A Review Paper on Visible and Invisible Underemployment

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Abstract

Underemployment is a severe form of labor underutilization which adversely impacts productivity and economic growth. However, unlike unemployment, the topic of underemployment receives far less attention than it deserves. Specifically, there are two types of underemployment: time-related underemployment and inadequate employment situation. The aim of this research is to provide a comprehensive review of underemployment, including types, measurement, and the extent of underemployment among countries, including Thailand. The findings reveal that the majority of existing studies on underemployment are centered on time-related underemployment due to the availability of data. In contrast, research studies on skill mismatch, income-related inadequate employment, and overemployment are limited.

Keywords: Underemployment, time-related underemployment, overemployment, skill mismatch, qualification mismatch, income-related underemployment
JEL Classification Codes: J21, J22, J24

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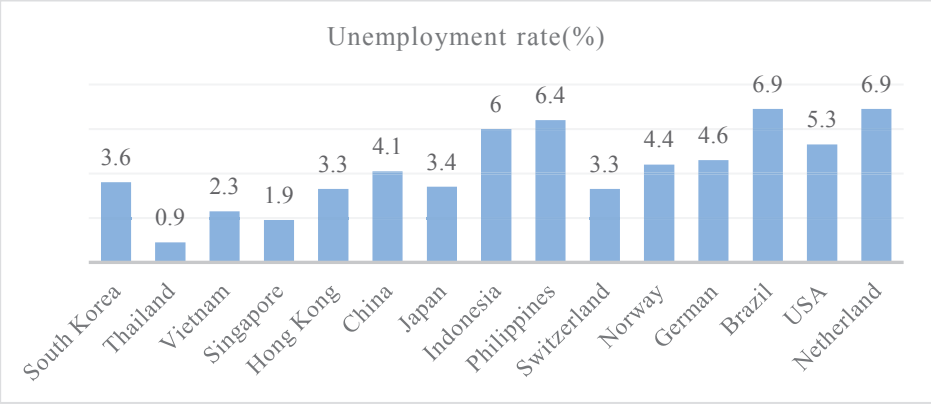
1. Introduction

The rate of unemployment is the most common measure of labor market slack. It shows a proportion of the labor force (i.e., the employed and the unemployed) who are without a job and actively seeking work. Unemployment rates normally understate the extent to which labor is underutilized because the statistics fail to capture underemployment. In fact, an economic downturn worsens both unemployment rates and underemployment situations.

Figure 1 illustrates the unemployment rates of Thailand between 2001 and 2017, in which unemployment had steadily declined from a high of 3.3% in 2001 to 0.7% in 2017. This was attributable to high prevalence of self-employment. By comparison, the unemployment rate of Thailand in 2015 was significantly lower than that of other countries (Figure 2). The low unemployment rate (0.9%) could be attributed to a number of factors, the most important of which is large proportions of Thai citizens are underemployed or informally employed.

Source: World Data Atlas

Figure 1. Unemployment rate in Thailand, 2001-2017



Source: Thailand National Statistics Office, 2015

Figure 2. Unemployment rates among countries

Underemployment is categorized into visible and invisible underemployment. Visible underemployment (time-related underemployment) refers to work of inadequate duration, including involuntary part-time employment and temporary short-time work, and invisible underemployment means work of inadequate productivity. Measurement of invisible underemployment (using differences in income or use of workers' skills) presents more challenge than measuring durations (i.e., visible underemployment).

At individual level, underemployed workers experience lower life satisfaction (Friedland & Price, 2003; Wilkins, 2007) and poor mental health (Johnson & Johnson, 1996). At macroeconomic level, underutilization of skilled labor represents a waste of economic resources. Although underemployment is less financially detrimental to workers than unemployment, it could have long term consequences on career progression, earnings potential, and the accumulation of retirement income.

The objective of this study is to comprehensively review underemployment, including types, measurement, and the extent of underemployment. The study first introduces the concept of underemployment and how it is understood by economists in particular. It then delves into two specific types and measurement of underemployment: time-related underemployment and inadequate employment situation (i.e., visible and invisible underemployment, respectively). Moreover, summaries of evidence on the extent of both underemployment types are also provided.

