

An event history analysis of Malaysia Fertility Rate: An Analysis Econometrics

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Abstract

The fertility rate refers to the total number of children that would be born to each woman. The fertility rate in Malaysia shows a decreasing trend. Foremost, this study sought to obtain the important effects of migration, education, urbanization, unemployment and economic growth on fertility rate in Malaysian. This study will employ the autoregressive distributed lag (ARDL) model to determine the relationship between dependent and independent variable. The expected finding will reveal the most important factors that will influences the fertility rate in Malaysia.

Keyword: Fertility, Migration, Education, Urbanization, Unemployment and Economic Growth

Introduction

Fertility rate is one of the important variables that will used to show a nation future human capital. Fertility rate shows a decreasing trend in most of the countries in the world but the magnitude of decreasing is different. According to Filoso & Papagni (2015), developed countries have a high rate of decreasing in fertility rate compare to developing countries.

Malaysian government has paid much attention to the role of fertility rate to achieve developed national status in 2020 as Malaysia needs human capital to achieve this status. Malaysia is one of the developing countries that show a decreasing trend in fertility rate and the fertility rate in Malaysia is below the replacement level 2.1. Replacement level is the level of fertility at which a population exactly replaces itself from one generation to next.

The fertility rate in Malaysia is at all-time low and it is expected to dip even lower in future. According to Vital Statistic Malaysia (2019), the fertility rate dropped to 1.8 in 2018 compare to 4.9 babies per woman in 1970 which mean that the average number of babies born per woman throughout her reproductive life has been insufficient to replace herself and her partner.

Furthermore, Malaysia also facing population ageing difficult, where there are now more people age 60 years and older than the children younger than five years older. If the fertility rate continues to decline it will have an implication on the age structure of the population and decline of the labor force in the future. As more of the population ages, the burden of the elder will increase. It will cause the household size to be smaller and the family support system will be deteriorated.

The main objective of this study is to identify the key determinants of fertility rate in Malaysia from 1980 to 2019. In this respect, some of the key determinants of fertility, namely migration, education, urbanization, unemployment and economic growth will be used to examine the effect of these key explanatory variables on fertility rate for Malaysia.

Literature Review

Fertility rate

According to Preston & Hartnett (2010) total fertility rate is a woman's capability of number of children she has in her lifetime and which she made due past regenerative age and had the particular age in fertility rates of the period. Fertility among the woman is impacted by few factors in term of social, biological, structural and also behavior elements. In some countries like cities in Brazil and developing countries the poverty and income equality has been an important factor which caused flattening in fertility rate (John, Xiaoyu Song, Samantha, Vinit & Russell, (2016). According to Goujon, Lutz & Samir (2015) there is connection between decrease in fertility rate and lack of improvement in education has put in place. Besides, birth chances will most likely be concentrated among less taught women, paying little heed to the development in preparing levels, as demonstrate from China (Piotrowski & Tong, 2016). According to Carr et al. (2012) in London summit about family planning conveyed consideration regarding the significance of family planning one of the reason for decrease in fertility rate and there is growing the choices accessible to ladies beyond reproduction. Fertility rate can be measured in terms of total birth accrue to a woman (Alola, Bekun and Sarkodie, 2019).

Economic growth and fertility rate

A study by Puig-Barrachina et al., (2020) based on the two time periods, pre-recession (1998-2008) and recession (2009-2013) shows that a fertility rate in Spain decreased during the economic recession. According to Kohler's (2012) completed survey of the distinctive channels which showed that population influences economic outcomes incorporates with normal asset shortage, the "demographic dividend" from changes in population age structure and the impacts of population estimate on development. Besides, areas with better economic growth have a tendency to have a lower level fertility rate compared to less developed regions in this 20th century. In contrast, Myrskylä et al. (2009) mentioned that changes in socioeconomic development do make changes to the relationship between economic growth and fertility more positive. The presentation of the Profamilia program in Colombia to distinguish both the impact of prophylactic accessibility on fertility and the impact of fertility on social and economic growth by Milller (2010). In addition, size of population is an important factor impacting economic growth, supported by Sinding (2009) mentioned that a diminishment in fertility rate, while not an adequate condition for the economic growth of a country. There are few factors like changes in age structure, female labor force participation, investment in children's education has been used to examine the effect of economic growth toward a decrease in fertility rate Ashraf et al. (2013).

