

Research article

Unveiling the Global Economic Impacts from Demographic Change in East Asia: An Estimation and Web Explores

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Abstract: This paper explores the economic consequences of demographic changes on development in 208 countries through 2100. We employ panel fixed effects models to estimate long-run equilibrium relationships between capital stock, labor force, and economic growth. Cointegration analysis confirms the existence of these long-run relationships. We affirm that there is a steady, long-run relationship between GDP, capital stock, and population. We also present our findings in an interactive web application, allowing users to explore how population shifts might impact economies worldwide. Highlighting key trends, we offer an illustrative case study of East Asia, while emphasizing the tool's universal applicability. Thus, this work does not seek to engage in specific academic discourse, but rather endeavors to contribute a valuable resource for informed public dialogue concerning the global economic implications of anticipated demographic transformations. The results show that the "Comparative Global Weights Forecasts" section showcases economic clout, illustrating Japan's decline and Indonesia's rise in global GDP rankings. Lastly, the "Comparative Regional Forecasts" section contrasts regional dynamics, such as East Asia & the Pacific versus South Asia, highlighting population peaks, economic growth disparities, and shifts in global GDP shares.

Keywords: economic impact, demographic change, data visualization, web application, forecasts

JEL Classification: J11, C53, E17, N15

Abstrak: Penelitian ini mengeksplorasi konsekuensi ekonomi dari perubahan demografis terhadap pembangunan di 208 negara hingga tahun 2100. Kami menggunakan model fixed effect data panel untuk memperkirakan hubungan keseimbangan jangka panjang antara stok modal, tenaga kerja, dan pertumbuhan ekonomi. Analisis kointegrasi mengonfirmasi adanya hubungan jangka panjang ini. Kami menegaskan bahwa PDB, stok modal, dan populasi saling terkait dalam hubungan jangka panjang yang stabil. Kami juga menyajikan temuan kami dalam aplikasi web interaktif, memungkinkan pengguna untuk mengeksplorasi bagaimana pergeseran populasi dapat mempengaruhi ekonomi di seluruh dunia. Dengan menyoroti tren utama, kami menawarkan studi kasus ilustratif tentang Asia Timur, sambil menekankan keterapan universal alat ini. Dengan demikian, karya ini tidak bertujuan untuk terlibat dalam diskursus akademis tertentu, melainkan berupaya menyumbangkan sumber daya yang berharga untuk dialog publik yang terinformasi mengenai implikasi ekonomi global dari transformasi demografis yang diantisipasi. Hasil menunjukkan bahwa bagian "Comparative Global Weights Forecasts" menampilkan pengaruh ekonomi, menggambarkan penurunan Jepang dan kenaikan Indonesia dalam peringkat PDB global. Terakhir, bagian "Comparative Regional Forecasts" membandingkan dinamika regional, seperti Asia Timur & Pasifik versus Asia Selatan, yang menyoroti puncak populasi, disparitas pertumbuhan ekonomi, dan pergeseran pangsa PDB global.

Kata Kunci: dampak ekonomi, perubahan demografi, visualisasi data, aplikasi web, ramalan

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1. INTRODUCTION

Demographic shifts across the globe are reshaping economies and geopolitics, with profound implications for the future. Aging populations in developed regions like East Asia grapple with the challenges of funding social security and maintaining economic dynamism (Korwatanasakul et al., 2021; Skakkebæk et al., 2022; Jones, 2022; Aassve et al., 2020), while young populations elsewhere need jobs to avoid social instability (Ganie, 2020; Weber, 2019). These demographic trends raise critical issues regarding the impact of demographic changes on global economic stability and growth and the geopolitical consequences arising from shifting population structures. This article addresses these issues using advanced data visualization techniques to provide insights and encourage informed dialogue.

Aging populations, particularly prevalent in developed regions like East Asia and parts of Europe, pose substantial economic challenges. As the proportion of elderly citizens increases, the financial burden on social security and pension systems intensifies. Governments must allocate more resources to support the elderly, which can strain public finances and necessitate reforms (Korwatanasakul et al., 2021; Lesthaeghe, 2020; Cheng et al., 2020; Lima et al., 2021). Additionally, aging populations might result in a slower pace of economic growth due to reduced labor force participation and potential declines in innovation and entrepreneurship. However, leveraging the experience and knowledge of older individuals through mentorship and advisory roles can mitigate these effects.

The relevance of this topic is underscored by numerous studies that have explored the economic and political impacts of demographic changes. Previous studies highlights how aging populations can strain public finances and reduce economic growth potential (Mejido, 2019), while youthful populations can lead to either demographic dividends or heightened instability depending on job market conditions (UKaid et al., 2018). Our work builds on these foundations by offering a novel, interactive web-based platform that aggregates and visualizes demographic and economic data, making complex information accessible and actionable for a broad audience.

