarta	-1.988	-3.561	-2.412	-3.913*	-1.255	-1.881	-2.010	-2.167	-3.118**	-3.576**
East Java	-0.756	-2.251	-0.964	-2.678	-1.243	-2.395	-1.629	-2.675	-2.103	-2.539
Bali	-1.714	-3.051	-2.315	-3.350	-2.023	-2.665	-3.545*	-3.890*	-3.029**	-4.289***
West Nusa Tenggara	-2.296	-3.107	-3.532*	-4.619**	-2.806	-3.195	-4.217**	-4.708**	-2.483	-2.379
East Nusa Tenggara	-1.988	-4.353**	-2.174	-2.884	-2.209	-3.311	-2.799	-3.796*	-3.729**	-3.819***
West Kalimantan	-1.577	-2.897	-2.067	-3.910*	-1.041	-2.293	-2.464	-3.959*	-3.320**	-4.634***
Central Kalimantan	-2.024	-3.843*	-2.304	-3.185	-2.148	-3.440	-2.833	-3.722	-2.352	-2.398
South Kalimantan	-2.448	-3.339	-3.273*	-4.630**	-2.512	-2.920	-3.632**	-4.282**	-2.793*	-5.149***
East Kalimantan	-3.310*	-4.867**	-3.814**	-5.427***	-1.273	-1.758	-2.746	-2.888	-2.608	-3.363**
North Sulawesi	-1.578	-2.688	-2.324	-3.164	-1.978	-2.667	-2.698	-3.185	-2.875*	-5.288***
Central Sulawesi	-2.356	-3.377	-2.925	-3.315	-2.680	-3.338	-3.361*	-3.458	-3.366**	-3.360**
South Sulawesi	-1.468	-2.394	-3.056	-3.592	-0.843	-1.709	-3.149	-4.000*	-2.416	-3.485**
South-East Sulawesi	-1.463	-2.131	-2.676	-3.000	-1.979	-2.742	-3.381*	-3.744*	-5.678***	-6.102***
Maluku	-1.505	-2.513	-2.046	-3.345	-2.023	-2.715	-3.984**	-4.574**	-3.029**	-3.575**
Papua	-2.096	-3.645	-3.281*	-5.052***	-2.411	-3.957*	-3.658**	-4.614**	-2.031	-1.823

Note: see Table 1.4.

Table 1.9 Test for Individual Province of Unemployment Hysteresis by Education and Education Gap, 1990-2012

Province	Low-Medium Education				High Education				Education Gap	
	CBS		U1		CBS		U1		CBS	U1
	DF-t	*DF-q*	*DF-t*	*DF-q*	*DF-t*	*DF-q*	*DF-t*	*DF-q*	*DF-c*	*DF-c*
Aceh Darussalam	-2.353	-3.259*	-4.778***	-5.210***	-3.228*	-3.234	-2.902	-3.021	-3.915***	-5.407***
North Sumatera	-0.050	-2.091	-3.761**	-5.903***	-2.648	-2.842	-3.393*	-4.651**	-2.718*	-6.551***
West Sumatera	-1.123	-1.940	-2.514	-2.864	-3.807**	-3.911*	-5.395***	-6.377***	-3.722**	-6.206***
Riau	-1.008	-2.078	-2.833	-7.149***	-1.970	-2.010	-2.424	-2.915	-2.970*	-3.145**
Jambi	-1.998	-2.954	-2.732	-3.308	-6.596***	-6.414***	-7.302***	-7.177***	-5.523***	-5.561***
South Sumatera	-1.381	-2.248	-2.529	-3.127	-3.815**	-3.648	-5.099***	-5.262***	-3.041**	-3.432**
Bengkulu	-1.754	-2.620	-2.488	-2.610	-4.099**	-4.375**	-4.576***	-5.107***	-5.451***	-6.821***
Lampung	-0.825	-2.370	-2.188	-4.967***	-2.525	-2.349	-3.020	-3.301	-2.942*	-4.757***
DKI Jakarta	-1.537	-4.912***	-2.594	-3.825*	-2.394	-2.616	-2.386	-3.243	-2.943*	-3.980***
West Java	-0.750	-2.248	-1.893	-4.050*	-2.589	-2.408	-4.643***	-5.182***	-2.368	-3.415**
Central Java	-1.001	-2.424	-2.758	-5.241***	-2.264	-2.204	-3.090	-4.476**	-3.294**	-4.228***
DI Yogyakarta	-1.462	-2.619	-4.900***	-4.972***	-2.695	-3.033	-2.675	-2.974	-4.502***	-5.211***
East Java	-0.777	-2.157	-1.715	-3.011	-0.976	-1.136	-2.737	-3.586	-1.893	-3.331**
Bali	-1.787	-2.852	-2.083	-2.715	-2.574	-3.432	-3.065	-4.152**	-4.645***	-4.208***
West Nusa Tenggara	-2.023	-2.748	-3.740**	-5.455***	-6.406***	-6.222***	-5.445***	-5.698***	-3.694**	-4.841***
East Nusa Tenggara	-1.273	-3.410*	-3.009	-3.160	-4.517***	-4.711**	-4.341**	-4.774**	-4.741***	-4.580***
West Kalimantan	-1.201	-2.515	-2.995	-4.215**	-5.094***	-5.142***	-4.600***	-4.953***	-4.718***	-4.780***
Central Kalimantan	-1.971	-4.051**	-2.679	-2.564	-6.000***	-6.533***	-5.829***	-6.960***	-4.216***	-2.575
South Kalimantan	-2.210	-2.856	-4.384***	-6.235***	-3.312*	-3.423	-2.567	-3.398	-4.481***	-4.649***
East Kalimantan	-2.289	-3.738**	-4.849***	-4.757**	-2.808	-2.787	-3.778**	-4.258**	-3.801***	-2.897*
North Sulawesi	-1.342	-2.242	-3.276*	-4.406**	-2.281	-2.181	-3.063	-3.074	-2.536	-3.015**
Central Sulawesi	-2.186	-3.203	-4.837***	-4.819**	-4.377***	-4.234**	-4.803***	-4.760**	-5.307***	-6.717***
South Sulawesi	-0.990	-1.899	-3.794**	-5.447***	-2.466	-2.474	-3.343*	-3.536	-1.734	-6.026***
South-East Sulawesi	-1.178	-1.944	-3.262*	-3.957*	-5.005***	-5.311***	-5.622***	-7.093***	-4.715***	-9.929***
Maluku	-1.296	-2.467	-3.178	-3.151	-3.408*	-3.937*	-4.323**	-5.141***	-2.160	-4.335***
Papua	-1.731	-3.485*	-5.036***	-5.313***	-3.644**	-3.654	-4.286**	-4.187**	-3.207**	-4.326***

Note: see Table 1.4.

Table 1.10 Test for Individual Province of Unemployment Hysteresis by Urban-Rural and Urban-Rural Gap, 1990-2012

Province	Urban				Rural				Rural-Urban Gap	
	CBS		U1		CBS		U1		CBS	U1
	DF-t	*DF-q*	*DF-t*	*DF-q*	*DF-t*	*DF-q*	*DF-t*	*DF-q*	*DF-c*	*DF-c*
Aceh Darussalam	-2.030	-3.442	-2.529	-3.562	-3.111	-3.634	-3.259*	-3.380	-4.750***	-5.100***
North Sumatera	-1.024	-3.755*	-1.770	-4.042*	-0.103	-1.928	-2.028	-5.344***	-2.451	-3.902***
West Sumatera	-1.945	-2.548	-2.402	-2.753	-1.442	-2.321	-2.840	-4.091*	-3.275**	-3.993***
Riau	-1.514	-2.388	-2.229	-3.110	-0.987	-2.363	-2.363	-4.161**	-3.117**	-2.679*
Jambi	-2.531	-4.084*	-3.151	-4.527**	-2.173	-2.658	-2.981	-3.084	-3.156*	-3.400**
South Sumatera	-2.697	-3.792*	-2.982	-4.469**	-1.648	-2.093	-2.870	-2.870	-16.032***	-14.265***
Bengkulu	-2.080	-2.877	-2.866	-4.101*	-2.632	-3.344	-4.140**	-4.215**	-4.411***	-4.426***
Lampung	-3.147	-4.564**	-2.827	-5.591***	-0.372	-2.089	-1.708	-3.097	-2.667*	-5.619***
DKI Jakarta	-1.457	-5.297***	-1.279	-4.743**						
West Java	-0.940	-2.787	-1.073	-3.418	-1.013	-2.308	-2.308	-3.582	-2.074	-2.275
Central Java	-1.401	-3.304	-0.972	-3.510	-0.882	-1.988	-1.578	-3.281	-3.592**	-5.358***
DI Yogyakarta	-1.571	-2.317	-1.992	-2.402	-2.392	-3.905*	-3.480*	-4.532**	-4.677***	-4.698***
East Java	-0.587	-2.461	-0.956	-2.850	-1.354	-2.315	-1.822	-3.024	-3.880***	-4.892***
Bali	-1.691	-3.113	-2.870	-4.438**	-2.230	-2.756	-2.779	-2.936	-3.104**	-2.859*
West Nusa Tenggara	-1.629	-2.483	-3.019	-4.403**	-3.008	-3.538	-4.130**	-4.528**	-2.998**	-2.395
East Nusa Tenggara	-2.146	-4.693**	-2.405	-4.645**	-2.180	-4.236**	-2.901	-3.480	-3.358**	-4.069***
West Kalimantan	-1.249	-2.845	-2.310	-3.918*	-1.606	-2.727	-2.510	-4.651**	-2.292	-3.360**
Central Kalimantan	-2.563	-3.638	-3.344*	-4.128**	-2.231	-4.232**	-2.682	-3.647	-4.420***	-4.284***
South Kalimantan	-2.021	-2.468	-2.603	-3.044	-2.914	-3.750*	-4.742***	-6.445***	-4.547***	-2.738*
East Kalimantan	-3.920**	-6.639***	-3.947**	-5.936***	-2.114	-2.853	-2.748	-2.884	-4.653***	-3.788***
North Sulawesi	-2.738	-3.165	-2.490	-3.031	-1.751	-3.044	-2.794	-3.546	-3.807***	-4.051***
Central Sulawesi	-2.759	-3.362	-2.889	-2.935	-2.135	-2.953	-3.351*	-3.755*	-2.607	-3.423**
South Sulawesi	-1.310	-2.422	-2.679	-3.056	-1.173	-1.937	-3.625**	-4.453**	-1.806	-3.615**
South-East Sulawesi	-3.106	-5.010***	-4.510***	-5.478***	-1.068	-1.745	-2.166	-2.372	-2.982	-3.403**
Maluku	-1.709	-3.397	-2.347	-4.259**	-1.537	-2.302	-2.519	-3.288	-1.940	-2.532
Papua	-2.342	-3.773*	-3.232	-4.245**	-1.798	-2.870	-3.324*	-4.274**	-2.237	-2.497

Note: see Table 1.4.

1.5.3 Panel Data

The results for the panel unit root tests are presented in Table 1.11. We apply Im, *et. al.* (2003) and Pesaran (2007) for the tests assuming that the ρs are different for each province. The majority of the tests reject the hysteresis hypothesis with the exception of the tests using the CBS definition, linear trend and IPS method (column 2). In this case, except for high education, all *t-bar* with a linear trend are not significant. The similar results are also found using the method of Levin, *et. al.* (2002) which assumes that there is the common coefficient (ρ-1) or (ρ) for all provinces (see Appendix 1.2).

It was noticed that on the individual time series unit root analyses, we found that the majority of the tests could not reject the hysteresis hypotheses. However, on the panel data analyses, most of the test rejected the hypotheses. The reason for behind this particularity lies in the fact that the null hypothesis in panel data assumes that all individual provincial coefficients are equal to zero. The null hypothesis can thus more easily be rejected due to this assumption. This would be one of the explanations for the differences in results between the individual and panel tests of hysteresis in OECD countries (see a summary comparison of the empirical results by Lee and Chang, 2008). Leon-Ladesma and McAdam (2004) found similar results between individual and panel tests in the case of transition economies in Eastern Europe.

The next part investigates as to whether there are variables that affect the size of (ρ-*1*). This can be shown in Table 1.12 through Table 1.15 by using the definition of CBS and U1. For the assumption of the common value of ρ, we employ pooled regressions which do not account for heterogeneity. Alternatively, the Arellano-Bond (1991) method will be used to account for heterogeneity. Additionally, if we assume that ρ varies across provinces, we can employ the method of random coefficients estimators by Swamy (1970). This method is similar to the SUR estimators by Zellner (1962).

Table 1.12 is based on the model using CBS and U1 definitions. We find that the lagged unemployment rate is significant in all subdivisions of unemployment rates. The provincial economic growths are also significant on total, female, adult, low and

medium education and urban unemployment regressions. Linear and quadratic trends are also significant in all regressions. The R-squares range between 0.09 and 0.18 which are relatively low. However, this is not surprising because the dependent variables are in first difference forms which usually produce low R-Squares. Similar results are found when using the U1 definition which produces R-squares ranging from 0.10 to 0.20.

In Table 1.13 we add three policy variables that may have effects not only on the unemployment rate but also on the estimated coefficient of ρ. These include the interaction variables of lagged unemployment rates with local government expenditures (Lag of U*RGovCons), gross fixed capital formation or investment (Lag of U*RGfcf), and growth of real minimum wages (Lag of U*real_minwages). All coefficients ρ as well as the coefficients of linear and quadratic trends remain significant (not shown in the table).

In the CBS definition, the interaction variable between lagged unemployment and government expenditure has a negative and significant effect on total unemployment rates. This variable is also significant for the regressions on male, youth, adult, low and medium education, and urban unemployment rates. Meanwhile, the interaction of the lagged unemployment and investment also has a negative and significant effect on the unemployment rates analysed by total, female, youth, low and medium education, high education, and rural.

The effects of the interaction variable on the growth of real minimum wages are significant only for female, high education and rural. The significant and negative effects of economic growth appear in total unemployment rates as well as female, adult, low and medium education and urban unemployment rates. Again, the trend and quadratic trends remain significant in all divisions. However, relatively different results are found for the U1 definition, especially for the interaction with the growth of real minimum wages. This variable has no significant effect on unemployment rates in all divisions.

Table 1.11 Panel Unit Root Tests

National	IPS (2003)				CIPS Method, Pesaran (2007)			
	CBS		U1		CBS		U1	
	tbar-t	*tbar-q*	*tbar-t*	*tbar-q*	*tbar-t*	*tbar-q*	*tbar-t*	*tbar-q*
Unemployment Rate	-1.462	-2.798***	-2.369*	-3.601***	-3.763***	-4.262***	-3.598***	-4.015***
By Gender:								
Female	-2.035	-3.258***	-2.533***	-3.762***	-4.052***	-4.400***	-3.818***	-4.245***
Male	-1.623	-2.838***	-2.657***	-3.744***	-3.907***	-4.341***	-3.932***	-4.096***
By Age:								
Youth, 15-24	-1.698	-2.999***	-2.337*	-3.590***	-3.879***	-4.395***	-3.581***	-4.016***
Adult, 25+	-1.938	-2.815***	-3.072***	-3.829***	-4.040***	-4.139***	-4.253***	-4.370***
By Education:								
Low and Medium	-1.442	-2.743***	-3.262***	-4.324***	-3.828***	-4.320***	-4.146***	-4.384***
High	-3.519***	-3.624***	-4.027***	-4.587***	-4.399***	-4.518***	-4.371***	-4.425***
By Location:								
Urban	-2.004	-3.486***	-2.526***	-3.946***	-4.303***	-4.588***	-3.979***	-4.140***
Rural	-1.754	-2.796***	-2.866***	-3.797***	-4.001***	-4.312***	-3.812***	-4.279***
By Gaps:	*tbar-c*		*tbar-c*		*tbar-c*		*tbar-c*	
Gender gap	-4.078***		-4.187***		-4.440***		-4.896***	
Age gap	-2.867***		-3.592***		-5.010***		-4.990***	
Education gap	-3.663***		-4.805***		-4.434***		-4.843***	
Urban-rural gap	-3.793***		-4.145***		-4.372***		-4.139***	

Notes: ***, **, * are significant at the 1%, 5%, and 10%, respectively. Critical Values for *tbar-c, tbar-t/tbar-q* from Im, et. al. (2003) are: -1.820, -1.730, -1.690, -2.450, -2.370, -2.330 and from Pesaran (2007): -2.300, -2.150, -2.070; -2.810, -2.660, -2.580. Sample period, 1990-2012.

Table 1.12 Panel Regressions without Intervention Variables (Pooled Estimators)

Variables	D.UT	D.UF	D.UM	D.UY	D.UA	D.ULM	D.UHE	D.UUR	D.URU
	Total	Female	Male	Youth	Adult	LowmedEd	HighEd	Urban	Rural
					CBS Definition:				
Lag of U	-0.162***	-0.233***	-0.155***	-0.206***	-0.171***	-0.165***	-0.241***	-0.0735**	-0.239***
	(-6.285)	(-6.863)	(-5.459)	(-7.811)	(-5.466)	(-6.348)	(-5.825)	(-2.379)	(-6.360)
growth_prov	-0.016*	-0.007**	-0.009	-0.006	-0.009***	-0.016**	0.0002	-0.010**	-0.006
	(-1.951)	(-1.985)	(-1.490)	(-1.044)	(-3.252)	(-2.044)	(-0.264)	(-2.311)	(-1.179)
trend	0.260***	0.185***	0.114***	0.160***	0.133***	0.248***	0.020***	0.063***	0.203***
	(6.360)	(6.970)	(4.810)	(5.710)	(7.090)	(6.420)	(3.280)	(2.710)	(6.910)
trend2	-0.011***	-0.008***	-0.005***	-0.007***	-0.005***	-0.011***	-0.001***	-0.003***	-0.008***
	(-7.494)	(-7.882)	(-5.271)	(-6.601)	(-7.389)	(-7.463)	(-2.664)	(-3.879)	(-7.539)
_cons	0.129	-0.027	0.0945	0.217	-0.115	0.092	0.0304	0.228**	-0.159
	(0.660)	(-0.240)	(0.830)	(1.610)	(-1.326)	(0.510)	(1.090)	(2.000)	(-1.194)
R-sq	0.159	0.177	0.126	0.156	0.152	0.158	0.122	0.090	0.171
					U1 Definition:				
Lag of U	-0.215***	-0.318***	-0.174***	-0.226***	-0.260***	-0.316***	-0.316***	-0.102***	-0.359***
	(-6.639)	(-7.619)	(-5.482)	(-6.857)	(-6.662)	(-7.664)	(-6.797)	(-3.053)	(-8.134)
growth_prov	-0.018**	-0.008***	-0.009*	-0.008	-0.010***	-0.003	-0.0001	-0.010**	-0.008*
	(-2.337)	(-2.600)	(-1.720)	(-1.345)	(-3.531)	(-1.105)	(-0.142)	(-2.400)	(-1.699)
trend	0.124***	0.093***	0.052***	0.072***	0.066***	0.043***	0.020***	0.030	0.095***
	(3.332)	(4.139)	(2.603)	(2.807)	(4.102)	(4.095)	(3.105)	(1.302)	(4.088)
trend2	-0.006***	-0.004***	-0.003***	-0.004***	-0.003***	-0.002***	-0.001***	-0.002**	-0.004***
	(-4.319)	(-5.056)	(-3.336)	(-3.917)	(-4.229)	(-4.505)	(-2.647)	(-2.381)	(-4.686)
_cons	0.791***	0.446***	0.352***	0.585***	0.218***	0.100*	0.058**	0.388***	0.415***
	(4.233)	(4.437)	(3.258)	(4.523)	(2.854)	(1.691)	(2.093)	(3.423)	(3.643)
N	572	572	572	572	572	572	572	572	550
R-sq	0.156	0.196	0.125	0.152	0.171	0.18	0.161	0.097	0.202

Notes: ***, **, * are significant at the 1%, 5%, and 10%, respectively. Values in parentheses are t-statistics from robust standard errors. Trend2 is a quadratic trend.

Table 1.13 Panel Regressions with Intervention Variables (Pooled Estimators)

Variables	D.UT Total	D.UF Female	D.UM Male	D.UY Youth	D.UA Adult	D.ULM LowmedEd	D.UHE HighEd	D.UUR Urban	D.URU Rural
				CBS Definition:					
Lag of U	-0.076*	-0.147***	-0.104**	-0.105**	-0.111**	-0.070*	-0.378***	-0.099*	-0.150**
	(-1.896)	(-2.859)	(-2.065)	(-2.264)	(-2.185)	(-1.661)	(-4.188)	(-1.864)	(-2.392)
Lag of U*RGovCons	-0.004**	-0.001	-0.007***	-0.004**	-0.004*	-0.004**	-0.001	-0.006**	0.001
	(-2.241)	(-0.714)	(-2.958)	(-2.213)	(-1.957)	(-2.289)	(-0.201)	(-2.513)	(0.512)
Lag of U*RGfcf	-0.003*	-0.004***	-0.001	-0.003**	-0.002	-0.003**	0.005**	0.002	-0.008***
	(-1.930)	(-2.907)	(-0.450)	(-2.066)	(-0.859)	(-2.119)	(2.228)	(0.924)	(-3.592)
Lag of U*real_minwages	0.014	0.032**	-0.006	0.008	0.022	0.019	-0.048*	-0.009	0.044***
	(1.109)	(2.195)	(-0.452)	(0.608)	(1.305)	(1.581)	(-1.891)	(-0.528)	(2.673)
growth_prov	-0.018**	-0.008**	-0.008	-0.008	-0.009***	-0.018**	0.0002	-0.009**	-0.008
	(-1.976)	(-2.279)	(-1.325)	(-1.128)	(-3.163)	(-2.097)	(0.200)	(-1.984)	(-1.414)
R-sq	0.177	0.205	0.15	0.178	0.164	0.182	0.156	0.117	0.223
				U1 Definition:					
Lag of U	-0.172***	-0.245***	-0.179***	-0.174***	-0.246***	-0.154*	-0.542***	-0.201***	-0.235***
	(-2.851)	(-3.670)	(-2.688)	(-2.766)	(-3.220)	(-1.915)	(-5.958)	(-2.669)	(-3.106)
Lag of U*RGovCons	-0.004	-0.001	-0.007***	-0.005*	-0.004	-0.010***	0.002	-0.006**	0.003
	(-1.635)	(-0.400)	(-2.665)	(-1.770)	(-1.389)	(-2.916)	(0.499)	(-2.149)	(0.947)
Lag of U*RGfcf	-0.001	-0.003	0.001	-0.001	0.001	-0.004	0.007***	0.004*	-0.009***
	(-0.337)	(-1.392)	-0.63	(-0.477)	(0.315)	(-1.507)	-3.027	-1.714	(-3.725)
Lag of U*real_minwages	-0.012	-0.005	-0.019	-0.011	-0.011	-0.032	-0.037	-0.015	-0.009
	(-0.668)	(-0.276)	(-0.989)	(-0.607)	(-0.485)	(-1.429)	(-1.304)	(-0.698)	(-0.450)
growth_prov	-0.019**	-0.010**	-0.009	-0.008	-0.010***	-0.003	0.0001	-0.009**	-0.010*
	(-2.125)	(-2.559)	(-1.508)	(-1.278)	(-3.266)	(-0.888)	(0.111)	(-2.027)	(-1.709)
N	520	520	520	520	520	520	520	520	500
R-sq	0.178	0.21	0.164	0.18	0.183	0.219	0.194	0.138	0.249

Notes: ***, **, * are significant at the 1%, 5%, and 10%, respectively. Values in parentheses are t-statistics from robust standard errors. RGovCons and RGfcf are ratios of local government consumption and gross fixed capital formation to gross regional domestic product. Models include constants, linear and quadratic trends.

