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THE EFFECT OF PERSONAL TAX EXEMPTION ON FERTILITY IN INDONESIA

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ABSTRACT

Keywords:
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the addition of children

Personal tax exemption (*Penghasilan Tidak Kena Pajak - PTKP*) can influence fertility choices by changing the costs or benefits of childbearing and increasing family disposable income. This study aims to investigate the impact of personal tax exemption on the addition of children in Indonesia. This study employs secondary data from Indonesian Family Life Survey (IFLS) data waves 4 and 5. The estimation, using a linear probability model, is an improvement from earlier studies as it employs a non-linear specification to more effectively capture the pattern of children's desired demand. This study found an inverse U-shaped relationship between the addition of children and personal tax exemption. The inverse U-shaped relationship indicates that the marginal effect of personal tax exemption decreases as the value of personal tax exemption increases. In addition, the probability of adding children is also influenced by the mother's characteristics (age and working status), other adult female family members in the household, and the number of children. This study reveals that the taxation variable, personal tax exemption, can affect fertility. Thus, birth control should be carried out by considering various aspects other than direct birth control (e.g., family planning), including taxation.

ABSTRAK

Kata Kunci:
Penghasilan Tidak Kena Pajak (PTKP),
fertilitas, Model Probabilitas Linear,
penambahan anak

Penghasilan Tidak Kena Pajak (PTKP) dapat mempengaruhi pilihan fertilitas dengan mengubah biaya atau manfaat melahirkan anak dan menambah pendapatan disposibel keluarga. Tujuan penelitian ini untuk menganalisis pengaruh dari PTKP terhadap penambahan anak di Indonesia. Penelitian ini menggunakan data sekunder berupa data IFLS gelombang 4 dan 5. Estimasi dilakukan dengan menggunakan model probabilitas linier yang merupakan perbaikan dibandingkan penelitian sebelumnya karena menggunakan spesifikasi non-linier agar lebih efektif menangkap pola permintaan yang anak. Penelitian ini menunjukkan hubungan berbentuk U terbalik antara penambahan anak dan PTKP, yang mengindikasikan bahwa efek marginal dari PTKP menurun seiring dengan bertambahnya nilai dari PTKP. Di samping itu, probabilitas menambah anak juga dipengaruhi oleh karakteristik ibu (usia dan status bekerja), anggota keluarga perempuan dewasa lainnya dalam rumah tangga, dan total anak. Penelitian ini mengungkapkan bahwa variabel perpajakan, yaitu PTKP dapat memengaruhi fertilitas. Dengan demikian, pengendalian kelahiran sebaiknya dilakukan dengan mempertimbangkan berbagai aspek selain pengendalian kelahiran yang bersifat langsung (contoh: Keluarga Berencana), yaitu aspek perpajakan.

INTRODUCTION

As measured by the TFR (Total Fertility Rate), Indonesia's fertility rate shows a declining trend. In the last six decades, Indonesia's TFR has decreased by nearly four points (1). Based on the IDHS (Indonesia Demographic and Health Survey) results, the fertility rate, which was initially stagnant at 2.6 for ten years (2002-2012), fell to 2.4 in 2017. In addition, Central Bureau of Statistics(BPS) stated that the TFR in Indonesia was recorded at 2.1 in 2022 (1). This number has approached the strategic plan fertility rate targets, 2.3 in 2020 and 2.1 in 2024 (2). If birth planning programs (e.g., the use of contraceptives) are implemented consistently, the fertility rate in Indonesia will continue to decline in the future (3). The decline in fertility rates also occurs because today's modern families desire fewer children because they believe they can provide a better life for them (4).

The continued decline in fertility rates will cause Indonesia to reach the replacement level of fertility in the future. A replacement level of fertility occurs when the TFR is about 2.1 children per woman, where each generation replaces itself so that the population growth rate is 0. When the fertility rate falls below the replacement rate, one generation does not have enough children to replace the previous generation. This will eventually lead to a decrease in the population, leading to a new challenge: a reduction in the young workforce (5,6). Therefore, Indonesia needs to identify various policy instruments to maintain the fertility rate at an optimal level.