Maintaining social security systems and economic vitality is extremely difficult for aging populations in many developed nations, especially those in East Asia. At the same time, developing nations with younger demographics must address the challenge of creating sufficient employment opportunities to sustain social stability (Aksoy et al., 2019; Huang et al., 2019). These national-level concerns have far-reaching implications, influencing regional and global economic dynamics and potentially shifting the balance of political power (Eberstadt, 2019; Haas, 2015; Jackson et al., 2008). Addressing these challenges requires comprehensive data analysis and accessible tools to aid policymakers, researchers, and the public in understanding and responding to these trends. Interactive visualizations enhance data comprehension and contribute more effectively to public and policy debates than traditional text-based formats (Tonidandel, 2015).

Aligning with the growing recognition of data visualization and information technology as critical tools for development (Labelle, 2005; Majeed & Khan, 2019; Ye & Yang, 2020; El Ammar & Profiroiu, 2020; Prihasari et al., 2023; Abdulnabi, 2024; Ramaj-Desku & Ukaj, 2021; Sharma, 2021; Sabaityté et al., 2022), our study presents demographic and economic projections in an accessible, web-based format to democratize access to information and facilitate informed decision-making. The scope of our article includes an analysis of global demographic trends, a detailed case study of East Asia, and the development of a web application to visualize these data. The structure of the paper is as follows: we begin with an overview of demographic changes and their economic implications, followed by a presentation of our web application. We then discuss our findings, focusing on East Asia, and conclude with the broader implications for global economic policy and development.

By addressing these critical demographic trends through the lens of advanced data visualization, our study aims to provide a valuable tool for understanding the complex interplay between demographic shifts and economic and geopolitical outcomes. This approach not only enhances comprehension but also empowers stakeholders to make informed decisions in shaping the future of global development.

2. MATERIALS AND METHODS

2.1. Data

This study employs a panel data approach to analyze the relationship between economic indicators and demographic factors across countries over time. The panel data allows for both cross-sectional and time-series analyses, providing a comprehensive view of how demographic shifts influence economic variables. The study aims to investigate how demographic changes, particularly aging populations and youth dynamics, affect economic growth and capital stock across a broad sample of countries.

This study utilizes panel data sourced from three primary sources to analyze demographic and economic trends. Population data, including total population and working-age population (aged 15-64 years) (United Nations, 2022). This dataset provides both historical estimates up to 2021 and medium variant projections from 2022 to 2100. Concurrently, GDP data from the United Nations National Accounts offers insights into economic performance over time (United Nations, 2023). Feenstra et al. (2015) Penn World Tables 10.01 (PWT) contributes economic data, including real GDP (constant 2017 USD) and capital stock (constant 2017 USD), facilitating standardized economic comparisons across countries. The World Bank Development Indicators Database plays a crucial role in the initial identification of the 217 countries included in this study, providing essential contextual information (Akimov et al., 2021; Makarov et al., 2023; O'Sullivan, 2023).

2.2. Panel Construction and Imputation

Our objective is to create a comprehensive panel data set covering as many countries as possible. While *PWT* includes 183 countries, we aim to expand this to 208 by imputing missing data for 34 countries using UN data. To achieve this, we employ two ordinary least squares (OLS) regressions to predict missing *PWT* values from available UN data.

$$PWTy(ln)_{it} = \beta_0 + \beta_1 UNy(ln)_{it} + u_{it} \quad (1)$$

$$PWTk(ln)_{it} = \gamma_0 + \gamma_1 UNy(ln)_{it} + u_{it} \quad (2)$$

where, $PWTy_{it}$ denote GDP values from the Penn World Table for the country i at time t ; $PWTk_{it}$ denote capital stock values from the Penn World Table for the country i at time t ; UNy_{it} denote GDP values from the United Nations for the country i at time t ; $\beta_0, \beta_1, \gamma_0, \gamma_1$ denote regression coefficients; u denote error term; i denote cross-sectional unit; and t is time-series

The collected data are analyzed using panel data regression techniques to explore the relationship between demographic variables (e.g., age structure) and economic indicators (e.g., GDP, capital stock). Statistical software, such as Stata or R, is utilized for data manipulation and regression analysis, ensuring robust statistical inference. Despite of the imputation, some countries still have missing observations due to their recent formation (e.g., post-Soviet states) or later independence (e.g., South Sudan). Our final dataset consists of 208 countries with a maximum of 52 complete observations per country (1970-2021).

This study methodology ensures a rigorous analysis of the impact of demographic shifts on economic variables across a broad spectrum of countries and over an extended period. By integrating diverse datasets and employing advanced statistical techniques, the study aims to provide valuable insights into the dynamics of economic development amidst changing demographics.

