Research Article

The Role of Birth Rate in ASEAN Bond Market Development

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ABSTRACT

In this study, we extend the existing literature in bond market development. To be more specific, we further shed the light on one aspect of population growth—the fertility rate. Our findings are based on six ASEAN bond markets namely—Indonesia, Malaysia, Philippines, Singapore, Thailand, and Vietnam between 2000 to 2020. We apply three different types of bonds market including Government bond, Corporate bond, and Central bank bond as well as the total market to perform the robust test of the result. Our findings shed the light on the role of birth rate on bond market development. We find that the fertility rate negatively associates with the bond market development which is supported by prior belief that an improvement in fertility rate cause a short-run effect on household saving and household income. Hence, the fertility rate is one important factor to deaccelerate the bond market expansion. Along with fertility rate, the bond market can be promoted by expanding economic size, improving stage of economic development, enhancing government spending, and lowering the interest rate spread.

Keywords: Bond Market Development, Asian Bond, Fertility Rate, Birth Rate
JEL: O16, G15, G51

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บทคัดย่อ

การศึกษานี้เป็นการศึกษาเพื่อหาปัจจัยในการที่ส่งผลให้ตลาดตราสารหนี้เติบโต โดยมีตัวแปรที่สนใจเป็นคือ อัตราการเติบโตของประชาการในมุมมองของอัตราการเกิด ซึ่งผลการทดลองจะอาศัยการโดยวิเคราะห์ข้อมูลของตลาดตราสารหนี้ในประเทศกลุ่มอาเซียนจำนวน 6 ประเทศ ได้แก่ ประเทศอินโดนีเซีย ประเทศมาเลเซีย ประเทศฟิลิปปินส์ ประเทศสิงคโปร์ ประเทศไทย และประเทศเวียดนาม โดยมีช่วงระยะเวลาการเก็บข้อมูลระหว่างปี ค.ศ. 2000 ถึงปี ค.ศ. 2020 ซึ่งในการวิเคราะห์การเติบโตของตลาดตราสารหนี้นั้น จะพิจารณาจากมูลค่าของตลาด ซึ่งผู้วิจัยได้ศึกษามูลค่าของตลาดโดยแยกออกเป็น 3 กลุ่มตลาด ได้แก่ ตราสารหนี้ที่ออกโดยภาครัฐ (Government Bond) ตลาดตราสารหนี้ภาคเอกชน (Corporate Bond) และตลาดตราสารหนี้ที่ออกโดยธนาคารกลาง (Central Bank Bond) โดยเมื่อนำมูลค่าของตลาดตราสารหนี้ทั้ง 3 มารวมกันจะได้มูลค่าของตลาดรวม ณ เวลาใดนั้น ผลจากการทดสอบจะพบว่า อัตราการเกิดของประชากรจะส่งผลในเชิงลบต่อการพัฒนาตลาดตราสารหนี้ของกลุ่มตัวอย่าง เมื่ออ้างอิงจากทฤษฎีในอดีตจะพบว่า เมื่ออัตราการเกิดของประชากรเพิ่มสูงขึ้นจะทำให้เกิดผลกระทบในระยะสั้น โดยพบว่า ส่งผลกระทบทำให้การออมภาคครัวเรือนลดลง และส่งผลกระทบให้รายได้ภาคครัวเรือนลดน้อยลงรายได้ภาคครัวเรือนลดลง และส่งผลกระทบให้การออมภาคครัวเรือนลดลง ซึ่งทั้งการออมและรายได้และการออมภาคครัวเรือนนั้น เป็นปัจจัยสำคัญที่ส่งผลต่อการพัฒนาหรือเติบโตของตลาดตราสารหนี้

คำสำคัญ : การพัฒนาตลาดตราสารหนี้ ตราสารหนี้ในตลาดอาเซียน อัตราการเกิด

1. INTRODUCTION

The Association of Southeast Asian Nations (ASEAN) are the group of fast-growing economies during last three decades. The total GDP of the group was about 1.66 trillion dollars in 1993 or about 4.94% of global GDP. In 2019, the group GDP expands to 8.46 trillion dollars or about 6.20% of global GDP. Based on this expansion, ASEAN's economies grew faster than overall global economies. This expansion demonstrates a rising demand from financial funding among the group members. Traditionally, corporates have two major sources of fund—debt and equity. Unlike equity financing, firm ownership is not affected by fund raising. Corporate raises fund via debt financing in various forms which are corporate bond and bank loans. Debt financing in terms of bank loan is the most common way to raise fund.

