Is The Natural Resource Drive Thailand National Income [*]

Doğal Kaynaklar Tayland'ın Milli Gelirini Artırıyor mu?

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ÖZ

Bu çalışma, 1972–2020 döneminde kentleşme, tasarruflar, doğal kaynak kullanımı ve kadın girişimciliğinin Tayland'ın milli gelirini eşanlı olarak nasıl etkilediğini incelemektedir. Eşanlı denklem modeli ve iki aşamalı en küçük kareler (2SLS) yöntemi kullanılarak yapılan analiz, değişkenler arasındaki önemli ilişkileri ortaya koymaktadır. Bulgular, kadın girişimciliğinin milli gelir üzerinde anlamlı ve olumlu bir etki yarattığını, dolayısıyla toplumsal cinsiyet eşitliğinin ekonomik büyümedeki kritik rolünü göstermektedir. Kentleşme ise karmaşık bir etkiye sahiptir: Basit modellerde hızlı kentleşme milli geliri düşürürken, içsel bir değişken olarak ele alındığında milli gelire olumlu katkı sunmaktadır. Tasarrufların milli gelir üzerinde hafif negatif etkisi, tasarrufların verimli yatırıma dönüştürülmesindeki aksaklıklara işaret etmektedir. Doğal kaynaklar milli geliri doğrudan artırmamakla birlikte kentleşmeyi teşvik etmektedir; ancak bu kanal 2SLS sonuçlarında anlamlı bir etki yaratmamaktadır. Genel olarak çalışma, uzun vadeli ekonomik büyüme için toplumsal cinsiyet eşitliğini güçlendiren, sürdürülebilir kentleşmeyi destekleyen, tasarruf kullanımını iyileştiren ve doğal kaynakların sorumlu yönetimini önceleyen politikaların gerekliliğini vurgulamaktadır.

ABSTRACT

This study examines how urbanization, savings, natural resource use, and women's business activity jointly influence Thailand's national income from 1972 to 2020. Using a simultaneous equations framework and the two-stage least squares (2SLS) method, the analysis reveals that women's business activity significantly enhances national income, emphasizing the economic importance of gender equality. Urbanization shows a mixed effect: while rapid urban population growth appears to reduce national income in simple models, it contributes positively when treated as an endogenous factor, reflecting the complexity of urban dynamics. Savings have a slightly negative impact on national income, suggesting inefficiencies in converting savings into productive investment. Natural resources do not directly increase national income but do stimulate urban population growth, although this channel does not produce a significant effect under the 2SLS estimation. Overall, the study highlights the need for policies that support gender equality, efficient urban development, improved use of savings, and responsible natural resource management to foster long-term economic growth.

1. Introduction

National income, typically measured by indicators like Gross Domestic Product (GDP) or Gross National Income (GNI), serves as a crucial metric for assessing a country's economic performance and overall well-being. These measures are the key metric for shaping monetary policy

(Ghosh & Ranjan, 2023), representing the total value of goods and services produced within a country's borders over a specific period. In particular, GNI measures the total income earned by a country's residents, including income from abroad. These indicators offer valuable insights into the size and health of an economy and are often used to gauge economic growth rates and compare economies globally (Shams et al., 2024).

Understanding the determinants of national income offers several benefits for policymakers and economists, as it allows them to develop informed strategies. For example, in Kosovo, remittances have been identified as the leading contributor to economic growth (Govori & Fejzullahu, 2020). Such insights enable policymakers to encourage investments in sectors like manufacturing to create jobs and reduce import dependence.

Nonetheless, the relationship between economic factors and national income can be complex and sometimes contradictory. While FDI and economic growth generally have a positive bilateral association in ASEAN countries (Sijabat, 2023), research on the US suggests that industrial specialization, ather than industrial diversity, may contribute more to the growth of economy (Zhong et al., 2023). These findings highlight the need for context-specific of the relationships.