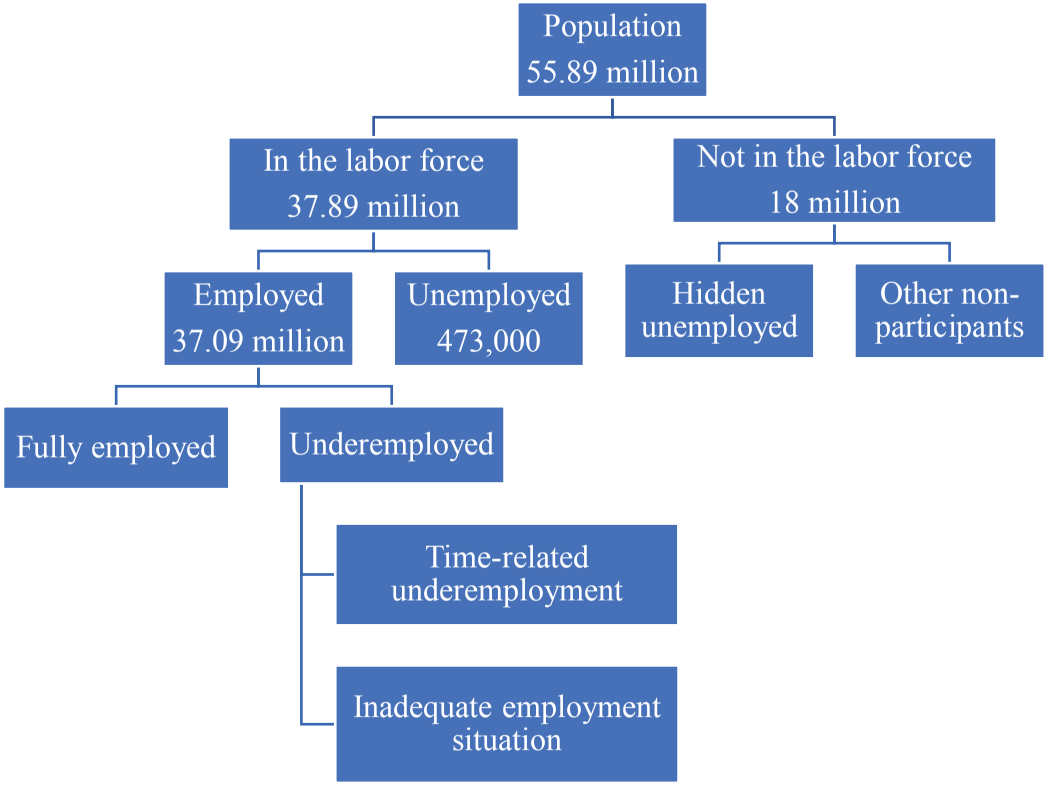
2. The concept of underemployment

In labor economics, a country's populations comprise those who are economically active (the labor force) and those who are not (not in the labor force). The economically active group can be divided into the employed and the unemployed. As shown in Figure 3, the employed include the fully employed and the underemployed. Unlike the unemployed, the underemployed hold some employment. According to the International Labor Organization (ILO) (1998), underemployment is an employment situation that reflects underutilization of the productive capacity of the employed population, partly as a result of an inefficient national or local economic system. Specifically, in April 2017, the population over 15 years of age in Thailand was 55.89 million, 37.89 million in the labor force comprising 37.09 million employed and 473,000 unemployed.

Underemployment is a wide-ranging topic. The growing rate of underemployment in today's economy is a global challenge. In Economics, underemployment can be an indicator of labor underutilization that represents a measure of unused productivity. ILO (1998) defines underemployment as underutilization of the productive capacity of the employed population in relation to an alternative employment situation in which persons are willing and able to engage. Measuring underemployment is critical for both developing countries as well as more developed countries. International Labor Organization (ILO) identified two forms of underemployment: one reflecting an insufficient volume of work, referred to time-related underemployment and one reflecting an insufficient use of skills or experience, referred to inadequate employment situation.

3. Measuring underemployment

According to ILO (1998), there are two types of underemployment: time-related underemployment (visible under-employment) and inadequate employment situation (invisible underemployment). As the name implies, visible underemployment requires



Source: National Statistics Office (NSO)

Figure 3. Labor force underutilization framework (the statistics belong to Thailand as at April 2017)

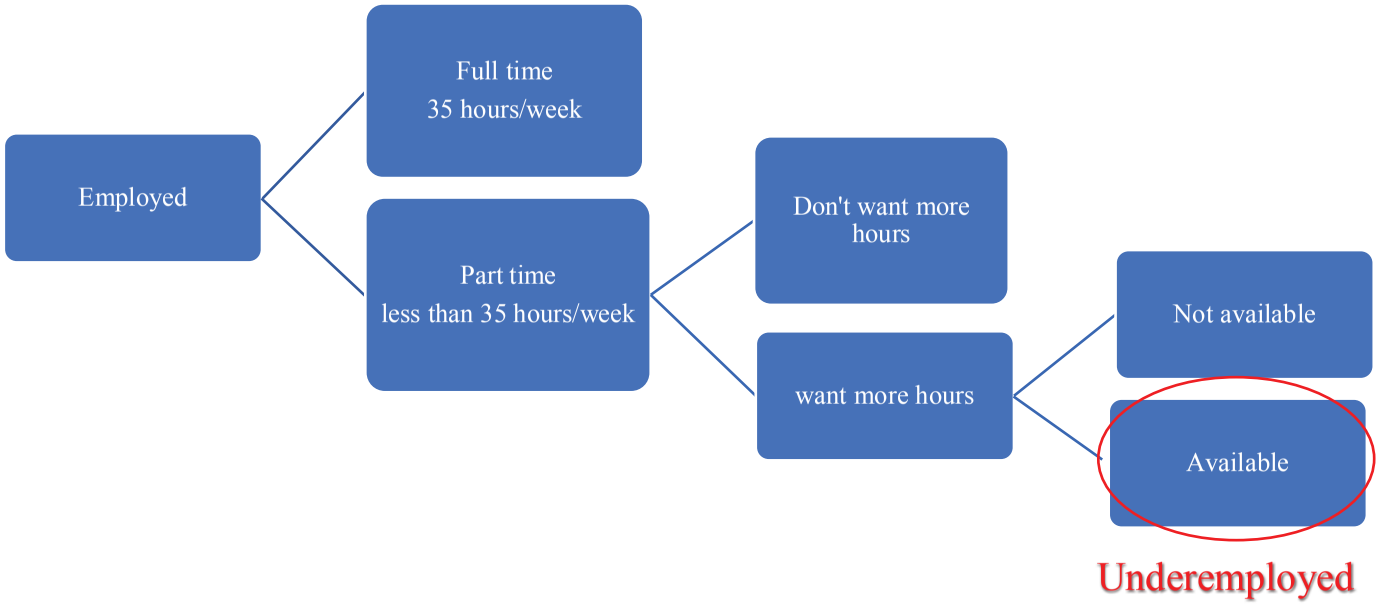


Figure 4. Time-related underemployment measure

no interpretation to determine whether a person is experiencing inadequate volume of employment due to limited number of hours worked. In addition, one is regarded as experiencing **time-related underemployment** if, during a given reference time period (usually one week), he/she: (1) is willing to work additional hours; (2) is available to work additional hours; and (3) has worked less hours than what is considered as full-time work (Figure 4). Given the definition, the underemployed exclude full-time workers. Instead, underemployment is referred to as involuntary part-time employment.