As debt financing is a popular funding vehicle worldwide, Levinger and Chen (2014) report that the global bond market expands at accelerating rate. Both corporate and government participate in bond market. At the end of 2000, the global bond market size was 31.194 trillion dollars and the global bond market size expanded to 118.64 trillion dollars[1] at the end of August 2020. Besides, the major bond issuers are government sectors. Government bond accounts for 50% while financial corporate bond shares 35.27% and the remaining are non-financial corporate bonds. Despite the fact that the bond markets expand impressively, the global market is dominated by bond markets in developed countries. At the end of 2000, among 31.194 trillion dollars, the bond markets in developed countries account for 98.30% while those in emerging markets share 1.70%. The, emerging bond markets demonstrate faster growth than developed bond markets. At the end of August 2020, the fraction of emerging bond markets increases to 17.32% while the fraction of developed bond markets decreased to 83.68%.

According to the prior finding, financial crisis is an important factor that accelerates the bond market development particularly in ASEAN market (Plummer & Click, 2005). Moreover, Plummer and Click (2005) also suggest that ASEAN countries develop bond markets as a mechanism to mitigate the future financial shocks. In addition to financial crisis, the prior literature offers several important determinant factors for bond market development including size of economies, stage of economic development, economic openness, financial market development, inflation, interest rate spread, and banking system concentration. However, none of prior literature addresses the role of fertility rate in bond market development though the negative relationship between the fertility rate and economics expansion is well documented (Arif & Chaudhry, 2008; Bloom & Finlay, 2009; Cruz & Ahmed, 2018; Cuaresma, Lutz, & Sanderson, 2014)[2]. In addition, the fertility rate, also, negatively associates with household saving (Mierau & Turnovsky, 2014). This could altogether lead to lower funds flow to bond markets.

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[1] Source: bank of international settlement (BIS)

[2] Fewer studies believe that the fertility rate positively contributes to the economic expansion (Eastwood & Lipton, 2011; Essien, 2016).

To fill this literature gap, in this study, we aim to explore the role of fertility rate in bond market development in ASEAN markets namely Indonesia, Malaysia, Philippine, Singapore, Thailand, and Vietnam between 2000 and 2020.

The remainder of the study is organized as follows. Section 2 provides brief review of literature. Section 3 shows data and methodology in this study. Section 4 shows empirical results and Section 5 is discussion and conclusion.

2. LITERATURE REVIEW

2.1 Fertility Rate

The negative effect of fertility rate on economic growth is well documented. An increasing in fertility rate can negatively affect the per capita income and house hold income at short-run (Robin Barlow, 1994) because an increasing in fertility rate possibly shrinks female labor force (Bremner, López-Carr, Suter, & Davis, 2010). In addition, an increasing in fertility rate also slows aggregate savings (Mierau & Turnovsky, 2014). As a consequence, an increasing in fertility rate potentially decelerates the economic expansion. Their findings are supported by several scholars (Arif & Chaudhry, 2008; Bloom & Finlay, 2009; Cruz & Ahmed, 2018; Cuaresma et al., 2014). Up to date, none of aforementioned above finds the effect of the fertility rate in bond market development.

