EQUALITY OF PAYS AND WAGE BEHAVIOURS: MICRO AND MACRO PERSPECTIVES OF INDONESIAN LABOUR MARKET

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ZUSAMMENFASSUNG

Diese Dissertation analysiert die Mängel des Arbeitsmarktes sowohl aus mikroökonomischer als auch aus makroökonomischer Sicht und bezieht empirische Untersuchungen zur Gleichheit von Entgelt und Lohnverhalten unter Zugrundelegung der indonesischen Arbeitsmarkterfahrungen ein. Im ersten Aufsatz wird ein alternatives Ernährungsmodell in der familiären Arbeitsteilung vorgestellt, um das Ausmaß des geschlechtsspezifischen Lohngefälles, der Lohnungleichheit und der Heiratslohnstrafe zu untersuchen. Ausgehend von der Sicht der traditionellen Arbeiterfamilie zeigt die Studie, dass Frauen tendenziell gleichzeitig als Ernährerin und Betreuerin eine Doppelrolle einnehmen. Während Frauen diese Rollen einnehmen, verdienen sie weniger. Trotz der Tatsache, dass die weibliche Heiratslohnstrafe ausgestorben ist, bestehen das geschlechtsspezifische Lohngefälle und die Lohndiskriminierung fort. Während die Rolle des regionalen Mindestlohns als derzeitiges institutionelles Instrument noch trivial ist, müssen andere alternative Strategien und Maßnahmen zur Förderung der Gleichstellung der Geschlechter bei der Entlohnung ergriffen werden.

Der zweite Aufsatz untersucht eine andere Dimension der Lohngleichheit. Das Alterslohngefälle wird als die neue Form des weltweiten Einkommens geteilt angeführt. Das in dieser Studie vorgestellte generationenübergreifende Lohngefälle untersucht das Ausmaß des Lohngefälles zwischen Boomers, Gen-Xers und Millennials. Intergenerationale Lohnunterschied wurden auch ausgeübt, um den potenziellen generierenden Faktor der Lohnprämie zu berücksichtigen. Diese Studie ergab, dass die Jahrtausende mit dem größten Lohngefälle zu kämpfen haben, während die Boomers höchstwahrscheinlich aufgrund von Lohndiskriminierung unverhältnismäßig bezahlt wurden. Hochschulabschluss, Spezialisierung, städtischer Arbeitsplatz und Pendeln führten zu einer gewissen Lohnprämie. Die Entwicklung der beruflichen Bildung, des Unternehmertums und der Kreativwirtschaft wird einen positiven Beitrag zur Förderung des gleichen Entgelts insbesondere für jüngere Arbeitnehmer leisten, während die Verbesserung des Rentensystems und des Zugangs zu Altersversorgungsplänen älteren Arbeitnehmern helfen könnte, ihre Verhandlungsmacht zu verbessern.

Schließlich wird im dritten Aufsatz das Ausmaß der Lohninflexibilität unter Berücksichtigung von Heterogenität und Abhängigkeit zwischen den Arbeitsmärkten der Provinzen, Regimen und heterogenen Strukturbrüchen untersucht. Die Ergebnisse zeigen, dass vorübergehende Auswirkungen der Arbeitslosenquote auf den Lohn, die kurzfristige Heterogenität des Lohnverhaltens, die interregionale Abhängigkeit von der Lohnflexibilität und das unterschiedliche Verhalten der Löhne in Gegenwart von Regimen und Strukturbrüchen bestehen. Diese Ergebnisse stimmen mit der Phillips-Kurve überein, was darauf hindeutet, dass sich die Arbeitslosenquote vorübergehend auf die Änderung der Löhne auswirkt. Es gibt zwar einige Anpassungen im Hinblick auf das langfristige Lohngleichgewicht, die Rolle des Arbeitsmarktangebots könnte jedoch komplizierter sein als erwartet. Die Gesamtergebnisse dieser indonesischen Erfahrungen dürften zur Entwicklung eines effizienten und flexiblen Arbeitsmarktes beitragen. Insgesamt sind alle Abhandlungen sowohl für Indonesien als Entwicklungsland als auch für die weltweiten Diskussionen über die Gleiche Bezahlung und Lohnverhalten.

SUMMARY

This dissertation analyses labour market imperfections from both microeconomic and macroeconomic perspectives, and incorporates empirical examinations of equality of pays and wage behaviours drawing on the Indonesian labour market experiences. In the first essay, an alternative breadwinner model in family division of labour is introduced to scrutinize the extent of gender wage gap, inequality of pay and marriage wage penalty. Departing from the view of the traditional family of labour, the study shows that women tend to take on double roles, simultaneously as breadwinner and caregiver. As women take on these roles, they earned a lower rate of wage. Despite the fact that the female marriage wage penalty died out, the gender wage gap and wage discrimination have persisted. While the role of regional minimum wage as the current institutional instrument is still trivial, other alternative policies and actions need to be exercised to promote gender equality of pay.

The second essay examines another dimension of equality of pay. The age wage gap is argued as the new form of the income divided around the world. The intergenerational wage gap introduced in this study examines the extent of the wage gap between boomers, gen-Xers and millennials. Intersectional intergenerational wage gaps also exercised to take into account potential generating factor of wages premium. This study found that millennials struggle the most in term of the wage gap, while boomers were most likely disproportionately paid due to wage discrimination. Higher education attainment, specialization, travelling to work and urban residential were found to generate a certain degree of wage premium. Developing vocational education, entrepreneurship and creative industries will have a positive contribution in promoting equal pay especially for younger workers, while improving the pension system and access to retirement plans might help older workers to improve their bargaining power.

Finally, the third essay examine the extent of wage inflexibility by considering heterogeneity and dependency across provincial labour markets, regimes and heterogeneous structural breaks. The findings indicate the existence of temporary effects of the unemployment rate on wage, heterogeneity of wage behaviour in the short run, interregional dependence in wage flexibility and differential behaviour of wages in the presence of regimes and structural breaks. These findings are in line with the Phillips curve, suggesting a temporary effect of unemployment rate to the change of wages. Some adjustments toward the long run equilibrium of wages do take place although the role of labour market supply might be more complicated than expected. The overall findings of these Indonesia's experiences are expected to contribute toward the development of an efficient and flexible labour market. Collectively, all essays are substantially relevant to Indonesia as a developing country, and to global discussions of equality of pays and wage behaviours.

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LIST OF ABBREVIATIONS

ACS	American Community Survey
ADBI	Asian Development Bank Institute
AEC	ASEAN Economic Community
ARDL	Autoregressive Distributed Lag
CCE	Common Correlated Effect
CSD	Cross-Section Dependence
DCCE	Dynamic Common Correlated Effect
DFE	Dynamic Fixed Effect
DLN	Decent Living Needs
ECM	Error Correction Model
ICESCR	International Covenant on Economic, Social and Cultural
IFLS	Indonesian Family Life Survey
IMF	International Monetary Fund
MG	Mean Group Estimation
MPN	Minimum Physical Needs
MSN	Minimum Subsistence Needs
NFLS	National Labour Force Survey
OECD	Organisation for Economic Co-operation and Development
PMG	Pooled Mean Group estimation
SAKERNAS	Survei Angkatan Kerja Nasional
SDGs	Sustainable Development Goals
TUC	Trade Union Congress

CHAPTER 1

WAGE AND DEVELOPMENT OF INDONESIA LABOUR MARKET: AN INTRODUCTION AND SYNOPSIS

1.1. WAGE AND IMPERFECT LABOUR MARKET

Wage is an essential outcome of labour markets. There are two major features regarding wages in the real world that are imperfectly competitive. **The first feature** is the presence of wage differential, which are based on the assumptions of non-homogenous and imperfect mobility of labour. Wage differences between workers lead to a wage gap, which represents the extent of inequality of pay. From a microeconomic perspective, wage differences between workers occurred due to productivity and non-productivity relevant factors. Productivity-relevant factors are attributable to human capital investment, institutional instrument, employment characteristic and occupational choice. After considering differences in those factors, any remaining difference in wage for equal factors is attributable to non-productivity-relevant factors including segregation and discrimination.

Equality of pay is firstly documented back in 1919 Treaty of Versailles, while the implementation instrument introduced later in 1951 as the International Labour Right Convention proclaimed the Equal Remuneration Convention[1]. The convention is one of eight fundamental conventions of the International Labour Organization (ILO) fundamental principles and rights at work. It recognized the principle of equal pay for work of equal value, or pay equity. The second principle, equal pay for equal work, was introduced later in 1957 as part of the Treaty Establishing the European Economic Community, also known as Treaty of Rome. Equal pay for equal work, also referred as pay equality, is the principle of equal remuneration without discrimination based on sex for individuals doing the same work[2].

[1] The Equal Remuneration Convention, 1951 (No. 100) stated that "Each Member shall, by means appropriate to the methods in operation for determining rates of remuneration, promote and, in so far as is consistent with such methods, ensure the application to all workers of the principle of equal remuneration for men and women workers for work of equal value".

[2] Article 119 of stated that each member state shall in the course of the first stage ensure and subsequently maintain the application of the principle of equal remuneration for equal work as between men and women workers, known as equal pay for equal work or pay equality.

The International Covenant on Economic, Social and Cultural Rights (ICESCR) in 1966 subsequently elevates equal pay beyond human rights and labour rights. Two additional principles were introduced, fair wage and decent living[3]. The principle of fair wage emphasized that remuneration depend not only on the work output but also on responsibilities, skill level and education required to perform the work. The report also added that remuneration depends on whether the work affects the health and safety of worker, specific hardships related to the work and the impact on the worker's personal circumstances. The principle of decent living emphasized that remuneration should also consider external factors such as the cost of living and other prevailing economic and social conditions. ICESCR also expressed the importance of an objective evaluation instrument for equal pay achievement. As both pay equity and pay equality are based on the value of the work, evaluation factors should include responsibilities, skills, and effort required by the worker, as well as employment characteristic. Alternatively, the evaluation could also be based on a comparison of rates of remuneration across organizations, enterprises, and professions. Finally, yet importantly, ICESCR also set equal pay criteria beyond gender, incorporating other differentiating factors of equality[4].

The second feature in imperfect competitive labour markets is the presence of wage inflexibility. From a macroeconomic perspective, wage inflexibility is based on the assumption that wage does not fully and immediately respond to supply-demand dynamic of the labour market, institutional labour market arrangement and economic aggregates. Accordingly, an intertemporal wage inflexibility potentially occurred in the short run and required certain periods to adjust to its long run equilibrium. In this regard, the sticky wages phenomenon explain the slow response of wages to the change of economic aggregate, differentiated as nominal wage rigidity and real wage rigidity. Nominal wage rigidity is attributable to menu cost in the wage-setting process as firms consider economic aggregates prior to wage change, while real wage rigidity is attributable to implicit contracting or as a by-product of efficiency-wage setting (Fallick, Lettau, and Wascher 2016). Both nominal and real wage rigidity are commonly related to the speed of wages change in reaction to economic aggregates shocks (Knell, 2013). There are three aggregates of economic

[3] Article 7 of ICESCR recognized equal pay as a human right and labour right that embodied in the right of everyone to the enjoyment of just and favorable conditions of work. The article also underline the minimum criteria for remuneration, which are fair wages, described as equal remuneration for work of equal value , with equal pay for equal work and a decent living for workers and their families.

[4] Article 2 of ICESCR stated that equality applies to all workers without discrimination of any kind as to race, color, sex, language, religion, political or other opinion, national or social origin, property, birth or other status including age and any other situation with the aim of impairing the equal enjoyment or exercise of economic, social and cultural rights[4]. "Age" considered as factor of discrimination at which described later General Comment No.18 on Article 6 of ICESCR.

shocks largely introduced in estimating wage rigidity, i.e. inflation, unemployment, and labour productivity.

Wage inflexibility is also attributable to interregional dependency. Although imperfect labour markets assume imperfect mobility of labour, labour market and aggregate economic development of neighbouring regions will also affect wage inflexibility at least in the short run. Cross-sectional dependence may rise from common shocks with heterogeneous impact across cross section units or local spillover effects between cross section units (Eberhardt, 2011). Additionally, wage inflexibility is also attributable to homogenous and heterogeneous structural breaks. Okui and Wang (2018) acknowledged the importance of structural breaks such as financial crises, technological progress, and economic transitions. Structural breaks might also mark an establishment of a new regime, whether based on permanent change of particular economic aggregates or substantial change in policy stance. Consequently, structural breaks will affect wage behaviour in responding to economics aggregates and adjust to its equilibrium.

1.2. INDONESIA ECONOMIC DEVELOPMENT: AN OVERVIEW

The Indonesian labour market provides an interesting case for an analysis of the imperfection of labour markets for reasons related to wage differentials and wage inflexibility. Firstly, in late 2015, Indonesia and other member countries began implementing the single market of ASEAN Economic Community (AEC). A core element of the AEC with respect to labour market was the implementation of the skilled-labour free movement regime between member countries regions including Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, Singapore, Thailand and Viet Nam. Consequently, Indonesia faces increased competition from a more integrated labour market. A more efficient labour market is essential for coping with these new challenges. An efficient labour market minimizes wage differentials, particularly from non-productivity relevant factors. Second, Indonesia is committed in mainstreaming the national development to Sustainable Development Goals 2030 (SDGs 2030). Goal Eight of the SDGs is promoting decent work and economic growth, of which one sub- target is to achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value. This goal explicitly and implicitly emphasizes the importance of narrowing gender, intergenerational and disability wage gaps.

Third, from a macroeconomic perspective, there were upturns and downturns in the Indonesian economy, which affects the business cycle and eventually, labour market condition. Hill (2011) recognized several economic down turns in Indonesian history. In the last two decades, he identified at least two turbulent economic periods. One is a long-standing economic crisis affected by a financial crisis in 1997-1998, and the other is financial turbulence stemming from the global economic recession in 2008-2009. These crises differed significantly in term of origins, severity,

impacts, and recovery trajectories. However, the impacts were extensive and might have shifted the equilibrium of the Indonesian labour market.

As part of the effort to recover, Indonesia took several fundamental policies. Government reform is one, from previously centralized governance to decentralized one. This reform was initiated by the legislation of the Regional Autonomy Act number 22 and The Fiscal Decentralization Atc number 25, both in1999. In the decentralization era, local governments are essentially had more intensive and extensive responsibilities. To established those responsibilities, each regional governments supported by additional sources of fiscal revenue based on the fiscal decentralization act. Simultaneously, the Bank Indonesia Act number 23 also legislated in the same year as an institutional guidance to reform the Indonesia's central bank, the Bank Indonesia. The act initiated the establishment of a new regime of monetary policy. The new regime came with two important transformations in the history of the Indonesian monetary sector including institutional independency and single monetary targeting.

The Indonesian labour market transformation was later initiated by the legislation of Indonesian Labour Act number 13 in 2003. The act comprehensively legislates employment training, labour placement, jobs creation, industrial relationship, labour protections, and labour inspections. It also legislates all wage relevant issues including rate of wage rates, methods of payment, structure and scale of proportional wage setting and minimum wage. According to the act, the amount of remuneration for workers in performing their job is determined by either a contract, bargaining process, or government regulations. Sugema and Solikin (2004) implicitly emphasized that firms most likely applied multiple wage setting schemes to their workers, including minimum wage, contracts, individual bargaining, efficiency wage, and union bargaining. The study found that more than 80 percent of the firms surveyed utilized minimum wage as a reference in wage setting.

Minimum wage legislations in Indonesia is established in consideration of several components, including the cost of living standard (CLS), prices, labour market development, current regional wage, firms' conditions, and macroeconomic developments. Table 1.1 presents the components of minimum wage legislations and their transformations between three distinctive eras. The establishment of Minimum Physical Needs (MPN) by tripartite consensus and nutrition experts represent the early development of minimum wage in Indonesia. Based on the MPN, minimum wage was introduced subsequently to the establishment of the National Wage Research Council of Indonesia in accordance to The Presidential Decree No.58 in 1969. The MPN established as a cost of living standard reference for minimum wage legislation until 1995.

Minimum Subsistence Needs (MSN) introduced later to substitute MPN in accordance to the Regulation of Ministry of Man Power and Transmigration No.81 of 1995. Four years later, multiple policy changes regarding minimum wage legislation were introduced within the MSN scheme.

There were four major transformations, including legislation for a minimum wage mechanism, the degree of labour union participation in the role of sub-national governments and reference components for determining the minimum wages. The minimum wage legislation before 1999 was very simple and efficient (Tjandraningsih, 2016). There was neither a redress mechanism nor labour union involvement in determining the minimum wage. The central government legislated a provincial minimum wage through the ministry of labour and the national wage council based on a proposal by the sub-provincial government and wage council.

Since 1999, multiple minimum wages legislated in provincial and sub-provincial levels, i.e. the regional minimum wages. A wage council established in each sub provincial region to oversee the legislation proposal to each corresponding provincial governments. There are also wage council in provincial level, who have the equal responsibility and structure of government bodies, representative associations for firms and labour unions with the assistance of university experts. Afterward, provincial governments legislate each provincial minimum wages and corresponding sub provincial minimum wages. In those legislations, provincial governments not only ensure that provincial minimum wages are not higher than the corresponding sub provincial minimum wages but also that the rate satisfies the needs of the workers without deterring the productivity of the firms. The third major development was the Regulation of Ministry of Man Power and Transmigration No.17 year 2005 regarding the reference transformation of minimum wage determination. Accordingly, Decent Living Needs (DLN) was introduced as substitute to MSN.

Table 1. 1 The Transformation of Minimum Wage Legislation in Indonesia

No.	Policy Items	1969-1994	1995-2005	2006-Present
1	*Minimum wage definition*	Monthly basic salary including fixed allowances, with the provision of basic salary as low as 75% of minimum wage.	monthly basic salary including fixed allowances	monthly basic salary including fixed allowances
2	*Cost of living standard*	Minimum Physical Needs (MPN)	Minimum Subsistence Needs (MSN)	Decent Living Needs (DLN)
3	*Cost components*	48 foods and non-foods items	43 foods and non-foods items	60 foods and non-foods items
4	*Prices*	consumer price index	consumer price index	consumer price index
5	*labour market*	job opportunity	Labour market condition	job employment/job seekers
6	*Previous regional wage*	Yes	Yes	Yes
7	*Firms conditions*	Growth, Sustainability	Ability, Growth, Sustainability	Marginal Firms capability
8	*National and regional economics*	Growth	Growth, per cap Income	Growth, RGDP/Employment
9	*Remuneration review*	1 in 2 years	Annual	Annual

Source: Tjandra, (2016), reproduced.

1.3. INDONESIAN NATIONAL LABOUR FORCE SURVEY

Our main data source is the Indonesian National Labour Force Survey (NLFS), shortened as SAKERNAS in Bahasa. We use data from the 2015 NFLS for the first and the second papers and extend back to the beginning of the survey in 1986 for the third paper. The survey covers nationwide labour force related database of working age individuals in sampled households. The complete questionnaire structure is enclosed in the appendix. Survey frequency is differed during 1986-2015 so that SAKERNAS data set collected in different rounds in those periods (Table 1.2). Until recently, the survey was conducted quarterly in February, May, August and November. This study uses data collected in August (except for 2005, for which the survey was only conducted in November) for following reasons. First, it provided the largest size of samples each year relatively to other rounds. Second, any cyclical or seasonal intertemporal bias can be minimized. By using the same round each year, a reasonable number of observations can be maintained for aggregation not only at the national level but also at the regional level.

Table 1. 2 Indonesian National Labour Force Survey Profile

Periods	Survey	Frequency	Sector	Households	Publication
1986-1989	regular	quarterly	5 sectors	65,440	1986, 1989
1990-1993	regular	quarterly	all sectors	82,080	
1994-1997	regular	annually	all sectors	65,664	
1998-2001	regular	annually	all sectors	32,384 - 57,456	
2002-2004	regular	annually and quarterly	all sectors	67,072 -69,408	every year
2005-2010	regular	biannually	all sectors	69,892 (1st) 300,000 (2nd)	
2011-2015	regular	quarterly	all sectors	50,000 (1st,2nd,4th) 200,000 (3rd)	

Source: http://sirusa.bps.go.id/, reproduced.

1.4. EMPIRICAL EVIDENCES AND POLICY IMPLICATIONS

A perfect competitive is an ideal setting of a labour market, where wage rates are determined the equilibrium of the market. It characterized by homogenous wage rates (i.e. for equal work) and fully responsive wage changes (e.g. to economic aggregates change). However, in many cases, labour markets are imperfectly competitive. This is because either workers or firms have certain level of power to influent wage determination above or below market-clearing rate. Thus, examines the extent of imperfectness of a labour market is important to identify and formulate necessary actions and policies toward more competitive labour market. Therefore, this dissertation incorporates empirical examinations of wage differential and wage inflexibility in macroeconomics and microeconomics perspectives, learning from Indonesian labour market experiences as a developing country. Accordingly, three essays are presented in this dissertation.

Essay 1. **Double Roles of Married Working Women in Indonesia: For Better or Worse?**

Presented in Chapter 2, the first essay examines the extent of the inequality of pay, the gender wage gap, and the marriage wage penalty in association with the family division of labour. An alternative breadwinner model developed in this study, featuring single and double roles of women and men. Single role represent being breadwinner in the family, while double roles represent being breadwinner and caregiver in the family simultaneously. To examine the objectives, SAKERNAS 2015 data are analysed, consisting more than 160,000 workers aggregately. The Regression Compatible approach of Oaxaca-Blinder decomposition is established in two-step estimation procedures. The first step estimates wage differential of women, men and pooled of both groups with the addition of a group membership dummy variable as explanatory variable in the last estimation. While the second step estimates predicted mean wage of each group and decomposes predicted mean wage differences.

Twofold wage decomposition established in the second step, where wage differences broken down into the explained and unexplained components. Explained component decompose differences in wages in the presence of differences in contributing factors and variables. While the unexplained component decompose differences in wages in the absence of differences in contributing factors and variables. Thus, the unexplained component decompose differences in wages due to group membership and unobservable factors and variables, and might leading to the indication of wage discrimination. The findings confirm the existence of the gender inequality of pay even after taking into account differences in individual characteristic, human capital investment, employment characteristic, institutional instrument and occupational choices. Regarding the family division of labour, the findings suggest that married women, compare to men, tend to take on double roles, as both family breadwinner and family caregiver. Our further analysis suggest, that taking on double roles might hinder the opportunity to move out from the secondary labour market, as double roles women earned a lower rate of wage. Although marriage wage penalty died out, the gender wage gap and the wage discrimination persist.

While the role of regional minimum wage as the current institutional labour market instrument is still trivial, alternative policy options need to be exercised to promote gender equality of pay and a more efficient labour market. The policy options are empirically abundance, ranging from less obligatory indirect actions to more obligatory straightforward policies. The former includes sharing information and awareness, capacity building and empowering collective action, while the latter including improved monitoring, implementing incentives for compliance and targeted labour inspection. Given the gravity of achieving equal pay, extending future research to include intertemporal and interregional analysis of gender equality of pay will be essential. Further studies considering other factors related to family division of labour are also recommended.

Essay 2. Boomers, Gen-Xers and Millennials in Indonesia: The Struggle for Intergenerational Equality of Pay

The second essay presented in Chapter 3, examines another dimension of inequality of pay, considering age as the new dimension of the income divide, in addition to gender. The intergenerational wage gap developed in this study focuses on three generations of currently active groups in Indonesian labour market: boomers, gen-Xers and millennials. The intergenerational wage gap defined into two measurements, the youth wage gap and the elderly wage gap. The youth wage gap is measured as wage differences between millennials and gen-Xers, while the elderly wage gap measured wage differences between boomers and gen-Xers. A twofold 'regression compatible Oaxaca-Blinder' decomposition method is applied to scrutinize the extent of the intergenerational wage gap, based on more than 160,000 workers surveyed in SAKERNAS 2015. In addition to aggregate intergenerational wage gaps, intersectional intergenerational wage gaps also analysed to account for the potential wage premium generator within gender, education, specialization, location, and traveling to work.

The findings suggest the existence of intergenerational wage gap even after accounting for productivity and non-productivity relevant factors including personal characteristic, human capital investment, employment characteristic, institutional instrument and occupational choices. The size and direction of those contributing factors and variables in the youth wage gap and elderly wage gap are diverged. First, the youth wage gap consistently higher than the elderly wage gaps, indicate that millennials struggle the most in term of the inequality of pay. Differences in human capital investment, particularly tenure, constitutes the lion's share of the youth wage gap. Second, in some cases, the elderly wage gaps are actually favours older workers. However, overall results indicate that boomers were disproportionately paid due to discrimination. Third, the findings also revealed the wage premium for higher education, specialization, residential place informal jobs and commuting.

Improving human capital investment remains a key factor in promoting intergenerational equality of pay. For the younger generation, government and education institutions play an important role for developing vocational education, entrepreneurship and creative industries. A targeted minimum wage, i.e. toward young workers, could also be a policy option. Although this policy must be carefully shaped due to potential trade-off between wage and unemployment of young workers. Simultaneously, improvement of the pension system and access to a retirement plan could help improve bargaining power for older workers. Future research, may want to take into account intertemporal and interregional aspects that contribute to the intergenerational equality of pay.

Essay 3. **Intertemporal and Interregional Wage Behaviour in Indonesia: A reconciliation of Phillips Curve and Wage Curve?**

Finally, the third essay is presented in Chapter 4. This study is motivated by the fact that wages do not necessarily respond to the same magnitude and speed of other economic aggregates. There is a long-standing debate in term of wage and unemployment relationships as to whether it is a change of wage or level of wage that should be associated with unemployment rates. The former refers to the Phillips curve and the latter to the wage curve. In regards to the theoretical foundations of wage behaviour, this study aims to analyse the extent of nominal and real wage behaviour in three interrelated issues, the nature of wage and unemployment relation, the heterogeneity and dependency across provincial labour markets, and the present of homogenous and heterogeneous structural breaks.

Longitudinal data of SAKERNAS, range from 1986 to 2015 for 26 provincial levels is used in this study. Applying pooled mean group common correlated effects estimators with homogenous and heterogeneous structural breaks, the findings showed that there are temporary effects of unemployment on wages, heterogeneity of wage behaviour in the short run, interregional dependence in wage flexibility and differential behaviour of wage in the presence of regimes and structural breaks. The findings are consistent with the Phillips curve, suggesting temporary effect of unemployment to change of wages. Some adjustments toward long run equilibrium of wages do take place although the role of labour market supply might be more complicated than expected.

A future study, might consider an analysis at the sub-provincial level with longer periods of data, which may potentially offer more robust analyses. From a policy point of view, the development of a more competitive labour market is necessary to amplify the wage responses to labour market equilibrium. Additionally, bridging education and labour market demand is necessary in order to ease labour supply uncertainty and occupational mismatch. Only then, change in wages can be more responsive to change in unemployment rate or other economic aggregates, and the incentives to keep the wages above market-clearing rate could be diminish. It is also essential to consider labour market and economic aggregates of neighbouring provinces in the wage determination. Simultaneously, maintaining a stable level of inflation will be more appropriate to ease the stickiness of real wages. Finally, institutional developments including minimum wage legislation are crucial towards a more competitive labour market.

CHAPTER 2

DOUBLE ROLES OF MARRIED WORKING WOMEN IN INDONESIA: FOR BETTER OR WORSE?

"*The identity of an individual is essentially a function of her choice, rather than the discovery of an immutable attribute*"

~ Amartya Kumar Sen~

Abstract

Marital status is argued to have a significant contribution on the gender inequality of pay and the root of the female wage penalty. The argument stem from traditional interpretation of the family division of labour, where men are breadwinners and women are caregivers. We examine this argument in Indonesia with the introduction of an alternative breadwinner model. Utilizing the Indonesian National Labour Force Survey of 2015, with a sample size of more than 160,000 workers, our 'twofold regression compatible Oaxaca-Blinder' decomposition analysis confirmed the existence of a statistically significant gender wage gap even when controlling human capital investment, family division of labour, institutional instrument and discrimination. Our findings suggest that married women tend to take on double roles, as both breadwinner and caregiver for the family. In this double roles, women's wage rate are the highest among other working women, and marriage wage penalty dies out. Unfortunately, the gender wage gap and wage discrimination has persisted. While the role of minimum wage, as the current institutional instrument labour market instrument is still trivial, other factors must also be addressed to achieve equality of pay and a more efficient labour market.

JEL Classification: J24, J31, J46, J71

Keywords: wage decomposition, gender wage gap, family breadwinner, marriage wage premium, minimum wage.

2.1. INTRODUCTION

Equal pay is a labour right that recognizes the equality of wage structure among individuals in the labour market. The right is based on pay equity and pay equality principles. Pay equity was first introduced in 1919 at the Peace Treaty of Versailles, while pay equality was introduced latter in 1951 at the 100th International Labour Organization (ILO) Convention, known as the Equal Remuneration Convention. In 1966, equal pay became part of human rights and labour rights when it became globally recognized at the International Covenant on Economic, Social and Cultural Rights (ICESCR). Article 2 of ICESCR states that equality applies to all workers without discrimination of any kind such as race, colour, sex, language, religion, politics, national or social origin, property, birth, or other status including age and any other situation that aims to impair the equal enjoyment or exercise of economic, social, and cultural rights.

The gender inequality of pay, measured commonly by the gender wage gap, receives the most attention regarding equal pay. Despite global trends showing the narrowing of the gender wage gaps in recent years (Blau and Kahn, 2016; Ortiz-Ospina and Roser, 2018), many countries are still dealing with the gap nearly a century after the global recognition of equal pay. The problem persists due to productivity and non-productivity relevant factors. The former is attributable to human capital investment factor, such as education, specialization and training. While the latter is attributable to factors such as undervaluing female dominated jobs (Leuze and Strauß, 2016; Suleman and Figueiredo, 2018), gender-based occupational segregation (Perales, 2013; Fuchs, 2016; Blau and Kahn, 2017), discrimination (Ahmed, 2014; Mihăilă, 2016), and a family breadwinner socio-cultural paradigm (Lim, 2015; Bear and Glick, 2017; Parry and Segalo, 2017). The latter cases lead to further discussion of women and men roles in the family as breadwinners and caregivers.

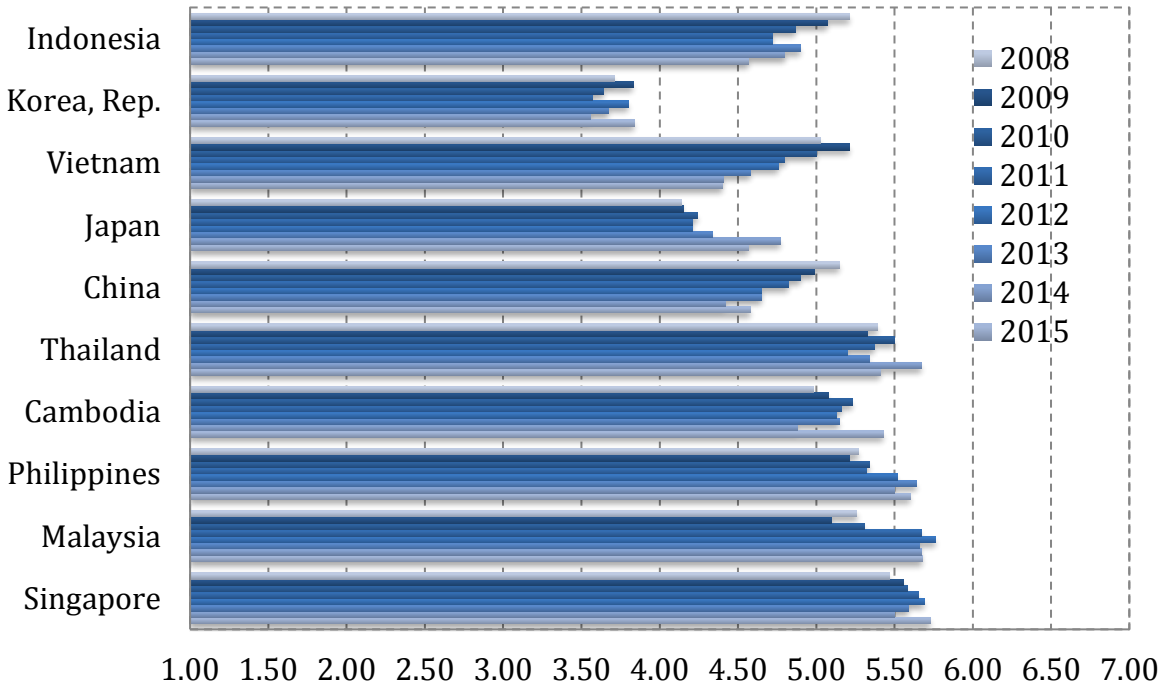
Narrowing the gender wage gap and reducing the marriage wage penalty required effective institutional instruments. The empirical selections of policy instruments is numerous; including development mainstreams, legal provisions, institutional arrangements, wage determination, requirement and audit, to collective agreement[5]. The effectiveness of the selected policy might be another story. It will also depend on the development of the labour market and current socioeconomic condition within each nation. Narrowing the gender wage gap might also require an integrated program aimed at overall stakeholders in the labour market, including workers, employers and related institutions. For a developing country, such an integrated program might be difficult to develop at least in the short run. Enforcing already established policy is an

[5] e.g. see: Foubert (2010); Oelz, Olney and Tomel (2013); Erickson (2015); Kahn (2015); Rubery and Koukiadaki (2016); Huffman, King and Reichelt (2017).

alternative option. Compared to fiscal instruments, which are frequently limited for developing countries, minimum wage could be one alternative. Recent studies on the effectiveness of minimum wage in narrowing the gender wage gap are infinite, with recent works including Bargain, Doorley and Van Kern (2016), David, Manning and Smith (2016), and Majchrowska and Strawiński (2018). Only a few are explicitly studied for the case of Indonesia as in Fitriani (2013), Taniguchi and Tuwo (2014), and Driemeier, Rijkers and Waxman (2015).

Data from The Global Gender Gap Report show that gender inequality of pay in Indonesia is relatively high and has been deteriorating in recent years (Figure 2.1). Thus, narrowing the gender wage gap pose several policies implications. First, Indonesia have been implementing single market of ASEAN Economic Community (AEC), starting at the end of 2015. Consequently, Indonesia faces crucial challenges from ASEAN integrated labour market. Second, Indonesia is also committed to mainstream national development to the Sustainable Development Goals 2030 (SDGs 2030). Goal Eight of the SDGs is promoting decent work and economic growth which targeting full and productive employment and decent work for all women and men in 2030. This goal explicitly and implicitly emphasizes the importance of narrowing the gender wage gap.

Figure 2. 1 Wage Equality for Similar Work for ASEAN+3 Countries, 2008-2015



Note: The ILO survey ask about equality, on the scale of 1-7, where 1 equals not at all, significantly below those of men; 7 equals fully, equal to those of men.

Source: The Global Gender Gap Report, World Economic Forum, 2015, reproduced.

Third, Indonesia has a long history of minimum wage legislation. It developed from a national discretionary policy instrument in the 1980's into compulsory reference for sub-provincial wage

in recent years. These developments resulted from many factors including international pressure in the late 1980's, decentralization of minimum wage legislation in the late 1990's, and strengthening of labour unions role in the tripartite system (Sugiyarto and Endriga, 2008). Presently, minimum wage in Indonesia is legislated in three strands: provincial minimum wages, sub-provincial minimum wages, and sectoral minimum wages. Accordingly, minimum wages could be one option for promoting gender equality of pay.

This study complements the existing literature with the objective of examining: (i) the extent of contributing factors attributable to the gender wage gap, i.e. human capital investment, demographic characteristic, institutional instrument, and occupational choices; (ii) the extent of family division of labour on the gender wage gap and marriage premium and penalty; and (iii) the effectiveness of minimum wage as institutional instrument in narrowing the gender wage gap. Accordingly, a twofold regression compatible Blinder-Oaxaca decomposition method are applied using Indonesian National Labour Force Survey (NFLS) 2015 dataset. The remainder of this paper is structured as follows: Section 2 provides a discussion of the relevant literature; Section 3 explains the data and estimation strategy; Section 4 deals with the presentation and interpretation of the empirical results; and finally, Section 5 concludes.

2.2. LITERATURE REVIEW

2.2.1. Dual Labour Market and Gender Inequality of Pay

Dual labour market theory acknowledges the coexistence of two labour markets, a primary and a secondary market. Doeringer and Piore (1971) argued that the primary labour market is characterized by high wages, good working conditions, stability of employment, chances of carrier advancement, and equity in the administration of work rules. In contrast, Doeringer and Piore (1971) also argued the secondary market is characterized by low wages and fringe benefits, poor working conditions, high labour turnover, little chances of carrier advancement, and arbitrary and capricious supervision. Beer and Barringer (1970) also emphasize that the secondary labour market is characterized by short-term employment relationships, little or no prospect of internal promotion, market forces that determine wages, job impermanence, and low returns to education or experience. As a consequences of low wage and unfavorable working circumstances, workers in the secondary labour market, relative to workers in primary labour market, tend to exhibit greater turnover, higher rates of lateness and absenteeism, greater insubordination, and engage more freely in petty theft (Doeringer and Piore, 1971).

Gender inequality of pay is most extensively studied in the context labour market dualism. Women is considered as disadvantaged workers group who earned lower rates of wage, even for equal work to men. Neoclassical economists argue that profit-maximizing employers evaluate workers in terms of their individual characteristic and predict that labour market differences

among groups will decline over time due to competition (Reich, et al., 1973). However, the persistence of duality continues to instigate labour market differential whether between sectoral, occupational or regional markets or between disadvantaged workers and its corresponding group within. Regarding wage structure, Bulow and Summers (1985) emphasized that although workers in the secondary market envy those in the primary market and are equally productive there is no equilibrating market force that can erode wage differences.

2.2.2. Measurements of Gender Inequality of Pay

Gender inequality of pay within dual labour markets distinguish by the presence of wage differences between female workers and male workers. Equality is an ideal and inequality is the outcome. Hence, improvements in gender equality of pay are measured by the gender wage gap. It is a measurement of earnings disparity between men and women (Gould, Schieder and Geier, 2016), and measured in mean, median, or different statistical point in wage distribution (Metcalf, 2009; ILO, 2015a). Although it is unanimously agreed that the gender wage gap is a measure of female to male wage differences, the magnitudes might be varied due to differences in measurement details. There are two general merits of measurement commonly used, the unadjusted and the adjusted gender wage gap.

The unadjusted gender wage gap, described also as absolute or raw gender wage gap, simply measures wage differences between female and male workers. It can be expressed as a relative value of the female wage to the male wage (Gould, et al., 2016), or alternatively, as how much less the female workers wage is relative to the male workers wage (ILO, 2015b). Careful attention have to be made in comparing the unadjusted gender wage gap between entities. Differences in the selected definition of earnings as well as the statistical inferences, employment coverages and remuneration periods can lead to different magnitudes of the unadjusted gender wage gap. For example, ILO measure it in average earnings while Organisation for Economic Co-operation and Development (OECD) in median earnings. Hence, the unadjusted gender wage gap provides an aggregate measure of inequality of pay between men and women (Beblo, Beninger, Heinze, and Laisney, 2003). Additionally, it has the advantages of being clear and simple, providing what is going on with typical female workers earnings relative to male workers (Gould, et al., 2016). However, the unadjusted gender wage gap is less likely explain the reasons, causes or attributes to the gap itself.

While the adjusted gender wage gap, described also as corrected or net gender wage gap, taking into account differences in productivity and non-productivity-relevant factors contribute to wages differences. It adjusted for differences in employment characteristic and work patterns (Metcalf, 2009). There are selections of adjustment approach to produce the adjusted gender wage gap, ranging from inclusion of sex dummy variable in a linear regression of wage equation,

to panel data with instrumental variables estimation (Weischselbaumer and Ebmer, 2005; Beblo, et al., 2003). Inclusion sex dummy variable considered as the crudest approach, establishes based on underlying assumption that the female and male wages are differ by a fixed amount but human capital investment and other explanatory variables have the same effects (Beblo, et al., 2003). Alternatively, wage decomposition approach is widely used as it considered as a more flexible approach to investigate the earnings differences (Beblo, et al., 2003).

The wage decomposition approach practically is equal to the estimation of wage equation on female and male workers separately, and then broken down the absolute differences in wages into the explained and unexplained components, considering the attribute of employment characteristic (Van Der Velde, Tyrowicz, and Goraus, 2013). Investigating the components separately will be helpful, if the aim in particular is to better target policy measures at reducing the earnings gap (Beninger, 2003). In this regards, the adjusted gender wage gap is able to isolate the role productivity and non-productivity-relevant factors in the wage gap. Any remaining differences in wage once adjustment have been made is sometimes attributed to discrimination (Metcalf, 2009). It is worth noting that, in term of the adjusted gender wage gap, Gould, et al. (2016) argued that adjusted measures might radically understate the indication of discrimination in wage differences. They emphasized that gender discrimination does not occurred only in the pay-setting stage but actually in every stage of a woman's life. Thus controlling for occupation, for example, the adjusted gender wage gap excludes the discrimination that potentially influence occupational choices. Additionally, Metcalf (2009) argued that the remaining wage differences might actually represent other employment characteristic, which have not been adjusted, and statistically describes as the unobservable variables. In this regards, the unadjusted gender wage gap can be seen as the maximum size of wage differences attributable to direct wage discrimination, which is occurred in the pay-setting stage.

2.2.3. Contributing Factors of Gender Wage Gap

The literature on the gender wage gap includes selections of contributing factors and variables to be considered in the estimation model as in World Economic Forum (2015), Anderson, Forth, Metcalf and Kirby (2001) and Driemeier, Rijkers and Waxman (2015). There are also studies on the gender wage gap utilizing meta-analyses approach that provides comparable alternatives of determinants of a wage differential including Weichselbaumer and Ebmer (2005) and Stanley and Jarrell (1998). Human capital theory provides the most prominent groundwork for explaining the earnings differential due to differences in the potential productivity of workers. Becker (1962, 1964), Mincer (1958, 1962, and 1974) and Schulz (1960, 1961) significantly contributed to the early development of the theory. These studies concurrently underlined the contribution of education, experience and training to the earnings differential.

Becker (1962) argued that people decide to complement their innate abilities with acquired abilities. Innate abilities refer to psychical and psychological characteristic at birth whereas acquired abilities refer to knowledge, skills and competences. Acquired abilities are established by investing in education, specialization and training based on its expected returns. Focusing on the earning side of human capital theory, Mincer (1974) formulated a life-cycle earnings model, which estimates earnings based on returns to education. Returns to education are commonly proxied by years of schooling or educational degrees. Education is considered as a pre-labour market factor where differentiation might have started before a worker enters the labour market.

Despite general education, differences in the content of education or subject area might also contribute to earnings differences (Brown and Corcoran, 1997; Paglin and Rufolo, 1990). Accordingly, some people invest in studying specific subject and skill formally in vocational education to gain specialization. Additionally, Becker (1964) considered training as a way to develop certain types of knowledge, and skills, and therefore included training as a human capital factor. Becker (1964) also differentiates general training to specific training based on the nature of the training. General training is defined as a training that not only increases the future marginal productivity of workers in the firm providing it, but also other firms as well. The argument is based on an assumption that perfectly general training would equally useful in all firms and marginal products would rise by the same degree in those firms. In contrast, specific training defined as a training that has no effect on the productivity of trainees that would be useful for other firms. More complex training measures also have been analyzed in terms of differences in the quantity, nature and quality of the training. Unfortunately, data regarding these aspects is limited.