Table 1.14 Panel Regressions with Heterogeneity (Arelano-Bond Estimators)

Variables	UT Total	UF Female	UM Male	UY Youth	UA Adult	ULM LowmedEd	UHE HighEd	UUR Urban	URU Rural
				CBS Definition:					
Lag of U	0.465***	0.438***	0.375***	0.437***	0.643***	0.497***	0.239	0.441***	0.479***
	(3.888)	(3.490)	(3.013)	(3.239)	(3.984)	(4.127)	(1.621)	(3.462)	(2.639)
Lag of U*RGovCons	0.003	0.006**	-0.003	0.0005	-0.003	0.004	-0.007	-0.011**	0.007
	(0.899)	(2.297)	(-0.582)	(0.130)	(-0.442)	(1.062)	(-1.103)	(-2.560)	(1.177)
Lag of U*RGfcf	-0.010***	-0.013***	-0.007**	-0.006	-0.013***	-0.010***	-0.002	-0.003	-0.016***
	(-3.394)	(-3.798)	(-2.187)	(-1.403)	(-4.409)	(-3.167)	(-0.442)	(-1.275)	(-3.541)
Lag of U*real_minwages	-0.016**	-0.006	-0.030***	-0.016	-0.024	-0.011	-0.073***	-0.025***	0.011
	(-1.984)	(-0.431)	(-2.992)	(-1.546)	(-1.603)	(-1.420)	(-2.663)	(-3.069)	(0.721)
growth_prov	-0.013	-0.008	-0.001	-0.003	-0.010**	-0.013	0.001	-0.004	-0.004
	(-1.050)	(-1.540)	(-0.236)	(-0.390)	(-2.089)	(-1.177)	(0.621)	(-0.694)	(-0.685)
				U1 Definition:					
Lag of U	0.263*	0.304*	0.244	0.285	0.474***	0.295	0.045	0.269	0.386***
	(1.785)	(1.940)	(1.639)	(1.387)	(2.697)	(1.348)	(0.277)	(1.541)	(2.733)
Lag of U*RGovCons	-0.001	0.001	-0.004	-0.003	-0.006	-0.010*	-0.003	-0.013**	0.004
	(-0.158)	(0.191)	(-0.729)	(-0.494)	(-0.813)	(-1.717)	(-0.358)	(-2.179)	(0.955)
Lag of U*RGfcf	-0.006	-0.011**	-0.004	-0.003	-0.013***	-0.008	0.001	0.003	-0.014***
	(-1.428)	(-2.490)	(-0.871)	(-0.439)	(-4.900)	(-1.592)	(0.185)	(0.688)	(-3.710)
Lag of U*real_minwages	-0.031**	-0.025*	-0.039***	-0.024	-0.048***	-0.029	-0.072**	-0.033***	-0.022
	(-2.496)	(-1.749)	(-3.307)	(-1.639)	(-2.911)	(-1.250)	(-1.964)	(-4.865)	(-1.444)
growth_prov	-0.01	-0.007	-0.001	-0.002	-0.009**	-0.002	0.001	-0.002	-0.005
	(-0.962)	(-1.370)	(-0.215)	(-0.313)	(-2.019)	(-0.546)	(1.044)	(-0.362)	(-0.796)
N	494	494	494	494	494	494	494	494	475

Notes: ***, **, * are significant at the 1%, 5%, and 10%, respectively. Values in parentheses are t-statistics from robust standard errors. Models include time dummies, constants, linear and quadratic trends.

Table 1.15 Panel Random Coefficient Regressions (Swamy Estimators)

Variables	D.UT	D.UF	D.UM	D.UY	D.UA	D.ULM	D.UHE	D.UUR	D.URU
	Total	Female	Male	Youth	Adult	LowmedEd	HighEd	Urban	Rural
					CBS Definition:				
Lag of U	-0.427**	-0.277	-0.769***	-0.387***	-0.612**	-0.359*	-1.018***	-0.821***	-0.302
	(-2.320)	(-1.596)	(-3.104)	(-2.686)	(-2.275)	(-1.907)	(-3.609)	(-4.483)	(-1.380)
Lag of U*RGovCons	0.007	0.003	0.009	-0.007	0.025*	0.003	0.033	0.008	0.004
	(0.839)	(0.284)	(0.684)	(-0.767)	(1.705)	(0.320)	(1.304)	(1.210)	(0.379)
Lag of U*RGfcf	-0.017***	-0.023***	-0.010**	-0.014***	-0.022***	-0.019***	-0.003	-0.010*	-0.023***
	(-4.033)	(-4.544)	(-2.055)	(-3.581)	(-3.435)	(-3.769)	(-0.452)	(-1.955)	(-4.945)
Lag of U*real_minwages	0.035***	0.056***	0.016	0.024***	0.053***	0.039***	-0.032*	0.023*	0.052***
	(3.274)	(4.529)	(1.276)	(3.098)	(4.021)	(3.884)	(-1.844)	(1.851)	(5.325)
growth_prov	-0.029***	-0.013*	-0.01	-0.018***	-0.008*	-0.029***	0.001	-0.008	-0.013
	(-2.924)	(-1.720)	(-1.337)	(-3.102)	(-1.916)	(-3.532)	(0.441)	(-1.272)	(-1.535)
					U1 Definition:				
Lag of U	-0.994***	-1.039***	-1.090***	-0.899***	-1.204***	-1.098***	-1.305***	-1.198***	-1.130***
	(-5.974)	(-5.292)	(-5.004)	(-5.301)	(-5.419)	(-6.203)	(-5.130)	(-5.030)	(-4.160)
Lag of U*RGovCons	0.013*	0.016*	0.011	0.001	0.030*	0.016	0.014	0.011	0.023
	(1.771)	(1.811)	(1.069)	(0.194)	(1.879)	(1.372)	(0.987)	(1.222)	(1.622)
Lag of U*RGfcf	0.001	0.001	0.003	0.001	0.002	0.0002	0.004	0.004	0.001
	(0.212)	(0.200)	(0.588)	(0.186)	(0.311)	(0.036)	(0.732)	(0.723)	(0.206)
Lag of U*real_minwages	-0.001	0.011	-0.01	-0.002	0.006	-0.039**	-0.017	-0.012	0.007
	(-0.081)	(0.767)	(-0.711)	(-0.224)	(0.530)	(-2.050)	(-0.921)	(-1.003)	(0.572)
growth_prov	-0.016	-0.007*	-0.006	-0.007	-0.005	-0.001	0.001	-0.004	-0.008
	(-1.425)	(-1.655)	(-0.735)	(-1.037)	(-1.231)	(-0.186)	-0.796	(-0.631)	(-1.111)
N	520	520	520	520	520	520	520	520	500

Notes: ***, **, * are significant at the 1%, 5%, and 10%, respectively. Values in parentheses are t-statistics from robust standard errors found through the bootstrap method. We employ the Stata command xtrc to get the results. Models include constants, linear and quadratic trends.

Table 1.14 presents the Arellano and Bond estimators. Most of the ρ coefficients are significant, except for high educated unemployment rates. Government expenditure is now insignificant, except for female and urban unemployment rates. This means that government expenditure becomes less effective to reduce unemployment rates and its degree of persistence (ρ), or its adjustment speed to normal level of unemployment rate. Minimum wages are also becoming less effective as a policy tool, except for total, male, high education, and urban unemployment. Relatively strong impacts are found for investment. This variable reduces the unemployment rates and their adjustments in all divisions, except in youth, high education, and urban. Provincial economic growths are also weakening in all divisions, except for adult unemployment rates. This concludes that relying on economic growth to reduce unemployment rates is not effective. Promoting investment is favourable to reducing unemployment and adjusting back to the normal level in regional labour markets. Linear and quadratic trends remain significant.

The effectiveness of investment compared to local government expenditure is also supported by the Swamy estimators using the CBS definition (Table 1.15). All coefficients of investment are negative and significant, except for the unemployment rates by high education. Minimum wages are also an effective policy against unemployment rates. Compared to the Arellano-Bond estimators, with these estimators, the regional economic growth plays a significant role in reducing and adjusting unemployment rates.

Moving to the U1 definition, there are quite sharp differences in the results compared to those found when using the CBS definition, especially when using the Arellano-Bond and Swamy estimators. Even though investment is relatively effective in reducing and adjusting unemployment rates in the labour market compared to government expenditure, this variable is less effective than the variables of minimum wages using the Arellano-Bond estimators (Table 1.14). We find that investment is becoming completely ineffective in reducing and adjusting unemployment rates using the Swamy estimators as presented in Table 1.15.

1.6 Conclusion

This paper provides the evidence from the empirical tests on the hysteresis versus persistence hypotheses for regional unemployment rates in Indonesia. The standard test for this uses the unit root test framework which uses the standard linear trend on the test. Following the actual trends of unemployment rates in Indonesia at the national and provincial levels, we propose the tests include quadratic trends. We also divide the tests by CBS version which is not consistent during the period 1990-2012 because of the changed definition in 2001 and by U1 definition which has adjusted to be more consistent during the same period.

For the individual provincial tests, our results suggest for not rejecting the hysteresis as oppose to the persistence hypothesis when using the CBS definition and a linear trend in all divisions of unemployment rates, namely: gender, age group, education level, and location either in urban or rural areas. On the other hand, we find increasing rejections for unemployment hysteresis when using quadratic trends with both the CBS and U1 definition. Moreover, most of the tests for the gaps in unemployment divisions: gender, age, education, and location reject the hysteresis, though gaps in the U1 definition seem to be more significant than those in the CBS definition.

For the panel data tests, we find that majority of the tests reject the hysteresis on Im, Pesaran, Shin (IPS) framework. The results also suggest rejecting the hysteresis and favouring the persistence hypothesis for both the CBS and U1 definition on the method of Levin, Lin, and Chu (LLC). Moreover, all division gaps in unemployment rates support the persistence hypotheses either on the method of LLC or Im, Pesaran, Shin (IPS).

In order to reduce and adjust regional unemployment rates in regional labour markets to their normal levels, policies relating to investment should be encouraged rather than relying on local economic growth as an auto mechanism in regional labour markets. Local governments could also manage the growth of their real minimum wages for reducing and adjusting unemployment rates. These two policy tools are favourable than increasing local government expenditures.

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Appendix 1.1 Unemployment Rates by Provinces, Categories and Gaps