Urbanization and fertility

The role of urbanization on fertility decline still under sceptical study especially in the latter half of the 1960s despite the overwhelming number of empirical studies done in developing nations prove evidence of rural-urban differences in fertility and the negative correlation between fertility and urban-wards migration (Martine et al., 2013). Galor (2005) explained that the realization of structural change away from subsistence farming to modern service and industry sectors would best describe "urbanization", of which it was central in the transition of Western economies from a (post) Malthusian towards a regime of sustained economic growth. In addition, Flückiger & Ludwig (2017) in their paper cited Guinnane (2011) that the processes of fertility transition and increased investment in child education were closely interconnected with urbanization. These two processes were first observed in cities.

White et al. (2008) in their research argued that the expectations that urbanization reduces fertility in urban areas are common. This is because urban housing is tend to be on the more expensive level and children are probably less valuable in household production in urban (compared to rural) areas. Gries & Grundmann (2015) investigated the relationship between human reproductive behaviour change in developing countries alongside modernization by using urbanization as a modernization indicator due to its large sample size and years covered. The evidence was found that lower quality and higher quality urbanization processes were both differ in terms of their impacts on fertility suggesting that the presence of skill-intensive jobs is crucial in the interplay. Other reasons are that urbanization (or urbanism) may result in the change in beliefs and attitudes surrounding large families and the better

access to modern birth control may allow urban residents to act more effectively on desire to reduce childbearing (White et al., 2008).

Nevertheless, Martine et al. (2013) argued that such assumption that fertility decline is largely attributable to the structural changes associated with development and its component transformations such as urbanization and industrialization had begun to come under sceptical scrutiny. The surge of concern with unprecedented rates of population growth in developing countries resulted in the birth of a population establishment that demanded more pragmatic and direct responses to the perceived threat of rapid demographic growth thus common influential policies such as family planning programmes were introduced to achieve this. There were various findings that pointed out the higher levels of fertility existed in rural and small towns areas whereas low in large cities (Kulu & Washbrook, 2014). Such pattern has been observed for many countries including the US (Glusker et. al., 2000; Heaton, Lichter, & Amoateng, 1989), England and Wales (Boyle, Graham, & Feng, 2007; Tromans, Natamba, & Jefferies, 2009), Romania (Cojocariu, 2015; Jemna, 2015), the Nordic countries (Kulu et al., 2007; Thygesen, Knudsen, & Keiding, 2005), India (Brinker & Amonker, 2013), Sub-Saharan Africa (Arouri et. al., 2014; Flückiger & Ludwig, 2017)), Coastal Ghana (White et. al., 2008), China (Guo et. al., 2012; Zheng Yi & Vaupel, 1989) and Russia (Zakharov & Ivanova, 1996; Miljkovic & Glazyrina, 2015). While these studies on urban–rural fertility variation show broadly similar patterns (the larger the settlement, the lower the fertility levels), it is far from clear why fertility levels are higher in smaller places and lower in larger settlements (Kulu & Washbrook, 2014).

Guo et al. (2012) supported the notion that the inverse relationship between urbanization and fertility is well-known in developed countries however similar to what White et al. (2008) advocated, the nature of this relationship within developing countries is not well-understood because these countries have already have relatively low fertilities. Mainly, developed countries or societies found to have low demand for children which resulted in low fertility (Brinker & Amonker, 2013). However, in developing countries, such as India, children have traditionally played significant roles in their parents' economic and old age security by which a number of field studies have reported that children in many developing countries are a principal economic resource (Brinker & Amonker, 2013).

Meanwhile, Guo et al. (2012) in their research, found that rural fertility behaviour in China accounted for most of the decline in the nation between 1982 and 2008 suggesting that not only the official birth control policies were crucial in curbing China's population growth, but urbanization has also been indicated to become the primary factor behind future declines in national fertility. Subsequently, Martine et al. (2013) advocated that developing countries will soon be facing reduced fertility similar to the declining economic value and the rising cost of children in urban life and the desire of parents to promote better health and education for their children prompted fertility decline in developed countries. Thus, while observers can generally remark on the intertwining of urbanization and the demographic transition, knowledge of the timing of changes in individual behavior, and the way in which population redistribution might determine vital outcomes, is sorely lacking. This lack of knowledge is

particularly troubling given that concerns persist about the relationship between demographic processes and economic development. Moreover, although population growth and urbanization are often thought to be threats to environmental quality, research on the relationship between urbanization and the contemporary shift in rates of natural increase also remains quite limited (White et al., 2008).

