Global Economy Indicators - Final Paper

The University of Texas at Dallas

BUAN 6312.001 Applied Econometrics and Time Series Analysis

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Group – 2

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1. Introduction

In this study we propose the research question: To what extent and in what ways have manufacturing, services and agricultural industries contributed to the GDP in developed and developing countries within the period of 1970-2021? In this study we will expound on the role of these sectors and how they are transforming and its impact on the economic development of these countries. There is ample acknowledgement that that compared with established economies, emergence economies demonstrate more-varied composition influenced by certain conditions derived from their socioeconomic environments though the later usually follow linear, well-trodden path from agriculture to manufacture and the service industry.

As is widely understood, the economy of a country is heavily dependent on sectoral shifts, or structural shifts, as they are sometimes called. Developed nations mainly transform and progress from agricultural sector to manufacturing sector and finally the services sector while on the other hand, developed nations mostly have another way of transitioning from the three sectors because of certain characteristics in their socio economical setting. Consequently, analysis of these discrepancies yields significant information regarding the economic development and policies of countries in the globe.

The application of econometrics and time series has been very crucial in our study, research employing various statistical instrument and models have pointed out some important conversion across sectors and their relationship to overall economic growth. This way, the study reveals and contrasts various patterns of these three sectors, the results of which in both developed and developing economies offer the framework for understanding their dynamics. The findings have the intention to help policymakers and indicate, how the identified strategies and relevant decisions have to be constructed or improved for targeting the strategic choices for the improvement of the economy.

2. Literature Review

So in order to gain knowledge of compact and incessant dynamic economic growth tenet of a nation, it is useful to have considerable knowledge about the concept of sectoral shifts in GDP contributions The movement of developed economies to shift from the agricultural sector to manufacturing sector and later on to the service sector On the other hand the development of this evolution is quite different in developing countries due to array of socio-Economical factor of the nation and take place at comparatively Although a number of current studies argue that the transitions from agriculture to industry and from industry to services have some causal relationship with greater growth, few studies analyse these patterns across developed and developing countries over different time periods.

This study will do so by comparing sectoral transitions across income classes and thus bring out distinctions in development trajectory. It will also determine the contribution rate of each sector to GDP growth in various economic environments

From the current literature, the flexible functions of agriculture, industry and service sectors in development are evident. Based on Kuznets' structural change hypothesis it is expected that economic development is associated with structural change from agriculture to industry and then to service sector. Nevertheless, the magnitude of such change varies from one economy to another. To the best of my knowledge, no prior studies have compared these contributions and analysed the interrelations between them using sophisticated statistical procedures to fill this gap.

3. Data

For the analysis of the structure of the contributions of various sectors to the GDP over the period 1970 to 2021, we employed a database of the sectoral shares of GDP by income level and world region. This data set contains GDP and sector wise information (agriculture, manufacturing and service) for the comparison. Our data set contains 10,512 observation and 26 variables.

Data cleaning was mainly performed by dealing with missing values and selecting some appropriate columns for the subsequent analysis of trends, regression, and comparative analysis. This selection enables exclusion of irrelevant data sets to the set research objectives.

Key Columns for Analysis based on research question:

- X.Agriculture..hunting..forestry..fishing.. ISIC.A.B.: This section refers to the Nielsen Five commercials in the agriculture trade.
- Manufacturing..ISIC.D. – Concerned with the manufacturing industry.
- X.Whole sale..retail trade..rest & hotels..ISIC.G.H..- Classifies as part of the services industry.
- Total respective Value Add – This represents sector added value of the various sectors combined.
- GNLIC – Gross National Income in USD – It points to the flow of income within a country.
- Gross Domestic Product – GDP: The most important measure for the growth of economy as a whole.
- Population – Allows the assessment of the impact per head of the population.
- Imports of goods and services, and Exports of goods and services – Trade factors that affects contributions and growth of the sectors.

Columns Considered for Exclusion due to high missing values or less relevance to research question :

- Changes.in.inventories – Inventory changes are not as exciting when looking at sectoral contributions.
- Household.consumption.expenditure..incorporating.non-profit.orgs.for.households – Totally unnecessary if Final.consumption.expenditure is already presented.
- Construction..ISIC.F. – A certain segment that is not a major field of concentration in agriculture, manufacturing, and service business.

- X.Mining..Manufacturing..Utilities..ISIC..C.E. – Combines all industrial sectors which might bring extra variability if manufacturing division is carried out.