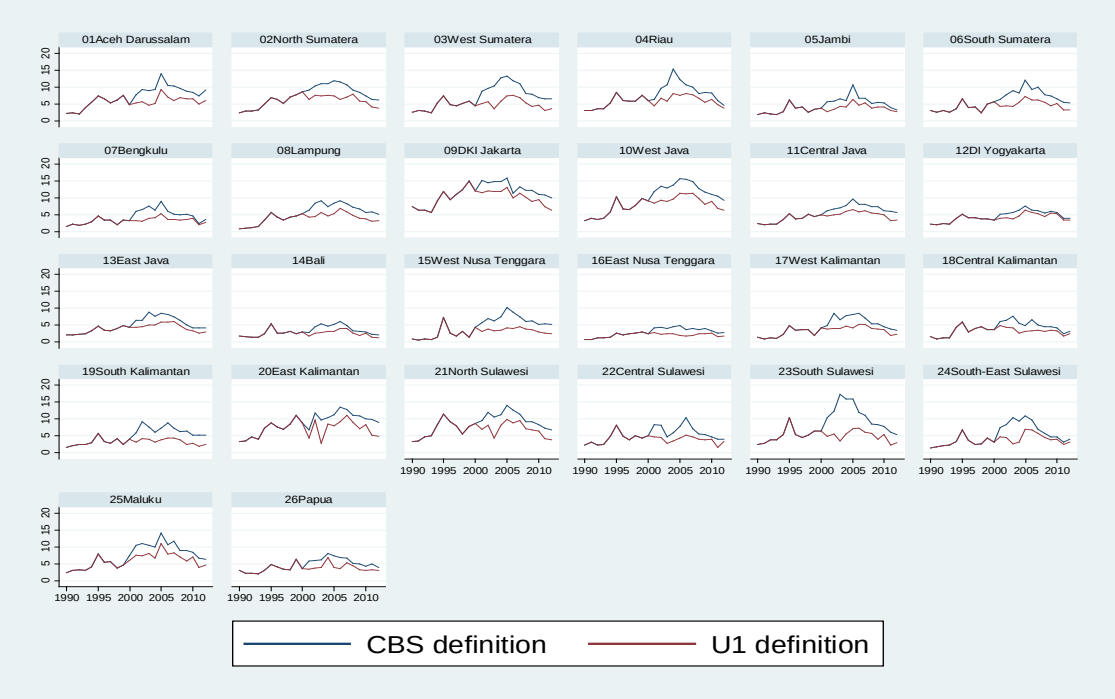

Figure 1.2 Unemployment rates by province, 1990-2012

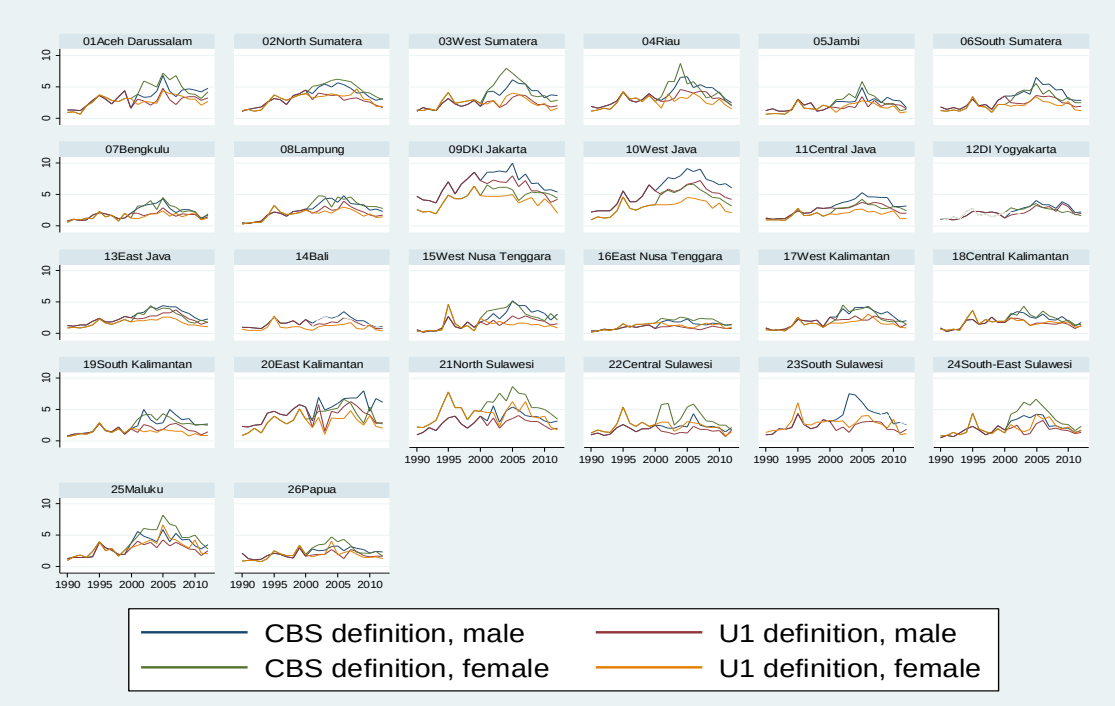

Figure 1.3 Unemployment rates by province and gender, 1990-2012

Figure 1.4 Unemployment rates by province and age, 1990-2012

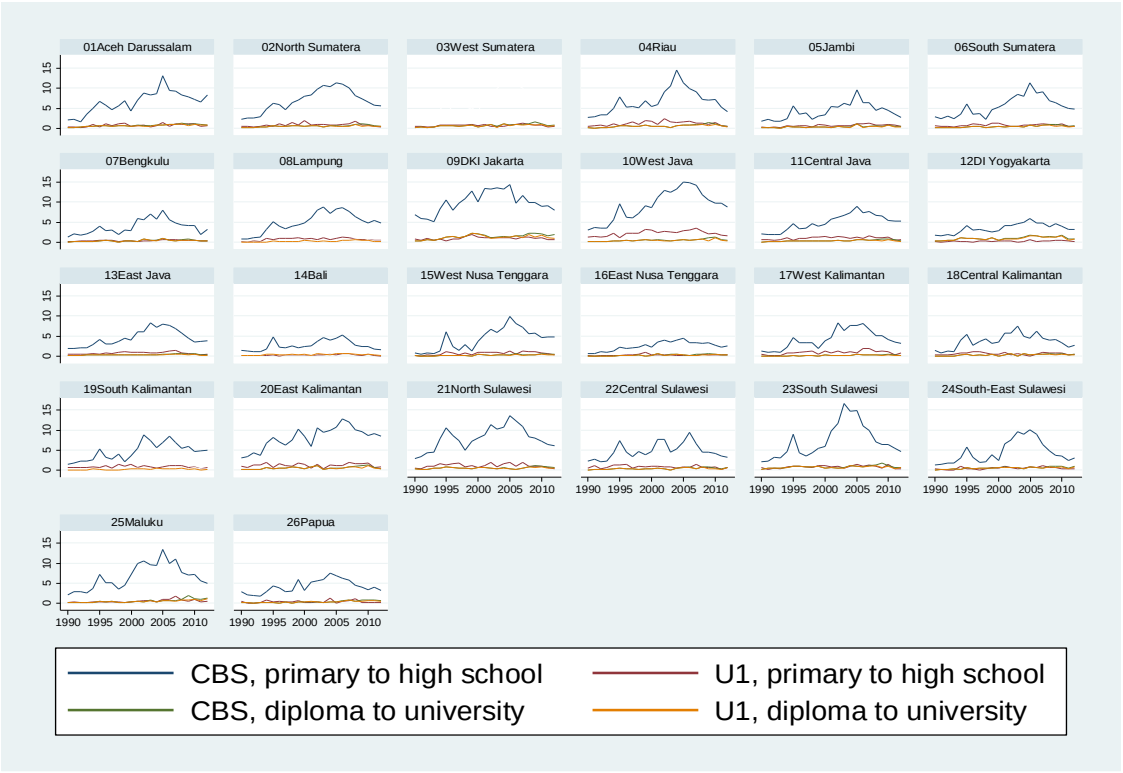

Figure 1.5 Unemployment rates by province and education, 1990-2012

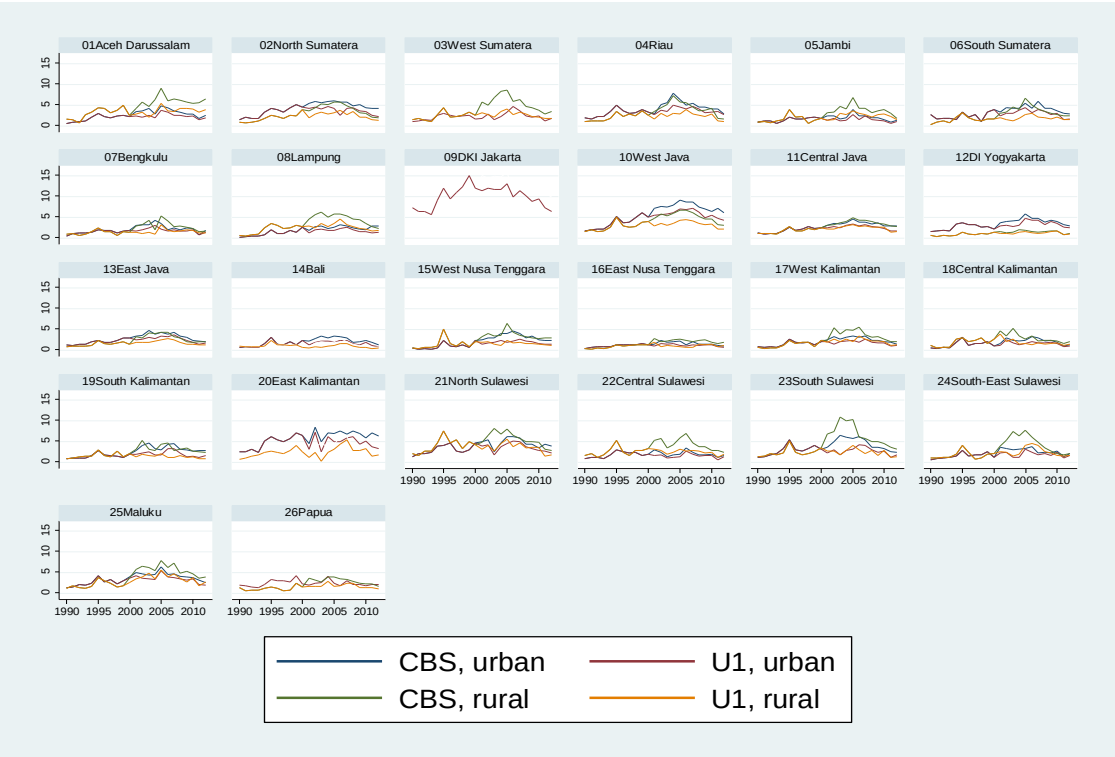

Figure 1.6 Unemployment rates by province and location, 1990-2012

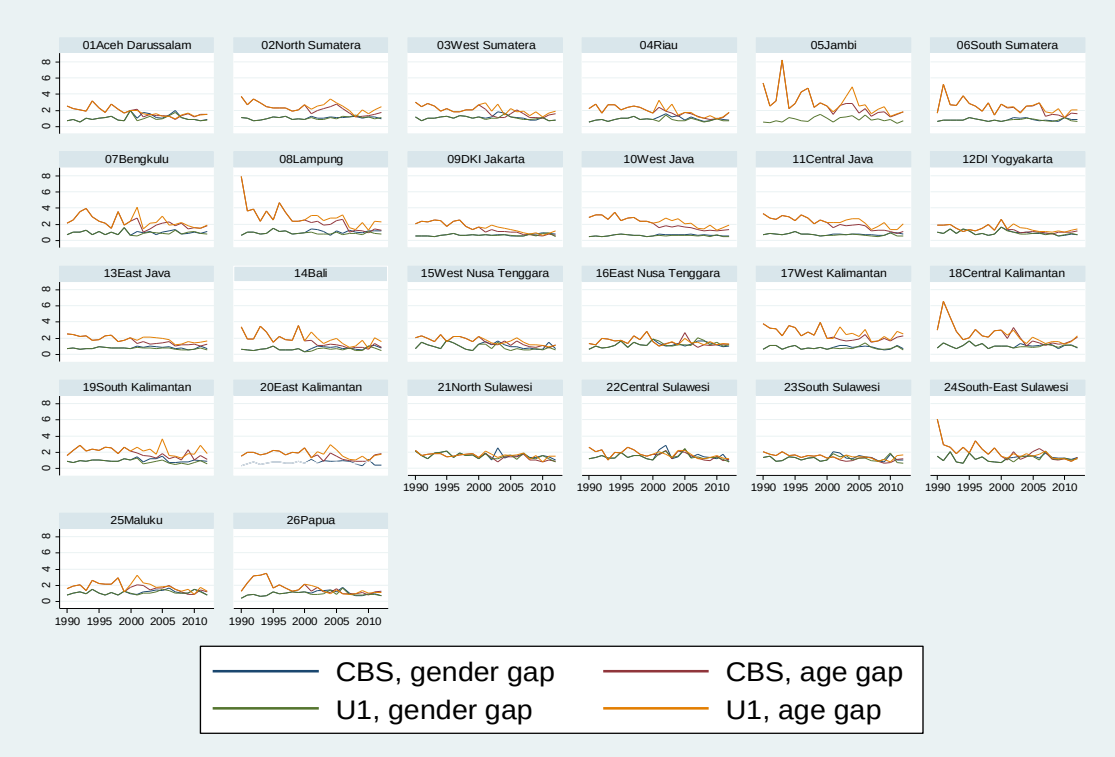

Figure 1.7 Unemployment rates by gender and age gaps, 1990-2012

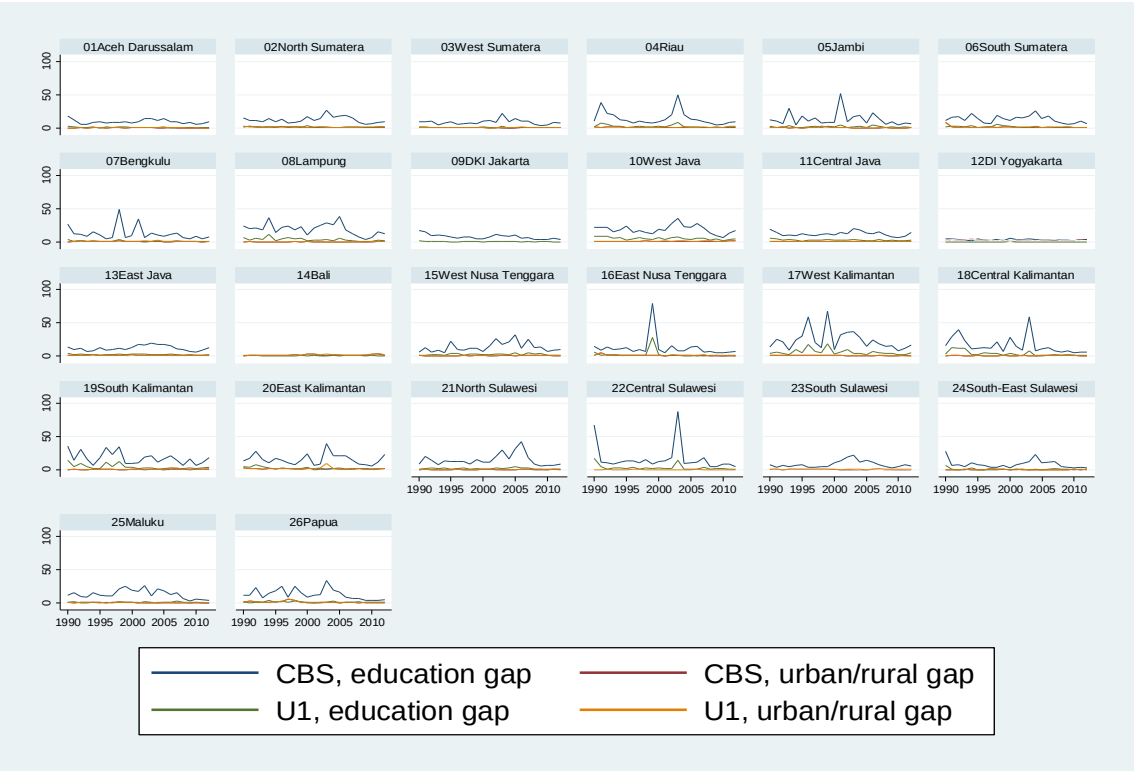

Figure 1.8 Unemployment rates by education and urban-rural gaps, 1990-2012

Appendix 1.2 LLC Panel Unit Root Test

National	1990 – 2000				2001 – 2012				1990 – 2012			
	CBS		U1		CBS		U1		CBS		U1	
	adj-t	*p-value*	*adj-t*	*p-value*	*adj-t*	*p-value*	*adj-t*	*p-value*	*adj-t*	*p-value*	*adj-t*	*p-value*
Unemployment Rate	-8.034***	0.000	-7.989***	0.000	-8.265***	0.000	-1.891***	0.029	0.126	0.550	-3.380***	0.000
By Gender:												
Female	-7.200***	0.000	-7.171***	0.000	-7.642***	0.000	-3.468***	0.000	0.096	0.538	-4.094***	0.000
Male	-9.670***	0.000	-9.625***	0.000	-6.975***	0.000	-3.839***	0.000	-1.133	0.129	-3.470***	0.000
By Age:												
Youth, 15-24	-7.683***	0.000	-7.653***	0.000	-8.726***	0.000	-6.580***	0.000	-2.514***	0.006	-4.806***	0.000
Adult, 25+	-8.887***	0.000	-8.871***	0.000	-6.830***	0.000	0.368	0.644	3.230	0.999	-1.693**	0.045
By Education:												
Low and Medium	-8.435***	0.000	-4.650***	0.000	-8.839***	0.000	-2.778***	0.003	0.755	0.775	-1.207	0.114
High	-5.379***	0.000	-5.382***	0.000	-5.394***	0.000	-4.298***	0.000	-6.528***	0.000	-2.517***	0.006
By Location:												
Urban	-7.964***	0.000	-7.947***	0.000	-8.486***	0.000	-3.590***	0.000	-1.494*	0.068	-2.565***	0.005
Rural	-7.598***	0.000	-7.455***	0.000	-7.718***	0.000	-3.958***	0.000	0.076	0.530	-4.603***	0.000
By Gaps:												
Gender gap	-6.742***	0.000	-6.746***	0.000	-4.758***	0.000	-8.392***	0.000	-13.881***	0.000	-7.897***	0.000
Age gap	-8.205***	0.000	-8.241***	0.000	-6.113***	0.000	-6.108***	0.000	-2.641***	0.004	-5.736***	0.000
Education gap	-9.239***	0.000	-6.190***	0.000	-4.596***	0.000	-4.900***	0.000	-12.720***	0.000	-6.166***	0.000
Urban-rural gap	-8.194***	0.000	-8.284***	0.000	-2.609***	0.005	-6.370***	0.000	-15.628***	0.000	-6.401***	0.000

Note: for sample period 1990-2000 and 2001-2012: included one lag and for 1990-2012: the optimum lags by Akaike Information Criteria (AIC). LLC tests for the gaps without a trend but the others with a trend. All tests apply for 26 provinces.

Essay 2: Persistence of Individual Unemployment in Indonesia: Dynamic Probit Analysis from Panel Susenas 2008-2010

Abstract

This paper presents a dynamic probit analysis of individual unemployment incidence using a panel survey on the National Socio-Economy (Susenas), 2008-2010. It compares a variety of dynamic random effects estimators, particularly focusing on the Heckman (1981) and Wooldridge (2005) approaches. The main results show a strong evidence of persistence or state dependence of individual unemployment in Indonesia. This finding is consistent with the theory of scar unemployment.

Keywords: individual persistent unemployment, state dependence, Wooldridge estimator, Heckman estimator.

JEL Classification Numbers: J64, J65, J68.

2.1 Introduction

In microeconomic literature, individual persistent unemployment or state dependence in unemployment could be defined as a causal link between past and current unemployment (Heckman and Borgas, 1980). This is also consistent with the theory of scar unemployment which postulates that, in fairly general conditions, the probability of being unemployed is higher for individuals that have experienced long periods of unemployment than for those who have had no or limited unemployment duration (Vishwanath, 1986).

This topic is widely studied in developed countries such as the United States America (USA), the United Kingdom (UK) and Germany because of the availability of individual panel data. In USA, Heckman and Borgas (1980) used data from the National Longitudinal Survey 1969-1971 for young males and Corcoran and Hill (1985) focused on men aged 35-64. Both studies found no evidence of state dependence in unemployment duration. However, Narendranathan and Elias (1993) and Greeg (2001) found strong evidence of state dependence in unemployment status using the National Child Development Study from UK. Arulampalam *et al.* (2000) also found strong evidence of unemployment persistence, especially for men older than 25 using the British Household Panel Survey. Strong evidence was also found in the case of Germany in Flaig *et al.* (1993), Muhleisen and Zimmermann (1994) and Biewen and Steffes (2010).

Related to individual unemployment persistence, there was strong evidence showing that unemployment benefits or insurance caused disincentive effects to unemployment duration, particular in the USA and European countries (Atkinson and Micklerweight, 1991; Holmlund, 1998, and Mayer, 2002). The availability of these benefits for long time periods might discourage the unemployed from searching for a job and cause them to prolong their unemployment duration in the labour market. Another effect of these benefits, among others, was that they could damage individual employability through productivity deterioration (Pissarides, 1992). Similar effects of a transfer cash program for work, called Plan Jefes, were found in the case of Argentina (Aturriza, *et. al.*, 2011). However, for those countries that do not have unemployment

benefits or government support systems, South Africa for example, the financial support from family and household formation may prolong unemployment (Klasen and Woolard, 2009).

Compared to those empirical works in the developed countries, individual unemployment persistence in developing countries, including Indonesian has not or rarely been investigated using individual dynamic panel data. Most of unemployment studies in Indonesia however, use regional panel data at provincial or district level (see for example: Dhanani, *et. al*., 2009, Soekarni, *et. al.,* 2009, Camola and de Mello, 2011, Suryadarma, *et. al.*, 2013). This might be because not enough individual panel data are available. The Indonesia's National Workforces Surveys (Sakernas) are based on individual data but cannot be used as panel data because they use a different random sample for each survey. Thus, an empirical analysis based on these data would be suitable for national or regional (provincial-district) panel analysis. Meanwhile Indonesia's Panel National Social-Economic Surveys (Panel Susenas) are recorded in limited three year periods, the latest one having took place from 2008 to 2010.

Therefore, this paper tries to analyse individual unemployment persistence in the case of Indonesia using Susenas Panel, 2008-2010. The method focuses the dynamic probit panel data model based on Wooldridge (2005) as an alternative to Heckman (1981). These methods are comparable, especially using short-time periods of panel data (Arulampalam and Stewart, 2009). For the empirical approach, this paper also investigates the effects of internal and external factors that affect employment prospects of an unemployed person. On internal side, it includes person's education, age, gender, marital status. On the external side, it also consists of internal and external household support. The models also include household formation. Again, for developing countries, especially for the Indonesian case, this kind of empirical research is relatively rare.

The next section describes the dataset of the Susenas Panel and the methods on which the empirical analysis is based. Section 2.3 shows the evidences on the persistence of individual unemployment in Indonesia and relative importance of family support and external support from government and other institution as well

household formation to the probability of being unemployed. The last section concludes.

2.2 Methodology

2.2.1 Data

The data contains a sample of households from the Panel National Survey on Socio-Economy (Susenas) who have a family member between the age 18 and 64 in March 2008 and who participated in all three waves of the survey from 2008 to 2010. There are 21,686 observations on the surveys that meet these criteria[2]. The definition of unemployment is based on the standard International Labour Organisation's (ILO) definition: *a person is unemployed if he or she does not have a job, and is actively looking for work.* This is also the narrow version of the official definition for unemployment from the Indonesian Central Body of Statistics (CBS). Thus, the unemployment rates in this paper are relatively low compared to those reported by CBS. The study restricts the observations to only those are in the labour force in all three years of period.

The dependent variable or unemployment status consists of employed and not employed. The explanatory variables include lag of unemployment for representing state dependence or persistent unemployment, number of employed adults in household and household's income, indicating family support to the unemployed. These variables are expected to be positively related to the probability of being unemployed. Household formation is represented by the number of children below six years of age, children in school, and elders in household and are all expected to have negative effects on the probability of unemployment. Support from outside the household comes from the number of received social safety net programs from the government and how much financial support via financial credit from bank, non-bank and informal parties they received. These variables should have positive effects on the probability of being unemployed.

[2] The raw observations are more than 21,686 for each year. However, we put additional consistency criteria during paneling data 2008-2010: sex and a relaxed criterion up to one year difference in age.

The individual's education in years, sex, age, age squares, marital status, urban and year dummies are placed as control variables to account for observed heterogeneities. For the advanced modelling of the Heckman's and Wooldridge's models, we include additional time-invariant variables to solve unobserved heterogeneity and initial conditions problems. These variables will be explained later in the section of methodology.

Table 2.1 State Transitions of Individual Unemployment in 2008-2010

State Transitions	Frequency	Percent
Never Unemployed	21,020	96.93
One period of Unemployed:		
U2008, E2009, E2010	251	1.16
E2008, U2009, E2010	167	0.77
E2008, E2009, U2010	132	0.61
Two period of Unemployed:		
U2008, U2009, E2010	45	0.21
U2008, E2009, U2010	16	0.07
E2008, U2009, U2010	28	0.13
Never Employed	27	0.12
Total Individuals	21,686	100.00

Note: U = Unemployed and E = Employed.

Table 2.1 shows the state transitions of employed and unemployed individuals during the periods of 2008-2010. From 21,686 total individuals in 2008, there were 21,020 individuals or 96.93 percent that never fell into unemployment during the other periods. Meanwhile, there were 550 individuals that experienced unemployment in one period. Of these, 251 had an unemployment status in 2008 but became employed in 2009-2010. There are 132 individuals who finally got a job in 2010 and 167 people who fell into unemployment in 2009 only. From 89 individuals that had two periods of unemployment, 45 of them finally got job in 2010 after trying to get jobs in 2008-2009, while 28 and 16 individuals had a job only in 2008 and 2009, respectively. Lastly, there were only 27 people that had very persistent unemployment or never got jobs during the three years of period.

2.2.2 Method

2.2.2.1 Modelling Persistence of Individual Unemployment

The observed dependent variable, referring to the other studies, is binary and takes the value of one if the observation is unemployed and zero otherwise, named individual unemployment (***un***). Then, we may specify the dynamic model of the unemployment status for individual ***i*** at the interview date at time *t* as follows:

(2.1) $un_{it}^{*} = f(un_{it-1}, \boldsymbol{fs}_{it}, \boldsymbol{hf}_{it}, \boldsymbol{es}_{it})$

where un^{*} denotes the unobservable individual propensity to be unemployed as a function of lagged observed unemployment status (un_{it-1}), family support (***fs***), household formation (***hf***), and external support from outside the household (***es***), such as government supports via social safety net programs, financial credit from the bank or loans from informal financial sources. The lagged unemployment status would increase the propensity being unemployed. Furthermore, the internal support from other family members and external support from outside the household would also increase that propensity. Meanwhile, the household formation with dependent children and elders would reduce it.

The general model of dynamic random effects probit for individual unemployment in equation (2.1) can be rewritten as (see also Arulampalam, *et. al.*, 2000):

(2.2) $un_{it}^{*} = \gamma un_{it-1} + \boldsymbol{x}_{it}^{'}\boldsymbol{\beta} + v_{it}$ (i = 1, 2, ..., N and t = 2, ..., T)

(2.3) $un_{it} = 1(un_{it}^{*} > 0)$

where: $\boldsymbol{x}$ is a vector of explanatory variables affecting un_{it}, $\boldsymbol{\beta}$ is the vector of coefficients associated with explanatory variables $\boldsymbol{x}$, and v is the unobservable error term. In equation (2.3), a person is observed to be unemployed when his/her propensity to be unemployed crosses zero, that is, un_{it} = 1 if un_{it}^{*} > 0 and zero otherwise. However, in equation (2.2), un_{it}^{*} is a function of the observed status of an unemployed person in the previous period or un_{t-1}. The inclusion of lagged unemployment on the right side of the equation allows us to test the persistence of

the individual unemployment. The positive and significant effect of this variable is also consistent with the testing for state dependence in unemployment or so-called the scar unemployment (Arulampalam, *et. al.*, 2000).

2.2.2.2 Heckman's Estimator

Heckman and Borjas (1980) pointed out a potential problem arising in equation (2.2) is that it could produce a spurious coefficient of lagged unemployment by including inappropriate control variables or by not including unobserved heterogeneity which might have a significant effect on the propensity of unemployment. They suggested controlling for all potential observable and unobservable individual characteristics. Hence, it assumes that the unobservable individual-specific heterogeneity is time-invariant and decomposes the error $v_{it} = c_i + e_{it}$, then equation (2.2) could be modified as,

(2.4) $un_{it}^{*} = \gamma un_{it-1} + \boldsymbol{x}_{it}^{'}\boldsymbol{\beta} + c_i + e_{it}$ i = 1, 2, ..., N and t = 2, ..., T,

where c_i is assumed to be independent for $\boldsymbol{x}$ all i and which is called the uncorrelated random effect model.

Furthermore, there is another problem in equation (2.4) when the initial observation of unemployed, un_{i1} has a significant correlation with the unobservable heterogeneity c_i (Heckman, 1981). This problem emerges because the start of observation period, year of 2008 in this case, does not coincide with the stochastic process generating individual's unemployment experiences. Heckman suggested approximating the density function of the initial period using the same parametric form as conditional density for the rest of observations (Arulampalam and Stewart, 2009). Then equation (2.4) can be rewritten as,

(2.5) $un_{it}^{*} = \gamma un_{it-1} + \boldsymbol{x}_{it}^{'}\boldsymbol{\beta} + \theta_t c_i + e_{it}$ i = 1, 2, ..., N and t = 2, ..., T,

with $\theta_T = 1$ for identification of σ_c^2, and the equation for the initial observation as,

(2.6) $un_{i1}^{*} = \boldsymbol{\lambda}^{'}\boldsymbol{z}_i + \theta_1 c_i + e_{i1}$ i = 1, 2, ... n and t = 1.

where $\boldsymbol{z}$ is a vector of exogenous covariates that is expected to include instrument variables such as pre-sample variables and c_i denotes the full set of time-varying explanatory variables. The standard assumption of the e_{it} and c_i are both normally distributed with variance 1 and σ_c^2, respectively.

In his paper, Heckman (1981) allowed the error in the equation of the initial condition ($\theta_1 c_i + e_{i1}$) to be freely correlated with the error in the equation for the other periods ($\theta_t c_i + e_{it}$). In addition, he also relaxed the standard assumption of equi-correlated errors in period *t = 2, ... ,T.* Hence, the *Cov*$(c_i + e_{it}, c_i + e_{is})$ is also equal to σ_c^2 for *t, s = 2, ... ,T* where $t \neq s$. Therefore, the correlation between the two periods is given by $\rho = \sigma_c^2/(\sigma_c^2 - 1)$ (Arulampalam and Stewart, 2009). Then, we could specify equation (2.5) as the same model as in equation (2.4),

(2.7) $un_{it}^* = \gamma un_{it-1} + \boldsymbol{x}_{it}^{'}\boldsymbol{\beta} + c_i + e_{it}$ *i* = 1, 2, ..., *N* and *t* = 2, ..., *T*,

and equation (2.6) as

(2.8) $un_{i1}^* = \boldsymbol{\lambda}^{'}\boldsymbol{z}_i + \theta c_i + e_{i1}$ *i* = 1, 2, ..., *N* and *t* = 1.

These two equations are jointly estimated by maximum likelihood and we could test for the exogeneity of the initial conditions on θ. It is noted that Heckman estimators approximate the joint probability of the full observed un sequences $(un_{i1}, un_{i2}, \dots, un_{iT})$.

2.2.2.3 Wooldridge's Estimator

An alternative to the Heckman approach is a simplified model proposed by Wooldridge (2005). Based on his approach, the initial conditions problem is solved by modelling un_{it} at period *t = 2, ..., T* conditional on the initial period (un_{i1}) and exogenous variables ($\boldsymbol{x}_{it}$). Recall equation (2.4),

(2.9) $un_{it}^* = \gamma un_{it-1} + \boldsymbol{x}_{it}^{'}\boldsymbol{\beta} + c_i + e_{it}$ *i* = 1, 2, ..., *N* and *t* = 2, ..., *T*,

then specify an approximation for density of c_i conditional on un_{i1} and the period-specific versions of time-varying explanatory variables starting from the second period of observations as:

(2.10) $c_i = \alpha_0 + \alpha_1 un_{i1} + \boldsymbol{x}_{\boldsymbol{i}}^{+\prime}\alpha_2 + \varepsilon_i$ *i* = 1, 2, ..., *N* and *t* = 1.

where $\boldsymbol{x_i^+} = \left(x_{i2}^{'}, \ldots, x_{iT}^{'}\right)^{'}$ and ε_i is the normal distribution with mean 0 and variance σ_ε^2. Substituting equation (2.10) into equation (2.9) gives,

(2.11) $un_{it}^{*} = \alpha_0 + \boldsymbol{x_{it}^{'}\beta} + \gamma un_{it-1} + \alpha_1 un_{i1} + \boldsymbol{x_i^{+'}\alpha_2} + e_{it}$,

This equation can be estimated by the standard random effects probit model. It notices that Wooldridge estimators starting un sequence from the second period of observation compared to the full observations in the Heckman estimators.

2.2.2.4 Correlated Random Effects of Dynamic Panel Model

The standard uncorrelated random effects probit model assumes that c_i is uncorrelated with $\boldsymbol{x_{it}}$. If this is not the case then the maximum likelihood of the estimates will be inconsistent. To avoid this problem, it could relax the assumption by following Mundlak (1978) and adding within-means of explanatory variables into the main equation in the Heckman estimators. Instead of using means of the full period of the observations, we use within-means of time-varying variables at *T-1* of the observations. Then, the Heckman models would be re-specified as:

(2.12) $un_{it}^{*} = \gamma un_{it-1} + \boldsymbol{x_{it}^{'}\beta} + \boldsymbol{\bar{x}_i^{'+}a}_1 + c_i + e_{it}$ $\quad i = 1, 2, \ldots, N$ and $t = 2, \ldots, T$,

(2.13) $un_{i1}^{*} = \boldsymbol{\lambda^{'} z}_i + \theta c_i + e_{i1}$ $\quad i = 1, 2, \ldots, N$ and $t = 1$

where $\boldsymbol{\bar{x}_i^{+}} = \frac{1}{T-1}\sum_{t=2}^{T} \boldsymbol{x_{it}}$.

It would be relatively different in the case of Wooldridge estimators. The popular version of the correlated random effect models for the Wooldridge approach is to replace $\boldsymbol{x_i^+}$ with the means of time-varying explanatory variables of all time periods (for example: Stewart, 2007; Biewen and Steffes, 2010; Akay, 2012). Then the equation (2.11) is rewritten as follows:

(2.14) $un_{it}^{*} = \gamma un_{it-1} + \boldsymbol{x_{it}^{'}\beta} + \alpha_1 un_{i1} + \boldsymbol{\bar{x}_i^{'}\alpha}_2 + e_{it}$.

Nevertheless, the equation (1.14) can be severely biased in the short periods of panel data, particularly in 3-5 time periods (Akay, 2012; Rabe-Hesketh and Skrondal, 2013).

As an alternative, we follow the suggestion by Rabe-Hesketh and Skrondal (2013) and use the following equation[3]:

(2.15) $un_{it}^{*} = \gamma un_{it-1} + \boldsymbol{x}_{it}^{'}\boldsymbol{\beta} + \alpha_1 un_{i1} + \overline{\boldsymbol{x}}_i^{+'}\boldsymbol{a_2} + e_{it}$,

where $\overline{\boldsymbol{x}}_{\boldsymbol{i}}^{+} = \frac{1}{T-1}\sum_{t=2}^{T}\boldsymbol{x_{it}}$.

The original and constraint models of Wooldridge estimators in the equation (2.11) and (2.15) would perform well as Heckman estimators especially for short-period of panel data (Arulampalam and Stewart, 2009; Rabe-Hesketh and Skrondal, 2013).

2.3 Empirical Evidence

The results from pooled and random-effects probit estimators for a probability model of unemployment are given in Table 2.2. Column [2] and [4] give the standard model of state dependence with explanatory variables (marginal effects are reported in Appendix 2.2). The difference is due to the choices in family support variables between the number of employed in household and the household's income or expenditure. The number of employed person in a household has negative effect to the probability of unemployed meanwhile household's income has positive effect. It seems that household's income is seen as financial support to the unemployed in the family, thereby increasing the probability of being unemployed. Meanwhile, instead of being a kind of family support to the unemployed member, the employed persons in the household put a physiological pressure on unemployed in the family to find a job and reduce his/her probability of being unemployed. In column [3] and [5], the estimates include the lag of family support, either lagged household's income or the lag of the number of employed in the household. In those estimates, the lagged family support has positive and significant impacts to the probability of being unemployed.

Increases in the number of children below the age of six and the number of children in school reduce the probability of being unemployed, while the number of

[3] Rabe-Hesketh and Skrondal (2013) also suggested including all the initial-periods of the explanatory variables in the equation (1.14) which they admitted was unrealistic even though it would perform well. Such equation would be: $un_{it}^{*} = \boldsymbol{x}_{it}'\boldsymbol{\beta} + \gamma un_{it-1} + \alpha_1 un_{i1} + \overline{\boldsymbol{x}}_i'\boldsymbol{a_2} + \boldsymbol{x}_{i1}'\boldsymbol{a_3} + e_{it}$.

elders is insignificant except for the estimates in column [3]. Furthermore, the external support from outside the household, i.e: the number of received social safety net programs and the other financial support from bank and non-bank institution have an insignificant effect on the probability of being unemployed, except for that estimate where the household's income is included as presented in column [4]. Being unemployed in *t-1* strongly increases the probability of being unemployed at *t* based on a very significant variable of lagged unemployment status in all estimates.