Unemployment and fertility

These findings suggest that there exists a reversal of the well-known negative correlation between these two aggregates (i.e. Total Fertility Rates and female labor force participation rates mostly across the OECD countries). Furthermore, scholars have been examining the relationship between fertility and unemployment for more than a century. Most studies find that fertility falls with unemployment in the short run, but it is not known whether these negative effects persist, because women simply may postpone childbearing to better economic times (Currie & Schwandt, 2014). In fact, the link between fertility and unemployment has been well examined by most recent studies and shown that the worsening of economic conditions lead to lower fertility (Arolas, 2017). Recent research such as Sobotka et al. (2011) has a comprehensive review of the empirical literature whereas Goldstein et al. (2013) concluded that unemployment has had a negative impact on fertility in the recession period. Arolas (2017) explained that such event can be linked to the findings of theoretical microeconomic models; a phenomenon known as countercyclical fertility, whereby recessions are known as periods during which opportunity cost of having children for working women reduces.

These fertility reductions may represent mere postponement of fertility to better times (a tempo effect) or persistent long-term effects on completed fertility, i.e., on the total number of children a woman ever bears (a quantum effect) (Currie & Schwandt, 2014). More recent research by Aksoy (2016) reinvestigates the causal effects of local unemployment on fertility. It argued that existing empirical research may have contradicting results due to neglect of sub-demographic differences and failure to recognize endogeneity. Aksoy (2016) advocated that the research was based on the UK Labor Force Survey and the Birth Statistics data from the Office for National Statistics, of which the results of this study suggest that female unemployment tends to increase births, whereas male unemployment has the opposite effect. More importantly, the results indicate a strong variation across demographic subgroups in the unemployment and fertility relation and that a persistent countercyclical fertility pattern was also recognized at the county level (Aksoy, 2016).

It is worthwhile to recall that the hypothesis for countercyclical fertility appeared in a context of rapidly increasing female labor force participation and decreasing fertility rates. As it is commonly accepted that opportunity costs are the driving force behind the negative trends in fertility, the natural corollary is that fertility should rise during periods in which the opportunity costs associated with having children are relatively low. The negative association between fertility and labor market participation has become an established empirical

regularity that has only relatively recently been revised, notably by Ahn & Mira (2002)(see Arolas, 2017). Based on the research, the authors suggested that this negative association was reversed from the late 1980s onward, due at least in part to the effect of unemployment. Currently, the countries with high levels of female labor market participation also tend to be the countries with relatively low levels of unemployment (Arolas, 2017). This situation was found in the study by Ahn & Mira (2001) where there was support that high levels of unemployment lead to delays in family formation and marriage and therefore acknowledged the assumption that unemployment is linked with lower fertility.

Evidently, recent research has also shown an increasing tendency for countries with lower rates of female employment to also experience lower rates of fertility (Adsera 2004; Adsera, 2005; Ahn & Mira 2002; Brewster & Rindfuss, 2000). This implies a reversal of the well-known negative correlation between these two aggregates (i.e. Total Fertility Rates (TFRs) and female labor force participation rates (FLFPRs)) across the OECD countries. Andersen & Ozcan (2013) explained that individuals' unemployment experiences may affect their fertility outcomes; either directly by influencing their childbearing decisions or indirectly by changing partnership formation and dissolution processes which, in turn, affect fertility outcomes (e.g. Eliason & Storrie, 2009; Huttunen & Kellokumpu, 2010). Thus, there exist supports that the downward trends in fertility coincide with increasing unemployment rates among women especially in European countries (e.g. Ahn & Mira 2002; Adsera 2005). A smaller group of researchers went beyond the aggregate data to analyze how one's unemployment experience and fertility behavior are related at the individual level¹ (e.g. Kravdal 2002; Kohler and Kohler 2002 and Kohler 2012; Tölke & Diewald 2003; Adsera 2005; Kreyenfeld 2009; Ozcan et al. 2010; Adsera 2011) (cited in Andersen & Ozcan, 2013).