2.2 Control Variable

Prior literatures document several factors affecting bond market development. The size of economic is an important factor of bond market development. The large economies enable both scale efficiency and liquidity to bond market. Based the economies of scale and better bond market liquidity, the large economies become more attractive market for investors (Bong & Premaratne, 2018; Rani & Kumar, 2019). Subsequently, the large economies are more likely to advance the bond market development (Ahwireng-Obeng & Ahwireng-Obeng, 2019; Eichengreen & Luengnaruemitchai, 2004; Essers, Blommestein, Cassimon, & Flores, 2016; Khalid & Rajaguru, 2018; Kowalewski & Pisany, 2019; Smaoui, Grandes, & Akindele, 2017). In this study, we apply GDP to represent the size of economics. In addition to the size of the economy, we also control for the economic development stage by GDP per capita as per prior studies (Eichengreen & Luengnaruemitchai, 2004), (Bhattacharyay, 2013). Moreover, an international economic openness can increase the level of domestic challenge and speed up the financial market development (Ahwireng-Obeng & Ahwireng-Obeng, 2019; Essers et al., 2016; Khalid & Rajaguru, 2018; Kowalewski & Pisany, 2019; Rajan & Zingales, 2004; Smaoui et al., 2017). Hence, in this study, we employ the current account balance per GDP as a proxy for economic openness (Kowalewski & Pisany, 2019; Rajan & Zingales, 2004).

We further control for the financial market structure. We add stock market capitalization to GDP to proxy for financial structure in each economy. The larger the stock market capital, the more likely that the economics will be market-based. Hence, this could help to promote the development of bond markets (Kowalewski & Pisany, 2019). Also, the prior studies suggest the relationship between historical inflation and bond market development. Burger & Warnock (2007) and Burger et al. (2010) demonstrate that the lower historical inflation enhances a development of bond market. Hence, in this study we introduce consumer price index as a proxy for economic inflation. The interest rate spread is another factor affecting bond market expansion. Since the government policies can directly affect both stock market and debt market. For instance, the level of government consumption is positively related with the increasing of financing needed for both banking and corporation (Ndikumana, 2000). Hence, the larger the government consumption, the faster the bond market expansion would be expected[3].

Based on substitution effect between bank credit and private debt, we follow Becker and Ivashina (2014) by controlling bank related variable[4]. The credit supplied by bank is proxied by the ratio between credit provided by domestic bank to GDP while we use return on asset as a measurement of bank profitability. Furthermore, we follow Schaeck et al. (2009) and Oskar Kowalewski and Paweł Pisany (2019) who document the positive relationship between bank power and corporate bond market expansion. To measure for bank concentration, we use the total bank deposit to GDP as a proxy for bank power in the economics.

[3] On the other hand, As suggest by Smaoui & Khawaja (2017) who study sukuk bond in 13 markets between 2001–2013. They suggest that the larger the government consumption may induce non-productive expenditure as well as the corruption in government, and oversized government. All of these activities can lead to a lower economic growth and hence slow down the bond market expansion.

[4] Prior studies show that bank have superior power and information advantage particularly in bank-based economics (W. Wattanatorn & Nathaphan, 2018; Woraphon Wattanatorn & Nathaphan, 2019, 2020; Woraphon Wattanatorn, Padungsaksawasdi, Chunhachinda, & Nathaphan, 2020).

3. DATA AND METHODOLOGY

3.1 Data

We gather the bond related information of six Asian bond markets[5] including Indonesia, Malaysia, Philippine, Singapore, Thailand, and Vietnam. Our sample includes all available bond market values at the end of each year since 2000 to 2020. Further, all economic variables are obtained from the World Bank—World Development Indicators (WDI) which include GDP, GDP per capita, current account balance, stock market capitalization, lending and deposit rate, Consumer price index (CPI), level of government consumption, total bank deposit, total private credit provided by bank, banks' ROA for each market at the end of each year. Since our sample includes both developed and emerging economies, we take a natural logarithm on GDP and GDP per capital to remove the scaling effect. Furthermore, due to data limitation, we apply annual data for this analysis. In sum, our database includes a unique 413 market-year observation.