Table 2.2 Pooled and Random-Effects Probit Estimates

Variables	Pooled Pobit				Random Effects Probit			
[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
Unemployment (t-1)	1.680***	2.151***	1.549***	1.555***	1.081***	1.619***	1.107***	1.120***
	(0.065)	(0.073)	(0.061)	(0.062)	(0.088)	(0.081)	(0.066)	(0.067)
Family Supports:								
Num. of Employed in HH	-0.430***	-0.769***			-0.653***	-0.899***		
	(0.026)	(0.032)			(0.058)	(0.036)		
Num. of Employed in HH (t-1)		0.471***				0.457***		
		(0.022)				(0.025)		
Log of HH's Income			0.100***	-0.090*			-0.055	-0.179***
			(0.029)	(0.047)			(0.038)	(0.054)
Log of HH's Income (t-1)				0.245***				0.174***
				(0.047)				(0.053)
Household Formation:								
Num. of Children Below 6	-0.184***	-0.129***	-0.131***	-0.127***	-0.058	-0.016	-0.036	-0.036
	(0.035)	(0.036)	(0.033)	(0.033)	(0.046)	(0.042)	(0.037)	(0.037)
Num. of Children in School	-0.156***	-0.132***	-0.129***	-0.131***	-0.009	-0.012	-0.027	-0.03
	(0.026)	(0.027)	(0.025)	(0.025)	(0.032)	(0.030)	(0.026)	(0.026)
Num. of Elders	0.095*	0.036	0.025	0.023	-0.003	-0.048	-0.038	-0.04
	(0.053)	(0.056)	(0.050)	(0.050)	(0.068)	(0.063)	(0.054)	(0.054)
External Supports:								
Num. of Safety Net Programs	0.026	0.027	0.046*	0.064**	0.099***	0.093***	0.065**	0.075**
	(0.028)	(0.029)	(0.028)	(0.028)	(0.036)	(0.034)	(0.030)	(0.030)
Num. of Other Supports	-0.044	-0.046	-0.145*	-0.135	0.095	0.100	-0.058	-0.051
	(0.089)	(0.094)	(0.086)	(0.086)	(0.111)	(0.103)	(0.092)	(0.092)
Control Variables:								
Education in years					0.006	0.004	0.009	0.007
					(0.006)	(0.006)	(0.006)	(0.006)
Males					0.087	0.071	0.119***	0.119***
					(0.057)	(0.052)	(0.044)	(0.044)
Age					-0.113***	-0.072***	-0.045***	-0.045***
					(0.020)	(0.017)	(0.015)	(0.015)
Age Squares devided by 100					0.110***	0.061***	0.036*	0.035*
					(0.025)	(0.022)	(0.019)	(0.019)
Married					-0.830***	-0.680***	-0.512***	-0.504***
					(0.090)	(0.066)	(0.058)	(0.059)
Urban					0.382***	0.340***	0.366***	0.348***
					(0.063)	(0.052)	(0.047)	(0.047)
Year 2009					1.296***	0.134	-0.462	-1.126*
					(0.358)	(0.308)	(0.585)	(0.618)
Year 2010					1.140***	-0.021	-0.552	-1.221*
					(0.352)	(0.311)	(0.591)	(0.625)
_cons	-1.452***	-1.940***	-3.723***	-4.495***				
	(0.056)	(0.063)	(0.427)	(0.453)				
Rho (ρ)					0.199	0.000	0.000	0.000
Log Likelihood	-2110	-1902	-2279	-2266	-1777	-1619	-2039	-2034
N	43372	43372	43372	43372	43372	43372	43372	43372

Note: *** p<0.01, ** p<0.05, * p<0.1. Values in parentheses are standard errors.

The second part of Table 2.2 gives the equivalent standard random effect probit estimates, treating lagged unemployment and initial conditions as exogenous variables (Arulampalam and Stewart, 2009). When we introduce control variables into the models, the family support remains significant, except for the estimate in column [8]. However, all variables in the household formation become insignificant. The number of received social safety net program remains positive and significant for all estimates as well as the lagged unemployment. Being married decreases the probability of being unemployed while living in urban area increases that probability. In some estimates, being male also increases the probability of unemployment. Surprisingly, education has no effect on the probability of being unemployed.

The random effects estimates would be similar to pooled probit estimates (all control variables included) if they produce ρ close to zero or zero. Except for the estimates in column [6] which it produces non zero ρ = 0.199, all estimates give ρ equal to zero. The coefficient of lagged unemployment at 1.081 is smaller than the pooled probit estimates at 1.680. However, the random effects probit and pooled probit models involve different normalizations (Arulampalam, *et. al.,* 2000). To compare coefficients, those from the random effects estimator need to be multiplied by the estimates of ($\sqrt{1-\rho}$), where ρ is a constant cross-period error correlation. Thus, the scaled coefficient of lagged unemployment in column [6] is 0.968. This estimated coefficient remains strongly significant.

Table 2.3 presents the random effects probit estimates based on the Heckman's and Wooldridge's approaches. All estimates are modelled with the Mundlak specifications. In the Heckman estimates (full versions in Appendix 2.3), we include one pre-sampling exogenous instrument, Cohort1990 (labour force that was born in 1990 then had first experience on the labour market in 2008) on the initial period estimations. The estimations produce positive and significant of the lagged unemployment which this supports the evidence of the existence of persistent individual unemployment in the case of Indonesia. The coefficients are ranging from 0.663–0.713. Compared to the random-effects estimators (Table 2.2) that treat the initial condition as exogenous, the estimated coefficients of the lagged unemployment

in the Heckman estimations are relatively lower in all cases and the coefficients of ρ are more than twice as high, especially for the first case, 0.520 and 0.199, respectively. In terms of scaled coefficient estimates, $\gamma(1-\rho)^{0.5}$, the standard random-effects probit with initial conditions being treated as exogenous produces 0.97 while the Heckman estimator gives 0.46.

Moreover, the current number of employed decreases the probability of being unemployed meanwhile its lag is not significant (column 2 and 3). The result also gives the negative and significant coefficient of the current household's income but not its lag. All variables in household formation are not significant as well as the variables in external support from outside households. Being male and living in urban areas increase the probability of being unemployed meanwhile being married decreases that probability. The estimations of θ in all estimates are significantly greater than zero, thus rejecting the exogeneity of the equation in the first observation. In fact, all coefficients of θ are insignificantly different from one.

In the Wooldridge estimates (full versions in Appendix 2.4), the effect of the current number of employed is consistently significant and negative while the previous number of employed is positively significant to the current status of unemployment. The similar results are also found for the household's income, except for the estimate in column [9] where household's income is insignificant. The variables of household formation are mostly insignificant except for the number of children younger than six years old. The variables of external support from the government and the others are also insignificant. The lagged unemployment remains significant for all estimates and their coefficients are ranging between 0.578 - 1.174.

These coefficients are relatively lower than those found in the other empirical studies. Arulampalam *et. al*. (2000) for example produced the coefficients ranging between 1.051 - 1.412. Arulampalam and Stewart (2009) provided the estimated coefficient from Wooldridge's method at 1.062 in the case of the UK. Biewen and Steffes (2010) presented the empirical coefficients ranging between 1.387 - 1.612 in the case of Germany.

Table 2.3 Heckman and Wooldridge with Mundlak Specifications

Variables	Heckman				Wooldridge			
[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
Unemployment (t-1)	0.663***	0.713***	0.676***	0.696***	0.578***	1.174***	0.559***	0.607***
	(0.162)	(0.171)	(0.171)	(0.170)	(0.196)	(0.161)	(0.176)	(0.172)
Family Supports:								
Num. of Employed in HH	-1.814***	-1.769***			-1.858***	-1.338***		
	(0.149)	(0.156)			(0.168)	(0.124)		
Num. of Employed in HH (t-1)		0.052				0.397***		
		(0.064)				(0.046)		
Log of HH's Income			-0.336***	-0.287***			-0.248**	-0.170
			(0.097)	(0.107)			(0.113)	(0.115)
Log of HH's Income (t-1)				0.105				0.215***
				(0.102)				(0.077)
Household Formation:								
Num. of Children Below 6	0.109	0.115	-0.037	-0.037	0.255	0.296**	-0.040	-0.040
	(0.134)	(0.133)	(0.097)	(0.096)	(0.163)	(0.134)	(0.118)	(0.117)
Num. of Children in School	-0.024	-0.021	-0.045	-0.045	0.048	0.061	0.014	0.011
	(0.116)	(0.115)	(0.082)	(0.082)	(0.141)	(0.119)	(0.101)	(0.099)
Num. of Elders	-0.074	-0.071	-0.021	-0.023	-0.021	0.041	0.017	0.01
	(0.209)	(0.207)	(0.149)	(0.148)	(0.255)	(0.212)	(0.178)	(0.177)
External Supports:								
Num. of Safety Net Programs	0.064	0.063	0.052	0.051	0.091	0.069	0.035	0.034
	(0.076)	(0.075)	(0.054)	(0.054)	(0.089)	(0.075)	(0.063)	(0.062)
Num. of Other Supports	0.227	0.228	0.145	0.143	0.233	0.208	0.141	0.137
	(0.200)	(0.198)	(0.141)	(0.141)	(0.238)	(0.195)	(0.165)	(0.163)
Control Variables:								
Education in years	-0.029	-0.028	-0.029	-0.029	-0.033	-0.034	-0.041	-0.039
	(0.029)	(0.028)	(0.021)	(0.021)	(0.035)	(0.029)	(0.025)	(0.025)
Males	0.064	0.064	0.133***	0.132***	0.097	0.083	0.139***	0.136***
	(0.077)	(0.076)	(0.051)	(0.051)	(0.083)	(0.065)	(0.053)	(0.052)
Age	0.235	0.230	0.032	0.032	0.125	0.099	-0.101	-0.104
	(0.214)	(0.221)	(0.158)	(0.146)	(0.255)	(0.217)	(0.178)	(0.176)
Age Squares divided by 100	-0.447	-0.436	-0.158	-0.158	-0.436	-0.348	-0.094	-0.089
	(0.311)	(0.321)	(0.225)	(0.210)	(0.361)	(0.305)	(0.248)	(0.245)
Married	-0.391	-0.389	-0.456**	-0.454**	-0.620*	-0.516*	-0.666***	-0.655***
	(0.291)	(0.289)	(0.219)	(0.218)	(0.328)	(0.273)	(0.237)	(0.235)
Urban	0.550***	0.540***	0.408***	0.403***	0.523***	0.403***	0.410***	0.388***
	(0.096)	(0.095)	(0.066)	(0.065)	(0.097)	(0.073)	(0.063)	(0.061)
Year 2009	1.926	-0.063	-0.136	0.061	0.569	0.055	-0.957	-1.270*
	(30.920)	(39.302)	(42.163)	(0.064)	(0.500)	(0.394)	(0.758)	(0.753)
Year 2010	1.669	-0.315	-0.180		0.413	-0.105	-0.954	-1.296*
	(30.920)	(39.302)	(42.163)		(0.498)	(0.393)	(0.759)	(0.756)
Initial Conditions:								
Unemployment 2008					1.083***	0.627***	0.679***	0.645***
					(0.284)	(0.220)	(0.202)	(0.196)
Exogenous test on initial condition:								
Theta (θ)	1.053***	1.067***	1.126**	1.161**				
	(0.283)	(0.294)	(0.457)	(0.495)				
Rho (ρ)	0.520	0.506	0.212	0.202	0.574	0.312	0.253	0.228
Log Likelihood	-2763	-2763	-3416	-3415	-1635.6	-1595.9	-2024.9	-2021.1
N	65058	65058	65058	65058	43372	43372	43372	43372

Note: *** p<0.01, ** p<0.05, * p<0.1. Values in parentheses are standard errors.

The control variables of married and urban dummies are consistently significant for all estimates while the male dummy is only significant for some estimates. Education remains insignificant for all estimates. This is probably because the majority of the labour force in Indonesia has low skill or an average of 8 years of education (see

Appendix 2.1). Age and age squares are also insignificant for all estimates as well as time dummies with an exception in the last estimate (column 9). Lastly, the initial condition of unemployment status in the year of 2008 is significant in all estimates.

2.4 Conclusion

In this paper, we have proved that there is strong evidence of an individual's previous unemployment experience having implications on his/her future labour market experience, which is consistent with the state dependence or scarring theory of unemployment. This strong conclusion come from all estimates presented in this paper, namely: pooled probit, random-effects probit, Wooldridge and Heckman estimates.

In addition, the consequences of including control variables or observable heterogeneity, unobservable heterogeneity, and initial conditions in the models, the effects of the variables in the household formation and external supports become weaker or insignificant. Meanwhile the variables in the family supports play a significant role in the current unemployment status. The probability of being unemployment increases if the persons are males and live in urban area. It will decrease if they are married. However, the level of education and external household support, especially receiving social safety net programs play no role in the probability of being unemployed.

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Appendix 2.1 Descriptive Statistics

Variables	Obs	Mean		
		2008	2009	2010
Unemployment	21686	0.016	0.012	0.009
Num. of Adult Employment in HH	21686	2.219	2.236	2.219
Log of HH Expenditure	21686	14.133	14.250	14.393
Num. of Children Below 6 Years	21686	0.502	0.480	0.445
Num. of Children in School	21686	0.808	0.810	0.808
Num. of Elder in HH	21686	0.117	0.117	0.117
Num. of Received Social Safety Net Programs	21686	0.604	0.538	0.702
Num. of Other Supports	21686	0.061	0.056	0.079
Education	21686	7.996	8.074	8.115
Males	21686	0.665	0.665	0.665
Age	21686	38.533	39.193	39.868
Married	21686	0.841	0.842	0.846
Urban	21686	0.435	0.435	0.435

Appendix 2.2 Marginal Effects of Probit Estimates

Variables	Pooled Pobit			
[1]	[2]	[3]	[4]	[5]
Unemployment (t-1)	0.040***	0.047***	0.039***	0.039***
	(0.002)	(0.002)	(0.002)	(0.002)
Family Supports:				
Num. of Employed in HH	-0.010***	-0.017***		
	(0.001)	(0.001)		
Num. of Employed in HH (t-1)		0.010***		
		(0.001)		
Log of HH's Income			0.003***	-0.002*
			(0.001)	(0.001)
Log of HH's Income (t-1)				0.006***
				(0.001)
Household Formation:				
Num. of Children Below 6	-0.004***	-0.003***	-0.003***	-0.003***
	(0.001)	(0.001)	(0.001)	(0.001)
Num. of Children in School	-0.004***	-0.003***	-0.003***	-0.003***
	(0.001)	(0.001)	(0.001)	(0.001)
Num. of Elders	0.002*	0.001	0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.001)
External Supports:				
Num. of Safety Net Programs	0.001	0.001	0.001*	0.002**
	(0.001)	(0.001)	(0.0007)	(0.001)
Num. of Other Supports	-0.001	-0.001	-0.004*	-0.003
	(0.001)	(0.002)	(0.0022)	(0.002)

Appendix 2.3 Full Versions of Heckman Estimates

Variables	Heckman Estimators with Mundlak Specifications			
(1)	(2)	(3)	(4)	(5)
Unemployment (t-1)	0.663***	0.713***	0.676***	0.696***
	(0.162)	(0.171)	(0.171)	(0.170)
Family Supports:				
Num. of Employed in HH	-1.814***	-1.769***		
	(0.149)	(0.156)		
Num. of Employed in HH (t-1)		0.052		
		(0.064)		
Log of HH's Income			-0.336***	-0.287***
			(0.097)	(0.107)
Log of HH's Income (t-1)				0.105
				(0.102)
Household Formation:				
Num. of Children Below 6 years	0.109	0.115	-0.037	-0.037
	(0.134)	(0.133)	(0.097)	(0.096)
Num. of Children in School	-0.024	-0.021	-0.045	-0.045
	(0.116)	(0.115)	(0.082)	(0.082)
Num. of Elders	-0.074	-0.071	-0.021	-0.023
	(0.209)	(0.207)	(0.149)	(0.148)
External Supports:				
Num. of Safety Net Programs	0.064	0.063	0.052	0.051
	(0.076)	(0.075)	(0.054)	(0.054)
Num. of Other Supports	0.227	0.228	0.145	0.143
	(0.200)	(0.198)	(0.141)	(0.141)
Control Variables:				
Education (years)	-0.029	-0.028	-0.029	-0.029
	(0.029)	(0.028)	(0.021)	(0.021)
Males	0.064	0.064	0.133***	0.132***
	(0.077)	(0.076)	(0.051)	(0.051)
Age	0.235	0.230	0.032	0.032
	(0.214)	(0.221)	(0.158)	(0.146)
Age Squares (1/100)	-0.447	-0.436	-0.158	-0.158
	(0.311)	(0.321)	(0.225)	(0.210)
Married	-0.391	-0.389	-0.456**	-0.454**
	(0.291)	(0.289)	(0.219)	(0.218)
Urban	0.550***	0.540***	0.408***	0.403***
	(0.096)	(0.095)	(0.066)	(0.065)
Year 2009	1.926	-0.063	-0.136	0.061
	(30.920)	(39.302)	(42.163)	(0.064)
Year 2010	1.669	-0.315	-0.180	
	(30.920)	(39.302)	(42.163)	
Time Invariant:				
Mean of Employed in HH, 08-10	1.157***	1.070***		
	(0.095)	(0.140)		
Mean of HH's Income, 08-10			0.326***	0.172
			(0.107)	(0.182)
Mean of Child. Below 6, 08-10	-0.186	-0.190	-0.006	-0.005
	(0.151)	(0.149)	(0.107)	(0.107)
Mean of Child. in School, 08-10	0.007	0.005	0.014	0.014
	(0.124)	(0.123)	(0.088)	(0.087)
Mean of Elders, 08-10	-0.008	-0.011	-0.029	-0.027
	(0.229)	(0.227)	(0.165)	(0.164)
Mean of Social Programs, 08-10	0.120	0.118	0.062	0.062
	(0.102)	(0.101)	(0.073)	(0.072)
Mean of Other Supports, 08-10	-0.322	-0.317	-0.464**	-0.456*
	(0.334)	(0.330)	(0.236)	(0.234)
Mean of Education	0.046	0.046	0.043*	0.042*
	(0.031)	(0.030)	(0.023)	(0.022)
Mean of Age	-0.359*	-0.351	-0.088	-0.087
	(0.214)	(0.222)	(0.158)	(0.145)
Mean of Age Squares	0.561*	0.547*	0.205	0.204
	(0.313)	(0.323)	(0.226)	(0.210)
Mean of Married	-0.672**	-0.658	-0.144	-0.140
	(0.313)	(0.310)	(0.231)	(0.230)
_cons	-1.278	0.669	-1.026	-1.226

	(30.921)	(39.299)	(42.152)	(0.753)
	rfper1			
Num. of Employed in HH	-0.883***	-0.876***		
	(0.104)	(0.104)		
Log of HH's Income			-0.197***	-0.197***
			(0.056)	(0.056)
Num. of Children Below 6 years	-0.052	-0.052	-0.022	-0.022
	(0.071)	(0.071)	(0.051)	(0.051)
Num. of Children in School	0.017	0.017	-0.016	-0.016
	(0.050)	(0.050)	(0.037)	(0.037)
Num. of Elders	0.143	0.142	0.044	0.044
	(0.105)	(0.104)	(0.074)	(0.074)
Num. of Safety Net Programs	0.091	0.090	0.046	0.046
	(0.062)	(0.061)	(0.046)	(0.046)
Num. of Other Supports	0.090	0.090	-0.062	-0.062
	(0.183)	(0.182)	(0.136)	(0.136)
Education (years)	0.036***	0.035***	0.040***	0.040***
	(0.011)	(0.011)	(0.009)	(0.009)
Males	-0.075	-0.074	0.032	0.032
	(0.086)	(0.085)	(0.061)	(0.061)
Married	1.133***	-1.125***	-0.675***	-0.675***
	(0.159)	(0.158)	(0.091)	(0.091)
Age	-0.224***	-0.223***	-0.107***	-0.107***
	(0.037)	(0.037)	(0.022)	(0.023)
Age Squares (1/100)	0.234	0.232***	0.104***	0.104***
	(0.046)	(0.045)	(0.029)	(0.029)
Urban	0.611***	0.606***	0.556***	0.555***
	(0.108)	(0.108)	(0.075)	(0.076)
Cohort1990	-0.400*	-0.399*	-0.172	-0.171
	(0.236)	(0.235)	(0.172)	(0.172)
_cons	3.136***	3.113***	2.315***	2.308***
	(0.610)	(0.607)	(0.844)	(0.844)
theta	1.053***	1.067***	1.126***	1.161***
	(0.283)	(0.294)	(0.457)	(0.495)
rho	0.520	0.506	0.212	0.202
Log Likelihood	-2763	-2763	-3416	-3415
N	65058	65058	65058	65058

Appendix 2.4 Full Versions of Wooldridge Estimates

Variables	**Wooldridge Estimators with Mundlak Specifications**			
(1)	(6)	(7)	(8)	(9)
Unemployment (t-1)	0.578***	1.174***	0.559***	0.607***
	(0.196)	(0.161)	(0.176)	(0.172)
Family Supports:				
Num. of Employed in HH	-1.858***	-1.338***		
	(0.168)	(0.124)		
Num. of Employed in HH (t-1)		0.397***		
		(0.046)		
Log of HH's Income			-0.248**	-0.17
			(0.113)	(0.115)
Log of HH's Income (t-1)				0.215***
				(0.077)
Household Formation:				
Num. of Children Below 6	0.255	0.296**	-0.04	-0.04
	(0.163)	(0.134)	(0.118)	(0.117)
Num. of Children in School	0.048	0.061	0.014	0.011
	(0.141)	(0.119)	(0.101)	(0.099)
Num. of Elders	-0.021	0.041	0.017	0.01
	(0.255)	(0.212)	(0.178)	(0.177)
External Supports:				
Num. of Safety Net Programs	0.091	0.069	0.035	0.034
	(0.089)	(0.075)	(0.063)	(0.062)

Num. of Other Supports	0.233	0.208	0.141	0.137
	(0.238)	(0.195)	(0.165)	(0.163)
Control Variables:				
Education (years)	-0.033	-0.034	-0.041	-0.039
	(0.035)	(0.029)	(0.025)	(0.025)
Males	0.097	0.083	0.139***	0.136***
	(0.083)	(0.065)	(0.053)	(0.052)
Age	0.125	0.099	-0.101	-0.104
	(0.255)	(0.217)	(0.178)	(0.176)
Age Squares (1/100)	-0.436	-0.348	-0.094	-0.089
	(0.361)	(0.305)	(0.248)	(0.245)
Married	-0.620*	-0.516*	-0.666***	-0.655***
	(0.328)	(0.273)	(0.237)	(0.235)
Urban	0.523***	0.403***	0.410***	0.388***
	(0.097)	(0.073)	(0.063)	(0.061)
Year 2009	0.569	0.055	-0.957	-1.270*
	(0.500)	(0.394)	(0.758)	(0.753)
Year 2010	0.413	-0.105	-0.954	-1.296*
	(0.498)	(0.393)	(0.759)	(0.756)
Initial Conditions:				
Unemployment 2008	1.083***	0.627***	0.679***	0.645***
	(0.284)	(0.220)	(0.202)	(0.196)
Time Invariant:				
Mean of Employed in HH, 09-10	1.150***	0.419***		
	(0.111)	(0.094)		
Mean of HH Income, 09-10			0.207*	-0.06
			(0.121)	(0.152)
Mean of Child. Below 6, 09-10	-0.340*	-0.359**	-0.002	-0.001
	(0.176)	(0.145)	(0.126)	(0.124)
Mean of Child. in School, 09-10	-0.091	-0.089	-0.053	-0.051
	(0.150)	(0.125)	(0.106)	(0.105)
Mean of Elders, 09-10	-0.041	-0.112	-0.073	-0.071
	(0.272)	(0.225)	(0.191)	(0.189)
Mean of Social Programs, 09-10	0.076	0.069	0.069	0.075
	(0.108)	(0.089)	(0.076)	(0.075)
Mean of Other Supports, 09-10	-0.274	-0.19	-0.334	-0.319
	(0.332)	(0.266)	(0.228)	(0.225)
Mean of Education	0.046	0.044	0.053**	0.051*
	(0.037)	(0.031)	(0.027)	(0.026)
Mean of Age	-0.249	-0.183	0.049	0.053
	(0.256)	(0.217)	(0.178)	(0.176)
Mean of Age Squares	0.548	0.419	0.135	0.129
	(0.363)	(0.305)	(0.249)	(0.246)
Mean of Married	-0.436	-0.291	0.083	0.091
	(0.335)	(0.281)	(0.244)	(0.241)
rho	0.574	0.312	0.253	0.228
log Likelihood	-1635.641	-1595.885	-2024.937	-2021.054
N	43372	43372	43372	43372

Essay 3: Issues on Targeting and Designing the Amount of Grant for the Cash Transfer Programs in Indonesia

Abstract

This paper has two objectives. The first objective is to investigate who currently gets the cash transfer programs in Indonesia, especially BLT and PKH programs. The results show that there is a significant number of the non-poor or non-intended households receiving the programs. However, in the probit estimates of the BLT and PKH recipients, results indicate that being poor, having household characteristics related to the poor conditions, and being a recipient of the other social benefits, increase the probability of receiving the programs. The second objective is to propose better alternative options for designing the grant amount of grant compared to the fixed universal grant that has been applied by the Indonesian government recently. Based on the simulations, the better alternative options for the grant amount are: (1) making the grant equal to the income deficit of the poor household plus the expected inflation, and (2) giving the grant equal to the 75^{th} percentile of the income deficits of the households plus the expected inflation in respective provinces. These two alternative options significantly reduce the provincial poverty rates compared to the fixed universal grant.