2.3. Model Specification

We employ panel fixed effects models to estimate long-run equilibrium relationships between capital stock, labor force, and economic growth. Cointegration analysis confirms the existence of these long-run relationships. Capital Stock Equation (Equation 3): Predicts future capital stock using lagged moving averages of capital stock and population dynamics, combined with one-year lagged capital stock data. We also estimate short-run dynamics using Error Correction Models (ECM) based

on equations 3 and 4. These models capture adjustment dynamics towards the long-run equilibrium. This captures both long and short-run trends in capital accumulation:

$$\ln K_{i_t} = \delta_0 + \delta_1 \ln K_{i_{t-1}} + \delta_2 \ln \frac{\sum_{\eta=1}^{15} K_{t-\eta}}{15} + \delta_3 \ln \frac{\sum_{\eta=1}^{15} L_{t-\eta}}{15} + u1_{i_t} \tag{3}$$

where, K_{i_t} denote capital stock for the country i at time t ; $K_{i_{t-1}}$ denote one-year lagged capital stock for the country i at time t ; $\frac{\sum_{\eta=1}^{15} K_{t-\eta}}{15}$ denote Lagged 15-year average capital stock for the country i at time t ; $\frac{\sum_{\eta=1}^{15} L_{t-\eta}}{15}$ denote lagged 15-year average working-age population for the country i at time t ; and $\delta_0, \delta_1, \delta_2, \delta_3$ denote regression coefficients.

The GDP equation (Equation 4): the estimates GDP as a function of lagged GDP; the working-age population; and the predicted capital stock (equation 3):

$$\ln Y_{i_t} = \lambda_0 + \lambda_1 \ln Y_{i_{t-1}} + \lambda_2 \ln L_{i_{t-1}} + \lambda_3 \ln \hat{K}_{i_{t-1}} + u2_{i_t} \tag{4}$$

where, Y_{i_t} denote GDP for the country i at the time t ; $Y_{i_{t-1}}$ denote One-year lagged GDP for the country i at time t ; $L_{i_{t-1}}$ denote the working-age population of the country i at time t ; $\hat{K}_{i_{t-1}}$ denote predicted capital stock for the country i at time t (from Equation 3); and $\lambda_0, \lambda_1, \lambda_2, \lambda_3$ denote regression coefficients.

3. RESULT AND DISCUSSION

3.1. Results

Figure 1 and Table 1 report the application of OLS regression results to estimate missing observations aimed at seeing the pattern of relationships between independent and dependent variables and then using these patterns to predict the value of missing observations. The accuracy of predictions will depend on several factors, such as the quality of the data available, the strength of the relationship between the independent and dependent variables, and the assumptions underlying the regression model.

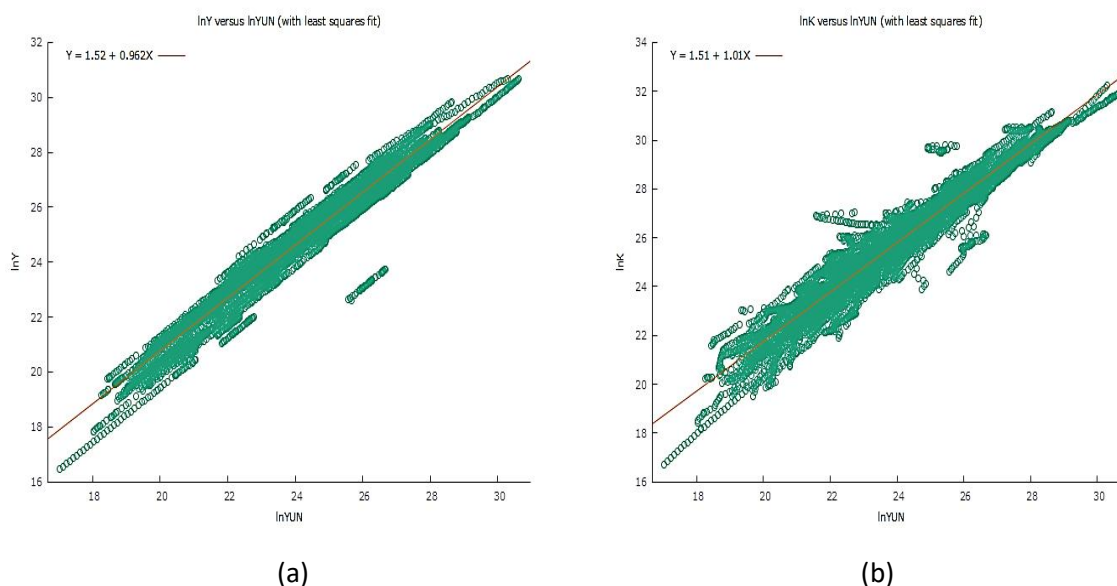


Figure 1. Scatter Plot test: (a) PWTy(ln) vs. UNy(ln) and (b) PWTk(ln) vs. UNy(ln)

Source: Author's Calculation

Table 1. OLS Regression Results Used to Estimate Missing Observations

Model	(a) Dep.Var = $PWTy(\ln)$	(b) Dep.Var = $PWTk(\ln)$
Constant	1.519*** (0.058)	1.513*** (0.074)
UNy(ln)	0.962*** (0.002)	1.011*** (0.003)
n	8,322	8,242
Cross-sectional units	178	175
Time-series length min	15	30
Time-series length max	50	50
R-squared	0.950	0.929

Note: *** significant at 1%.