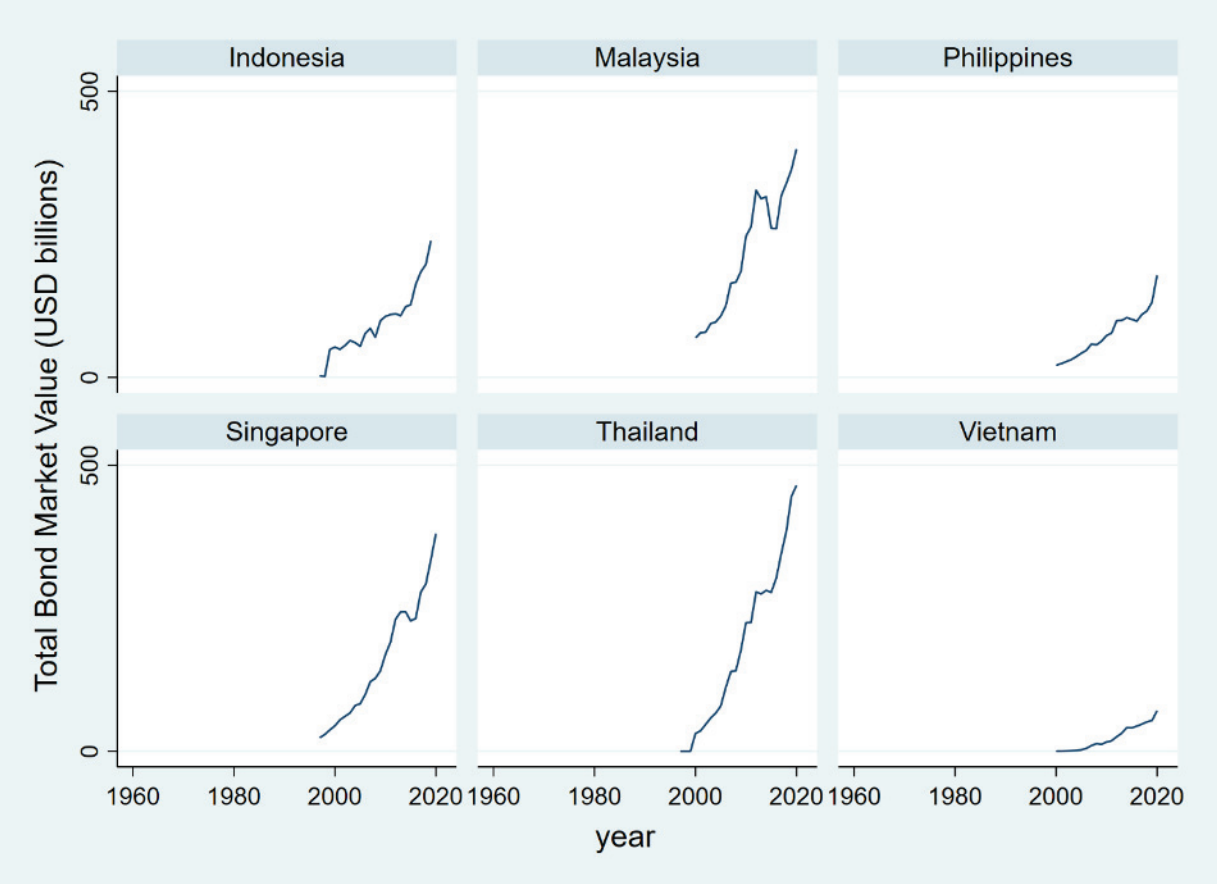

Figure 1: Illustrates the Bond Market Value in All Six ASEAN Bond Market Between 2000 and 2020

[5] Source: https://asianbondsonline.adb.org as of 31 March 2021

Table 1: Descriptive Statistics

Variable	Definition
ln (GDP)	The natural logarithm of Gross domestic product (GDP) at current level at the end of each year
ln (GDP Per capita)	The natural logarithm of Gross domestic product (GDP) per capita at current level at the end of each year
Economic openness	Economic openness defines as the current account balance per GDP at the end of each year
Financial Market structure	The financial structure defines as the stock market capitalization to GDP at the end of each year
Inflation	Inflation is represented by consumer price index (CPI) at the end of each year
Interest rate spread	Interest rate spread is the different between lending and deposit rate at the end of each year
Private credit	Private credit is the ratio between domestic bank provided credit to GDP at the end of each year
Bank ROA	The bank ROA represents the bank's profitability at the end of each year
Government consumption	Government consumption is presented by the level of government consumption at the end of each year
Bank deposit	Bank deposit is the total deposit at bank to GDP at the end of each year
Fertility rate	Fertility rate is the birth rate per woman at the end of each year

Table 2: Reports the Variable Descriptive Statistic by Country. Total Bond is the Summation of Government Bond Outstanding Value, Corporate Bond Outstanding Value, and Central Bank Bond Outstanding Value.