Changes in the demand for children would occur due to changes in family income and to changes in the relative cost of children and other consumer goods (Martine et. al., 2013). The context may influence fertility behaviour through economic opportunities and constraints or cultural factors (Kulu, 2013). A modern family now prefers to have fewer children with a common believe that they are able to give a better life to them (Kamaruddin & Khalilia, 2015). Children are more expensive in cities than in rural areas (Becker, 1991; Livi-Bacci & Breschi, 1990) (cited in Kulu & Washbrook, 2014). In addition, further explanation on the work by Becker et al (1960) was made by Kamaruddin & Khalilia (2015) whereby the quantity-quality model is most widely discussed theory as it described that an increasing marginal cost of quality (child outcome) with respect to quantity (number of children) leads to a trade-off between quantity and quality. Furthermore, Kamaruddin & Khalilia (2015) found empirical results of a negative relationship between number of child and social status (ownership, education and classwork) in Malaysia implying that household prefers quality over quantity of children. This coincides with the work by Morgan (2003) that advocated most countries will reach low fertility levels in the next two decades due to the speeds of aging populations and slow growth of populations caused by low fertility.

In fact, these findings are in line with some of the findings of previous studies. Del Bono et al (2012) found that job displacement decreases completed fertility by about 5-10% – although

they argue that this is not due to unemployment, but the result of career interruption – and Lindo (2010) found that job losses may decrease completed fertility, but does not delay the timing of births. These effects may possibly be driven by uncertainty about future employment (Ahn & Mira, 2002), or higher levels of opportunity cost both in monetary and non-monetary terms (Hotz et al. 1997). Therefore, the relationship between unemployment and fertility rates is still crucial for current research due to many areas that previous literatures have not covered yet.

Education and fertility

Lagerlöf (1999) examines the impact of the women education on fertility and economic growth and stated that the greater education of female most likely will lead to reduced fertility. The effect of educational enrolment by women may delay the process of child birth because it can create dispute in the length of education that occurred. Schultz (1994) and Tembon (2008) stated that ratio of one year of female education will reduces infant mortality by 5-10 percent. Klasen (1999) stated that when women gain four years more education, fertility per woman drops by roughly one birth. Klasen, Stephan (1999) in his study concluded that the greater the gap between men's and women's education, the higher the fertility rate. In fact, the gender gap matters more than women's overall level of education in determining the fertility rates. Lloyd, Kaufman, & Hewett. (2000) found that illiterate women have an average of 6 children each, whereas literate women have an average of 2.5 children, therefore it's clearly shows that education lead for reducing in fertility rate. Monstad et al. (2008) study the connection between fertility and education. Their study indicate that increasing education leads to postponement of first births away from teenage motherhood and towards women having their first birth in their 20s as well as for a smaller group up to the age of 35-40. Adding to that point, Osilii & Long (2008) stated the effect on education are significantly negative to fertility in Nigeria

Many of the studies that address this issue have been hampered by methodological challenges pertaining to Female education, especially secondary levels and it shows that it's have negative effect on fertility rate. (Barro 1996; Dollar & Gatti 1996; Hill & King 1995; Klasen 1999, 2002; Lagerlof 1999, Dreze, J. & Murthi, M. 2001, Schultz 1994, Tjomsland M. 2009). Majority of the scholars claim that secondary female education has a direct effect on reducing fertility rate while primary education has an indirect effect in reducing fertility rate through reducing mortality rate for children under the age of five. Dreze & Murthi (2001) argue that female education together with low mortality rate are the only significant factors reducing fertility rate. Women education has powerful effects on the total fertility rates hence population growth, infant mortality rate, child health and nutrition (Sanderson & Dubrow 2000). Herz & Sperling (2004) concluded that the expansion of female secondary education may substantial reductions in fertility. It shows that female secondary education reduces fertility and mortality as a package. (Subbarao, K., & Laura Raney. 1995,)

Syomwene, & Kindiki (2015) have discussed in their paper that relationship between women education and sustainable economic development somehow contribute to the reducing the fertility rate. Education thus increases a woman's potential income however it lowering fertility rate and thus slowing population growth. However, this lead to the growth in economic wealth as a lot of women will be working, instead of raising their children. (Weil, 2009). Some researchers have stressed that the education of women increases, fertility rate goes down. Educational attainment of parents, especially of mothers, has been found to have a significant negative relationship with fertility (Smita & Pandey, 2010).