Source: Author's Calculation

The coefficients obtained from the long-run equilibrium relationships (equations 3 and 4 in Table 2) can be interpreted as one-period elasticities. This means that the coefficients show the percentage change in the dependent variable (e.g., capital stock or GDP) in response to a one-percent change in the independent variable (e.g., the 15-year moving average of the working-age population). For example, a one-percent increase in the 15-year moving average of the working-age population from the previous year results in an average increase of 0.038 percent in a country's capital stock in the following year. This implies that changes in the working-age population have a measurable and immediate impact on the accumulation of capital within a country. Similarly, a one-percent increase in the lagged working-age population from the previous year results in an average increase of 0.03 percent in a country's GDP in the following year. This indicates that shifts in the working-age population directly influence economic output.

Table 2. Estimation Results of Long-run Equilibrium Relationships

Variables	Dep.Var: k(ln), lnK	Dep.Var: y(ln), lnY
Constant	0.5*** (0.066)	0.414*** (0.042)
Capital stock (ln), lag 1	1.033*** (0.008)	-
15-year moving average capital ($\ln \frac{\sum_{\eta=1}^{15} K_{t-\eta}}{15}$), lag 1	-0.074*** (0.008)	-
15-year moving average working age population ($\ln \frac{\sum_{\eta=1}^{15} L_{t-\eta}}{15}$), lag 1	0.038*** (0.008)	-
GDP (lnY _{t-1}), lag 1	-	0.968*** (0.005)
Working Age Population (lnL _{t-1}), lag 1	-	0.03*** (0.005)
Capital stock (lnK _{t-1}), lag 1	-	-0.002 (0.004)
Cross-sectional units	208	208
Time-series length min	13	13
Time-series length max	37	51
R-Squared	0.998	0.999

Note: Standard errors in parentheses. *** significant at 1%.

Source: Author's Calculation

Given that the United Nations World Population Prospects provides estimates of total and working-age populations up to the year 2100, these long-run population forecasts can be utilized to predict future trends in capital stock, GDP, and GDP per capita. By applying the elasticities derived

from our long-run equilibrium relationships, we can generate forecasts for these economic indicators, complete with 95% confidence intervals. This allows for a clearer understanding of how demographic changes will shape economic outcomes over the coming decades. These predictions can be invaluable for policymakers, economists, and planners who need to prepare for and adapt to the expected demographic shifts.

The error correction terms (u_1 and u_2) in the short-run dynamic regressions are statistically not different from negative ones. This suggests that any deviation from the long-run equilibrium relationship is quickly corrected, indicating a high degree of stability in the relationship. Essentially, when there is a shock that pushes the system away from its long-run path, the model quickly adjusts to bring it back to equilibrium. This rapid adjustment means that the relationships we observe are robust and consistent over time.

This rapid adjustment to equilibrium highlights the resilience of the economic systems being studied. The speed at which these systems correct themselves suggests that external shocks, whether economic, political, or social, have a limited long-run impact on the fundamental relationships between GDP, capital stock, and population. This is crucial for policymakers, as it implies that while short-term measures may be necessary to address immediate disruptions, the underlying economic dynamics remain stable and predictable over the long-run. This stability can help in formulating long-run economic policies and strategies that are less susceptible to short-term fluctuations.

Table 3. Estimation Results of Short-run Dynamics

Variables	$\Delta \ln K$	$\Delta \ln Y$
Constant	-0.003 (0.002)	-0.003 (0.002)
$\Delta \ln K_{t-1}$	1.041*** (0.055)	-0.054*** (0.012)
$\Delta \ln Y_{t-1}$	-	1.056*** (0.046)
$\Delta \ln L_{t-1}$	-	0.138*** (0.051)
$\Delta \ln \frac{\sum_{\eta=1}^{15} K_{t-\eta}}{15}_{t-1}$	-0.048 (0.056)	-
$\Delta \ln \frac{\sum_{\eta=1}^{15} L_{t-\eta}}{15}_{t-1}$	0.161* (0.087)	-
$u1_{t-1}$	-1.043*** (0.053)	-
$u2_{t-1}$	-	-0.966*** (0.046)
n	7255	9747
cross-sectional units	208	208
Time-series length min	12	12
Time-series length max	36	50
R-squared	0.089	0.061

Note: Standard errors in parentheses. *** significant at 1%, * significant at 10%.