Keywords: cash transfer, income deficit, poverty.

JEL Classification Numbers: I38, H53.

3.1 Introduction

The Asian economic crisis hit the Indonesian economy harder than most countries in the period of 1997–2000. According to the Indonesian Central Body of Statistics (CBS), the economy shrank by about 13 percent in 1998, after a strong performance from 1970 to 1996. In the same period, investment decreased by approximately 30 percent. Inflation and interest rates increased into the double digits. Food prices, in particular, rocketed, increasingly by almost 80 percent. Poverty and unemployment, which were already problems before the crisis, escalated to destabilizing levels. Some academics and government officials believed that Indonesia would continue in economic depression and social chaos if the lack of comprehensive and integrated programs to prevent them continued. As a result, the interim government and legislators started to devise programs that could serve as social safety nets.

In 2005, to compensate for the economic shock, as seen in the increase in fuel prices, the government of Indonesia (GOI) initiated a one-year unconditional cash transfer (UCT) program for poor and near-poor families, called Bantuan Langsung Tunai (BLT). In October, 2008, a second BLT was implemented to again compensate for increasing fuel prices, followed by a third in June, 2013, a third program, called Bantuan Langsung Sementara Masyarakat (BLSM). In mid-2007, the government also designed a conditional cash transfer (CCT) program, called Program Keluarga Harapan (PKH), with the intention of running it from 2007 to 2014. In the BLT program, each targeted household would receive cash fixed at Rp 100,000 or $10 per month (Rp 150,000 in BLSM). In the PKH program, grants would vary from a minimum of Rp 600,000 to a maximum of Rp 2,200,000 per year, depending on the household's characteristics, especially in health and education.

Presently, economic arguments for the most suitable cash transfer amounts are not well-formed. The most popular argument from the government, which was used for the BLT program, is that the amount should depend on the availability of government funds and the number of targeted households. An alternative argument, this time used in the PKH program, is that poor households should be provided with a percentage of their monthly expenditure (15–20 percent).

The general finding in the literature is that cash transfer amounts are often too small, especially for conditional cash transfer programs for education (see for example: Filmer and Schady, 2006, World Bank, 2011). In the case of Indonesia, the grants are insufficient in covering the additional expenditures of households, such as additional junior high school fees (World Bank, 2011). Similarly, in Cambodia, grant amounts are so small that there is no evidence of a disincentive effect on labour supply (Filmer and Schady, 2006). Evidence in Latin America and the Caribbean also suggests that the amounts of benefit is too small to make a change (Handa and Davis, 2006, Kabeer, 2009). However, several empirical simulations found that increasing the grant amount had positive effects, particularly on education (Bourguignon, Ferreira, and Leite, 2003; Attanasio, Meghir, and Santiago, 2011; Todd and Wolpin, 2006).

Many studies started to pay more attention to the cash transfer programs' impact evaluations and targeting methods rather than the amounts with which poor households should be provided (see for example: Fiszbein *et. al.,* 2009, Arnold *et. al.*, 2011, and Klasen and Lange, 2012). For Indonesian cases, this can be found in the work of Alatas *et. al.* (2012) and the several studies of the World Bank (2011, 2012a, 2012b). Therefore, this paper aims to investigate who gets the cash transfer programs in Indonesia and to propose alternative options for calculating the expected amount of cash transfer that can be given to poor families when socio-economic indicators and living costs are taken into account in order to maximise the impact on poverty. This approach would be more appropriate than the previous or even current approach (fixed universal grant) being used by the government.

3.2 Literature Review

3.2.1 Desirable Goals

In general, cash transfer programs are designed to support of some purposes, such as poverty alleviation, improved nutrition, health, and education outcomes, productivity, economic growth and women empowerment. Based on empirical evidences, particularly in Asia and Latin America countries, the primary function of most cash transfer programs is the direct and immediate support for the reduction of economic

vulnerabilities and alleviation of poverty in both development and humanitarian relief situations. In the medium-term, transfers are expected to show positive impacts on poor people's productive livelihood strategies. In the long-term, with growing evidences, indicates that the programs can catalyse important effects that can help break the intergenerational transmission of poverty. Nevertheless, not all programs that have been robustly evaluated deliver impacts in all of these areas. Many new and existing programs await rigorous evaluation, so the full range of impacts is still emerging (Fiszbein *et. al.,* 2009).

3.2.2 Targeting

The other thing that is probably the most important to make cash transfer program successfully, is targeting. Targeting is the process of determining the family or the person entitled for receiving cash transfers. For the cases of developed countries in which the population administration and the system of social safety nets are well defined, then the targeting process is not going to be a significant problem. In contrast are the cases of developing countries, where these systems have not been managed well, and thus have turned the targeting process into a very serious problem.

The targeting process ranges from universal to categorical options (e.g. by poverty status, disability, age, student, pregnant women). The process can be done by a means test which might be administratively difficult for developing countries and expensive due to the large number of potential recipients that need to be validated individually. One can use a proxy means test in which information on assets and demographic characteristics is used to create a proxy for household expenditure or income based on a survey of a group of households. The other way is self-targeting that relies on beneficiaries to categorise themselves as potential recipients. Geographical targeting (e.g. population in natural disaster areas) and community-based selection can also be used (Coady, *et. al.*, 2004; Arnold, *et. al.*, 2011; Klasen and Lange, 2012).

In fact, the targeting process could involve a combination of those processes. In developed countries, the targeted households apply for social benefits and are

evaluated by local/central government staff (often by using *means test*s, such as income) to decide whether the household is entitled to social benefits. In developing countries such as Indonesia, the government makes a database of intended beneficiary households by surveying and using PMT to create a final beneficiary list and delivers the social benefits based on this final list. This is probably why mis-targeting is relatively higher in developing countries than developed ones. Targeting inaccuracies in Indonesia have been documented in many government antipoverty programs (Cameron, 2002; Daly and Fane, 2002; Olken, 2006; World Bank, 2012a).

3.2.3 Indonesia's Cash Transfer Programs

The Indonesian Constitution contains several articles on human rights and social security. Article 28H(3) states: "Every person shall have the right to social security in order to develop oneself fully as a dignified human being". In Article 34(1), it states: "The poorest-poor and abandoned children shall be taken care of by the State"; (2) "The State shall develop a system of social security for all of the people and shall empower the inadequate and underprivileged in society in accordance with human dignity"; (3) "The State shall have the obligation to provide sufficient medical and public service facilities"; and (4) " Further provisions in relation to the implementation of this Article shall be regulated by law". Article 28H(3) is from the second amendment on 18th August, 2000, and Article 34(1)–(4) are from the fourth amendment on 10th August, 2002.

Although, since 2000, the crisis has been overcome and the economy has improved, it took seven years before the government and its legislators passed a law mandating the implementation of a social security system (Law 40/2004). It then took another seven years to pass a law creating social security agencies (Law 24/2011). In general, Law 40/2004 regulates social security in terms of health, work accidents, old age, pensions, and death. Although these social security dimensions appear in some articles related to the poor, there is no explicit article in Law 40/2004 that regulates social security in the context of covering basic needs, such as food, shelter, and health

care. This law also does not regulate social benefits, such as cash transfers. This is in contrast to many developed countries, where social benefits are required by law.

There are at least two reasons why social benefits or cash transfers should be regulated by law. The first is that political reasons for getting social benefits will be eliminated (i.e., as a means of gaining more votes in the general election), because every successive government will have the same obligation to protect poor citizens. The second reason is that there will be consequences for mis-targeting recipient households. In the GOI's implementation of the cash transfer programs (BLT or PKH), there is a significant number of mis-targeted households. Although the government, not the targeted households, is usually responsible for failing to properly identify the poor households, there is no protocol for dealing with mis-targeting and recouping lost funds (such as by making the beneficiary return the grants). Sometimes, a negative result of the mis-targeting is social conflict, and the GOI relies on local administrative staff to resolve them. However, if social benefits are regulated by law, these problems will be resolved by the civilian court instead.

***Bantuan Langsung Tunai* (*BLT/BLSM*)**

In October 2005, the GOI decided to reduce fuel subsidies by increasing fuel prices. To cope with the price shocks that resulted from the rise in fuel prices, the GOI ran a BLT program with immediate cash support for poor and near-poor households. The program was designed to last one year (October 2005–September 2006), with each household receiving Rp 100,000, or about US$10, per month and disbursements made quarterly (Table 1). Beneficiary households were identified by CBS using a proxy-means testing methodology, after which the GOI created a database by population survey, called Pendataan Sosial Ekonomi/Data Collection for Social Economy (PSE 2005). Total financing for this program was around Rp 24 trillion, or about US$ 2.4 billion.

In May, 2008, amidst pressure from the global fuel price increase, the GOI again reduced fuel subsidies, which led to an increase in fuel prices by around 29 percent. A similar BLT scheme was employed in 2008–2009 to mitigate the economic shocks on the poor. The 2008 BLT program initially targeted the same number of people as the

2005 program—15.4 million households—after using the same baseline data. However, after adjustments were made following a verification process, known as Pendataan Program Perlindungan Sosial/Data Collection for Social Protection Programs (PPLS 2008), the number of targeted households increased to 19.2 million (Table 3.1).

Table 3.1 Summary of BLT/BLSM and PKH Programs

	BLT/BLSM Program	**PKH Program**
Objective:	Consumption support because of increased inflation caused by increasing fuel prices, which resulted from reduced fuel subsidies	(1) Provide grants to send children to school and receive regular health care (2) Long-term poverty reduction and interruption of the transmission of poverty
Type:	Cash and Unconditional	Cash and Conditional
Year Implementation:	2005/2006, 2008/2009, 2013	2007–2014
Targeting:		
Targeted households (HH)	Poor and Near-poor	Very poor
Targeting Method	Proxy Means Tests	Proxy Means Tests
Targeting Database	PSE 2005, PPLS 2008/2011	PPLS 2008/2011
Number of Official Targeted HH	15.4 to 19.2 million	2007–2008: 810 thousand 2013: 2.4 million
Coverage	Nationwide	Pilot project
Benefits:		
The amount of grant	Rp 100,000 (2005–2009) Rp 150,000 (2013)	Minimum Rp 600,000 (per year) Maximum Rp 2,200,000 (per year)
Payee	Head of the HH	Mother or woman in HH
Payment method	Via local post office	Via local post office
Duration	2005/2006: 12 months 2008/2009: 9 months 2013: 4 months	Up to 6 years, recertification should be made twice (after 3 and 6 years)
Conditions:		
Health	None	(1) Children aged 0–6 must visit a health clinic and receive medical treatment (2) Pregnant or nursing women must attend a health centre to receive ante-and post-natal examinations
Education	None	(1) Children aged 7–12 must enrol in school and attend a minimum of 85% of school days (2) Children aged 12–15 who have not completed 9 years of basic education must enrol in an education program to complete an equivalent of 9 years of basic education
Financing:		
Total (Billion Rp)	2005/2006: 23,966 2008/2009: 17,809 2013: 9,300	2013: 2,900 (Budget Plan)
Source of Financing	Government Budget	Government Budget

Source: World Bank, Ministry of Social, Ministry of Finance of Indonesia.

The amount of funds disbursed was also Rp 100,000 per month per household, but the program ran for nine months only, from June, 2008, to February, 2009, in three tranches: Rp 300,000 for the months of June to August, 2008, Rp 400,000 for the months of September to December, and Rp 200,000 for the months of January to February, 2009. The total financing for this round was about Rp 17.8 trillion (about US$ 1.8 billion). In June, 2013, the GOI decided to increase domestic fuel prices again, while at the same time starting the Bantuan Langsung Sementara Masyarakat (BLSM) program. This program targets 25 percent of the poorest households; that is, 15.5 million households, based on PPLS 2011. Each family will receive Rp 150,000 ($15) per month for only four months. The total cost of this program is Rp 9.3 trillion ($ 0.93 billion).

***Program Keluarga Harapan* (PKH)**

In 2007, the GOI introduced a pilot project in seven provinces for a conditional cash transfer program, called Program Keluarga Harapan. This program was motivated by the success of similar programs in Latin America, such as Mexico's Progresa and Brazil's Bolsa Familia. Targeted groups were the poorest households with pregnant or nursing women and children up to 15 years of age. These households received grants for a maximum period of six years. According to data from CBS, there were 6.5 million households in these categories. However, during its inception as a pilot project, only 810,000 families were supported, with a planned total of 2.5 million households by 2013 (Table 3.1).

Beneficiary households must fulfil certain conditions related to health and education. Households with children aged 0–6 must visit health clinics and receive medical treatment, such as basic vaccinations. Pregnant or nursing mothers must receive ante- and post-natal treatment. Children aged 7–12 must enrol in a school and attend a minimum of 85 percent of school days. Children aged 12–15 who have not completed nine years of basic education must enrol in an education program to complete an equivalent of nine years of basic education.

3.3 Targeting Performances of BLT and PKH Programs

As it mentioned in earlier section, the Indonesian government made the database of the intended recipients both in the BLT and PKH programs. The database for these programs should be come from the database for the social protection programs in 2008, called PPLS 2008.

Table 3.2 Type of the Household Samples in Susenas 2009 and 2010

Type of Household	BLT Recipients (Susenas 2009)			PKH Recipients (Susenas 2010)		
	Ya	No	Total	Ya	No	Total
Poor HH	8,803	14,513	23,316	265	7,320	7,585
(%)	(37.76)	(62.24)	(100.00)	(3.49)	(96.51)	(100.00)
Non poor HH	73,578	194,859	268,437	820	58,111	58,931
(%)	(27.41)	(72.59)	(100.00)	(1.39)	(98.61)	(100.00)
Intended HH	41,836	45,703	87,539	103	2,427	2,530
(%)	(47.79)	(52.21)	(100.00)	(4.07)	(95.93)	(100.00)
Non-Intended HH	46,255	139,511	185,766	982	63,004	63,986
(%)	(24.90)	(75.10)	(100.00)	(1.53)	(98.47)	(100.00)

Notes: In Susenas July 2009, poor households are defined based on provincial poverty lines in March 2009 (published by CBS), with adjustment to the inflation from March to July. Intended beneficiaries are defined based on deciles 1–3 of household expenditure per capita in that particular province. In Susenas March 2010, poor households are defined based on the poverty lines in March 2010 (also published by CBS) while intended beneficiaries are defined based on household expenditure per capita below 80 percent of provincial poverty lines (the definition of the poorest household by CBS).
Sources: Susenas July 2009 and March 2010.

Table 3.2 presents sampled households that are categorised based on participation in the BLT program (Susenas July 2009) and PKH program (Susenas Mach 2010) and their poverty status in order evaluate the performance of the database. Of the poor households in 2009, 37.76 percent received grants from the BLT program, and 47.79 percent of households in deciles 1–3 were intended beneficiary households. Only 3.49 percent of the total poor households and 4.07 percent of intended beneficiary households were recipients of the PKH program in 2010. This contrast between recipients of the BLT program and PKH program is because the latter was designed to be a pilot project with an intentionally smaller number of served households. Officially, about 6.5 million households were served by the PKH program, compared with about 19.2 million households in the BLT program.

Furthermore, if it used the poverty category as the foundation for delivering the program, then the exclusion error was at 62.24 percent for and the inclusion error

was at 315.57 percent[4]. However, the government had categorized the BLT beneficiaries based on the deciles 1–3 of the household per capita expenditures in particular provinces. Thus, this category made the exclusion error at 52.21 percent and inclusion error at 52.84 percent.

The exclusion error in PKH program was much worst at 96.51 percent but the low inclusion error was at 10.81 percent if it used the poverty category as compared to the BLT program. Nevertheless, in the PKH program, the government considered the PKH recipients as the poorest households (for those who had per capita expenditures below 80 percent of the poverty lines). In this category, the exclusion error was at 95.93 percent and the inclusion error was at 38.81 percent of total intended beneficiaries. Again, this was because the PHK program was designed as a pilot project.

The significant exclusion and inclusion errors both in the BLT and PKH programs had consequences for the revision of the database PPLS 2008. The revision however, had been made when the government introduced PPLS 2011 as the newest database for the social protection programs in Indonesia.

Furthermore, Table 3.3 presents the probit estimates of the BLT and PKH recipients. Even though there is a significant number of mis-targeting in those programs, in general, these probit estimates could well explain the characteristics of the BLT and PKH recipients from their household formation, health condition, house type, and head's features. The number of children in the primary and secondary school increases the probability of being a BLT or PKH recipient. As explained in earlier section, there is a requirement that the children aged 0-6 years must visit health clinics, especially in the PKH program. Therefore, this variable increases the probability of being a PHK recipient. This condition does not apply to the BLT program which could cause a negative impact on the probability of being a BLT recipient. The variables in the health conditions of the member of the household also play a significant role on the probability of being a BLT or PKH recipient. The households with low quality housing tend to have a higher chance for receiving grants from the BLT or PKH program. The

[4] The exclusion error is defined as the ratio of the poor households not receiving the BLT to the total poor households meanwhile the inclusion error is the ratio of the non-poor households receiving the BLT also to the total poor households (for this classification, see for example: Klasen and Lange, 2012) .

head's education, gender, age, and marital status also have significant impacts on the probability of being BLT or PKH recipient. Being poor and receiving the other social benefits, such as *raskin* (subsidised price for rice), *jamkesmas/kartusehat* (health insurance card for the poor) and *SKTM* (identification card as the poor) also increase the probability of being a recipient of the BLT or PKH program. However, the probit estimate for the BLT recipients seems to be better compared to PKH since they produce pseudo R-squares at 0.347 for the BLT program and at 0.078 for the PKH program.

Table 3.3 Probit Estimates of the BLT and PKH Recipients

Variables	BLT		PKH	
	coef.		coef.	
Household Formation:				
Num. of Children below age 5	-0.060***	(0.006)	0.059***	(0.023)
Num. of Children in primary school	0.081***	(0.004)	0.138***	(0.017)
Num. of Children in secondary school	0.051***	(0.007)	0.113***	(0.027)
Num. of Adults older than 60	0.025***	(0.007)	-0.062**	(0.028)
Num. of Unemployed adults	0.010	(0.008)	0.045	(0.036)
Health Condition:				
Num. of HH's members with serious health problems	0.030***	(0.004)	-0.030*	(0.016)
Num. of HH's members with self-treatment			0.014	(0.012)
Num. of HH's members with traditional self-treatment	0.007	(0.005)		
Num. of HH's members with modern self-treatment	-0.009***	(0.003)		
Num. of HH's members with outpatient treatment	-0.026***	(0.004)	0.076***	(0.016)
Num. of HH's members with hospitalised treatment	-0.032***	(0.010)	0.051	(0.039)
House Characteristics:				
Floor (1 = soil)	0.229***	(0.009)	0.239***	(0.034)
Roof (1 = from palm fibre)	0.239***	(0.011)	0.128**	(0.050)
Ownership (1 = not owner)	-0.063***	(0.009)	0.086**	(0.037)
Wall (1 = not brick)	0.374***	(0.006)	0.086***	(0.029)
Floor size (m2)	-0.003***	(0.000)	0.0001	(0.000)
Electricity (1 = does not have electricity)	0.305***	(0.009)	-0.044	(0.036)
Drinking water (brand, refill, piping = 1)	0.077***	(0.008)	-0.008	(0.035)
Toilet (1 = non-private)	0.076***	(0.004)	0.053***	(0.019)
Cooking (non-electric, non-gas = 1)	0.180***	(0.007)		
Head of the Household:				
Max years of education obtained (years)	-0.027***	(0.001)	-0.008**	(0.003)
Sex (1 = male)	-0.083***	(0.014)	0.005	(0.064)
Age (years)	0.004***	(0.000)	0.001	(0.001)
Marital status (1 = married)	-0.258***	(0.013)	0.135**	(0.063)
Others Social Benefits:				
Raskin (1 = buyer)	1.109***	(0.007)	0.231***	(0.031)
Jamkesmas (1 = user)	0.788***	(0.009)	0.153***	(0.016)
Kartusehat (1 = user)	0.456***	(0.024)	0.100***	(0.028)
SKTM (1 = user)	0.669***	(0.019)		
Poor Household	0.176***	(0.011)	0.169***	(0.031)
Log of Per Capita Expenditure	-0.297***	(0.008)	0.018	(0.040)
_cons	2.291***	(0.112)	-0.144***	(0.034)
Number of observations	291,753		66,516	
Pseudo R2	0.347		0.078	

Notes: *** p<0.01, ** p<0.05, * p<0.1. Values in parentheses denote standard errors.

3.4 Method for Calculating the Amount of Grant and Simulation Options

Ideally, one would want to give every household exactly the poverty gap. However, that is clearly not possible since one would need precise verifiable information. The other extreme is to set a single standard amount for all but that would be too little for the very poor and too much for the near poor. One could choose an intermediate strategy, e.g. 2-3 levels of grants, depending on the distance from the poverty lines. It also should reflect the differences in prices across regions or provinces (Klasen and Lange, 2012, 2013).

As mentioned in the previous section, the Indonesian government set the grants for the cash transfer programs, especially in the BLT/BLSM programs as fixed for all beneficiaries despite their socio-economic conditions, living costs and locations. This paper proposes two alternative options which they can be explained as follows.

The estimated cash transfer for each poor household is calculated by subtracting its respective province's poverty line from the household's per capita expenditure (income deficit) in absolute term, or,

(3.1) $id_i = |y_i - z_i|$

where *y* and *z* are income/expenditure per capita and the poverty line, respectively. If the government makes up these deficits, poor households would escape from poverty. Moreover, if future inflation is taken into account, the expected cash transfer for each family would be,

(3.2) $E(ct_i) = \{1 + E(\pi_i)\}.id_i$

where $E(ct)$ is the expected cash transfer per capita and $E(\pi)$ is the expected inflation of each household (*i*). This would be, hypothetically, the best way of calculating the expected amount of grants for the every poor household. This would be ***the first alternative option***. However, it has two disadvantages. Firstly, it is difficult to assess every household's income deficit when the income sources of the majority of poor households are in informal sectors. Secondly, if the assessments are based on

interviews, some households may report a lower income/expenditure so as to be classified as poor, and thus be able to apply for a grant.

The ***second alternative option*** is when the representative value of the income deficits in a particular province is used. The mean, median, maximum, or 75th percentile of the deficits at a provincial level could be used as the expected cash transfer amount for each specific province,

(3.3) $ct_p = \overline{id_{i_p}}$

where *ct* is the cash transfer amount in the specific province (*p*). If the future inflation rate in the specific province is considered, the expected grants will be,

(3.4) $E(ct_p) = \{1 + E(\pi_p)\}.\overline{id_{i_p}}$

where $E(ct)$ is the expected amount of cash transfer per capita and $E(\pi)$ is the expected inflation in the specific province (*p*). By using these methods, the expected cash transfer amounts should vary across provinces but uniform transfers for each province.

Although it may not allow some poor households to escape from poverty if the cash transfers are lower than their deficits, households still have the benefit of being supported at a level that commensurates with their own province, as well as reducing moral hazard. Furthermore, this second option is more suitable than the first option for economic policies, because it avoids the disadvantages which have been previously explained.

In our formulas, the expected inflation is an important component for calculating the appropriate amount of cash transfer beside the income deficits. It will protect the purchasing power of the poor household in the future. However, the cities' inflations published by CBS are biased for urban areas only. In order to capture the inflation in rural areas, one could use the change in the poverty lines both in rural and urban areas.

Figure 3.1 shows that inflation rates have been in line with the changes in the urban poverty lines. National inflation from March 2008 to March 2009, was 8.48

percent, while the national poverty line changed by 9.65 percent during the same period. The highest inflation and poverty line occurred in West Papua, with a 20.77 percent and 18.77 percent change, respectively. Inflation rates tended to be low from March 2009, to March 2010. Poverty lines, however, were quite high in almost all provinces. In East Nusa Tenggara, for example, the inflation rate was 8.00 percent and change in the poverty line was 12.24 percent, a 4.24 percent difference. Only in South East Sulawesi was the change in the poverty line lower than inflation, 1.22 percent and 3.00 percent, respectively. Furthermore, in both periods, inflation rates varied across provinces. As such, price adjustments to poverty lines and expenditures also varied. Based on Figure 3.1, especially in 2008-2009, the changes in poverty lines could be used as the expected inflation.