The full-time hours threshold for underemployment varies from country to country. For example, a US citizen is regarded as fully employed if he works 35 hours a week, but in Taiwan one has to work 42 hours to be regarded as such. The time-related underemployment is largely attributable to demand constraints, such as business cycle, slow job growth, and unemployment rate

The drawbacks of the time-related approach to underemployment are: (1) It excludes full-time workers who are temporarily working less than full-time hours for economic reasons, and (2) It includes workers who would like to work more hours, but only at higher wage. On the contrary, underemployed workers desire more work hours at prevailing wage rates.

Robinson and Abbasi (1979); Ramulongo (2014); Pratomo (2015); Wilkins (2004) used the time-related approach to underemployment and proposed country-specific full-time hours thresholds. For Thailand, Teeraswat et al. (2002) defined the underemployed as those employed individuals working less than 35 hours a week and desire to work more hours. The authors documented that 63% of Thai labor force were fully employed and time-related underemployment increased from 1.61% in 1996 to 2.42% in 2000, due mainly to the East Asia economic crisis in 1997. The Thai National Statistics Office (NSO) also relies on the time-related approach to underemployment and reported an underemployment rate of 0.8% in May 2017. Table 1 tabulates existing studies that utilized the time-related approach and the extent of underemployment among countries.

A person subjected to **inadequate employment situations**, during a given reference period, desires for changes in his current work situation for reasons that it limits his capacities and well-being and is available to do so. There are three forms of inadequate employment situation: skill-related inadequate employment, income-related inadequate employment, and inadequate employment related to excessive hours.

In **skill-related inadequate employment**, an employed worker, during a given reference period, desires or seeks to change his current work situation to fully utilize his current occupational skills and are available to do so. This form of underemployment signifies poor utilization of human capital and is the reflection of mismatch of occupational skills (i.e., skill mismatch).

Skill mismatch is defined as the discrepancy between the skills of the workforce (the supply of skills) and the requirements for available jobs in the economy (the demand for skills) at a given time and place. More specifically, a mismatch arises when a worker possesses a level of skills that is either higher (over-skilled worker) or lower (under-skilled worker) than what is required for the job. The situation of skill underutilization is alternatively referred to as skill surplus or overskilling.

There are essentially three methods to measure skill mismatch: self-reported skill mismatch, statistical or realized match, and OECD measure of skill mismatch. For self-reported skill mismatch, workers are asked as to what extent their skills correspond to the assigned tasks. One key advantage of the self-reported method is

Table 1. Summary of studies using time-related approach to underemployment

Source	Country	Sample	Full-time hours threshold	The extent of underemployment
Robinson and Abbasi (1979)	Pakistan	Labor Force Surveys by the Central Statistical Office (CSO) from 1968-69 to 1974-75	35 hours/week	Underemployment rate was 13.13% in 1968-69 and decreased to 4.27% in 1974-75. By comparison, rural areas experienced higher rates of underemployment than urban areas.
Ramulongo (2014)	South Africa	Labor Force Surveys Quarter 3 in 2010-2014	35 hours/week	Underemployment rate was about 4% in 2010-2014, with the exception of 2011 when it stood at 3.7%. Underemployment was more prevalent among women than men.
Pratomo (2015)	Indonesia	2011 National Socio-Economic Survey	35 hours/week	Underemployment was around 30% because of the high proportion of agricultural workers and a significant number of workers living in rural areas.
Wilkins (2004)	Australia	2001 Household, Income and Labor Dynamics (HILDA) survey	35 hours/week	Over one in six employed persons were affected by underemployment, with majority of whom held part-time jobs.
Mehmet TASCI (2006)	Turkey	Turkish Household Labor Force Survey	40 hours/week	From 1988 to 2004, the underemployment rates for males (females) in urban areas had varied between 4.1 (2.3) and 9.45 (7.4)%.
Islam and Kamarudin (2018)	Malaysia	Labor Force Survey and Malaysia Economic Statistics Time Series	30 hours/week	The year 2013 recorded the highest number of persons affected by time-related underemployment (643,100 persons). The lowest number of time-related underemployment was recorded in the year 2008 (470,700).
Teeraswat et al., 2002	Thailand	Labor Force Survey 1996-2000	35 hours/week	Underemployment rate increased form 1.61% in 1996 to 2.42% in 2000 due to the 1997 East Asia economic crisis.

Table 2. Self-reported skill mismatch questions in the PIACC questionnaire

		Do you feel that you have the skills to cope with more demanding duties than those you are required to perform in your current job?	
		yes	no
Do you feel that you need further training in order to cope well with your present duties?	yes	-	Under-skilled
	no	Over-skilled	Well-matched

up-to-date information on skills but the information is prone to biases. Specifically, respondents have the tendency to overstate the requirements of their work and exaggerate their responsibility. Examples of the self-reported skills questions are: *I use many of my abilities in my current job* (McGuinness and Wooden, 2009); *In my current job I have enough opportunity to use the knowledge and skills that I have* (Green and McIntosh, 2007); *how often at work you use the skills acquired during the university years* (Chevalier and Lindley, 2009).

Furthermore, the self-reported skill mismatch can be conducted through the Program of the International Assessment of Adult Competencies (PIAAC). PIACC was developed by the organization of economic cooperation and development (OECD) and provides internationally comparable data about skills of the adult populations in 24 countries[†]. The self-reported skill mismatch is determined by two questions in the PIACC questionnaire: (1) *Do you feel that you have the skills to cope with more demanding duties than those you are required to perform in your current job?*, and (2) *Do you feel that you need further training in order to cope well with your present duties?* The answer is *yes* or *no* to each question, giving rise to four combinations of answers but only three combinations are meaningful: under-skilled, well-matched, and over-skilled (Table 2).