Fertility is influenced by rational choice, where the benefits of childbearing are compared with the costs of childbearing (7,8). Thus, fertility-related choices are one aspect of maximizing the utility of the human lifecycle. Children are assumed to provide utility to their parents, so the demand model is structured as utility maximization subject to income constraints (7). Child-rearing costs, which include direct costs (food, clothing, school, et cetera) and opportunity costs, can also affect the demand for children. Opportunity costs are earnings forgone due to time spent caring for children or expenses incurred when child care is done by someone else (9,10). When the cost of raising children increases, the demand for children decreases. Thus, when the government provides a reduction in the cost of raising children through subsidies and incentives, the cost of raising children decreases, and the demand for children will increase (11).

Governments can influence fertility choices through policies that alter the costs or benefits of childbearing. One form of policy that can affect fertility is tax incentive policies, for example, family allowances, personal tax exemptions, and child tax credits (12–15). Tax incentive policies are intended to affect fertility in some circumstances but not in others. Despite having different approaches, the two policy intentions will cause changes in the relative cost of having children so that they can affect the fertility choices of a household (12).

Indonesia has implemented a tax incentive policy: personal tax exemption (*Penghasilan Tidak Kena Pajak - PTKP*). Personal tax exemption is a form of subsidy that will reduce the cost of childbearing relative to the cost of other consumer goods.

Thus, theoretically, personal tax exemption will positively affect fertility (16). Previous studies have shown the significance of personal tax exemption's effect on Indonesia's fertility rates using the estimated regression panel logit and probit models (17).

The current study aims to improve a previous model and develop a fertility empirical model that more comprehensively represents the impacts of relevant variables. Specifically, the suggestion is that using a non-linear specification to represent how the actual tax value of the dependent tax exemption impacts the desire for children provides a more accurate approximation. This particular specification is considered an enhancement since it enables the prediction of varying marginal effects of the dependent exemption based on its value. Policymakers in Quebec and Greece acknowledge the non-linear nature of the demand for children, as evident in their structuring of child subsidy schemes to increase the marginal subsidy for each additional child (18). The findings of this study highlight the statistical significance of the non-linear component within our model.

The prior research utilized maternal traits and geographical location as variables dependent. This study utilizes different dependent variables from the previous research, including father's characteristics (age, working status, education) adult female family members, and the total number of children are : 1). Father's age, increasing paternal age is associated with decreased fertility rates (19). Increasing the father's age results in a decrease in male sexual function, which impacts decreasing fertility and increasing infant morbidity (20) ; 2). Father's working status, unemployed men affect fertility rates (21). Studies in the UK, Denmark, and Germany reveal that men's income as family breadwinners impacts fertility. Families decide to have children when the family's financial status, reflected by the working head of the household, is relatively favorable (22,23). ; 3). Father's education, educated men tend to delay getting married and having children so that it will reduce the demand for children (24) ; 4). Other adult female family members in the family who are proxies for childcare assistance. The presence of child care assistance can influence decisions regarding fertility. The help of grandmothers or assistant in raising children can ease the

burden of child care and reduce the burden on mothers in balancing work with child care (25,26) ; 5). The total number of children, which is a proxy for the value of children. Children's values are influenced by culture, so that culture will influence decisions regarding fertility (27). Some tribes in Indonesia are accustomed to large family sizes (28,29). A study in Romania found that perceptions of children and the number of children who have been significantly born determine the probability of giving birth to children (30).

The research objective is to analyze the effect of personal tax exemption on the addition of children in Indonesia. This research contributes to the development of economics in the field of taxation and population and also can provide policy recommendations for the government related to fertility control.

METHODS

This study requires information on married women over several periods, containing relevant economic and demographic variables to capture the impact of personal tax exemption changes on the addition of children. The only dataset that fulfills these specific criteria is the IFLS (Indonesian Family Life Survey), a large-scale longitudinal survey data available in several waves, thus it is utilized in this analysis.

IFLS data used in this study are IFLS wave 4 and IFLS wave 5 (31,32). This research focuses on married women of childbearing age who are considered at risk of pregnancy. Thus, the sample in this study was limited to married women between the ages of 15-44 years during the study period (16,33). The sample of 3,736 married women met the requirement under the constraint. Hence panel data with 7.472 observations were formed.