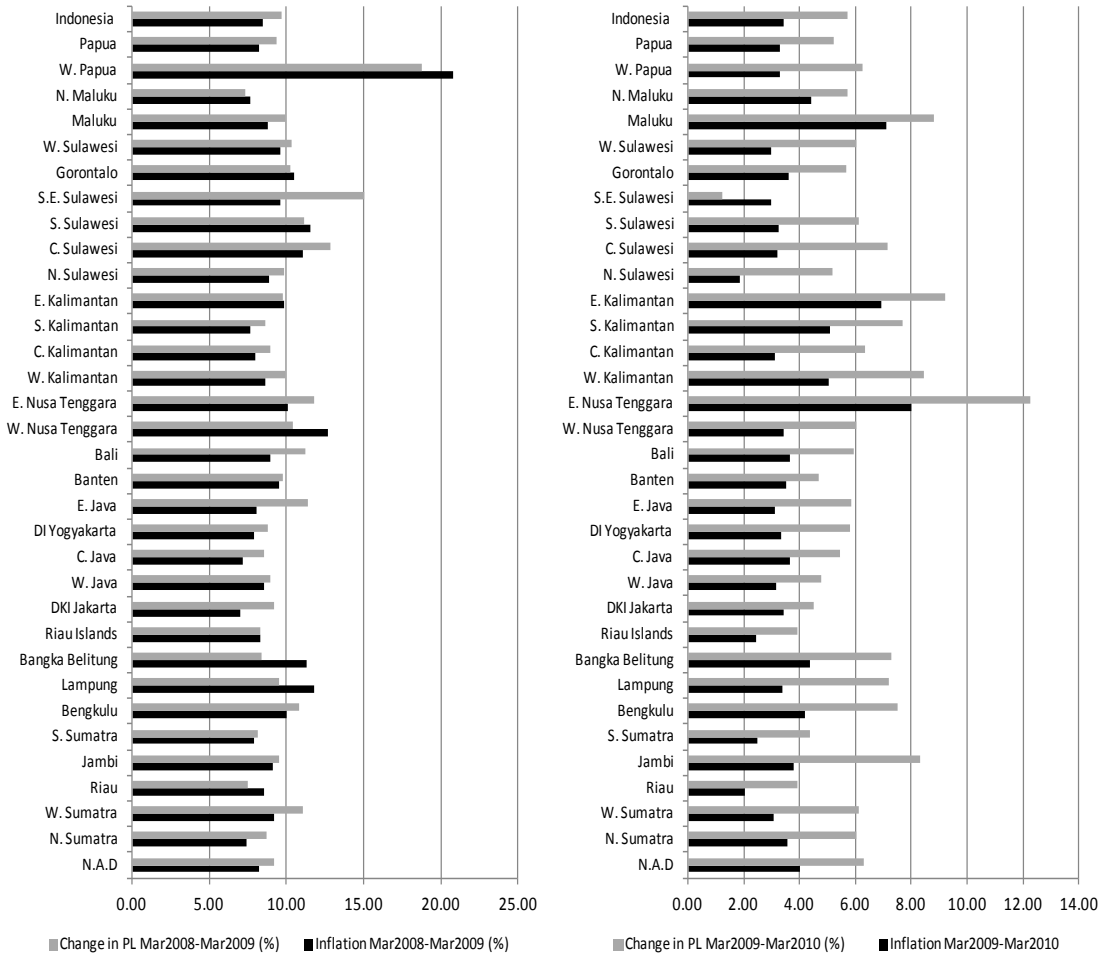

Figure 3.1 Changes in Provincial Poverty Lines (PL) and Inflation

In order to prove that our alternative options are better than the fixed universal grant by the government, this paper simulates all possible options and compares their results of the provincial poverty rates. However, several assumptions for the simulations in this exercise should be noted. For the most part we use the same assumptions for simulations cash transfer as Klasen and Lange (2013).

First, it is assumed that household attributes are perfectly observable at zero cost and they do not change their attributes in order to a gain beneficiary status. Second, we do not consider how the funds used for the transfer scheme are generated. Third, we assume that policy-makers agree for the total funding. Lastly, we assume zero growth of nominal income or expenditure. This assumption is quite relevant especially for 30 percent of the poorest population for each province. There are three options of five simulations based on the amounts of the expected cash transfers that would be given. They are:

(1) Option 1: (*Simulation 1*). The grant is fixed at Rp 100,000 for each targeted household in all provinces with no adjustment to expected regional inflation. *The grants are given to the poorest 30 percent of the population in particular province.* This is the actual grant by the government on the BLT program in 2008-2009.

(2) Option 2: (*Simulation 2*). Give the grants to the poor households at their per capita income deficit amounts adjusted to the expected regional inflation. *The grants are given only for the poor households at baseline.* This is the first alternative option that was previously mentioned.

(3) Option 3. Give the grants based on the representative values of the per capita income deficits, adjusted to the expected inflation at respective provinces: the means (*Simulation 3*), the medians (*Simulation 4*), and the 75^{th} percentiles (*Simulation 5*). *The grants are given for 30 percent of the poorest population in particular province.* Therefore, the grants are uniform transfer for arch province. This option is the second alternative option as explained previously.

The grant is given on a monthly basis and there is no inclusion and exclusion error for delivering the transfers.

3.5 Simulation Result

Table 3.4 shows the means, medians, and 75th percentiles of the income deficits, the expected inflation using the change in poverty lines, and the expected cash transfer per capita across provinces using Susenas 2008-2010 (March rounds). In 2008 and using the means adjusted to expected inflation, the expected grants vary from Rp 25,000 (Bali and West Sulawesi) to Rp 75,000 (West Papua). They are ranging from Rp 28,000 (West Sulawesi and South Sulawesi) to Rp 88,000 (West Papua) in 2009 and from Rp 23,000 (West Sulawesi) to Rp 93,000 (West Papua) in 2010. If it uses the means, then the expected grants would be from Rp 20,000 (West Sulawesi and North Sulawesi) to Rp 77,000 (West Papua) in 2008, from Rp 23,000 (South Kalimantan) to Rp 88,000 (West Papua) in 2009, and from Rp 18,000 (West Sulawesi) to Rp 91,000 in 2010. Lastly, if it uses the 75th percentiles of the income deficits in respective provinces, then grants vary from Rp 34,000 (Bali) to Rp 107,000 (Papua) in 2008, from Rp 37,000 (West Sulawesi) to Rp 125,000 (West Papua) in 2009, and from Rp 30,000 (West Sulawesi) to Rp 141,000 (West Papua) in 2010.

Table 3.5 presents the simulation results in 2008 and in Appendix 3.3 for simulation results in 2009. Susenas March 2008 is used as the baseline as well as the poverty lines at the combination Urban+Rural (published by the CBS but not used for the official poverty calculation) instead of using the urban and rural poverty lines (the official poverty lines for the official poverty rates by the CBS). The poverty rates at the baseline in 2008 vary from 4.29 percent (DKI Jakarta) to 40.47 percent (Papua). If the fixed cash transfer amount of Rp 100,000 per household per month (Sim1) and the actual poverty lines in 2009 is used then the poverty rates do not change so much. Even in some provinces, they have higher poverty rates compared to their baselines in 2008. For example, Nangro Aceh Darussalam (NAD) has a poverty rate at 25.93 percent which is higher than its baseline at 25.86 percent. In North Sumatera however, the poverty rate is 14.10 which is lower than its baseline at 14.91. West Papua is 14.66 percent higher than its poverty rate at baseline at 36.17. These simulated poverty rates are relatively similar to the actual poverty rates in 2009 at 24.34, 12.90, and 36.64 percent for NAD, North Sumatera, and West Papua, respectively.

Table 3.4 Income deficits and Expected cash transfers per capita by Province

Province	Income deficit per month (thousand Rp)									Expected Inflation per year			Expected cash transfer per month (thousand Rp)								
	mean			median			75th percentile						mean			median			75th percentile		
	2008	2009	2010	2008	2009	2010	2008	2009	2010	2008	2009	2010	2008	2009	2010	2008	2009	2010	2008	2009	2010
N.A.D	48	51	54	41	42	45	73	77	79	10.0	9.2	6.3	53	55	58	46	45	48	80	85	84
N.Sumatra	32	35	41	24	30	37	48	51	59	8.5	8.8	6.0	34	38	43	27	33	39	52	55	62
W.Sumatra	31	32	38	25	27	35	42	49	54	8.3	11.1	6.1	34	36	41	27	30	37	45	55	58
Riau	39	38	41	33	33	31	59	53	62	7.2	7.5	3.9	42	40	42	36	35	32	63	57	65
Jambi	25	33	29	22	28	23	37	48	44	5.7	9.5	8.3	27	36	31	24	30	25	39	52	48
S.Sumatra	35	36	39	32	32	33	51	56	57	10.2	8.1	4.4	39	39	41	35	35	34	56	60	60
Bengkulu	37	37	36	34	34	29	52	53	54	11.0	10.8	7.5	41	41	39	37	37	31	58	59	58
Lampung	31	35	32	29	32	28	47	51	47	9.7	9.6	7.2	34	39	35	32	35	30	52	56	50
BangkaBelitung	36	46	47	25	37	37	63	63	67	4.6	8.4	7.3	37	50	50	26	40	40	66	69	72
RiauIslands	43	73	46	34	62	42	76	104	63	5.6	8.3	3.9	46	79	48	36	67	43	80	113	65
DKIJakarta	44	50	42	37	45	32	65	74	58	8.8	9.2	4.5	48	54	44	41	49	33	70	80	61
W.Java	31	31	34	25	27	28	42	45	51	6.3	8.9	4.8	33	34	36	26	29	30	45	50	53
C.Java	31	31	30	27	27	26	46	46	44	9.1	8.5	5.4	33	33	32	29	29	27	50	49	47
DIYogyakarta	36	44	41	31	41	37	53	64	61	5.3	8.8	5.8	38	48	43	32	45	40	56	69	65
E.Java	31	33	33	26	28	28	45	48	47	10.4	11.4	5.8	34	36	35	29	32	30	50	53	50
Banten	28	34	30	26	29	25	39	49	44	6.8	9.8	4.7	30	37	32	28	32	26	42	54	46
Bali	23	29	28	19	28	21	32	42	39	6.4	11.3	5.9	25	33	30	21	31	22	34	47	41
W.NusaTenggara	29	36	32	25	31	27	43	54	47	11.7	10.4	6.0	32	40	34	28	34	29	48	60	50
E.NusaTenggara	27	30	36	25	25	31	40	45	55	10.6	11.8	12.2	30	33	40	28	28	35	45	50	61
W.Kalimantan	24	29	24	19	23	21	35	45	36	11.4	9.9	8.5	27	32	26	22	25	23	39	50	39
C.Kalimantan	29	30	30	22	28	25	43	42	45	14.6	8.9	6.3	33	32	32	26	30	26	49	46	47
S.Kalimantan	27	27	27	20	21	21	39	40	34	11.6	8.6	7.7	30	30	29	23	23	22	44	44	37
E.Kalimantan	43	50	55	38	37	43	64	76	76	8.0	9.8	9.2	47	55	60	41	41	47	69	84	83
N.Sulawesi	25	30	25	19	29	22	39	44	36	7.4	9.9	5.2	27	32	27	20	31	23	42	48	38
C.Sulawesi	35	41	35	29	36	29	49	60	52	9.1	12.9	7.2	38	46	37	32	41	31	53	68	55
S.Sulawesi	25	26	27	22	21	21	36	38	43	9.2	11.1	6.1	28	28	29	24	24	22	39	42	45
S.E.Sulawesi	25	29	30	22	23	26	34	40	44	8.6	13.9	2.2	27	33	31	24	26	26	37	46	45
Gorontalo	28	32	31	26	27	28	43	47	45	6.5	10.2	5.7	30	35	33	28	29	30	46	52	48
W.Sulawesi	23	26	21	18	25	17	36	33	29	8.3	11.4	5.0	25	28	23	20	28	18	39	37	30
Maluku	39	41	41	34	35	36	53	61	66	5.2	10.0	8.8	41	45	45	36	39	39	56	67	72
N.Maluku	29	33	36	25	29	31	41	47	52	13.7	7.4	5.7	33	36	38	28	31	33	46	51	55
W.Papua	59	74	88	51	74	85	92	105	133	13.4	18.8	6.2	67	88	93	58	88	91	105	125	141
Papua	67	64	65	69	64	60	96	90	89	11.3	9.3	5.2	75	70	68	77	70	63	107	98	94

Note: the calculation for income deficits restrict for the poor only. Expected Inflation is calculated from a percentage change of the poverty lines (Urban+Rural) to previous year.

Table 3.5 Simulation Results in 2008 and Actual Poverty in 2009

Province	Number of Poor Households							Percentage of Poor Households						
	Baseline2008	Option1	Option 2	Option3			Actual 2009	Baseline2008	Option1	Option 2	Option3			Actual 2009
		Sim1	Sim2	Sim3	Sim4	Sim5			Sim1	Sim2	Sim3	Sim4	Sim5	
N.A.D	1,054,897	1,057,883	265,966	671,299	728,550	390,765	996,953	25.86	25.93	6.52	16.45	17.86	9.58	24.34
N.Sumatra	1,917,792	1,813,688	624,498	1,240,216	1,470,064	718,060	1,681,017	14.91	14.10	4.85	9.64	11.43	5.58	12.90
W.Sumatra	561,831	610,494	282,227	442,476	515,706	313,587	505,383	12.56	13.65	6.31	9.90	11.53	7.01	11.23
Riau	593,839	587,221	195,030	366,636	418,221	205,490	534,910	11.14	11.01	3.66	6.88	7.84	3.85	9.61
Jambi	330,043	285,802	124,569	241,454	255,645	176,245	272,270	11.82	10.24	4.46	8.65	9.16	6.31	9.56
S.Sumatra	1,417,908	1,338,165	353,363	908,906	998,524	583,753	1,393,773	20.11	18.98	5.01	12.89	14.16	8.28	19.43
Bengkulu	360,665	349,760	118,800	258,740	275,271	160,668	330,179	21.14	20.50	6.96	15.16	16.13	9.42	18.93
Lampung	1,740,906	1,521,537	500,912	1,215,313	1,268,425	699,842	1,744,993	22.95	20.06	6.60	16.02	16.72	9.23	22.64
BangkaBelitung	88,065	93,358	39,390	54,176	54,176	28,621	73,590	8.71	9.24	3.90	5.36	5.36	2.83	7.17
RiauIslands	200,843	188,352	55,650	119,795	141,943	66,401	162,933	13.52	12.68	3.75	8.06	9.55	4.47	10.51
DKIJakarta	379,681	412,223	175,019	273,369	318,931	179,353	323,173	4.29	4.66	1.98	3.09	3.60	2.03	3.62
W.Java	6,151,057	5,291,488	2,159,261	4,227,522	5,177,119	2,826,674	5,421,589	15.03	12.93	5.28	10.33	12.65	6.91	13.01
C.Java	6,835,575	5,632,149	2,036,361	4,406,517	4,981,385	2,573,792	6,187,989	21.23	17.49	6.32	13.69	15.47	7.99	19.15
DIYogyakarta	716,066	600,210	169,852	467,883	533,783	289,724	661,741	21.28	17.84	5.05	13.90	15.86	8.61	19.46
E.Java	7,590,067	6,841,000	2,410,208	5,416,478	6,050,382	3,449,347	6,680,083	21.12	19.03	6.71	15.07	16.83	9.60	18.51
Banten	1,023,960	969,410	464,731	787,360	830,177	563,866	951,912	10.22	9.68	4.64	7.86	8.29	5.63	9.23
Bali	263,602	254,484	162,774	224,999	259,507	161,746	207,401	7.54	7.28	4.66	6.44	7.42	4.63	5.85
W.NusaTenggara	1,146,884	1,050,817	439,498	908,463	988,245	633,047	1,193,029	25.27	23.15	9.68	20.01	21.77	13.95	25.85
E.NusaTenggara	1,352,161	1,586,936	444,477	1,306,776	1,359,611	927,004	1,214,204	31.57	37.06	10.38	30.51	31.75	21.65	27.94
W.Kalimantan	539,765	501,085	260,302	395,553	468,978	243,411	476,021	11.75	10.90	5.66	8.61	10.21	5.30	10.18
C.Kalimantan	217,813	187,168	99,968	142,793	173,632	93,294	178,287	9.48	8.15	4.35	6.22	7.56	4.06	7.54
S.Kalimantan	259,409	217,865	131,481	156,437	197,419	111,865	221,211	7.68	6.45	3.89	4.63	5.84	3.31	6.44
E.Kalimantan	364,056	369,494	93,997	241,716	266,649	165,220	358,852	12.09	12.27	3.12	8.03	8.85	5.49	11.59
N.Sulawesi	234,301	200,302	119,730	166,834	213,743	100,930	223,031	10.58	9.05	5.41	7.53	9.65	4.56	9.94
C.Sulawesi	536,083	543,554	231,326	405,550	462,995	270,133	509,770	21.20	21.49	9.15	16.04	18.31	10.68	19.76
S.Sulawesi	1,257,142	1,130,935	500,076	890,943	1,022,135	619,758	1,235,753	16.25	14.62	6.46	11.51	13.21	8.01	15.79
S.E.Sulawesi	463,781	458,899	194,933	378,997	404,721	311,521	448,471	20.77	20.55	8.73	16.97	18.12	13.95	19.55
Gorontalo	223,465	199,849	63,671	154,840	164,434	99,579	240,125	25.09	22.44	7.15	17.38	18.46	11.18	26.74
W.Sulawesi	163,405	156,410	85,705	129,304	155,658	84,336	169,404	15.97	15.29	8.38	12.64	15.22	8.24	16.37
Maluku	403,882	445,552	129,406	345,377	367,389	232,383	409,861	30.60	33.76	9.81	26.17	27.84	17.61	30.44
N.Maluku	133,775	132,078	42,756	69,563	82,797	49,882	113,472	14.37	14.18	4.59	7.47	8.89	5.36	11.99
W.Papua	253,891	356,838	109,533	257,799	275,022	179,690	263,537	36.17	50.83	15.60	36.72	39.18	25.60	36.64
Papua	800,338	897,346	97,008	813,869	798,459	557,033	768,693	40.47	45.38	4.91	41.16	40.38	28.17	37.94
Total	39,576,948	36,282,352	13,182,478	28,087,953	31,679,696	18,067,020	36,153,610	17.45	16.00	5.81	12.38	13.97	7.97	15.94

Table 3.6 Total Cost of Each Simulation

Province	Expected Total Cost (in billion Rp) in 2008				
	Option1	Option2	Option3		
	Sim1	Sim2	Sim3	Sim4	Sim5
N.A.D	25.75	118.26	68.20	61.76	102.94
N. Sumatra	86.40	160.32	152.29	120.93	232.91
W. Sumatra	31.29	49.17	54.30	43.12	71.87
Riau	34.70	61.09	73.34	62.87	110.02
Jambi	20.18	23.17	24.01	21.34	34.68
S. Sumatra	47.02	121.02	87.39	78.43	125.48
Bengkulu	12.92	38.30	24.74	22.33	35.00
Lampung	53.67	139.70	81.09	76.32	124.02
Bangka Belitung	7.66	8.88	13.97	13.97	24.93
Riau Islands	11.54	18.38	24.24	18.97	42.16
DKI Jakarta	64.78	47.02	142.53	121.74	207.86
W. Java	309.81	518.88	431.01	339.59	587.74
C. Java	249.36	538.46	342.58	301.05	519.05
DI Yogyakarta	31.94	73.94	44.74	37.67	65.93
E. Java	279.53	652.37	389.25	332.01	572.43
Banten	73.05	88.77	104.62	97.64	146.46
Bali	26.11	19.30	28.38	23.84	38.59
W. Nusa Tenggara	35.05	88.81	46.03	40.27	69.04
E. Nusa Tenggara	25.36	94.78	42.14	39.33	63.21
W. Kalimantan	30.13	34.25	41.71	33.99	60.25
C. Kalimantan	16.69	17.01	24.40	19.23	36.23
S. Kalimantan	26.56	19.50	34.02	26.08	49.90
E. Kalimantan	20.83	44.48	47.44	41.38	69.64
N. Sulawesi	17.67	17.89	21.19	15.70	32.97
C. Sulawesi	17.54	51.02	32.61	27.46	45.48
S. Sulawesi	50.92	82.02	70.03	60.03	97.55
S.E. Sulawesi	14.48	34.94	20.22	17.98	27.71
Gorontalo	6.79	18.90	9.95	9.29	15.26
W. Sulawesi	6.70	12.18	9.38	7.51	14.64
Maluku	8.12	40.49	19.81	17.39	27.06
N. Maluku	5.99	11.20	12.57	11.05	17.52
W. Papua	3.98	26.79	13.48	11.67	21.13
Papua	12.20	111.77	41.19	42.28	58.76
Total	**1,664.73**	**3,383.07**	**2,572.87**	**2,194.24**	**3,748.44**

Table 3.5 presents the simulation 2 (Option 2) where the grants equal to the household's income deficits plus the expected inflation for each poor household as the first alternative to the fixed universal transfer amount. In total, the national poverty dropped down to 5.81 percent compared to 17.45 percent at the baseline in 2008. This 5.81 percent of national poverty rate comes from the near-poor households in 2008 and after the simulation they become poor using the actual poverty lines in 2009.

The second alternative (Option 3) uses the means (Sim3), the medians (Sim4), and the 75^{th} percentiles (Sim5) of the income deficits. By using the means, the poverty rates in all provinces decrease by about 1.1 to 9.41 percent compared to their

respective poverty rates at baseline except for West Papua and Papua. In these provinces, the poverty rates are 0.55 percent and 0.69 percent higher than their baselines. In total, the poverty rate decrease to 12.38 percent compared to 17.45 percent at baseline. Similar to the simulation 3, we find relatively lower of poverty rates by 0.12 to 8 percent in the simulation 4 (the medians), except for East Nusa Tenggara and West Papua which they increase by 0.18 and 3.01 percent, respectively. In total, the poverty rate decreases to 13.97 percent. It is still lower than the baseline.

The best simulation in this option is using the 75th percentiles of the income deficits (Sim5) as the amounts of grants. The poverty rates decrease by an average of 8.9 percent or range from 2.91 percent (Bali) to 16.28 percent (Nangro Aceh Darussalam) compared to their respective poverty rates at baselines. In total, the poverty rate decrease to 7.97 percent compared to 17.45 percent at the baseline and 15.94 percent at actual poverty rate in 2009. From these three simulations, we conclude that the cash transfer should be varied across provinces and should large enough (in this case, 75th percentiles of the income deficits of respective provinces). The universal fixed cash transfer is not the best option.

Table 3.6 shows the expected total cost of the simulation 1–5, excluding all administrative, personnel, and other costs. Total financing for simulation 1 (fixed grant at Rp 100,000 per household in all provinces) is Rp 1,665 billion per month. Compared to simulation 1, the total cost for simulation 2 (grant equals to household's income deficit for each poor family) is about 100 percent higher at Rp 3,383 billion. Furthermore, the total cost for simulation 3 (the means) is also higher at Rp 2,572 billion per month compared to the fixed universal cash transfer amount. In the last two simulations, the total costs are Rp 2,194 billion of the simulation 4 (the medians) and Rp 3,748 billion per month for simulation 5 (the 75th percentiles).

The total cost, excluding administration and other costs, for simulation 1 at Rp 1.665 billion per month is relatively low compared to the total actual financing of the BLT program in 2008–2009, which is Rp 18,966 billion for nine months or Rp 2,107 billion per month (World Bank, 2012b). However, this total actual financing of the BLT program slightly differs to the total cost of simulation 4 at Rp 2,194 billion per month.

3.6 Conclusion

Despite a significant number of mis-targeting in the BLT and PKH programs using the database for the social protection programs in 2008 (PPLS 2008), the probit estimates of these programs' recipients indicate that being poor, having household characteristics related to the poor conditions, and being recipients of the other social benefits, increase the probability of being a recipient of the programs.

Furthermore, the main weakness of the Indonesian government's policy in determining cash transfer amounts, especially in the BLT/BLSM programs, lacks awareness of the socio-economic conditions and living costs of recipients. This paper examined two alternatives to the GOI's fixed cash transfer amounts that should be used as guidelines by decision-makers. The first is making the amount equal to the value of the poor family's income deficit plus expected inflation which almost eradicate all poor households. The second is making the value of the cash transfer amount equal to a province's representative value of income deficit plus its expected inflation. From this alternative, we simulate three scenarios in which the 75^{th} percentiles of the income deficits are the representative value for the amount of expected cash transfer in specific province.

Of the two alternatives, the second would be the most suitable for a cash transfer program in the future. Basing the amount on individual households would be more accurate, but would also create the risk of a moral hazard, as some households may lie about their income or expenditure to receive grants. This is avoided by using 75^{th} percentiles of the provincial income deficits. The second alternative may make a greater contribution to poverty-reduction than the fixed cash transfer amounts, while providing minimal risk for the government.