4. Empirical Methods

a. Trend Analysis

We used trend analysis to examine the evolution of contributions of agriculture, industry, and services to GDP over time in developed and developing economies from 1970 to 2021. Using time-series plots, in this analysis we captured structural shifts across various regions, that reflected the economic transformations experienced over five decades. These finding added to the importance of understanding the unique economic trajectories of different regions and how their effect on sectoral contributions influence the overall growth of an economy.

b. Correlation Analysis

We used correlation analysis to explore the interrelationships between sectoral contributions and GDP growth, a correlation matrix was computed, this gave insights about the strength and direction of these relationships.

Then we also generated a heat map which further revealed notable regional differences in correlation strengths, making it evident that economic structures and sectoral dynamics vary significantly across different income levels. These findings suggest that there is need for region-specific strategies in economic policymaking.

c. Regression Analysis

A multiple regression model was also developed to estimate the GDP based on sectoral contributions and other economic variables. For better accuracy and understanding we applied log transformations to the model. This transformation allowed the coefficients to be interpreted as elasticities and resulted in a clearer understanding of the percentage changes in GDP growth corresponding to percentage changes in sectoral contributions.

The regression model is:

$$\log(\text{GDP Growth}) = \beta 0 + \beta 1 \log(\text{Agriculture}) + \beta 2 \log(\text{Industry}) + \beta 3 \log(\text{Services}) + \epsilon$$

with the help of this regression framework a quantitative foundation for understanding sectoral impacts on economic growth was formed and this also helped in advancing the comparative perspective between developed and developing economies.

5. Results

a. Descriptive Statistics

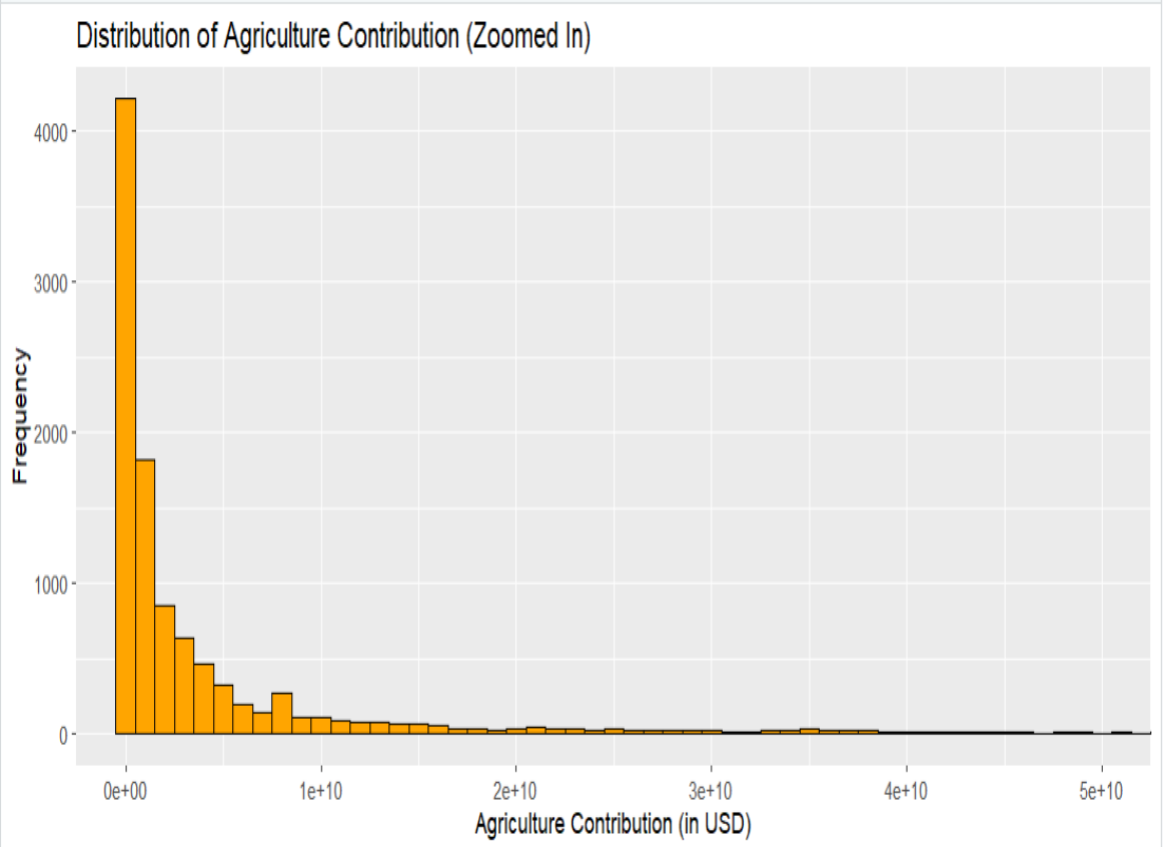
The analyses of the descriptive statistics portrayed differential sectoral distributions in developed and developing economies. To compare, we calculated different indices like mean, median and standard deviation on GDP, GNI and different sectors. These statistics as noted drew clear differences between the developed and the developing economies.