Source: Author's Calculation

Panel cointegration tests require complete observations, which our data set lacks. Yet to support the idea of co-integration, we sub-sampled our dataset for complete observations for the 1991-2020 period, obtaining 202 complete country observations. On this sub-sample, we conducted a Kao cointegration test of equations (3) and (4) in Table 4. This test rejects the null of no cointegration in line with other findings of cointegration among GDP, capital, and population such as, most prominently, Pesaran and Shin (1999) our results are summarized in Table 4. Where H_0 : No cointegration and H_A : Cointegration.

The use of the Kao cointegration test on a sub-sample of our data provides robust support for the existence of long-run equilibrium relationships among the variables studied. By rejecting the null hypothesis of no cointegration, we affirm that GDP, capital stock, and population are intertwined in a stable, long-run relationship. This is consistent with other prominent studies, adding credibility to our findings. Moreover, this approach underscores the importance of using comprehensive and complete datasets to validate economic models. The sub-sample analysis not only strengthens our results but also illustrates the robustness of our methodology even when faced with incomplete data.

Table 4. Result of Cointegration test

Equation (3): $lnK_{it} = \beta_0 + \beta_1 lnK_{it-1} + \beta_2 ln \frac{\sum_{\eta=1}^{15} K_{t-\eta}}{15} + \beta_3 ln \frac{\sum_{\eta=1}^{15} L_{t-\eta}}{15} + u1_{it}$			
	Stat.	Left p-value	Conclusion
Unadjusted Dickey Fuller	-8.33	<0.01	Reject H ₀
Unadjusted modified Dickey Fuller	-97.31	<0.01	Reject H ₀
Equation (4): $lnY_{it} = \lambda_0 + \lambda_1 lnY_{it-1} + \lambda_2 lnL_{it-1} + \lambda_3 ln\hat{K}_{it-1} + u2_{it}$			
	Stat.	Left p-value	Conclusion
Unadjusted Dickey Fuller	-16.95	<0.01	Reject H ₀
Unadjusted modified Dickey Fuller	-66.15	<0.01	Reject H ₀

Source: Author's Calculation

Furthermore, the confirmed cointegration among GDP, capital, and population underscores the interconnectedness of these variables. As countries experience demographic shifts, whether through aging populations or burgeoning youth, these changes are intrinsically linked to economic performance and capital accumulation. This interconnectedness suggests that demographic policies cannot be formulated in isolation from economic strategies. For instance, efforts to increase the working-age population through policies that encourage higher birth rates or immigration can have direct and measurable impacts on economic growth and capital formation. Conversely, neglecting demographic changes can lead to missed opportunities or exacerbated economic challenges.

In conclusion, our findings of rapid error correction and strong cointegration provide a comprehensive understanding of the dynamic relationships between demographic factors and economic outcomes. These insights are invaluable for policymakers, researchers, and economists who seek to navigate the complexities of demographic and economic planning. By leveraging these robust relationships, stakeholders can make more informed decisions that promote sustainable economic growth and stability in the face of demographic changes.

Because we want to make our estimates as widely available and as easily accessible as possible, we created a web application. This web application allows users to interactively visualize five themes: (i) country snapshot forecasts; (ii) comparative economic forecasts; (iii) comparative demographic forecasts; (iv) comparative global weights forecasts; and (v) comparative regional forecasts. To see the web application for yourself, please web visit [Global Economic Impacts of Demographic Change](#). The web application is not designed to focus on one specific aspect of the discussion of the economic impacts of demographic change. Instead, it is designed to illustrate the web application's visualization opportunities and to discuss some highlights that are relevant to the East Asia and Pacific region.

3.2. Discussion for Country Snapshot Forecasts Section

Figure 2 reports illustrate the web application's visualization output when a user selects Japan, for example. This user will then be shown three-line charts, which display our: (i) GDP Forecast (including 95 percent confidence interval); (ii) GDP Per Capita Forecast (including 95 percent

confidence interval); and (iii) UN World Population Prospect "Medium Variant" forecast for total and working-age population. The three graph below show our estimated forecast for GDP and GDP Per Capita, including 95% confidence intervals, as well as the UN World Populations prospects' medium forecasts for the total and working age population.