Researchers have extensively explored the determinants of economic growth, employing various methodologies to analyze these factors. Studies like those by Khan et al. (2021) use advanced econometric techniques, such as second-generation panel unit root tests and generalized least squares (GLS) regressions, to examine the impact of energy trilemma on economic growth. Similarly, Osei et al. (2019) employs the system generalized method of moments to investigate trade openness and its relationship with economic growth in African countries. Other studies focus on specific growth factors. for example, Dokas et al. (2022) analyzes the dynamics of energy consumption across developed and developing countries using error correction models and causality tests their relation with growth. However, contradictions exist in the findings. While Haseeb et al. (2020) demonstrate a positive impact of natural resources on economic growth in Asian economies, Gu et al. (2023) validate the resource curse hypothesis for the US, showing how natural resources can hinder long-term growth. This divergence underscores the importance of context in analyzing economic growth determinants. Given the complexities of economic growth, this study aims to explore additional factors influencing national income, particularly in Thailand by focusing on key variables such as urban population growth, natural resource rents, adjusted savings, and women's economic participation, as measured by the Women Business and the Law Index (WOB). By utilizing a simultaneous equations model, the study seeks to provide a comprehensive understanding of how these interconnected factors influence Thailand's net national income (NNI) over the period from 1972 to 2020. This

research contributes to the literature by exploring the simultaneous relationships between economic and social variables that influence national income. The subsequent sections will provide a literature review that emphasizes the empirical foundations of the research, followed by the methodology section, which will define the data sources, variables, and multiple regression model used for analysis. The results section will present the findings, which will be followed by a discussion of the policy implications.

2. Literature Review

This section will provide some background of some factors that influence economic growth. Savings play a crucial role in influencing economic growth, as demonstrated by several studies. Financial development, which includes the mobilization of savings, can stimulate economic growth, particularly in high-income countries by providing the necessary capital for economic activities (Ikhsan & Satrianto, 2023). Savings act as a mechanism for meeting financial resource needs and contribute to overall economic expansion. In open economies, investments can be financed not only through domestic savings but also through foreign capital flows, allowing countries to achieve investment levels beyond their domestic saving capacity (Atique & Ahmad, 2022). However, the effects of savings on economic growth are not always straightforward and can vary depending on various factors. In some cases, savings have been found to have a positive impact on economic growth. For instance, in the Developing-8 countries, national savings help mitigate environmental degradation over the long term, indirectly supporting sustainable economic growth (Majekodunmi et al., 2023).

Additional research supports the positive association between savings and economic growth. A study using the Spatial Durbin Model (SDM) across 158 countries from 1990 to 2019 found that higher savings rates contribute to increased economic growth (Jayadevan et al., 2024). Similarly, a PVAR system GMM model applied to a panel of 184 countries from 1981 to 2020 showed that savings, in conjunction with other factors such as oil prices, CO_2 emissions, oil rents, and energy consumption, jointly Granger-cause economic growth (Ajayi, 2024). This causal relationship was found to be particularly strong in high-income and upper- middle-income countries. However, other studies reveal the complexity of this relationship. In Pakistan, for example, gross domestic savings were found to negatively affect economic growth according to certain regression techniques (Rehman et al., 2023). These contrasting findings illustrate that while savings generally provide capital for investments and promote financial development, their effects can be influenced by factors such as environmental concerns, financial market conditions, and the economic structures specific to each country. Policymakers must account for these nuances when designing strategies to enhance savings and economic growth (Majekodunmi et al., 2023; Rehman et al., 2023). Moreover, Ajayi (2024) found that in low-income and

lower-middle-income countries, the combined effect of savings and other variables on economic growth was not statistically significant. This finding suggests that the relationship between savings and economic growth may be more complex in developing economies, where additional factors could moderate this relationship.

Population growth can stimulate economic growth by increasing demand and production, but its impact depends on several factors such as age structure, health, and country-specific circumstances. The relationship between population growth and economic growth is complex and multifaceted, with varying effects depending on different countries and contexts. Several studies have identified a positive relationship between population growth and economic development. For example, in China, at the national level, a 1% increase in the population growth rate was associated with a 1.7% increase in the economic growth rate (Fang & Leong, 2014). In Kenya, research found a positive correlation between population growth and economic growth, with population increases contributing to higher economic growth (Thuku, 2013). Similarly, a study of Organization of Islamic Cooperation (OIC) countries from 1980 to 2016 revealed a positive and statistically significant long-term impact of population growth on economic growth, with a bidirectional relationship in the short run (Mahmoudinia et al., 2020). In Singapore, a unidirectional Granger causality relationship was observed between population growth and economic growth during the period from 1970 to 2020, further emphasizing the positive link between these variables (Suluk, 2021).