Mincer's life-cycle earnings model, also considers experience as human capital investment. Experience commonly proxies by age to represent potential experience due to limited availability of actual experience in specific individual data level. Beyond the original Mincerian-earning model, several additional human capital investment are also studied, including tenure. Matching theory (Jovanovic, 1979) argues, due to imperfect information, an employer (insider) will not substitute a workers with known characteristics, efficient work and a span of tenure with other potential workers (outsider). Hence, an efficient employer-workers relationship (consider as a match) will continue, while non-efficient ones will end. To maintain this efficient relationship, higher wages will be given to those workers with longer tenure. It is argued that the contribution of age, experience and tenure are non-linear. Within the life cycle of a worker, earnings will increase with age, experience, and tenure up to some point until it arrives at its optimal level. Afterwards, as human capital stock depreciates with declining health or other innate abilities, earnings will decline. A quadratic form as well as a higher polynomial form is utilized to represent

the non-linear relationship and to examine the contribution of age, experience and tenure in determining earnings (e.g.: Mincer,1974; Mincer and Polachek, 1974).

Human capital theory underpins most of the empirical literature on wage differentials, including the gender wage gap. For the case of the public sector in Czech Republic and Slovak Republic, Jurajda (2003) found that a substantial part of the gender wage gap was attributable to differences in educational attainment. Similiarly, Plasman and Sissoko (2004) found that human capital investment variables explained less than 50 percent of gender pay gap across countries. Blau and Kahn (2016) empirically concluded that from 1980-2010, the gender wage gap has greatly decreased as females have exceeded males in educational attainment. Convergence of female and male workers in education and experience played an important role in narrowing the wage gap. Additionally, Ndamsa, Njong, Baye, and Youyem (2015) and Nwaka, Guven-Lisaniler and Tuna (2016) emphasized that the gender wage gap is not necessarily due to differences in human capital investment or the proportion of female workers in the labour market, but also different working patterns, occupational preferences, divisions of labour, and discriminatory behavior.

2.2.4. Marriage Penalty and Family Division of Labour

Selected literatures extent the analysis of gender wage gap to examine the role of marital status, i.e. if there is a marriage premium or penalty on the wage rates of workers (e.g. Nwaka et al., 2016). Marriage premium (penalty) is higher (lower) earnings drive by men and women decision on marriage as compare to decision of staying single. Three hypotheses explain the marriage premium (penalty) (Petersen, Penner and Høgsnes, 2014). Selection hypothesis proposes that carrier-orientational change of men (women) due to selection at marriage, resulting in higher (lower) productivity and eventually higher (lower) wages. Whereas the treatment hypothesis proposes that men (women) undergo behavioural change at the workplace, resulting in higher (lower) productivity and eventually higher (lower) wages. Alternatively, the discrimination hypothesis proposes that employer might decides to pay a higher (lower) wage rates to men (women), for non-productivity-relevant factors, such as societal norms, taste, and statistical discriminations. Based on those hypotheses, the effect of marriage on wage could diverge, resulting in a marriage wage penalty for female workers and marriage wage premium for male workers. Alternatively, being married might elevate the importance of earning more income, leading both men and women to become more productive and pursue a better paying job. Some literature studies this alternative convergence effect of marriage on wage, such as Gorman (2000), Waite and Gallagher (2000), and Lewis (2001).

Becker (1965) and Mincer and Polachek (1974) introduced other earnings differential factors related to marital status. They account for the allocation of time, household roles, working hours,

and mobility within the family division of labour. Family division of labour, or intra-household division of labour in other selected literatures, generally differentiates family members, particularly husbands and wives, by the roles they provided for the family (Shelton and John, 1996). The traditional family division of labour, place men as the main earner and provider of family needs (i.e. family breadwinner) and women as the caretakers of the family (i.e. family caregiver). This setup is commonly refered to as the male-breadwinner model (Eagly, 1987; Gerson, 1987). Although families change over time and more women are entering labour market, regardless of whether they undertake paid employment, the traditional family division of labour persists, where women are still predominantly responsible for domestic and caring duties (Anderson, et al., 2001). Furthermore, Lewis (2001) proposed the adult-worker models to accommodate the shifting of family earning structures where women were less dependent to male-breadwinner[6]. In addition to the male-breadwinner model, where men alone engage in paid work, she also proposed other models to accommodate a shifting trend in family roles, where both husband and wife are engaged in the labour market. Adult-worker models also consider different types of employment, i.e. short part time, long part time and full-time.

2.2.5. Minimum Wage and the Gender Wage Gap

Minimum wage legislation and centralize payment, which have been associated with narrowing wage distribution, may therefore also contribute to the size of the gender wage gap (Anderson et al., 2001). Minimum wage is defined as the lowest amount to be paid for work performed in certain periods and cannot be reduce through collective agreement or an individual contract (ILO, 2014). Although it seems mainly targeted at workers who earned lower wages, a minimum wage has the potential to affect workers who both earned lower and higher wages. Spillover effects indicate a positive effect of minimum wage on lower wages rates (Margolis, 2014), whereas a numeraire effect indicates a positive effect of minimum wage on higher wage rates in the wage distribution (Maloney and Nuñez, 2004). Regarding the gender wage gap, the minimum wage effect may lead to two possible outcomes. First is the compression effect, where minimum wage has a positive effect on the gender wage gap. Minimum wage might not necessarily apply and have a higher impact discretely for wage of female or male workers. However, in many cases, female workers are at the bottom of wage distribution. Thus, an effective minimum wage with a higher impact on female workers wages rates, will contribute a compression effect on the gender wage gap. In contrast, any dispersion of the minimum wage effect that has a negative impact on the gender wage gap is consider as a depression effect. In this case, minimum wage causes a widening of the gender wage gap. The extent of the minimum wage effects on the gender wage gap are

[6] For a background on the early development of the breadwinner model, see: Lewis (1992) and Creighton (1999).

influenced by many factors, including imperfect minimum wage coverage, incomplete compliance by employers, and an inadequate minimum wage (ILO, 2016).

Several studies support the role of minimum wage on narrowing the gender wage gap. For the case of Australia, Austin et al., (2008) found that minimum wage helped narrow the gender wage gap by roughly 1.2 percent for 1995-2005 period. Similarly, for the case of Ukraine, Ganguli and Terrell (2009) found that minimum wage lowered the rate of change of inequality for women more than men. Plasman and Sissoko (2004) also find a significant effect of minimum wage in reducing gender wage gaps in Belgium, Denmark, Ireland, Italy, and Spain. Recent studies, e.g. Bargain et al., (2015), found evidence that the minimum wage in the UK and Ireland could reduce the gender wage gap at the lower end of the wage distribution.

2.2.6. Segregation and Discrimination

The gender wage gap is not entirely driven by productivity-relevant factors, but also by non-productivity-relevant factors, e.g. segregation and discrimination. Overcrowding theory (Bergman, 1974) explains that occupational segregation occurs when certain group of workers cluster in certain occupations based on demographic characteristics across and within those occupations. The across distribution refers to horizontal occupational segregation while the within distribution refers to vertical occupational segregation (Charles, 2003). The glass ceiling effect represents a barrier or restriction in keeping certain demographic groups (e.g. female workers) as they observe noticeably (through the glass ceiling) their equal productive demographic counterpart (e.g. male workers)—from career advancement. Labour market segregation due to worker characteristics could also be explained by compensating differential theory. The term 'compensating' refers to an earnings premium given to a group of workers who are willing to take an undesirable job, due to its unpleasantness, risks, or other undesirable attributes.

Segregation could be both observable and non-observable. Non-observable segregation leads to wage discrimination. Arrow (1973) argued that wage discrimination exists when the observed differences in wages between two groups of workers are not related to productivity. Taste-based discrimination (Becker, 1957) for example, is defined as the acceptability and allocation of certain worker group, over their corresponding workers group, to work in certain type of jobs based on the preferences of co-workers, employers, or customers. Alternatively, statistical discrimination or determinist discrimination (Aigner and Cain, 1977) is based on average perceived characteristics or average attributes of a certain group of workers. Patronage discrimination, in contrast, is known as blue-eyed boy syndrome and discriminates workers purely on their likeability, which is based on observations of the individual rather than group characteristics (Anderson, et al., 2001).

Many studies find that both segregation and discrimination attributable to the gender pay gap. Sissoko (2007) emphasized that the gender pay gap generally occurs due to lower endowment of female workers in productivity characteristics, indicates by occupational segregation and sectoral segregation. While Son (2007) argued that discrimination is a greater contributor to the gender wage gap, compare to inequality and segregation. Similarly, Xiu and Gunderson (2015) argued that a deeper sub-occupational disaggregation is needed to highlight the incidence of occupational segregation. However, they also emphasized that wage discrimination remains the main contributor in the gender pay gap.

2.3. DATA AND EMPIRICAL STRATEGY

2.3.1. Dataset

Our analysis is based on the Indonesian National Labour Force Survey (NLFS), also known as SAKERNAS. The survey collects working age individual data of sampled household, including individual characteristic, earnings, activities related to employment status, information on primary and secondary jobs, and other information such as working hours and tenure. We use the second round of the 2015 wave with more than 160,000 working individuals, including self-employed individuals. The advantage of using SAKERNAS compared with other datasets, such as the Indonesian Family Life Survey (IFLS), is that it covers all regions in Indonesia; consisting of 34 provinces and 511 sub-provinces. Our sample is intentionally composed of individuals who are working and between the ages of 15 to 64 years old to ensure that children and the elderly are not included. Although many people continue to work beyond the age of 64, we use this age cut off accordingly as it is the official retirement age for public worker in Indonesia.

2.3.2. Empirical Strategy

Our estimation model is based on a Mincerian earnings function with additional contributing factors, considering theoretical and empirical literatures. We estimate the following specification:

$$\ln w_{i(F,M)} = a_0 + a_{1j}L^j_{i(F,M)} + a_{2j}H^j_{i(F,M)} + a_{3j}C^j_{i(F,M)} + a_{3j}O^j_{i(F,M)} + a_4 I_m + \varepsilon_i \qquad (2.1)$$

where log of nominal individual wage (w_i) of female (F) or male (M) worker groups are determined by multiple contributing factors, including individual characteristic (L), human capital investment (H), employment characteristic (C), occupational choice (O, and institutional instrument in the labour market (I). Within each factor, multiple relevant explanatory variables are exercised[7]. Variable details and measurements are elaborated in the next section.

[7] Weber and Wolter (1999) provide a valuable input in our modification of the basic Mincerian earnings function, particularly in determining the gender wage gap and its differential contributing factors and explanatory variables.

The next step in our estimation strategy is to decompose the wage differences between female and male workers. Throughout the decomposition analysis, we seek to examine the extent of the gender wage gap and its contributing factors and variables. We use the Oaxaca-Blinder decomposition method (Oaxaca, 1973; Blinder, 1973) for the analysis. The Oaxaca-Blinder decomposition method combines human capital theory and discrimination theory in explaining earnings differentials. The idea is to piece together all possible contributing factors and variables of the wage differences, and contrast the results of particular groups with their corresponding groups through a decomposition process. In this case, between female workers and male workers. By assuming that wage determination is separable in observable and unobservable characteristics, equation (2.1) can be generalize as follows:

$$w_g = \beta_g X + \varepsilon_g, \qquad E(\varepsilon_g) = 0 \quad g\epsilon(f, m) \tag{2.2}$$

Where (w) is the natural logarithm of individual wages, (X) is a vector of explanatory variables, (β) contains the slope of the parameters and the intercept, and (ε) is the error term. The subsequent step is then to measure the means for linear prediction of wage differences between female workers (F) and male workers (M) through the following equation:

$$R = E(w_F) - E(w_M) \tag{2.3}$$

and because:

$$\mathrm{E}(\mathrm{w_g}) = \mathrm{E}(\mathrm{X'_g}\hat{\beta}_\mathrm{g} + \varepsilon_\mathrm{g}) = \mathrm{E}(\mathrm{X'_g}\hat{\beta}_\mathrm{g}) + \mathrm{E}(\epsilon_\mathrm{g}) = \mathrm{E}(\mathrm{X_g})'\hat{\beta}_\mathrm{g} \tag{2.4}$$

the mean wage difference between these two groups (4) can be computed as:

$$\mathrm{R} = \mathrm{E}(\mathrm{w_F}) - \mathrm{E}(\mathrm{w_M}) = \mathrm{E}(\mathrm{X_F})'\hat{\beta}_\mathrm{F} - \mathrm{E}(\mathrm{X_M})'\,\hat{\beta}_\mathrm{M} \tag{2.5}$$

assuming that $\mathrm{E}(\beta_g) = \hat{\beta}_g$ and $\mathrm{E}(\varepsilon_g) = 0$.

The ultimate objective of our strategy is to estimate and decompose differences in the mean wage of female and male workers, and the return of all productivity-relevant factors to wages. Therefore, we exploit a twofold decomposition approach for our analyses. This approach assumes a non-discriminatory coefficient vector that should be used as a counterfactual parameter to determine the contribution of the differences in the groups' explanatory variable to difference in the dependent variable. As such, $\bar{X}_F$ and $\bar{X}_M$ are the mean estimates of $E(X_F)$ and $E(X_M)$, and the twofold decomposition of wages differences can then be write as:

$$\mathrm{R} = \{\bar{X}_F - \bar{X}_M\}'\hat{\beta}^* + \{\bar{X}'_F(\hat{\beta}_\mathrm{F} - \hat{\beta}^*) + \bar{X}'_M(\hat{\beta}^* - \hat{\beta}_\mathrm{M})\} \tag{2.6}$$

The first term of the twofold decomposition on the right-hand side is given by:

$$Q = \{\bar{X}_F - \bar{X}_M\}'\hat{\beta}^*$$

is the explained component which is the part of the wage differences that is represent female and male workers differences in the explanatory variables, signifying an endowment effect. Whereas the second term:

$$U = \{\bar{X}'_F(\hat{\beta}_F - \hat{\beta}^*) + \bar{X}'_M(\hat{\beta}^* - \hat{\beta}_M)\}$$

is the unexplained component, which is part of the wage differences that represent the absence of differences in the explanatory variables, signifying a wage structure effect. Although this component is commonly associated with wage discrimination, it is critical to scrutinize further, since it also captures the underlying effect of unobserved variables. Explicitly, there are non-discriminatory parameter (β^*) in the decomposition of the explained component and the unexplained component as in equation (2.6). Oaxaca (1973) originally assumed that discrimination is directed toward only one of the groups (i.e. female workers), so that ($\beta^* = \beta_F$) ($\beta^* = \beta_M$). Accordingly, Oaxaca described the assumption as an index number problem. This index number problem is debatable to some extent and motivated by the development of other non-discriminatory parameters[8].

Among alternative measures of non-discriminatory parameters, we utilize the regression-compatible Oaxaca-Blinder Decomposition approach, following Jann (2008) and Fortin (2008)[9]. This approach estimates equation (2.2) within three sets of data separately, i.e. female workers, male workers, and pooled of both workers group. Accordingly, equation (2.2) can be reformulated as:

$$w_g = \beta_g X + \varepsilon_g, \qquad E(\varepsilon_g) = 0 \quad g\epsilon(f, m, p) \tag{2.7}$$

Similar to Neumark (1988) and Oaxaca and Ransom (1994), the regression compatible approach considers estimated coefficients of pooled regression (p) as non-discriminatory parameters, so that are ($\beta^* = \beta_p$) is applied for equation (2.6) and its derivatives. However, Jann (2008) and Fortin (2008) argue that a dummy group membership variable should be taken into account as an additional explanatory variable in the pooled sample estimation. Failing to do so could inappropriately transfer the unexplained part of the differential into the explained component, leading to omitted variable bias.

The Blinder-Oaxaca decomposition not only allows us to analyse an aggregate wage decomposition but also makes it possible to arrive at a detailed decomposition. For the explained component (Q), the detailed decomposition can be expressed as follows:

[8] In line with mean decomposition, much of the literature suggests that undervaluation of a group results with an overvaluation of the corresponding group (Cotton, 1988).

[9] See Oaxaca and Ransom (1994) for exercising integrative treatments of alternatives approaches and Jann (2008) for detailed explanation of those non-discriminatory parameter alternatives.

$$\hat{Q} = (\bar{X}_F - \bar{X}_M)'\hat{\beta}^* = (\bar{X}_{1F} - \bar{X}_{1M})'\hat{\beta}_1^* + (\bar{X}_{2F} - \bar{X}_{2F})'\hat{\beta}_2^* + \cdots + (\bar{X}_{PF} - \bar{X}_{PM})'\hat{\beta}_P^* \quad (2.8)$$

Where $\bar{X}_1, \bar{X}_2, \ldots, \bar{X}_P$ and $\hat{\beta}_1, \hat{\beta}_2, \ldots, \hat{\beta}_P$ are the means of the explanatory variables and their associated coefficients, whereby the p^{th} summand reflects the contribution of the group differences in the p^{th} explanatory variable. As for the unexplained component (U), if $\rho_{PF} = \hat{\beta}_{PF} - \hat{\beta}_P^*$ and $\rho_{PM} = \hat{\beta}_{PM} - \hat{\beta}_P^*$, the detailed decomposition can be expressed as follows:

$$\hat{U} = \bar{X}'_F\rho_F + \bar{X}'_M\rho_M = \bar{X}'_{1F}\rho_{1F} + \bar{X}'_{1M}\rho_{1M} + \bar{X}'_{2F}\rho_{2F} + \bar{X}'_{2F}\rho_{2F} + \cdots + \bar{X}'_{PF}\rho_{PF} + \bar{X}'_{PM}\rho_{PM} \quad (2.9)$$

Since the unexplained component also captures all of the potential effects of differences in unobserved variables, a detailed decomposition might not be as straightforward as the explained component. In the case of dummy explanatory variables, deviation contrast is employed to transform the dummy-variable sets, so that the contribution of categorical variables to the unexplained part of the decomposition is independent of the choice of the base category. In our decomposition, we set the first category as the base of each categorical variable. Our estimation and decomposition are established based on the Oaxaca-Blinder Decomposition platform by Jann (2008) using STATA 15.

Further computations were executed to produce comparable measurements of gender wage gaps and its components. The unadjusted and adjusted gender wage gaps were computed as:

$$w_g = \frac{(\overline{w^M} - \overline{w^F})}{\overline{w^M}} \times 100\% \quad (2.10)$$

where the gender wage gap (w_g) is a percentage difference between the mean wage of disadvantaged female workers group (w^F) and male workers group (w^M) relative to its corresponding group (w^C). As described above, wage differences are decomposed into explained and unexplained components. The endowment effect (e) and remuneration effect (r) are consecutively represented by the explained and unexplained components, measured by each percentage contribution on wage differences. Following Taniguchi and Tuwo (2014), the wage gap attributable to wage discrimination (ATD) is calculate as:

$$ATD = r_g \times w_g \quad (2.11)$$

2.3.3. Variable of Interest and Explanatory Variables

Our main variable of interest is monthly nominal wage, defined as in-cash and in-kind remunerations received during the previous month from the main job, after deduction of taxes and other mandatory contributions[10]. This wage calculation also deducts severance, termination

[10] Following the resolution concerning the measurement of employment-related income adopted by the Sixteenth International Conference of Labour Statisticians (October 1998).

pay, and employer contributions to social security and pension schemes, including the benefits received by workers under these schemes. In the right side of the equation, we exercised several explanatory variables, grouped as the wage differences contributing factors. In terms of individual characteristic factor, we include age and marital status. We include age to capture its contribution to productivity, e.g. physical strength. A gender dummy variable is included as a group membership variable. Human capital investment is represent by educational attainment, tenure, specialization, and training. Educational attainment is measured as years of schooling corresponding to the Indonesian education system. A dummy variable for general education and vocational education is also included to capture specialization effects of education other than years of those general educations. Furthermore, training is also included to capture specialization or investment in certain types of skills. The training dummy variable differentiates workers with no training, first training, and secondary training. We also include tenure as a proxy for on-the-job human capital accumulation, considering that our dataset does not explicitly provide personal data on experience in terms of time span after schooling. A quadratic form is used to allow for the possibility of diminishing returns of age and tenure.

While in term of employment characteristic factor, we included commuting to work, measured as the daily commute time for people working outside of their residential place. Hours of work in the previous week were also included because wages might be sensitive to the length of working hours. We also consider whether a worker also has a secondary job or not given the possibility that the main source of earnings is insufficient (Dasgupta, 2015). Dummy variables of workers' residential place (i.e. urban or rural) and types of work (i.e. full time, part time, or under employment) are also included in this employment characteristic factor. In institutional instrument factor, the regional minimum wages are included and defined as the nominal minimum wage paid on a monthly basis in each of the 511 sub provincial regions in Indonesia based on standard of cost of living of each region and other relevant components[11].

Finally, in term of occupational choices factor, we included dummy variables of formal-informal occupations, nine sector-based occupational categories, and ten skilled-based occupational categories. The sector-based occupational categories is exercised to examine horizontal segregation, while the skilled-based occupational categories is exercised to examine vertical segregation. After controlling for all productivity-relevant variables, any differences in earnings of two equally productive workers is subject to the indication of inefficient behaviour in wage structure through favouritism or discrimination, i.e. the wage structure effect. A detailed

[11] Recently, the regional minimum wages determine by decent living need and taking into account cost of 60 items, consumer price index, labour market development, current regional wage, aggregate firms conditions, and national and regional economic trends.

decomposition analysis is conducted to highlight each explanatory variables within each factor that contribute to the gender wage gap.

2.3.4. Robustness Checks and Sub Groups Analyses

Initially, we estimate two slightly different specifications to ensure that the endowment effect and the wage structure effect on the wage differential do not stem from sample selection bias. The baseline specification includes all explanatory variables described in the previous section. While alternative specification, excludes occupational choices dummy variables, i.e. sector-based occupations and skill-based occupations. The comparison of baseline and alternative specifications will disclose whether horizontal and vertical segregation directly contribute to gender pay gaps and its decompositions. The aggregate sample is used in the estimation of those two specifications, consists of individuals who indicated that they are working or have a job but are temporarily on sick leave in the previous week. Using the baseline specification, we also estimated and decomposed wage differences of multiple sub-samples, according to working states and main activities of workers, i.e. newcomers, active and passive workers. Accordingly, we examine whether different working states and main activities of workers are attributable to the gender wage gap, which also serves as a robustness check of the estimations. The newcomers sub-sample only includes workers who were at their first job with less than a year of tenure. While the active sub-sample only includes workers who indicated working as their main activity. Lastly, the passive sub-sample only includes workers who indicated household caring as their main activity.

In regards of objectives of this study, we also estimated the baseline specification on multiple sub-samples according to marital and breadwinner statuses of the workers. Four sub-samples categories based on marital status are examined, including single, married, divorced, and widowed. Furthermore, to examine the contribution of family division of labour in the gender wage gap, we introduced an alternative breadwinner model. Six breadwinner statuses are examined, taking into account workers' roles in the family as breadwinners, caregivers, and self-earners. Combining family memberships, family roles and marital status, we examined six statuses: primary breadwinners, secondary breadwinners, single rolers, double rolers, single earners and tertiary breadwinners. Detailed categorization of the alternative breadwinner models is presented in Table 2.1. Our model serves as an alternative to six adult workers models by Lewis (2001), which already taking into account the shift of family division of labour in the recent years. However, the adult workers model might overlooks other possibilities of family roles, e.g. a female full-time breadwinner or a male full-time family caregiver.

Table 2. 1 Categorization of the Alternative Breadwinners Model

Categories	Family Membership	Family Roles	Marital Status
1. Primary Breadwinners	Household head	Breadwinner	Married
2. Secondary Breadwinners	Spouse	Breadwinner	Married
3. Single Rolers	Household head or Spouse	Breadwinner	Married
4. Double Rolers	Household head or Spouse	Breadwinner and Family caregiver	Married
5. Single Earners	Household head	Breadwinner and Family caregiver	Divorced or Widowed
6. Tertiary Breadwinners	Relatives	Self-earners	All Status
7. Non-Breadwinners	Housemaid or others	None	All Status

2.4. EMPIRICAL RESULTS

2.4.1. An Overview of Gender Inequality in Indonesian Labour Market

As a developing country, Indonesia is struggling with inequality in many aspects of development including inequality of pay between men and women in the labour market. Despite converging education attainment between female and male workers in recent years, women participation in the economy is moderately low compared to men. In 2015, the female to male labour participation rate and the female to male employment to population ratio are both nearly 60 percent. Thus, more educated women are out of labour market with the unemployment rate of 6.37 percent in 2015. This rate is higher than male unemployment rate, which account for 6.07 percent in the same year. Many high skilled women working in lower skill job and event take part-time job with female underemployment rate of 8.57 percent (Statistic Indonesia, 2016).

Taking into account education and all other human capital investment variables, a persisting gender wage gap is most likely affected by other factors, including family division of labour. Labour structures by marital status between women and men were similar, around 20 percent for single people and around 70 percent for married people. Thus, the family division of labour most likely accounts for a portion of the wage differences between women and men. The initial indication is the fact that women take on part-time jobs at almost double the rate of men, and mainly in addition to their role as the family caregiver.

Walton (2019) described above conditions as the double burden of Indonesian women. Our analysis, based on the breadwinner theory, supports this view. We categorize breadwinner status of individuals based on family membership and the working state[12]. Our findings show that 70.42 percent of men are the primary breadwinners in the family, while 55.32 percent of women are secondary breadwinners. Our calculation shows that nearly 95 percent women are mainly family caretakers, compared to nearly 30 percent of men for the same role. These preliminary finding

[12] Nine categories of the respondent's relationship to household head were reclassified into four categories of family memberships: household head, spouse, relatives, and non-relatives.

imply that the traditional family division of labour, or the male-breadwinner model, might have faded away even in a developing country like Indonesia. Presently, men are the primary breadwinner and women are the secondary breadwinner and the caregiver.

Table 2. 2 Labour Force Indicators by Gender, Indonesia 2015 (Percent)

No.	Indicators	Female	Male	No.	Indicators	Female	Male
1.	Labour participation rate	48.87	82.71	14.	*Married workers by informality**	100	100
2.	Employment to population	45.76	77.69		Informal sectors	65.89	57.16
3.	Part-time workers	31.81	15.25		Formal sectors	34.11	42.84
4.	Underemployment rate	8.57	8.43	15.	*Married workers by Sectors*	100	100
5.	Unemployment rate	6.37	6.07		Agriculture, farming, forestry, etc.	10.09	24.64
6.	*Labour education attainment*	*100*	*100*		Mining and quarrying	0.37	2.97
	primary education	31.81	32.81		Manufacture industries	14.14	10.94
	secondary education	41.80	53.42		Electricity, gas, and water supply	0.12	0.64
	tertiary education	26.39	13.76		Constructions	0.35	8.10
7.	*Labour by marital status*	*100*	*100*		Trading, restaurant, etc.	30.78	16.05
	single	19.09	20.78		Transportations, storage, etc.	0.68	10.91
	married	66.36	75.51		Finance, real estate and services	2.19	3.45
	divorced	5.20	1.81		Social and community services	41.29	22.29
	widowed	9.34	1.91	16.	*Married workers by Occupations*	100	100
8.	*Labour Breadwinner Status*	*100*	*100*		Legislator, senior off. and managers	1.56	2.89
	primary BW	14.43	70.42		Professionals	18.75	7.13
	secondary BW	55.32	0.25		Technicians and ass. professionals	4.71	4.25
	tertiary BW	28.66	28.77		clerks	11.63	8.45
	non BW	1.60	0.55		Services and market sales	28.30	13.76
9.	Active-Workers	87.15	98.67		Skilled agricultural and fishery	8.24	17.73
10.	Passive-Workers	12.42	0.57		Craft and related trades	9.75	11.59
11.	Caregivers	94.93	28.50		Plant, machine op. and Assemblers	2.36	13.01
12.	Single Rolers	2.26	49.00		Elementary occupations	14.51	19.11
13.	Double Rolers	56.39	19.85		armed forces	0.19	2.08

Source: Statistics Indonesia (2016) and SAKERNAS (2015), reproduced.

Those reality lead to other issues in Indonesia dual labour market, i.e. occupational segregation. Labour distribution across occupational choices in Table 2.2 above show that married women and married men are segregated in difference types of job. By sector-based occupational categories, married women are horizontally segregated in trading, restaurant and accommodation sector and social and community services, while married men in agricultural sector. While by skilled-based occupational categories, married women vertically segregated in professional, service and market sale jobs, while married men in skilled agricultural and fishery jobs.

Finally, considering informality of the jobs, higher portion of women as well men work in informal jobs. Despite the similar structure, the reasons behind those portions are possibly diverge. Married women work in informal jobs for the intention of maintaining family-caring whist in the same time supporting family income. Whereas men work in informal jobs for other potential reasons, e.g. overcrowding formal sectors, limited formal jobs creation, or pursuing higher rate of income. The distribution of workers above shows that married women and married men are dominated in differences types of occupations. This fact might contributed to the gender wage

gap, as female dominated jobs are often undervalued. Overall indications of the dual labour market incidence described above serves as our starting point from which to examine the extent of the gender inequality of pay and its contributing factors with a focus on marital status, family division of labour, and the role of minimum wage. In the next section, we elaborate and scrutinize the magnitudes, variations, and attributes of the adjusted gender wage gap and further extend the analysis to include comparison between marital statuses and between the breadwinner statutes.

2.4.2. Gender Wage Determinants

Wage determinant analysis is the first step of our decomposition analyses. Results from the wage regressions for female workers, male workers, and pooled of both groups are presented in Table 2.3. The first panel of the table present all explanatory variables for individual characteristic. As expected, age and gender have significant effects as worker's innate ability in determining wages. A positive and statistically significant coefficient of the gender group-membership variable in the pooled estimation indicates a significant wage difference; in which men earn more than women. Our estimation results also shows a negative significant coefficient for the squared age variable, signifying a non-linear relationship between age and wage (i.e. the differing ages effect). Thus, the positive relationship between age and wage only exists up to a certain age before it starts to diminish. A further estimate shows that the turning point age is in the mid-50's, shortly before workers reach their retirement age. Furthermore, being married is more likely to correspond with a higher wage rate than other marital status, i.e. single, divorced, and widowed.

The second panel presents the explanatory variables of human capital investment factor. As expected, education, specialization and training have positive effects on wage rate. Similar with age, tenure also show positive effect on wage rate with the addition of the tenure differing effect. As an institutional instrument, the regional minimum wages shows statistically significant roles in wage determination for female workers, male workers, and pooled sample groups. Considering that part of both female and male workers have earned above and below minimum wage rates, statistically significant coefficients indicate the spillover effect and the numeraire effect. All the variables included to represent the employment characteristic also have significant effects on wage. Accordingly, being a full-time worker, being in an urban area, having a secondary job, and traveling to work have positive effects on wage. In terms of occupational choices, working as a formal sector worker as a legislator, senior officer, or manager (LSOM) in mining and quarrying sectors hold the greatest possibility of earning a higher wage compared with other occupations.

Table 2. 3 Wage Determinants of Female Workers, Male Workers and Pooled Samples

Variables	Female Workers		Male Workers		Pooled	
	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
Individual characteristic						
Age	0.030***	(0.002)	0.034***	(0.002)	0.032***	(0.001)
Age^{2} a)	-0.291***	(0.026)	-0.389***	(0.018)	-0.347***	(0.015)
Marital status (base: single)						
married	0.102***	(0.011)	0.190***	(0.008)	0.139***	(0.006)
divorced	0.127***	(0.017)	0.018	(0.018)	0.088***	(0.012)
widowed	0.046***	(0.016)	-0.002	(0.018)	0.038***	(0.011)
Group membership: Gender	-	-	-	-	0.247***	(0.004)
Human Capital Investment						
Years of schooling	0.053***	(0.001)	0.041***	(0.001)	0.046***	(0.001)
Tenure	0.004***	(0.000)	0.002***	(0.000)	0.003***	(0.000)
Tenure^{2} a)	-0.005***	(0.000)	-0.002***	(0.000)	-0.003***	(0.000)
Vocational (base: general)	0.021*	(0.011)	0.014**	(0.007)	0.019***	(0.006)
Training (base: no training)						
Primary training	0.263***	(0.012)	0.230***	(0.009)	0.242***	(0.007)
Secondary training	0.455***	(0.017)	0.425***	(0.014)	0.445***	(0.011)
Employment Characteristic						
Working hours	0.007***	(0.000)	0.006***	(0.000)	0.006***	(0.000)
Rural (base: urban)	-0.095***	(0.007)	0.008	(0.005)	-0.033***	(0.004)
Types of work (base: full time)						
part time	-0.240***	(0.011)	-0.147***	(0.008)	-0.202***	(0.007)
under employment	-0.560***	(0.015)	-0.415***	(0.010)	-0.475***	(0.009)
Secondary job (base: primary)	0.134***	(0.012)	0.101***	(0.007)	0.097***	(0.006)
Domestic (base: travel to work)	-0.286***	(0.014)	-0.139***	(0.009)	-0.189***	(0.007)
Institutional instrument						
ln minimum wage	0.621***	(0.013)	0.608***	(0.010)	0.613***	(0.008)
Occupational Choices						
Formal (base: informal)	0.013	(0.010)	-0.127***	(0.006)	-0.079***	(0.005)
Occupations (base: LSOM^{b})						
professional	-0.416***	(0.027)	-0.378***	(0.016)	-0.386***	(0.013)
technicians and prof. assoc.	-0.273***	(0.029)	-0.296***	(0.017)	-0.286***	(0.015)
clerks	-0.352***	(0.027)	-0.416***	(0.015)	-0.371***	(0.013)
services and market sales	-0.651***	(0.029)	-0.671***	(0.016)	-0.667***	(0.014)
skilled agricultural and fishery	-0.820***	(0.038)	-0.931***	(0.020)	-0.872***	(0.018)
craft and related trades	-0.831***	(0.031)	-0.735***	(0.016)	-0.762***	(0.014)
operator and assemblers	-0.385***	(0.035)	-0.630***	(0.016)	-0.580***	(0.015)
elementary occupations	-0.704***	(0.028)	-0.813***	(0.015)	-0.775***	(0.014)
armed forces	0.108	(0.077)	0.042**	(0.021)	0.015	(0.020)
Sectors (base: agriculture)						
mining and quarrying	0.206***	(0.055)	0.249***	(0.017)	0.257***	(0.016)
manufacture	-0.064**	(0.026)	-0.119***	(0.013)	-0.123***	(0.012)
electricity, gas and water supply	0.072	(0.091)	-0.006	(0.031)	-0.016	(0.030)
constructions	0.206***	(0.053)	0.052***	(0.014)	0.061***	(0.013)
trading, hotel and restaurant	-0.028	(0.026)	-0.102***	(0.014)	-0.095***	(0.012)
transportation and comm.	0.007	(0.040)	-0.192***	(0.014)	-0.186***	(0.013)
finance services	0.019	(0.030)	-0.102***	(0.016)	-0.084***	(0.015)
social and community services	-0.276***	(0.024)	-0.286***	(0.013)	-0.291***	(0.011)
_Cons	4.013***	(0.202)	4.670***	(0.143)	4.053***	(0.118)
Number of obs.	58,947		104,621		163,568	
Prob > F	0.000		0.000		0.000	
Adj. R-squared	0.3949		0.3278		0.3633	

Note:

a) Age and tenure square normalized by 1000.

b) LSOM: Legislator, senior officer and manager

*c) *p<0.1, **p<0.05, ***p<0.01*

2.4.3. Aggregate Gender Wage Gap Decomposition

We exercise wage differences decomposition based on the aggregate sample and its sub-samples. Table 2.4 presents the estimation result of wage difference decompositions of the aggregate, newcomer, active, and passive workers based on the baseline specification. We also present, in

lower panel of the table, additional indicators calculated from the estimations results, i.e. unadjusted gender wage gaps, adjusted gender wage gaps, wage structure effects, and the gender wage gap attributable to discrimination[13]. Our results confirm the existence of gender inequality of pay in aggregate sample and all sub-samples. The predicted mean wage differences between female and male workers range from 0.116 points to 0.323 points, equivalent to 15.27 percent to 27.58 percent of the adjusted gender wage gap. Additionally, our results also show that the wage structure effect ranges from 76.47 percent to 157.10 percent, while the degree of the wage gap attributable to discrimination ranges from 21.09 percent to 23.99 percent. For comparison, Taniguchi and Tuwo (2014) apply similar approaches using SAKERNAS 2010, resulting an aggregate adjusted gender wage gap, equivalent to 29.90 percent to 30.80 percent. Accordingly, compare to previous work, our finding imply that the gender wage gap and discrimination has been narrowed in recent years.

Although estimation results of the baseline and alternative specifications on aggregate sample show the similar result in terms of wage differences, the structure of explained and the unexplained components are diverged, including the contribution of particular variables in each component. For example, the contribution of regional minimum wage in the unexplained component, which is statistically non-significant in the baseline estimation becomes positively significant and contributes the largest part in the alternative estimation. As occupational choices are not included, the effects are distributed to the unexplained component of wage differences. Thus, the exclusion of occupation choices could lead to an upward bias of wage discrimination measures. Our findings are in line with previous studies, e.g. Blau, et al. (2014), who argued that gender occupational segregation contributes to male-female wage differences.

[13] Predicted wages and its between groups differences are in logarithmic scale. Gender wage gap (GWG) measured as percentage wage differential of male and female workers to male workers. Wage structure effect (RE) calculated as a share of the unexplained components in the predicted mean wages differences. Whereas the degree of gender wage gap attributable to discrimination, measure by multiplication of the gender wage gap and the wage structure effect.

Table 2. 4 Detailed Decomposition of the Aggregate Gender Wage Gap

Variables	Baseline		Alternative		Newcomers		Active		Passive	
	Coef.	Robust Std. Err.	Coef.	Robust Std. Err.	Coef.	Robust Std. Err.	Coef.	Robust Std. Err.	Coef.	Robust Std. Err.
Overall Decomposition										
Predicted female wage	13.834***	(0.004)	13.834***	(0.004)	13.860***	(0.004)	13.921***	(0.004)	13.248***	(0.011)
Predicted male wage	14.157***	(0.003)	14.157***	(0.003)	14.174***	(0.003)	14.167***	(0.003)	13.413***	(0.041)
Difference	-0.323***	(0.005)	-0.323***	(0.005)	-0.314***	(0.005)	-0.247***	(0.005)	-0.166***	(0.043)
Explained	-0.076***	(0.003)	-0.060***	(0.003)	-0.067***	(0.004)	-0.030***	(0.004)	0.095***	(0.028)
Unexplained	-0.247***	(0.004)	-0.262***	(0.004)	-0.247***	(0.005)	-0.217***	(0.005)	-0.260***	(0.041)
Detailed Decomposition										
Explained										
Individual Characteristic										
Age	-0.015***	(0.002)	-0.015***	(0.002)	-0.008***	(0.002)	-0.024***	(0.002)	-0.059***	(0.019)
Age^{2}*	0.010***	(0.002)	0.010***	(0.002)	0.005***	(0.002)	0.017***	(0.002)	0.065***	(0.021)
Marital status	-0.008***	(0.001)	-0.008***	(0.001)	-0.008***	(0.001)	-0.013***	(0.001)	0.022***	(0.006)
Human Capital Investment										
Years of schooling	0.018***	(0.001)	0.022***	(0.001)	0.017***	(0.001)	0.029***	(0.001)	0.002	(0.007)
Tenure	-0.028***	(0.002)	-0.029***	(0.002)	-0.022***	(0.001)	-0.025***	(0.002)	-0.068***	(0.018)
$Tenure^{2}$*	0.008***	(0.001)	0.009***	(0.001)	0.007***	(0.001)	0.007***	(0.001)	0.044***	(0.013)
Vocational	0.001***	(0.000)	0.001***	(0.000)	0.001***	(0.000)	0.0004**	(0.000)	0.003	(0.002)
Training	0.008***	(0.001)	0.009***	(0.001)	0.008***	(0.001)	0.009***	(0.001)	-0.003	(0.005)
Employment Characteristic										
Working hours	-0.021***	(0.001)	-0.020***	(0.001)	-0.022***	(0.001)	-0.005***	(0.000)	0.108***	(0.015)
Urban	0.001***	(0.000)	0.001***	(0.000)	0.001***	(0.000)	0.002***	(0.000)	-0.011***	(0.004)
Fulltime	-0.022***	(0.001)	-0.024***	(0.001)	-0.021***	(0.001)	-0.006***	(0.001)	0.009*	(0.005)
Secondary job	0.005***	(0.000)	0.005***	(0.000)	0.005***	(0.000)	0.006***	(0.000)	0.001	(0.001)
Travel to work	-0.003***	(0.000)	-0.003***	(0.000)	-0.002***	(0.000)	-0.001***	(0.000)	-0.004	(0.003)
Institutional instrument										
Minimum wage	-0.017***	(0.001)	-0.018***	(0.001)	-0.018***	(0.001)	-0.017***	(0.001)	0.029***	(0.007)
Occupational Choices										
Informality	0.002***	(0.000)	0.0002	(0.000)	0.002***	(0.000)	0.0004**	(0.000)	-0.001	(0.003)
occupation	0.039***	(0.002)			0.041***	(0.002)	0.051***	(0.002)	-0.019	(0.014)
sector	-0.055***	(0.002)			-0.052***	(0.002)	-0.059***	(0.002)	-0.022	(0.016)

Variables	Baseline		Alternative		Newcomers		Active		Passive	
	Coef.	Robust Std. Err.	Coef.	Robust Std. Err.	Coef.	Robust Std. Err.	Coef.	Robust Std. Err.	Coef.	Robust Std. Err.
Unexplained										
Individual Characteristic										
Age	-0.168	(0.103)	-0.396***	(0.104)	-0.130	(0.110)	-0.140	(0.106)	-1.289	(0.99)
Age^{2} a)	0.159***	(0.052)	0.265***	(0.053)	0.143***	(0.056)	0.151***	(0.054)	0.752	(0.515)
Marital status	-0.080***	(0.007)	-0.083***	(0.007)	-0.081***	(0.007)	-0.070***	(0.007)	-0.089**	(0.042)
Human Capital Investment										
Years of schooling	0.110***	(0.012)	0.093***	(0.01)	0.112***	(0.012)	0.119***	(0.013)	0.045	(0.07)
Tenure	0.178***	(0.013)	0.180***	(0.013)	0.178***	(0.015)	0.166***	(0.014)	0.025	(0.112)
Tenure^{2} a)	-0.053***	(0.007)	-0.058***	(0.007)	-0.051***	(0.008)	-0.046***	(0.007)	0.005	(0.059)
Vocational	0.003	(0.005)	-0.009*	(0.005)	0.0004	(0.005)	-0.004	(0.005)	0.024	(0.047)
Training	-0.017**	(0.008)	0.015*	(0.008)	-0.018**	(0.009)	-0.009	(0.008)	0.034	(0.084)
Employment Characteristic										
Working hours	0.049***	(0.016)	0.044***	(0.016)	0.064***	(0.016)	-0.026	(0.017)	0.306***	(0.101)
Urban	0.010***	(0.001)	0.010***	(0.001)	0.010***	(0.001)	0.011***	(0.001)	-0.004	(0.005)
Fulltime	0.051***	(0.006)	0.060***	(0.006)	0.050***	(0.006)	0.063***	(0.007)	0.034	(0.03)
Secondary job	0.014**	(0.006)	0.015**	(0.006)	0.015**	(0.006)	0.023***	(0.007)	-0.019	(0.055)
Travel to work	-0.064***	(0.006)	-0.079***	(0.006)	-0.063***	(0.006)	-0.057***	(0.006)	-0.036	(0.13)
Institutional instrument										
Minimum wage	0.186	(0.238)	0.549**	(0.242)	0.241	(0.246)	0.143	(0.244)	-0.034	(2.365)
Occupational Choices										
Informality	0.022***	(0.002)	0.006***	(0.002)	0.020***	(0.002)	0.027***	(0.002)	0.009	(0.009)
occupation	-0.011	(0.007)			-0.009	(0.007)	-0.007	(0.007)	-0.074	(0.101)
Sector	-0.030	(0.012)			-0.030**	(0.012)	-0.027**	(0.012)	0.118	(0.099)
Constant	-0.606**	(0.244)	-0.875***	(0.247)	-0.698***	(0.253)	-0.534**	(0.25)	-0.066	(2.471)
Number of obs.	163,568		163,568		154,247		154,728		7,824	
Mean female wage (IDR)	1,624,011		1,624,011		1,668,858		1,728,411		908,036	
Mean male wage (IDR)	2,056,079		2,056,079		2,088,201		2,068,232		1,120,274	
Unadjusted gender wage gap	21.01%		21.01%		20.08%		16.43%		18.95%	
Predicted female wage (IDR)	1,019,100		1,019,100		1,045,682		1,110,766		566,737	
Predicted male wage (IDR)	1,407,211		1,407,211		1,431,395		1,421,368		668,900	
Adjusted gender wage gap (AGWG)	27.58%		27.58%		26.95%		21.85%		15.27%	
Wage structure effect	76.47%		81.29%		78.63%		87.88%		157.10%	
ATD b)	21.09%		22.42%		21.19%		19.20%		23.99%	

Note:

a) Age and tenure square normalized by 1000.

b) ATD: Adjusted wage gap attributable to discrimination

c) *Robust standard errors in parentheses*, *** p<0.01, ** p<0.05, * p<0.1

Furthermore, the results show that newcomer workers undergone the greatest adjusted gender wage gap and simultaneously the lowest wage structure effect compared with active and passive workers. The results show that, in case of the newcomer workers, the employment characteristic (i.e. working hours) is more pronounced than individual characteristic (i.e. age) or human capital investment (i.e. education). Thus, factor closely related to productivity, as working hours, are more pronounced than other factor as individual characteristic and human capital investment in the early phase of a worker's attachment to the labour market. In contrast, for the active workers, individual characteristic and human capital investment factors starting have some significant roles in the gender wage gap, exceeding the employment characteristic factor. In this case, the adjusted gender wage gap is narrower and wage structure effect is higher. These findings imply that larger contribution of productivity-relevant factors on the adjusted gender wage gap might leave less space for discrimination, especially in the early year of working history, vice versa.