For the statistical/realized match approach to skill mismatch, skill mismatch is determined on the basis of reported engagement in a given skill-related task at work and direct measures of the skills of workers. An example of the survey which ask respondents about the extent of use of specific skills in their jobs is the Adult Literacy and Lifeskills Survey (ALLS). ALLS is an international comparative study designed to provide participating countries with information about the skills of their adult populations. ALLS measures the literacy and numeracy skills of a nationally representative sample of 16- to 65-year-olds in participating countries.

Specifically, literacy mismatch is determined on the basis of reported engagement in literacy-related tasks at work and direct measures of the literacy skills of workers. Individuals with reading engagement scores below the median are assigned to the low to medium-low engagement category (low-skill job), and those scoring above are assigned to the medium-high to high-engagement category (high-skill job). Similarly, those scoring at skills Levels 1 and 2 on the prose literacy scale are assigned to the low-skills category, and those scoring at Levels 3 and 4/5 are assigned to the high-skills category. The approach combines the observed skills (i.e., skills owned) and skill use variables to arrive at four match and mismatch categories (Table 3). The derivation of numeracy match and mismatch is similar.

Table 3. Categories of matching according to realized match skills

Skill owned	Skill use (or engagement)	Categories of skill mismatch
low	low- to medium-low engagement	LOW-SKILL MATCH
Medium to high	medium-high to high- engagement	HIGH-SKILL MATCH
Low	medium-high to high- engagement	DEFICIT MISMATCH
Medium to high	low- to medium-low engagement	SURPLUS MISMATCH

[†] Countries that participated in PIACC are Australia, Austria, Belgium, Canada, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Ireland, Italy, Japan, Korea, the Netherlands, Norway, Poland, the Russian Federation, the Slovak Republic, Spain, Sweden, the United Kingdom, and the United States.

The drawback of the ALLS is that it focuses on the incidence and frequency of literacy and numeracy behaviors, while ignoring the criticality and complexity dimensions. Desjardins, R. and K. Rubenson (2011) used this approach and found that literacy and numeracy mismatch is a widespread phenomenon, with 31-41% and 35-52%, respectively. Specifically, literacy and numeracy skills underutilization (skill surplus) varies substantially between countries, ranging from 12-32% and 17-46%, respectively.

On the other hand, the OECD measure of skill mismatch focuses exclusively on numeracy skill (Pellizzari and Fichen, 2013). Specifically, skill mismatch is determined by: (1) identifying workers who self-report being well-matched; (2) defining the minimum and maximum numeracy skill requirements of an occupation as the minimum and the maximum test scores of the self-reported well-matched workers in that specific occupation in each country; and (3) classifying workers as being over-skilled if their numeracy test score is above the maximum requirement for their occupation and under-skilled if below the minimum requirement. Those between the minimum and maximum scores are classified as well-matched. One key advantage of this methodology is that it requires minimal amounts of self-reported information, partially overcoming the problem of defining the skill requirements of a job based on a survey of workers and subjective evaluations. Table 4 summarize studies using different measures of skill mismatch among countries.

Table 4. Summary of measurements in skill mismatch

Source	Country	Measurement	The extent of skill mismatch
Mavromaras et al. (2007)	Australia and Britain	Self- report	In Australia, severe overskilling declined from over 18% for those completing education below year 10 to less than 10% for undergraduates, averaging 14 percent, while in Britain it is invariant to highest education level at 18-21%.
Green and McIntosh (2002)	Britain	Self- report	In 2001, 35% of UK employees were over-skilled and so did not make full use of all the skills and abilities in their possession.
Jones and Sloane (2009)	Britain	Self-report	The disabled were significantly more likely to report having "much higher" skills than those required to do their job than the non-disabled and were significantly less likely to be matched.
Pellizzari and Fichen (2013)	OECD countries	OECD method	For literacy proficiency, approximately 86% of dependent employees were classified as well-matched across all the countries covered by the survey, about 10% were over-skilled and 4% were under-skilled.
Desjardins and Rubenson (2011)	OECD countries	Realized Match	Skill surplus or skill underutilization pertaining to literacy and numeracy skills varied substantially between countries, ranging from 12-32% and 17-46%, respectively.

Due to limited access to skills data in most countries, level of schooling or educational attainment is adopted as a proxy for skills. As a result, most existing research on skill-related underemployment measured underemployment using qualification or education mismatch (overeducation). There are three types of educational mismatch: overeducated, undereducated, and properly matched. An individual is defined as being overeducated (undereducated) if his educational level is above (below) the required level of education to perform the job. Overeducation reflects labor underutilization because workers' allocation of skill (educational level) over jobs is suboptimal. Specifically, overeducation represents an inefficient use of human capital resources and thus lowers productivity and economic growth. Table 5 tabulates the definitions in educational and skill mismatch and measurement methods.

Table 5.The glossary of mismatch terms

Mismatch concept	Definition	Measurement
Qualification mismatch	Discrepancy between the highest qualification held by a worker and the qualification required by his/her job.	4 methods to measure required schooling: -Self-assessment -Job analysis -Realized match -OECD method
Over-qualification (Overeducation)	Situation where a worker's highest qualification exceeds that required by his/her job.	A worker is classified as overqualified when the difference between his/her qualification level and that required in his/her occupation is positive.
Under-qualification (undereducation)	Situation where a worker's highest qualification is lower than that required by his/her job.	A worker is classified as underqualified when the difference between his/her qualification level and that required in his/her occupation is negative.
Skill mismatch	Discrepancy between the skills—both specific and general—possessed by a worker and those required by his/her job.	2 methods to measure: -Self-assessment -Objective measure
Over-skilling	Situation where a worker's skills are above those required by his/her job.	A worker is classified as over-skilled if he/she reports that he/she has "the skills to cope with more demanding duties at work".
Under-skilling	Situation where a worker's skills are below those required by his/her job.	A worker is classified as underskilled if he/she reports that he/she "needs further training to cope well with his/her duties at work".