		Mean	S.D.	Min	P25	P50	P75	Max	Skew	Kurt
Full Sample	Total Bond (mil $)	127.08	111.83	0.00	44.53	95.25	190.66	445.59	1.01	3.12
	Government bond	70.98	51.82	0.00	34.53	57.83	98.81	211.58	0.79	3.08
	Corporate bond	38.34	45.02	0.00	3.54	18.06	57.50	174.08	1.31	3.76
	Centralbank bond	17.76	30.33	0.00	0.00	2.57	20.99	112.33	1.88	5.34
Indonesia	Total Bond (mil $)	95.21	58.72	1.73	54.15	85.67	123.49	238.75	0.69	3.15
	Government bond	72.92	50.10	0.00	43.07	50.86	97.67	198.52	0.94	3.33
	Corporate bond	12.01	9.61	1.73	2.81	8.42	18.12	32.10	0.67	2.23
	Centralbank bond	10.28	8.03	0.00	5.36	7.90	13.59	27.63	0.88	2.83
Malaysia	Total Bond (mil $)	217.51	108.20	68.71	106.97	246.55	315.52	399.09	0.02	1.57
	Government bond	108.58	54.82	33.91	56.84	113.58	149.83	211.58	0.17	1.75
	Corporate bond	96.30	49.63	33.02	45.63	101.11	130.54	187.01	0.21	1.80
	Centralbank bond	12.63	14.49	0.50	2.20	5.20	20.99	50.44	1.24	3.29
Philippine	Total Bond (mil $)	75.93	41.17	20.98	42.13	73.11	101.48	178.39	0.57	2.86
	Government bond	64.95	30.58	20.83	41.13	64.34	86.29	140.24	0.44	2.81
	Corporate bond	10.76	10.38	0.07	1.00	8.77	17.35	33.57	0.70	2.42
	Centralbank bond	0.22	1.00	0.00	0.00	0.00	0.00	4.58	4.25	19.05

Table 2: Reports the Variable Descriptive Statistic by Country. Total Bond is the Summation of Government Bond Outstanding Value, Corporate Bond Outstanding Value, and Central Bank Bond Outstanding Value. (Cont.)

		Mean	S.D.	Min	P25	P50	P75	Max	Skew	Kurt
Singapore	Total Bond (mil $)	158.11	104.84	23.78	64.13	134.17	238.01	380.42	0.44	2.06
	Government bond	69.38	37.89	13.05	35.29	73.58	95.23	148.48	0.28	2.22
	Corporate bond	63.07	38.36	10.73	28.84	53.97	98.01	131.19	0.24	1.69
	Centralbank bond	25.66	35.53	0.00	0.00	0.00	56.04	100.75	0.87	2.12
Thailand	Total Bond (mil $)	183.05	144.84	0.00	52.49	158.90	279.90	464.74	0.37	1.98
	Government bond	87.66	62.91	0.00	39.11	78.30	128.73	229.18	0.43	2.41
	Corporate bond	43.74	40.17	0.00	9.03	32.25	70.02	127.44	0.72	2.36
	Centralbank bond	51.66	43.85	0.00	4.36	48.40	87.23	125.16	0.08	1.46
Vietnam	Total Bond (mil $)	23.25	21.84	0.09	2.65	16.26	41.46	71.04	0.58	2.11
	Government bond	20.04	19.20	0.08	2.63	12.33	34.53	58.81	0.58	1.92
	Corporate bond	2.38	2.75	0.01	0.02	1.91	3.38	12.23	2.23	8.94
	Centralbank bond	0.84	1.67	0.00	0.00	0.00	0.72	6.28	2.24	7.12

Table 3: Displays the Related Independence Variables Used in Our Study. The Descriptive Statistics are Based on the All Panel Average Between 2000 And 2020.