While the passive workers experienced the lowest adjusted gender wage gap and simultaneously the highest wage structure effect. Interestingly, the endowment effects in the adjusted gender wage gap are in favour of female workers. This finding represent by positive and statistically significant contribution of explained component in the wage differences of passive workers. A detailed decomposition revealed that the contribution of marital status is at the centre of these diverging findings, followed by age and working hours. This finding implies that married passive workers, who assumed prioritize family care over earning an income, actually undergone the lowest adjusted gender wage gap. However, the contribution of the unexplained components is negative and comparably higher than the explained components, resulting in a relatively higher wage structure effect leading to potentially a higher wage discrimination. Thus, for active workers, the wage structure effect might stem from firm or employer preferences, but for passive workers, might stem from workers preferences for jobs with greater flexibility and less travelling, among other factors. To some extent, as more than 90 percent of passive workers are women, worker preferences might hinder the opportunity to move to the primary market and earn equal pay. Overall findings in this section suggest the presence of a gender inequality of pay, regardless of the state of working history or main activities, even in female-dominated jobs.

2.4.4. Gender Wage Gap Decomposition: Marital Status and Marriage Premium

The first four pairs of columns in Table 2.5 presents the decomposition of wage differences by marital status and the latter two pairs of columns show the decomposition of marriage wage premiums. Married workers experience the highest adjusted gender wage gap as married female workers earned nearly 30 percent lesser than married male workers. In contrast, single workers experience the lowest adjusted gender wage gap as single female workers earned 10.23 percent less than single male workers. For married workers, differences in education attainment and

tenure contribute significantly to the explained components of the adjusted gender wage gap. Education attainment contributes positively in favour of female workers, indicating that the female pursuit of higher education pays off. While tenure show negative contribution, at least up to certain point of tenure where wages reached its peaks, than starting to contribute positively to the adjusted gender wage gap.

Additionally, occupational choices contributes the most to the adjusted gender wage gap. Differences in sector-based occupations contribution is in favour of married male workers, whereas differences in skill-based occupation favour married female workers. These finding indicate that while men stand out across horizontal occupational choices, female might be in higher positions within vertical occupational choices. While some variables in the explained component of wage differences partially favour female workers, and thus partially contribute in narrowing the adjusted gender wage gap, the unexplained components contribute to wage difference at a higher portion. Our decomposition results show that previously or presently married is related to a higher possibility of wage discrimination as the wage structure effect contributes to more than 80 percent of the adjusted gender wage gap.

Our findings also provide an alternative analysis by comparing predicted wages between single workers and married workers within each gender group. Marital status is positively associated with the productivity of male workers, which in turn results in the male marriage premium (De Hoon, Keizer and Dykstra, 2015; De Linde Leonard, and Stanley, 2015). On the contrary, marital status is negatively associated with the productivity of female workers, which in turn results in the female marriage penalty (Nwaka et al., 2016; Blau and Khan (2016). They argued that married female workers have lower productivity, e.g. due to less motivation to stay at work, work schedule, travel constraints, and lack of desire to be promoted to a more demanding position. Interestingly, our results not only add similar empirical evidence of a male marriage premium, but also adds contrasting evidence of a female marriage premium.

Table 2. 5 The Adjusted gender wage gap by Marital Status and Marriage Premium Decompositions

Variables	Single		Married		Divorced		Widowed		Marriage Premium			
									Female		Male	
	Coef.	Robust Std. Err.	Coef.	Robust Std. Err.	Coef.	Robust Std. Err.	Coef.	Robust Std. Err.	Coef.	Robust Std. Err.	Coef.	Robust Std. Err.
Overall Decomposition												
Group 1 predicted wage	13.741***	(0.009)	13.896***	(0.005)	13.787***	(0.016)	13.610***	(0.013)	13.741***	(0.009)	13.848***	(0.006)
Group 2 predicted wage	13.848***	(0.006)	14.252***	(0.003)	13.926***	(0.020)	13.827***	(0.020)	13.896***	(0.005)	14.252***	(0.003)
Difference	-0.108***	(0.010)	-0.356***	(0.006)	-0.139***	(0.026)	-0.218***	(0.023)	-0.156***	(0.010)	-0.404***	(0.007)
Explained	-0.039***	(0.007)	-0.058***	(0.004)	-0.018*	(0.018)	-0.034**	(0.017)	-0.039***	(0.007)	-0.058***	(0.004)
Unexplained	-0.069***	(0.010)	-0.298***	(0.005)	-0.121***	(0.025)	-0.184***	(0.021)	-0.069***	(0.010)	-0.298***	(0.005)
Detailed Decomposition												
Explained												
Individual Characteristic												
Age	-0.006	(0.004)	-0.081***	(0.004)	-0.015	(0.012)	0.016*	(0.010)	-0.006***	(0.004)	-0.081***	(0.004)
Age^{2} a)	-0.007*	(0.004)	0.073***	(0.004)	0.012	(0.012)	-0.014	(0.011)	-0.007***	(0.004)	0.073***	(0.004)
Human Capital Investment												
Years of schooling	0.078***	(0.003)	0.027***	(0.001)	0.002	(0.005)	-0.023***	(0.004)	0.078***	(0.003)	0.027***	(0.001)
Tenure	-0.003*	(0.002)	-0.044***	(0.002)	-0.029***	(0.008)	-0.034***	(0.009)	-0.003***	(0.002)	-0.044***	(0.002)
$Tenure^{2}$ a)	-0.003***	(0.001)	0.015***	(0.001)	0.008	(0.005)	0.020***	(0.006)	-0.003***	(0.001)	0.015***	(0.001)
Vocational	-0.00005	(0.000)	0.001***	(0.000)	0.001	(0.001)	-0.000	(0.001)	-0.00005**	(0.000)	0.001**	(0.000)
Training	0.006***	(0.001)	0.010***	(0.001)	0.008***	(0.003)	0.005***	(0.002)	0.006***	(0.001)	0.010***	(0.001)
Employment Characteristic												
Working hours	-0.003**	(0.001)	-0.026***	(0.001)	0.005	(0.003)	-0.008**	(0.003)	-0.003***	(0.001)	-0.026***	(0.001)
Urban	0.005***	(0.001)	0.001***	(0.000)	0.005***	(0.002)	0.004***	(0.001)	0.005***	(0.001)	0.001**	(0.000)
Fulltime	-0.001	(0.002)	-0.025***	(0.001)	0.002	(0.004)	-0.008***	(0.003)	-0.001***	(0.002)	-0.025***	(0.001)
Secondary job	0.001*	(0.000)	0.007***	(0.001)	0.001	(0.001)	0.002*	(0.001)	0.001***	(0.000)	0.007***	(0.001)
Travel to work	0.004***	(0.001)	-0.003***	(0.000)	0.001	(0.002)	-0.002	(0.001)	0.004***	(0.001)	-0.003***	(0.000)
Institutional instrument												
Minimum wage	-0.003	(0.002)	-0.020***	(0.001)	-0.008*	(0.004)	-0.021***	(0.004)	-0.003***	(0.002)	-0.020***	(0.001)
Occupational Choices												
Informality	-0.013***	(0.001)	0.002***	(0.000)	-0.005**	(0.002)	0.002	(0.001)	-0.013*	(0.001)	0.002***	(0.000)
occupation	0.018***	(0.005)	0.054***	(0.003)	0.035**	(0.014)	0.049***	(0.014)	0.018***	(0.005)	0.054***	(0.003)
sector	-0.113***	(0.005)	-0.049***	(0.003)	-0.039***	(0.013)	-0.021***	(0.013)	-0.113***	(0.005)	-0.049**	(0.003)

Variables	Single		Married		Divorced		Widowed		Marriage Premium Female		Marriage Premium Male	
	Coef.	Robust Std. Err.	Coef.	Robust Std. Err.	Coef.	Robust Std. Err.	Coef.	Robust Std. Err.	Coef.	Robust Std. Err.	Coef.	Robust Std. Err.
Unexplained												
Individual Characteristic												
Age	-0.015	(0.177)	-0.214	(0.150)	0.855	(0.652)	-0.776	(0.902)	-0.015	(0.177)	-0.214	(0.150)
Age^{2} a)	0.013	(0.077)	0.204***	(0.077)	-0.386	(0.338)	0.493	(0.499)	0.013	(0.077)	0.204	(0.077)
Human Capital Investment												
Years of schooling	0.225***	(0.038)	0.114***	(0.014)	0.094*	(0.049)	0.053*	(0.032)	0.225*	(0.038)	0.114	(0.014)
Tenure	0.055***	(0.018)	0.188***	(0.018)	0.055	(0.065)	0.177**	(0.086)	0.055	(0.018)	0.188***	(0.018)
Tenure^{2} a)	-0.005	(0.006)	-0.041***	(0.009)	-0.003	(0.033)	-0.077	(0.051)	-0.005***	(0.006)	-0.041***	(0.009)
Vocational	-0.004	(0.007)	0.018***	(0.007)	0.039	(0.029)	-0.031	(0.039)	-0.004***	(0.007)	0.018***	(0.007)
Training	0.024	(0.026)	-0.025***	(0.009)	-0.011	(0.077)	0.030	(0.067)	0.024***	(0.026)	-0.025*	(0.009)
Employment Characteristic												
Working hours	-0.194***	(0.040)	0.102***	(0.019)	-0.104	(0.083)	0.067	(0.076)	-0.194***	(0.040)	0.102***	(0.019)
Urban	0.030***	(0.004)	0.008***	(0.001)	0.005	(0.004)	0.000	(0.001)	0.030***	(0.004)	0.008	(0.001)
Fulltime	0.083***	(0.016)	0.048***	(0.007)	0.055*	(0.030)	-0.025	(0.026)	0.083***	(0.016)	0.048**	(0.007)
Secondary job	0.030	(0.022)	0.012*	(0.007)	0.081**	(0.033)	0.037	(0.025)	0.030	(0.022)	0.012	(0.007)
Travel to work	-0.031***	(0.010)	-0.062***	(0.007)	-0.030	(0.038)	-0.042	(0.049)	-0.031*	(0.010)	-0.062***	(0.007)
Institutional instrument												
Minimum wage	-0.362	(0.500)	0.277	(0.288)	-2.187	(1.396)	-0.690	(1.298)	-0.362***	(0.500)	0.277***	(0.288)
Occupational Choices												
Informality	0.058***	(0.014)	0.017***	(0.002)	-0.001	(0.004)	-0.005	(0.008)	0.058	(0.014)	0.017***	(0.002)
Occupation	-0.020	(0.017)	-0.016*	(0.008)	0.019	(0.040)	0.016	(0.051)	-0.020***	(0.017)	-0.016***	(0.008)
Sector	-0.017	(0.020)	-0.026	(0.016)	-0.001	(0.065)	0.061	(0.052)	-0.017***	(0.020)	-0.026***	(0.016)
Constant	0.060	(0.512)	-0.902***	(0.298)	1.399	(1.455)	0.529	(1.392)	0.060***	(0.512)	-0.902***	(0.298)
Number of obs.		32,308		118,938		4,905		7,417		50,410		100,836
Group 1 mean wage (IDR)		1,357,745		1,759,781		1,456,038		1,291,691		1,357,745		1,441,672
Group 2 mean wage (IDR)		1,441,672		2,244,505		1,574,612		1,447,790		1,759,781		2,244,505
Unadjusted wage gap		5.82%		21.60%		7.53%		10.78%		22.85%		35.77%
Group 1 predicted wage (IDR)		927,789		1,084,305		971,630		813,890		928,198		1,033,023
Group 2 predicted wage (IDR)		1,033,478		1,547,452		1,117,026		1,011,728		1,083,817		1,547,266
Adjusted wage gap (AWG)		10.23%		29.93%		13.02%		19.55%		14.36%		33.24%
Wage structure effect		63.78%		83.67%		87.00%		84.50%		69.23%		46.78%
ATD$^{c)}$		6.52%		25.04%		11.32%		16.54%		9.94%		15.55%

Note:

a) For marital status sub groups, group 1 is female workers, while group 2 is male. For marriage-premium sub groups, group 1 is single workers, while group 2 is married workers.

b) Age and tenure square normalized by 1000.

c) ATD: Adjusted wage gap attributable to discrimination

d) Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Our decomposition results show that female workers actually gain a wage marriage premium rather than marriage penalty as Becker (1981) would expect. In line relevant studies (e.g. Gorman, 2000; Waite and Gallagher, 2000; Lewis, 2001), being married had elevated the importance of earning a higher wage, and would lead to more productive and better jobs. Our findings are also in line with Bear and Glick (2017) who find that the family caregiver penalty can become a breadwinner premium if females present themselves as family breadwinners. However, the extent of the female marriage premium and the male marriage premium are diverged. Detailed decomposition of the female marriage premium show that education attainment contribute the most of the explained components. In case of the male marriage premium, tenure, working hours and types of job jointly contribute the most of the explained component. Additionally, our decomposition also show that the married men earned higher rates of wages not only to the single men but also to the married women. Our findings emphasized that the wage marriage premium are lesser than the wage gap, even after controlling for productivity and non-productivity-relevant variables. Thus, the findings imply that, for Indonesia's case, married female workers no longer face a wage penalty but still have to deal with the gender pay gap.

2.4.5. Breadwinner Models and Family Division of Labour: For Better or Worse?

In this section, we further scrutinize the extent of the adjusted gender wage gap, particularly between selections of breadwinner statutes. Table 2.6 present the decomposition results of gender wage differences of based on the alternative breadwinner model as described in Table 2.1 except non-breadwinners. In this regards, workers categorized to six breadwinners statuses, from primary breadwinners to tertiary breadwinners. Straightforward comparisons of the results between breadwinner statuses shows that the primary breadwinner earned the highest wage rates while single-earners earned the lowest wage rates. These findings suggest that being married and take on breadwinner roles motivates workers, men and women, to earn higher wage rate. Our results also suggest that gender inequality of pay existed in all statuses of breadwinners, which double rolers experienced the highest gap and tertiary breadwinners the lowest adjusted gender wage gap.

Furthermore, the single earners adjusted gender wage gap is lower to all breadwinners except to tertiary breadwinner. In contrast, the wage structure effect of single earners is lower only to tertiary breadwinners. Thus, despite undergo a lower adjusted gender wage gap, single mother most likely earned lower rate of wages and experienced higher wage discrimination at the same time. For tertiary breadwinners, the structure of contributing factors to the adjusted gender wage gap are similar to that estimation on the single workers in the previous section. In both cases of single earner and tertiary breadwinner, education have the higher contribution in the explained component and working hours in the unexplained component.

Table 2. 6 Breadwinner Models and the Adjusted gender wage gap Decompositions

Variables	Primary		Secondary		Single Rolers		Double Rolers		Single Earners		Tertiary	
	Coef.	Robust Std. Err.	Coef.	Robust Std. Err.	Coef.	Robust Std. Err.	Coef.	Robust Std. Err.	Coef.	Robust Std. Err.	Coef.	Robust Std. Err.
Overall Decomposition												
Predicted female wage	13.908***	(0.031)	13.918***	(0.006)	14.269***	(0.027)	13.908***	(0.006)	13.665***	(0.012)	13.728***	(0.007)
Predicted male wage	14.280***	(0.003)	14.163***	(0.057)	14.283***	(0.004)	14.283***	(0.006)	13.851***	(0.022)	13.893***	(0.005)
Difference	-0.371***	(0.032)	-0.245***	(0.058)	-0.014	(0.028)	-0.375***	(0.008)	-0.186***	(0.025)	-0.166***	(0.009)
Explained	-0.098***	(0.017)	-0.115***	(0.040)	0.135***	(0.016)	-0.106***	(0.007)	-0.042**	(0.018)	-0.053***	(0.006)
Unexplained	-0.273***	(0.024)	-0.130***	(0.049)	-0.149***	(0.021)	-0.270***	(0.008)	-0.144***	(0.022)	-0.113	(0.008)
Detailed Decomposition												
Explained Components												
Individual Characteristic												
Age	-0.028***	(0.010)	-0.014	(0.021)	-0.034***	(0.009)	-0.049***	(0.006)	0.022**	(0.011)	0.023***	(0.004)
Age^{2} a)	0.026***	(0.010)	0.019	(0.017)	0.034***	(0.008)	0.043***	(0.005)	-0.030**	(0.012)	-0.027***	(0.003)
Human Capital Investment												
Years of schooling	-0.021***	(0.007)	-0.007	(0.014)	0.066***	(0.006)	-0.002	(0.002)	-0.030***	(0.005)	0.065***	(0.002)
Tenure	-0.031***	(0.006)	0.035*	(0.019)	-0.012***	(0.005)	-0.063***	(0.004)	-0.020**	(0.008)	0.003*	(0.002)
Tenure^{2} a)	0.008***	(0.002)	-0.014*	(0.008)	0.003	(0.002)	0.022***	(0.002)	0.010*	(0.006)	-0.006***	(0.001)
Vocational	0.001**	(0.000)	0.003*	(0.002)	0.000	(0.000)	0.004***	(0.001)	0.000	(0.000)	0.002	(0.000)
Training	0.005	(0.003)	0.029***	(0.004)	0.012***	(0.003)	-0.004***	(0.001)	0.003	(0.002)	0.008***	(0.001)
Employment Characteristic												
Working hours	-0.015***	(0.003)	-0.047***	(0.008)	-0.014***	(0.002)	-0.024***	(0.001)	-0.006*	(0.003)	-0.014***	(0.001)
Urban	0.002	(0.000)	-0.003	(0.002)	0.000	(0.001)	-0.000	(0.000)	0.006***	(0.002)	0.004***	(0.001)
Fulltime	-0.019***	(0.004)	-0.041***	(0.009)	-0.002	(0.003)	-0.024***	(0.002)	-0.005	(0.003)	-0.013***	(0.002)
Secondary job	0.006***	(0.001)	0.004	(0.003)	0.008***	(0.001)	0.011***	(0.001)	0.002**	(0.001)	0.001***	(0.000)
Travel to work	-0.004***	(0.001)	-0.015***	(0.005)	-0.002	(0.002)	-0.012***	(0.001)	-0.001	(0.001)	0.002***	(0.001)
Institutional instrument												
Minimum wage	-0.034***	(0.004)	-0.037***	(0.009)	0.020***	(0.004)	0.000	(0.001)	-0.009**	(0.004)	-0.008***	(0.002)
Occupational Choices												
Informality	0.014***	(0.002)	0.002	(0.001)	-0.015***	(0.002)	0.002***	(0.001)	0.002	(0.001)	-0.007***	(0.001)
occupation	0.022***	(0.008)	0.020	(0.016)	0.134***	(0.009)	0.016***	(0.004)	0.032**	(0.013)	0.016***	(0.004)
sector	-0.028***	(0.004)	-0.048***	(0.011)	-0.063***	(0.005)	-0.024***	(0.004)	-0.019*	(0.011)	-0.100***	(0.004)

Variables	Primary		Secondary		Single Rolers		Double Rolers		Single Earners		Tertiary	
	Coef.	Robust Std. Err.	Coef.	Robust Std. Err.	Coef.	Robust Std. Err.	Coef.	Robust Std. Err.	Coef.	Robust Std. Err.	Coef.	Robust Std. Err.
Unexplained Components												
Individual Characteristic												
Age	-1.358*	(0.726)	0.459	(1.302)	-1.557*	(0.795)	0.025	(0.264)	-0.550	(0.905)	-0.149	(0.143)
Age^{2} a)	0.643*	(0.372)	-0.189	(0.664)	0.978**	(0.423)	0.141	(0.136)	0.361	(0.491)	0.061	(0.065)
Human Capital Investment												
Years of schooling	0.029	(0.056)	0.014	(0.137)	0.182***	(0.066)	0.085***	(0.020)	0.054	(0.035)	0.166***	(0.030)
Tenure	0.157***	(0.074)	-0.128	(0.152)	0.203**	(0.079)	0.222***	(0.027)	0.134	(0.084)	0.046***	(0.016)
Tenure^{2} a)	-0.061*	(0.037)	0.137*	(0.077)	-0.053	(0.043)	-0.067***	(0.015)	-0.067	(0.048)	0.004	(0.006)
Vocational	0.053	(0.033)	0.070	(0.057)	-0.007	(0.027)	0.016*	(0.009)	0.005	(0.038)	-0.003	(0.006)
Training	-0.026	(0.048)	-0.024	(0.118)	0.023	(0.032)	-0.032***	(0.011)	0.039	(0.058)	-0.016	(0.022)
Employment Characteristic												
Working hours	0.129	(0.086)	0.279	(0.174)	0.123	(0.095)	0.099***	(0.027)	0.040	(0.078)	-0.064*	(0.033)
Urban	0.011***	(0.004)	0.027*	(0.014)	0.021***	(0.008)	0.008***	(0.001)	0.0003	(0.001)	0.022***	(0.002)
Fulltime	-0.071**	(0.032)	-0.134	(0.099)	0.020	(0.039)	0.035***	(0.010)	-0.016	(0.025)	0.073***	(0.012)
Secondary job	0.034	(0.032)	-0.056	(0.061)	-0.032	(0.050)	0.008	(0.008)	0.042*	(0.025)	0.033**	(0.016)
Travel to work	-0.020	(0.051)	-0.015	(0.052)	-0.060**	(0.023)	-0.039***	(0.009)	-0.008	(0.049)	-0.036***	(0.009)
Institutional instrument												
Minimum wage	2.936**	(1.479)	-2.070	(2.898)	-0.409	(1.235)	-0.232	(0.419)	-1.804	(1.362)	0.211	(0.416)
Occupational Choices												
Informality	0.002	(0.001)	-0.011	(0.015)	0.020	(0.015)	0.013***	(0.003)	-0.004	(0.007)	0.049	(0.008)
occupation	-0.120***	(0.033)	-0.009	(0.044)	0.013	(0.028)	-0.017*	(0.010)	0.079	(0.048)	-0.012	(0.013)
Sector	-0.004	(0.048)	0.028	(0.047)	-0.100	(0.067)	-0.017	(0.019)	0.020	(0.047)	-0.022	(0.018)
Constant	-2.605*	(1.539)	1.490	(3.030)	0.486	(1.335)	-0.516	(0.443)	1.530	(1.441)	-0.475***	(0.431)
Number of obs.	70,583		32,943		50,981		52,545		7,686		46,178	
Mean female wage (IDR)	1,805,549		1,808,486		2,494,393		1,786,444		1,356,249		1,363,085	
Mean male wage (IDR)	2,315,030		2,297,988		2,320,394		2,321,111		1,510,339		1,497,136	
Unadjusted gender wage gap	22.01%		21.30%		-7.50%		23.03%		10.20%		8.95%	
Predicted female wage (IDR)	1,096,902		1,107,926		1,568,170		1,092,326		860,269		916,209	
Predicted male wage (IDR)	1,591,042		1,415,509		1,590,995		1,588,753		1,036,127		1,080,571	
Adjusted gender wage gap	31.06%		21.73%		n.s.		31.25%		16.97%		15.21%	
Wage structure effect	73.49%		52.98%		n.s.		73.83%		77.39%		n.s.	
ATD b)	22.83%		11.51%		n.s.		23.07%		13.13%		n.s.	

a) Age and tenure square normalized by 1000.

b) ATD: Adjusted wage gap attributable to discrimination

c) n.s.: statistically non-significant wage differential, i.e. insufficient for measuring gender wage gap.

d) *Robust standard errors in parentheses*, *** p<0.01, ** p<0.05, * p<0.1

For married workers, the decision on family division of labour fall into four options, i.e. primary breadwinners, secondary breadwinners, single rolers or double rolers. Between primary breadwinners and secondary breadwinners, married men earned higher rate of wage in former statuses, while married women earned slightly higher rate of wage in latter status. However, the primary breadwinners' adjusted gender wage gap is substantially higher compare to the secondary breadwinners. The detailed decomposition revealed that contributing variables within human capital investment factor (i.e. education, tenure, and training) play a greater part in the explained component of the primary breadwinner's adjusted gender wage gap. For the secondary breadwinners, employment characteristic factor (i.e. working hour, types of job and traveling to work) have the largest effect on the wage gap. These findings highlight the difference in nature of adjusted gender wage gaps between breadwinner models. Accordingly, our results suggest that married women take on primary breadwinners have to deal with differences in human capital to married men. While for taking on secondary breadwinners, married women have to deal with differences in employment characteristic to married men.

In term of comparison between single rolers and double rolers, married men most likely take on the former roles, while married women take on the latter roles. Between single rolers and double rolers, married men earned relatively equal wage rates, while married women earned substantially lower wage rates in double rolers. Interestingly, the adjusted gender wage gap is statistically significant in double rolers' case. The adjusted gender wage gap even higher compare to the primary breadwinners. Similarly, the wage structure effects are also higher in case of double rolers' case. These findings imply that as married women take on double roles, they earned a substantially lower rate of wage and experienced a higher adjusted gender wage gap and a higher potential of wage discrimination.

Detailed decomposition of the wage differences revealed that the extent of the explained component contribution are diverged between single rolers and double rolers. For single rolers, differences in education contribute the lion's share of wage differences. This share played by differences in tenure for double rolers. Additionally, employment characteristic contribution in the explained components are more pronounced to double rolers than single rolers. In the unexplained components, age contributed to a greater share compare to other explanatory variables. This indicate that in the single rolers' case, married women earned a lower rate of wage to married men of equal age, ceteris paribus. In this case, wage discrimination against married women are it the context of age. Other contributing variables in the unexplained component, both for single rolers and double rolers, actually favoured married women. Education, tenure, working hours, residential place, types of job and informality favoured married women for a higher rate of wages to equally married men. The overall findings in this section suggest that a glass ceiling effect

does exist and married working women have to deal will with inequality of pay compared with married working men of equal productivity and equal position.

2.4.6. Gender Wage Gap Decomposition: Roles of the Regional Minimum Wages

Our wage determinant analysis show a significant role of the regional minimum wage, with higher coefficients for the wage rate of female workers. Since minimum wage is set at the sub-provincial level, not at the individual level, the twofold decomposition results imply different effect of the regional minimum wages, as we would expected with the other explanatory variables. The extent of minimum wage roles in decomposition of the gender wage gap are also different. The contribution of a regional minimum wage in the explained component rationalizes the role of differences in regional minimum wage in wage differences (i.e. 'between' endowment effect), while the contribution of minimum wage in the unexplained component rationalizes the role of differences in wage structures within each regional minimum wage rate (i.e. 'within' wage structure effect). Thus, the sum of both effects determine the aggregate effects of minimum wage and determine the compression or depression effect of regional minimum wages on the gender wage gap.

Table 2. 7 Minimum Wage Roles in the Gender Wage Gaps

Sub Samples	in Explained Component		in Unexplained Component	
	Coef.	Robust Std. Err.	Coef.	Robust Std. Err.
1. Baseline	-0.017***	(0.001)	0.186	(0.238)
2. Newcomers	-0.018***	(0.001)	0.241	(0.246)
3. Active	-0.017***	(0.001)	0.143	(0.244)
4. Passive	0.029***	(0.007)	-0.034	(2.365)
5. Single	-0.003	(0.002)	-0.362	(0.500)
6. Married	-0.020***	(0.001)	0.277	(0.288)
7. Divorced	-0.008*	(0.004)	-2.187	(1.396)
8. Widowed	-0.021***	(0.004)	-0.690	(1.298)
9. Female Marriage Premium	-0.003***	(0.002)	-0.362***	(0.500)
10. Male Marriage Premium	-0.020***	(0.001)	0.277***	(0.288)
11. Primary Breadwinner	-0.034***	(0.004)	2.936**	(1.479)
12. Secondary Breadwinner	-0.037***	(0.009)	-2.070	(2.898)
13. Single Rolers	0.020***	(0.004)	-0.409	(1.235)
14. Doubles Rolers	0.000	(0.001)	-0.232	(0.419)
15. Tertiary Breadwinner	-0.008***	(0.002)	0.211	(0.416)
16. Single Earners	-0.009**	(0.004)	-1.804	(1.362)

**p<0.1, **p<0.05, ***p<0.01*

Summarized in Table 2.7 above, our detailed decomposition results show that in most sub-samples, the contribution of the regional minimum wages on the explained components are negative and statistically significant. The results imply that a higher rate of regional minimum wage partially contributes to a higher gender wage gap. In contrast, the effect of regional

minimum wage on the unexplained component is only significant in terms of the wage premium and primary breadwinners. The coefficient of the regional minimum wages in the unexplained component is statistically significant and considerably higher than in the explained component. This indicate that the between effects of the regional minimum wages are more pronounced than the within effects. For the case of the male marriage premium and primary breadwinners, the coefficient is positive. This result suggest that the regional minimum wages might contributed in narrowing the gender wage gap. However, the effects are hindered by the fact that higher wage rates in one sub-province lead to a higher gender wage gap. As the effect of the regional minimum wages on the gender wage gap is trivial, a stronger within effect are essential to overcome the between effect of the regional minimum wages and eventually improve its contribution on the narrowing gender wage gap.

2.5. Conclusion

As an important initial step of the gender wage differences decomposition, our wage determinant analysis shows that most explanatory variables within each factor of individual characteristic, human capital investment, employment characteristic, institutional instrument, and occupational choices are statistically significant. In the next step, our wage differences decomposition analyses, revealed several interesting results. In general, the gender wage gap exists regardless of states of working history or priority of activities, marital and breadwinner statuses. In terms of marital status, married workers earned the highest wage rate, but also undergone the highest gender wage gap. In addition to those findings, our decomposition analysis also revealed that married working women no longer experienced a wage penalty, as traditional family division of labour would argue, but instead gained a wage premium. Nevertheless, the wage premium of married working women is considerable lower relatively to married-working men.

In term of breadwinner status, men tend to take on primary single role while women take on secondary double roles. As married women take on double roles, they earned a substantially lower rate of wage and experienced a higher adjusted gender wage gap and a higher potential of wage discrimination. These findings suggest that being both breadwinner and caregiver motivates workers to earn higher wages. However, despite the fact that married women earned higher rates of wage to single women, the gender wage gap and the gender wage discrimination persisted. Even between married working women and married working men who decided to take on double roles, as breadwinner and caregiver for the family. The overall findings suggest that a glass ceiling effect does exist and married working women have to deal will with inequality of pay to married working men of equal productivity and equal position.

While the role of regional minimum wage as the current institutional instrument in labour market is still trivial, it may be possible to make it an effective policy instrument toward more equal pay.

National and regional stakeholders of the regional minimum wages legislation need to promote stronger role of the instrument in narrowing the gender wage gap.

Additionally, policy options toward more equal pay are abundant. They range from less obligatory indirect actions (i.e. sharing information and awareness, capacity building, and empowering collective action) to obligatory straightforward policies (i.e. improved monitoring, implementing incentives for compliance, and targeted labour inspection). Improving human capital investment in all aspects will certainly remain a key factor in achieving equal pay. Given the gravity of achieving equal pay, future research should be extended to include intertemporal and interregional analysis of gender equality of pay. Further studies considering other factors related to family division of labour are also recommend.

CHAPTER 3

BOOMERS, GEN-XERS AND MILLENNIALS IN INDONESIA: THE STRUGGLE FOR INTERGENERATIONAL EQUALITY OF PAY

"Have confidence in the young people, give them a chance, and they will surprise you"

~Kofi Atta Annan~

Abstract

As younger workers in the labour market, millennials have become the centre of attention as they are expected to play an important role in the future of nations. However, statistics have revealed that millennials across the globe currently earn lower rate of wages than preceding generations, gen-Xers and boomers. We extend previous studies by investigating intergenerational equality of pay in two general forms; the youth wage gap and the elderly wage gap. In addition to the aggregate intergenerational wage gap, we also examine the intersectional intergenerational wage gaps, taking into account several wage-premium generating factors. Utilizing the Indonesian National Labour Force Survey of 2015, we performed the twofold regressions compatible Oaxaca-Blinder decomposition method to examine the size of wage gaps and the extent of its contributing factors and variables. The findings suggest the incidence of youth wage gaps and elderly wage gaps in the Indonesian labour market, even after considering productivity and non-productivity relevant factors and variables. In most cases, youth wage gaps are substantially higher than elderly wage gaps and both are attributable to different contributing factors. Our findings indicate that wage discrimination might exist in different direction. Millennials might struggle the most in terms of the wage gap, particularly due to differences in tenure, but boomers struggle the most in terms of wage discrimination. The estimates also suggest the incidences of the wage premium of higher education, specialization, urban residential place, informal jobs, and traveling to work.

JEL Classification: I24, J24, J31, O18, C21

Keywords: Intergenerational equality of pay, wage decomposition, return on education, urban-rural disparity

3.1. INTRODUCTION

Current labour markets worldwide consist of multiple generations of workers, including millennials, gen-Xers, and boomers. In the workplace, millennials are characterized as producing meaningful work, finding creative outlets and preferring immediate feedback (Huyler, Pierre, Ding and Norelus, 2015). As younger workers in the labour market, millennials have become the centre of attention as they are expected to play important roles in the future of all nations. In the next decade, they will reach the peaks of their careers and make important decisions for their countries. However, statistics reveal that millennials across the globe currently earn less compare to their predecessors, i.e. boomers and gen-Xers. The American Community Survey (ACS) revealed that in 2016, millennials earned less income in all US states. Similarly, Organisation for Economic Co-operation and Development (OECD) data show that the average youth wage gap of OECD member countries in 2015 was approximately 38 percent[14].

Casserly (2011) argued that the wage gap between generations represents a new inequality of pay, exceeding the global gender wage gap, which has narrowed in recent years. Similarly, Gill, Knowles and Steward-Patterson (2014) emphasized that the income gap between young and old workers represents the new income divide in Canada. Additionally, Gill, Knowles and Steward-Patterson (2014) emphasized that the income gap between young and elderly workers grew faster for women than for men. The Trade Union Congress (TUC) report in 2018 emphasized that on average younger workers, mostly millennials, are paid less than older workers and make less career progress in the labour market relative to previous generations (TUC, 2018). Additionally, to a larger degree, millennials might also be affected by wage stagflation, be concentrated in low paying jobs, and are vulnerable in terms of work security. In fact, millennials have been adversely affected by economic down turns and structural factors (Gardiner and Gregg, 2017).

Equality of pay was ratified internationally not only as a labour right but also a human right[15]. Accordingly, the International Covenant on Economic, Social and Cultural Rights (ICESCR) in 1966 acknowledged that equality of pay applies to all workers, without discrimination based on demographic factors including age[16]. In this regard, intergenerational inequality of pay is an important part of equality of pay. Accordingly, each generation has different characteristics and

[14] The youth wage gap is measured as a percentage of average wage differences of young workers (15-24 years old), which is generally equal to the millennial cohort who are adult workers (25-54 years old).

[15] The Treaty of Versailles (1919) first acknowledged equal pay as part of human rights and the Equal Remuneration Convention (1951), first acknowledged equal pay as part of labour rights.

[16] Article 2 of ICESCR states that equality applies to all workers without discrimination of any kind, including race, color, sex, language, religion, political or other opinion, national or social origin, property, birth or other status including age and any other situation with the aim of impairing the equal enjoyment or exercise of economic, social and cultural rights. Age is included as a factor of discrimination that is described later in General Comment No.18 of Article 6 of ICESCR.

workplace attitudes, defined by experiences in their respective time (Nnambooze and Parumasur, 2016). Metcalf (2009) also argued that difference in industries and production technologies might affect relative productivity of different age groups. The intergenerational inequality of pay is attributable to productivity-relevant factors (e.g. education, training, and specialization) and non-productivity-relevant factors (e.g. segregation and discrimination).

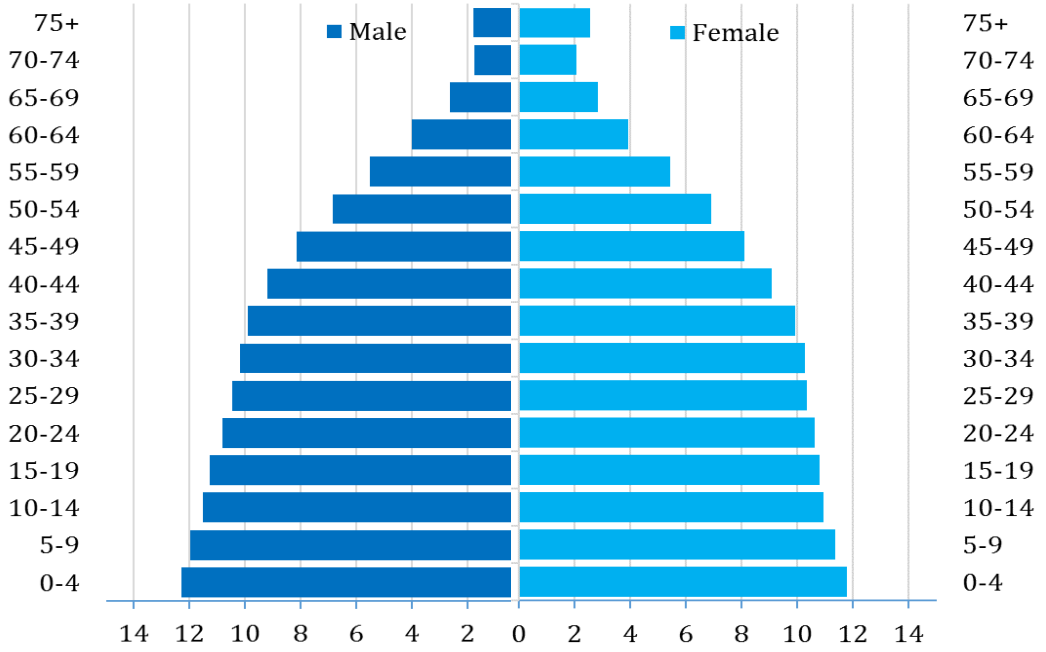
Hence, to examine the contribution of productivity-relevant factors and non-productivity-relevant factors is important for improving the intergenerational inequality of pay. However, the literature on the age inequality of pay is not as extensive as the gender inequality of pay. General age groups are commonly used in the studies addressing the age wage gap (e.g. Grimshaw, 2014); only a few are based on generational cohorts (e.g. Kurz, Li and Vine, 2018). The studies that specifically examined the intergenerational inequality of pay, however, mainly used the unadjusted wage gap measurement (e.g. Bialik and Fry, 2019; TUC, 2018). The unadjusted wage gap is practical but cannot take into account the size and direction of contributing factors of the gap. Alternatively, the adjusted wage gap and decomposing the wage differences within and between productivity and non-productivity-relevant factors offers the advantages of examine the size and direction of those contributing factors. By combining the unadjusted and the adjusted wage gap analyses, this study complements the literature in two ways. First, we focus on the intergenerational inequality of pay, particularly the millennials, gen-Xers, and boomers. Second, as an alternative to the few intergenerational unadjusted wage gap analyses, we developed an adjusted intergenerational wage gap analyses and then decompose the wage differences to examine the extent of the wage gaps.

The Indonesian labour market offers an interesting background for examining the intergenerational wage gap for several reasons. First, Indonesia is undergoing a demographic transition where the labour force is expected to rise substantially in the coming decade. The working age population in 2015 is 65 percent of the total population and is projected to substantially increase and peak in 2031 by 70 percent (Figure 3.1.). Millennials comprise the bulk of the working age population, which currently contributes 35.1 percent of workers and 59.93 percent of unemployment. The youth unemployment rate in 2015 is approximately 22.6 percent. The rate has remained constant at around 20 percent for the last 5 years. The incoming working age population can embrace the demographic dividend if they can be absorbed efficiently into the labour market. Otherwise, unemployment will rise, leading to other problems, and the incoming labour force will instead become a demographic burden.

Second, the urban formal sector in Indonesia grew substantially since the oil boom in the 1970s (Azis, 1997). The boom generated jobs, and with it, a growing urban population due to migration. Cities are growing at a rate of 4.1 percent and by 2025, 68 percent of the population is expected

to live in cities. Unfortunately, Indonesia has not gain any advantages from those growing urban population. The Indonesian economic growth elasticity in terms of urbanization is 4 percent, while Thailand, China, and India have achieved 7 percent, 10 percent and 13 percent (World Bank, 2012). Instead, many problems rise because of urbanization, including rural-urban labour market disparity leading to labour market dualism. Promoting a more efficient labour market is key for channelling not only a demographic dividend but also an urbanization dividend.