There are four measurements for the required level of schooling: self-assessment, job analysis, realized match, and OECD method. The lack of uniform measurement (i.e., there exist four measurement methods) is attributable to the nature and extent of available data.

In the self-assessment, workers are asked to specify the minimum education required for their jobs and their response is defined as required schooling. Examples of the questions are: *How satisfied or dissatisfied are you with the match between your work and your qualifications?* (Chavalier, 2003); *How much formal education is required to get a job like yours?* (Duncan and Hoffman, 1981); *To you, what level of education is best prepared for your job?* (Hartog and Oosterbeek, 1988); *What kind of education does a person need in order to perform in your job?* (Alba-Ramirez, 1993). One key advantage of workers' self-assessment of required schooling is up-to-date information. However, the method is prone to biases as the respondents have a proclivity to overstate the requirements of their jobs and to inflate their job status.

Job analysis is a systematic evaluation by professional job analysts who identify the required level of education for the job titles in an occupational classification. One example is the U.S. Dictionary of Occupational Titles (DOT), which contains an indicator for educational requirement in the form of the General Educational Development (GED) scale. The scale runs from 1 to 6 or the lowest to the highest years of required schooling. These GED categories are then translated into school years equivalents (0-18). For example, GED scale of six is an equivalence of 15-16 years of schooling. Nevertheless, its major drawback is the lengthiness to compile the information which could become obsolete by the time of release. The DOT information was used to estimate an overeducation earnings function in Rumberger (1987), Rubb (2003), and Verhaest & Omey (2009).

Realized match calculates the mean and mode of completed schooling of workers as required schooling. According to Verdugo and Verdugo (1989), the required amount of schooling is calculated from the mean of completed schooling of all workers holding the same occupation. A person is regarded as overeducated (undereducated) if his actual education is greater (less) than one standard deviation above (below) the mean for the specific occupation. One key drawback of the realized match method is in developing countries education data are levels of the schooling completed, not years of schooling, and converting educational level to years of schooling is prone to error. The realized match method was used in Cohn and Ng (2000), and Tsai (2010), Bauer (2002) and Lin and Wang (2005).

The OECD proposes an approximation for an objective and comparable measure of overeducation based on the ISCO classification of occupations and the ISCED classification of education and a correspondence between the occupations and the educational level required. Occupations are coded 0-9 by ISCO and are classified into three skilled occupational levels: low-skilled, intermediate-skilled, and high-skilled (Table 6). Table 7 lists eight educational levels in relation to the three skilled levels. The correspondence between occupation and educational levels generates three categories of qualification match/mismatch: overeducation, undereducation, and properly matched (Table 8). Based on internationally comparable educational and occupational categories, the OECD method is applicable across countries and thus facilitates comparative research. Several studies used the OECD method to determine the incidence of overeducation, e.g., Ortriz (2008); Ortriz et. al. (2008); Stefanik (2011).

Table 9 summarizes studies using different measures of required schooling to estimate rates of overeducation among countries. The incidence of overeducation (%) varies between countries and time periods. In Thailand, three approaches, i.e., self-assessment, realized match, and OECD method, are commonly used to determine overeducation. Varakamin (2017) used self-assessment to determine overeducation in *Maptaphut* Industrial Estate, in Thailand's eastern province of *Rayong*; and found that 7.2% were overeducated. Pholpirul et al (2016) used realized match to determine vertical mismatch (overeducation and undereducation) based on the 2011 Thailand Labor Force Survey and found that 35.97% of workers with higher than secondary education experienced vertical mismatch. Senkrua (2015) used the OECD method and reported that overeducated workers in Thailand were 6.27% in 2006 and increased to 8.51% in 2011.

Another form of inadequate employment situation, income-related inadequate employment is a condition in which an employed worker, during a given reference period, desires or seeks to change his current work situation in order to increase income limited by such factors

Table 6. Conversion of ISCO occupational categories to three categories of skill levels

Occupational titles	Low-skilled	Intermediate	High-skilled
1.Legislators, senior officials, and managers			X
2.Professionals			X
3.Technicians and associate professionals			X
4.Clerks		X	
5.Services and sales workers		X	
6.Skilled agricultural, forestry, and fishery workers		X	
7.Craft and related trades workers		X	
8.Plant and machine operators, and assemblers		X	
9.Elementary occupations	X		

Table 7. Conversion from ISCED educational categories to three categories of skill levels

Educational level	Low-skilled	Intermediate	High-skilled
1.Pre-school	X		
2.Primary education	X		
3.Lower secondary education	X		
4.Upper secondary education		X	
5.Post-secondary education		X	
6.Bachelor degree			X
7.Master degree			X
8.Doctorate degree			X

Table 8. Correspondence between ISCED educational levels and ISCO occupational levels

ISCED educational level	ISCO occupational level		
	Low-skilled	Intermediate	High-skilled
Low-skilled	Matched	Undereducated	Undereducated
Intermediate	Overeducated	Matched	Undereducated
High-skilled	Overeducated	Overeducated	Matched

as insufficient equipment or training, and is available to do so. Findeis et al. (2000) and Domfe et al. (2013) defined low-earnings underemployment (low-wage workers) as employment in which labor income is less than 125% of the poverty threshold published by the Social Security Administration. Teeraswat et al. (2002) defined income-related underemployed workers as individuals who work full-time jobs but earn incomes 1.25 times below the poverty line. Hauser (1974, 1977) defined the income-related underemployed as workers whose work-related income is less than the minimum social requirement, i.e., 1.25 times below the poverty line. Table 10 summarizes the extent of underemployment in which different definitions lead to different extent of underemployment.