	Mean	S.D.	Min	P25	P50	P75	Max	Skew	Kurt
ln (GDP)	27.21	0.64	26.02	26.76	27.14	27.60	28.73	0.44	2.75
ln (GDP Per capita)	9.74	10.00	6.89	8.41	9.00	9.80	11.51	2.26	7.46
Economic openness	5.65	7.88	−8.98	0.08	3.47	10.51	26.89	0.77	2.94
Financial Market structure	92.41	68.06	13.46	37.05	74.97	128.84	269.89	1.02	3.27
Inflation	4.28	6.18	−0.90	37.05	3.03	5.36	23.12	5.75	47.96
Interest rate spread	3.69	1.57	1.43	37.05	3.68	4.73	6.90	−2.15	17.52
Private credit	74.70	38.48	16.23	37.05	90.82	104.29	154.85	−0.13	1.69
Bank ROA	0.58	3.25	−12.93	37.05	1.09	1.40	2.35	−7.36	63.53
Government consumption	0.001	0.0007	0.0001	0.0006	0.001	0.002	0.003	0.714	3.512
Bank deposit	70.47	39.56	8.76	37.05	84.76	103.46	126.45	−0.14	1.49
Fertility rate	2.11	0.65	1.15	1.70	2.02	2.51	3.77	0.65	2.91

Table 1 summarizes variable definition while Figure 1 displays the bond market expansion in every country. Further, the result from Table 2 shows that the Malaysia has the biggest bond market among our sample where Vietnam has the smallest bond market in this region. In all markets, the bond markets consists mostly of the government bonds. Furthermore, Table 2 demonstrates the clear difference between bond market in developed and emerging markets. The bond market in emerging nations—Indonesia, Malaysia, Philippine, Thailand, and Vietnam are dominated by government bond. While Singapore is the only developed market in ASEAN, its bond market has similar proportion of government and corporate bonds. Table 3 exhibits descriptive statistics for exogenous variables used in our study.

3.2 Empirical Model

Since we aim to examine the panel data which combines both time-series and cross-sectional variation, the heteroscedasticity and autocorrelation issues are concerned. Therefore, to alleviate the issues, we follow the prior literatures by applying generalized least square as our estimator (GLS). However, the prior studies cannot agree on the method used to examine the bond market development and its exogenous variables. On one hand, Kowalewski, and Pisany (2019) examine 10 Asian bond markets using panel regression with random effect. On the other hand, several studies rely the results on panel regression with fixed effect. For example, Smaoui et al. (2017) study 22 emerging countries for the period 1990 and 2013 based on panel regression fixed effect and Bhattacharyay in 2013 who studies 10 Asian bond markets between 1998 and 2008 also apply panel regression with fixed effect. The more recent study also applies panel regression with fixed effect to examine bond market in 47 developed and emerging economies between 1998 and 2007 (Khalid & Rajaguru, 2018). In addition, many researchers apply both panel regression with random effect and fixed effect. For example, Mu et al. (2013) and Essers et al. (2016) study Sub-Saharan Africa samples during 1998-2010 and 2003–2013 respectively. Both studies apply panel regression with random effect and panel regression with fixed effect. In this study, we apply Hausman specification test to determine the most appropriate method for our study. At the first step, we set up the model for both fixed effect and random effect as shown in Eq.1 and Eq.2

Fixed effects model

$$\begin{aligned} Y_{i,t} = {} & \alpha_{1i} + \alpha_2 \ln(GDP)_{i,t} + \alpha_3 \ln(GDP\ Per\ Capital)_{i,t} + \alpha_4 Economic\ Openness_{i,t} \\ & + \alpha_5 Financial\ market\ structure_{i,t} + \alpha_6 Inflation_{i,t} + \alpha_7 Interest\ rate\ spread_{i,t} \\ & + \alpha_8 Private\ credit_{i,t} + \alpha_9 Bank\ ROA_{i,t} + \alpha_{10} Government\ Consumption_{i,t} \\ & + \alpha_{11} Bank\ Deposit_{i,t} + \alpha_{12} Fertility\ rate_{i,t} + \varepsilon_{it} \end{aligned} \quad \text{...Eq.1}$$