As the estimated results show the development of the developed economies which have evidences the service sector as the leading sector ahead of manufacturing and agriculture, with the least contribution to the GDP. The developing economies indicated a higher diversity level than the industrialized economies in the aspects of services sector highlighting the highest, agricultural and industry fields. Such discoveries present some understanding of the structural disparities in economic structures between the developed and the developing countries.• According to this analysis, contribution from agriculture to GDP has reduced progressively throughout the world more so in the developed countries. Statistics such as mean, median, and standard deviation for GDP, GNI, and sectoral contributions. These statistics highlighted significant disparities between developed and developing economies.

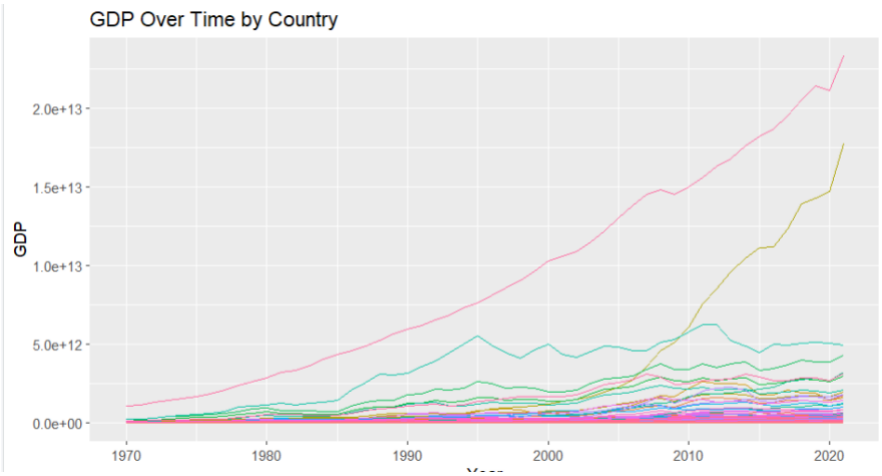
According to the estimated results the developed economies demonstrated a dominant service sector, with agriculture having the least contribution. Developing economies signified a greater diversity, with services contributing the highest, followed by agriculture and industry. These findings highlight the structural differences in economic compositions between high-income and low-income nations.

b. Trend Analysis

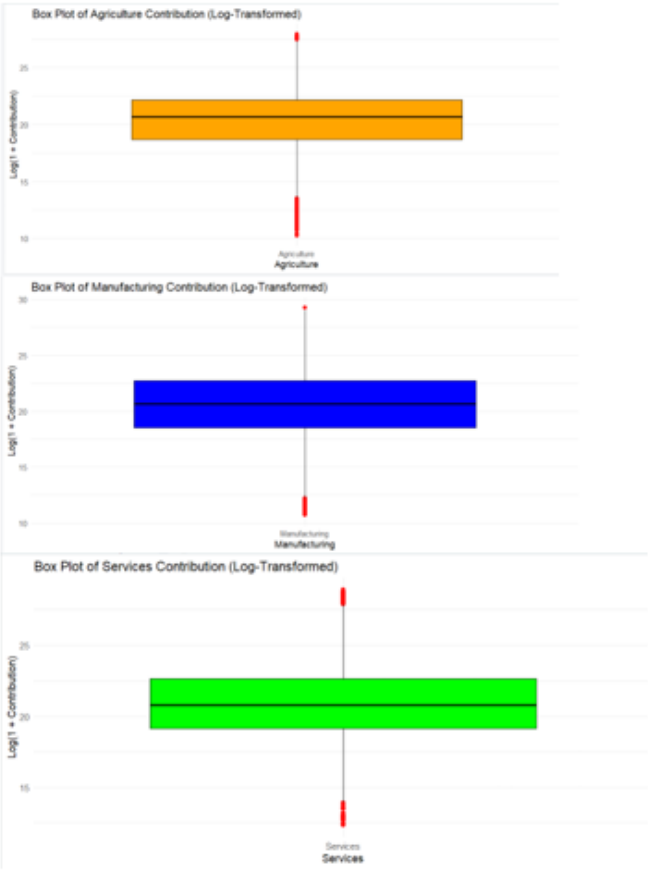
• This analysis reflected that contribution from agriculture to GDP has steadily declined globally, with a more pronounced decrease in developed economies. This decline showed the industrialized and the urbanized societies in the developing regions. There was a sheer increase in the service sector all over the world and mainly in the developed countries and in the developing countries due to technological and financial innovations.