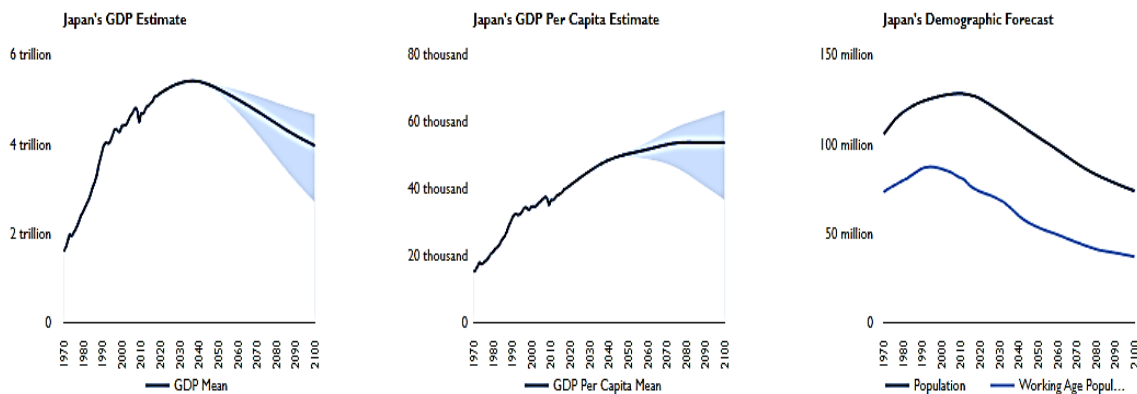


Figure 2. Country Snapshot Visualization Output Snippet - Example: User selection for Japan
 Source: [Global Economic Impacts of Demographic Change](#)

For example, a visualization output like this might be used to supplement a discussion focusing on Japan's demographic challenges. The results suggest that while Japan's total economic output is predicted to peak over the next two decades (left panel), there is a good chance that as a result of Japan's demographic changes, income per capita will stall or even fall (middle panel). The right panel visualizes Japan's forecasted total and working-age population.

3.3. Discussion for Comparative Economic Forecasts Section

The comparative economic forecasts section allows users to compare the various estimates (mean, lower limit, upper limit) for two countries' GDP and GDP per capita. Figure 3 illustrates the case when a user selects "GDP" and wants to compare, for example, Indonesia's GDP upper limit estimate to China's GDP mean estimate. This section allows for two-country comparisons of our mean and 95% confidence interval lower and upper limit estimates for GDP and GDP per capita.

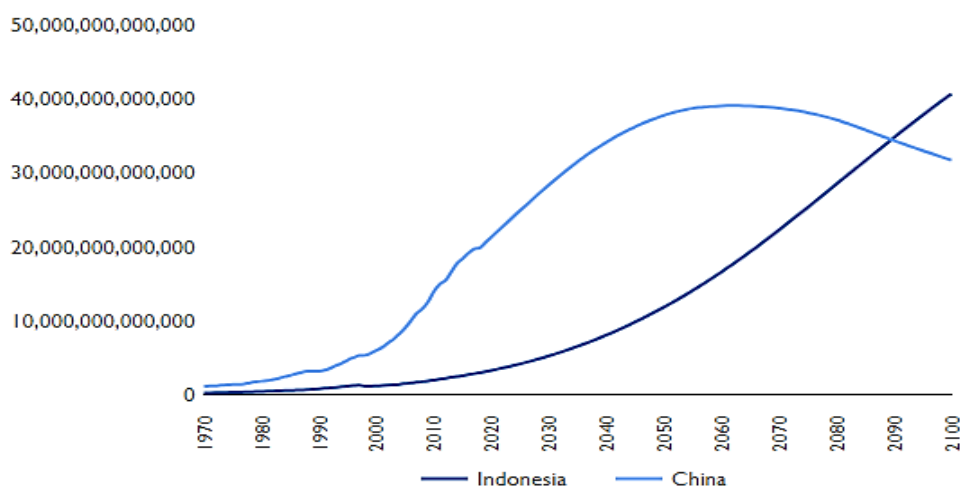


Figure 3. Comparative Economic Forecasts Snippet - Example: Indonesia's GDP vs. China's GDP
 Source: [Global Economic Impacts of Demographic Change](#)

Such a comparison could be used, for example, to test the hypothesis that "Indonesia's GDP will be greater than China's by the end of the century," which could not be easily rejected. Similar comparisons could be conducted for GDP per capita and any other two-country comparison.

3.3. Discussion for Comparative Demographic Forecasts Section

The comparative demographics forecasts section allows for two-countries comparisons of the total (left panel) and working-age population (right panel). Figure 4 shows the output when a user selects Thailand and Vietnam, for example.