Natural resources can significantly impact economic growth, with both positive and negative effects depending on various factors. In G7 economies, for example, natural resource rents negatively affect economic growth in countries with low GDP but positively influence those with high GDP (Meng et al., 2022). Contradictory, In China, an increase in natural resource exploitation negatively impacts economic development in the long run (Li et al., 2023). The impact of natural resources on economic growth depends on various factors such as institutional quality, trade openness, and technological advancement. While some countries benefit from their natural resource endowments, others struggle with the "resource curse," where resource dependence leads to poor economic performance. To maximize the positive effects of natural resources on economic growth, countries should focus on efficient resource utilization, economic diversification, and the adoption of clean and green energy technologies (Khan et al., 2023; Zhou et al., 2023). Furthermore, strong institutions and effective policies are essential for harnessing the potential of natural resources for sustainable economic development (Kerner et al., 2023).

While natural resources can affect economic growth, the impact is far from straightforward. The key lies in how these resources are managed and integrated with other factors of production. Policymakers must prioritize diversifying revenue sources, fostering financial expansion, and investing in renewable energy systems to create more equitable and sustainable growth (Xue et al., 2024).

Women's entrepreneurship and business ownership can significantly impact economic growth, as evidenced by numerous studies. Women-owned businesses contribute to job creation, innovation, and overall economic development (Gulvira et al., 2024; Rizvi et al., 2023). The economic role of women is crucial for fostering growth and achieving a more equitable distribution of wealth, particularly in developing countries (Gulvira et al., 2024). Research shows that women's economic rights have a positive effect on growth, with a 75% spillover effect that benefits neighboring countries (Naveed et al., 2023). Women's economic role is not only vital for overall economic development but also for achieving a more equitable distribution of wealth (Gulvira et al., 2024). Digital technologies hold great potential for empowering women entrepreneurs and helping them overcome socio-cultural and economic barriers (Salamzadeh et al., 2024). Moreover, the inclusion and integration of migrant women entrepreneurs within entrepreneurial ecosystems can positively affect diversity and sustainability in countries (Aman et al., 2024). However, to fully realize the potential of women's entrepreneurship, it is crucial to create more favorable conditions, implement thoughtful policies, and take decisive actions aimed at empowering women entrepreneurs (Gulvira et al., 2024). Despite these positive impacts, women still face significant challenges in starting and expanding their businesses, including limited access to markets, technology, networks, and financing (Veckalne & Tambovceva, 2023). Promoting women's entrepreneurship and addressing gender disparities in business can lead to substantial economic benefits. Empowering women through education, employment, and business ownership is essential for accelerating economic and financial progress (Mubeen et al., 2022). To fully harness this potential, policymakers should focus on creating favorable conditions for women entrepreneurs by implementing thoughtful policies and taking decisive measures aimed at empowering women in the business world (Gulvira et al., 2024; Veckalne & Tambovceva, 2023).

3. Methodology

Simultaneous equations models are systems of structurally related equations where multiple dependent variables are determined jointly, often used in econometrics, biostatistics, and experimental design (Henningsen & Hamann, 2007). These models capture complex relationships between variables that influence each other simultaneously. Two-stage least squares (2SLS) is a widely used estimation technique for simultaneous equations models. It is particularly useful when errors across equations are not correlated and the equations are over- identified or exactly identified (Mishra, 2008). The 2SLS method involves two stages: first, it estimates the endogenous variables using instrumental variables, and second, it uses these estimates in

$$NNI = a_1 + a_2 UPG + a_3 SAV + a_4 WOB$$

the structural equation (Amemiya, 1982; Lee et al., 2015). In this research, the simultaneous equations model is written as follows:

$$UPG = a_5 + a_6 TNR + a_7 SAV + a_8 WOB$$

where NNI is adjusted net national income per capita, SAV denotes adjusted savings: carbon dioxide damage as a percentage of GNI. UPG presents urban population growth, TNR is total natural resources rents, and WOB exhibits women business and the law index score.