Random effects model

$$Y_{i,t} = \alpha_{1i} + \alpha_2 \ln(GDP)_{i,t} + \alpha_3 \ln(GDP\ Per\ Capital)_{i,t} + \alpha_4 Economic\ Openness_{i,t} + \alpha_5 Financial\ market\ structure_{i,t} + \alpha_6 Inflation_{i,t} + \alpha_7 Interest\ rate\ spread_{i,t} + \alpha_8 Private\ credit_{i,t} + \alpha_9 Bank\ ROA_{i,t} + \alpha_{10} Government\ Consumption_{i,t} + \alpha_{11} Bank\ Deposit_{i,t} + \alpha_{12} Fertility\ rate_{i,t} + \nu_i + \varepsilon_{it} \quad ...Eq.2$$

Where $Y_{i,t}$ is the bond outstanding value for each market i^{th} at time t. To robust the result, we repeat the analysis of Eq.1 and Eq.2 using Total bond outstanding value, Government bond outstanding value, Corporate bond outstanding value, and Centralbank bond outstanding value. Further, α_{1i} is the i^{th} market's fixed effects and ν_i is the i^{th} market's random effects. $\ln(GDP)_{i,t}$ and $\ln(GDP\ Per\ capita)_{i,t}$ is the i^{th} market's GDP and the i^{th} market's GDP per capita at year t respectively. $Economic\ Openness_{i,t}$, $Financial\ market\ structure_{i,t}$, $Inflation_{i,t}$, $Interest\ rate\ spread_{i,t}$, $Private\ credit_{i,t}$, $Bank\ ROA_{i,t}$, $Government\ Consumption_{i,t}$, $Bank\ Deposit_{i,t}$, and $Fertility\ rate_{i,t}$ are the independence variables for market i^{th} at year t defined in Table 2. In an unreported table, we perform Hausman specification test and find a strong evidence to reject random effect specification. Our Chi^2 statistic is 40.91 with p-value of 0.000[6]. Hence the panel regression with fixed effect[7] is appropriate for our analysis as suggested by several studies (Bhattacharyay, 2013; Khalid & Rajaguru, 2018; Smaoui et al., 2017).

4. RESEARCH FINDING

We perform panel regression with fixed effect to examine the effect of fertility rate on bond market development. Table 4 reports the result obtained from Eq.1.

[6] The null hypothesis for Hausman specification test states that the appropriate model is panel data regression random effect. Hence, with Chi^2 statistic is 40.91 with p-value of 0.000. We can statistically reject the panel data regression random effect model. Hence, our baseline regression is panel data regression with fixed effect model.

[7] Since the panel regression with fixed effect estimator can examine the variations within particular country and handle all time invariant unobserved heterogeneity among countries, this method can potentially alleviate the unobserved heterogeneity issue.

Table 4: Presents Empirical Results Based on Eq.1. Total Bond is the Summation of Government Bond Outstanding Value, Corporate Bond Outstanding Value, and Central Bank Bond Outstanding Value. in (GDP) is the Natural Logarithm of GDP at Current Level. GDP Per Capital is at Current Level. The Economic Openness is the Ratio OF THE Current Account Balance Per GDP. Financial Market Structure is Stock Market Capitalization to GDP. Inflation Represent by CPI (Consumer Price Index). Interest Rate Spread is the Different Between Lending and Deposit Rate. Private Credit is the Ratio Between the Credit Provided by Domestic Bank to GDP. Government Consumption is the Ratio Between Government Consumption to GDP. Fertility Rate is the Birth Rate Per Woman. T-Statistic are Shown in Parentheses. ***, **, and * Indicate Statistical Significance at the 1%, 5%, and 10% Levels, Respectively