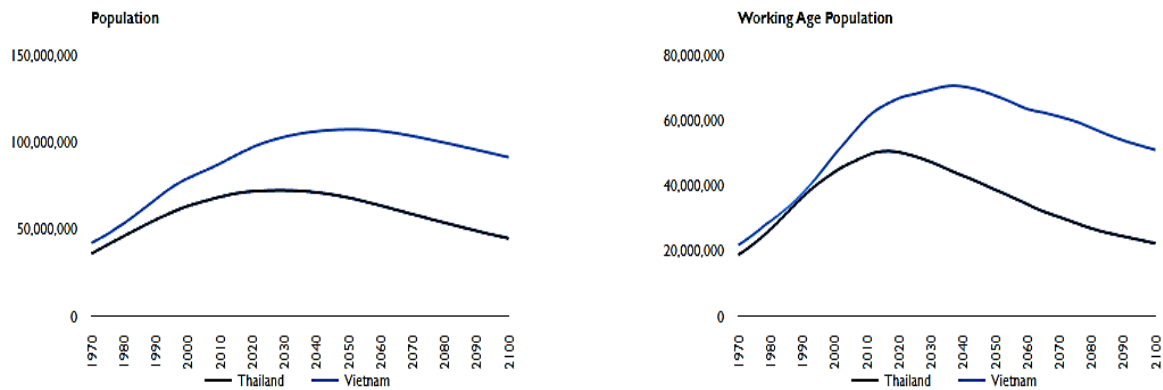


Figure 4. Comparative Demographic Forecasts Snippet: Example Thailand vs. Vietnam

Source: [Global Economic Impacts of Demographic Change](#)

The visualization output then shows that Thailand's population is about to peak around 2030, whereas Vietnam's population still grows for at least two decades longer. A similar picture emerges when looking at the working-age population. This section allows for two-country comparisons of the UN World Population prospects medium forecasts for total and working-age populations.

3.4. Discussion for Comparative Global Weights Forecasts - Example: Indonesia vs. Japan

This section provides snapshots of countries' economic clout from three global perspectives: (i) World GDP rank; (ii) share of global GDP; and the sortable table summarizing each nation's share by region. Take Indonesia and Japan, for example. Figure 5 reveals both countries' projected trajectories. Japan, once a top-3 economic powerhouse, is expected to settle at 14th by 2100, with its global GDP share shrinking from 8% to 1.5%. Conversely, Indonesia is poised for a remarkable rise, moving from rank 22 in 1970 and a world GDP share of less than 1% to the 4th largest economy with a 5% global GDP share by the end of the century. This section allows on the left panel for two-country comparisons of our estimated world rankings of GDP and shares of world GDP. The right panel provides a country list with information about their share of world GDP for every 10 years beginning in 1970 and ending in 2100.

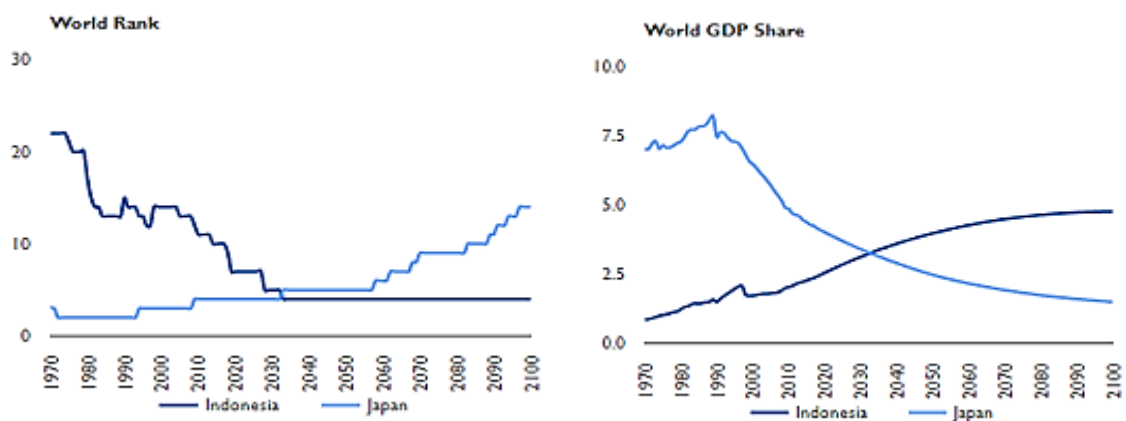


Figure 5. Comparative Global Weights Forecast Snippet - Example: Indonesia vs. Japan

Source: [Global Economic Impacts of Demographic Change](#)

3.5. Discussion for Comparative Regional Forecasts Section

Diving deeper into regional dynamics, Figure 6 explores key demographics and economic indicators for select regions, such as East Asia & the Pacific versus South Asia. Here's what stands out: East Asia and the Pacific's peak population arrives sooner, while South Asia's demographic boom will push its population past that of East Asia & the Pacific by mid-century.