A person experiencing inadequate employment related to excessive hours (third form of inadequate employment situation) is referred to as an overemployed worker. Specifically, overemployed workers are those in employment who desire or seek to work fewer hours than they did during a given reference period, either in the same job or in another job, with a corresponding reduction in income. Overemployment occurs when a worker's desired hours of labor demand are in excess of hours of labor supply at current pay rates. Thus, overemployed workers are willing to reduce hours of paid work in spite of reduced incomes. For overemployment, there exists no threshold for a minimum number of hours worked because a worker might prefer to work fewer hours despite his current shorter-than-average working hours.

Table 9. Summary of studies using different measures of required schooling and overeducation among countries

Source	Country	Sample	Measurement	The extent of overeducation
Duncan and Hoffman, 1981	US	The Panel Study of Income Dynamics in 1976	Self-assessment	42% of sample reported having more education than their jobs required.
Hartog and Oosterbeek, 1988	The Netherlands	1500 respondents in a representative national survey	Self-assessment	Overeducation was about 30% and underutilization increased with level of education.
Alba-Ramirez, 1993	Spain	Cross-section data from Spanish Labor Force survey	Self-assessment	60% of workers had adequate education, 23% were undereducated, and 17% overeducated.
Rumberger, 1987	US	The 1969 Survey of Working Conditions and the 1973 and 1977 Quality of Employment Survey	Job analysis	Between 11 and 17% of workers reported that they had more than three years of schooling in excess of what their jobs required.
Verhaest and Omey, 2009	Belgium	SONAR database	Job analysis (JA)	Overeducation is relatively high for JA method (49.1%) because JA systematically underestimates requirements because of skill-biased technological change.
Cohn & Ng, 2000	Hong Kong	The 1986, 1991 Hong Kong Census	Realized match	About 30% of workers were overschooling. Males had higher probability to be overeducated than female.
Tsai, 2010	US	The PSID for 1979 to 2005	Realized match	About 22% of workers were overeducated with 0.63 years of surplus schooling and about 9% of workers were undereducated with 0.31 years of deficit schooling.
Bauer, 2002	Germany	German panel data set for the period 1984–1998	Realized match	About 12% of males were overeducated and 10% undereducated. Among females, 10% were overeducated and 15% undereducated.
Stefanik, 2011	EU countries	The National Level Census and European Community Household Panel	OECD method	Cyprus, Estonia and Ireland showed overeducation numbers higher than 30%. Spain was a country with low proportion of tertiary educated workers and relatively high overeducation, as opposed to the Netherlands.
Ortiz, 2008	France, Italy, and Spain	European Community Household Panel data on three countries 1994-2001	OECD method	Overeducation was 10%-13.5% from 1995-2001.
Ortiz and Kucel, 2008	Spain and German	European Labor Force Survey 2003–2005 data	OECD method	Overeducation was 16.34% in Spain and 6.95% in Germany.

Table 10. Summary of definitions of income-related underemployment and the extent

Source	Country	Definition of income-related underemployment	The extent of underemployment
Findeis et al., 2000	US	Individuals whose labor income is 125% below the individual poverty threshold published by the Social Security Administration.	Among regions, the US's South had the highest rate of income-related underemployment. Around 19.4% of working-age adults in the South were income-related underemployed.
Domfe et al., 2013	Ghana	Individuals whose labor income is 125% below the individual poverty threshold.	Underemployed by wage income was 15.4% of working aged population.
Teeraswat et al., 2002	Thailand	Persons who work full time jobs but earn incomes 1.25 times below the poverty line.	In 1996, income-related underemployment rate was 12.09% due to the East Asia economic crisis; and declined after the crisis.

Measuring overemployment involves information on the desired hours of work and whether a worker would like to reduce working hours. The commonly asked questions in relation to overemployment is centered on workers' willingness to reduce hours at their current job in exchange for lower current or future earnings. Examples of the questions are: *Would you like to work more hours than you currently work, same numbers of hours, or fewer hours than you currently work?* (Heldrich Center, 1999); *(In case of married employed workers) Would you prefer to work less than your present work schedule?* (Clarkberg and Moen, 2001); *Would you be willing to work fewer hours in order to have more free time?* (Feather and Shaw, 1999)

Estimates of the rate of overemployment vary depending on the type of question. Interestingly, the finding revealed that respondents' openness to hour reduction was greatest if surveys failed to explicitly state direct tradeoff of lower income. Table 11 summarizes the extent of overemployment among countries.

The conventional microeconomic model of labor market suggests that individuals work in jobs that reflect preferred work time in the long run. Nevertheless, they may actually hold jobs with desired and actual hours mismatch. The time mismatch is individually and socially suboptimal because overemployment brings about adverse consequences on work-life balance, workers' well-being and job performance. Green and Tsitsianis (2005) documented that working-time mismatch was associated with significantly lower levels of job satisfaction, and the problem was more severe for working too many hours (overemployment) than for working too few hours (underemployment) in both Britain and West Germany. Angrave and Charlwood (2015) reported that overemployment was of greater negative consequence than underemployment. Wooden et al. (2009) reported that an hour of overemployment is more damaging for life satisfaction than an hour of underemployment, especially among male workers.