Finally, because of the importance of cash transfer programs to poor households, it is strongly recommended that a law be created to better facilitate the empowerment of the poor. Currently, cash transfer programs are provided as a matter of policy, not law; as such, the government is not legally obligated to support the poor, and any program implemented by one administration risks being cut by their successor.

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Appendix 3.1 Simulation Results in 2009 and Actual Poverty in 2010

Province	Number of Poor Households							Percentage of Poor Households						
	Baseline	Option1	Option 2	Option3			Actual	Baseline	Option1	Option 2	Option3			Actual
	2009	Sim1	Sim2	Sim3	Sim4	Sim5	2010	2008	Sim1	Sim2	Sim3	Sim4	Sim5	2010
N.A.D	996,953	950,211	179,975	552,520	667,908	344,291	894,316	24.34	23.20	4.39	13.49	16.31	8.41	21.84
N.Sumatra	1,681,017	1,511,554	434,270	996,113	1,079,585	626,513	1,576,955	12.90	11.60	3.33	7.64	8.28	4.81	12.10
W.Sumatra	505,383	477,357	162,645	291,684	349,060	154,618	493,177	11.23	10.61	3.61	6.48	7.76	3.44	10.96
Riau	534,910	480,371	111,447	269,267	315,928	161,855	570,788	9.61	8.63	2.00	4.84	5.68	2.91	10.25
Jambi	272,270	259,040	113,619	170,315	207,548	101,053	289,783	9.56	9.10	3.99	5.98	7.29	3.55	10.18
S.Sumatra	1,393,773	1,083,714	173,008	779,663	831,805	425,228	1,238,926	19.43	15.11	2.41	10.87	11.60	5.93	17.27
Bengkulu	330,179	302,709	76,621	209,517	226,598	127,733	335,391	18.93	17.36	4.39	12.02	12.99	7.33	19.23
Lampung	1,744,993	1,464,344	352,623	1,126,455	1,210,971	647,407	1,674,587	22.64	19.00	4.58	14.62	15.71	8.40	21.73
BangkaBelitung	73,590	77,027	27,625	47,346	53,935	27,136	65,132	7.17	7.50	2.69	4.61	5.25	2.64	6.34
RiauIslands	162,933	150,021	3,228	56,718	70,465	34,548	124,584	10.51	9.67	0.21	3.66	4.54	2.23	8.03
DKIJakarta	323,173	306,866	87,893	172,912	189,928	114,804	312,179	3.62	3.44	0.99	1.94	2.13	1.29	3.50
W.Java	5,421,589	4,235,812	1,146,856	3,002,972	3,497,625	1,662,299	5,114,039	13.01	10.16	2.75	7.21	8.39	3.99	12.27
C.Java	6,187,989	4,683,003	1,000,122	3,539,073	3,944,886	2,074,229	5,560,401	19.15	14.49	3.09	10.95	12.21	6.42	17.20
DIYogyakarta	661,741	552,140	133,683	366,214	391,042	236,605	636,362	19.46	16.24	3.93	10.77	11.50	6.96	18.72
E.Java	6,680,083	5,135,991	1,449,403	3,859,802	4,284,402	2,252,911	6,017,993	18.51	14.23	4.02	10.69	11.87	6.24	16.67
Banten	951,912	783,446	236,344	516,026	583,898	300,066	873,406	9.23	7.60	2.29	5.00	5.66	2.91	8.47
Bali	207,401	168,296	52,872	129,269	138,971	74,596	232,070	5.85	4.75	1.49	3.65	3.92	2.11	6.55
W.NusaTenggara	1,193,029	949,545	150,273	668,274	761,201	386,338	1,078,204	25.85	20.58	3.26	14.48	16.50	8.37	23.37
E.NusaTenggara	1,214,204	1,298,778	351,234	1,018,191	1,115,881	612,095	1,241,565	27.94	29.89	8.08	23.43	25.68	14.09	28.57
W.Kalimantan	476,021	441,530	198,786	264,376	354,091	164,555	483,620	10.18	9.44	4.25	5.65	7.57	3.52	10.34
C.Kalimantan	178,287	151,065	78,027	106,589	111,589	76,568	170,029	7.54	6.39	3.30	4.51	4.72	3.24	7.19
S.Kalimantan	221,211	196,283	80,149	131,540	183,967	86,853	217,917	6.44	5.71	2.33	3.83	5.35	2.53	6.34
E.Kalimantan	358,852	382,126	94,510	205,411	280,642	121,988	312,727	11.59	12.35	3.05	6.64	9.07	3.94	10.10
N.Sulawesi	223,031	171,761	57,319	137,369	137,369	86,400	207,171	9.94	7.66	2.56	6.12	6.12	3.85	9.23
C.Sulawesi	509,770	472,787	129,433	288,939	326,429	162,895	509,165	19.76	18.32	5.02	11.20	12.65	6.31	19.73
S.Sulawesi	1,235,753	939,326	254,908	672,019	790,109	442,468	1,100,619	15.79	12.00	3.26	8.59	10.10	5.65	14.06
S.E.Sulawesi	448,471	315,021	28,267	209,498	251,824	111,486	423,558	19.55	13.73	1.23	9.13	10.98	4.86	18.46
Gorontalo	240,125	195,469	20,666	123,802	150,734	63,517	215,514	26.74	21.77	2.30	13.79	16.78	7.07	24.00
W.Sulawesi	169,404	134,787	31,341	99,069	99,069	70,227	143,918	16.37	13.03	3.03	9.58	9.58	6.79	13.91
Maluku	409,861	411,162	89,579	252,261	283,837	167,990	412,242	30.44	30.54	6.65	18.74	21.08	12.48	30.62
N.Maluku	113,472	110,528	15,042	59,844	63,768	35,972	107,154	11.99	11.68	1.59	6.33	6.74	3.80	11.33
W.Papua	263,537	251,880	30,913	150,963	150,963	68,631	271,508	36.64	35.02	4.30	20.99	20.99	9.54	37.75
Papua	768,693	821,098	55,207	647,888	647,888	439,647	818,863	37.94	40.53	2.72	31.98	31.98	21.70	40.42
Total	36,153,610	29,865,048	7,407,888	21,121,899	23,753,916	12,463,522	33,723,863	15.72	12.99	3.22	9.19	10.33	5.42	14.67

Essay 4: Dollar a Day Re-Revisited

with: Friederike Greb, Stephan Klasen, and Manuel Wiesenfarth

Abstract

Recently, the World Bank re-estimated the international poverty line used for global poverty measurement and the first Millennium Development Goal based on an updated country sample of national poverty lines and new results for PPP exchange rates. The empirical relationship between those poverty lines and the log of mean consumption is the basis of the international poverty lines, but the new international poverty line of $1.25 per capita per day in 2005PPP$ is based on estimating the relationship between the poverty line and mean consumption. In this paper we show, using the same data, that the estimated relationship is statistically problematic and that the best statistical estimation of the relationship between mean consumption and national poverty lines generates a point estimate of an international poverty line that is substantially higher than $1.25 a day, but with very large standard errors attached to the estimates.

Keywords: international poverty line, global poverty, purchasing power parity.

JEL Classification Numbers: I32, E31, O10.

4.1 Introduction

In 2008, the World Bank presented its results from a major revision of the global absolute income poverty estimates, commonly known as the $-a-day poverty numbers. These numbers measure the number, headcount ratio, and poverty gap of people in the developing world who fall below the international poverty line. This international poverty line was created by taking the averages of the national poverty lines of a sample of poor countries (with the lines expressed in PPP$, see Ravallion, Datt, and van de Walle, 1991; Chen and Ravallion, 2001). The argument supporting this averaging has been that for a large range of low income countries, the observed national poverty lines are empirically rather similar, while for richer economies the poverty lines appear to rise with (the log of) mean incomes (see Figure 1a). Since their inception in 1990, they have since become one of the central targets of the Millennium Development Goals.

As described in detail in Chen and Ravallion (2010), these revisions drastically changed the view of the level and distribution of global poverty in the world. In particular, the headcount rate of poverty in 2005 was now estimated at 25%, while prior to the revision, the number for the same year had been estimated (by the same authors) to be 17%. The difference implies that some 400 million more people (1.37 billion instead of 930 million) were now declared to be absolutely poor, compared to before. The level adjustments were particularly substantial in East Asia, followed by South Asia and Sub-Saharan Africa, while they were much smaller elsewhere. The time trends in poverty between 1981 and 2005 were reported as being similar to the previous ones. Both are nicely summarized in the title of Chen and Ravallion (2010)'s paper: 'the developing world is much poorer than we thought, but no less successful in the fight against poverty.'

The drastic revisions have generated considerable debates and commentary with several authors questioning aspects of the revisions (e.g. Deaton, 2010, Ward, 2009; Klasen, 2009; Reddy, 2008; Heston 2008); this paper contributes to one aspect of this debate. The debate is however complicated by the fact that the revision undertaken by the World Bank in 2008 included not one but two major changes. The

first was to base the entire poverty analysis, including the international poverty line, on the new purchasing power parity estimates that had been produced in the 2005 round of the International Comparison of Prices Project (ICP2005), thereby discarding the ones previously used the 1993 ICP. The 2005ICP suggested that many developing countries, particularly China, but also India and some African countries, were much poorer than previously thought, related to the higher price levels identified in the ICP. The second major change was that the new international poverty line was re-created using the same procedure but a different country sample than had previously been used. In particular, the poverty line switched from $1.08 per capita per day at 1993PPPs to $1.25 per capita per day at 2005 PPP.[5] While many surmised that the changes in levels and regional distribution of poverty were largely driven by the changes in the ICP, Deaton (2010) argued that this is unlikely to be the case. In particular, if the ICP simply made the average PPP-adjusted poverty line of the poor countries that make up the international poverty line lower than before (due to higher prices observed in these countries in the ICP2005) and reduced their consumption levels as well for the same reason, then this should not have any significant impact on measured poverty rates in the developing world.

One way to test this assumption is to simply use the old sample of countries that made up the old international poverty line ($1.08) and calculate the new poverty line. Using the median of the national poverty lines of the 10 countries included in the $1.08 poverty line (Bangladesh, China, India, Indonesia, Nepal, Pakistan, Tanzania, Thailand, Tunisia, and Zambia, see Chen and Ravallion, 2001)[6], the updated poverty line at 2005ICP would be $1.05 per capita per day (or $32.04 per month). Note that this apparent decline from $1.08 to $1.05 in the value of the poverty line despite international inflation in the intervening years[7], precisely reflects the fact that the ICP2005 finds price levels to be much higher in poor countries (on average and relative to rich countries) than the 1993ICP. At the $1.05 a day poverty line, the Povcal

[5] This is discussed in detail in Ravallion, Chen, and Sangraula (2009) as well as Chen and Ravallion (2010)
[6] To create the median, we take the average of the two middle observations: Indonesia ($32,63 a month) and Bangladesh ($31.46 a month).
[7] In fact, as calculated by Chen and Ravallion (2010), had one simply inflated the $1.08 poverty line using the US CPI, the international poverty line in 2005 would have been $1.45.

database calculates that the number of poor people in 2005 would have been 979 million, only slightly higher than the 931 million found using the old $1.08 poverty line and the 1993ICP.[8] Thus, it indeed appears to be the case that the change in the ICP has a minor impact on the global number of poor people, while the switch in the sample to generate the new poverty line (i.e. essentially from $1.05 to $1.25) accounts for the bulk of the change to be explained.[9] As a result, the question of whether the new international poverty line is properly derived is the key question to examine. Deaton (2010) already expressed a range of criticisms and suggested some ad hoc adjustments which we will discuss below. We will take a different route here though. We will basically examine whether the newly derived international poverty line is properly specified when the most suitable econometric and statistical methods are applied to the issue. As shown in the next section, this essentially boils down to the question how best to estimate a kinked regression line between (the log of) per capita consumption and the national poverty line (expressed in 2005PPP$), allowing for a flat relationship for a range of low-income economies and an ascending portion covering richer economies, giving it the shape of a piece-wise linear curve (see Figure 1a).

We first find that there are some problems with the way the methods proposed in Ravallion, Chen, and Sangraula (henceforth referred to as RCS) (2009) are actually applied in their estimation. In particular, they estimate a model that relates the poverty rates to mean consumption levels (rather than logs), thereby essentially estimating the relationship in Figure 1b. We show that they thereby force a non-linear relationship on the data that is actually not warranted. Addressing this and other issues and additionally supplementing the analysis using straight-forward parametric and advanced non-parametric techniques, we find that the analyses based on these methods used to derive the poverty line converge on a significantly higher poverty line,

[8] See http://go.worldbank.org/NT2A1XUWP0 accessed on March 23, 2011. After completing work on this paper, we noted that Deaton performed a similar calculation with similar results. See Deaton (2010b)

[9] This confirms the claim by Deaton (2010) who arrived at this conclusion using a different approach. Of course, the changes in the ICP will have larger impacts on the regional distribution of poverty to the extent the changes in the PPP exchange rates differ between and within regions which they did to some extent. See Deaton (2010).

ranging from $1.33 to $1.53. We also find that there is a great deal of uncertainty surrounding these estimates, even larger than suggested by RCS (2009).

The paper is organized as follows. The next section briefly discusses the way the international poverty line is derived, reviews Deaton's (2010) critiques and presents the basic framework for the analysis. The following section presents the methods used in the estimation, section 4.4 presents the results and section 4.5 concludes.

4.2 Deriving the International Poverty Line

It is important to preface this section by emphasizing that we do not attempt to somehow generate some consistency between the old and the new poverty line.[10] We thereby accept the (plausible) arguments advanced by Ravallion, Chen, and Sangraula (2009) that the data base used to generate the old international poverty line was dated, unrepresentative, too small, and with insufficient official status. Indeed, they show that the older database included only 22 observations, largely from the 1980s, while the new data base includes 74 observations from 1988-2005; the latter also appears to originate from more official sources while quite a few of the older ones were based on academic studies where it was unclear to what extent these poverty lines were officially accepted.

A consequence of accepting this line of argument is that the 'revisions' prepared by the World Bank in 2008 cannot be seen so much as 'revisions' and certainly cannot be considered an 'update', rather they are a completely new analysis starting essentially from scratch: a new poverty line is derived using a new sample of countries and new ICP data. The only link to previous estimates is that they are

[10] For reasons explained, for example, in Reddy and Pogge (2008), it is not possible to generate inter-temporally consistent PPP-adjusted estimates of incomes or poverty. Each ICP produces PPP exchange rates valid for the benchmark year. Linking them with previous years using old ICP rounds (as was done using the Penn World Tables) or national inflation rates (as done in the World Bank poverty work) has different conceptual advantages and disadvantages. We also do not want to contribute here to the debate on whether using the ICP rounds to derive an international poverty line and then calculate global absolute poverty numbers is conceptually a good idea. See Klasen (2009) for a discussion of these issues and possible alternatives.

roughly based on the same empirical approach (see below); the second link is that once the international poverty line has been derived for the benchmark year (now 2005, before 1993) and translated into local currency in that year, both approaches use *national* CPIs to inflate and deflate the poverty line backwards and forward in time and then use the household surveys of the respective years and the deflated poverty line to count the poor. As a result, it is, of course, not surprising that the trends in poverty have not changed a great deal. They have only changed to the extent that the location of the poverty line also affects the pace of poverty reduction. Since the density of people around the poverty line will differ depending on the location of the poverty line, this will affect poverty reduction, but the effect is empirically not substantial.[11]

Once it is accepted that one is essentially redoing the entire analysis from scratch, trying to find consistency with the previous estimate is no longer the pertinent question. The key question is whether the methods to do it now from scratch are the best available and the results robust to methodological choices. This is what we focus on here.

The empirical starting point for the analysis is Figure 1a which shows the log of per capita consumption from the national accounts and the national poverty lines, expressed in 2005PPP$. These data are identical to the ones used by Ravallion, Chen, and Sangraula (2009). As can be seen, there clearly appears to be a range of low levels of (log) per capita consumption where the relationship is flat, while the relationship turns clearly positive at higher levels of (log) per capita consumption. Since the first derivation of the international poverty line, the essence of the international poverty line has been to take the average of the flat portion of the curve;[12] the central question is where the flat portion ends and the rising portion begins. In other words, what is the relevant reference group over which to calculate the average? Ravallion,

[11] See Bourguignon, (2003) and Klasen and Misselhorn (2007) for a precise statement on this under the assumption of lognormal income distributions.

[12] In Chen and Ravallion (2001) using the old 1993ICP, the median of the countries along the flat portion was used. In Ravallion, Chen, and Sangraula (2009), the mean is used (although the median is also mentioned and does not differ much). To keep with the more recent approach, we will stick to the mean.

Chen, and Sangraula (2009) end up with a reference group of the poorest 15 countries which then delivers a mean $1.25 (and a median $1.27) international poverty line. They use two approaches to get there. The first is to estimate the following parametric regression equation:

(4.1) $$Z_i = Z^* I_i + f(C_i)(1 - I_i) + \varepsilon_i$$

where *Z** is the mean poverty line of the reference group (countries with $C_i \leq C^*$), also known as the estimated international poverty line, and I_i takes the value one if i is a member of the reference group and zero otherwise.

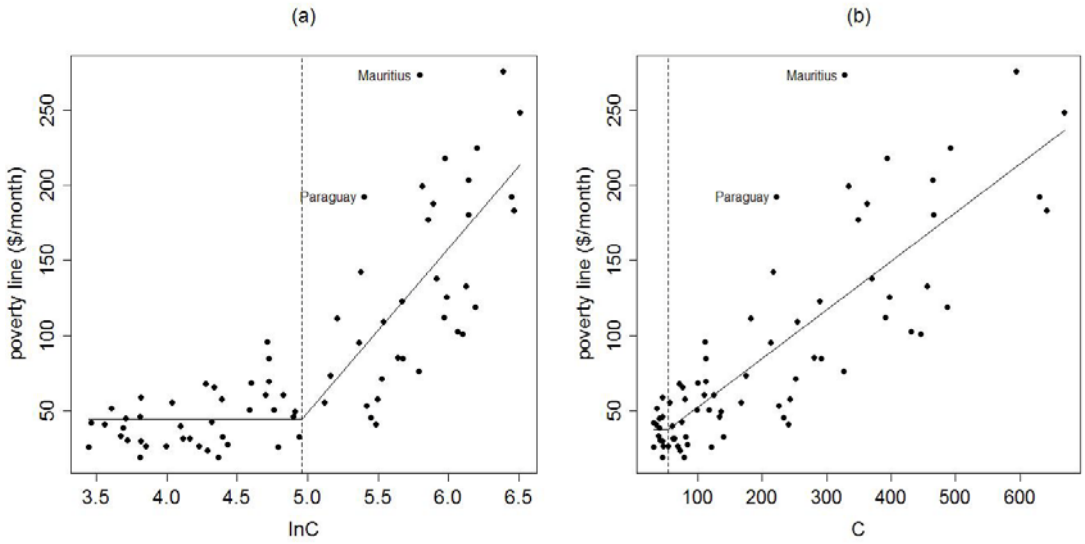

Figure 4.1 Estimated Threshold Models for Log of consumption (a) and Consumption (b)

Note: Dashed vertical lines indicate the estimated thresholds.

They then check whether the estimated curve is (roughly) continuous and whether the reference group is consistent so that the estimated per-capita consumption at the poverty line is below the maximum per capita consumption of the reference group countries and find this to be the case. When estimating the above model, one only needs to check for one condition. If one does not impose continuity on equation (4.1), consistency is assured as the OLS estimate of the flat portion of the curve is simply the mean of the reference group. As that group was chosen ex ante,

consistency is assured and one just needs to check for continuity which RCS do by visual inspection and find it to be (roughly) so. If one does impose continuity on (1) (see below), then one needs to check for consistency as we do below. They concede, however, that their approach of estimating (1) is statistically not valid as it treats "the regressor I as data since I is a function of C*, which depends on the parameters." (RCS (2009): 175). To remedy this, they estimate a restricted piece-wise linear threshold model based on Hansen (2000) where they constrain the model to have a slope of 0 in the lower linear segment, Z* to be consistent and that there must not be any discontinuity at the kink. Using this approach, the estimate for Z* is quite close ($1.23).

In his critique of the new global poverty numbers, Deaton (2010) is largely concerned with trying to establish some consistency between the old and new numbers. He carefully investigates to what extent the change could be due to changes in the ICP and estimates thus possibly boosting global poverty count by some 100 million poor people. The rest is due to the re-estimation of the poverty line using the new sample. Here Deaton criticizes that several populous fast-growing countries including China, India, Indonesia, and Bangladesh are no longer part of the new reference group. As some of them, notably India and China, have rather low poverty lines, their removal from the reference groups contributed to increasing the global poverty line and, paradoxically, leading to higher measured poverty rates using this global line in India and China. He then proposes that a better procedure would be to calculate the international poverty line using all 74 observations, but weighed by the number of poor people in each country. This would, of course, mean that the international poverty line thus derived would be heavily driven by the poverty lines of the population giants India and China and many other data points would be largely irrelevant. This would then generate a poverty line of $0.92 in 2005PPP$ and a global poverty count of 874 million, actually lower than the last count using the old $1.08 line of 931 million.

As we are not treating RCS (2009) as an 'update' (as Deaton implicitly does), we are less concerned about the consistency between the estimates (although it is of course interesting to understand what drives the differences). As to the weighting of

the poverty lines, while one may give higher weight to poverty numbers that have been derived with greater technical competence or have been based on a great deal of public discussion (as has been the case in India), it appears implausible to assume that the credibility or standard of the poverty line is proportional to the poor people in the country. Also, this poverty line would then be influenced by countries in the ascending portion of the line which appears wrong since in these countries apparently absolute poverty considerations have given way to more relative views of poverty and it appears unclear why these countries should influence the global absolute poverty line.[13] Thus, our approach is to more narrowly focus on whether the proposed two estimation methods discussed above are indeed the best ways to estimate the international poverty line. The first and rather important point of note is that both models actually estimated by RCS (2009) do not actually use the relationship in Figure 4.1a where the national poverty lines are plotted against respective *log* of per capita consumption. Instead, both regressions only use the per capita consumption (not the log thereof) as the regressor. They thus try to estimate the relationship in Figure 4.1b. But the piece-wise linear relationship that drives the whole motivation for the international poverty line is actually not there in Figure 1b. This is already apparent from visual inspection. Also, using the Hansen model and assuming either homoscedasticity or heteroscedasticity, the p-value for the null hypothesis of no threshold (i.e. no kink) is 0.15 and 0.73, respectively. In both cases, one cannot reject the claim of a simply linear relationship between per capita consumption and the poverty line. In contrast, the respective p-values for the log-linear relationship in Figure 1a are 0.0002 and 0.005, respectively, clearly rejecting the no threshold hypothesis and confirming that estimating a linear threshold model is clearly favoured over a simple linear model. Thus, in the following, we base our considerations on the model of Figure 4.1a with $\ln C$ as the regressor assuming that the log-transformation is justified (and thus the motivation of the derivation of the poverty line) and investigate whether the poverty line of 1.25$ still results.[14]

[13] On a closely related issue, see Ravallion and Chen (2010).

[14] However, note that the log transformation is an assumption and its theoretical justification is unclear in this context. In principle, any other nonlinear monotone transformation could also be plausible and

4.3 Identifying the Most Appropriate Reference Group

We now present several approaches to estimate the international poverty line based on different approaches used to generate a reference group. In principle, we will follow two approaches. The first is to simply determine at which point the flat portion of the curve in Figure 1a experiences a slope that is significantly different from 0. We will investigate this question using parametric and non-parametric approaches. As soon as the curve has a significant positive slope, we can be sure that the optimal size of the reference group has been exceeded, i.e. there must be a country (or countries) included where the poverty line depends on (log) per capita mean income and no longer seems to be appropriate for inclusion for an absolute poverty line. That is, the reference group should include all countries where the relationship between the log of per capita consumption and national poverty lines did not exhibit a positive relationship.