The dependent variable in this study is the addition of childbirth in a household. The variable of additional childbirths in IFLS-5 data is obtained from the presence of additional childbirths between 2008-2014. The time range is the difference between the period of the IFLS-4 survey and the IFLS-5 survey. In the same way, the additional variable for additional childbirths in IFLS 4 data is obtained from the presence of childbirths between 2000-2007.

The main independent variable in this study is the real tax value of the personal tax exemption value received by each household. Furthermore, other independent variables in this study include mother's characteristics (age, working status, education), father's characteristics (age, working status, education), adult female family members, the total number of children, and location.

The real tax value of personal tax exemption is determined by a combination of the personal tax exemption value, marginal tax rate, and family income (16,33). Furthermore, the real tax value of personal tax exemption is calculated by multiplying the value of personal tax exemption with the marginal family tax rate determined by the tax laws and regulations. Thus, the real tax value of personal tax exemption value reflects a family's additional disposable income. In the IFLS-4 period, the value of personal tax exemption ranges from IDR 13,200,000.00 to IDR 18,000,000.00 with a marginal tax rate of 5%-35% (34,35). Meanwhile, in the IFLS-5 period, the personal tax exemption value ranges from IDR 24,300,000.00 to IDR 32,400,000.00 with a marginal tax rate of 5%-30% (36).

The value of personal tax exemption received by a household is obtained by identifying the number of dependent family members. Dependents are children under the age of 18 who are not married and whose living expenses are still provided by the taxpayer. However, if the child is over 18 years old and has not worked, then the child is still a dependent and entitled to personal tax exemption. Furthermore, the maximum number of dependents in personal tax exemption is three people, so families with more than three children only get personal tax exemption for three children.

The real tax value of personal tax exemption received by households will vary due to differences in the marginal tax rate for each household. The real tax value of personal tax exemption will also vary over time because of changes in the value of personal tax exemption, tax rates set by law, and changes in taxable income (33).

This study uses the Linear Probability Model (LPM) because the dependent variable is discrete. LPM was chosen because linear regression is the best linear approach for all

types of Conditional Expectation Function (CEF) (37–39). In comparison to non-linear models, LPM provides interpretive advantages due to its ability to clearly interpret estimated marginal effects and coefficients. Additionally, LPM is suggested to produce results that are comparable in quality to logistic and probit regression models (39). Moreover, to determine the relationship between personal tax exemption and fertility, this model uses a nonlinear specification to predict different marginal effects of personal tax exemption on fertility (18).
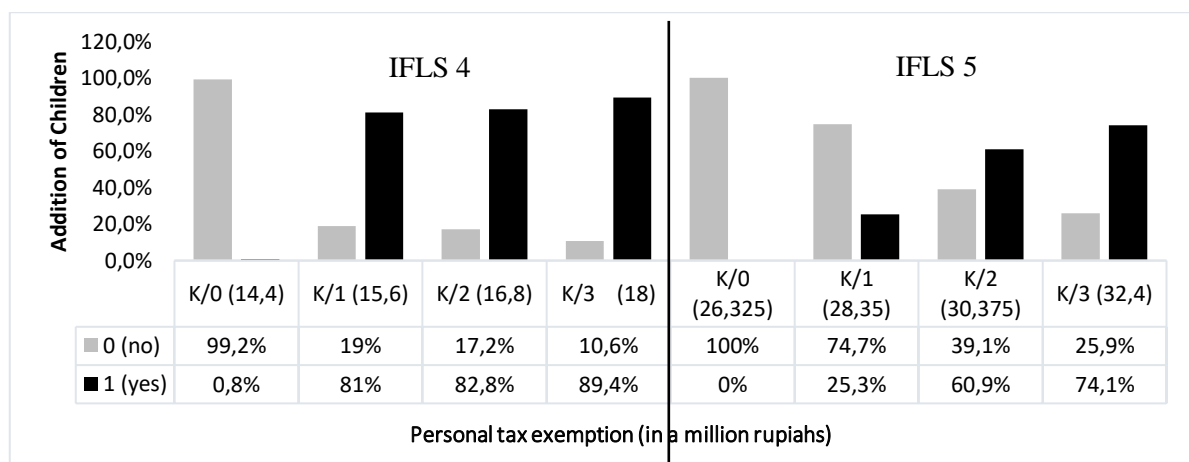
RESULTS