Figure 3. 1 Indonesia Population Pyramid 2015 (in millions headcount)



Source: Statistics Indonesia, 2013, reproduced.

Third, the Indonesian labour market became an integral part of the ASEAN Economic Community (AEC) in 2015. AEC introduced the free movement of skilled labour for people associated principally with trade in services and investment (ADBI, 2014). Several policies were enacted to support the AEC changes, which are expected to have a positive effect on ASEAN members, especially for lower-middle income countries including Indonesia. In those countries, high-skilled employment is expected to increase between 0.3 to 1.4 percent while wage rates are expected to increase by 10 to 20 percent by 2025 (Adhisti, 2018). Consequently, Indonesia faces competition from the implementation of ASEAN integrated labour market, especially in terms of the incoming working age labour force. Fourth, Indonesia is also committed to mainstreaming the national development to the Sustainable Development Goals 2030 (SDGs 2030). Target 8.5 of the SDGs 2030 aims for full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value. This goal

explicitly addresses the importance of narrowing the intergenerational wage gap, particularly in regards of younger generations.

A twofold regression compatible Blinder-Oaxaca decomposition method is applied on the National Labour Force Survey (SAKERNAS) 2015 dataset to examine the extent of the intergenerational inequality of pay in Indonesia. Specifically, this paper (i) examines the size and direction of intergenerational wage gaps; (ii) examines the extent to which returns to education and specialization affect the intergenerational wage gap; and (iii) examines the extent to which traveling to work and urban-rural residencies affect the intergenerational wage gap. The remainder of this paper is structured as follows: Section 2 provides a discussion of the relevant literature; Section 3 explains the data and estimation strategy; Section 4 deals with the presentation and interpretation of the empirical results; and finally, Section 5 concludes.

3.2. LITERATURE REVIEW

3.2.1. Dual Labour Market and Age Inequality of Pay

Doeringer and Piore (1971) introduced dual labour market theory that distinguished between primary and secondary labour markets. They argued that the primary labour market has the advantages of high rate of wages, good working conditions, stable employment, opportunities for career advancement, and both equity and due process in the administration of working conditions. On the contrary, the secondary market is characterized by low rate of wages and fringe benefits, poor working conditions, high labour turnover, few opportunities for career advancement, and both arbitrary and capricious supervision. Accordingly, the duality of labour markets is characterized by, among others, inequality of pay between workers in the primary market and secondary market.

The inequality of pay is commonly measured as the wage gap and has multi-dimensional concerns[17]. The gender wage gap, including the marriage wage gap and motherhood wage gap, has received substantial attention compared to other strand of wage gaps, including the age wage gap. However, recent studies find that the age wage gap might be the new wage gap as it is exceeding the gender wage gap, which has been narrowing in recent years (Casserly, 2011; Goodman, 2014). Accordingly, the duality of labour market in terms of age is concentrated at both ends of the age wage spectrum. Younger workers and older workers are considered as the disadvantaged groups as they are most likely at the bottom of the wage distribution (Tigges, 1988; Metcalf, 2009). Adult workers, however, are considered as the advantaged groups as they are at the peak of the age wage spectrum and benefit the most from higher productivity-related

[17] The wage gap and pay gap are used in the literature interchangeably, while computation method are diverse.

factors. Therefore, the wage of adult workers is treated as a reference point when measuring the youth and elderly wage gaps.

Described alternatively as the youth wage discount, the youth wage gap occurred in almost all OECD countries despite the declining share of young workers in corresponding periods (Blanchflower and Freeman, 2000). Similarly, Kapsalis, Morisstette and Picot (1999) find that in the United States, the youth wage gap has increased in recent years. In terms of the elderly wage gap, Campbell (1999) argues that even though older workers are received a decent pay, there is a wage gap when their contribution to the work exceeds the compensation they receive. The correlation between diminishing returns to age and diminishing productivity of age explain the phenomenon, where wages plateau earlier than productivity and even declines with older age. Deviating from these correlations, Marina (2017) concluded that favouritism of older workers, rather than productivity differences, contributes to the reversal of the elderly wage gap.

The youth wage gap is in most cases attributable to productivity-relevant factors and will develop as they age. While the elderly wage gaps in most cases attributable to non-productivity-relevant factors, including wage discrimination. For those reason, the elderly wage gap has received more attention compare to the youth wage gap (Metcalf, 2009), despite the fact that discrimination occurs at all ages (Metcalf and Thompson, 1990). Complexity of the age wage gap extended as it is also attributable to the coinciding of three effects, i.e. age, cohort, and period (Tigges, 1988). Tigges argued that the size of cohorts and educational level of birth cohorts influence the returns to age, while the effect of change in cohort experiences overlap with the effect of period in trivial correlation. Thus, the extent of both the youth and elderly wage gap are distinctive yet interconnected. The breakdown of productivity and non-productivity relevant factors and their contribution to the wage differences will be elaborated in the next section.

3.2.2. Intersectional and Intergenerational Wage Gap

In the existing literature, age complements the gender wage gap or other dimensions of inequality of pay when conducting intersectional wage gap analyses. Mariuci and Marcela (2017) examined the gender wage gap in Paraguay of three different age groups, younger, adult, and older workers. Using a quantile-pooled regression method, they argued that the gender wage gap is the highest for adult workers, despite there is still pay inequality towards both ends of the age distribution. The gender wage gap was the lowest for the older workers group, due to less attachment of older women to the labour market and those with higher abilities stay in the market. While Chiara, Matteazzi and Petrarca (2014) studied the gender wage gap by age group for the cases of France, Italy, the Netherlands, and the United Kingdom. They found a gender wage gap in all countries and that the gap tended to increase with age. They also argued that the glass ceiling effect increased as women get older, starting at the age of 30.

An alternative measure to the age wage gap is an intergenerational wage gap. The initial step to estimate this wage gap is to define the term generation. There are three common definitions in the general literature, and particularly in labour economics. The first is generation defined as a group of ages with various interval, mostly 5 years for shorter intervals and 10 years for longer intervals. In the latter segmentation, it is used to represent dynamics in the corresponding labour market, and described as generation 1970's, 1980's, and so forth (e.g. Aydemir and Skuterud, 2005). The second definition of generation is based on age groups and based on family relationships. Under this definition, generation is commonly referred to as children, parents, grandparents, and so forth (e.g. Epstein and Lecker, 2001). This definition is used to highlight the roles of the previous generations (i.e. parents) in making human capital investment decisions of the next generation (i.e. children). It is also used to compare certain traits, abilities, and knowledge that is passed on between generations, which might be related to productivity at work or regional and cross-sectional types of occupations.

Third, based on the Strauss–Howe generational theory, generations are segmented in approximately 20 years intervals, representing the length of a life cycle, from childhood, youth, adulthood, midlife, to elderly (Kuron, Lyons, Schweitzer and Ng, 2015). In this theory, a starting year of a generation is described as the turning point, while the span of each cohort associated with historical events of new social, political or economic climates. Each generation has different characteristics, which concerning the workers' and employers' relationship, might also be associated with different work attitudes and values (e.g. Becton, Walker, Jones-Farmer, 2014; Kaifi, Nafei, Khanfar and Kaifi (2012); Parry and Urwin, 2011). According to their generational segmentation, and in combination with the workforce age cohort, the current labour market consists of boomers, gen-Xers, millennials, and gen-Zers in consecutive order. All the variations in terms of the definitions and cohort segmentation of generations are used interchangeably and in some cases overlap in the empirical literature. Thus, it is imperative to consider the nature of the generational term used in both prior and further analysis the wage gap.

Accordingly, there are at least three divergent views in the existing literature which explicitly define the intergenerational wage gap. The first view is that equal to the cohorts' age wage gap, workers should be segmented using a constant interval cohort of age for the overall labour force. Here, the literature mainly examines the contribution of individual attributes and characteristics, which are perfectly substitutable and less conditionalized for the workers at any point of time and in their respective cohort. In short, this can be described as the non-conditionalized intergenerational wage gap. In the empirical literature, Rupert and Zanella (2015) concluded that younger and older workers who experienced an age wage gap indicate that earnings rise with age up to the 50's at which point they begin to decline. Two important contributing factors of

declining wages are the decline in benefit of human capital investment and increasing marginal disutility of work.

The second view, the *posteriori* conditional intergenerational wage gap, defines generation similarly to the first view, but adds an external contributing factor, demographic incidences and economic outcomes of the wage gap. Kingman and Seager (2014) defined the intergeneration wage gap as the difference in median gross weekly pay across five age groups starting with 18-to 21-year-old workers. They utilized empirical external wage differential contributing factors in explaining the intergenerational wage gap. Results of this study showed that an intergenerational wage gap exists. They argue that the wage gap between millennials (workers under 21 year of age) and boomers (workers over 50 year of age) has risen by over 50 percent since 1997, due to increases in the cost of living in the United Kingdom.

The third view, the *priori* conditional intergenerational wage gap, attributes generations to specific age cohorts and includes individual attributes, demographic incidences, and economic outcomes across segments of workers. In this area of research, workers are considered imperfect substitutes as certain age cohorts are specifically assigned to a specific generation based on their birth cohorts. Gardiner and Gregg (2017) used earnings data of workers from 1975 to 2016 to categorize generations of workers. Each generation of workers were determined by the birth cohort of workers in consecutive order: greatest generation (1911-1925), silent generation (1926-1945), baby boomers (1946-1965), generation X (1966-1980), and millennials (1981-2000). In the study on the UK, the results suggested that in the twenty-first century, all generations have been affected by wage stagnation and falling wages, and millennials have suffered the most.

3.2.3. Age and Earnings Differential Factors

Many studies on earnings differential have been motivated by the human capital investment theory[18]. Based on early works on human capital investment dating back to *The Wealth of Nations* by Adam Smith in 1776, Becker (1962, 1964), Mincer (1958, 1962, 1974), and Schulz (1960, 1961) reinforced the theory in individual worker perspectives. Mincer (1974) emphasized that although earnings is a function of experience, rather than age, age is still relevant. Age is a factor in the depreciation of human capital, whether it is innate or acquired. Mincer (1974) modelled age and earnings as a concave curve throughout an individual worker's life cycle. Thus, wage rises when an individual enters the market, and continues until an optimal point of age where it start

[18] For more recent studies, see e.g. Grönlund and Magnusson, 2016; Hirsch, König and Möller; Lips,2013; Hohberg and Lay, 2015; Blau and Kahn, 2016.

to decline to the point of retirement. Klevmarken and Quigley (1975) extended the human capital model of the earnings differential by distinguishing age from experience.

Regarding the worker life cycle, Göbel and Zwick (2009) emphasized that after the peak point, the decline of earning is slow and depends on individual and occupational characteristics. Other factors potentially reshape depreciation and shift the potential peak point of human capital investment with regards to the age-earnings profile. The first factor is the type and time required for human capital investment. Age alone represents innate abilities, e.g. physical strength and psychological characteristics at birth, assumed to form the initial and baseline of the age-earnings profile curve or the hump-shaped curve (Rupert and Zanella, 2015). While acquired abilities will steepen the baseline age-earnings profile for an additional human capital investment (Becker, 1975). It might also shift over the entire life cycle of the age-earnings profile.

The second factor is the continuity between working and investing in human capital. Therefore, variations in the age of completion of human capital investment will complicate the profile (Klevmarken and Quigley, 1976). Individuals might withdraw from full-time work for short or long periods on the way to earning a degree and might even need to take on part-time work intermittently. This could shift the peak of the wage to an older age and reshape the age-earnings profile. Klevmarken and Quigley (1976), add differences in the age of entering or re-entering the labour market as the third factor to cause shifting in the age-earnings profile. Thus, two workers of equal age might earn different wage rates at a certain point of time, ceteris paribus. In contrast to other dimensions, using age as an identifier for comparing wages of advantaged groups with disadvantaged groups may reflect cohort differences instead of age differences (Metcalf, 2009).

Furthermore, Becker (1962) proposed that individuals enhance their innate abilities (i.e. psychical and psychological characteristic at birth) with investment in schooling, training, medical care, acquired information, and others for the improvement of earnings. Differences between educational degrees and subjects are also suggested to contribute to an earnings differential (Brown and Corcoran, 1997; Paglin and Rufolo, 1990). From the employer's perspective, Burdett (1978), in terms of job search theory, proposed that employers might increase wage cost gradually to worker's tenure as a back-loading measure due to the uncertainty of a worker's commitment to tenure at the job. Similarly, Jovanovic (1979) proposed matching theory where an increase in the wage rate represents an employer's effort in maintaining an efficient relationship with the worker.

Despite human capital investment, the employment characteristic also contributes to earnings differences. From the spatial labour market perspective, workplace preference is commonly associated with residential and transportation preferences. The access-space model of urban spatial structures is largely used to interact residential, transportation, and labour markets. The

model explains how interactions influence mobility between labour markets. Spatial differences in residential prices, taking into account transportation cost or earnings potential, may influence individuals decisions to move or stay in various place (Haas and Osland, 2014). If the utility of residential choice and transportation choice can be maximize through temporal mobility, then commuting between places is potentially attributable to wage differences. Accordingly, Hazans (2004) concluded that, among other factors, travelling to work (i.e. from rural to urban area) tend to have significant earnings gains. Alternatively, if those with equal utility can maximize their utility through permanent mobility, migrating between places is preferred and generates differences in earnings between two places, e.g. rural and urban regions. D'costa and Overman (2014) identified the existence of a rural-urban wage gap, described as an urban premium, in Britain, covering the 1998-2008 period.

Other contributing factors to a wage differential are institutional instruments of the labour market. Minimum wage is the most frequently studied institutional instrument of the labour market. Minimum wage legislation aims to protect workers from being disproportionately situated at the bottom of the wage distribution. Since young workers and older workers are mostly clustered at the bottom of the wage distribution, minimum wage expected to have a positive effect on both groups' wages. Regarding the fact that younger workers are in the bottom of wage distribution, Card (1992) study the effect of minimum wage on younger workers in the United States. Card concludes that rise in federal minimum wage have a positive effect on the wage of younger workers. For a case where a minimum wage legislated specifically for younger workers, Grimshaw (2014) concluded that the effect have significant effect on the youth wage structure. Grimshaw emphasizes that a high share of young workers actually paid at minimum wage rates. However, he also stresses that some countries suffer from non-compliance problems with the young minimum wage legislation.

Hence, minimum wage can potentially affect not only workers with lower rate of wages but also workers with higher rate of wages. Accordingly, minimum wage might also affect adult workers with a higher wage rate. Spillover effects represent a positive effect of minimum wage on workers with lower wages (Margolis, 2014), while numeraire effects represent positive effects of minimum wage on workers with higher wages (Maloney and Nuñez, 2004). Additionally, minimum wage does not necessarily affect disadvantaged workers in the same magnitude as their corresponding group. Dispersion between spillover effects and numeraire effects of minimum wage contribute positively towards narrowing the wage gap and are described as a compression effect (Lemos, 2004, 2009; Machin, Manning and Rahman, 2003). A negative dispersion between spillover effects and numeraire effects, however, contributes negatively toward the widening wage gap, described as a depression effect.

3.2.4. Age-based Segregation and Discrimination

The age wage gap is not only attributable to productivity-relevant factors, but also to non-productivity factors including wage discrimination. Becker (1971) described discrimination as differential treatment of two individuals with identical observable productive characteristics, due to an observable non-productive characteristic. This taste-based discrimination reflects the acceptability of workers. Consequently, disadvantaged workers receive disproportionately lower wages in order to be hired. One phenomenon that could lead to taste-based discrimination is occupational segregation. Overcrowding theory (Bergman, 1974) explains occupational segregation as a phenomenon where certain groups of workers are found in certain occupations based on demographic characteristics across and within those occupations. The former distribution refers to horizontal occupational segregation while the later refers to vertical occupational segregation, which is also known as the glass ceiling effect (Charles, 2003). Thus, segregation considered as discrimination if it is driven by non-productivity-relevant factors such as employer preferences.

Rather than taste-based discrimination, Arrow (1771) and Phelps (1972) argue that discrimination is the result of perceived characteristics or attributes of a certain group of workers. In this regard, it can be described as statistical discrimination or determinist discrimination. Employers might use expectations, real or presumed, of the productivity of those workers in disadvantaged group and offer them a lower wage rate (Berson, 2016). With or without segregation, age-based discrimination, generally referred to ageism, occurs when a negative age-based stereotype is assumed to be indicative of the capability of a member of that age group rather than considering the individual's true capability regardless of their age (Ghosheh, 2008). To some extent, age discrimination is considered as a special case of ageism, where prejudice, discrimination, and stereotyping are believed to affect behaviour and cognition (McMullin and Marshall, 2001). Discrimination against younger workers is described as adultism, while discrimination against older workers described as jeunism. Apascaritei et al. (2014) and Stypińska and Nikander (2018) empirically analyze age-based discrimination against younger workers, while others (e.g., Saphiro and Sandell, 1985; Ghosheh, 2008) study age-based discrimination against older workers. The literature largely centres on the elderly wage gap as it is attributed mostly to discrimination, while youth wage gap is attributed to productivity-relevant factors (Metcalf and Thompson, 1990; Metcalf, 2009).

3.3. DATA AND EMPIRICAL STRATEGY

3.3.1. Data

Our main data source is the Indonesian National Labour Force Survey (NLFS), also referred to as SAKERNAS in Bahasa. The survey covers nation-wide labour market characteristics of all working

age individuals of the sampled households. We use the August round of the 2015 survey with more than 500,000 working age individuals. Of the overall sample, we selected individuals aged 15 to 64 years and having reported to have worked in the previous week. We intentionally chose aged 15 to 64 years as a cut off to create a sample of the working age population and to ensure that children and the elderly were not included. Three groups of workers are categorized by age range according to generational cohorts. We assign generation group using birth cohorts according to Strauss and Howe (2000), which categorizes the 1943-1960, 1961-1981, and 1982-2000 birth cohorts as boomers, gen-Xers and millennials. Since we used SAKERNAS 2015, we categorized generations according to their age, which are boomers (age 55-64), gen-Xers (age 34-54) and millennials (age 15-33). Thus, age 64 for boomers is the upper limit, rather than age 72, to ensure than we do not include retirement-age workers. After the selection process, our aggregate sample consists of more than 160,000 workers.

3.3.2. Empirical Strategy

Our analysis of the intergenerational equality of pay is conducted as pair analyses, between disadvantaged and its corresponding groups. The intergenerational wage gap treats millennials and boomers as disadvantaged worker groups while gen-Xers treats as the corresponding group for both disadvantaged worker groups. The analysis is performed in two steps, first is the wage determinant estimation and then the wage difference decomposition. The first step estimates the wage determinant for disadvantaged, corresponding, and pooled of both groups with the inclusion of a cohort membership dummy variable as explanatory variable in the pooled group estimation. While the second step estimate and decomposes wage differences, and examine the explained and unexplained components of the wage differences in regards of its contributing factors and variables.

The wage differential estimations are based-on a Mincerian earnings function, from which we introduce additional contributing factors that can be specified as follows:

$$\ln w_{i(D,C)} = a_0 + a_{1j}L^j_{i(D,C)} + a_{2j}H^j_{i(D,C)} + a_{3j}C^j_{i(D,C)} + a_{3j}O^j_{i(D,C)} + a_4 I_m + \varepsilon_i \qquad (3.1)$$

Where each worker (i) belongs to either the disadvantaged group (D), or its corresponding group (C). Our variable of interest, nominal wages (w) are in natural logarithm form. Several explanatory variables are examine within each contributing factor of individual characteristic (L), human capital investment (H), employment characteristic (C), occupational choices (O) and institutional instrument of labour market (I)[19]. Weber and Wolter (1999) provide a valuable

[19] Weber and Wolter (1999) were relied upon in our modification of the basic Mincerian earnings function, particularly in determining the gender wage gap and its differential contributing factors and explanatory variables.

consideration in our modification of the basic Mincerian earnings function, particularly in determining the composition of contributing variables within each factor. Additional details on these variables and the operational definition are described below. The final specification of equation (3.1) will set as the basic model for the second step of our analysis.

In the second step, decomposition analysis is intended to disentangle wage differences between the disadvantaged worker group and their corresponding group. Accordingly, we utilize the Oaxaca-Blinder method (Oaxaca, 1973; Blinder, 1973). This method decomposes the wage difference's contributing components, factors, and variables based on the human capital theory and the discrimination theory. The decomposition compiles all theoretical and empirical contributing factors and variables, differentiating between disadvantaged groups and their corresponding groups. This method is chosen for three particular reasons that reflect back to the objectives of this study. First, it estimates the mean wages of each group and wage gaps across both groups, i.e. calculated the adjusted wage gap. Second, it decomposes the adjusted wage gap for different components. Third, it decomposes the wage gap into further detailed contributing factors and variables.

Assuming that the wage gaps are attributed separately to observable and unobservable factors, the estimation of mean wage of each group is based on the wage differential of equation (3.1) which in more general form can be specified as follow:

$$w_g = \beta_g X + \varepsilon_g, \qquad E(\varepsilon_g) = 0 \quad g\epsilon(d, c) \tag{3.2}$$

Where (X) is a vector of contributing variables, (β) is the slope of parameters and intercept, and (ε) is the error term. Accordingly, mean linear prediction of the wage gap between disadvantaged group (D) and their corresponding group (C) are computed as:

$$R = E(w_D) - E(w_C) \tag{3.3}$$

because:

$$\mathrm{E}(\mathrm{w_g}) = \mathrm{E}(\mathrm{X'_g}\hat{\beta}_\mathrm{g} + \varepsilon_\mathrm{g}) = \mathrm{E}(\mathrm{X'_g}\hat{\beta}_\mathrm{g}) + \mathrm{E}(\epsilon_\mathrm{g}) = \mathrm{E}(\mathrm{X_g})'\hat{\beta}_\mathrm{g} \tag{3.4}$$

The mean linear prediction of the wage gap between those two groups can be computed as:

$$\mathrm{R} = \mathrm{E}(\mathrm{w_D}) - \mathrm{E}(\mathrm{w_C}) = \mathrm{E}(\mathrm{X_D})'\hat{\beta}_\mathrm{D} - \mathrm{E}(\mathrm{X_C})'\,\hat{\beta}_\mathrm{C} \tag{3.5}$$

Assumes that $\mathrm{E}(\beta_g) = \hat{\beta}_g$ and $\mathrm{E}(\varepsilon_g) = 0$.

Following the estimation of mean wage differences between the two groups, we exploit a twofold decomposition approach for our decomposition analyses. The approach assumes the existence of a non-discriminatory coefficient vector, which serves as a counterfactual parameter to at least one of those two estimation groups. Then, the contribution of differences in observable and unobservable variables towards the wage gaps can be estimated. If $\bar{X}_D$ and $\bar{X}_C$ are the mean

estimates of $E(X_D)$ and $E(X_C)$, the twofold decomposition of wage differences can then be estimated as:

$$\mathrm{R} = \{\bar{X}_D - \bar{X}_C\}'\hat{\beta}^* + \{\bar{X}'_D(\hat{\beta}_\mathrm{D} - \hat{\beta}^*) + \bar{X}'_C(\hat{\beta}^* - \hat{\beta}_\mathrm{C})\} \quad (3.6)$$

The first fold of the wage gap decomposition, the explained components (Q), is specified in the right-hand side of above wage differences specification (R) as:

$$Q = \{\bar{X}_D - \bar{X}_C\}'\hat{\beta}^*$$

This component estimates the contribution of observable factors to the wage differences where the coefficient of estimation represents the endowment effect on the wage gap. Whereas the second fold is described as the unexplained component (U), and is specified on the right-hand side of above wage differences specification (R) as:

$$U = \{\bar{X}'_D(\hat{\beta}_\mathrm{D} - \hat{\beta}^*) + \bar{X}'_C(\hat{\beta}^* - \hat{\beta}_\mathrm{C})\}$$

In contrast to the first fold, this second fold estimates the occurrence of wage differences in the absence of differences in the explanatory variables, commonly described as wage structure effect. Although this component is commonly associated with a wage discrimination effect, it is critical for distinguishing between a discrimination effect and the underlying effect of unobserved variables.

For each decomposition component, there are non-discriminatory parameters (β*) as in equation (3.6), estimated using a non-discriminatory wage structure method. Oaxaca (1973) and Blinder (1973) originally assumed that discrimination is directed toward only one of the groups so that $\beta^* = \beta_C$ or $\beta^* = \beta_D$. However, this assumption involved an index number problem. The problem is due to the selection of one group of estimations as non-discriminatory wage structures, against the other, which leads to different results (Cotton, 1988; Oaxaca and Ransom, 1994). The argument is that discrimination occurs not only toward one group, but also to the corresponding group, either negatively or positively. This index number problem is arguable to some extent and motivated by the development of other measures of non-discriminatory parameter references[20]. Among alternative measures of non-discriminatory parameter, we utilize the regression compatible approach of Oaxaca-Blinder decomposition, following Jann (2008) and Fortin (2008)[21]. Accordingly, recall estimations based on equation (3.2) for each sample of advantaged and disadvantaged group separately. Then, additional estimation established for both groups samples pooled together (p), so equation (3.2) can be reformulate as:

[20] In line with the mean decomposition, much of the literature suggests that the undervaluation of one group results with an overvaluation of the corresponding group (Cotton, 1988).

[21] See Oaxaca and Ransom (1994) for exercising integrative treatments of alternatives approaches and Jann (2008) for detailed explanation of those non-discriminatory parameter alternatives.

$$w_g = \beta_g X + \varepsilon_g, \qquad E(\varepsilon_g) = 0 \quad g\epsilon(d,c,p) \tag{3.7}$$

Similar to Neumark (1988) and Oaxaca and Ransom (1994), the regression compatible approach considered estimated coefficients of pooled regression (p) as non-discriminatory parameter, so that are ($\beta^* = \beta_p$) is apply for equation (3.6) and its derivatives. However, Jann (2008) and Fortin (2008) argued that group membership variables should include as an additional explanatory variable in the pooled sample estimation. Failing to do so could inappropriately transferring the unexplained component of the wage difference into the explained component, leading to omitted variable bias.

The Blinder-Oaxaca decomposition method not only allows us to analyse an aggregate wage decomposition but also makes it possible to arrive at a detailed contribution of selected explanatory variables in each part of the decomposition. For the explained component, the detailed decomposition can be expressed as follow:

$$\hat{Q} = (\bar{X}_D - \bar{X}_C)'\hat{\beta}^* = (\bar{X}_{1D} - \bar{X}_{1C})'\hat{\beta}_1^* + (\bar{X}_{2D} - \bar{X}_{2C})'\hat{\beta}_2^* + \cdots + (\bar{X}_{PD} - \bar{X}_{PC})'\hat{\beta}_P^* \tag{3.8}$$

where $\bar{X}_1, \bar{X}_2, \ldots, \bar{X}_P$ and $\hat{\beta}_1, \hat{\beta}_2, \ldots, \hat{\beta}_P$ are the means of the regressors and their associated coefficients, whereby the p^{th} summand reflects the contribution of the group differences in the p^{th} regressors. As for the unexplained component, if $\rho_{PD} = \hat{\beta}_{PD} - \hat{\beta}_P^*$ and $\rho_{PC} = \hat{\beta}_{PC} - \hat{\beta}_P^*$, the detailed decomposition can be expressed as follows:

$$\hat{U} = \bar{X}'_D\rho_D + \bar{X}'_C\rho_C = \bar{X}'_{1D}\rho_{1D} + \bar{X}'_{1C}\rho_{1C} + \bar{X}'_{2D}\rho_{2D} + \bar{X}'_{2C}\rho_{2C} + \cdots + \bar{X}'_{PD}\rho_{PD} + \bar{X}'_{PC}\rho_{PC} \tag{3.9}$$

Since the unexplained component also captures all the potential effects of differences in unobserved variables, a detailed decomposition might not be as straightforward as the explained component. For the dummy explanatory variable, deviation contrasts are employed to transform the dummy variable sets so that the contribution of categorical variables to the unexplained part of the decomposition is independent of the choice of the base category. Accordingly, we set the first category of each categorical variable as the base category. The overall steps in the intergenerational wage gap decomposition is performed in STATA 15, following the Oaxaca-Blinder Decomposition routine by Jann (2008).

Further computations are completed to produce comparable measures of intergenerational wage gaps and its components. Accordingly, an intergenerational wage gap is measured in combination of two wage gaps. First the youth wage gap, measured by mean wages differences between millennials and gen-Xers. Second the elderly wage gap, measured by mean wage differences between boomers and gen-Xers. The unadjusted and adjusted wage gaps are computed based on the same formulation, i.e.:

$$g_e^y = \frac{(\overline{w^C} - \overline{w^D})}{\overline{w^C}} \times 100\% \tag{3.10}$$

Where the youth wage gap (g^y) or the elderly wage gap (g_e) are percentage differences between the mean wage of disadvantaged worker groups (w^D) and its corresponding group (w^C), relative to its corresponding group (w^C). As described above, wage differences are decomposed twofold, the explained and unexplained components. The endowment effect (e) and wage structure effect (r), are represented by explained and unexplained components, measured by each percentage contribution on wage differences. Following Taniguchi and Tuwo (2014), the wage gap attributable to wage discrimination (ATD) is calculated as:

$$ATD = r_e^y \times g_e^y \tag{3.11}$$

3.3.3. Variable of Interest and Contributing Variables

Our main variable of interest is the hourly nominal wage, which is defined as hourly gross remuneration in cash and in-kind paid to worker at regular intervals, for time worked or work done together with remuneration for time not worked, such as annual vacation, other types of paid leave or holidays[22]. This earnings calculation excludes employer contributions to social security and pension schemes and the benefits received by workers under these schemes. This wage calculation also excludes severance and termination pay. In line with the outcome variable, our explanatory variable of interest is nominal minimum wage, which is defined as the nominal wage paid on a monthly basis in each of the 511 sub-provincial regions in Indonesia based on the cost of living standard of each region[23]. Minimum wage is set to represent the institutional instrument of regional labour markets. Monthly minimum wage is adjusted to hourly minimum wage based on the assumption of a 40 hours work a week.

In individual characteristic factor, we include gender and marital status of workers. While in human capital investment factor, we include education attainment, specialization, training, experience, and tenure. Educational attainment is measured by years of schooling, which corresponds to the Indonesian education system. For specialization, a dummy variable differentiate between general education and vocational education is also included. Training considered as a way to development certain types of skill or knowledge. In our case, training measured as a dummy variable that differentiate between workers with no training, initial training, and secondary training. Experience and tenure are also used as proxies for on-the-job human capital accumulation. A dummy variable that differentiate work prior to worker's current

[22] Following the resolution concerning the measurement of income from employment adopted by the Sixteenth International Conference of Labour Statisticians (October 1998).

[23] Recently, the cost of living standard of regional minimum wages were determined by decent living needs and taking into account the cost of 60 items, the consumer price index, labour market developments, current regional wages, aggregate firms conditions, and national and regional economic trends.

job is used as a proxy for experience, while tenure is measured as years in the worker's current job. A quadratic form is also included to analyse the possibility of diminishing returns to tenure.

Our analysis also consider several variables that represent employment characteristic factor, including traveling to work, secondary job, types of the main job, and urban-rural residential place. Traveling to work measure the effect of commuting, i.e. working outside the worker's residential place, while secondary job differentiate workers for having a secondary jobs aside from their main job. Dummy variables for the type of the main job and urban-rural working area are also included. To examine the contribution of occupational choices to the gender wage gap, dummy variables for formal-informal occupations, nine sector-based occupational categories, and ten skilled-based occupational categories are also included. The sector-based occupational categories aim to examine horizontal segregation, while the skilled-based occupational categories aim to examine vertical segregation.

After controlling for all productivity-relevant variables, any differentials in the earnings of two equally productive workers are subject to inefficient of labour market, i.e. the wage structure effect, which leads to favouritism or discrimination. In addition to the aggregate intergenerational wage decomposition, subgroups were also analysed to examine further the importance multiple intersections of the intergenerational wage gap, i.e. based on gender, educational attainment, specialization, traveling to work, and urbanization. A detailed decomposition analysis was carried out to highlight certain variables within each factor that are important for the analysis of the intersectional and intergenerational wage gaps.

3.4. EMPIRICAL RESULTS

3.4.1. Overview of the Indonesian Labour Market: An Intergenerational Perspective

Indonesia is the fourth most populous country in the world with population growth estimated at 1.38 percent annually from 2010 to 2015, reaching approximately 260 million in 2016 (Statistics, 2013). With an expansive population structure, Indonesia is undergoing a demographic shift where the working age population is expected to grow substantially and peak in 2031. The current working age population accounts for approximately 65 percent of the total population and expected to increase up to 70 percent at its peak in 2031. The incoming working age population can be embraced as a demographic dividend as it provide a unique window of opportunity to promote growth through multiple channels, including increase in labour force size, productivity, and capital formation (IMF, 2018). Hence, the favourable demographic shift must be transformed through those channels in order to absorb the incoming labour force efficiently to become the agents of growth in the economy. Otherwise, the incoming working age population will become a demographic burden with problems as unemployment, inequality, and poverty.

Millennials, currently in an early phase of the work life cycle, have an important role in the current labour force. The labour force participation rate of millennials was 67.24 percent in 2017 (Statistics Indonesia, 2018). The role of millennials will become more crucial in the next decades as millennials who are currently in school will graduate and come into the labour market. Additionally, younger millennials who soon come to working age might also decide straight to come into the labour market. In terms of education attainments, millennials are better educated than gen-Xers and boomers. Approximately 57.28 percent and 12.83 percent of millennials workers are secondary and tertiary education graduates. However, only approximately 12.7 percent of millennials have a vocational education while only 5.96 percent have a training background. Lack of skill and experience are the reason to prevent them from being absorbed efficiently in the labour market (IMF, 2018). Consequently, the millennial unemployment rate is substantially higher than for gen-Xers and boomers (Table 3.1).

Promoting an efficient labour market is particularly important for millennials considering their profiles compare to gen-Xers and boomers. Currently, 49.79 percent of millennials work in the formal sector, compared to a smaller share of gen-Xers (43.24 percent) and boomers (28.18 percent) in the same sectors. Thus, millennials preferred working in formal occupation, although informal sectors might be more suitable to their characteristics (i.e. interest in creative industries) and offer more employment opportunities. Second, millennials segregate horizontally in different sectors of the economy than boomers and gen-Xers. Although majority of all generations work in agriculture sector, the share of millennials working in that sector are substantially lower to gen-Xers and boomers. Only 35.42 percent of millennials working in the agriculture sector, relative compared to 39.14 percent of gen-Xers (39.14 percent) or 54.63 percent of boomers (54.63 percent). Higher share of millennials to gen-Xers and boomers are in manufacture, financial, real estate and services sectors.

Third, millennials work in slightly different type of jobs to other generations, especially in manufacturing-related jobs including services and market sales (18.16 percent), craft and related trades (10.33 percent), plant and machine operators (6.25 percent) and elementary occupations (15.75 percent). Hence, millennials might have experienced vertical and horizontal occupational mismatch. Alisjahbana, Purnagunawan and Pitriyan (2018) found that 45.58 percent of millennials with a tertiary education were over-educated for their current jobs, while 16.89 percent were working in jobs unrelated to their education. This situation is somehow contrary to the argument that more years of education at a younger age might come at a cost, which results in higher levels of confidence and expectations (Alton, 2016). Similar, Fajri (2019) argues that millennials prefer jobs with the advantages of good working conditions, clear carrier advancement, coworking space of equal age, and comfortable working rules.

In the last two decades, Indonesia has been experiencing a long-standing economic crisis that was affected by the 1997-1998 Asian financial crisis. While on the road to recovery, Indonesia has also experienced financial turbulence due to the 2008-2009 global economic recession. Those two crises might differ significantly in origin, severity, impact and recovery trajectories (Hill, 2011). However, the impact was extensive and might have shifted the equilibrium of the Indonesian labour market. As part of recovery, Indonesia introduced several fundamental development policies including reformation from a centralized to a decentralized government by legislating the Regional Autonomy and Fiscal Decentralization Acts in 1999[24]. The Bank Indonesia Act was also legislated in the same year, and serves as institutional foundation of the independency of Bank Indonesia as the central bank of Indonesia[25]. This act also marked the reformation of monetary policy stance, from multiple to single targeting monetary policy.

Throughout those years, Indonesia also participated in several bilateral and multilateral agreements including the ASEAN Economic Community (AEC) in 2015. As the part of economic integration, AEC introduced a skilled-labour free movement regulation as one of its core elements, including mobility of selected categories of people associated principally with trade in services and investment across member countries (ADBI, 2014)[26]. In those countries, high-skilled employment is expected to increase between 0.3 to 1.4 percent while wage rates were expected to increase by 10 to 20 percent in 2025 (Adhisti, 2018). Thus, despite the lack of skill and experience, current Indonesian labour market conditions might not be in favour of that free movement regulation.

[24] Regional Autonomy act number 22 and Fiscal Decentralization act number 25, year 1999.

[25] Bank Indonesia act number 23, year 1999.

[26] The Association of Southeast Asian Nations (ASEAN) was established on 8 August 1967. The member countries are Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, Singapore, Thailand and Viet Nam.

Table 3. 1 The Intergenerational Structure of the Indonesian Labour Market, 2015

Indicators	Millennials	Gen-Xers	Boomers	Indicators	Millennials	Gen-Xers	Boomers
1. Labour Participation Rate	67.24%	78.99%	52.40%	10. *Sector-based Occupations*			
2. Unemployment Rate	9.26%	2.40%	0.56%	Agriculture etc.	35.41%	39.14%	54.63%
3. Unemployment Rate -				Mining and quarrying	1.95%	1.47%	0.78%
Including discouraged workers	11.09%	3.84%	2.07%	Manufacture industries	10.77%	8.64%	6.48%
4. Gender				Electricity, gas etc.	0.27%	0.27%	0.11%
Women	38.02%	39.55%	37.09%	Constructions	6.26%	6.48%	4.30%
Men	61.98%	60.45%	62.91%	Trading, restaurant etc.	20.48%	20.17%	19.17%
5. Marital Status				Transportations, storage etc.	4.28%	4.37%	2.75%
Single	46.18%	3.73%	1.24%	Finance, real estate, and services	3.15%	1.77%	0.79%
Married	51.47%	89.40%	80.26%	Social and community services	17.44%	17.69%	11.00%
Divorced	1.87%	2.75%	2.17%	11. *Skill-based Occupations*			
Widowed	0.49%	4.12%	16.33%	Legislator, senior officials etc.	0.90%	2.51%	1.91%
6. Education Attainment				Professionals	6.23%	6.34%	3.73%
Primary education	29.89%	47.29%	74.62%	Technicians and associate prof.	3.26%	2.28%	1.10%
Secondary education	57.28%	41.12%	19.60%	Clerks	7.08%	4.60%	1.64%
Tertiary education	12.83%	11.59%	5.78%	Services and market sales	18.16%	17.79%	17.35%
7. Specialization				Skilled agricultural and fishery	31.25%	35.02%	50.54%
Vocational	12.07%	7.81%	4.37%	Craft and related trades	10.33%	10.20%	8.59%
General	87.93%	92.19%	95.63%	Plant and machine operators etc.	6.25%	5.71%	2.63%
8. Training				Elementary occupations	15.75%	14.73%	12.30%
No training	94.04%	92.34%	95.46%	Armed forces	0.78%	0.82%	0.22%
First training only	4.74%	5.26%	2.94%	12. *Informality*			
Having secondary training	1.21%	2.40%	1.60%	Informal sector workers	50.21%	56.76%	71.82%
9. Weekly working hours	43.29	42.28	38.85	Formal sector workers	49.79%	43.24%	28.18%

Note: Generations were grouped using birth cohort definitions by Strauss and Howe (2000), which are boomers (age 55-64), gen-Xers (age 34-54) and millennials (age 15-33). Age 64 for boomers is used as a cut off, rather than age 72, to ensure than we do not include retirement-age workers.

Millennials clearly face a more demanding, borderless, and therefore, more competitive labour market. These challenging labour market conditions might even discourage millennials from finding a job. Our data shows that millennials unemployment rate was 11.09 percent in 2015, including discouraged unemployed millennials. While boomers unemployment rates was 2.07 percent, including discouraged unemployed boomers. Additionally, the discouragement for boomers might not for the reason of entering the labour market as millennials did, but more likely for re-entering the labour market who mainly loss their jobs during those economic crises. Due to the economic crisis in 1998 alone, unemployment rate has rapidly increased from 4.77 percent 1997 to its peak at 11.24 percent in 2005.

Economic shock from an economic crisis or from a structural transformation may lead to the reallocation of workers from the primary to secondary labour markets. They also tend to intensify outcome differences between both markets where millennials and boomers might disproportionately paid relative to gen-Xers. The age-wage profiles commonly show that millennials and boomers are found at both ends of the distribution, where the peak is approximately at older age of gen-Xers. For Indonesia's case, that common age-wage profile apply in term of female workers, which show by the positive unadjusted youth and elderly wage gap (Table 3.2). For aggregate and male workers, the unadjusted elderly wage gap are negative, indicate that boomers earned slightly higher than gen-Xers. It is worth noting that in our case, boomers are accounted for workers only until the age of 64 instead of age 72 as in Strauss and Howe (2000).

In terms of residential place, the unadjusted youth wage gap was higher for urban workers than rural workers, which also show a negative unadjusted elderly wage gap in urban workers. Interestingly, while the unadjusted youth wage gap are increased with education attainment, the unadjusted elderly wage gap are negative for higher education attainments. In term of sector-based occupations, social and community services and financial services show substantially higher rates of the adjusted youth wage gap. In case of the unadjusted elderly wage gap, workers of electricity, gas and water provider experience substantially higher rate while workers of those sectors with a higher unadjusted youth wage gap actually experienced a negative elderly wage gap. Additionally, the higher skilled-based occupations, the higher unadjusted youth wage gaps are. In term of the unadjusted elderly wage gaps, those skill-based occupations with higher unadjusted youth wage gap experienced negative elderly wage gaps.

A description of the overall intergenerational labour market above indicates the existence of a dual labour market in Indonesia, as well as an intergenerational inequality of pay. Further examination is important in order to understand the extent of the intergenerational wage gap to its contributing factors and variables. We will disclose the contributing factors and variables of the intergenerational wage gaps in the next section by exploiting wage determinant and wage

differences decomposition analyses. In regards to the research objective, we also examine extensions of the generational wage gap attributable to differences in education, specialization, traveling to work and urban-rural residencies.