4. Conclusion

Underemployment is an economic inefficiency stemming from the failure to fully utilize the labor of employed persons. According to the ILO (1998), underemployment is categorized into two types: time-related underemployment and inadequate employment situation. Time-related underemployment has been widely studied and numerous country-specific working hour thresholds determined. In Thailand, underemployed worker is defined as an individual who works less

Table 11. The extent of overemployment among countries

Source	Country	Sample	The extent of overemployment
Golden and Gebreselassie (2007)	US	Current Population Survey (CPS) of 2001	The estimate of overemployment on the willingness to trade income for reduced hours in 2001 was about 7% of all employed.
Tam (2010)	UK	Labour Force Survey between 2001 and 2010	Overemployment was about 10% (not seasonally adjusted) between 2001-2005 and decreased gradually from 2005 to 2009.
Golden (2004)	US	The May 2001 Current Population Survey (CPS)	Overemployment was under 7% among full-time workers.
Wunder and Heinecdk (2012)	Germany	German Socio-Economic Panel (SOEP) Study	62% of men and 38% of women were overemployed.
Otterbach et al. (2016)	Australia and Germany	Household, Income and Labor Dynamics in Australia (HILDA) Survey; and German Socio-Economic Panel (SOEP)	In Australia, about 28% of employed men and 25% of employed women were overemployed. In Germany, 48% of employed men and 38% of employed women were overemployed.

than 35 hours a week and would like to work more hours. In addition, the Thai National Statistics Office relies on the time-related approach to underemployment and found that the country's underemployment rate was 0.8% in May 2017.

ILO defines inadequate employment situation into three types: skill-related inadequate employment (overskilling), income-related inadequate employment, and inadequate employment related to excessive hours (overemployment). In case of overskilling, a worker possesses a level of skills that is higher than what is required for the job. Overeducation is used to measure skill-related inadequate employment in Thailand due to limited access to skills data in Thailand. Senkrua (2015) concluded that overeducated workers are 6.27% in 2006 and increased to 8.51% in 2011.

Income-related underemployment is an employed worker who desires or seeks to change his current work situation in order to increase income. Income-related underemployment rate in Thailand is about 12.09% in 1996 (Teeraswat et al., 2002). Overemployment is a situation in which an employed worker desires to work fewer hours than they currently do with a corresponding reduction in income. Due to limited access to data, the measure of inadequate employment situation is less studied in Thailand.

References

Alba-Ramirez. (1993). Mismatch in the Spanish labor market. *The Journal of Human Resources,* 28(2), 259-278.

Angrave, David, and Andy Charlwood. (2015). "What is the Relationship Between Long Working Hours, Over-employment, Under-employment and the Subjective Well-being of Workers? Longitudinal Evidence from the UK." *Human Relations*, 68(9), 1491-1515.

Bauer. (2002). Educational mismatch and wages: a panel analysis. *Economics of Education Review*, 21(2002), 221–229.

Blundell, R. and Macurdy, T. (1999). Labor supply: A review of alternative approaches, *in* O. Ashenfelter and D. Card (eds), *Handbook of Labor Economics*, Vol. 3 of *Handbook of Labor Economics*, Elsevier, chapter 27, 1559–1695.

Chevalier, Arnaud. (2003). 'Measuring Over-Education'. *Economica*, 70(279), 509–31. doi:10.1111/1468- 0335.t01-1-00296

Clarkberg, M. and Moen, P., (2001). Understanding the Time-Squeeze: Married Couples Preferred and Actual Work-Hour Strategies. *American Behavioral Scientist*, 44, 1115-1136.

Cohn and Ng. (2000). Incidence and wage effects of overschooling and underschooling in Hong Kong. *Economics of Education Review*, 19(2000), 159-168.

Desjardins, R. and K. Rubenson. (2011). An Analysis of Skill Mismatch Using Direct Measures of Skills. *OECD Education Working Papers*, No. 63, OECD Publishing, Paris. http://dx.doi.org/10.1787/5kg3nh9h52g5-en