Table 1 summarizes research data statistics containing the number of observations, average, standard deviation, and minimum and maximum values of each variable. Table 1 shows that the number of observations was 7,472 married women aged 15-44 during the observation period (IFLS-4 and IFLS-5). A total of 65.1% of the number of observations experienced additional births in the observation period. Personal tax exemption is given to each household, so the amount of personal tax exemption received by households is in the range of IDR 14,400,000.00 up to IDR 32,400,000.00 with an average of IDR 23,360,000.00. After multiplying the marginal tax rate, the average real tax value of personal tax exemption received becomes IDR 1,323,000,000 with a minimum amount of real tax value of personal tax exemption received of IDR 720,000,00 and a maximum of IDR 9,720,000.00.

Table 1. Descriptive Statistics

Variables	Obs	Mean	Std. Dev.	Min	Max
Addition of childbirths	7,472	0.651	0.477	0	1
Number of additional children	7,472	0.807	0.711	0	4
Total children	7,472	0.0894	0.285	0	1
Personal tax exemption (in a million)	7,472	23.36	7.175	14.40	32.40
The real tax value of personal tax exemption (in a million)	7,472	1.323	0.828	0.720	9.720
Mother's age	7,472	32.32	6.084	15	44
Mother's working status	7,472	0.419	0.493	0	1
Mother's education	7,472	8.920	3.632	0	18
Father's age	7,472	37.03	7.316	18	74
Father's working status	7,472	0.991	0.0943	0	1
Father's education	7,472	9.216	3.928	0	20
Adult female family members	7,472	0.165	0.372	0	1
Location	7,472	0.541	0.498	0	1
Mean ideal children	7,472	3.019	0.375	2.375	3.830

Source: IFLS 4 and IFLS 5 (processed)

	K/0 (14,4)	K/1 (15,6)	K/2 (16,8)	K/3 (18)	K/0 (26,325)	K/1 (28,35)	K/2 (30,375)	K/3 (32,4)
0 (no)	99,2%	19%	17,2%	10,6%	100%	74,7%	39,1%	25,9%
1 (yes)	0,8%	81%	82,8%	89,4%	0%	25,3%	60,9%	74,1%

Personal tax exemption (in a million rupiahs)

Figure 1. Cross-Tabulation Between Personal Tax Exemption and the Addition of Children

Figure 1 presents additional children regarding the number of personal tax exemptions received. In general, most additions of children occurred in families with three or more children (K/3). The number of families that add children in families with children (K/1, K/2, K/3) is more than families that do not add children in IFLS 4. Meanwhile, in IFLS 5, most families that add children are families with more than two children (K/2 and K/3). Families that already have three children tend to add children compared to other families in the two IFLS survey periods.

The results of the estimation of the effect of personal tax exemption on the probability of adding children using the Linear Probability Model method are shown in Table 2. All models use the dependent variable of additional childbirths; the main independent variables are the real tax value of personal tax exemption and the real tax value of personal tax exemption squared. The quadratic function captures the increase or decrease in the marginal effect. Furthermore, all models include individual fixed and time-fixed effects and use robust standard errors.

Table 2. Estimation Result

Variable	Specification 1 All Observation	Specification 2 Formal Worker	Specification 3 Informal Worker
The real tax value of personal tax exemption (in a million)	0.220***	0.201*	0.252
	(0.0555)	(0.113)	(0.183)
The real tax value of personal tax exemption squared (in a million)	-0.0276***	-0.0280*	-0.0274
	(0.00800)	(0.0167)	(0.0246)
Mother's age	-0.0187**	-0.0335	-0.118***
	(0.00835)	(0.0271)	(0.0324)
Mother's education	0.0103	-0.0155	0.00304
	(0.00776)	(0.0272)	(0.0199)
Mother's working status	-0.138***	-0.148***	-0.133**
	(0.0182)	(0.0518)	(0.0552)
Father's age	-0.00198	-0.0126	-0.0227
	(0.00752)	(0.0256)	(0.0180)
Father's education	0.00182	-0.00817	0.0220
	(0.00748)	(0.0276)	(0.0231)
Father's working status	-0.0637		
	(0.0705)		
Adult female family members	0.0964**	-0.0400	0.109
	(0.0409)	(0.146)	(0.114)
Total children	0.288***	0.266***	0.220***
	(0.0240)	(0.0730)	(0.0555)
Location	0.00348	0.124	-0.0236
	(0.0315)	(0.0915)	(0.0776)
Constant	1.162***	2.193**	4.554***
	(0.250)	(0.892)	(1.198)
Observations	7,472	2,123	2,260
R-squared	0.129	0.076	0.174
Number of household	3,736	1,626	1,819
Individual FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes

Note: Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Specification 1 shows significant results and an inverse U-shaped relationship between fertility and personal tax exemption. In addition, an older mother's age and working mother's status significantly reduce the probability of having children in the household. Meanwhile, the presence of other female family members in the household and more than three children significantly increase the probability of having children. The variables of the mother's education, the father's characteristics, and location do not

affect the probability of having children in the household.

DISCUSSION

The Effect of Personal Tax Exemption on Fertility

Based on the quadratic function estimation result in specification 1, it is known that the marginal effect of the real tax value of personal tax exemption decreases as the value of the real tax value of personal tax exemption increases. The turning point of the inverted U estimate was reached when the real tax value of personal tax exemption amounted to IDR 3,985,507.00. This number is obtained by using the following equation (40):

$$X^* = |\frac{\hat{\beta}1}{2\hat{\beta}2}|$$

Documented evidence from the urban area of the United States showed the same result (18). However, only 281 observations, or 3.76%, received a real tax value of personal tax exemption above IDR 3,985,507.00. So it can be concluded that, in most of the population, there is a positive correlation between the probability of adding a child and personal tax exemption. This finding is consistent with previous research (16,41).

The probability of most households having children increases as the value of the personal tax exemption received increases. The household may decide to have children because of changes in children's costs. The cost of children will fall when personal tax exemption increases while other goods remain. The declining cost of children will cause a substitution effect and an income effect. Parents tend to add children because of the substitution effect when the cost of children becomes cheaper than other goods. Meanwhile, in the income effect, children's cost is lower, giving parents more purchasing power. As a result, parents will be more able to raise children, so they decide to have more children (42).

However, the inverted U-shaped relationship between the probability of adding children and the personal tax exemption reaches a turning point when the real tax value of personal tax exemption is IDR 3,985,507.00. So in households with more than that number of real tax value of personal tax exemption, 281 households, the relationship between personal tax exemption and the probability of adding children is negative. In addition to reflecting the number of children, real tax value of personal tax exemption also reflects household income through the marginal tax rate. Based on the data, the 281 households are high-income households with an average income of IDR 156 million per year, much higher than the average income of all observations, IDR 23.4 million per year. When there is an increase in personal tax exemption, household income will increase. In high-income households, an increase in income will lead to an increase in demand for the quantity and quality of children. The negative relationship between personal tax exemption and the probability of adding children can occur because when there is a change in income in high-income households, the elasticity of demand for the quality of children is greater than the elasticity of demand for the quantity of children (7).

An increase in income will create a negative substitution effect in high-income households, causing an increase in the amount of expenditure for each child and indicating a desire to improve the quality of children rather than increase the quantity of children (43,44). On the other hand, with an increase in income, parents' purchasing power will increase so that parents decide to have more children. In high-income households, the substitution effect is more dominant than the income effect, so personal tax exemption has a negative effect on fertility.

The characteristics of the mother also influence the probability of adding a child. The estimation results show that the mother's age and working status variables negatively affect the addition of children. A woman's fertility rate will decrease gradually with age. Every one-year increase in maternal age decreases the probability of adding a child to the household by 1.87%. Meanwhile, working mothers have a 13.8% smaller probability of adding children than mothers who do not work. Working mothers have less time to take care of children and the household than mothers who do not work, so there is a decrease in pregnancy in working mothers.