In the simplest form, we simply run a sequence of linear parametric regressions in "windows" of different sizes sliding along the x-axis. That is, we order the data by $\ln C$ and compute a linear model based on observations $i, \dots, i+h$ with i an integer increasing from 1 and h the window width (number of countries included)[15]. Thereby, we obtain the reference group by determining where the slope begins to turn positive with p-value for the slope smaller than 0.05 (0.10) as stopping-rule[16], i.e. countries 1 to

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lead to different results. Thus, the question of whether the logarithmic transformation is sensible is a crucial issue to discuss. On the other hand, not taking the logarithm puts the motivation of the poverty line into question as it is one transformation where we clearly see the distinction between the flat and ascending portion of the line. Also, as we are following RCS (2009) here and their motivation for the international poverty line (which, in their figures, always uses Figure 1a as motivation), we think it is appropriate to continue with this assumption.

[15] Note that this strategy is similar to the method of moving averages with "moving slopes" instead, and to local polynomials of degree one with bandwidth depending on the number of countries within the window and uniform kernel. However, we do not intend to estimate a regression curve but interpret the coefficients as slopes (actually at country i+h), thus in a way interpreting them as the first derivative of the regression curve at a given point.

[16] Note that we refrain from calling this a significance level since we are confronted here with a classical example of the problem of multiple testing: The type-1-error rate increases with the number of comparisons made and thus the significance level would have to be adjusted for this (e.g. by Bonferroni correction). Also, with the small number of observations considered, the normality assumption is questionable. However, still the p-value can serve as an order statistic and the stopping rule is as arbitrary as any significance level. Further, we will handle this issue in our nonparametric approach.

$i + h - 1$ are considered the reference group with the minimal i where the slope at countries i to $i + h$ has a smaller p-value than a certain level.

A valid concern, of course, is that using this method, the reference group might depend on the number of countries in the window (h) and on the stopping-rule. The simplest way to address this robustness issue is to try different values of h (we tried h =10, 15, 20) and levels of 0.05 and 0.10 which we also implement below and show that changing the window width does not affect the results. A more elegant way is to use a nonparametric approach to estimate the point where the slope turns significantly positive. More precisely we now consider the model:

(4.2) $\quad Z_i = s(\ln C_i) + \varepsilon_i$

where $s(\cdot)$ is a smooth function of unknown functional form. We use penalized splines to estimate this function (see Ruppert et al., 2003). Thereby, the curve of interest is approximated by some spline basis based on a generous number of knots and overfitting is avoided by penalization with an integrated squared derivative of the spline function. We used cubic B-splines with penalty on the integrated squared second derivative of the spline function in order to get a twice differentiable curve. To obtain the estimated curve, we employ the mixed models representation of penalized splines due to the following advantages. First, this allows us to automatically estimate the smoothing parameter controlling the "wiggliness" of the curve (which corresponds in some sense to estimating the window width in our parametric approach from the data) from the corresponding restricted likelihood simultaneously with the remaining parameters. Secondly, heteroscedastic data can be easily handled within this framework. Finally, this allows us to use a recent approach to construct simultaneous confidence bands which were shown to perform well even under such small sample sizes (see Krivobokova et al., 2010, and Wiesenfarth et al., 2010)[17].

[17] Due to lack of easily available simultaneous confidence bands, usually pointwise confidence intervals are given. However, these bands correspond to the curve estimates at specific values of a covariate and do not assess the whole function. In particular, pointwise confidence intervals - in contrast to simultaneous confidence bands - do not allow statements about the statistical significance of certain features in a regression curve as we do here. More precisely, the usually used pointwise intervals only cover the true function (when repeating the experiment many times) at $(1 - \alpha)\%$ of the data points

In order to identify the point where the slope of the curve turns statistically significant, we estimate the first derivative $s'(\cdot)$ of the curve. Then, the slope is significant when the simultaneous confidence band around the first derivative does not enclose the zero line. This nonparametric estimation is more appropriate as it can identify much more clearly where the shape of the curve changes, irrespective of the previous length of the flat portion. At the same time, it may still be the case that the identification of a significant positive slope will depend on the number of observations:[18] More observations lead to a more precise estimate and therefore might lead to an earlier finding of a positive slope (and thus a smaller reference group implying a possibly different international poverty line).[19] Still, in any case this approach as well as the parametric approach from before serve to identify the upper bound for the number of countries in the reference group: We obtain the maximal number of countries where the regression line can be flat.

The crucial advantage of the nonparametric strategy is that no prior assumption on the functional form of the regression line can influence the estimation of the poverty line (particularly in the ascending part of the line in Figure 1a where no foundation for linearity seems to be given by the theory and where the linearity assumption is questionable as seen from Figure 4.2a). Further, the possible presence of outliers can barely have an effect. Note that we have to assume that vthe regression curve is twice-differentiable (smooth) in order to obtain a once differentiable first derivative which is in contradiction to the motivational assumption of a broken regression line with a kink at lnC* (and which we did not have to assume for the parametric approach). However, this might be interpreted as a "smooth transition" from the constant to the ascending part and thus as a range of countries

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where $\alpha \in (0,1)$ and in the extreme case a specific point of the curve could be never covered. In contrast, simultaneous confidence bands cover the entire true curve with some pre-specified probability such that the significance level holds for every point of the curve. Moreover, simultaneous confidence bands treat the problem of multiple testing in footnote 15. Thus, simultaneous confidence bands are generally wider than the pointwise ones.

[18] More precisely, the p-value is a function of the sample size and a large p-value (insignificance) cannot be interpreted as evidence for constancy (no positive slope) of the regression curve.

[19] A smaller reference group does not necessarily generate a lower average poverty line; it depends on whether the marginal observation is above or below the average.

where we are indifferent as to whether they already belong to the linearly ascending part or still to the constant part of the regression curve.

Nevertheless, in order to stick to the motivation of the broken regression line with two linear parts and as our second approach to determining the reference group size, we estimate a piecewise-linear threshold model to estimate the full relationship presented in Figure 1a. There is a simple approach chosen also by RCS (2009) which is to estimate equation 1 above. We will do that as well, except that we, as discussed above, will estimate the model with log-transformed consumption as regressor. We will also consider the continuity and consistency issues that they considered as discussed above.

But since this approach treats the reference group as data rather than as a function of C* which itself is a parameter, we will also estimate, as did RCS(2009), the piecewise linear threshold model using the procedure of Hansen (2000). The difference is that we will, following our threshold tests reported on above, again estimate the model with $\ln C$ as regressor, which was the only one where a threshold was identified in the data. More precisely, we will estimate the model:

(4.3) $$Z_i = Z^* I_i + f(\ln\ C_i)(1 - I_i) + \varepsilon_i$$

where $f(\cdot)$ is assumed to be linear as in equation (3.1). What has become known as Hansen's method is plain least squares estimation for threshold regression models. In our case, this amounts to finding the threshold *C** as the argument minimizing the sum of squared errors:

(4.4) $$\sum_{i=0}^{n} [\mathrm{Z_i} - Z^* I_i - f(\ln C_i)(1 - I_i)]^2$$

where *C** enters through I_i, *Z** and *f*. We minimize this function over all linear *f* restricted to meet the consistency and continuity conditions imposed; the parameters specifying *f* are concentrated out beforehand.[20]

[20] Note that in contrast to our nonparametric approach this approach depends on the assumption of a linear functional relationship for the ascending part in Figure 1a. Thus, if linearity is actually not given (but for example a quadratic relationship warranted), the estimated threshold may be affected. This highlights again that the empirical derivation (of RCS (2009) as well as of the approach used here) of the

4.4 Empirical Result

Table 4.1 shows the results of the first linear estimation approach. It turns out that, depending on the stopping rule and window width chosen, a reference group of 29 or 30 countries would be appropriate in the sense that the p-value for the slope would be clearly larger than the levels of 0.10 and 0.05. This would lead to an international poverty line significantly above the $1.25 a day. If the mean of the reference group is chosen the poverty line ranges from $1.31 (G29) to $1.33 (G30).

Table 4.1 Estimating the Relationship using lnC based on Fixed Windows of Countries (h=10, 15, 20)

h=10			h=15			h=20		
Obs.	lnC	t-stat	**Obs.**	lnC	t-stat	**Obs.**	lnC	t-stat
8-17	12.389	0.47	**8-22**	10.219	0.51	**8-27**	8.417	0.560
9-18	-1.149	-0.04	**9-23**	19.783	0.86	**9-28**	10.079	0.710
10-19	-3.629	-0.13	**10-24**	13.613	0.55	**10-29**	22.206	1.490
11-20	14.169	0.36	**11-25**	12.386	0.51	**11-30**	21.507	1.590
12-21	23.645	0.77	**12-26**	24.249	1.32	**12-31**	46.440***	3.290
13-22	25.163	0.82	**13-27**	15.067	0.71	**13-32**	56.581***	3.970
14-23	43.227	0.94	**14-28**	14.051	0.67	**14-33**	60.329***	4.030
15-24	-8.087	-0.15	**15-29**	24.352	1.01	**15-34**	53.051***	3.070
16-25	50.067	1.07	**16-30**	45.631***	3.42			
17-26	46.378	1.08	**17-31**	75.446***	3.33			
18-27	9.183	0.17	**18-32**	86.974***	3.93			
19-28	16.681	0.37	**19-33**	86.832***	3.57			
20-29	37.229	0.74	**20-34**	68.873**	2.34			
21-30	68.715**	2.4						
22-31	94.303*	2.22						
23-32	109.406**	2.53						
24-33	135.316***	3.97						

Note: t-statistics are based on robust standard errors and * p<0.10, ** p<0.05, *** p<0.01, one-tailed test. Columns "Obs." give the range of countries included ordered by lnC.

In Table 4.2 additionally estimates for parametric models based on reference groups of different sizes are given. Here, also p-values for the regression coefficient lnC are smaller than 0.05 and 0.10 for group sizes of 30 and 31 countries, respectively. Thus, these groups (according to the stopping rule) already include observations of the

international poverty line depends strongly on a priori assumptions that have to be thoroughly discussed.

ascending part of the kinked regression line. Thus, this again leads us to the conclusion that 29 or 30 are the maximal numbers of countries that should be included in the reference group.

Table 4.2 Estimated Linear Regressions using lnC based on Reference Groups of Different Sizes

Indep. Variables	Dep. Variable = Z				
	G15	G29	G30	G31	G32
lnC	3.763	9.359	11.947*	19.321**	23.471***
	(0.19)	(1.19)	(1.70)	(2.17)	(2.77)
_cons	23.927	2.151	-7.826	-36.288	-52.321
	(0.32)	(0.07)	(-0.28)	(-1.04)	(-1.57)
N	15	29	30	31	32
F-statistics	0.035	1.405	2.879	4.725	7.683
R-squared	0.003	0.048	0.083	0.166	0.228
Mean of Z (per day)	37.983	39.79	40.492	42.27	43.596
	(1.25)	(1.31)	(1.33)	(1.39)	(1.43)
Median of Z	38.510	38.510	39.100	39.690	40.365

Note: t-statistics in parentheses based on robust standard errors and * p<0.10, ** p<0.05, *** p<0.01, one-tailed test.

The nonparametric estimation results using simultaneous confidence bands are shown in Figure 4.2. As heteroscedasticity clearly is an issue here (see panel b), the simultaneous confidence bands need to be adjusted to account for this. The first derivative of the nonparametrically estimated curve suggests that the slope turns significantly positive (on a 10% level) around a log of per capita expenditure of 4.43 (or $83.93). This would generate a reference group of the 27 poorest countries and deliver a mean poverty line of about $1.26 (95% confidence interval [$1.09; $1.43])[21]. It is surprising that the line is very close to the $1.25 found by RCS. This clearly suggests that the reference group of just the 15 poorest countries excludes a considerable flat portion of the curve in Figure 1a. In order to appreciate the great uncertainty inherent in these estimates, one can examine the predicted poverty line at the cut-off point of per capita expenditures of $83.01, which would be an upper bound of the

[21] On a 5% significance level the slope turns significantly positive around a log of per capita expenditure of 4.48 generating a reference group of the 27 or 28 poorest countries (where lnC is below 4.43 and 4.59, respectively) and delivers a mean poverty line of about $1.26 or $1.27.

international poverty line as it is based on the point estimate where the slope has just turned significantly positive (instead of using the average of the flat portion). The point estimate is $1.53 with confidence interval (as given by the simultaneous confidence band around the nonparametric fit) ranging from $1.04 to $2.03. So the nonparametric approach to identifying the flat portion of the curve suggests an international poverty line of $1.26 or $1.53 (depending on assumptions made), but with substantial uncertainty associated with these estimates.

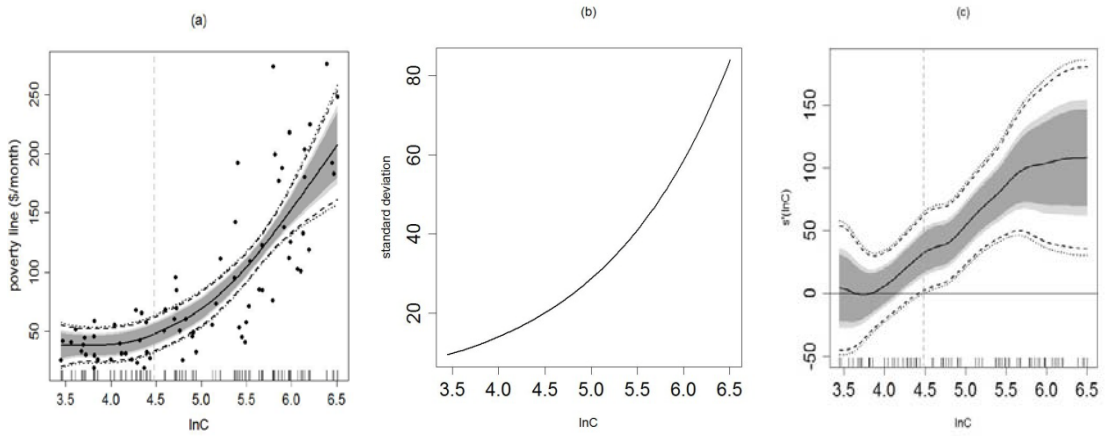

Figure 4.2 Nonparametric estimation of Z regressed on lnC

Notes: Panel (a) shows the curve with 90% and 95% pointwise (shaded areas) and simultaneous confidence bands (areas between dashed and dotted lines), panel (b) the standard deviation of residuals (suggesting heteroscedasticity) and panel (c) the first derivative of the curve in panel (a).

The piece-wise linear estimation (equation 4.1) using lnC as regressor without assuming continuity of the two pieces is shown in Table 4.3. Consistency is still assured for all the estimations for the reasons discussed above. The results are shown for the reference groups of 15 (as used by RCS), 29 and 30 countries. The regressions with 29 and 30 countries yield the same higher poverty lines as shown in Table 4.1 (as the OLS estimates provide nothing else than the mean of the flat portion); the fit is marginally higher for those estimates than when using the 15 country reference group. But note that the confidence intervals suggest substantial uncertainty of these point estimates. Much more important is, however, that the estimation that uses the 15 country reference group is highly discontinuous at the kink which is shown in Figure 4.3. This suggests that the reference group is too small as there are some countries in the

upward portion of the line which have poverty lines lower than the flat portion. On the other hand, there are no such problems when using the reference group of 30 (or 29) countries. This provides further confirmation that a reference group of about 30 countries would be more appropriate.

Table 4.3 Estimated International Poverty Lines (IPL) of Various Reference Groups

Indep. Variables	Dep. Variable = Z		
	G15	G29	G30
I	37.983***	39.791***	40.492***
	(12.55)	(14.64)	(14.89)
1-I	-288.914***	-380.743***	-389.714***
	(-8.28)	(-6.41)	(-6.22)
lnC(1-I)	73.792***	89.613***	91.311***
	(10.24)	(8.14)	(7.92)
N	74	74	74
F-statistics	158.988	167.992	169.549
R-squared	0.878	0.884	0.884
Estimated IPL (Z*) in $ a day	1.25	1.31	1.33
95% confidence interval	[1.05, 1.44]	[1.13, 1.48]	[1.15, 1.51]

Note: t-statistics in parentheses based on robust standard errors and * p<0.05, ** p<0.01, *** p<0.001.

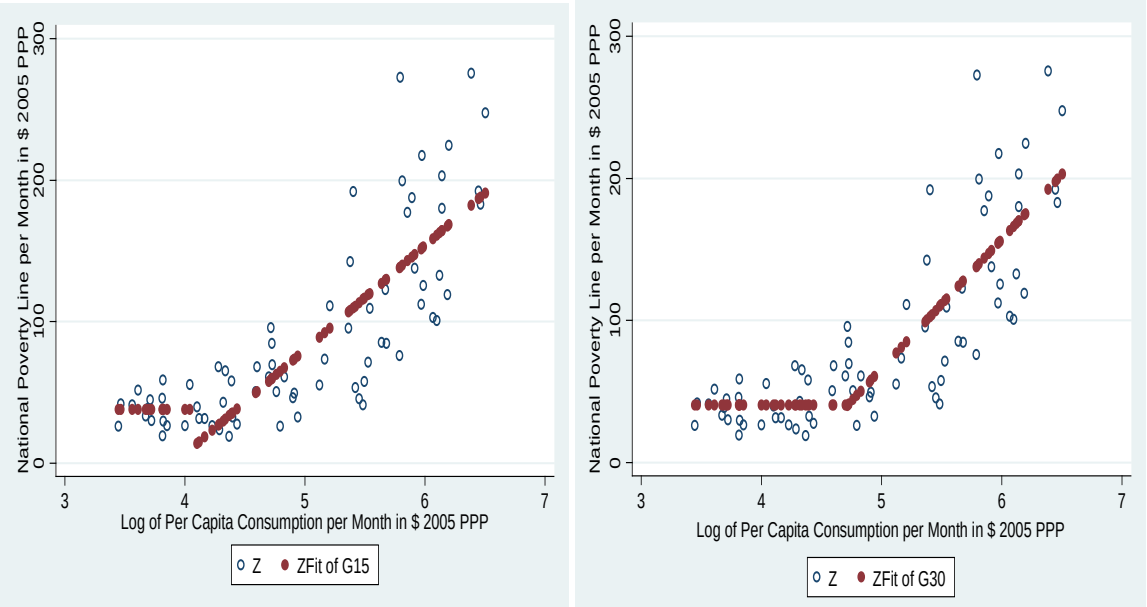

Figure 4.3 Continuity of piecewise function for G15 (left) and G30 (right)

In Table 4.4, we now constrain equation (4.1) to be continuous. The results are interesting. For the 15 country reference group, a poverty line of $0.81 is now generated, which is, of course, due to the very small reference group. Enforcing continuity drags down the poverty line substantially. For the 29 or 30 country reference groups, this is not a problem. The poverty lines are now 1.27 and 1.32, again with rather wide confidence intervals, and it can be shown that they are also consistent in the sense that no country in the reference group has a higher lnC than the estimated lnC at the kink.

Table 4.4 Estimating Equation (4.1) Assuming Continuity

Indep. Variables	Dep. Variable = Z		
	G15	G29	G30
I	24.676***	38.731***	40.161***
	(3.397)	(6.453)	(6.785)
1-I	-242.954***	-367.722***	-385.401***
	(-8.249)	(-9.798)	(-9.900)
lnC(1-I)	65.738***	87.404***	90.402***
	(11.391)	(12.238)	(12.250)
N	74	74	74
F-statistics	129.761	149.775	150.060
R-squared	0.643	0.675	0.676
estimated IPL (Z*) in $ a day	0.81	1.27	1.32
95% confidence interval	[0.38,1.24]	[0.90,1.65]	[0.94,1.71]

Lastly, we consider the constrained threshold model following procedures by Hansen (2000), arguably the econometrically best way to approach the issue when the motivational assumption of two continuously connected linear lines is correct.[22] The results are shown in Table 4.5. The endogenously determined threshold is found to be at a level of lnC of 4.96, or a monthly per capita expenditure of $142.6. Left of the threshold there are 39 observations (now including also India and China), and the estimated international poverty line stands at $1.45. Asymptotic confidence intervals for the threshold translate into a global poverty line between $1.06 and $1.75 a day at

[22] Continuity and consistency problems cannot arise here as they are parts of the constraints for the estimation.

95% confidence level. [23] Thus the possibly best approach to generating an international poverty line generates the largest reference group of 39 countries and a line that is substantially above the one found by Ravallion, Chen, and Sagraula (2010).[24]

Table 4.5 Estimation of Threshold Model using Hansen (2000) Method

Indep. Variables	Dep. Variable = Z	
	complete observations	without outliers
I	44.353***	44.353***
	(15.247)	(15.247)
1-I	-497.883***	-559.469***
	(5.165)	(6.722)
lnC(1-I)	109.384***	118.733***
	(16.209)	(17.982)
N	74	72
F-statistics	262.743	323.364
R-squared	0.783	0.820
estimated IPL (Z*) in $ a day	1.45	1.45
95% confidence interval	[1.06,1.75]	[1.23,1.91]

4.5 Some Robustness Checks

Our results so far indicate that all methods we proposed using to estimate the relationship between log per capita expenditures and the national poverty lines (expressed in 2005PPP$) generate a higher poverty line. Arguably the best approach generates a poverty line of $1.45. We now do a range of robustness checks to assess the sensitivity of our findings.

[23] These confidence intervals have to be treated with upmost caution. Following RCS we base our strategy on Hansen (2000). However, the theory developed in Hansen (2000) is based on assumptions which do not hold for the constrained threshold model which we estimate here. Clearly, with respect to one of his assumptions, he notes that while it "might appear innocuous, it excludes the interesting special case of a continuous threshold model"; namely, it excludes our model. While this does not have consequences for estimation, our confidence intervals (computed as outlined in section 4.1 of Hansen, 2000, using kernel regression to estimate η^2 for the heteroscedasticity adjustment; and augmented to account for the variability of the poverty line implied) are based on an inappropriate asymptotic distribution. Furthermore, the value of asymptotic confidence intervals based on just 74 observations is questionable.

[24] One should note again that the threshold model estimation is sensitive to the functional form assumption on the right of the threshold. Choosing, for example, a quadratic function to the right of the threshold would deliver a somewhat lower poverty line. We follow RCS (2009) here as they assumed a linear function.

When estimating the entire relationship directly (model 3), two issues might arise in a robustness check. The first is the sensitivity to outliers. As can be seen in figures 1 and 2, Mauritius and Paraguay are outliers in the sense that they have unusually high poverty lines, given their per capita expenditure levels. We therefore exclude these two countries in the constrained threshold model estimation. As shown in Table 5, the results do not greatly change. A second issue that might arise is that the fit of the entire curve as well as the identification of the threshold might be driven by observations that should arguably not drive the results. In particular, one might worry that the threshold and the associated international poverty line is heavily driven by country observations with high levels of per capita consumption and high poverty lines; those countries should arguably not have a large influence on the results. In a further robustness check, we progressively remove the observations with the highest levels of per capita expenditures. As shown in Figure 5, removing up to 15 observations does not generally change the identified threshold by much, in most cases is stays very close to \$1.45 a day.[25] This check to some extent also serves to investigate the robustness of the threshold parameter with respect to the linearity assumption on the regression line on the right hand side of the threshold.

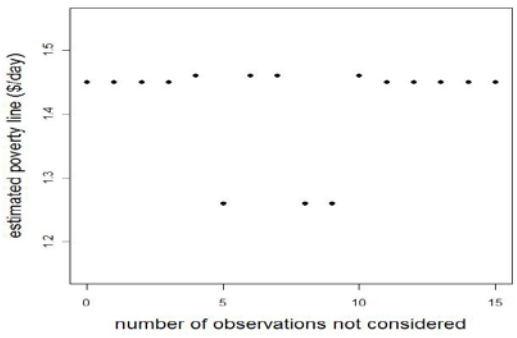

Figure 4.4 Estimates for Reduced Sets of Observations

[25] We explain the large effect of excluding 5,8, or 9 observations with the fact that the threshold least squares estimator does not produce reliable results in certain settings, particularly in small samples. This view is encouraged when comparing least squares estimates with those obtained using a modified threshold estimator, which has proven to possess superior properties. The latter turn out to be more stable (see Greb, Krivobokova, Munk and von Cramon, 2011).

4.6 Conclusion

In this paper we revisit the derivation of the new international poverty line proposed by Ravallion, Chen, and Sangraula (2009). First, we emphasize that it is critical to estimate the relationship with respect to the log of per capita consumption as only that relationship actually shows a structural break which is at the heart of the issue of an absolute international poverty line. When doing so, all our estimates generate a significantly larger reference group for the estimation of the international poverty line. Our best estimate for the threshold model stands at $1.45 per day. Of course, this would lead to a higher global poverty count that the new $1.25 poverty line already generated. In fact, in 2005, we would now be looking at 1.74 billion absolutely poor in the world if we adopted that procedure for finding the new international poverty line.

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