Table 3. 2 The Unadjusted Intergenerational Wage Gaps, Indonesia 2015

Items	Youth Wage Gap	Elderly Wage Gap	Items	Youth Wage Gap	Elderly Wage Gap
Intergenerational	32.49%	-0.26%	By sectors:		
1. Female	30.78%	9.17%	3. Manufacture industries	18.43%	10.37%
2. Male	33.07%	-2.94%	4. Electricity, gas, etc.	32.41%	45.25%
3. Urban	34.71%	-2.66%	5. Construction	26.42%	0.80%
4. Rural	28.23%	3.26%	6. Trading, restaurant, etc.	23.61%	5.50%
5. Locals	31.87%	0.20%	7. Transportations, storage, etc.	17.72%	17.46%
6. Commuters	36.22%	-18.23%	8. Finance, real estate and services	43.35%	-11.63%
By marital status:			9. Social and community services	47.57%	-21.95%
1. Single	25.32%	9.13%	By Occupations:		
2. Married	26.54%	-7.01%	1. Legislator, senior off. etc.	39.92%	-13.40%
3. Divorced	25.20%	12.13%	2. Professionals	55.11%	-24.85%
4. Widowed	12.41%	12.00%	3. Technicians and associate prof.	40.70%	-17.06%
By education attainments:			4. Clerks	40.53%	-14.25%
1. Primary	12.91%	0.64%	5. Services and market sales	27.16%	1.81%
2. Secondary	29.50%	-28.24%	6. Skilled agricultural and fishery	10.76%	3.94%
3. Tertiary	49.50%	-29.50%	7. Craft and related trades	16.52%	-1.22%
By sectors:			8. Plant and machine op. etc.	12.93%	12.66%
1. Agriculture, etc.	9.88%	4.04%	9. Elementary occupations	7.07%	12.52%
2. Mining and quarrying	29.73%	5.52%	10. Armed forces	27.19%	1.41%

Note: Negative values indicate higher wage rates for disadvantaged workers.

3.4.2. Intergenerational Wage Determinants

In this section, wage determinant estimation is applied on multiple groups, including boomers, gen-Xers and millennials with additional youth pooled and elderly pooled groups. The estimation of youth pooled is based on aggregation of millennials and gen-Xers, while the elderly pooled is based on aggregation of boomers and gen-Xers. In each of those pooled group estimation, generational membership variables are included. Table 3.3 shows the wage determinant estimations of each generation and the pooled of youth and elderly pooled groups. We examine the roles of several factors and variables in determining rates of hourly wage of individual workers. First are the individual characteristic factor, where gender and marital status are found to be statistically significant in determining wages of all workers groups. The positive and significant effect of gender coefficient represent the incidence of gender wage differences within all generations. Thus, although gen-Xers earned a higher wage rate relative to millennials and boomers, gender wage differences are also relatively higher to intergenerational wage differences. Marital status also show a statistically significant effect on wages across generations, which implying that being married leads to higher rate of wages.

In term of human capital investment, all variables accumulated pre-labour market including education, specialization and training, are found to have positive effect on wages. In case of specialization, having vocational education attainments found statistically significant in gen-Xers group. Interestingly, having work experience prior to a person's current job shows different results on wage determinant. The effect is positive for millennials, statistically non-significant for gen-Xers and negative for boomers. To some extent, the results indicate a hump-shaped return to experience curve, suggesting a non-linear relationship between earnings and experiences. Tenure also has a similar effect where tenure shows positive effects and tenure-squared shows negative effects.

In terms of residential place, reside in an urban place or traveling to work also shows positive effects on wages. Thus, as an alternative to a more expensive residency, workers most likely decide to commute to their workplace and reside in a cheaper residency. Having a secondary job also has a positive effect on the wage determination across all generations, and working part-time or being underemployed shows a significantly higher hourly wage. In this regards, a higher hourly wage most likely compensates for fewer working hours in part-time and underemployed jobs. Our results also show that the coefficient for the regional hourly minimum wage is statistically significant across all generations. The regional hourly minimum wage has the greatest effect on millennials, as they are most likely at the bottom of the wage distribution.

Interestingly, the estimation results indicate that informal workers most likely earned a higher wage rate relative to formal workers for all generations. In a more skills-based occupational choice, wages are distributed according to the required skills. In terms sector-based occupations, the result show that mining and quarrying workers across all generations earned relative higher rates of hourly wages, followed by construction workers (except for millennials) and agriculture workers. Thus, although mining and quarrying might have higher potential risks at work, it also offers higher rate of returns. Lastly, the intergenerational membership variables in the youth and elderly pooled group estimations are statistically significant and positive, which indicates the existence of significant wage differences between millennials, gen-Xers, and boomers. These findings indicate the incidence of both the youth wage gap and the elderly wage gap. To scrutinize further the extent of intergenerational wage gap and its contributing factors and variables, wage differences and decompositions analyses will be presented in the next section.

Table 3. 3 Intergenerational Wage Determinant: Millennials, Gen-Xers and Boomers

Factors and Variables	Millennials	Gen-Xers	Boomers	Youth Pooled	Elderly Pooled
Individual characteristic					
Gender (base: female)	0.144***	0.241***	0.206***	0.209***	0.238***
	(0.007)	(0.006)	(0.016)	(0.005)	(0.006)
Marital status (base: single)					
married	0.142***	0.194***	0.290***	0.172***	0.203***
	(0.007)	(0.012)	(0.045)	(0.006)	(0.012)
divorced	0.090***	0.148***	0.152***	0.122***	0.144***
	(0.021)	(0.018)	(0.056)	(0.013)	(0.017)
widowed	0.100**	0.141***	0.156***	0.108***	0.123***
	(0.042)	(0.017)	(0.046)	(0.013)	(0.015)
Human capital investment					
Years of schooling	0.044***	0.044***	0.040***	0.045***	0.043***
	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)
Vocational (base: general)	0.0002	0.060***	-0.007	0.028***	0.050***
	(0.009)	(0.009)	(0.026)	(0.006)	(0.008)
Training (base: no training)					
primary training	0.198***	0.221***	0.222***	0.235***	0.223***
	(0.012)	(0.010)	(0.028)	(0.008)	(0.009)
secondary training	0.406***	0.375***	0.317***	0.438***	0.373***
	(0.023)	(0.013)	(0.035)	(0.012)	(0.013)
Experience (Base: no)	0.073***	0.008	-0.033**	0.034***	0.002
	(0.007)	(0.005)	(0.013)	(0.004)	(0.005)
Tenure	0.063***	0.023***	0.022***	0.029***	0.025***
	(0.003)	(0.001)	(0.002)	(0.001)	(0.001)
Tenure^2	-0.003***	-0.0004***	-0.0003***	-0.0004***	-0.002***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Employment Characteristic					
Rural (base: urban)	-0.052***	-0.025***	-0.034**	-0.033***	-0.027***
	(0.007)	(0.006)	(0.014)	(0.004)	(0.005)
Job types (base: full time)					
part time	0.338***	0.373***	0.432***	0.358***	0.382***
	(0.010)	(0.007)	(0.014)	(0.006)	(0.006)
under employment	0.104***	0.194***	0.246***	0.126***	0.201***
	(0.011)	(0.011)	(0.031)	(0.008)	(0.010)
Secondary job (base: only primary)	0.081***	0.086***	0.049***	0.085***	0.079***
	(0.012)	(0.008)	(0.019)	(0.007)	(0.007)
Commuters (base: Non-Commuters)	0.235***	0.194***	0.228***	0.208***	0.200***
	(0.011)	(0.009)	(0.025)	(0.007)	(0.008)
Institutional instrument					
ln minimum wage	0.701***	0.578***	0.530***	0.633***	0.572***
	(0.013)	(0.011)	(0.026)	(0.008)	(0.010)
Occupational Choices					
Informality (base: formal)	-0.171***	-0.140***	-0.179***	-0.137***	-0.139***
	(0.009)	(0.007)	(0.019)	(0.006)	(0.007)
Occupation (base: senior officers)					
professionals	-0.598***	-0.264***	-0.047	-0.419***	-0.238***
	(0.032)	(0.016)	(0.041)	(0.014)	(0.015)
technicians and prof. assoc.	-0.292***	-0.223***	-0.310***	-0.292***	-0.234***
	(0.033)	(0.019)	(0.053)	(0.016)	(0.018)
clerks	-0.379***	-0.318***	-0.271***	-0.372***	-0.319***
	(0.031)	(0.016)	(0.045)	(0.014)	(0.016)
services and market sales	-0.682***	-0.774***	-0.933***	-0.738***	-0.790***
	(0.032)	(0.018)	(0.046)	(0.015)	(0.017)
skilled agricultural and fishery	-0.751***	-0.979***	-1.096***	-0.900***	-0.997***
	(0.037)	(0.023)	(0.060)	(0.019)	(0.021)
craft and related trades	-0.671***	-0.881***	-1.018***	-0.807***	-0.896***
	(0.033)	(0.018)	(0.048)	(0.016)	(0.017)
operator and assemblers	-0.515***	-0.710***	-0.842***	-0.640***	-0.720***
	(0.033)	(0.018)	(0.050)	(0.016)	(0.017)
elementary occupations	-0.668***	-0.911***	-1.058***	-0.816***	-0.927***
	(0.032)	(0.017)	(0.043)	(0.015)	(0.016)
armed force	0.139***	-0.083***	-0.110	-0.031	-0.090***
	(0.040)	(0.025)	(0.082)	(0.021)	(0.024)
Sectors (base: agriculture)					
mining and quarrying	0.136***	0.189***	0.242***	0.174***	0.200***
	(0.026)	(0.023)	(0.067)	(0.017)	(0.022)
manufacture	-0.158***	-0.156***	-0.135***	-0.144***	-0.149***
	(0.019)	(0.017)	(0.046)	(0.013)	(0.016)
electricity, gas and water supply	-0.022	-0.043	0.191	-0.037	-0.013
	(0.049)	(0.039)	(0.124)	(0.031)	(0.038)
constructions	-0.001	0.029*	0.207***	0.011	0.052***
	(0.021)	(0.018)	(0.048)	(0.014)	(0.017)
trading, hotel and restaurant	-0.255***	-0.146***	0.010	-0.192***	-0.121***
	(0.020)	(0.017)	(0.043)	(0.013)	(0.016)
transportation and comm.	-0.258***	-0.248***	-0.217***	-0.258***	-0.245***
	(0.022)	(0.018)	(0.049)	(0.014)	(0.017)
finance services	-0.094***	-0.114***	-0.070	-0.103***	-0.105***
	(0.022)	(0.021)	(0.062)	(0.015)	(0.020)
social and community services	-0.447***	-0.237***	-0.075*	-0.320***	-0.213***
	(0.019)	(0.016)	(0.042)	(0.012)	(0.015)
Generation membership dummies				0.102***	0.031***
				(0.005)	(0.007)
Constant	2.161***	3.409***	3.999***	2.681***	3.409***
	(0.131)	(0.106)	(0.261)	(0.083)	(0.099)
Observations	59,589	86,829	16,038	146,418	102,867
Adjusted R-squared	0.219	0.348	0.408	0.304	0.356

Notes: Youth pooled included millennials and gen-Xers, elderly pooled included boomers and gen-Xers.
*Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1*

3.4.3. The Intergenerational Wage Gap and Its Decomposition

In this section, wages are decomposed to not only measure the magnitude of wage differences but also scrutinize the extent of the intergenerational wage gap. Gen-Xers are treated as the reference generation for particular reasons. First, age cohort of gen-Xers are equal to adult workers group who empirically used as reference in determining the youth and elderly wage gaps in several literature. Second, according to previous section in this study, gen-Xers earned higher rate of wages relatively to millennials and boomers. Accordingly, the results of intergenerational wage decomposition analyses are presented in two panels table (Table 3.4). Intergenerational wage gaps are measured in two parts, the youth wage gap and the elderly wage gap. The former measures wage gaps between millennials and gen-Xers, and the latter between boomers and gen-Xers. The first panel shows an overall wage differences decomposition, including the estimated mean wages of disadvantaged group (i.e. millennials or boomers) and the corresponding group (i.e. gen-Xers), wage differences, the adjusted intergenerational wage gap, the wage structure effect, and the wage gaps attributable to discrimination. The second panel shows detailed wage decomposition, broken down into the explained and unexplained components. Detailed wage differences decomposition of each contributing variable is presented in each column of the components. Aside from the aggregate intergenerational wage gap, we also present the intergenerational wage gaps for female and male workers to examine any implication from the gender wage gap.

Our results show that both the youth wage and the elderly wage differences are statistically significant in both cases, for aggregate, male and female workers sub sample. Youth wage gaps are approximately 25 percent, while elderly wage gaps are approximately 10 percent. These findings confirmed that millennials earned a substantially lower wage rate not only d to gen-Xers but also to boomers, even after considering productivity-relevant and non-productivity-relevant factors. Our overall decomposition revealed that approximately two-thirds of the wage gap is attributable to the explained component (i.e. endowment effect) and the rest is attributable to the unexplained component (i.e. wage structure effect). For the aggregate youth wage gap, tenure contribute the lion's share of the explained and unexplained component; despite other variables show some positive contribution including education. Interestingly, in the unexplained component, results show a positive effect in equal tenure. These findings imply that millennials are earning lower rate of wage for having shorter periods of tenure, but earning higher rate of wages relative to gen-Xers of equal tenure. The contradiction on the latter case explain a potential positive discrimination, i.e. against gen-Xers, due to employers' favouritism of younger workers.

Other prominent contributing variables that also favours millennials is the regional minimum wages. The regional minimum wages has a positive effect on both the explained and unexplained components. These findings point to an aggregate compression effect of the regional minimum wages on the youth wage gap from both within and between provincial effects. Furthermore,

despite negative unobservable effects in wage differences, major parts of contributing variables in the unexplained component might actually favour millennials, i.e. positive discriminations. Some attributes that negatively contribute to youth wage gaps, i.e. through wage structure effect, include traveling to work, informality, and sector-based occupational choices. In term of negative contribution of sector-based occupational choices in the unexplained component, it indicate the incidence of horizontal segregation lead to wage discrimination.

Further examination on both the male and female sub samples show that the male and female youth wage gaps similar pattern to aggregate sample. Additionally, result also show that the female youth wage gap (24.27 percent) is narrower than the male youth wage gap (28.61 percent). While the unexplained component contributes nearly half of female youth wage differences compared to a quarter of male youth wage differences. Hence, millennial women not only experienced a lower youth wage gap relative to millennial men, but also experienced a higher wage structure effect. In the detailed decomposition, some results post several interesting findings. First, following aggregate results, differences in tenures are the lion's share of the explained components. This finding imply female millennials earned lower rate of wage to female gen-Xers most likely because female gen-Xers have longer period of tenure. Second, marital status contribute to the female youth wage gap lower than the male youth wage gap. Thus, married millennials women might not only earned lower rate of wage than married gen-Xers women but also gained lower rate of wage marriage premium to married millennial men. Third, in term of human capital investment, our findings show that millennial women also gain the advantages of both higher returns to education and positive discrimination attributable to education. However, millennials women might disproportionately be paid for equal specialization in education (i.e. having a vocational education background) and horizontally segregated (i.e. sector-based occupational choices).

For the adjusted elderly wage gap, overall decomposition result of aggregate sample shows that wage differences are statistically significant between boomer and gen-Xers. Although the elderly wage gap are much lower than youth wage gap, the wage structure effect is slightly higher. Thus, millennials struggle the most in term of wage differences, but boomers potential experienced more severe wage discrimination. The detailed decomposition revealed that differences in tenure are contributed the most of the explained components. While, tenure show consistently reversed contribution in the unexplained component of the youth and elderly wage gaps. The findings might similar with the youth wage gap, although for different sign of coefficients. From both the youth and elderly wage gaps, findings imply that differences in tenure explained the most of wage differences, which are favoured older workers groups, gen-Xers in term of the youth wage gap and boomers in term of the elderly wage gap. Thus, employers pay higher rate of wage for higher tenure that increase with age, but pay higher rate of wage for younger workers of equal tenure.

Table 3. 4 The Intergenerational Wage Gap: Aggregate and Gender Intersections

Samples – Wage Gap	Baseline - Youth	Baseline – Elderly	Female - Youth	Female- Elderly	Male - Youth	Male- Elderly
Factors and Variables			*Overall Decomposition*			
Predicted mean wages of:						
Millennials (Boomers) [a)]	8.799***	9.028***	8.699***	8.838***	8.860***	9.132***
	(0.003)	(0.008)	(0.006)	(0.014)	(0.004)	(0.009)
Gen-Xers	9.119***	9.119***	8.977***	8.977***	9.197***	9.197***
	(0.003)	(0.003)	(0.006)	(0.006)	(0.004)	(0.004)
Wages differences	-0.320***	-0.091***	-0.278***	-0.138***	-0.337***	-0.065***
	(0.005)	(0.008)	(0.008)	(0.015)	(0.006)	(0.010)
Explained component	-0.219***	-0.060***	-0.141***	-0.136***	-0.252***	-0.018***
	(0.004)	(0.006)	(0.007)	(0.011)	(0.005)	(0.007)
Unexplained component	-0.102***	-0.031***	-0.137***	-0.002	-0.085***	-0.047***
	(0.005)	(0.007)	(0.009)	(0.013)	(0.006)	(0.009)
Adjusted Wage Gap (AWG)	27.39%	8.70%	24.27%	12.98%	28.61%	6.29%
Wage structure effect	31.88%	34.07%	49.28%	-	25.22%	72.31%
ATD [b)]	8.73%	2.96%	11.96%	-	7.22%	4.55%
Observations	146,418	102,867	52,813	36,091	93,605	66,776

						Detailed Decomposition						
Components	Explained	Unexplained	Explained	Unexplained	Explained	Unexplained	Explained	Unexplained	Explained	Unexplained	Explained	Unexplained
Individual characteristic												
Gender	-0.005***	-0.013***	-0.001	-0.005**								
	(0.001)	(0.001)	(0.001)	(0.002)								
Marital status	-0.071***	-0.0003	-0.006***	0.051***	-0.057***	-0.010	-0.007**	0.032*	-0.094***	-0.009	-0.004***	0.045*
	(0.003)	(0.012)	(0.001)	(0.015)	(0.004)	(0.015)	(0.004)	(0.017)	(0.003)	(0.019)	(0.001)	(0.024)
Human capital investment												
Years of schooling	0.050***	0.004	-0.123***	-0.027**	0.101***	0.118***	-0.165***	-0.057***	0.023***	-0.039**	-0.098***	-0.009
	(0.001)	(0.013)	(0.003)	(0.014)	(0.003)	(0.026)	(0.006)	(0.020)	(0.001)	(0.015)	(0.003)	(0.018)
Have experience (0/1)	-0.003***	0.092***	-0.0001	-0.059***	-0.001**	0.079***	0.0003	-0.024	-0.004***	0.100***	-0.0002	-0.066**
	(0.000)	(0.012)	(0.000)	(0.021)	(0.000)	(0.020)	(0.000)	(0.033)	(0.001)	(0.015)	(0.000)	(0.026)
Tenure	-0.209***	0.198***	0.181***	-0.030	-0.274***	0.197***	0.250***	-0.145**	-0.162***	0.201***	0.134***	0.039
	(0.006)	(0.014)	(0.007)	(0.036)	(0.011)	(0.023)	(0.012)	(0.057)	(0.008)	(0.017)	(0.008)	(0.046)
Tenure^2	0.063***	-0.090***	-0.104***	-0.031	0.082***	-0.087***	-0.149***	0.018	0.046***	-0.092***	-0.069***	-0.065**
	(0.005)	(0.006)	(0.007)	(0.022)	(0.008)	(0.011)	(0.012)	(0.034)	(0.006)	(0.008)	(0.009)	(0.028)

Samples – Wage Gap	Baseline - Youth		Baseline – Elderly		Female - Youth		Female- Elderly		Male - Youth		Male- Elderly	
Factors and Variables	*Detailed Decomposition*											
Components	Explained	Unexplained	Explained	Unexplained	Explained	Unexplained	Explained	Unexplained	Explained	Unexplained	Explained	Unexplained
Vocational	-0.002***	-0.022***	0.002***	-0.028**	-0.002***	-0.036***	0.003***	-0.091***	-0.001***	-0.019***	0.001***	-0.002
	(0.000)	(0.004)	(0.000)	(0.012)	(0.001)	(0.009)	(0.001)	(0.026)	(0.000)	(0.005)	(0.000)	(0.014)
Training	-0.013***	-0.002	-0.007***	0.017	-0.013***	0.017	-0.013***	0.051**	-0.013***	-0.017	-0.004***	-0.001
	(0.001)	(0.010)	(0.001)	(0.015)	(0.001)	(0.016)	(0.002)	(0.025)	(0.001)	(0.014)	(0.001)	(0.019)
Employment Characteristic												
Urban	-0.0003***	0.002***	-0.000**	0.001	0.001*	0.005**	-0.003***	-0.002	0.0002**	0.001	-0.0003	0.001
	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.002)	(0.001)	(0.002)	(0.000)	(0.001)	(0.000)	(0.002)
Fulltime	-0.020***	0.030***	0.046***	-0.016	-0.030***	0.031***	0.039***	-0.082***	-0.015***	0.028***	0.052***	0.020*
	(0.001)	(0.005)	(0.002)	(0.010)	(0.001)	(0.008)	(0.003)	(0.018)	(0.001)	(0.007)	(0.002)	(0.012)
Secondary job	0.005***	-0.002	0.0004	-0.014*	0.004***	0.008	0.000	-0.004	0.005***	-0.004	-0.0003	-0.022**
	(0.000)	(0.007)	(0.000)	(0.008)	(0.001)	(0.013)	(0.000)	(0.017)	(0.001)	(0.007)	(0.000)	(0.009)
Travel to work	-0.0002	-0.017***	-0.006***	-0.015	0.008***	-0.007	-0.007***	-0.009	-0.003***	-0.010*	-0.006***	-0.018
	(0.000)	(0.005)	(0.001)	(0.011)	(0.001)	(0.010)	(0.001)	(0.022)	(0.000)	(0.006)	(0.001)	(0.012)
Institutional instrument												
Minimum wages	0.005***	1.144***	-0.016***	-0.449*	0.012***	1.029***	-0.022***	-0.101	0.002**	1.279***	-0.012***	-0.740**
	(0.001)	(0.159)	(0.001)	(0.273)	(0.001)	(0.266)	(0.002)	(0.442)	(0.001)	(0.198)	(0.001)	(0.344)
Occupational choices												
Informality	-0.022***	-0.009***	0.027***	0.003***	-0.018***	0.0001	0.031***	0.010**	-0.022***	-0.018***	0.026***	0.0004
	(0.001)	(0.003)	(0.001)	(0.001)	(0.002)	(0.005)	(0.003)	(0.005)	(0.001)	(0.003)	(0.002)	(0.000)
Skill-based	0.003*	0.014***	-0.065***	-0.030**	0.044***	-0.019	-0.117***	-0.055	-0.021***	0.043***	-0.045***	-0.031**
	(0.001)	(0.005)	(0.003)	(0.012)	(0.003)	(0.014)	(0.006)	(0.040)	(0.002)	(0.006)	(0.004)	(0.015)
Sector-based	0.002**	-0.048***	0.012***	-0.002	0.001	-0.092***	0.024***	0.017	0.007***	-0.023***	0.007***	-0.021
	(0.001)	(0.007)	(0.002)	(0.016)	(0.002)	(0.024)	(0.003)	(0.056)	(0.001)	(0.007)	(0.002)	(0.017)
Constant		-1.383***		0.604**		-1.368***		0.440		-1.506***		0.820**
		(0.163)		(0.278)		(0.275)		(0.459)		(0.202)		(0.351)

Note:

a) Predicted mean wage of millennials in case of youth wage gap, and Predicted mean wage of boomers in case of elderly wage gap

b) ATD: Adjusted wage gap attributable to discrimination

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.

This distinctive but convergent result also show by the contribution of the regional minimum wages. What might differentiate the contribution of tenure from the regional minimum wages is that the regional minimum wages have more pronounced contribution in the unexplained component, despite some other contributing variables that are in favour of boomers. In this case, the within provincial effects are essentially higher than the between provincial effects. Thus, together with the contribution in the explained component, the contributions in the unexplained component intensifies the depression effects of the regional minimum wages in the elderly wage gap. Similarly the contribution of education, which mostly are the third important attributes in the intergenerational wage gap. While in the youth wage gap the contribution is positive, in the elderly wage gap it is negative. These findings imply that boomers' lack of education significantly contributes to a lower rate of wages where for different or for equal education to gen-Xers. In terms of occupational choices, our detailed decomposition shows that the contribution of skill-based occupations toward wage differences are higher than the contribution of sector-based occupation and consistently in favour gen-Xers whether in the explained or unexplained components.

Gender intersection of the elderly wage reveal several different results. Tenure still contribute the lion's share of wage differences, but only significant in the unexplained component in case of the female elderly wage gap. This finding might lead to the indication of wage discrimination of female boomers, due employer's favouritism over younger workers. In contrast, vertical and horizontal segregation according to skill-based and sector-based occupational choices are less pronounced in case of the female elderly wage gap. Thus, wage discrimination based on vertical and horizontal segregation occurred against male boomers. Overall findings in terms of the intergenerational wage gap above are generally in line with Metcalf (2009), which in Indonesia's case we also found that, in term of wage, younger workers are disadvantaged largely because of productivity-relevant factors (e.g. education, experience, and tenure) while older workers are disadvantaged due to non-productivity relevant factors (e.g. discrimination). In addition, the regional minimum wages plays important roles in improving the intergenerational equality of pay not only within each province but also between provinces in Indonesia.

3.4.4. Returns to Education and Specialization

We extend our analysis to compare the intergenerational wage gaps of different education attainments. Fourteen categories of education attainments, based on the Sakernas 2015 data set, were clustered into three categories, i.e. primary, secondary, and tertiary education attainments. Estimation result of wage differences and decompositions in this setup, presented in Table 3.5. The overall decomposition results revealed that the higher the education attainments, the wider the youth wage gaps were. Thus predicted mean wages increased with the education attainments, where millennials earned lower rate of wages than gen-Xers in all education attainments.

Table 3. 5 The Intergenerational Wage Gap: Returns to Education

Samples – Wage Gaps	Primary Ed. - Youth	Primary Ed. - Elderly	Secondary Ed. - Youth	Secondary Ed. - Elderly	Tertiary Ed. - Youth	Tertiary Ed.- Elderly
Factors and Variables			*Overall Decomposition*			
Predicted mean wages of:						
Millennials (Boomers) [a)]	8.599***	8.672***	8.768***	9.228***	9.086***	10.198***
	(0.007)	(0.009)	(0.004)	(0.014)	(0.009)	(0.016)
Gen-Xers	8.718***	8.718***	9.079***	9.079***	9.884***	9.884***
	(0.005)	(0.005)	(0.004)	(0.004)	(0.006)	(0.006)
Wages differences	-0.119***	-0.046***	-0.311***	0.149***	-0.797***	0.315***
	(0.009)	(0.010)	(0.006)	(0.015)	(0.011)	(0.018)
Explained component	-0.086***	0.041***	-0.279***	0.202***	-0.511***	0.280***
	(0.006)	(0.005)	(0.005)	(0.009)	(0.011)	(0.012)
Unexplained component	-0.034***	-0.088***	-0.032***	-0.053***	-0.287***	0.035*
	(0.009)	(0.010)	(0.007)	(0.014)	(0.014)	(0.019)
Adjusted wage gap	11.22%	4.50%	26.73%	-16.07%	54.98%	-36.89%
Wage structure effect	28.57%	191.30%	10.29%	-35.57%	36.01%	11.11%
ATD [b)]	3.21%	8.60%	2.75%	5.72%	19.80%	-4.10%
Observations	40,680	38,685	76,254	44,546	29,484	19,636

Detailed Decomposition

Components	Explained	Unexplained	Explained	Unexplained	Explained	Unexplained	Explained	Unexplained	Explained	Unexplained	Explained	Unexplained
Gender	0.034***	-0.013***	-0.007***	-0.003	-0.014***	-0.025***	0.012***	-0.028***	-0.012***	0.001*	0.013***	-0.010**
	(0.002)	(0.004)	(0.002)	(0.002)	(0.001)	(0.003)	(0.002)	(0.009)	(0.001)	(0.001)	(0.002)	(0.004)
Marital status	-0.059***	-0.021	-0.010***	0.036**	-0.065***	0.009	0.001	0.079***	-0.077***	0.029	0.003	0.032
	(0.004)	(0.019)	(0.002)	(0.017)	(0.003)	(0.016)	(0.002)	(0.031)	(0.006)	(0.042)	(0.002)	(0.053)
Human capital investment												
Have experience (0/1)	-0.003***	0.094***	-0.0002	-0.045*	-0.004***	0.092***	-0.0001	-0.082**	-0.002***	0.067**	-0.001	-0.066
	(0.001)	(0.024)	(0.000)	(0.027)	(0.001)	(0.016)	(0.000)	(0.042)	(0.001)	(0.028)	(0.001)	(0.051)
Tenure	-0.106***	0.082***	0.099***	0.062	-0.166***	0.184***	0.155***	-0.072	-0.431***	0.239***	0.424***	-0.402**
	(0.009)	(0.027)	(0.008)	(0.041)	(0.008)	(0.017)	(0.011)	(0.073)	(0.022)	(0.043)	(0.028)	(0.181)
$Tenure^2$	0.075***	-0.053***	-0.095***	-0.004	0.021***	-0.079***	-0.023*	-0.017	0.108***	-0.102***	-0.185***	0.088

Samples – Wage Gaps	Primary Ed. - Youth		Primary Ed. - Elderly		Secondary Ed. - Youth		Secondary Ed. - Elderly		Tertiary Ed. - Youth		Tertiary Ed.- Elderly	
Factors and Variables	*Detailed Decomposition*											
Components	Explained	Unexplained	Explained	Unexplained	Explained	Unexplained	Explained	Unexplained	Explained	Unexplained	Explained	Unexplained
Training	-0.001***	-0.105	-0.001**	0.175	-0.007***	0.038**	0.005***	0.030	-0.046***	-0.040***	0.019***	0.012*
	(0.000)	(0.180)	(0.000)	(0.115)	(0.001)	(0.017)	(0.001)	(0.027)	(0.002)	(0.010)	(0.003)	(0.007)
Employment characteristic												
Urban	0.001***	0.005***	-0.0001	-0.001*	-0.001***	0.0002	0.002***	0.011*	-0.005***	0.019***	0.002**	-0.014
	(0.000)	(0.002)	(0.000)	(0.000)	(0.000)	(0.002)	(0.001)	(0.007)	(0.001)	(0.005)	(0.001)	(0.009)
Fulltime	-0.016***	0.010	0.048***	0.007	-0.017***	0.020**	0.035***	-0.009	-0.043***	-0.020	0.020***	-0.143**
	(0.002)	(0.007)	(0.003)	(0.011)	(0.001)	(0.008)	(0.003)	(0.022)	(0.003)	(0.018)	(0.003)	(0.070)
Secondary job	0.002***	-0.002	0.0001	-0.014	0.004***	-0.018**	0.001*	0.016	0.004***	0.030**	-0.0001	-0.013
	(0.001)	(0.012)	(0.000)	(0.010)	(0.001)	(0.009)	(0.001)	(0.018)	(0.001)	(0.015)	(0.001)	(0.021)
Travel to work	-0.001***	0.050***	-0.004***	-0.012	-0.001**	-0.028***	-0.002***	-0.030*	-0.003***	-0.026***	-0.0001	0.010
	(0.000)	(0.016)	(0.001)	(0.020)	(0.000)	(0.006)	(0.001)	(0.017)	(0.001)	(0.009)	(0.001)	(0.016)
Institutional instrument												
Minimum wage	0.011***	-0.269	-0.011***	0.257	0.0001	1.073***	-0.006***	-0.930*	-0.002	2.126***	-0.013***	-1.351**
	(0.001)	(0.353)	(0.002)	(0.371)	(0.001)	(0.201)	(0.002)	(0.526)	(0.002)	(0.408)	(0.003)	(0.682)
Occupational choices												
Informality	-0.027***	0.002**	0.025***	0.018***	-0.022***	-0.007**	0.013***	0.0002	-0.0001	-0.060**	-0.001	0.077
	(0.002)	(0.001)	(0.002)	(0.005)	(0.001)	(0.003)	(0.001)	(0.001)	(0.000)	(0.028)	(0.001)	(0.069)
Skill-based	-0.002**	0.048	-0.007***	0.039	-0.015***	0.027***	0.019***	-0.017	-0.025***	-0.149***	0.013***	0.152**
	(0.001)	(0.053)	(0.002)	(0.072)	(0.002)	(0.007)	(0.004)	(0.013)	(0.002)	(0.023)	(0.004)	(0.067)
Sector-based	0.007***	-0.012	0.004***	-0.023	0.007***	-0.018**	-0.009***	-0.015	0.025***	-0.164***	-0.014***	0.036
	(0.002)	(0.031)	(0.002)	(0.042)	(0.001)	(0.008)	(0.002)	(0.019)	(0.002)	(0.023)	(0.003)	(0.070)
Constant		0.150		-0.580		-1.302***		1.010*		-2.238***		1.629**
		(0.406)		(0.401)		(0.205)		(0.535)		(0.416)		(0.709)

Note:

a) *Predicted mean wage of millennials in case of youth wage gap, and Predicted mean wage of boomers in case of elderly wage gap*
b) *ATD: Adjusted wage gap attributable to discrimination*
Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

In case of the youth wage gaps, the contributions of the endowment effect on wage differences increased with education attainments. As variable in the individual characteristic, gender actually favour millennials in primary education attainment case, while favour gen-Xers in secondary and tertiary education attainment cases. In term of human capital investment, tenure contribute the highest share to the youth wage gaps, where it increase with the education attainments. Previously, our finding also suggest that millennials wages and the youth wage gaps increase with education attainments as well. Thus, there are trade-off between times spent for a higher education and tenure for earning a higher rate of wage. For the regional minimum wages, the effects are diverged across education attainments, although aggregately are converged. Between effects are more pronounced in case of primary education graduates, while within effect are more pronounced in case of secondary and tertiary education graduates.

In term of the unexplained component, the wage structure effect show that millennials potentially earned higher rage of wages for equally having experience prior to current main job, tenure, residential place and workplace to gen-Xers. However, statistically negative contribution of the unexplained component in the wage differences signify the wage structure effect in the youth wage gap. The highest wage structure effect is in the youth wage gap of tertiary education attainment. Overall, the higher the education attainments of millennials and gen-Xers, the wider the youth wage gaps and the higher wage structure effects are. Following the aggregate pattern in the previous section, our results also show that the youth wage gaps are substantially higher than elderly wage gaps across all education attainments. Interestingly, the elderly wage gaps in case of secondary and tertiary education attainments are negative, imply that boomers actually earned higher rate of wages than gen-Xers, as they both hold secondary and tertiary education attainments.

While boomers with primary education attainment earned lower rate of wage to gen-Xers with the equal education attainment. Even for those with primary education attainment, the explained components favours boomers. This finding implies that for differences in productivity-relevant factors, aggregately, boomers are paid higher than gen-Xers. the detailed decomposition shows that tenure contributed the most of the explained components, which then clarifies the positive contribution of the explained components in the elderly wage gaps. However, the unexplained component's contribution in wage differences of primary education attainments is almost twice as much as the gaps themselves. With respect to Metcalf (2009), wage discrimination towards older workers are more pronounced for those with primary education attainments. Accordingly, boomers with a primary education background are likely disproportionately paid, compared to secondary and tertiary graduates. Hence, following wage difference patterns between boomers and gen-Xers, millennials who attained higher education levels will eventually be compensated through wage advantages albeit later on in their careers, ceteris paribus.

Furthermore, detailed decomposition has revealed that having experience contribute significantly to the unexplained component in wage differences of primary education graduates. Thus, having experience alone does not necessarily contribute positively to the wage gap. Boomers who are around retirement age may have already passed the peak of their productive life cycle, especially given their low education attainment. Otherwise, it might be a case of discrimination against older workers (i.e. jeunism) where employers prefer younger workers. More specific than for primary education graduates, the elderly wage gap among tertiary graduates shows that tenure contributed substantially to the unexplained components. The results indicate that boomers with a tertiary education are disproportionately paid to gen-Xers in their current jobs.

Our further examination of specialization, i.e. differentiating general and vocational senior secondary school graduates, revealed several interesting findings (Table 3.6). First, youth wage gaps for vocational education graduates were slightly narrower than for the general education graduates. In this case, the finding implies that education specialization contributed positively in narrowing the wage gaps. Second, unexplained components are statistically significant only in case of the youth wage gap of general senior graduates. This finding indicate that millennials of general education graduates are more likely to experience wage discrimination relative to millennials of vocational education graduates. Third, when comparing the predicted mean wage of general and vocational education graduates, we find a vocational wage premium for each generation. The elderly wage gaps are statistically significant and positive for both general and vocational education graduates, with the higher gap in the latter case. This finding implies not only that investing in higher education yields an earnings advantage for boomers relative to gen-Xers, but also that vocational education yields an earning advantage than general education.

Detailed decomposition show that tenure still contribute a lion's share to the youth wage gap, both in case general and vocational graduates. Tenure contribution in the explained components are in favour gen-Xers, while in the unexplained component are in favour millennials. This is consistent with previous section, which also suggest that older worker earned higher rates of wage for longer tenure, but younger workers earned higher rates of wage for equal tenure to older workers. Tenure also the largest contribution in the elderly wage gaps, which again consistent with the results of previous section are in reverse to the contribution in the youth wage gaps. The regional minimum wages, combining between and within effect, show positive effect in the youth wage gap and negative effect in the elderly wage gap. Thus, generally the regional minimum wages show a compression effects toward younger workers' wages, except in the case of the elderly wage gap of general high school graduate. In term of segregation, negative contribution in the unexplained component only show in case of the youth wage gap of general senior school graduates. In this case, general senior school graduates millennials earned lower rate of wages for equal sector-based occupation to gen-Xers. While for vocational graduates, the segregation is positive in favour millennials in term of skill-based occupational choices.

Table 3. 6 The Intergenerational Wage Gap: Returns to Specialization

Samples – Wage Gaps	General Senior - Youth	General Senior - Elderly	Vocational Senior - Youth	Vocational Senior - Elderly
Factors and Variables		*Overall Decomposition*		
Predicted mean wages of:				
Millennials (Boomers) [a)]	8.810***	9.411***	8.843***	9.487***
	(0.006)	(0.024)	(0.008)	(0.032)
Gen-Xers	9.176***	9.176***	9.197***	9.197***
	(0.006)	(0.006)	(0.009)	(0.009)
Wages differences	-0.366***	0.235***	-0.354***	0.290***
	(0.009)	(0.025)	(0.012)	(0.033)
Explained component	-0.320***	0.241***	-0.364***	0.322***
	(0.008)	(0.014)	(0.012)	(0.022)
Unexplained component	-0.046***	-0.007	0.010	-0.032
	(0.010)	(0.023)	(0.015)	(0.033)
Adjusted Wage Gap	30.65%	-26.49%	29.81%	-33.64%
Wage structure effect	12.57%	-	-	-
ATD [b)]	3.85%	-	-	-
Observations	33,460	19,400	17,176	8,908
		Detailed Decomposition		
Components	Explained / Unexplained	Explained / Unexplained	Explained / Unexplained	Explained / Unexplained
Individual characteristic				
Gender	-0.019*** / -0.022***	0.015*** / -0.026	-0.011*** / -0.031***	0.010*** / -0.065***
	(0.001) / (0.004)	(0.003) / (0.017)	(0.001) / (0.005)	(0.003) / (0.021)
Marital status	-0.070*** / 0.024	0.002 / 0.073	-0.073*** / 0.005	0.006* / 0.088
	(0.005) / (0.024)	(0.003) / (0.051)	(0.008) / (0.041)	(0.003) / (0.070)
Human capital investment				
Have experience (0/1)	-0.003*** / 0.103***	0.0004 / -0.051	-0.003** / 0.115***	0.0002 / -0.045
	(0.001) / (0.024)	(0.000) / (0.069)	(0.001) / (0.034)	(0.001) / (0.098)
Tenure	-0.195*** / 0.189***	0.154*** / -0.302**	-0.226*** / 0.334***	0.189*** / 0.008
	(0.013) / (0.027)	(0.017) / (0.142)	(0.020) / (0.036)	(0.030) / (0.187)
Tenure^2	0.025** / -0.078***	0.012 / 0.145	0.005 / -0.135***	0.020 / -0.145
	(0.010) / (0.013)	(0.020) / (0.091)	(0.016) / (0.017)	(0.037) / (0.120)

Samples – Wage Gaps	General Senior - Youth		General Senior - Elderly		Vocational Senior - Youth		Vocational Senior - Elderly	
Factors and Variables	*Overall Decomposition*							
Components	Explained	Unexplained	Explained	Unexplained	Explained	Unexplained	Explained	Unexplained
Training	-0.008***	0.022	0.006***	0.046	-0.009***	0.061***	0.011***	0.053
	(0.001)	(0.024)	(0.002)	(0.038)	(0.001)	(0.023)	(0.003)	(0.038)
Employment Characteristic								
Urban	-0.002***	0.005*	0.002**	0.020	-0.0001	-0.006	0.001	-0.025
	(0.001)	(0.003)	(0.001)	(0.013)	(0.000)	(0.006)	(0.001)	(0.018)
Fulltime	-0.012***	0.023*	0.024***	0.066	-0.026***	0.019	0.045***	-0.043
	(0.002)	(0.012)	(0.005)	(0.041)	(0.002)	(0.023)	(0.007)	(0.065)
Secondary job	0.005***	-0.006	0.002*	0.055*	0.008***	-0.028	0.001	-0.025
	(0.001)	(0.014)	(0.001)	(0.030)	(0.002)	(0.019)	(0.002)	(0.040)
Travel to work	-0.003***	-0.027***	-0.000	-0.057**	0.002**	-0.032***	-0.003**	0.068**
	(0.001)	(0.009)	(0.001)	(0.023)	(0.001)	(0.010)	(0.001)	(0.031)
Institutional instrument								
Minimum wage	-0.002	1.358***	-0.002	-2.456***	0.010***	1.430***	-0.019***	-0.823
	(0.002)	(0.324)	(0.004)	(0.887)	(0.003)	(0.372)	(0.006)	(1.127)
Occupational choices								
Informality	-0.017***	-0.015**	0.005***	-0.011	-0.018***	-0.005	0.009***	0.013
	(0.002)	(0.006)	(0.002)	(0.010)	(0.003)	(0.011)	(0.003)	(0.015)
Occupation	-0.024***	-0.011	0.033***	0.019	-0.029***	0.033**	0.063***	0.010
	(0.003)	(0.008)	(0.008)	(0.013)	(0.004)	(0.014)	(0.011)	(0.018)
Sector	0.004***	-0.039***	-0.012***	-0.026	0.005*	-0.010	-0.012**	-0.042
	(0.002)	(0.012)	(0.003)	(0.032)	(0.003)	(0.013)	(0.005)	(0.033)
Constant		-1.571***		2.496***		-1.741***		0.941
		(0.328)		(0.900)		(0.379)		(1.154)

Note:

a) Predicted mean wage of millennials in case of youth wage gap, and Predicted mean wage of boomers in case of elderly wage gap

b) ATD: Adjusted wage gap attributable to discrimination

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

3.4.5. Returns to Traveling to Work and Urban-Rural Residencies

As an alternative to residing and working in the same region, workers travelling to and from their workplace across regions on a regular basis. In this regards, they make an investment to live and work in different regions, commonly described as commuting, to pay for their cost of living and cost of maintaining a home (Monte, Redding and Rossi-Hansberg, 2018). To analyse any contribution of returns to commuting to differences in wage rates between generations, we present in Table 3.7, the results of wage differences decomposition for locals and commuters. Locals defined as workers who reside and work in the same region. While commuters defined as workers who commute on daily basis to work outside of their residential place, differentiated by sub-provincial administrative borders. Our wage differences decomposition results revealed that the wage rates of commuters were substantially higher than that of locals. Thus, our decomposition results confirm the presence of a commuting wage premium for all generations. Accordingly, workers who have invested in travelling to work earned a higher wage rate. Boomers earned the highest commuting wage premium, while millennials earned the lowest commuting wage premium.