Other factors that affect fertility are other adult female family members in the

household and the total number of children. Households with other adult female family members have a 9.64% greater probability of adding children compared to households that do not have other adult female family members. This is because assistance from grandmothers and domestic helpers can lessen the stress that mothers experience when juggling jobs and child care. Furthermore, households with more than three children have a 28.8% greater probability of adding children than households with less than or equal to three. Families with more than three children tend to want a large family size, so they will continue to have children until they reach the desired family size.

The Effect of Personal Tax Exemption on Fertility on Formal and Informal Workers

This study assumes that all respondents have paid taxes, both formal and informal sector worker. According to the Asian Development Bank, the informal sector tends to be challenging to detect by tax authorities. The informal sector not covered by the tax system is estimated at 23% of Indonesia's Gross Domestic Product (GDP). However, the tax authorities have the opportunity to encourage the informal sector to enter the tax system by simplifying tax administration (45). The government has issued a regulation concerning Income Tax on Income from Businesses Received or Obtained by Taxpayers with Certain Gross Circulation (46). These regulations promote voluntary compliance by providing justice and convenience for MSMEs (micro, small, and medium enterprises) who are informal sector taxpayers. Thus, it is assumed that both formal and informal sector taxpayers have started paying taxes.

The probability of paying taxes in the formal sector is undoubtedly higher than in the informal sector (45). This difference in the probability of paying taxes will probably cause a difference in the personal tax exemption effect on the probability of having more children. Table 3 (specifications 2 and 3) shows the estimation result of the effect of personal tax exemption on the probability of adding children to the group of formal workers and groups of informal workers who are different. Personal tax exemption has been shown to affect fertility in the formal worker group. Meanwhile, personal tax exemption was not proven to affect fertility in the informal

worker group. The discrepancy in tax compliance between formal and informal workers is probably to blame. Compliance in paying taxes for formal workers is relatively high because it is easy to monitor. In contrast, compliance in paying taxes for informal workers is relatively low due to weak tax supervision and enforcement, inefficient tax administration, and tax avoidance behavior (45). Other research also claims that most of Indonesia's informal sector do not want to register their business because they want to avoid paying taxes (47).

The informal sector is dominated by small companies with fewer than five employees. These companies provide low wages and are relatively less productive than formal companies (47). This means that most individuals who work in the informal sector earn below the personal tax exemption, so they are not required to pay taxes.

If informal workers avoid taxation or are not obliged to pay taxes, informal workers will not feel the impact of changes in the value of personal tax exemption. Changes in personal tax exemption do not cause changes in children's costs or disposable income earned by informal workers. Thus, changes in personal tax exemption do not affect the probability of adding children to the informal worker group.

CONCLUSIONS AND SUGGESTIONS

Conclusion

The estimation results using the Linear Probability Model show an inverse U-shaped relationship between the addition of children and personal tax exemption, which indicates that the marginal effect of personal tax exemption decreases as the value of personal tax exemption increases. The turning point of the inverted U estimate was reached when the real tax value of personal tax exemption amounted to IDR 3,985,507.00. However, it turns out that only 281 observations, or 3.76% of observations, received real tax value of personal tax exemption above IDR 3,985,507.00, so it can be concluded that the relationship between personal tax exemption and fertility is positive in most of the population.

The characteristics of the mother also influence the probability of adding a child. The

estimation results show that the mother's age and working status variables negatively affect the addition of children. Other factors that influence the addition of children are other adult female family members in the household and the total number of children. Households with other adult female family members have a 9.64% greater probability of adding children compared to households that do not have family members. Furthermore, households with more than three children have a 28.8% greater probability of adding children than households with less than or equal to three. Families with more than three children tend to want a large family size, so they will continue to have children until they reach the desired family size.

Suggestion

This study reveals that the taxation variable, personal tax exemption, can affect fertility. Thus, birth control should be carried out by considering various aspects other than direct birth control (e.g., family planning), including taxation. Fertility can be affected by adopting tax policies that can affect child-related costs, mainly by providing personal tax exemptions. Personal tax exemptions can be adjusted to the objectives achieved, whether they want to increase or decrease fertility rates. However, to reduce or increase fertility, we cannot continue to increase or decrease child costs by changing the personal tax exemption. When it comes to a point where the personal tax exemption cannot be increased or decreased, for example, when the increase in the personal tax exemption erodes the tax base, the government can implement other policies to control fertility rates, including by providing child support.

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