The model formulation presented in the simultaneous equation's framework captures the complex interrelationships between key economic and social variables, reflecting the idea that these variables do not operate in isolation but influence each other simultaneously. The first equation models Net National Income (NNI) as a function of Urban Population Growth (UPG), Adjusted Savings (SAV), and the Women, Business, and the Law Index (WOB). This suggests that national income is driven by urbanization, the level of savings (adjusted for environmental damage), and the level of gender inclusiveness in legal and business environments. The second equation models UPG as a function of Total Natural Resource Rents (TNR), SAV, and WOB. Here, urban population growth is influenced by the country's ability to generate income from its natural resources, savings, and the legal empowerment of women.

This research uses Data from Thailand between 1972 and 2020 downloaded from the World Bank database for model estimation.

3. Results

This section presents the key findings from the correlation analysis and regression models by OLS and 2SLS methods. Table 1 shows descriptive statistics.

Table 1. Descriptive Statistics

Variable	Mean	Std. dev.	Min	Max
NNI	2,169.014	1,705.540	191.579	6,082.000
SAV	1.677	0.718	0.649	2.860
UPG	3.028	1.251	1.480	5.441
TNR	1.747	0.788	0.546	3.717
WOB	60.434	10.178	51.875	78.125

Table 2. Correlation Analysis

Variable	NNI	SAV	UPG	TNR	WOB
NNI	1.000				
SAV	0.626	1.000			
UPG	-0.511	-0.247	1.000		
TNR	0.355	0.250	0.423	1.000	
WOB	0.904	0.728	-0.241	0.565	1.000

Table 2 presents the correlation analysis of the variables in the study, revealing important relationships between them. Net National Income (NNI) is positively correlated with Adjusted Savings (SAV) (0.626), Total Natural Resource Rents (TNR) (0.355), and the Women, Business, and the Law Index (WOB) (0.904), suggesting that these variables are associated with higher national income. However, Urban Population Growth (UPG) shows a negative correlation with NNI (-0.511), indicating that higher urban population growth may be linked to lower national income.

Table 3 demonstrates that the coefficient for SAV is negative (-264.834) but not statistically significant at the 10% level (P-value = 0.107), indicating a weak relationship between savings and NNI. Conversely, UPG has a strong negative impact on NNI, with a significant coefficient of -448.539 and a P-value of 0.000, suggesting that higher urban population growth is associated with lower net national income. TNR, however, shows a positive coefficient (33.609) but is not statistically significant (P-value = 0.844), implying that natural resource rents have an insignificant effect on NNI in this model. On the other hand, WOB has a highly significant positive impact, with a coefficient of 150.247 and a P-value of 0.000, indicating that improvements in women's legal and business rights contribute substantially to increasing national income. The overall model is robust, with an R-squared value of 0.914, indicating that 91.4% of the variance in NNI is explained by the model, and an F-statistic of 117.10, confirming the overall statistical significance of the model.

Table 3. Full Regression Model Estimation

NNI	Coefficient	Std. err.	t		P>|t|	95% conf. interval lower	95% conf. interval upper
SAV	-264.834	160.985	-	1.650	0.107	-589.279	59.611
UPG	-448.539	87.449	-	5.130	0.000	-624.782	-272.297
TNR	33.609	169.423		0.200	0.844	-307.841	375.060
WOB	150.247	15.928		9.430	0.000	118.146	182.347
_cons	-5,167.302	771.853	-	6.690	0.000	-6,722.870	-3,611.735
Number of obs		49.000	R-squared			0.914	
F (4,44)		117.100	Adj R-squared			0.906	
Prob > F		0.000	Root MSE			522.010	

Table 4. UPG Regression Model Estimation

UPG	Coefficient	Std. err.	t	P>|t|	95% conf. interval lower	95% conf. interval upper
SAV	0.2466012	0.2719525	0.91	0.369	-0.3011392	0.7943416
WOB	-0.10172	0.0225227	-4.52	0.000	-0.147083	-0.0563571
TNR	1.357429	0.2060681	6.59	0.000	0.9423865	1.772471
_cons	6.391101	0.9074702	7.04	0.000	4.563362	8.21884
Number of obs		49.000	R-squared		0.526	
F (4, 44)		16.640	Adj R-squared		0.494	
Prob > F		0.000	Root MSE		0.890	