In term of the youth wage gap, our results show that commuters undergone slightly wider youth wage gap compare to locals. Interestingly, the wage structures effect within the youth wage gap in commuters is lower compare to locals. This findings imply that commuting millennials undergone wider wage gap to commuting gen-Xers, but experienced lower rate of wage discrimination. Detailed decomposition revealed that tenure have the greatest contribution in both the endowment and the wage structure effects of the wage differences of locals and commuters. Expectantly, in commuters' case, tenure contribution in the explained component favour gen-Xers, while in the unexplained component favour millennials. Thus, employers actually favour travelling to work millennials than gen-xers for equal tenure. In term of institutional instrument of the labour market, our wage differences decomposition show both between effects and within effect of the regional minimum wages, favouring local and commutering millennials. The regional minimum wages' between effects is higher for commutering millennials, while within effects is higher for local millennials. Thus, to some extent, higher wage rates of commutering millennials is attributable to higher regional minimum wage of the workplace than the residential place.

Table 3. 7 The Intergenerational Wage Gap: Locals and Commuters

Samples – Wage Gaps	Locals - Youth	Locals - Elderly	Commuters - Youth	Commuters- Elderly
Factors and Variables		*Overall Decomposition*		
Predicted mean wages of:				
Millennials (Boomers)[a)]	8.766***	8.990***	9.104***	9.545***
	(0.004)	(0.008)	(0.010)	(0.031)
Gen-Xers	9.082***	9.082***	9.455***	9.455***
	(0.003)	(0.003)	(0.010)	(0.010)
Wages differences	-0.316***	-0.092***	-0.351***	0.090***
	(0.005)	(0.009)	(0.014)	(0.032)
Explained component	-0.214***	-0.057***	-0.245***	0.077***
	(0.004)	(0.006)	(0.013)	(0.023)
Unexplained component	-0.102***	-0.035***	-0.106***	0.012
	(0.006)	(0.008)	(0.015)	(0.025)
Adjusted Wage Gap	27.09%	8.79%	29.60%	-9.42%
Wage structure effect	32.28%	38.04%	30.20%	-
ATD[b)]	8.75%	3.34%	8.94%	-
Observations	131,949	93,152	14,469	9,715
		Detailed Decomposition		
Components	Explained / Unexplained	Explained / Unexplained	Explained / Unexplained	Explained / Unexplained
Individual characteristic				
Gender	-0.003*** (0.001) / -0.012*** (0.001)	0.0001 (0.001) / -0.005** (0.002)	-0.002 (0.002) / -0.006 (0.006)	0.001 (0.001) / -0.029 (0.019)
Marital status	-0.074*** (0.003) / -0.000 (0.012)	-0.006*** (0.002) / 0.047*** (0.015)	-0.051*** (0.008) / 0.009 (0.043)	-0.0001 (0.002) / 0.117** (0.057)
Human capital investment				
Years of schooling	0.050*** (0.001) / -0.003 (0.014)	-0.121*** (0.003) / -0.027* (0.014)	0.039*** (0.004) / 0.099* (0.052)	-0.076*** (0.011) / 0.027 (0.080)
Have experience	-0.003*** (0.000) / 0.096*** (0.013)	0.0002 (0.000) / -0.057*** (0.021)	-0.005*** (0.001) / 0.055 (0.035)	-0.002** (0.001) / -0.042 (0.078)
Tenure	-0.207*** (0.007) / 0.193*** (0.014)	0.184*** (0.007) / -0.042 (0.037)	-0.204*** (0.020) / 0.248*** (0.039)	0.129*** (0.021) / 0.045 (0.154)
Tenure2	0.063*** (0.005) / -0.088*** (0.007)	-0.110*** (0.008) / -0.025 (0.022)	0.046*** (0.015) / -0.108*** (0.019)	-0.014 (0.024) / -0.049 (0.100)

Samples – Wage Gaps	Locals - Youth		Locals - Elderly		Commuters - Youth		Commuters- Elderly	
Factors and Variables	*Detailed Decomposition*							
Components	Explained	Unexplained	Explained	Unexplained	Explained	Unexplained	Explained	Unexplained
Vocational	-0.001***	-0.021***	0.001***	-0.033**	-0.006***	-0.026***	0.004***	0.022
	(0.000)	(0.005)	(0.000)	(0.013)	(0.001)	(0.009)	(0.001)	(0.032)
Training	-0.014***	0.003	-0.008***	0.022	-0.010***	-0.037*	0.004*	0.014
	(0.001)	(0.011)	(0.001)	(0.017)	(0.001)	(0.022)	(0.002)	(0.030)
Employment Characteristic								
Urban	-0.0003**	0.002**	-0.0003**	0.0001	-0.0006	0.016**	-0.001	0.007
	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.006)	(0.001)	(0.016)
Fulltime	-0.021***	0.028***	0.046***	-0.014	-0.009***	0.055	0.014***	-0.070
	(0.001)	(0.005)	(0.002)	(0.010)	(0.002)	(0.035)	(0.004)	(0.084)
Secondary job	0.005***	-0.002	0.0002	-0.013	0.001*	0.014	0.0001	-0.035
	(0.000)	(0.007)	(0.000)	(0.008)	(0.001)	(0.029)	(0.000)	(0.047)
Institutional instrument								
Minimum wage	0.004***	1.166***	-0.016***	-0.544*	0.013***	0.930**	-0.008*	0.263
	(0.001)	(0.175)	(0.001)	(0.292)	(0.003)	(0.373)	(0.005)	(0.768)
Occupational choices								
Informality	-0.022***	-0.008***	0.026***	0.004***	-0.024***	-0.061***	0.025***	0.007
	(0.001)	(0.003)	(0.001)	(0.001)	(0.002)	(0.021)	(0.004)	(0.024)
Skill-based	0.007***	0.014**	-0.070***	-0.038***	-0.034***	0.024*	0.017*	0.008
	(0.001)	(0.005)	(0.003)	(0.014)	(0.004)	(0.014)	(0.010)	(0.018)
Sector-based	0.001	-0.052***	0.015***	-0.004	0.002	-0.026	-0.016***	-0.017
	(0.001)	(0.007)	(0.002)	(0.017)	(0.003)	(0.019)	(0.004)	(0.036)
Constant		-1.418***		0.693**		-1.293***		-0.256
		(0.179)		(0.297)		(0.384)		(0.802)

Note:
a) Predicted mean wage of millennials in case of youth wage gap, and Predicted mean wage of boomers in case of elderly wage gap
b) ATD: Adjusted wage gap attributable to discrimination
Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

In term of the elderly wage gap, our decomposition revealed that locals and commuters undergone difference direction of wage differences. In locals' case, gen-Xers earned higher rates of wage than boomers, thus the elderly wage gap favour the younger workers. In the commuter's cases, the elderly wage gap is statistically significant and negative. This finding imply that by commutering, boomers managed to earn slightly higher rates of wage than gen-Xers. Detailed decomposition show that differences in informality and skill-based occupations contributes positively to the explained component of the elderly wage gap in commuters' case. This finding implies that boomers who worked in the informal sector or in higher skilled occupations, and decide to work outside their residency region, potentially earned a higher rate of wage. Interestingly, as a deviation from the results of other elderly wage gaps in this study, the contribution of unexplained components to wage differences are not statistically significant for commuters in terms of the elderly wage gap. This implies that commuting boomers, despite any wage differences they experienced, less likely encountered wage discrimination based on their age.

Lastly, we intersect the intergenerational wage gap based on workers' residential place, which we differentiated between boomers, gen-Xers and millennials living both in rural and urban area. Our decomposition results show that the intergenerational wage differences are statistically significant in both urban and rural areas (Table 3.8). Again, following results in the previous sections, the findings show that the youth wage gaps are higher than the elderly wage gap. Additionally, the youth wage gap of urban area is higher compare to rural area, but the wage structure effect of urban area are lower than rural area. This finding indicate that urban millennials might undergone a wider wage gap but simultaneously less severe wage discrimination than rural millennials. Furthermore, comparing predicted mean wages between both residential places, our result also shows that workers in urban area earned relatively higher wages compare to workers in rural area across all generations. This finding points to the existence of urban wage premium within all generations, which millennials gained the lowest urban wage premium and boomers gained the highest.

Detailed decomposition reveal that tenure contribute the most in the explained and unexplained components of wage differences of both urban and rural areas. In this regards, negative and statistically significant contribution of differences in tenure in the explained component signify that the youth wage gap favour gen-xers in both urban and rural areas. However, contribution of tenure in the unexplained component, reversed differences in tenure contribution in the explained component. For equal share to the wage differences, the wage structure effect of equal tenure are favoured millennials. Aggregately, tenure contribution in the wage differences between millennials and gen-Xers are in urban area is higher than in urban area, where both are favoured gen-Xers for earning higher rate of wages.

Table 3. 8 The Intergenerational Wage Gap: Urban and Rural

Samples – Wage Gaps	Urban - Youth	Urban - Elderly	Rural - Youth	Rural - Elderly
Factors and Variables		*Overall Decomposition*		
Predicted mean wages of:				
Millennials (Boomers)*	8.835***	9.119***	8.749***	8.901***
	(0.005)	(0.011)	(0.005)	(0.012)
Gen-Xers	9.186***	9.186***	9.021***	9.021***
	(0.004)	(0.004)	(0.005)	(0.005)
Wages differences	-0.352***	-0.067***	-0.272***	-0.120***
	(0.006)	(0.011)	(0.007)	(0.012)
Explained component	-0.268***	-0.040***	-0.153***	-0.083***
	(0.006)	(0.008)	(0.006)	(0.008)
Unexplained component	-0.083***	-0.027***	-0.119***	-0.038***
	(0.007)	(0.010)	(0.008)	(0.012)
Adjusted Wage Gap	29.60%	6.48%	23.81%	11.31%
Wage structure effect	23.58%	40.30%	43.75%	31.67%
ATD*	6.98%	2.61%	10.42%	3.58%
Observations	86,663	61,028	59,755	41,839
		Detailed Decomposition		
Components	Explained / Unexplained	Explained / Unexplained	Explained / Unexplained	Explained / Unexplained
Individual characteristic				
Gender	-0.006*** / -0.011***	0.002** / -0.006*	-0.003** / -0.016***	-0.008*** / -0.008**
	(0.001) / (0.001)	(0.001) / (0.003)	(0.001) / (0.003)	(0.002) / (0.004)
Marital status	-0.070*** / 0.039**	-0.001 / 0.068***	-0.070*** / -0.047***	-0.012*** / 0.023
	(0.003) / (0.016)	(0.002) / (0.019)	(0.004) / (0.017)	(0.003) / (0.023)
Human capital investment				
Years of schooling	0.048*** / 0.085***	-0.131*** / -0.016	0.050*** / -0.050***	-0.106*** / -0.043***
	(0.002) / (0.020)	(0.004) / (0.021)	(0.002) / (0.017)	(0.004) / (0.017)
Have experience	-0.003*** / 0.098***	0.0001 / -0.113***	-0.003*** / 0.073***	-0.0003 / 0.018
	(0.000) / (0.015)	(0.000) / (0.027)	(0.001) / (0.019)	(0.000) / (0.032)
Tenure	-0.245*** / 0.217***	0.178*** / -0.144***	-0.166*** / 0.164***	0.177*** / 0.072
	(0.009) / (0.017)	(0.008) / (0.047)	(0.009) / (0.021)	(0.011) / (0.054)
Tenure^2	0.065*** / -0.090***	-0.081*** / 0.025	0.062*** / -0.084***	-0.126*** / -0.070**
	(0.006) / (0.008)	(0.009) / (0.029)	(0.007) / (0.010)	(0.012) / (0.032)

Samples – Wage Gaps	Urban - Youth		Urban - Elderly		Rural - Youth		Rural - Elderly	
Factors and Variables	*Detailed Decomposition*							
Components	Explained	Unexplained	Explained	Unexplained	Explained	Unexplained	Explained	Unexplained
Vocational	-0.002***	-0.016***	0.002***	-0.009	0.0003	-0.040***	0.001	-0.067***
	(0.001)	(0.005)	(0.000)	(0.014)	(0.000)	(0.009)	(0.000)	(0.025)
Training	-0.014***	-0.005	-0.005***	0.025	-0.012***	0.013	-0.010***	-0.000
	(0.001)	(0.012)	(0.001)	(0.017)	(0.001)	(0.020)	(0.001)	(0.031)
Employment Characteristic								
Fulltime	-0.020***	0.041***	0.039***	-0.018	-0.022***	0.019***	0.055***	-0.014
	(0.001)	(0.009)	(0.002)	(0.016)	(0.001)	(0.006)	(0.003)	(0.012)
Secondary job	0.003***	0.001	0.0002	-0.003	0.007***	-0.002	0.0002	-0.020**
	(0.000)	(0.010)	(0.000)	(0.013)	(0.001)	(0.008)	(0.000)	(0.010)
Travel to work	-0.0002	-0.019***	-0.006***	-0.015	-0.0004	-0.003	-0.005***	-0.009
	(0.000)	(0.006)	(0.001)	(0.011)	(0.000)	(0.010)	(0.001)	(0.026)
Institutional instrument								
Minimum wage	0.006***	1.396***	-0.019***	-0.593*	0.005***	0.448	-0.011***	-0.106
	(0.001)	(0.189)	(0.002)	(0.328)	(0.001)	(0.297)	(0.002)	(0.484)
Occupational choices								
Informality	-0.033***	-0.020***	0.036***	0.001	-0.006***	-0.006***	0.008***	0.018***
	(0.001)	(0.005)	(0.002)	(0.001)	(0.001)	(0.002)	(0.002)	(0.006)
Skill-based	-0.006***	0.002	-0.051***	-0.018*	0.009***	0.021*	-0.062***	-0.038
	(0.002)	(0.006)	(0.004)	(0.010)	(0.002)	(0.011)	(0.004)	(0.033)
Sector-based	0.009***	-0.044***	-0.005***	-0.001	-0.006***	-0.058***	0.017***	-0.039
	(0.001)	(0.009)	(0.002)	(0.017)	(0.001)	(0.013)	(0.003)	(0.042)
Constant		-1.760***		0.788**		-0.551*		0.246
		(0.193)		(0.335)		(0.302)		(0.494)

Note:

ATD: Adjusted wage gap attributable to discrimination
Robust standard errors in parentheses
**** p<0.01, ** p<0.05, * p<0.1*

In contrast, for a smaller contribution, education have positive effect in the youth wage gap in both urban and rural areas. In term the endowment effects, education contribute a higher share to wage differences in rural area. However, in term of the wage structure effects, education contribute a higher share to wage differences in urban area, while in rural area it is negative and against millennials. This finding signify that in urban millennials have more leverage for higher rate of wages to gen-Xers, either due to a higher education of employers preferences for younger workers. While for rural millennials, the endowment and wage structure effect of education are somehow equal and counteract each other, hindering the roles of education in the wage gap. Additionally, the regional minimum wages also play an important role in narrowing the youth wage gap. Our results show an aggregate positive contribution on the regional minimum wages and is substantially higher in urban areas. Thus, minimum wage compression effects are more pronounced for urban millennials, particularly due to the within regional minimum effect.

While in regards of the elderly wage gap, our decomposition show that wage differences of urban area is lower compare to rural area. While, wage structure effects are more pronounced in the urban elderly wage gap. Those findings suggest that urban boomers experienced a narrower wage gap but simultaneously encountered a higher rate of wage discrimination. In line with the youth wage gap, detailed decomposition result show that tenure contribute the most of the wage differences between boomers and gen-Xers in urban and rural areas. In both urban and rural area, tenures effect favour boomers to gen-Xers. Our decomposition results also show that informality contribute negative and statistically significant in the explained components. Thus, gen-Xers working in informal sector more likely earned higher rates of wages in both urban and rural area. While differences in sector-based occupation and skill-based occupation are negative and statistically significant in the endowment effect, except in rural area where the effect of sector-based occupational choices is favouring boomers. However, the extent of those variables towards the wage structure effect are differed. The contribution of occupational choices in the wage differences only significant in urban area, which signify the incidence of skill-based occupational segregation in urban area. These findings suggest boomers in urban area more likely experiences vertical segregation leading to wage discrimination.

3.5. CONCLUSION

Our examination of intergenerational inequality shows that the youth wage gap and the elderly wage gap are equally statistically significant, taking into account productivity and non-productivity-relevant factors including personal characteristic, human capital investment, employment characteristic, institutional instrument, and occupational choices. Hence, the size and direction of those contributing factors and variables are diverse. Youth wage gaps are substantially higher than elderly wage gaps in all cases, suggesting that millennials were more

struggling to earn equal pay, due to differences in productivity-relevant factor, mainly differences in tenure. However, boomers might be more disproportionately paid, most likely due to wage discrimination.

Our decomposition results show that millennials have some advantages over gen-Xers and boomers, such as higher return to education, higher regional minimum wage effects, and even benefit from employer preferences for younger workers, ceteris paribus. However, return to specialization, training and tenure are aggregately have higher contribution to wage differences. Consequently, millennials are most likely segregated into the secondary labour market, earning a lower rate of wage. Boomers also struggle toward equal pay, but for non-productivity-relevant reasons. Favouritism of younger workers, to some extent, contributed to the inequality of pay. However, boomers improved theirs wage rate by having longer tenure, vocational educational, and working in informal jobs or in certain types of sectors.

We also found some indication of horizontal and vertical segregation, due to sector-based and skill-based occupational choices, leading to wage discrimination. Learning from boomers experiences, millennials have a window of opportunity to improve their earnings and narrow the intergenerational wage gap. At a minimum, earnings will increase towards its peak and then decline towards retirement age as gen-Xers and boomers currently have experienced. Millennials have the advantage of making investments needed to steepen and extend their age-wage profile. Additionally, our decomposition results also identified wage premiums for having higher educational attainment, specialization, travelling to work and urban residential place. These factors considered as the wage premium generator factors.

To promote a better intergenerational equality of pay, improving all those wage premium generator factors is the key, especially for younger generation. Governmental and educational institutions need to initiate and create more space for the development of vocational education, entrepreneurship, and creative industries. It is also crucial to develop better public transportation and residential area along with improvement in rural labour market so millennials can be attached to labour market more efficiently. Targeting minimum wage towards young workers could also be a policy option. This option, however, must be proceeded thoughtfully due to the potential trade-off between higher wages and higher unemployment of young workers. Simultaneously, a better pension system and access to a retirement plan might help improve the bargaining power of older workers and ease wage discrimination. Given the gravity of attaining equal pay, extending future studies to include intertemporal and interregional analysis of the intergenerational equality of pay is essential.

CHAPTER 4

INTERTEMPORAL AND INTERREGIONAL WAGE BEHAVIOUR IN INDONESIA: A RECONCILIATION OF THE PHILLIPS CURVE AND THE WAGE CURVE?

"It is not knowledge, but the act of learning,
not possession but the act of getting there,
which grants the greatest enjoyment"

~Carl Friedrich Gauss~

Abstract

Combining interregional and intertemporal perspectives of wage behaviour in a developing country serve equal importance not only in formulating policy for regional economic development but also towards the development of economic thought. We develop a panel error-correction model of wage behaviour to convey the Phillips curve and the wage curve in a reconciliation specification, featuring nominal and real wage rigidity in the short run and wage flexibility in the long run equilibrium. The Indonesian National Labour Force Survey for the periods of 1986 -2015 provides a comprehensive panel data for such a model. Using pooled mean group common correlated effects estimators with homogenous and heterogeneous structural break, our results signify the existence of temporary effects of unemployment on wages, heterogeneity of wage behaviour in the short run, interregional dependence in wage flexibility and differential behaviour of wage in the presence of structural breaks and regimes. The findings are in line with the Phillips curve, with temporary effect of unemployment on wage changes. For the wage curve, there are some adjustments towards a long run equilibrium of wages while the role of labour market supply might be more complicated than what was expected.

JEL Classification: C23, E24, J31, R23

Keyword: wage rigidity, heterogeneous panel, cross section dependence, structural breaks

4.1. INTRODUCTION

Wage rigidity is an important feature of wage behaviour, which characterizes the dynamics of a labour market. It explains why any change in unemployment, cost of living, or productivity is not always followed by the same magnitude or velocity of change in wages as in a competitive labour market setting. Both nominal and real wage rigidity serve equal importance not only in terms of contributing to the development of economic thoughts but also in terms of contributing towards alternative policies and solutions for many economic problems including unemployment, inflation, and productivity. Determining the basic relationship of wage and other economic aggregates is crucial in examining wage rigidity. A paper by Phillips (1958) described the inverse relationship between a change in wage and the unemployment rate, known as the Phillips curve. The Phillips curve provides groundwork for studies on the intertemporal relationship between 'changes of wage' and unemployment rates. Alternatively, Blanchflower and Oswald (1994) proposed an inverse relationship between 'level of wage' and the contemporaneous unemployment rate, known as the wage curve. Along with growing studies based on each of the curve, Blanchard and Katz (1997) proposed a reconciliation by augmenting the wage curve into the Phillips curve based on an error correction model featuring short run adjustments toward a long run equilibrium of wage.

There are a growing number of studies either in favour of, or in contrast to, the Phillips curve and the wage curve, which indicates the importance of further analysis of wage and unemployment relationship. Blanchard (2016) emphasizes that the Phillips curve is still present, and its current shape will raise serious challenges for monetary policy in the future. However, most of the studies were in the context of developed countries, particularly the US and European countries, which may have different outcomes in term of developing country. Furthermore, the Phillips curve studied mostly for macroeconomics context, while the wage curve for more microeconomics. Thus, studies based on the Phillips curve mainly exploited aggregate national or multinational level data, while based on the wage curve exploited individual or firm level data. Only a few studies were on developing countries or aimed at sub-national interregional level as in Messina and Sanz-de-Galdeano (2014), Kaur (2014) and Choudhary et al. (2013). More recent studies, with more refined datasets, also based on Blanchard and Katz (1999) dynamic approach, have introduced multi-regimes or structural breaks in the equation featuring different economic environments or different policy stances, e.g. Rusinova, Lipatov and Heinz (2015) and Kumar and Orrenius (2016).

Indonesia provides a stimulating developing country context to complement the growing literatures on wage and unemployment relationship, particularly the wage rigidity. Accordingly, there were upturns and downturns in the Indonesian economy, which affects the business cycle and the labour market condition eventually. In the early 1990's, for example, where Indonesia

managed to counter the post oil boom shock and industrialize by growing the exports-oriented manufacturing sector, the unemployment rate was between 2.55 percent and 4.36 percent (1990-1994) while inflation was between 4.94 percent and 9.77 percent in the same period. The economic boom was then ended by the economic crisis where unemployment rates as well as inflation were considerably high (between 11.24 and 17.10 percent in 2005). These experiences make it possible to study the extent of wage rigidity on different phases of the business cycle.

Using a panel of labour market data on 26 sub-national regions across 30 years, this study aims to complement the literatures on nominal and real wage rigidity by: (i) testing the incidence of the Phillips curve or the wage curve, (ii) testing the heterogeneity and dependency of labour markets across provinces, and (iii) examining the wage behaviour in the presence of homogenous and heterogeneous structural breaks. The remainder of this paper is structured as follows: Section 2 provides a discussion of the relevant literature; Section 3 explains the data in use and estimation strategy; Section 4 deals with the presentation and interpretation of the empirical results; and finally, Section 5 concludes.

4.2. LITERATURE REVIEW

4.2.1. Between Nominal and Real Wage Rigidity

Two major features of the New Keynesian economics are sticky prices and wages in the framework of imperfect markets. Sticky wages explain the slow response of wages to changes in economic aggregates; differentiate as nominal wage rigidity and real wage rigidity. Nominal wage rigidity arises from the presence of menu cost in the wage-setting process as firms taking into account economic aggregates prior to a wage change decision. It is commonly related to the speed with which nominal wages can be changed in reaction to economic shocks (Knell, 2013). There are three economic shocks largely introduced in estimating wage rigidity, i.e. inflation, unemployment, and labour productivity. Based on adaptive price expectations and backward-looking wage setting assumptions, nominal wage depends positively on price changes (Avsar and Gur, 2004). Additionally, Sigurdsson and Sigurdardottir (2016) emphasized that taking any expectations of price change (expected inflation) into account will result in different time profiles of wage adjustments and consequently, have different implications for the transmission of monetary shocks. Recent empirical studies emphasized the influence of price expectation in nominal wage rigidity including Abbritti and Fahr (2013), Daly and Hobijn (2014), Kolsrud and Nymoen, (2015), and Kumar and Orrenius (2016).

Another shock to nominal wage change, which also contributes to nominal wage rigidity, is the unemployment rate. Phillips (1958) argued that an increase in the unemployment rate necessitates a falling nominal wage to restore the equilibrium of the labour market, forming what

is known in macroeconomic textbooks as the Phillips curve. Despite developments in various directions, the original Phillips 'wage inflation' empirical groundwork continues to have a substantial contribution in a number of recent works (Dali and Hobijn, 2014; Kumar and Orrenius, 2016; Anderton and Bonthuis, 2015; and Fallick, Lettau, and Wascher, 2016).

Phillips (1958) also highlighted the need for much more detailed research into the relationship between wage rate and productivity. Based on the search and matching model, Haefke et al., (2008) provided a comprehensive discussion that unemployment might not be the only explanation for nominal wage change. They differentiate the degree of the productivity effect on wages between new hires and all workers and found the elasticity of wage changes to be one-to-one in terms of labour productivity. It is also reasonable to corroborate whether labour productivity contributes to nominal wage rigidity as it might also stem from behavioural factors that lead employers and workers to focus on nominal rather than real wages (Fallick et al,. 2016). Recent studies acknowledged a significant role of labour productivity on nominal wages as in Bardsen, Doornik and Klovland (2004), Dadam and Viegi (2016), Anderton and Bonthuis (2015).

Another key part of the New Keynesian is the real wage rigidity. The real wage rigidity could arise from implicit contracting or as a by-product of the efficiency-wage setting (Fallick, et al., 2016). Implicit contract theory (Azariadis, 1975; Baily, 1974; Gordon, 1974) implies a long-term agreement between employers and workers regarding workloads and its pay as a form of risk sharing, keeping the real wage rate constant into the distance future. Manning (1993) and later Blanchard and Katz (1999), set lagged real wage as the reservation wage. Recent studies such as Bellou and Kaymak (2012) argue that an implicit contract could also be identified by lagged unemployment, assuming that wages in the contractual market contain information on economic conditions when the contract is renegotiated.

In efficiency wage theory, employers assume the productivity of their workers according to the rate and change of real wage. Therefore, paying an above market-clearing rate serves as an insurance in order to avoid a decline in worker's productivity, e.g. the efficiency-wage model by Shapiro and Stiglitz (1984), and the shirking model. Recently, Knell (2014) studied an efficiency wage model with a shirking behavioural framework. He argued that paying an above market-clearing rate that eventually affects labour productivity, might not necessarily represent the reservation wage if the lagged real wage is already above the non-shirking threshold. Other derivative models of the efficiency wage theory, such as the gift-exchange model (Akerlof, 1982) and fair-wage effort hypothesis (Akerlof and Yellen, 1990) provide similar approaches to the explanation of the contribution of labour productivity on real wage rigidity. In those models, a higher wage rate could be considered as an efficiency wage, while the market-clearing wage rate

is considered as a reservation wage. Accordingly, Layard et al., (1991) defines the wage curve using the assumption that the reservation wage is equal to labour productivity.

Blanchflower and Oswald (1994) define the wage curve as a negative relationship between the level of real wages and unemployment. They argue that worker in a region with high unemployment earn lesser than identical worker in a region with low unemployment does. The wage curve is originally state-dependent as it links real wage rates to unemployment rates. When time dimensions are added to the equation and changes in real wages are linked to changes in the unemployment rates, the specification provides a method for calculating an index of wage rigidity (Blanchflower and Oswald, 1994). In the absence of a temporary friction in the labour market such that there is an incomplete adjustment of wages in the short run, aggregate labour productivity is consistent with a hypothetical natural rate of unemployment (Blanchard and Katz, 1997).

The natural rate of unemployment is determined by the supply side of the labour market, including production possibilities and institutional factors. If institutional factors involved real wage rigidity, the natural rate of unemployment may feature involuntary unemployment. Although New Keynesian Economics considers both nominal and real wage stickiness, those that deal more directly with involuntary unemployment refer to real rigidities (Guerrazzi and Meccheri, 2012). There are at least two prominent efficiency wage models explain the contribution of involuntary unemployment on real wage rigidity. The labour turnover models by Stiglitz (1974), Schlicht (1978), and Salop (1979), similar with shirking approach, assume that workers are reluctant to wage cuts. Meanwhile, employers face turnover costs from not only losing the incumbent worker but also by recruiting and training new workers. The more skilled a worker is, the higher the turnover cost becomes for the firm. Employers eventually avoid wage cuts and pay higher wages than the reservation wage. Assuming that all employers in the market implement the same measure, this will potentially result in an average sticky real wage.

The insider-outsider models by Solow (1986) and Lindbeck and Snower (1989) argue that the incumbent worker, the insider, has some power in determining their wage and employment decisions. The reason for this power is turnover costs needed to substitute the insider for a new worker, the outsider. Due to the presence of labour turnover and the risk of decreasing productivity, a sticky real wage can be considered as the insider's share of economic rent, even when unemployment increases. Franz and Pfeiffer (2003) concluded, based on surveys in the US and Germany, that employers use implicit contract theory as a reason for wage rigidity for less-skilled workers as well as turnover costs and a negative influence of a wage cut on a skilled worker's efforts.

Other than economic aggregates as described above, wage rigidities can also arise from institutional factors. Villavicencio and Saglio (2013) found that real wages depend not only on

unemployment levels but also on institutional factors characterizing the labour market. Meanwhile, Fallick et al., (2016) emphasized that nominal wage rigidity might arise from government regulations such as minimum wages or government pay systems or informational factors that lead employers and/or workers to focus on nominal rather than real wages. Nominal wages could possibly remain fixed for some periods due to formal or informal contracts, i.e. minimum wage. For both nominal and real wages, Babecky et al., (2010) and Anderton and Bonthuis (2015) also supported the role of institutional factors on wage rigidities. Overall, institutional factors affecting wage rigidities range from those that characterize the regional or sectoral labour markets (such as share of union density, high skilled workers, tenures, and firm sizes) to governmental regulations (such as wage centralization, minimum wage, and employment protections).

The next important question is related to the underlying connections between nominal and real wage rigidity. Based on theoretical foundations and recent empirical work, connections between nominal and real wage rigidity most likely depend on how wage rigidities themselves are defined. Based on studies by Blanchard and Katz (1996, 1999), several studies define real (nominal) wage rigidity as a temporary disequilibrium phenomenon that adjusts to the nominal (real) wage equilibrium. Similarly, Arpaia and Pichelmann (2007) defined nominal (real) wage rigidity as the speed with which nominal (real) wages adjust to real or nominal shocks. Alternatively, Babetskii (2007) and Rusinova, Lipatov and Heinz (2015) defined nominal wage rigidity as the responsiveness of nominal wages to changes in price levels or inflation, whereas responsiveness to other economic shock such as productivity, unemployment, and lagged wages were regarded as real wage rigidity. This study use the former definition, following Blanchard and Katz (1996, 1999) and Arpaia and Pichelmann (2007).

The connection between nominal and real wage rigidity also depends on the principal assumption of their occurrence, i.e. within particular wage setting. Grubb, Jackman and Layard (1983) assumed that nominal and real wage rigidity might co-exist. They found a positive correlation between nominal and real wage rigidities across nineteen OECD countries, although the result was statistically non-significant. Alternatively, the occurrence of nominal and real wage rigidity could also be both cause and effect. Knell (2013) assumed that real wage rigidity occurred as the result of nominal price and nominal wage rigidity. He also emphasized that only the interplay between two nominal rigidities can cause real wage rigidity.

Focusing on the downward responses of wages, Gertler and Senaj (2008) considered nominal and real wage rigidities as neither alternatives nor simply cumulative concepts. In addition to the underlying connection between nominal and real wage rigidity mentioned above, both also depend on the magnitude of nominal wage growth. Real wage rigidity, compared with nominal

wage rigidity, is more relevant in cases of high inflation, as nominal wage growth is too high (too low) and nominal growth is distorted. Hence, the connections between nominal and real wage rigidity is important beyond their conceptual frameworks. It is critical to differentiate between both nominal and real wage rigidity, as they will correspond to different policy implications (Goette, Sunde and Bauer, 2007). In the presence of downward nominal wage rigidity, a moderate level of inflation may 'grease the wheels of the labour market', which would rather ask for monetary policy to counteract demand shocks (Tobin, 1986; Akerlof, Dickens and Gordon, 1996). On the contrary, in the presence of real wage rigidity, a stable rate of inflation is required for pro-cyclical adjustment of the money supply (Goodfriend and King, 1997).

4.2.2. Reconciliation of Phillip Curve and Wage Curve

Determining the basic wage model is crucial for investigating wage rigidity. There are at least three main views influencing the literature on wage dynamic, particularly wage rigidity. The first, having a broader development and incorporated in many macroeconomics textbooks, is the Phillips curve. A renowned paper by Phillips (1958) introduced the curve, which described an inverse relationship between wage changes and unemployment rates in the United Kingdom from 1861 to 1957. This wage and unemployment relationship known as the traditional Phillips curve, due to the fact that the concept has developed widely in many theoretical and empirical literature. The Phillips curve also provides a groundwork for intertemporal relationship studies between wage changes and unemployment. Recent work on wage rigidity such as Dali and Hobijn (2014), Kumar and Orrenius (2015), and Fallick, Lettau, and Wascher (2016) have validated the occurrence of the Phillips curve.

The second line of work based on theoretical work by Harris and Todaro (1970), emphasized that worker who are willing to work in undesirable environments must be compensated with a higher wage rate, known as the compensating wage differential. An undesirable environment can include overpopulation, high unemployment, and high job insecurity. Thus, in term of undesirable environment, wage differential have a mixed features between state and sectoral dependents. The concept proposed a positive relationship between wage and local unemployment rates considering the interregional variation of wage behaviour rather than intertemporal variation as in the Phillips curve. In term of wage rigidity, they assumed that there is wage inflexibility in urban sectors, leading to the simultaneous existence of unemployment and an urban informal sector in the migration equilibrium. Recent work by Afesorgbor and Mahadevan (2016) and Marks, Duncan and Jaswal (2017) provide empirical evidence of this compensating differential.

The third line of literature centres on supply and demand interactions of the labour market, which consider unemployment, in some circumstances, as a negative employment. In a neoclassical setting, unemployment is the result of an imbalance in supply and demand of the labour market.

The higher the unemployment rate, the more that wage exceeds the market-clearing rate. Depending on whether the function of wage and unemployment relationship is specified as a labour supply or demand function, the relationship might be positive or negative. This logic might be considered as a stretch, because labour demand and supply theory are not typically framed within the unemployment space (Blanchflower and Oswald, 2005). For example, based on early work such as Grubb, Jackman and Layard (1983), studies in this field measure real wage rigidity as an inverse long run coefficient on unemployment, while nominal wage rigidity is measured as real wage rigidity multiplied by average lags effects of changes of wage and price.

In contrast to previous studies, the fourth area of research proposes an inverse relationship between the level of real wage and the contemporaneous rate of unemployment, known as the wage curve. Blanchflower and Oswald (1994), proposed a microeconomics foundation for the wage curve with empirical tests for the United States, European countries and South Korea. Recent studies in favour of the wage curve are included in Pessoa and Reen (2013), Daouli et al. (2016), and Blanchflower and Machin (2016). The rationalization of the wage curve is to appeal to non-competitive markets including the idea of no-shirking behaviour and bargaining power effects (Blanchard, 2005).

The wage curve have several differences to the Phillips curve. First, the Phillips curve focused on the change of money (nominal) wage rates, while the wage curve addressed the levels of (real) wage rates. Second, this particular difference leads to another argument that the reservation wage is a crucial element in differentiating between the Phillips curve and the wage curve (Reynes, 2010). Third, assuming that changes in nominal wages is a temporary event while the level of the real wage rate is at steady state, the Phillips curve represents a short run adjustment mechanism while the wage curve represents a long run steady state (Blanchard and Katz, 1996, 1999). Fourth, both curves can also be referred to as the difference between macro-econometrics and micro-econometrics, since Phillips's (1958) empirical analysis is based on a macroeconomic approach with aggregate data while Blanchflower and Oswald (1994) is based on a microeconomic approach with individual data. Another important difference is in term of the model specifications. For example, the Phillips curve provides an intertemporal analysis while the wage curve provides an interregional analysis.

Some considerable pros and cons on the model specification of both lines of research should be noted. To begin with, Blanchflower and Oswald (2005) emphasized that the relationship between wage level and unemployment rates in Phillips (1958) was unclear. Gomes and Parreno (2015) emphasized that Blanchflower and Oswald (1994) might reflect a wage-setting schedule and not the neo-classical aggregation of labour supply curve due to statistically insignificant variables of labour market conditions except for unemployment rates. From an econometric perspective,

following Blanchflower and Oswald (1994), some studies argued that Phillips (1958) might have bias due to data aggregation problem, incorrect specification, and measurement errors (Reynes, 2010). L'Horty and Thibault (1997) also claimed that the Phillips curve might be a Granger and Newbold (1974) type of spurious regression.

Some studies also argue that results from Blanchflower and Oswald (1994) are partly an outcome of the use of inappropriate data for the US (Card, 1995; Blanchard and Katz, 1997; Black and FitzRoy, 2000), misspecification errors caused by the forms, and calculation of wage and utilization fixed effect dummies (Albaek et al., 2000; Blanchard and Katz, 1999). Furthermore, Montuenga-Gómez and Ramos-Parreño (2015) also emphasized the possibility of endogeneity bias and common group bias in Blanchflower and Oswald (1994). Although there are growing theoretical developments and empirical studies supporting both line of thoughts, there is no consensus on the exact form of the curve (Villavicencio and Saglio, 2012). Surprisingly, both lines of work acknowledge the possibility of short run adjustments and long run equilibrium of wage (Blanchard and Katz, 1997; Blanchflower and Oswald, 2005).

Accordingly, Blanchard and Katz (1997) initiated a reconciliation measure between the Phillips curve and the wage curve. The reconciliation executed by augmenting the wage curve into the Phillips curve was based on an error-correction model featuring short run adjustment toward long run equilibrium of wages and unemployment and other economics aggregate. Subsequently, our first motivation in studying the reconciliation of the Phillips curve and the wage curve is the possibility to examine the short run and long run behaviour of wage. Examining wage behaviour in dynamic environments offers the advantage of proving whether temporary wage rigidity causes disequilibrium in the short run and will need adjustments in the equilibrium of wage flexibility in the long run. Nevertheless, in the long run, it is those economies with less flexible labour markets and greater wage rigidities, which appear likely to experience greater persistence in both unemployment and inflation (OECD, 1994).

Our other motivation for this study is to exercise several empirical approaches of modelling wage behaviour and determine the suitable one for Indonesia economy as a developing country. Blanchflower and Oswald (2005) emphasize that while the supply and demand approaches might have been misspecified, many researchers supported one of the approaches. Many US labour economists supported the Harris-Todaro model and some form of the Phillips curve while many European labour economist argued against both of those but supported some form of wage curve. Revisiting the reconciliation of the Phillips curve and the wage curve provides the possibility to distinguish the existence of both wage models particularly in a developing country with a diverse empirical setting. Thus, integrated short run adjustments and long run equilibrium analyses is an alternative for contrasting measures between the Phillips curve and the wage curve.

4.2.3. Wage Dynamic in Multiple Regimes

Nominal and real wage rigidity also have a long tradition in capturing the effects of the business cycle. The highs and lows of business cycles commonly identified by economic aggregates or economic policies at different points of time are referred to as multiple regimes. Hence, different magnitudes of wage rigidities in different set regimes are commonly associated with the asymmetric behaviour of wages. Phillips (1958) initially indicated that changes in nominal wages tends to be high in low unemployment periods and vice versa. Recent literature such as Rusinova, et al. (2015) acknowledge that wages are less responsive to unemployment when there is a positive unemployment gap.

Furthermore, Avsar and Gur (2004) emphasized that the New Keynesian are developed under the assumption that nominal wage rigidity, in the presence of economic shocks, varied according to the level of inflation and inflationary expectations. Avsar and Gur argument is consistent with Akerlof et al. (1996) where they argue that for periods of low inflation, workers might get used to nominal wage reduction and be less resistant to nominal wage cuts. In contrast, Card and Hyslop (2007) utilized the Phillips curve approach and concluded that real wage is less rigid during high inflation than low inflation regimes. Similarly, Rusinova et al. (2015) found thresholds of inflation regimes where real wage rigidity significantly varied between unemployment and productivity shocks. Despite the different magnitudes of wage rigidities, Goette et al. (2007) confirmed the possibility of different directions of wage rigidities between different inflation regimes. The empirical exercise concluded that low inflation leads to downward nominal wage rigidity while high inflation leads to downward real wage rigidity, implying the importance of the effect of monetary policies on the flexibility of labour market.

Abbritti and Fahr (2013) emphasized that nominal wages grow with some friction, following positive productivity shocks during business-cycle fluctuations. Employment creation becomes more difficult as nominal and real wage continually increase. The lows and highs of business cycles are also referred to as downturns and upswings of the economy. Recent empirical work by Anderton and Bonthuis (2015) and Fallick et al. (2016) show nominal and real wage rigidity during normal times and recessions by including GDP interaction with unemployment rate. They concluded that wage rigidities were higher during economic downturns and declined as the crisis prolonged. While Rusinova et al. (2015) argue that real wage rigidity tend to be lower in downturn than upswings of the unemployment rate change. The results confirm similar works including Woitek (2005), Du Caju et al. (2008), Arpaia and Pichelmann (2007), and Messina et al. (2010). Two features of wage rigidity acknowledged by these results, the possibility of asymmetric adjustment of wages and the downward rigidity of wages. Alternatively, Gali (2011) concluded that excluding crisis periods improves robustness of the equation and heightens the negative

effect of unemployment on wages. While Daly and Hobijn (2014) concluded that during recessions, adjustments take place by increasing unemployment rather than decreasing wages.

4.3. DATA AND EMPIRICAL STRATEGY

4.3.1. Data

The main data source for this work is the Indonesian National Labour Force Survey, also known as SAKERNAS. The survey was first established in 1976 and has been conducted regularly since 1986. As a household-based survey, SAKERNAS provides demographic information of selected individual regarding the labour force, wages, and other information required to analyse labour market characteristic. Some development on the definitions, classifications, and measurements have been taking place since 1986 until recently. For example, there were changes in the definition of unemployment. In 1992, the International Labour Organization's (ILO) standard definition for unemployment was introduced, which is defined as someone who does not have a job and is simultaneously looking for a job. Afterward, additional categories were added to unemployment definition in 2012, including: discouraged unemployed, future workers, and starting a new business. For consistency reason, we used the basic definition of unemployment rates based on ILO's standard definition.