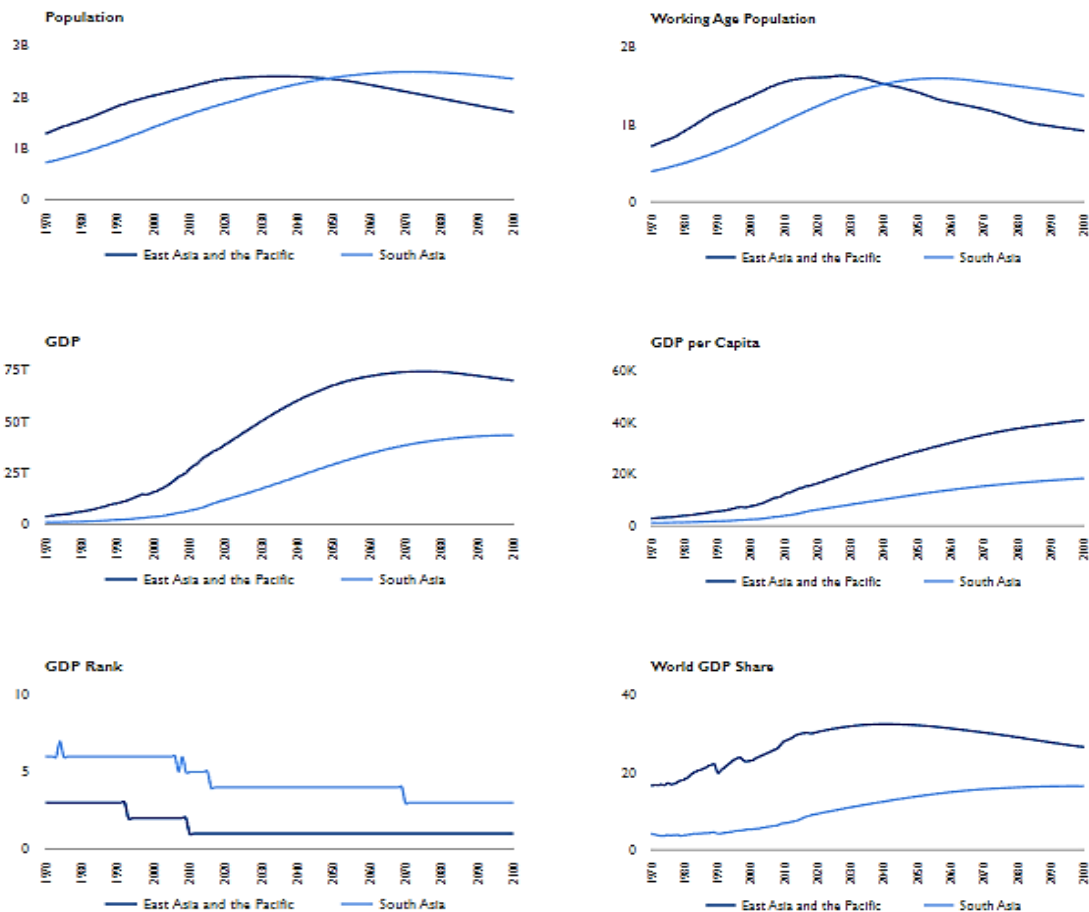


Figure 6. Comparative Regional Forecasts Snippet - Example: East Asia & the Pacific vs. South Asia
 Source: [Global Economic Impacts of Demographic Change](#)

Despite South Asia's growing population, its GDP and GDP per capita lag behind East Asia & the Pacific, highlighting persistent economic disparities. East Asia & the Pacific remain the top economic regions, but South Asia is projected to climb from 4th to 3rd by 2070. Additionally, South Asia's share of global GDP steadily increases, while East Asia & the Pacific's starts declining from the 2040s. This section provides regional perspectives on UN population prospects medium estimates for total and working-age populations, as well as our mean estimates for GDP and GDP per capita and corresponding world rankings and world GDP shares for East Asia, the Pacific, and South Asia.

4. CONCLUSIONS

Our study aims at empowering informed discussions about demographic impacts on the global economy. While technical aspects matter, we strive to make academic research accessible and engaging. The web application is designed to visualize the economic impacts of demographic change, particularly in the East Asia and Pacific region, through various sections. The "Country Snapshot Forecasts" section provides GDP, GDP per capita, and population forecasts for selected countries, exemplified by Japan, where GDP is predicted to peak while income per capita may stagnate. The "Comparative Economic Forecasts" section allows for GDP and GDP per capita comparisons between countries, such as Indonesia and China. The "Comparative Demographic

Forecasts" section compares population trends between countries like Thailand and Vietnam. The "Comparative Global Weights Forecasts" section showcases economic clout, illustrating Japan's decline and Indonesia's rise in global GDP rankings. Lastly, the "Comparative Regional Forecasts" section contrasts regional dynamics, such as East Asia & the Pacific versus South Asia, highlighting population peaks, economic growth disparities, and shifts in global GDP shares. This interactive visualization exemplifies how data visualization can translate complex findings for various audiences, which we exemplarily discussed in the context of insights as relevant to the East and the Pacific. We hope that policymakers, media, and NGOs can leverage our forecasts to support targeted policies addressing demographic challenges and harnessing opportunities.

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