Table 5. NNI Regression Model Estimation

NNI	Coefficient	Std. err.	t	P>|t|	95% conf. interval lower	95% conf. interval upper
UPG	-423.780	88.140	-4.810	-	-601.302	-246.258
SAV	-270.940	153.138	-1.770	0.084	-579.376	37.497
TNR	152.765	10.778	14.170	-	131.058	174.473
_cons	-5,325.542	633.835	-8.400	-	-6,602.152	-4,048.932
Number of obs		49	R-squared		0.914	
F (4, 44)		150.440	Adj R-squared		0.908	
Prob > F		0.000	Root MSE		516.650	

Table 6. Simultaneous Model Estimation by 2SLS

NNI	Coefficient	Std. err.	t	P>|t|	95% conf. interval lower	95% conf. interval upper
UPG_hat1	1.030	0.146	0.030	-	0.736	1.323
SAV	4.745	153.079	0.030	0.975	-303.572	313.063
TNR	-4.748	25.584	-0.190	0.854	-56.276	46.781
_cons	214.441	1,162.204	0.180	0.854	-2,126.358	2,555.241
Number of obs		49.000	R-squared		0.914	
F (4, 44)		159.520	Adj R-squared		0.908	
Prob > F		0.000	Root MSE		516.410	

Tables 4, 5, and 6 present different regression models of analysis. Table 4 examines the determinants of UPG, with SAV, TNR, and WOB as explanatory variables. The results show that WOB has a significant negative effect on UPG, suggesting that improvements in women's legal and business rights reduce urban population growth. TNR has a significant positive effect, indicating that higher natural resource rents are associated with increased urban growth, while SAV has no significant impact. Regarding, Table 5 focuses on the relationship between NNI and its predictors (UPG, SAV, and WOB). Here, UPG has a strong negative effect on NNI, indicating that higher urban population growth is linked to lower national income.

WOB continues to show a positive and significant effect on NNI, highlighting the importance of women's rights in boosting national income, while SAV shows a marginally significant negative relationship with NNI. According to Table 6 applies a simultaneous equations model using Two-Stage Least Squares (2SLS), where UPG is treated as endogenous (instrumented as UPG_hat1). In contrast to the negative relationship in Table 5, UPG_hat1 shows a significant positive effect on NNI, indicating that when endogeneity is addressed, urban population growth contributes positively to national income. However, in this model, SAV and WOB are not significant, suggesting that the relationship between these variables and NNI changes when UPG is accounted for as an endogenous factor.

When compare between results in Table 6 and Table 3. It was found that, in Table 3, where ordinary least squares (OLS) regression is used, UPG has a negative impact on NNI, consistent with the findings in Table 5. However, in Table 6, the 2SLS model shows a positive relationship between UPG and NNI, demonstrating that addressing the endogeneity of UPG significantly alters its effect.

4. Discussion

One of the central findings from the results is the strong positive impact of WOB on NNI. Across all models, WOB consistently emerges as a significant driver of national income growth, highlighting the importance of gender inclusiveness in fostering economic development. This result aligns well with the broader literature, which suggests that women's economic participation and legal empowerment significantly contribute to economic growth. For instance, the literature review references studies demonstrating how women-owned businesses and greater gender equality in business rights lead to job creation and overall economic development (Gulvira et al., 2024; Rizvi et al., 2023). Therefore, the findings support existing previous findings that emphasize the critical role of women's legal and economic empowerment in boosting national income. Conversely, the negative effect of UPG on NNI, as shown in the OLS models (Table 5), indicates that higher urban population growth is associated with lower national income. This relationship is complex and contrasts with some of the expectations in the previous empirical findings. For instance, the previous studies discuss how population dynamics, particularly favorable age structures, can positively affect economic growth in certain contexts (Jayadevan et al., 2024). However, this study suggests that rapid urban population growth may strain resources and infrastructure, negatively impacting income. This finding could be context-specific, reflecting challenges associated with urbanization in the sample region, Thailand, where rapid urbanization may not be accompanied by adequate infrastructure development or resource allocation. however, the 2SLS model in Table 6 presents a contrasting view. When UPG is treated as endogenous, it shows a positive effect on NNI, indicating that urban population growth contributes positively to national income when its simultaneous relationship with other variables is accounted for. This result challenges the negative association found in the OLS models and suggests that UPG might have a more complex, potentially beneficial role in economic growth when proper controls are in place.