	Total Bond	Government Bond	Corporate Bond	Central bank Bond
ln(GDP)	140.3***	125.0***	27.04**	–11.71
	(4.57)	(8.85)	(2.32)	(–0.76)
GDP Per capita	0.00226***	0.000778**	0.00136***	0.00168***
	(3.12)	(2.33)	(4.94)	(4.60)
Economic openness	–0.295	–0.222	–0.362	0.289
	(–0.34)	(–0.55)	(–1.09)	(0.66)
Financial market structure	–0.0411	0.0220	–0.0848*	0.0217
	(–0.32)	(0.37)	(–1.72)	(0.33)
Inflation	0.545	0.192	0.131	0.222
	(0.51)	(0.39)	(0.32)	(0.41)
Interest rate spread	–10.51***	–2.819*	–4.335***	–3.354*
	(–2.93)	(–1.71)	(–3.19)	(–1.86)
Private credit	–1.019***	–0.661***	–0.169	–0.189
	(–3.34)	(–4.71)	(–1.46)	(–1.23)
Bank ROA	2.967	0.828	1.165	0.974
	(1.33)	(0.81)	(1.38)	(0.87)
Government consumption	15.73***	2.072**	2.811*	10.85***
	(3.87)	(2.31)	(1.82)	(5.31)
Fertility rate	–46.63*	–27.42**	–0.637	–19.84
	(–1.74)	(–2.22)	(–0.06)	(–1.47)
α_{1i}	–4050.3***	–3428.0***	–777.9**	155.7
	(–4.73)	(–8.70)	(–2.40)	(0.36)
Adj-R2	87.20%	88.60%	83.80%	59.70%
Time fixed effect	Yes	Yes	Yes	Yes
Country fixed effect	Yes	Yes	Yes	Yes

The result from Table 4 shows that the fertility rate is negatively associated with the bond market development in general. We find the evidence to support the negative relationship between fertility rate and bond market development. To be more specific, we find a negatively significant coefficient of –46.63 for fertility rate in Total bond market, at 10% significant level. With respect to the bond type, we find a negatively significant coefficient at 5% level, –27.42, for government bond. This means the higher the fertility rate, the slower growth in overall bond market and particularly in government bond market. Although the negative coefficients are preserved for Corporate bond market and Central bank bond market, we cannot reject the null hypotheses for these two bonds. Our result is consistent with the prior literature that the bond market development is positively associated with the market size representing by GDP. Furthermore, we find the same positive relationship between bond market development and stage of economic development measured by GDP per capita. In addition, the negative relationship between the interest rate spread and bond market development exists in ASEAN bond markets. Lastly, we find the positive relationship between the government consumption and bond market development. As expected, the larger the government consumption, the larger the government bond issued.

5. DISCUSSION AND CONCLUSION

This study aims to explore the drivers of bond market development. To be more specific, we shed the light on the role one important population growth—fertility rate. We find the negative relationship between fertility rate for and bond market development. Our finding is consistent with prior literature that an increasing in fertility rate causes a short-run effect on household savings and household income. Therefore, the fertility rate is one important factor to deaccelerate the bond market expansion. In regard to other control variables, our finding suggests that the larger the economic size, the larger the bond market development expansions (Eichengreen & Luengnaruemitchai, 2004; Smaoui et al., 2017). The more recent finding ascertains this positive relationship (Ahwireng-Obeng & Ahwireng-Obeng, 2019). Ahwireng-Obeng & Ahwireng-Obeng (2019) studies government bond markets from 26 African markets and concludes that the economic sizes have a positive impact on bond market development. Furthermore, we find a positive relationship between bond market development and the stage of economic developments—GDP per capita. This finding is consistent with Smaoui & Khawaja (2016)[8] and Eichengreen & Luengnaruemitchai (2004) who find that the higher the income per capital, the higher the demand for financial assets. Hence, the stage of economic development enhances the bond market development. In the same direction, the more recent study supports the same view on the positive impact of the stage of economic development on bond market development (Smaoui et al., 2017)[9]. Furthermore, we find a negative relationship between interest rate spread and the bond market development in every bond type. This means that the higher the interest spread discourage both government and corporations to borrow

[8] Smaoui and Khawaja (2016) studied sukuk bond in 13 markets between 2001–2013.

[9] Smaoui et al. (2017) summarized their finding based on 22 emerging and developing markets.

through debt markets. We find the government consumption is positively related with bond market development which is consistent with Kowalewski and Pisany (2019). The larger the government consumption, the more likely that the government bonds are issued. This can accelerate the bond market development. Our finding consistent with Ndikumana (2000) who suggested the crowd-out effect from the higher government consumption. He shows that the banking sectors and corporate sectors require larger financing activities.

In sum, our study suggests an important role of fertility rate in bond market development in ASEAN bond markets in which fill the literature opened gap. We do include reviewed control variables to robust our test results. However, since the decline in fertility rate is a global issue, we leave the worldwide examination on the role of fertility rate on worldwide bond market development as for future research.

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