Due to differences in survey frequency of SAKERNAS each year, August round were selected for several reason (except for 2005, because the survey was carried out in November). First, it provides the largest sample size each year, relative to other rounds of the survey. Second, any cyclical or seasonal intertemporal biases can be minimized for selecting consistently survey of the same point of month each year. Therefore, a reasonable number of observations can be maintained for aggregation not only at the national level but also at the regional level. Given data availability and the reasons above, we used SAKERNAS survey data from 1986 until 2015 and aggregated the data at the provincial level.

4.3.2. Estimation Strategy

Our estimation strategy consists of four interrelated steps. The first step is to run several pre-estimation tests including cross-dependence test, unit root test and cointegration test. These tests allow us to determine the profile of each variable in used, which latter will be considered to set up a baseline specification, suitable to our data setup. The second step is to run contrasting measures to differentiate the incidence of the Phillips curve and the wage curve. We applied selections of contrasting measures to determine the relation between wage and unemployment. The third step is to set up a baseline model of wage behaviour, taken into account all results from previous steps. In this step, we also determined appropriate forms of each variables and introduced additional variables in the model. In the fourth step, after the baseline specification is established, we

exercise three additional features to be part of the wage behaviour estimations, i.e. heterogeneity, cross-sectional dependence and structural breaks. In this final step, we expect robust estimations that yield the best outcomes for interpretation. Detailed estimation strategy of each step are elaborated in the next sections.

4.3.2.1. Pre-Estimation Tests

Our panel data setup provides a large time dimension (T=30 years) with moderate cross-sectional dimensions close to the time dimension (N=26 provinces) which is useful for macro-panel analysis rather than micro-panel analysis. To develop a comprehensive estimation specification and produce robust estimation results, we employ particular pre-estimation tests to indicate any potential 'treads' that need to be accommodated in the estimation strategy. With a moderate cross-sectional dimension, the initial potential issue in our data setup is cross-sectional dependence. Cross-sectional dependence may arise from common shocks with heterogeneous impacts across cross-sectional units or local spill over effects between cross-sectional units (Eberhardt, 2011). In our case, the 26 provincial regions interconnect geographically and administratively, so they are potentially interconnect in terms of the flow of resources, such as labour, products, and services. Failed to account for cross-sectional dependence will push this factor into the error term and violate the basic assumption of an independent and identically distributed error term ($\varepsilon_{i,t} \sim$ i.i.d) and may lead to a biased and inconsistent estimation (Andrews, 2005).

We exercise Pesaran (2004) and Pesaran (2015) approaches for testing cross-sectional dependence between provincial units of our dataset. Pesaran (2004) introduced an approach for testing strict cross-sectional independence while Pesaran (2015) compliments previous work and testing weak cross-sectional dependence. Both tests are based on simple averages of pairwise correlation coefficients of OLS residual regressions. For a set of variables (x) in N panel units and up to T time periods, the standard deviation can be computed as follow:

$$s_i = \sqrt{\frac{1}{T_{i-1}}}\left(\sum_{t=1}^{T} x_{it} - (\bar{x}_{it})^2\right). \tag{4.1}$$

Which is then used to compute the pairwise correlation of cross-sectional units:

$$\rho_{i,j} = \frac{1}{T_{i-1}} \sum_{t=1}^{T} \left[\left(\frac{(x_{it}-\bar{x}_{it})}{s_i}\right)\left(\frac{(x_{jt}-\bar{x}_{jt})}{s_j}\right)\right]. \tag{4.2}$$

Then, the cross-dependence statistics are computed as:

$$CD = \sqrt{\frac{2}{N(N-1)}}\left(\sum_{i=1}^{N-1}\sum_{j=i+1}^{N}\sqrt{T_{ij}\hat{\rho}_{ij}}\right) \; CD \sim N(0,1). \tag{4.3}$$

Accordingly, as the number of cross-sectional units goes to infinity, the correlation between units at each point in time converges to a constant for strict cross-sectional independence and converges to zero for weak cross-sectional dependence. The test has a mean of zero for fixed dimensions of T and N in the panel data and uses a heterogeneous dynamic model with multiple breaks[27]. It is applicable for a range of specifications including accommodating the possibility of a non-stationary dynamic heterogeneous panel with multiple breaks as our expected setup.

The next issue in our panel data setup is stationarity. It could be caused by the presence of either a unit root or deterministic trend in the data overtime. Leaving them untreated will lead to spurious regressions, resulting in misleading estimation results. We adopt two types of panel unit root tests (PURT), the Maddala and Wu (1999) test, and the Pesaran (2007) test. Maddala and Wu (1999) proposed a Fisher-type test, which combines p-values from separate unit-root tests for each panel's series and executes an overall PURT. Fisher-type tests allow heterogeneous autoregressive coefficients in Dickey-Fuller regressions and assume cross-sectional independence. The Fisher-type test estimate is written as:

$$\Delta y_{r,t} = \alpha_r + \rho_r y_{r,t-1} + \sum_{j=1}^{p} \gamma_{r,j} \Delta y_{r,t-j} + \varepsilon_{r,t} \tag{4.4}$$

and tests (ρ_r) the null hypothesis of whether or not all series are non-stationary. For comparison, we employ CIPS test by Pesaran (2007) for testing the stationarity of the variables. The test was developed following the work of Im, Pesaran, and Shin (2003) on panel stationarity. Pesaran (2007) proposed augmenting cross-sectional dependence using a Dickey-Fuller regression method as an additional feature to IPS test[28]. The CIPS test is formulated as:

$$\Delta y_{r,t} = \alpha_r + \beta_r y_{r,t-1} + \gamma_r \bar{y}_{r-1} + \delta_r \Delta \bar{y}_t + \varepsilon_{r,t} \tag{4.5}$$

CIPS is established by testing the coefficient of the lagged dependent variable (β_r) for the null hypothesis of homogeneous non-stationarity against the alternative of at least one stationary variable in the panel estimation, similar to the Fisher's type test. CIPS also includes a cross-sectional average of dependent and independent variables($\bar{y}_r, \bar{x}_r$) including their corresponding lagged differences to account for serial correlation.

As part of the research objective of this paper, the cointegration test will also determine whether an error correction model, with short run adjustments and long run equilibrium specifications, is statistically appropriate with our panel data setup. Therefore, we employ a set of panel

[27] Unconditional means of dependent and independent variables are time-invariant and their innovation are symmetrically distributed.

[28] Im, Pesaran and Shin (2003) and Pesaran (2007) tests for panel stationarity test commonly abbreviated as IPS and CIPS tests.

cointegration tests proposed by Westerlund (2007). The test accommodates panel cointegration test with several difference structure, including the one with completely heterogeneous long run and short run specifications, according to our data setup. It also accommodates the possibility of cross-sectional dependence in the panel unit by allowing bootstrapping to obtain robust critical values. Denoted as an error correction model, the Westerlund (2007) test specification is as follow:

$$y_{r,t} = a_0^r + \sum_{j=1}^{p-1} \gamma_j^r \Delta y_{r,t-j} + \theta_r ect + \sum_{j=0}^{q-1} b_j^r \Delta x_{r,t-j} + \varepsilon_{r,t}, \quad (4.6)$$

where θ_r represents the speed adjustment of short run error correction towards a long run equilibrium for selected cross section (r). Four statistical measures are proposed in this approach. Two statistics (i.e. G_t and G_a) are group mean tests for no cointegration series in the panel against the presence of cointegration for at least one of the cross-sectional units. While another two statistics (P_t and P_a) are derived from a panel means test for no cointegration in the pool against the presence of cointegration of the overall panel. G_t and Pt are normalized by the size of the time series (T) while G_a and P_a are normalized by standard error.

4.3.2.2. Contrasting Phillips Curve and Wage Curve

The need of contrasting the Phillips curve and the wage curve is beyond the growing pros and cons on both curves themselves. It will affect the precision of wage behaviour analysis and thus the selection of corresponding policies. Two general approaches are proposed as ways to differentiate the Phillips curve and the wage curve, a level approach and a first-differenced approach. Blanchflower and Oswald (1994) proposed a level approach in this following formulation:

$$w_{r,t} = a_0 u_{r,t} + b_0 X_{r,t} + c_0 w_{r,t-1} + g_{0r} + f_{0t} + e_{r,t} \quad (4.7)$$

where (W), (U) and (X) represent wage rate, unemployment rate, and observed characteristics for all individuals in the market, observed in the regional labour market (r) and in time period (t). Lowercase letters denote the logarithm form of the corresponding variable. A regional dummy (g_r) and time dummy (f_t) are considered unrestricted intercepts for different labour markets and different periods, or time and regional fixed effects. The contrasting measure of this approach is the response of wage rates to lagged wage rates (c_0). The wage curve implies that the coefficient of the lagged wage is close to zero ($c_0 \approx 0$) while the Phillips curve implies that the coefficient is close to one ($c_0 \approx 1$).

Card (1995) discussed some drawbacks of the Blanchflower and Oswald (1994) approach. First, there are technical problems associated with the presence of lagged dependent variable and

regional fixed effects. Second, Card (1995) discussed the possibility of serial correlation within the market error term. He proposes a first-differenced approach, as follow:

$$\Delta w_{r,t} = a_1 u_{r,t} + a_2 u_{r,t-1} + b_1 X_{r,t} + b_2 X_{r,t-1} + f_{1t} + \Delta e_{r,t} \quad (4.8)$$

where the contrasting measures of this approach are the coefficient of unemployment rates (a_1) and lagged unemployment rate(a_2). Card (1995) argued that opposing values between the coefficients ($a_1 = -a_2$) indicates a wage curve, while a zero coefficient of lagged unemployment rates ($a_2 = 0$) indicates a Phillips curve.

An alternative first-differenced approach proposed by Blanchard and Katz (1997) based on an error correction framework by augmenting the wage curve into the Phillips curve is as follows:

$$\Delta w_{r,t} = a_{3w,r} + \Delta p_{t-1} - \theta\left(w_{r,t-1} - p_{t-1} - l_{t-1}\right) - b_3 U_{r,t} + \varepsilon_{w,r,t} \quad (4.9)$$

where (w), (p) and (l) represent nominal wage, price index, and labour productivity levels in logarithm forms so that (Δw), (Δp) and (Δl) represent productivity growth for wage, price, and labour. The idea is to use the coefficient of the error correction terms (θ) as a contrasting measure between the Phillips curve and the wage curve, where the value of zero represents the incidence of the Phillips curve versus the value of one for the wage curve. The regional unemployment rate (U) is in percentage form so that equation (4.9) is as semi-log specification.

Madsen (2002) criticized the idea of using an error correction coefficient (θ) as a contrasting measure based on two reasons. First, both the Phillips curve and the wage curve predict a mean reversion in wage. Second, a supply shock can have persistent effects on wages in the Phillips curve framework under an imperfect competition framework. Consequently, it is more difficult to contrast the curves in case of a smaller sample. Alternatively, based on a similar error correction approach, Madsen (2002) proposed the inclusion of level and first-difference of unemployment as follow:

$$\Delta w_{r,t} = a_{7r} + d_1 \Delta p_{t-1} + d_7 \Delta z_{t-1} - \theta_r ect - \beta_7 \Delta U_{r,t} - \beta_8 U_t + \varepsilon_{r,t} \quad (4.10)$$

$$ect = w_{r,t} - \delta_1 p_{t-1} + \delta_2 z_{t-1} - \gamma_2 U_t + \mu_{w,t}$$

where ($\underline{z_t}$) is a vector of wage push variables and (ect) is error correction term. Madsen (2002) argued that the error correction coefficient (θ) cannot be used as contrasting measure due to the potential correlation between lagged dependent variables and the error term. Alternatively, he proposed coefficients of level and first-difference of unemployment rates as the contrasting measure between the Phillips curve and the wage curve. In this setting, the level of unemployment rate is estimated in a pooled specification while first-difference of unemployment rate is estimated in a regional specification. The Phillips curve will be represented by a negative unemployment rate coefficient ($\beta 7<0$), while the wage curve will be represented by a negative

change of unemployment rate ($\beta 8<0$). Thus, the Phillips curve is represented by a negative relationship between the change of wage rate and level of unemployment rates, while the wage curve is represented by a negative relationship between the change of wage and unemployment rates.

To this point, particularly under the error correction model, there are at least three aspects are considered in determining the basic structure of the wage behaviour, i.e. inclusion, measurement, and form of the variables. We utilize both level and first-difference contrasting measures primarily to determine whether to focus on the intertemporal specification as in the Phillips curve or interregional specification as in the wage curve. This exercise is also set to preclude any biases in estimation results due to specification error, measurement error, and omitted variable biases.

4.3.2.3. Baselining Wage Behaviour

The error correction model (ECM) was selected as a starting point of our baseline wage behaviour model for two reasons. First, the conceptual setup of the reconciliation model is consistent with the results of stationarity and cointegration tests on our dataset in the previous section. Second, it fits the objective of reconciling the Phillips curve and the wage curve. In line with Blanchard and Katz (1997), reconciliation model designate the Phillips curve to capture the short run dynamic behaviour of wage (including speed of adjustment), while the wage curve is designated to capture the long run equilibrium of wage. This combination of the conceptual setup and data profile is in line with the macro-econometric error correction framework of Johansen (1995). With the addition of independent variables, the basic wage and unemployment relationship described in equation (4.10) can be reformulated as follows[29]:

$$\Delta w_{r,t} = \alpha'_0 + \beta'_0 \Delta w_{r,t-1} + \beta'_1 \Delta p_{r,t} + \beta'_2 \Delta u_{r,t} - \theta' ect_{t-1} + \gamma_p \Delta z^p_{r,t} + \mu_{r,t}. \qquad (4.11)$$

All variables are computed as aggregate provincial averages. The error correction term (*ect*) is equal to lagged residuals of the long run equilibrium ($\varepsilon_{r,t-1}$) of:

$$w_{r,t} = \beta^*_3 p_{r,t} - \beta^*_4 u_{r,t} + \gamma^*_1 z_{r,t} + \varepsilon_{r,t}, \qquad (4.12)$$

where the labour output ratio and minimum wage are included in the vector of wage push (z). The error correction coefficient (θ') indicates the speed of the short run adjustment of wage convergence to its equilibrium. The coefficient must be negative and significant for it to indicate a return to equilibrium (Pesaran et al., 2001; Olawale and Hassan, 2016).

We opt for equation (4.11) and (4.12) as baselines to estimate two main variables of interest, nominal wage and real wage. To estimate the real wage, the equation and other variables are

[29] As recommended for further research in Phillips (1958), Harris andTodaro (1970) and Blanchflower and Oswald (1994).

normalized by the consumer price index. Wages are measured as regional averages of individual hourly rates instead of annual average rates to preclude the effects of cyclical fluctuation of working hours among provinces. These effects on annual average wages are negatively correlated with unemployment rates, leading to systematic measurement error[30].

Unemployment rates are measured in accordance with the ILO definition[31]. In the level form, the effect of unemployment rates on wages indicate a shock in the labour supply. We expect a negative effect of the unemployment rate on wages given that, e.g. increasing unemployment due to excess supply should generate downward pressure on wage. Additionally, the effect of lagged unemployment rates on wages indicate a hysteresis effect and is expected to have a positive value. While a change of unemployment captures the speed limit effect and is expected to have a positive value.

Furthermore, the labour output ratio is measured as the ratio of total output to total employment as a proxy of labour productivity. A positive value for the labour output ratio indicates the degree of contribution of labour productivity on the wage setting. Meanwhile, a positive value inthe change of consumer price index (i.e. inflation) is expected to be positive for two reasons. First, it indicates the effort of, fully or partially, maintaining wages in the real term due to increases in prices. Second, a higher value of the coefficient indicates a higher degree of bargaining position of labour or wage indexation in the regions (Anderton and Berthuis, 2015). Instead of a homogenous assumption as in Blanchflower and Oswald (1994) which leads to omitted variables bias as described in Bell (1996), we specify heterogeneous labour productivity and consumer prices across regions. Moreover, equation (4.11.) and (4.12.) serve as alternative approaches for contrasting measure between the Phillips curve and the wage curve. In this setup, the coefficient of the error correction method is used as a contrasting measure between the Phillips curve and the wage curve. Our setup is similar to that of Madsen (2002) with the exception that we include level of employment in the long run specification. Inclusion in the same forms in both the short run and long run specifications add complexity in the model leading to misspecification biased.

4.3.2.4. Heterogeneity of Dynamic Wage Behaviour

We use a baseline specification using three types of estimators, dynamic fixed effect (DFE), mean group (MG), and pooled mean group (PMG). These estimators accommodate different features in heterogeneity of parameters of interest and estimate under the combination of maximum likelihood and ordinary least squares. DFE imposes restrictions on both long run and short run

[30] For further discussion, see: Blanchard and Katz (1997), Black and FitzRoy (2010).

[31] Unemployed person divine as a person of working age (15 or over) who meets three conditions simultaneously :
(i) being without employment, meaning having not worked for at least one hour during the reference week ;
(ii) being available to take up employment within two weeks; and having actively looked for a job in the previous month or having found one starting within the next three months.

coefficients including the error correction term, to be homogeneous across cross-sectional units, except for the intercept. Although it has the advantage of a higher degree of freedom, there are also some drawback. Baltagi, Griffin, and Xiong (2000) emphasize that DFE is subject to simultaneous equation bias due to endogeneity between error terms and lagged dependent variables in cases with a small sample size. On the contrary, MG does not impose any restrictions. MG estimators capture short run and long run effects within each cross-sectional unit. Pesaran and Smith (1995) introduced MG in which the coefficients are computed as unweighted means of separately estimated coefficients for each cross-sectional unit. Consequently, MG requires a large and equal cross-section and time series dimension to produce consistent and effective estimation result[32]. Farava (2003) highlighted that MG is reasonably sensitive to outliers and small model permutations in case of a small sample size.

As a combination of the two estimators above, Pesaran, Shin and Smith (1999) introduced PMG by allowing heterogeneous coefficients of short run adjustment, error correction term, and error term while restricting long run equilibrium coefficients that are homogenous across cross-sectional units. Pesaran et al. (1999) acknowledged PMG to have better flexibility and performance, overcoming the limitations in DFE and MG estimators. DFE potentially yields an inconsistent coefficient in case of heterogeneous short run parameters as MG in case of homogenous long run parameters. Regarding our objectives, PMG allows us to examine wage behaviour under the assumption of heterogeneous short run adjustments of each provincial unit towards convergence in the long run equilibrium. Equivalent to MG estimators, PMG requires an equally large size of cross-sections and time series dimensions to yields valid, consistent, and efficient estimation results (Samargandi, Fidrmuc and Ghosh, 2014). The heterogeneity of all or part of the parameters in the equation will be decided based on Hausman tests.

MG and PMG estimators were introduced under an autoregressive distributed lag (ARDL) model particularly for the error correction specification. An application of this dynamic heterogeneous panel specification, among others, is a cointegration test as elaborated in the previous section. Although Johansen (1995) emphasized that a cointegration relationship required an equal degree of integration, Pesaran, et al. (1999) argued that panel ARDL is applicable for variables with different degrees of integration. MG-ARDL and PMG-ARDL also propose the advantage of producing consistent coefficients even in the presence of endogeneity as it includes lagged dependent and independent variables (Pesaran et al., 1999). In the ARDL specification, we analyse not only coefficient sizes but also the speed and lag structure of wage dynamic behaviour. In addition, the ARDL-ECM model makes it possible for the simultaneous estimation of both short run and long run effects from a dataset with large cross-section and time dimensions. Due to the

[32] To include about 20 to 30 cross sectional units (Samargandi, Fidrmuc and Ghosh, 2014).

limitation of our time series dimension, we impose common lag structures across provinces as suggested in Loayza and Ranciere (2006) and Demetriades and Law (2006), i.e. first lag of dependent, and independent variables. In a more simple form, a baseline specification in equation (4.11) is formulated in the ARDL-ECM model as:

$$\Delta w_{r,t} = \alpha_0^r + \sum_{j=1}^{p-1} \gamma_j^r \Delta w_{r,t-j} + \theta_r ect + \sum_{j=0}^{q-1} \delta_j^r \Delta u_{r,t-j} + \sum_{j=0}^{q-1} \delta_j^r \Delta p_{r,t-j} + \sum_{j=0}^{q-1} \delta_j^r \Delta z_{r,t-j} + \mu_{r,t} \quad (4.13)$$

4.3.2.5. Interregional Dependency

In addition to exercising heterogeneity, recent studies on dynamic panel analyses raise the importance of cross-sectional dependence (CSD) due to unobservable common factors or spatial spill over effects. CSD plays an important part to capture the interdependence between cross-sectional units, which in our case represents interregional dependency[33]. Sarafidis and Wansbeek (2012) emphasized that estimators based on the assumption of cross-sectional independence may prove inefficient or even inconsistent. To overcome the problem, Pesaran (2006) introduced common correlated effects (CCE) as additional covariates in heterogeneous panel analysis to capture the contribution of CSD in error variance. Another development in this strand, Chudik and Pesaran (2013), proposed a dynamic common correlated effect (DCCE) to accommodate dynamic analysis because including lagged dependent variables on the right side of the equation would violate strict exogeneity. Therefore, DCCE is implemented by adding cross-sectional means of lagged dependent variables in the unobserved common correlated effects approximation. DCCE is formulated as follows:

$$y_{i,t} = \lambda_i y_{i,t-1} + \beta_i x_{i,t} + e_{i,t}$$

$$e_{i,t} = \gamma_i' f_t + v_{i,t}, \qquad f_t = (\bar{y}_t, \bar{y}_{t-1}, \bar{x}_t)$$

where (f_t) is an unobservable common factor or spatial spill over, approximated by cross-sectional averages of dependent and independent variables with the option of including their lagged terms. Overall, we exercise DFE, MG, and PMG with the inclusion of CCE and DCCE specifications in our estimations[34]. In terms of cross-sectional dependence, equation (4.13) can be specified as:

$$\Delta w_{r,t} = \alpha_0^r + \sum_{j=1}^{p-1} \gamma_j^r \Delta w_{r,t-j} + \theta_r ect' + \sum_{j=0}^{q-1} \delta_j^r \Delta x_{r,t-j} + \sum_{j=0}^{m-1} \pi_r \Delta \bar{z}_{t-j} + + \mu_{r,t} \quad (4.14)$$

where (z_t) represents cross-sectional average variables, including their lagged values in the case of DCCE. Two conditionalities need to be satisfied to have consistent and efficient DCCE yields.

[33] Regions or regional in this paper refer to sub-national administrative area, i.e. provinces.

[34] For implementation of DCCEPMG, see: Bhattacharya, Mann and Nkusu (2018), Cavalcanti, Mohaddes and Raissi (2015), Chudik, et al. (2015).

First, the times-series dimension needs to be large enough for dynamic panel analyses i.e. to capture any intertemporal behaviour of the wage, and N and T dimensions should grow at the same rate[35]. Implementing this estimation strategy has the advantage of including both heterogeneous time effects and cross-sectional dependencies. DCCE estimators are also robust to endogeneity and simultaneity issues (Karadam, 2015). We employ the STATA command platform *xtdcce2* introduced by Ditzen (2016) for our specifications.

Although the size of our dataset is reasonably adequate for a PMG estimation, having satisfied the asymptotic and large assumptions of N and T, we employed a mean adjustment procedure for correcting potential small-sample time series bias in dynamic heterogeneous panels. Therefore, the half-panel jack knife and the recursive mean adjustment procedures are run following Ditzen (2018) and Chudik and Pesaran (2015b). Between these two adjustment procedures, we choose the recursive mean adjustment procedure because it produced more robust estimation results. Additionally, partial mean within the recursive mean adjustment is lagged by one period to prevent the influence of endogenous observations. Furthermore, the inclusion of lagged aggregate wage is essential to represent the incidence of wage inertia in the market. In the absence of lagged aggregate wage in an interregional wage setting, the time dummies will capture the effect, leading to downward bias of wage inertia. Recent studies such as Arpaia and Pichelmann (2007) and Deak, Holden, and Levine (2017) emphasized the existence of wage inertia.

4.3.2.6. Common and Regional Specific Structural Breaks

Okui and Wang (2018) discuss the importance of considering structural breaks in a panel data model, such as a financial crises, technological progress, or economic transition. A structural break might also mark the beginning of a new regime in the economy. These breaks may affect the relationship of economic variables and cause breaks in the parameters of the selected model. Failure to account for breaks in the data generating process commonly leads to an overestimation of relevant regressors and a failure to include regressors that are only informative in short-lived regimes (Smith et al., 2018). Additionally, independent variables that are subjected to systematic shocks or risks are most likely the source of endogeneity (Okui and Wang, 2018). A panel model with common breaks proposed in Baltagi, Feng and, Kao (2016) is modelled as:

$$y_{i,t} = \alpha_i + \beta_i(k_0)x_{i,t} + e_{i,t}, \qquad i = 1, \dots, N; t = 1, \dots, T$$

$$\beta_i(k_0) = \begin{cases} \beta_{1i}, & t = 1, \dots, k_0, \\ \beta_{2i} = \beta_{1i} + \delta_i, & t = k_0 + 1, \dots, T \end{cases}$$

[35] A data set with N x T dimension of 30 x 34 units would be more appropriate compare to 10.000 x 360 units for the reason that the latter are certainly larger but not grow with the same rates (Ditzen, 2016).

where (k_0) is a common breakpoint, so that (δ_i) represents the slope jump before and after breakpoint (β_2-β_1). However, a common breakpoint (k_0) is assumed to be unknown in this setup and (k_0) = 0.5T uses a general theoretical rule to determine the breakpoint[36].

We examine the potential deviation of dynamic wage behaviour stemming from shocks in the market by including structural breaks in our panel data. Two types of structural breaks are employed, homogenous and heterogeneous break points. The homogenous break is applied equally to all cross-sectional units, while the heterogeneous break is applied uniquely to each cross-sectional unit. In addition to the breakpoints and the size of the breaks, another important component of structural change is the heterogeneity of breaks. Okui and Wang (2018) emphasize the importance of jointly considering heterogeneity and structural breaks. Ignoring the heterogeneity of breaks may lead to an incorrect detection of break points and inconsistent slope coefficient estimates.

We use a stationarity test introduced by Zivot and Andrew (1992) to identify the potential breakpoints of each variables series specifically for each provinces. The test has a null hypothesis of a unit root with drift and exogenous structural breaks. Therefore, potential breakpoints are initially identified in this stationarity test. The potential breakpoint is determined based on minimum ADF t-test statistics of each series. We utilize those breakpoints to generate two additional variables. A dummy variable is applied to differentiate the 'before' and 'after' of hypothetical structural shocks or differentiate between regimes. Interaction variables are also included to represent any deviation of wage behaviour on corresponding variables between breakpoint periods. In terms of structural breaks, we name the model a multidimensional augmented wage equation, specified as follows:

$$\Delta w_{r,t} = \alpha_0^r + \sum_{j=1}^{p-1} \gamma_j^r \Delta w_{r,t-j} + \theta_i ect'' + \sum_{j=0}^{q-1} \delta_j^r \Delta x_{r,t-j} + \sum_{j=0}^{s-1} \pi_r \Delta \bar{z}_{t-j} + \vartheta_r \Delta R_i + \mu_{i,t} \tag{4.15}$$

$$ect'' = \varepsilon_{r,t-1} = w_{i,t-1} - \beta_r^1 x_{i,t-1} - \beta_r^2 \bar{z}_{t-1} + \beta_r^3 R_i$$

$$\bar{z}_t = f(\bar{w}_t, \bar{w}_{t-1}, \bar{x}_t)$$

$$R_i = f(D_{r,t}, D_{r,t} X_{r,t})$$

where (R_r) are pairs of structural break variables including dummy breaks and interaction with the independent variables. The pairs represent hypothetical breaks such as currency fluctuations, changes in the business cycle, economic crises, and inflation. Currency attacks are determined by breaks in the exchange rate (Indonesia Rupiah to US Dollar), business cycles is determined by breaks in the provincial unemployment rate, economic crises is determined by provincial

[36] Baltagi, Feng and Kao (2016) exercise multiple set up of N cases trough Monte Carlo simulation and suggest 0.5T as general rule to predict common breakpoint as it is the one that minimized the sum of N individual sum of squared residuals.

economic growth, and inflation regimes is determined by differentiating periods of high and low inflation using the mean of provincial inflation as a benchmark. Robust estimates including the cross-sectional average of (z_t) needs to be established before conducting a least-squares estimation of (K_0).

4.4. EMPIRICAL RESULTS

4.4.1. Pre Estimation Tests

All tests and estimations are performed using the STATA 15 platform. For the cross-dependence test, we utilize the *xtcdf* command by Wursten (2017). The command makes it possible to employ the Pesaran (2004) CD test for strict cross-sectional. Besides an individual variable test, we also test cross-sectional dependence of residual of the baseline specifications. Table 4.1 presents the results of the test, show that there are cross-sectional correlations between units of our data panel and wage specification set up. The result suggest that we need to consider cross-sectional dependence in following tests and estimations.

Table 4. 1 Cross-Sectional Dependence Tests

Variable	Levels		First Differences	
	CD-test	p-value	CD-test	p-value
Nominal Wage	98.299	0.000	37.091	0.000
Real Wage	85.839	0.000	53.386	0.000
Unemployment Rate	70.501	0.000	50.457	0.000
Nominal Minimum Wage	97.582	0.000	40.750	0.000
Real Minimum Wage	92.872	0.000	59.183	0.000
Consumer Price Index	98.619	0.000	93.626	0.000
Nominal Labour Productivity	97.447	0.000	59.325	0.000
Real Labour Productivity	75.218	0.000	57.990	0.000
Nominal Residual Est.	48.259	0.000	36.123	0.000
Real Residual Est.	50.217	0.000	39.755	0.000

Notes: Under the null hypothesis of cross-section independence, CD ~ N(0,1)
P-values close to zero indicate data correlated across panel groups.

The next pre-estimation test is the unit root test where we utilize the *multipurt* command for panel stationarity tests that combines Fisher's types test (Maddala and Wu, 1999) and CIPS test (Pesaran, 2007)[37]. The result of both stationarity tests are presented in Table 4.2 for all the variables of interest in level and difference forms. Interestingly as CIPS includes cross-sectional dependences in the test specification, the result indicate that at least one series of a provincial unit is stationary in the level for almost all variables of interest.

[37] The *multipurt* command by Eberhardt (2011) integrates the *xtfisher* command by Merryman (2004) and the *pescadf* command by Lewandowski (2006).

Table 4. 2 Panel Unit Root Tests: Fisher's Test and CIPS Test

Variable	lags	(A) Fisher's Test (Maddala and Wu, 1999)				(B) CIPS Test (Pesaran, 2007)			
		Levels		First Differences		Levels		First Differences	
		chi_sq	p-value	chi_sq	p-value	Zt-bar	p-value	Zt-bar	p-value
Nominal Wage	0	16.089	1.000	751.366	0.000	-12.564	0.000	-22.716	0.000
	1	19.507	1.000	238.721	0.000	-5.809	0.000	-17.836	0.000
Real Wage	0	50.400	0.537	1087.941	0.000	-11.028	0.000	-22.685	0.000
	1	36.848	0.945	443.341	0.000	-5.216	0.000	-17.279	0.000
Unemployment	0	166.767	0.000	837.885	0.000	-11.461	0.000	-22.807	0.000
Rate	1	126.928	0.000	591.737	0.000	-6.101	0.000	-16.424	0.000
Nominal	0	333.868	0.000	375.666	0.000	-6.125	0.000	-20.579	0.000
Minimum Wage	1	108.253	0.000	251.264	0.000	-5.677	0.000	-12.227	0.000
Real	0	319.716	0.000	424.867	0.000	-5.529	0.000	-19.897	0.000
Minimum Wage	1	162.650	0.000	253.847	0.000	-4.723	0.000	-12.696	0.000
Consumer	0	10.482	1.000	666.379	0.000	-3.457	0.000	-15.706	0.000
Price Index	1	10.970	1.000	316.383	0.000	-2.620	0.004	-9.483	0.000
Nominal Labour	0	15.871	1.000	1271.297	0.000	-4.287	0.000	-19.319	0.000
Productivity	1	20.569	1.000	552.392	0.000	-1.791	0.037	-10.213	0.000
Real Labour	0	79.103	0.009	1351.475	0.000	-3.353	0.000	-21.069	0.000
Productivity	1	34.171	0.973	598.652	0.000	-0.603	0.273	-12.278	0.000

Notes: Fisher's test assumes cross-sectional independence, while the CIPS test assumes cross-sectional dependence in the form of a single unobserved common factor. All variables are in natural logarithm form.

However, both tests indicate that our variables of interest are integrated at the first difference. These results suggest that only the short run wage behaviour estimation will produce non-spurious regressions. Further examination required to determine whether the log-run wage behaviour could also be estimate, and produce non-spurious regression. The cointegration test is performed for this examination, and identify if a dependent variable is cointegrated with at least one of the independent variables. For testing cointegration in a panel data setting, we utilize the xtwest command by Persyn and Westerlund (2008).

Table 4.3 presents the results of cointegration tests, where panel (A) is based on nominal wage specification and panel (B) is based on real wage specification. We use the same specification of nominal wage and real wage behaviours with the one in the cross dependence test, which included unemployment rate, minimum wage, labour productivity and exchange rates. Results of cointegration test of both nominal wage and real wage specifications are converged, suggesting that there are cointegration between wages with at least one of the explanatory variable. The cointegration is sturdier for real wage as we extend the lags of autoregressive variables in the test specification.

Table 4. 3 Panel Cointegration Tests

A. Westerlund ECM Panel Cointegration Test : Nominal Wage Model								
	AR (1) with Constant				AR(2) with Constant			
Statistics	Value	Z-value	P-value	Robust P-value	Value	Z-value	P-value	Robust P-value
Gt	-2.869	1.194	0.116	0.025	-2.785	0.742	0.229	0.060
Ga	-14.583	0.243	0.596	0.000	-2.402	7.777	1.000	0.270
Pt	-11.497	0.558	0.712	0.100	-6.011	5.634	1.000	0.445
Pa	-12.030	0.437	0.331	0.000	-1.762	5.846	1.000	0.425
B. Westerlund ECM Panel Cointegration Test: Real Wage Model								
	AR (1) with Constant				AR(2) with Constant			
Statistics	Value	Z-value	P-value	Robust P-value	Value	Z-value	P-value	Robust P-value
Gt	-3.086	3.420	0.000	0.010	-2.822	2.012	0.022	0.000
Ga	-8.517	2.954	0.998	0.400	-4.789	5.435	1.000	0.340
Pt	-14.095	2.899	0.002	0.000	-10.035	0.849	0.802	0.020
Pa	-7.770	1.033	0.849	0.200	-4.402	3.298	1.000	0.135

Notes:

Gt, Ga -> H0: No cointegration of at least one of cross section unit (based on group mean).
Pt, Pa -> H0: No cointegration for all cross section units (based on pooled panel).
Gt, Pt: Normalized by size of T and Ga, Pa: Normalized by conventional standard error.

4.4.2. Contrasting Phillips and Wage Curve

Before introducing any other components to the wage behaviour model, it is important to predetermine the nature of the wage and unemployment relationship. We employ four different approaches in contrasting the Phillips curve and the wage curve. Table 4.4 present the summary results of all four approaches. A level-based approach based on Blanchflower and Oswald (1994) uses coefficients of lagged wages as a contrasting measure between the Phillips curve and the wage curve. The estimation results of both nominal and real wage specifications yield positive and statistically significant coefficients. Despite some drawbacks to this approach, as elaborated in Madsen (2002), discretely pinpointing the Phillips curve or wage curve based on this approach is intricate since the contrasting coefficients are 'in between' and not 'close' to the values of one and zero.

The difference-based approach, however, show that the coefficient of both unemployment rates and its lagged values are indifferent but have opposing signs for the nominal and real wage specifications. The results would indicate a wage curve if the coefficient was statistically insignificant, which is not our case. As in the Blanchard and Katz (1997) ECM-based 1 approach, all the coefficients of speed of adjustment are negative and statistically significant and range from 0.392 to 0.470. The result suggests the existence of a wage curve particularly in the reconciliation setting with the Phillips curve as in Blanchard and Katz (1997). For the Madsen (2002) ECM-based 2 approach, we arrive at different results. The effect of change of unemployment on both nominal and real wages are negative and significant, indicating that a wage curve is present. The effect of unemployment rates in contrast are positive and significant, as opposed to the Phillips curve.

Table 4. 4 Contrasting the Phillips Curve and the Wage Curve

Contrasting Approach	Corresponding Parameters	Nominal Wage - Unemployment		Real Wage - Unemployment	
		Semi-Log	Log - Log	Semi-Log	Log-Log
1. Level-Based (Blanchflower and Oswald, 1994)	Lagged Wages	0.389*** (0.032)	0.388*** (0.032)	0.524*** (0.029)	0.527*** (0.029)
2. Difference-Based (Card, 1995)	Unemployment Rates	-0.005 (0.003)	-0.016 (0.014)	-0.005*** (0.003)	-0.019 (0.014)
	Lagged Unemployment Rates	0.004 (0.003)	0.015 (0.014)	0.005 (0.003)	0.019 (0.014)
3. ECM-Based 1 (Blanchard and Katz, 1997)	Error Correction Term	-0.460*** (0.028)	-0.470*** (0.026)	-0.392* (0.034)	-0.397*** (0.033)
4. ECM-Based 2 (Madsen, 2002)	Level of Unemployment Rates	0.007** (0.002)	0.036*** (0.013)	0.006** (0.002)	0.036** (0.013)
	Change of Unemployment Rates	-0.009** (0.002)	-0.055*** (0.009)	-0.017*** (0.002)	-0.101*** (0.012)

Notes:
All labour productivity and prices in nominal wage estimation as in 'original' specification.
* p<0.05, ** p<0.01, *** p<0.001, standard errors are in parentheses.

Out of four contrasting measures, only the Blanchard and Katz (1997) ECM-based approach provides the most conclusive findings. It also has the advantage of including results from other measures, i.e. taking into account the market's long run wage behaviour. Therefore, we decide to use the ECM-based approach as our baseline specification and elaborate it by introducing other variables and components. We exercise multiple forms of unemployment rates in the specifications as suggested in Phillips (1958) and Blanchflower and Oswald (1994). We decide to employ a natural logarithm of unemployment rates, i.e. a log-log specification, for being the best empirical fit as in Whelan (1997). The results motivate us to use an alternative approach, i.e. ECM-based 3, which specifies the change of unemployment rates in the short run and level of unemployment rates in the long run. For the next part of the paper onward, we will focus on ECM-based approaches 1, 2, and 3.

4.4.3. Heterogeneity of Dynamic Wage Behaviour

As alternative to ECM-based 1 and 2 approaches, we introduced the ECM-based 3 approach, which specifically sets the first differenced unemployment rates in the short run specification and level of unemployment rates in the long run specification. We further scrutinize the estimations to account for heterogeneity not only in the intercept but also in the slope coefficients of the short run adjustment and the long run equilibrium of dynamic wage behaviour. To do so, we utilize three estimators to estimate those three ECM-based specifications, i.e. DFE, MG and PMG. Table 4.5 and Table 4.6 presents the results of nominal wage and real wage cases. Hausman tests for both cases conclude that PMG estimators provide consistent and efficient coefficients. This result

imply that PMG estimators are more robust than DFE and MG estimators, suggesting heterogeneous short run adjustments and homogeneous long run equilibrium relationships. Accordingly, we focus on utilizing PMG estimators in the following estimations in the nominal wage and real wage models.

Table 4. 5 Nominal Wage Behaviour and Heterogeneity

Variables	ECM-Based 1			ECM-Based 2			ECM-Based 3		
	DFE	MG	PMG	DFE	MG	PMG	DFE	MG	PMG
Short run									
Unemployment Rate (L)	0.002 (0.009)	-0.013 (0.014)	-0.010 (0.011)	0.023* (0.010)	0.009 (0.017)	0.008 (0.012)	-	-	-
Unemployment Rate (D)	-	-	-	-0.050*** (0.010)	-0.043*** (0.013)	-0.038*** (0.010)	-0.026** (0.010)	-0.034* (0.014)	-0.030** (0.010)
Nominal Wages (D.-1)	0.014 (0.035)	0.057 (0.033)	0.062 (0.039)	0.016 (0.034)	0.038 (0.034)	0.058 (0.040)	0.016 (0.034)	0.038 (0.034)	0.068 (0.039)
Labour Productivity (D)	0.028 (0.032)	0.053* (0.025)	0.044* (0.021)	0.032 (0.032)	0.056 (0.031)	0.047 (0.025)	0.032 (0.032)	0.056 (0.031)	0.052* (0.024)
Minimum Wage (D)	0.071 (0.038)	0.154** (0.051)	0.154*** (0.037)	0.080* (0.039)	0.148** (0.053)	0.155*** (0.039)	0.080* (0.039)	0.148** (0.053)	0.153*** (0.040)
Prices (D)	0.299*** (0.043)	0.288*** (0.036)	0.285*** (0.026)	0.309*** (0.042)	0.296*** (0.035)	0.292*** (0.026)	0.309*** (0.042)	0.296*** (0.035)	0.295*** (0.026)
ECT	-0.462*** (0.036)	-0.665*** (0.046)	-0.584*** (0.038)	-0.454*** (0.034)	-0.642*** (0.047)	-0.567*** (0.035)	-0.454*** (0.034)	-0.642*** (0.047)	-0.541*** (0.038)
Cons	0.528*** (0.091)	0.596*** (0.134)	0.473*** (0.038)	0.538*** (0.095)	0.640*** (0.145)	0.509*** (0.040)	0.538*** (0.095)	0.640*** (0.145)	0.454*** (0.028)
Long run									
Unemployment Rate (L,-1)	-	-	-	-	-	-	0.052* (0.024)	0.046 (0.037)	0.024 (0.017)
Labour Productivity (L,-1)	0.084 (0.070)	0.077 (0.053)	0.099*** (0.027)	0.077 (0.070)	0.065 (0.055)	0.090*** (0.027)	0.077 (0.070)	0.065 (0.055)	0.086** (0.028)
Minimum Wage (L,-1)	0.216*** (0.040)	0.186* (0.076)	0.259*** (0.025)	0.209*** (0.042)	0.156 (0.084)	0.247*** (0.025)	0.209*** (0.042)	0.156 (0.084)	0.253*** (0.025)
Prices (L,-1)	0.777*** (0.081)	0.842*** (0.084)	0.698*** (0.039)	0.786*** (0.082)	0.893*** (0.093)	0.719*** (0.040)	0.786*** (0.082)	0.893*** (0.093)	0.721*** (0.040)
Observations	728	728	728	728	728	728	728	728	728
bic	-	-1,842.19	-1,698.29	-	-1,882.47	-1,728.23	-	-1,882.47	-1,690.89
aic	-	-1,888.09	-1,744.19	-	-1,932.96	-1,778.72	-	-1,932.96	-1,741.38
Hausman MG-DFE		1.000			0.999			1.000	
Hausman MG-PMG		0.430			0.350			0.126	

Note:
* p<0.05, ** p<0.01, *** p<0.001, standard errors are in parentheses.
Hausman tests are based on the probability of Chi-square statistics.

In terms of contrasting the Phillips curve and the wage curve, all specifications show statistically significant error correction coefficients with values ranging from 0.436 to 0.648 for nominal wage and 0.516 to 0.814 for real wage. Based on these speed of adjustment coefficients, the reconciliation of both curves is more profound. Within PMG estimation results, based on AIC and BIC selection criteria, the nominal wage specification is in favour of ECM-based 3 while the real wage specification is in favour of ECM-based 1. Similar to the results in the previous section, results of the ECM-based 2 specification are inconclusive. Therefore, we apply ECM-based 3 in the following estimations.