Migration and fertility

Economists have investigated the implications of this process of migration from the perspective of the relationship between labor force and fertility within the strong industrial developed corporations and countries. Geographical studies have revealed some patterns of the correlations between population migration and the rate of fertility. Massey (2008) stated that the effects of migration will increase the population size from small to become large in any states therefore there will be growth on population. However, is much more significant that migration with those age groups will directly attributable to the lower the potential fertility. DS Massey (2003) argued that fertility rates may relate to a level of investment in human capital which could have the direct long-term impact on maternal productivity, earnings, and quality of life. In recent decades, many studies have done on the impacts of the relationship between fertility and migration hence the long terms migration somehow affected on the fertility rate. (Massey 2008, DS Massey 2003, Kritz, Lim & Zlotnik 1992; J Durand, 1999). Many of the social and economic processes that are thought to affect fertility, such as cultural diffusion and assimilation, economic development and income growth.

Singer & Massey (1998) estimate the volume of the migration and stated that the changes in the fertility are the clear consequence for aggregate fertility in the U.S. and in Mexico. These observations suggest that women's experience in the U.S. will be more important than men's for reducing fertility and that this gender difference will be greater among return migrants in Mexico than among settled migrants in the U.S. (Kanaiaupuni 1995; Perez-Itriago, A., & Guendelman, S. (1989). Paun, D. (2015) and Stilwell (2004) studies on the health workers migrants and stated that although the progress of medicine and the natural development of the civilization of human being have increased the life expectancy at birth in the world, though they still face declined on birth rate in civilized countries as resulted on the decrease in fertility and an increasing share of the population elderly. Neumayer (2006) and JE Cohen (2005) identified that migrants who move from high-fertility to low fertility regions or their descendants often adopt the reduced-fertility patterns of their new home, with some time delay. It is reporting that indirect evidence shows that immigrant women have fewer children in the United States than they would have had in their origin country.

(Yam, 2011, Leung, 2013, Kohler et al. 2002, Yip et al., 2015, Lam & Tu, 2016) addressing the core for reducing on fertility are due to migration, and aging. Lam, (2017) in his article have

emerged the pattern of immigration from China to Hong Kong in the twenty-first century on the issue related to fertility stated that there was reduce in population growth rate compare to recent. Reiterer (2010) decided that demographic transition was characterized by social modernization, in which fertility rates decreased significantly due to a shifting paradigm. Birth control became more prevalent, resulting in lower fertility rates. Evaluating the impact of migration on fertility it can leading to fluctuating population numbers.

Methodology

To examine the effects of migration, education, urbanization, unemployment and economic growth on fertility rate, this study will employ the autoregressive distributed lag (ARDL) model (Pesaran et al., 2001) to determine the presence of co-integration among the variables. The ARDL bound test has been chosen in this study due to its advantageous over the small sample properties (Pesaran & Shin,1999; Panopoulou & Pittis, 2004). This study will test the model with mixed order of integration of I(0) and I(1) (Pesaran et al., 2001). To avoid the inclusion of the second order of integration, I(2) regressors in the test, this study conducts an Augmented Dickey-Fuller (ADF) unit root test (Dickey & Fuller, 1979) for each of the variables before proceed to ARDL model bounds test.

If the F-statistic exceeds the upper critical bounds value, then this study concludes that the variables are co-integrated. Otherwise, the variables are not co-integrated. If the variables are co-integrated, this study will frame the ARDL equation. The empirical model is as:

Model 1

$$FR_t = \beta_0 + \beta_1 Mig_t + \beta_2 Edu_t + \beta_3 Urb_t + \beta_4 Unemp_t + \beta_4 GDP_t + \varepsilon_t \dots \dots \dots (1)$$

Where:

- FR = Fertility Rate
- Mig = Migration
- Edu = Education
- Urb = Urbanization
- Unemp = Unemployment
- GDP = Economic Grwoth
- β_0 = y-intercept
- t = Year
- ε_t = Error Term

The model (1) will be regressed against five independent internal variables using statistical software to find out the relationship between these independent variables and fertility rate in Malaysia. The independent variables are factors that could be fully controlled and manipulated by country itself. The Hausman test is also used to evaluate the consistency of an

estimator when compared to an alternative that is less efficient but is already known to be consistent (Greene, 2014).

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