Domfe et al. (2013). Determinants of Types of Underemployment in the MiDA Intervention Zones of Ghana. *Developing Country Studies,* 3(12), 33-47.
Duncan and Hoffman. (1981). The Incidence and wage effects of overeducation. *Economics of Education Review*, 1(1), 75-86.
Feather P. and Shaw, D. (1999). Estimating the Cost of Leisure Time for Recreation Demand Models. *Journal of Environmental Economics and Management*, July, 49-65.
Friedland, D.S. and Price, R.H. (2003), Underemployment: Consequences for the Health and Well-Being of Workers. *American Journal of Community Psychology*, 32(1), 33–45.
Golden. (2004). *Overemployed workers in the US*. Labor Market. Industrial Relations Research Association Series 56th Annual Meeting, San Diego, California.
Golden and Gebreselassie. (2007). Overemployment mismatches: the preference for fewer work hours. *Monthly Labor Review*, April 2007, 18-37.
Green F., & Mc Intosh. (2002). Is there a genuine underutilization of skills amongst the over-qualified?. *SKOPE Research Paper*. 30(Spring).
Green, Francis, & Nicholas T. (2005). An Investigation of National Trends in Job Satisfaction in Britain and Germany. *British Journal of Industrial Relations*, 43(3), 401-429.
Guironnet, J.-P.; Peypoch, N. (2007). Human capital allocation and overeducation: A measure of French productivity (1987, 1999). *Economic Modelling*, 24(3), 398–410.
Hartog & Oosterbeek. (1988). Education, Allocation and Earnings in the Netherlands: Overschooling? *Economics of Education Review,* 7(2), 185-194.
Hauser, P. M. (1974). The Measurement of Labour Utilization. *The Malayan Economic Review*, 19, 1–17.
Hauser, P. M. (1977). The Measurement of Labour Utilization–More Empirical Results. *The Malayan Economic Review*, 22, 10–25.
Heldrich Center for Workforce Development. (1999). Who Will Let the Good Times Roll?: A National Survey on Jobs, the Economy, and Race for President. *Work Trends Survey*, 1, 16.
Hersh. (1991). Education Match and job match. *Review of Economics and Statistics*, 73, 140-144
ILO. (1998). *Resolution Concerning the Measurement of Underemployment and Inadequate Employment Situations*, adopted by the 16th ICLS, October 1998, available at: http://www.ilo.org/global/statistics-and-databases/standards-and-guidelines/resolutions-adopted-by-international-conferences-of-labour-statisticians/WCMS_087487/lang—en/index.htm (accessed 15 September 2016).
Islam & Kamarudin. (2018). Analysing and Forecasting the underemployment trend in Malaysia. *International Journal of Social Science and Economic Research*, 2(1), 2018-2032.
Jensen, U., Gartner, H., & Rässler, S. (2010). Estimating German overqualification with stochastic earnings frontiers. *AStA Advances in Statistical Analysis*, 94(1), 33– 51.
Johnson, G.J. & Johnson, W.R. (1996). Perceived Overqualification and Psychological Well-Being. *Journal of Social Psychology*, 136(4), 435–45.
Jones & Sloane. (2009). *Disability and skill mismatch*. IZA DP No.4430, Sept 2009
Lin, C. H. & C. H. Wang. (2005). The Incidence and Wage Effects of Overeducation: The Case of Taiwan, *Journal of Economic Development*, 30, 31-47.
Linsley. (2005). Overeducation in the Australian labor market: Its incidence and effects. The University of Melbourne department of Economics Research paper No. 939.
Mavromaras, McGuinness, O'Leary, Sloane & Fok. (2007). The Problem of Overskilling in Australia and Britain. Discussion Paper Series No.3136 Nov, 2007. The Institute of the Study of Labor (IZA), Germany
Ortiz. (2008). *Not the right job, but a secure one: Over-education and temporary employment in France, Italy, and Spain*. (Estudio/Working Paper 2008/235 June 2008).
Ortiz & Kuce. (2008). Do Fields of Study Matter for Over-education?: The Cases of Spain and Germany. *International Journal of comparative Sociology,* 49(4-5), 305-327.
Otterbach et al. (2016). Working time mismatch and mental health. IZA DP No. 9818, March 2016, Germany
Pellizzari & Fichen. (2013). *A new measure of skills mismatch: Theory and Evidence from the Survey of adult skills*. (OECD Social, Employment and Migration Working Paper No.153). OECD Publishing, Paris.
Pholpirul et al. (2016). Educational Mismatches and Labor market outcomes. *Development Economic Review*, 10(2), 534-546.
Pratomo. (2015). The analysis of underemployment in Indonesia: determinants and its implication. *Procedia-Social and Behavioral Sciences*, 211 p.528-532
Ramulongo. (2014). An Analysis of Underemployment in the South African Labour Market. *Labour Market Review*, 2014/15, Department of Labour. Government Printers.
Robinson & Abbasi. (1979). Underemployment in Pakistan. *The Pakistan Development Review*, 18(4), 313-331.
Rubb. (2003). Overeducation in the labor market: a comment and re-analysis of a meta-analysis. *Economics of Education Review*, 22(6), 621-629.
Rumberger. (1987). The Impact of Surplus Schooling on Productivity and Earnings, 1986. *The Journal of Human Resources*, 21(1), 24-50.
Senkrua. (2015). The mismatch in Thai labor market: Overeducation. *Chiang Mai University Journal of Economics*, 19(1), 92-116.
Sicherman. (1991). Overeducation in the labour market. *Journal of Labor Economics,* 9, 101-122.
Stefanik. (2011). What can existing overeducation tell us about the situation in supply and demand of tertiary educated? *Review of Applied Socio- Economic Research*, 1(1), 11-28.
Tam. (2010). Characteristics of the underemployed and the overemployed in the UK. *Economic & Labour Market Review*, 4(7), 8-20
Tasci, H.M. (2005). Recent trends in underemployment and determinants of underemployment in Turkey. Suleyman Demirel Universitesi, Iktisadi ve Idari Bilimler Fakultesi Y.2006, c11, S.1 s.299-319
Teeraswat et al. (2002). *The Underemployment in Thailand*. The Thailand Research Fund, Bangkok.
Tsai. (2010). Returns to overeducation: A longitudinal analysis of the U.S.labor market. *Economics of Education Review*, 29(2010), 606-617.

Tsang et al. (1991). The impact of surplus schooling on worker productivity. *Industrial Relation*, 30, 209-227.
Varakamin. (2017). Education and skill mismatches in Maptaphut Industrial Estate, Thailand *Journal of Review on Global Economics*, 6, 233-238
Verdugo & Verdugo. (1989). The impact of surplus schooling on earnings: Some additional findings. *The Journal of Human Resources*, 24(4), 629-643.
Verhaest, D & Omey, E. (2009). *The Determinant of Overeducation: Different Meausres, Different Outcomes?* (Universiteit Gent Working Paper 2009/592), Faculty of Economics: Universiteit Gent.
Weiss, A. (1984). Determinants of quit behavior, *Journal of Labor Economics,* 2(3), 371–87.
Wilkins. (2004). The extent and consequences of underemployment in Australia. Melbourne Institute Working Paper No. 16/04. Melbourne Institute of Applied Economic and Social Research, The university of Melbourne. August 2004
Wilkins, R. (2007). The Consequences of Underemployment for the Underemployed. *Journal of Industrial Relations*, 49(2), 247–75.
Wooden, Mark, Diana W., & Robert D. (2009). Working Time Mismatch and Subjective Well-being. *British Journal of Industrial Relations*, Vol. 47, No. 1, pp. 147-179.
Wunder & Heinecdk. (2012). Working time preferences, hours mismatch, and well-being of couples: Are there spillovers?. German Socio-Economic Panel Study Paper 471. DIW Berlin