Table 4. 6 Real Wage Behaviour and Heterogeneity

Variables	ECM-Based 1			ECM-Based 2			ECM-Based 3		
	DFE	MG	PMG	DFE	MG	PMG	DFE	MG	PMG
Short run									
Unemployment Rate (L)	-0.006 (0.011)	-0.015 (0.014)	-0.010 (0.012)	0.025* (0.011)	0.011 (0.016)	0.014 (0.014)	-	-	-
Unemployment Rate (D)	-	-	-	-0.071*** (0.011)	-0.064*** (0.013)	-0.073*** (0.012)	-0.046*** (0.013)	-0.053*** (0.013)	-0.068*** (0.011)
Real Wages (D.L1)	-0.087** (0.032)	0.029 (0.031)	-0.028 (0.033)	-0.073* (0.030)	0.020 (0.032)	-0.024 (0.033)	-0.073* (0.030)	0.020 (0.032)	-0.028 (0.031)
Labour Productivity (D)	0.023 (0.032)	0.092* (0.038)	0.065* (0.030)	0.034 (0.032)	0.092* (0.040)	0.071* (0.034)	0.034 (0.032)	0.092* (0.040)	0.080* (0.036)
Minimum Wage (D)	0.403*** (0.024)	0.479*** (0.024)	0.447*** (0.028)	0.395*** (0.025)	0.467*** (0.024)	0.449*** (0.028)	0.395*** (0.025)	0.467*** (0.024)	0.425*** (0.032)
ECT	-0.458*** (0.039)	-0.707*** (0.060)	-0.582*** (0.057)	-0.454*** (0.036)	-0.689*** (0.061)	-0.574*** (0.057)	-0.454*** (0.036)	-0.689*** (0.061)	-0.543*** (0.057)
Cons	0.634** (0.225)	1.188*** (0.354)	1.122*** (0.115)	0.787*** (0.208)	1.315*** (0.332)	1.159*** (0.123)	0.787*** (0.208)	1.315*** (0.332)	1.074*** (0.109)
Long run									
Unemployment Rate (L.-1)	-	-	-	-	-	-	0.055* (0.026)	0.054 (0.038)	0.004 (0.017)
Labour Productivity (L,-1)	0.119* (0.058)	0.195** (0.075)	0.107*** (0.033)	0.113* (0.053)	0.185* (0.077)	0.097** (0.032)	0.113* (0.053)	0.185* (0.077)	0.111*** (0.033)
Minimum Wage (L,-1)	0.437*** (0.036)	0.375*** (0.039)	0.405*** (0.020)	0.406*** (0.037)	0.351*** (0.045)	0.401*** (0.020)	0.406*** (0.037)	0.351*** (0.045)	0.394*** (0.020)
Observations	728	728	728	728	728	728	728	728	728
bic	.	-1,583.00	-1,478.35	.	-1,622.77	-1,530.36	.	-1,622.77	-1,488.11
aic	.	-1,619.72	-1,515.08	.	-1,664.08	-1,571.68	.	-1,664.08	-1,529.42
Hausman MG-DFE		0.996			0.998			0.999	
Hausman MG-PMG		0.541			0.531			0.699	

Note:
* p<0.05, ** p<0.01, *** p<0.001, standard errors are in parentheses.
Hausman tests are based on the probability of Chi-square statistics.

4.4.4. Common Correlated Effects and Interregional Wage Dependencies

In this section, we investigate common correlated effects in the specifications to ease the estimation bias toward cross-section dependences. Our further discussion are based on ECM-based 3 specification as it produce more robust estimation results[38]. Table 4.7 and Table 4.8 present estimation results of wage behaviour on different setups of cross-section average variables. For comparison reference purposes, the first and second columns present estimation results of the baseline specification, not including the cross-sectional average variables. We include contemporaneous cross-sectional averages for the independent variables (3rd and 4th columns), the addition of their lags (5th and 6th columns), and the lagged dependent variables (7th and 8th columns) to analyse the presence of common correlated effects. Based on a cross-sectional dependence test from the previous section, we included a cross-sectional average of all variables. For each common correlated effects estimator, we exercise two different settings of error

[38] We also exercise ECM-based 1 and ECM-based 2 as in previous section. However, we focus in ECM-based 3 specification for providing more robust estimation results.

correction mechanisms. Model A assumes a homogenous error correction mechanism and model B assumes a heterogeneous error correction mechanism. Out of eight specifications of nominal and real wage cases, the third specification provides the most robust estimation results including effectively accounting for common correlated effects.

Table 4. 7 Nominal Wage Behaviour and Interregional Dependencies

Variables	PMG-A	PMG-B	Common Correlated Effect				Dynamic CCE	
			PMG-A	PMG-B	PMG1-A	PMG1-B	PMG1-A	PMG1-B
Short run								
Unemployment Rate (D)	-0.031** (0.010)	-0.031** (0.010)	-0.033** (0.011)	-0.023* (0.011)	-0.018 (0.021)	-0.007 (0.020)	-0.025 (0.025)	-0.026 (0.032)
Unemployment Rate (D,-1)	-	-	-	-	-	-	-0.019 (0.017)	-0.019 (0.020)
Labour Productivity (D)	0.057* (0.025)	0.063** (0.024)	0.135*** (0.025)	0.161*** (0.025)	0.081 (0.049)	0.105* (0.050)	0.157* (0.068)	0.080 (0.086)
Labour Productivity (D,-1)	-	-	-	-	-	-	0.009 (0.044)	-0.026 (0.055)
Minimum Wage (D)	0.108** (0.034)	0.104** (0.032)	0.193*** (0.034)	0.199*** (0.031)	0.131** (0.044)	0.157*** (0.043)	0.181** (0.059)	0.274*** (0.073)
Minimum Wage (D,-1)	-	-	-	-	-	-	0.019 (0.051)	-0.007 (0.054)
Prices (D)	0.303*** (0.024)	0.322*** (0.022)	0.740*** (0.033)	0.650*** (0.033)	0.512* (0.219)	0.200 (0.251)	0.297 (0.218)	0.433 (0.246)
	-	-	-	-	-	-	0.031 (0.075)	0.114 (0.076)
Nominal Wages (D.-1)	-	-	-	-	-	-	-0.079 (0.049)	-0.052 (0.064)
ect	-0.455 (1.269)	-0.530*** (0.005)	-0.920*** (0.108)	-0.954*** (0.013)	-0.889*** (0.252)	-0.946*** (0.020)	-0.915* (0.358)	-1.037*** (0.114)
Const.	1.494*** (0.028)	1.471*** (0.075)	0.044 (0.045)	0.005 (0.052)	0.052 (0.056)	0.002 (0.071)	0.166 (0.203)	7.468 (10.440)
Long run								
Unemployment Rate (L,-1)	0.048 (0.353)	0.039 (0.468)	-0.026 (0.036)	-0.015 (0.036)	0.005 (0.090)	0.020 (0.075)	0.084 (0.152)	0.044 (0.140)
Labour Productivity (L, -1)	0.099 (0.499)	0.115 (0.620)	0.160* (0.074)	0.187** (0.062)	0.137 (0.201)	0.188 (0.123)	0.237 (0.287)	0.199 (0.268)
Minimum Wage (L, -1)	0.140 (0.397)	0.124 (0.376)	0.277*** (0.075)	0.305*** (0.060)	0.282 (0.151)	0.327** (0.104)	0.102 (0.262)	0.231 (0.253)
Prices (L, -1)	0.858 (0.812)	0.866* (0.361)	0.794*** (0.201)	0.659*** (0.172)	0.806 (0.505)	0.557 (0.463)	0.160 (0.800)	0.185 (0.701)
Observations	754	754	728	728	728	728	702	702
Adjusted R^2	0.673	0.684	0.626	0.644	0.219	0.268	0.540	0.559
F-Stat	10.930	9.832	5.594	5.540	1.520	1.640	2.581	2.631
CD-Stat	24.620	27.590	-2.160	-2.041	-2.049	-1.956	-1.185	-1.352
Prob CD-Stat	0.000	0.000	0.031	0.041	0.041	0.050	0.236	0.177

Note: * p<0.05, ** p<0.01, *** p<0.001, standard errors are in parentheses.

In both the nominal and real wage cases, a change in unemployment consistently show significant negative effects to wage in the short run, except for in the dynamic common correlated effects model. The effects range from 3 percent for nominal wage to 5 percent for real wage. Similar to other studies, e.g. Rusinova, et al. (2015) and Anderton and Bonthuis (2015), the effects are less pronounced than other variables including labour productivity and minimum wage. These findings are not only important for the development of the labour market but also have important implications for monetary policy, e.g. inflation targeting in Indonesia. Despite a statistically insignificant level of unemployment, we keep the parameter in the long run equation for particular

reasons. Our exercises show that excluding unemployment level from the equation would change the robustness of the overall results. The inclusion of unemployment level rates in the long run are also essential for differentiating the Phillips curve and the wage curve.

The findings suggest two important lessons for the wage and unemployment relationship. First, considered as a supply shock, unemployment has a speed limit effect on the short run dynamic of wages. Second, the possibility of an intertemporal permanent effect of supply shock in the long run is most likely hindered by a more pronounced effect, possibly from spill over effects from the labour market of neighbouring provinces. It highlights the importance of addressing intertemporal and interregional development of labour markets within and between provinces in the short run adjustment and long run equilibrium of wages. Concerning our main objective of differentiating the Phillips curve from the wage curve, the results suggest that there are intertemporal short run effects of unemployment with the possibility of an interregional equilibrium effect in the long run.

Changes in labour productivity also consistently shows positive effects on changes of nominal wage in the short run. In regard to employer and worker interaction, these findings indicate wage changes response on the changes of labour productivity. Thus, increasing wage of insider worker might be more preferred than replacing them with a potentially more productive outsider worker in the market, including the added cost of finding and hiring, and the risk of adverse selection. The significant effect of labour productivity on real wages indicates that the employer pays more than the reservation wage in order to avoid the consequence of shirking or even losing their productivity, leading to a loss of profit. The effects of a change in labour productivity are higher than unemployment, suggesting greater issues in terms of industrial relations between workers and employers in the wage dynamic instead of the labour market. We also examine the inclusion of nominal and real labour productivity in the long run specifications. The results show a less significant effect of labour productivity in the long run, as suggested in Blanchard and Katz (1999).

Following role of the changes in labour productivity above, changes in minimum wages have higher and consistent effects on the change of both nominal and real wages. The changes in minimum wage has contributed approximately 19 percent to the changes in the nominal wage and 32 percent to changes in the real wage. In nominal wage case, the effects indicate the role of minimum wage in wage determination, i.e. the wage indexation to minimum wages to some extent. In the real wage case where it is more pronounced than nominal wage, the effect indicates a more rigorous role of minimum wage beyond inflationary issues. Workers represented by labour unions try to increase minimum wage as much as possible not only in nominal terms but also in real terms. In the long run, our results also show a permanent effect of minimum wage on the nominal and real wage equilibria.

Table 4. 8 Real Wage Behaviour and Interregional Dependencies

Variables	PMG-A	PMG-B	Common Correlated Effect				Dynamic CCE	
			PMG-A	PMG-B	PMG1-A	PMG1-B	PMG1-A	PMG1-B
Short run								
Unemployment Rate (D)	-0.0576*** (0.010)	-0.0586*** (0.010)	-0.0259* (0.011)	-0.014 (0.011)	-0.029 (0.021)	-0.022 (0.021)	-0.034 (0.022)	-0.039 (0.025)
Unemployment Rate (D,-1)	-	-	-	-	-	-	-0.026 (0.018)	-0.020 (0.017)
Labour Productivity (D)	0.0951** (0.030)	0.0995*** (0.027)	0.296*** (0.036)	0.331*** (0.031)	0.074 (0.079)	0.054 (0.076)	0.048 (0.055)	0.057 (0.053)
Labour Productivity (D,-1)	-	-	-	-	-	-	0.025 (0.039)	0.006 (0.036)
Minimum Wage (D)	0.424*** (0.026)	0.436*** (0.020)	0.324*** (0.025)	0.296*** (0.021)	0.175*** (0.041)	0.179*** (0.037)	0.143** (0.046)	0.173*** (0.044)
Minimum Wage (D,-1)	-	-	-	-	-	-	0.028 (0.041)	0.037 (0.042)
Real Wages (D.-1)	-	-	-	-	-	-	-0.0830* (0.038)	-0.083 (0.055)
ect	-0.458 (1.263)	-0.521*** (0.022)	-0.796*** (0.084)	-0.842*** (0.013)	-0.594*** (0.128)	-0.670*** (0.013)	-0.860 (0.657)	-0.885*** (0.083)
Const.	1.844*** (0.030)	1.420*** (0.298)	-0.009 (0.032)	-0.010 (0.030)	0.005 (0.037)	-0.006 (0.037)	-0.029 (0.038)	-0.135* (0.067)
Long run								
Unemployment Rate (L,-1)	0.062 (0.908)	0.038 (0.663)	0.012 (0.035)	0.021 (0.032)	0.045 (0.053)	0.038 (0.034)	-0.003 (0.331)	-0.018 (0.328)
Labour Productivity (L, -1)	0.177 (0.610)	0.216 (0.423)	0.381*** (0.094)	0.428*** (0.073)	0.306 (0.213)	0.365*** (0.079)	0.146 (1.174)	0.190 (1.034)
Minimum Wage (L, -1)	0.341 (0.686)	0.321 (0.360)	0.363*** (0.088)	0.316*** (0.074)	0.427* (0.177)	0.370*** (0.077)	0.084 (0.421)	0.135 (0.564)
Observations	754	754	728	728	728	728	702	702
Adjusted R^2	0.408	0.421	0.576	0.612	0.116	0.202	0.606	0.622
F-Stat	5.812	5.128	5.672	5.853	1.304	1.544	3.582	3.603
CD-Stat	27.350	29.730	1.458	0.591	-2.935	-2.913	-1.412	-2.162
Prob CD-Stat	0.000	0.000	0.145	0.555	0.003	0.004	0.158	0.031

Note: * p<0.05, ** p<0.01, *** p<0.001, standard errors are in parentheses.

In the Indonesian labour market, minimum wage has developed from a complementary policy instrument into a prevailing wage reference. These developments resulted from many factors including international pressure in the late 1980's, decentralization of minimum wage legislation in the late 1990's and the strengthening of labour unions in the tripartite system (Sugiyarto and Endriga, 2008). The minimum effect represents the contribution of institutional factors on wage changes, i.e. institutional wage rigidity. As regional minimum wages are mostly applied for unskilled labour, which accounts for nearly half of the labour force (Statistics Indonesia, 2015), the institutional rigidity effect will most likely persist. A consistent increase of regional minimum wages might eventually discourage efforts to alleviate the unemployment problem (Sugiyarto and Endriga, 2008).

Prices have the highest effect and contributes approximately 70 percent to changes in nominal wages. Unemployment and labour productivity are considered to play a role, where price change contributes to the nominal part of wage rigidity. Interestingly, aside from being responsive to changes in the minimum wage, nominal wages are also responsive to changes in prices, i.e. inflation. In this case, inflation might raise other input costs, and in aggregate terms, force employers to raise wages and changing the menu cost. At least employer and worker will have to

agree on raising nominal wages in order to preserve part or overall wages in real terms. This finding could also signify the backward-looking effect on wages where workers try to maintain their budget constraint at least to levelling off the raise of prices. Although a moderate level of inflation might be required to 'grease the wheels of labour market', keeping the change of wage responding into inflation might trading off the capacity to absorb labour supply shock.

Error correction coefficients for both nominal and real wages are dynamically stable and convergence, evidenced by the significant and negative value of the coefficients. The results suggest nominal and real wage rigidities and certain adjustment processes toward the long-run equilibrium of wage behaviours. The coefficients range from 0.53 to 1.04 for nominal wage and from 0.52 to 0.89 for real wage. The higher the error correction coefficient, the faster the adjustment and convergence of wages to their long-run equilibrium. Taking model CCEPMG-A (3rd columns) as an example, nominal wage converges towards its long-run equilibrium as much as 90 percent within a year. While the real wage converges to 80 percent of the long-run equilibrium within a year. These findings indicate that real wage rigidity is more severe than nominal wage rigidity.

4.4.5. Homogenous and Heterogeneous Structural Breaks

We exercise four pairs of dummy and interaction variables in the following estimations. The pairs represent structural breaks in the labour market or in the economy, driven by currency attack, business cycle, economic crisis, and inflation regimes. The currency attack is homogenous (i.e. common across provinces) while the others are heterogeneous (i.e. specific to each province). We also exercise a dummy regime, which examine potential behaviour deviation of wage in downward and upward changes. Interaction variables also includes in the estimations to examine wage behaviour specifically after the structural breaks. Table 4.9 presents the estimation results in nominal and real wage cases with additional pairs of structural break variables. Overall, nominal wages are more stable during structural breaks, except in break caused by economic crises. This finding indicates a more rigid nominal wage to adjust to its long-run equilibrium after a break of economic crisis. Wage change is higher in the short run after an economic crisis, and will eventually require longer periods to adjust to its equilibrium. Overall, economic shocks in the provinces might have caused a change or shift in the economic structure and thus, affected the labour market.

Real wage behaviour is also subject to multiple structural breaks. The first are structural breaks driven by an external factor such as exchange rates. A currency attack, determined by the largest fluctuation in exchange rates during the periods of our study, signify the effect of currency attacks in Indonesia in late 1997. Our results show that the response of real wages to the exchange rate are greater after a currency attack. Thus, real wage is more rigid after a currency attack. A change

of real wages also shows statistically significant differences during the shift of a business cycle. The peaks in unemployment rates determines business cycles during the overall period. Accordingly, a contraction period include years leading up to the peak, and the peak itself, whereas an expansion period include years of post-peak. Our findings suggest a different rate of real wage rigidity during expansion and contraction episodes in the provincial economies. This finding is similar with Rusinova, et al., (2011), suggesting that real wages are less responsive to unemployment during higher unemployment periods as indicated in Phillips (1958).

Table 4. 9 Nominal and Real Wages Behaviour and Structural Breaks

Variables	Nominal Wage with Structural Break of				Real Wage with Structural Break of			
	Currency Attack	Business Cycle	Economic Crisis	Inflation Regime	Currency attack	Business Cycle	Economic Crisis	Inflation Regime
Short run								
Unemployment Rate (D)	0.120*** (0.028)	-0.016 (0.016)	-0.031** (0.010)	-0.0321** (0.010)	-0.038*** (0.010)	-0.018 (0.015)	-0.028** (0.009)	-0.015 (0.009)
Labour Productivity (D)	-0.030** (0.009)	0.121*** (0.025)	0.116*** (0.029)	0.132*** (0.021)	0.249*** (0.034)	0.268*** (0.034)	0.268*** (0.035)	0.199*** (0.036)
Minimum Wage (D)	0.117*** (0.033)	0.121*** (0.031)	0.143*** (0.035)	0.115*** (0.031)	0.234*** (0.022)	0.211*** (0.019)	0.227*** (0.025)	0.110** (0.034)
Prices (D)	0.682*** (0.038)	0.604*** (0.039)	0.703*** (0.051)	0.724*** (0.211)	-	-	-	-
Break Dummies	0.030 (0.062)	0.005 (0.033)	0.076* (0.033)	0.023 (0.021)	-0.047 (0.027)	-0.053** (0.017)	-0.003 (0.024)	0.055*** (0.013)
Interaction Breaks	0.017 (0.027)	-0.005 (0.018)	-0.174 (0.100)	-0.002 (0.003)	-0.076** (0.029)	-0.011 (0.018)	-0.031 (0.369)	-0.006*** (0.001)
Downward - Upward Wage Dummy	0.091*** (0.011)	0.100*** (0.012)	0.091*** (0.012)	0.097*** (0.011)	0.093*** (0.006)	0.103*** (0.007)	0.092*** (0.006)	0.106*** (0.007)
ECT	-0.787*** (0.142)	-0.735*** (0.139)	-0.756*** (0.161)	-0.723*** (0.138)	-0.588*** (0.104)	-0.550*** (0.087)	-0.637*** (0.115)	-0.450 (0.232)
_cons	0.004 (0.057)	0.029 (0.047)	0.054 (0.052)	0.059 (0.052)	0.142* (0.070)	0.086 (0.046)	-0.017 (0.044)	0.128** (0.040)
Long run								
Unemployment Rate (L,-1)	-0.033 (0.039)	-0.009 (0.045)	-0.024 (0.079)	-0.043 (0.037)	-0.053 (0.039)	0.005 (0.048)	-0.029 (0.037)	-0.007 (0.246)
Labour Productivity (L, -1)	0.154 (0.100)	0.173 (0.093)	0.168 (0.120)	0.173 (0.096)	0.417** (0.134)	0.490*** (0.088)	0.420*** (0.093)	0.453 (0.979)
Minimum Wage (L, -1)	0.281*** (0.082)	0.295** (0.098)	0.287** (0.105)	0.293*** (0.087)	0.325*** (0.098)	0.259*** (0.065)	0.335*** (0.071)	0.320 (0.835)
Prices (L, -1)	0.856* (0.332)	0.764** (0.283)	0.764* (0.326)	0.780** (0.293)	-	-	-	-
Observations	728	728	728	728	728	728	728	728
Adjusted R2	0.717	0.709	0.710	0.718	0.751	0.719	0.755	0.751
F-Stat	6.380	6.183	6.216	6.405	8.596	7.427	8.766	8.599
cd	-0.470	-0.046	-0.465	0.241	3.137	3.327	1.657	3.481
Prob CD-Stat	0.639	0.963	0.642	0.809	0.002	0.001	0.098	0.000

Note: * p<0.05, ** p<0.01, *** p<0.001, standard errors are in parentheses.

We also study the response of wages during high and low inflation regimes, differentiated heterogeneously by intertemporal means of inflation for overall periods. Interestingly, our results show statistically significant effects of the dummy regime and the interaction variable on the real wage change. The findings suggest that changes in real wages are greater in high inflation regimes, while the response to change in prices are less pronounced. These findings indicate that under certain economic conditions, e.g. cost of living in general are high, employers and workers might focus on nominal rather than real wages although respond to nominal wage eventually leads to

higher real wage change. Moreover, both nominal and real wages show statistically significant differences between the downward and upward regimes. These findings suggest that downward wage rigidities are more pronounced than upward wage rigidities. The rest of the estimation results are consistent with results in the previous section. Nevertheless, the error correction coefficient is lesser than previous results as we take into account the structural breaks. These differences suggest that nominal and real wages are actually stickier in the event of various breaks in the market.

4.5. CONCLUSION

This study analysed the extent of nominal and real wage rigidity in three interrelated parts, which are testing the nature of wage and unemployment relations (i.e. the incidence of the Phillips curve or the wage curve), testing provincial heterogeneity and dependencies across labour markets, and examining wage behaviour in the presence of homogenous and heterogeneous structural breaks. The results signify the existence of temporary effects of unemployment on wages, heterogeneity of wage behaviour in the short run, interregional dependence in wage flexibility and differential behaviour of wages in the presence of structural breaks and regimes. Thus, in the short run, wages require a certain periods to adjust with the temporary structural breaks and regime effects, correct the disequilibrium, and eventually convergence toward its long-run equilibrium.

In the long run, flexibility of nominal wage is determined largely by the minimum wage whereas for real wage also includes labour productivity. The findings are in line with the Phillips curve, with a temporary effect of unemployment to a change in wages. For the wage curve, some adjustments towards a long-run equilibrium of wages does take place while the role of labour market supply shocks might be more complicated than what is expected. In our cases, labour market supply shocks between provinces might have an equal role, if not more, as within provinces themselves. Those findings imply that spillover effects spread directly through wage or indirectly through labour mobility across provinces. It underlines the importance of considering intertemporal and interregional development of labour markets within and between provinces in the short-run adjustment and long-run equilibrium of wages. In regards to structural breaks and regimes, our results show that nominal wage is more sensitive to economic changes, whereas real wage is more sensitive to business cycle and inflation regimes. Both signify the asymmetric behaviour of wage rigidity in the presence of structural breaks of regime shifts. The results also imply that both nominal and real wage rigidity are more pronounced during downward-leaning wage regimes. Nominal and real wage rigidity do coexist. The essential part of dealing with nominal and real wage rigidities are to determine the behaviour in a certain economic setting and formulate appropriate policy to deal with.

A more intensive structure of panel data, i.e. utilizing sub-provincial levels and longer periods of the dataset, will provide more advantages for further studies. Not only can it provide significant additional observations for the analyses of wage behaviour, but it may also make it possible to scrutinize specific issues in wage dynamic behaviours including the structure of intertemporal wage dynamics and interregional wage spatial. Finally, our findings on wage behaviour in the Indonesian labour market has several policy implications. First, development towards a more competitive labour market is necessary in order to amplify the wage response to the labour market equilibrium. The less wage rigidity there is, the more jobs will be created. Second, labour productivity improvement is necessary to ease labour productivity uncertainty and occupational mismatch. Only then, the incentives to keep the wages above market-clearing rate are diminished. Third, development of a wage-setting stance is needed to account for labour market and aggregate economic development of neighbouring provinces. Fourth, maintaining a stable level of inflation will be more appropriate for easing the stickiness of real wages. Finally, institutional developments including setting a minimum wage are crucial for developing a more competitive labour market.

The Indonesia National Labour Force Survey Questionnaire

BPS STATISTICS INDONESIA

SAK15.AK
One set for
BPS Regency

THE NATIONAL LABOR FORCE SURVEY 2015

INFORMATION OF HOUSEHOLD MEMBERS

CONFIDENTIAL **FEBRUARY**

I. LOCATION IDENTIFICATION			
1	PROVINCE		☐☐
2	REGENCY/MUNICIPALITY*)		☐☐
3	SUB-REGENCY		☐☐☐
4	VILLAGE/POLITICAL DISTRICT ADMINISTERED BY LURAH*)		☐☐☐
5	VILLAGE CATEGORY	URBAN -1 RURAL -2	☐
6	CENCUS BLOCK CODE		
7	SERIAL NUMBER OF SAMPLED SAKERNAS		☐☐☐☐☐
8	SERIAL NUMBER OF HOUSEHOLD SAMPLE {SAK15.DSRT BLOCK III COLUMN (1)}		☐☐
9	NAME OF HOUSEHOLD HEAD		
10.	VISIT RESULT	1. SUCCES 2. REFUSE 3. NOT FOUND	☐ BLOCK III, STOP

II. SUMMARY		
1	NUMBER OF HOUSEHOLD MEMBERS	☐☐
2	NUMBER OF HOUSEHOLD MEMBERS AGED 10 YEARS AND OVER	☐☐

III. INFORMATION OF FIELD WORKER			
1	A. ENUMERATOR CODE:	☐☐☐	
	B. ENUMERATOR HANDPHONE NUMBER:	☐☐☐☐☐☐☐☐☐☐☐☐	
2	NAME OF ENUMERATOR:	DATE OF ENUMERATION:	SIGNATURE: .....
3	A. NAME OF SUPERVISOR:	DATE OF SUPERVISION:	SIGNATURE: .....
	B. SUPERVISOR HANDPHONE NUMBER:	☐☐☐☐☐☐☐☐☐☐☐☐	

**) Please, crossed it out the inapplicable one*

IV. LIST OF HOUSEHOLD MEMBERS

Number	Name of Household Members	Relationship to Head of Household *(code)*	Sex *Male 1 Female 2*	Age *(Years)*	Only for Those Aged 10 Years and Over	
					Marital Status *(code)*	School Participation *(code)*
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1		☐	☐	☐☐	☐	☐
2		☐	☐	☐☐	☐	☐
3		☐	☐	☐☐	☐	☐
4		☐	☐	☐☐	☐	☐
5		☐	☐	☐☐	☐	☐
6		☐	☐	☐☐	☐	☐
7		☐	☐	☐☐	☐	☐
8		☐	☐	☐☐	☐	☐
9		☐	☐	☐☐	☐	☐
10		☐	☐	☐☐	☐	☐
11		☐	☐	☐☐	☐	☐
12		☐	☐	☐☐	☐	☐
13		☐	☐	☐☐	☐	☐
14		☐	☐	☐☐	☐	☐
15		☐	☐	☐☐	☐	☐

Code for Column (3):
Relation to Head of Household

1 Household Head
2. Wife or husband
3. Son or daughter
4. Son/daughter in-law
5. Grandchild
6. Parent, father/ Mother in-law
7. Others relative
8. Housemaid
9. Others

Code for Column (6):
Marital Status

1. Single
2. Married
3. Divorced
4. Widowed

Code for Column (7):
School Participation

1. No Schooling
2. Informal School
3. In Non Formal School
4. Not In School Anymore

1. **After recording all of the household members in column (2) and column (3), please confirm to the respondent once more whether anyone such as : housemaid(s), driver, gardener, baby sitter and others on the same context, whom living in that household. If you found them, please added those names on the list.**
2. **Please confirm by asking whether anyone name was missed out. As an example: new born babies, and members of household who have been away for less than 6 months. If you found them, please added those names on the list.**
3. **If there is a household member who is leaving for less than 6 months but intended to move or would leaving home for 6 months and more is not counted as a household member, take he/she out from the list.**
4. **Finally, reordering the serial number in column (1).**

V. CHARACTERISTICS OF HOUSEHOLD MEMBER AGED 10 YEARS AND OVER

Name: …….. Serial No: ……

Informant: .....

V. A. EDUCATION

1. a. What is (NAME) the highest level of educational attained?

NO SCHOOLING	1	GENERAL SENIOR HIGH SCHOOL	8
INCOMPLETED PRIMARY SCHOOL	2	VOCATIONAL SENIOR HIGH SCHOOL	9
PRIMARY SCHOOL	3	PACKAGE C	10
PACKAGE A	4	DIPLOMA I/II	11
GENERAL JUNIOR HIGH SCHOOL	5	DIPLOMA III	12
VOCATIONAL JUNIOR HIGH SCHOOL	6	DIV/S1	13
PACKAGE B	7	S2/S3	14

→ Q1c

b. Field of study:
.....

Filled in by Supervisor

c. Has (NAME) ever had training/course and got **certificate**?

Yes 1 *No* 2 → ***SUB BLOCK V.B***

d. If "Yes", please stated the two main training/ courses based on priority use:

Filled in by Supervisor

1. .....
2. .....

V.B. ACTIVITY DURING THE PREVIOUS WEEK

2. a. During the previous week?

	Yes	No
1. Did (NAME) go to work?	1	2
2. Did (NAME) go to school?	1	2
3. Did (NAME) do housekeeping?	1	2
4. Did (NAME) have others activity, exclude 'personal action' ?	1	2

(If Q2.a.1 through Q2a.4=2, go to Q3)

b. According to the number of "yes" answered above, which activity was mostly engaged the time during the previous week?

1 → **Q4** 2 3 4

(If Q2a.1=1, go to Q4)

3. Did (NAME) have a job but temporarily not working [1] during the previous week?

Yes 1 *No* 2

4. Is (NAME) looking for a job?

Yes 1 *No* 2

5. Have (NAME) established a new business/firm during previous week?

Yes 1 *No* 2

Asked if Q4 = 2 and Q5 = 2

6. The main reason of not looking for a job/establishing a new business/firm:

Discouraged [2]	1
Have a job but has not started yet	2
Attending school	3
Housekeeping	4
Already have a job	5
Sufficient income[3]	6
Unable to do work	7 → **Q23**
Others	8

(COMPLETELY WROTE)

7. If offered a job, would (NAME) accept it?

YES 1 NO 2

(If Q2a.1 = 2 and Q3 = 2, go to Sub Block VE)

Q8 TO Q18 are just for household member who employed (Q2a.1 = 1 or Q3 = 1)

8. a. Total working day(s): ……..….day(s)

b. Total number of working hours of **all jobs** during the previous week:

Mon	Tue	Wed	Thr	Fr	Sat	Sun	Total

V.C. MAIN JOB

9. What is (NAME) main industry during the previous week of jobs?

.....

.....

(COMPLETELY WROTE)

Filled in by Supervisor

10. What is (NAME) main occupation during the previous week?

.....

.....

(COMPLETELY WROTE)

Filled in by Supervisor

11. What is (NAME) total number of hours worked of a main job during the previous week? ..... *Hours*

12. What is (NAME) main employment status during the previous week:

Own account worker	1	
Employer assisted by temporary workers/ unpaid worker	2	**Q14**
Employer assisted by permanent workers	3	
Employee	4	
Casual employee **in agriculture**	5	
Casual employee **not in agriculture**	6	
Unpaid workers	7 → **Q15**	

13. How much do (NAME) usually get a salary/wage/income of a main job per month?

a. Cash : Rp. .....

b. Goods: Rp. .....

Asked if Q12 = 1, 2, 3, or 4

14. How long have (NAME) been working for the main job?

..... *YEAR(S)* ..... *MONTH(S)*

1) Temporarily not working: if Q3=1, Q12 cannot be coded as 5 or 6 or 7.
2) Q6 code 1: A reason for the looking job several times but do not obtain the job. So that they feel will not have a job or due to situation/condition/climate.
3) If Q6=6 & working (Q.2.a.1=1 or Q3=1) continue to Q8
If Q6=6 & not working (Q.2.a.1=2 or Q3=2) continue to V.F

15.a. Where is (NAME) job's location of during the previous week?

Filled in by Supervisor

Province : .....

Regency/Municipality *) : .....

(If province & regency/municipality = Q1 & Q2 Block I, go to Q16.a)

b. If the job's location is outside regency of resident's area, does (NAME) commute every day/week/month?**)

Every day *1* Every week *2* Every month *3*

(If Q15.b = 2 or 3, go to Q16.a)

c. How far is from home to the location of work?

< 10 km	*1*	≥ 30 km	*3*
10 - 29 km	*2*	Unknown	*4*

d. How long the trip from home to the location of work?

≤ 30 minutes	*1*	*61-120 minutes*	*3*
31-60 minutes	*2*	*> 120 minutes*	*4*

e. What is kind of transportation used by (NAME) to go and back to/from the location of work?

Common transportation	*1*	Personal transportation	*3*
Collective transportation	*2*	Walking	*4*

16.a. When did (NAME) start working?

More than one year ago *1* → **Q17**

Last year *2*

b. How long have (NAME) been looking for a job/ establishing a new business/firm ? …….. MONTH(S)

V.D. ADDITIONAL JOB

17. Did (NAME) have an additional job during the previous week?

YES 1 NO 2 → ***SUB BLOK V.E***

18. What is (NAME) type of industry of a main additional job?

Filled in by Supervisor

…… .....

……

(COMPLETELY WROTE)

V.E. LOOKING FOR A JOB ACTIVITY/ ESTABLISHED A NEW BUSINESS/FIRM

Q19 to Q22 asked if Q4 = 1 or Q5 = 1

19. What is (NAME) main reason of looking for a job/establishing a new business/firm:

Completed/Not attending school anymore	*1*
Responsible for making a living/supporting household financing	*2*
Additional income	*3*
Current job is unsuitable	*4*
Lay off	*5*
Business collapse	*6*
Others (……)	*7*

COMPLETELY WROTE)

20. What efforts have (NAME) been done to find a new job/establishing a new business/firm?

	YES	NO
1. Registering at the Job Market	*1*	*2*
2. Applying directly to establishment/offices	*3*	*4*
3. Applying through advertisements	*1*	*2*
4. Contact through relatives/friends	*3*	*4*
5. Obtaining capital/equipments	*1*	*2*
6. Looking for location/place of business	*3*	*4*
7. Applying for permits, licences	*1*	*2*
8. Others (……)	*3*	*4*

(COMPLETELY WROTE)

21. How long have (NAME) been looking for a job/establishing a new business/firm?

..... *YEAR(S)* ..... *MONTH(S)*

22. What type of job has been looking for?

Full time job *1* Part time job *2*

V.F. JOB EXPERIENCE

23. Did (NAME) ever work before?

YES 1 NO 2 → ***STOP***

24. Did (NAME) stop working or move out into another job for the last year?

YES 1 NO 2 → ***STOP***

25. The main reason of stop working move into another job for the last year?

Lay off	*1*
Business collapse	*2*
Insufficient income	*3*
Unsuitable on working environment	*4*
Work contract have finished	*5*
Other (.....)	*6*

(COMPLETELY WROTE)

26. (NAME'S) previous job main industry before stop working/move out into another job?

Filled in by Supervisor

……

……

(COMPLETELY WROTE)

27. (NAME'S) employment status of the previous job before stopping or move into a new one?

Own account worker	*1*
Employer assisted by temporary workers/ unpaid worker	*2*
Employer assisted by permanent workers	*3*
Employee	*4*
Casual employee in agriculture	*5*
Casual employee not in agriculture	*6*
Unpaid workers	*7*

*). Crossed it out the inapplicable one

**). If respondent is not household head, Q.15b cannot be coded as 2 or 3

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ORIGINALITY AND AUTHORSHIP

Ph.D. Program in Economics

Declaration of Originality and Certificate of Authorship

I, Deniey Adi Purwanto, hereby declare that I am the sole author of this dissertation entitled, "**Equality of Pays and Wage Behaviours: Micro and Macro Perspectives of Indonesian Labour Market**". I certify that all chapters of this cumulative dissertation have been written in single authorship. All references and data sources that were used in the dissertation have been appropriately acknowledged. I furthermore declare that this work has not been submitted elsewhere in any form as part of another dissertation procedure.

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Date, Signature

DOCTORAL EXAMINATION

Ph.D. Program in Economics

Declaration for Admission to the Doctoral Examination

I confirm,

1. that the dissertation that I submitted:

   Equality of Pays and Wage Behaviours:

   Micro and Macro Perspectives of Indonesian Labour Market

   was produced independently without assistance from external parties, and not contrary to scientific standards and integrity,

2. that I have adhered to the examination regulations, including upholding a high degree of scientific integrity, which includes the strict and proper use of citations so that the inclusion of other ideas in the dissertation are clearly distinguished,

3. that in the process of completing this doctoral thesis, no intermediaries were compensated to assist me neither with the admissions or preparation processes, and in this process,
   - No remuneration or equivalent compensation were provided,
   - No services were engaged that may contradict the purpose of producing a doctoral thesis.

4. that I have not submitted this dissertation or parts of this dissertation elsewhere.

I am aware that false claims (and the discovery of those false claims now, and in the future) with regards to the declaration for admission to the doctoral examination can lead to the invalidation or revoking of the doctoral degree.

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Date, Signature

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2. Master of Science in Economics, 2005
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   Thesis: *Interest Rate Rigidity Analysis of Bank Lending Rates in Indonesia:*
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3. Bachelor in Economics, 2001
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   Thesis: *The Analysis of SMES Credit in Contractionary Monetary Policy Era*
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Field of interest

Econometrics, Monetary Economics, Labour Economics, Development Economics

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Selected publications

Purwanto, D.A., (2019). Strengthening the Role of Vocational Education in National Economy, in *Economic Independence Gate of Welfare, the Thoughts of 100 Indonesian Economists*, INDEF Press, Jakarta, Indonesia.

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Researches

2019 "Boomers, Gen-Xers and Millennials: The Struggle for Intergenerational Equality of Pay?" University of Göttingen, Germany.

2018 "Double Roles of Married Working-Women in Indonesia: For Better or For Worse?" University of Göttingen, Germany.

2017 "Intertemporal and Interregional Wage Behaviour in Indonesia: A Reconciliation of Phillip Curve and Wage Curve?" University of Göttingen, Germany.

2015 "Regional Wage Rigidity in Indonesia: A Contribution of Developing Country Experience", University of Göttingen, Germany.

2012 "Labour Market, Sticky Wage and Monetary Policy: Indonesia Experience", University of Göttingen.

2011 "Evaluation Study of Rural Development Programs in Improving Rural Community Welfare", National Development Planning Agency (Bappenas).

2011 "Climate Change Impact on Strategic Foods Production, Poverty and Farmer's Wealth in Indonesia," Bogor Agricultural University.

2011 "Feasibility Study of Mortgage Guarantee Development in Indonesia", Ministry of Housing.

2011 "Dealing with Commodity Price Volatility in East Asia", Ministry of Finance.

2010 "Survey of Stakeholder Perception of Ministry Of Finance Services", Ministry of Finance.

2010 "Study of International Bonds and Credit Guarantee and Investment Facilities (CGIF) in Indonesian Perspective", Ministry of Finance.

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2010 "Study of Pro-Green Policy Improvement Effectiveness", National Economic Committee (KEN).

2010 "Impact Analysis of Fiscal Decentralization to the disparities of Compulsory Education Access in Indonesia", Ministry of National Education.

2010 "Evaluation Study of Agriculture Revitalization in Improving Farmer Welfare in Indonesia", National Development Planning Agency (Bappenas).

2010 "Administrative Obstacles in investment to the industries", BKPM.

2009 "Regional and Urban Development of Indonesia", World Bank Office Jakarta (WBOJ).

2008 "Study on 9 Years Compulsory Education", National Development Planning Agency, Indonesia.

2008 "Provincial Human Development Report – Gorontalo PHDR", UNDP Indonesia.

2007: "Study on Government of Indonesia and Islamic Development Bank (IDB) Cooperation Improvement Strategy", National Development Planning Agency, Indonesia.

2007 "Study of The Framework of Subsidizing Policy In Indonesia", National Development Planning Agency, Indonesia.

2007 "The Evaluation of Proliferation In Indonesia", BRIDGE, UNDP Indonesia-National Development Planning Agency, Indonesia.

2006: "Study on Indonesia's Foreign Debt Financing Management Strategy", National Development Planning Agency, Indonesia.

2006 "Survey of Value Improvement Program (VIP) of BRI's Units", Bank Rakyat Indonesia (BRI).

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2006 "Study on Economic Incentive for Environmental Management", Ministry of Environment, Indonesia.

2006 "Policy Study on The Economic Prerequisite to Decentralized Governance Preliminary Stage" LOGIC, National Development Planning Agency -UNDP.

2006 "Study of Cooperation Bank in Indonesia", The Ministry of Small Medium Enterprise and Cooperation of Indonesia.

2006 "Baseline Survey on Bank Rakyat Indonesia (BRI) as Apex Bank for Bank Perkreditan Rakyat (BPR)", Bank Rakyat Indonesia (BRI) and Bank Indonesia.

2005 "Survey on Direct Foreign Investment Barriers at Eastern Indonesia", REDI and European Union (EU).

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2005 "Survey on Costumers Satisfaction of Bank Perkreditan Rakyat (BPR)", Bank Indonesia and GTZ-Profi German.

2004 "Survey on Price and Wage Setting Mechanism", INDEF - Bank Indonesia.

2004 "Survey on Economic Value Added (EVA) of BRI's Units in Indonesia (Selindo)", Bank Rakyat Indonesia (BRI).

2003 "Survey on Economic Value Added (EVA) of 40 BRI's Units", INDEF - Bank Rakyat Indonesia (BRI).

2003 "Developing Guideline for Feasibility Studies in Regional Autonomy Partnership", Ministry of Home Affairs, Indonesia.

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2001 "Study On Improving Public Services Quality in Surabaya and Sidoarjo", Institute for Policy and Community development Studies (IPCOS).

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