The role of SAV in this study presents another intriguing dimension. The OLS results indicate that SAV has a marginally significant negative impact on NNI, which runs counter to much of the literature that generally positions savings as a positive contributor to economic growth. For example, financial development through savings mobilization is often seen as a critical factor for capital formation and investment in high-income countries (Ikhsan & Satrianto, 2023).

The negative impact of savings in this context may reflect issues related to inefficient allocation of savings or environmental factors, as mentioned by some previous studies. In some cases, savings have been found to negatively affect growth, particularly when other structural issues, such as environmental degradation or poor financial management, come into play (Majekodunmi et al., 2023; Rehman et al., 2023). This could explain why SAV has a mixed effect in this model, particularly in the specific context of Thailand, where savings may not be translating into productive investments.

Lastly, TNR exhibits an insignificant effect on NNI across the models, which departs from the expected positive relationship often found in previous studies, especially in resource-rich countries. The literature review discusses how natural resource rents can either positively or negatively affect growth depending on the country's institutional quality and economic structure (Meng et al., 2022). In Thailand's case, the neutral or insignificant effect of TNR could be a result of weak institutional mechanisms or the "resource curse," where reliance on natural resources does not necessarily lead to sustainable economic development.

5. Policy Implementation

The analysis reveals several policy implications for enhancing economic growth in Thailand and similar contexts. First, the significant positive relationship between the Women, Business, and the Law Index (WOB) and Net National Income (NNI) highlights the importance of promoting gender equality in economic and legal frameworks. Policymakers should prioritize legal reforms that enhance women's participation in the economy, such as improving access to financial resources, expanding women's legal rights in business ownership, and eliminating barriers to female entrepreneurship. The analysis also highlights the complex role of Urban Population Growth (UPG). This suggests that policymakers should focus on improving urban planning and infrastructure development, ensuring that cities are equipped to handle population growth sustainably. Investments in transportation, housing, and public services will enable urban areas to act as engines of economic growth rather than sources of strain.

Furthermore, the mixed results for Adjusted Savings (SAV) imply that while savings are generally important for economic growth, their impact may be moderated by how efficiently they are used. Policies should focus on enhancing the productivity of savings by encouraging investments in sectors that generate long-term economic benefits, such as education, technology, and sustainable industries.

6. Future Research

Future research could explore the conditions under which urbanization promotes economic growth. This includes investigating the role of infrastructure development, public services, and regional economic policies in moderating the effects of rapid urbanization. Another area for further investigation is the impact of Adjusted Savings (SAV) on economic growth. The mixed results in this study suggest that savings may not always translate into productive investments. Future research could examine the mechanisms through which savings contribute to or detract from growth, particularly in developing countries. Finally, research could further examine the significant role of Women, Business, and the Law Index (WOB) in driving growth, particularly in diverse cultural and economic contexts.

7. Conclusion

This research explored the relationships between several economic variables in Thailand, specifically focusing on Net National Income (NNI), Urban Population Growth (UPG), Adjusted Savings (SAV), Total Natural Resources Rents (TNR), and the Women, Business, and the Law Index (WOB) during the period from 1972 to 2020. To capture the interdependencies among these variables, the study employed a simultaneous equations model, utilizing data sourced from the World Bank. Both ordinary least squares (OLS) regression and Two-Stage Least Squares (2SLS) were implemented to address potential endogeneity issues within the model. The findings yielded several key insights. First, the analysis highlighted a positive and significant effect of the WOB on NNI, underscoring the critical importance of women's economic and legal empowerment in fostering economic growth. Second, the relationship between UPG and NNI was found to be complex. While the OLS models indicated that rapid urban population growth negatively affects national income, the 2SLS model suggested that, once endogeneity is accounted for, UPG can actually contribute positively to economic growth. Lastly, the results regarding SAV were mixed, indicating that while savings are an important factor in economic growth, their impact may vary depending on how efficiently they are utilized. Consequently, the research suggests that policymakers should prioritize legal reforms aimed at empowering women in business, as this has a strong and positive influence on economic growth. Furthermore, managing urbanization effectively requires a focus on infrastructure development and sustainable urban planning to harness the benefits of urban growth. Finally, enhancing the productivity of savings through targeted investments in education, technology, and sustainable industries will help maximize the economic benefits derived from savings.

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