- Developed nations demonstrated consistent growth in services, whereas manufacturing peaked before stabilizing.



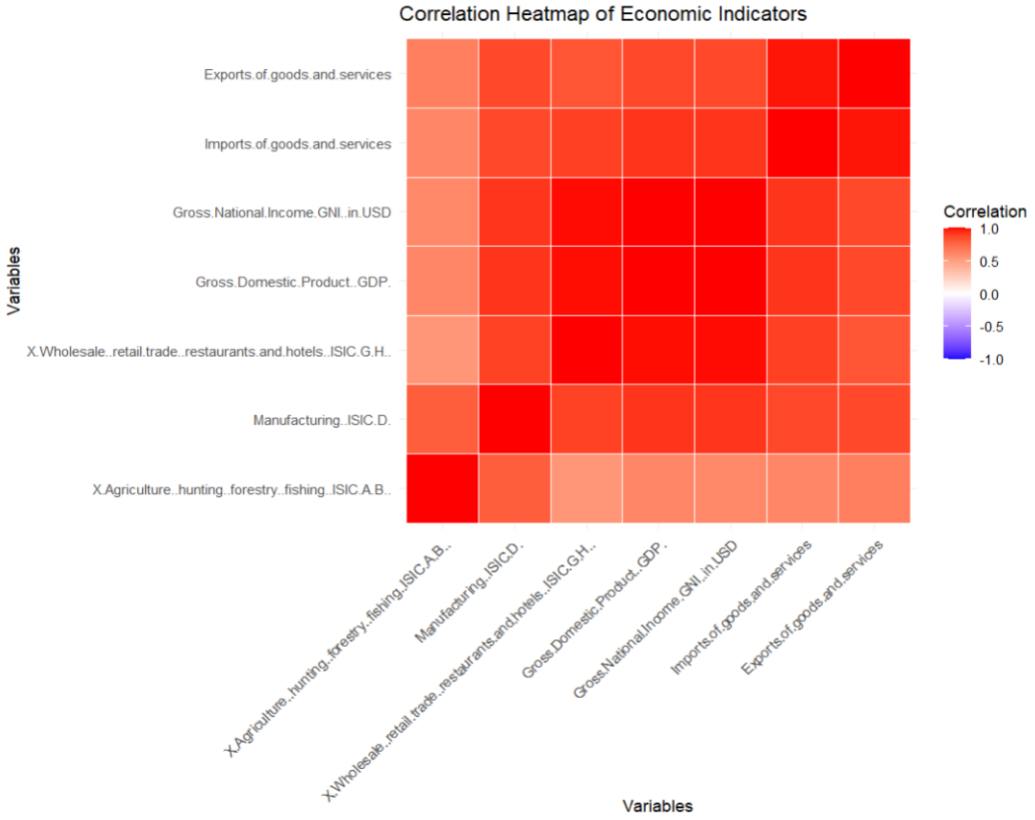
- Developing economies showed gradual transitions, with agriculture still playing a notable role.



c. Correlation Analysis

The simple correlation test was used to determine the relationship between various economic variables, with major emphases on the relationship between GDP and sectoral contributions (Agriculture, Manufacturing, Services) and export and imports.

- A near-perfect correlation (0.999) between GDP and GNI was observed, emphasizing their interconnectedness as measures of economic output.
- Services strongly correlated with GDP and GNI (both 0.99), manufacturing showed high correlations (both 0.92), and agriculture displayed moderate correlation (0.61).
- Imports (0.92) and exports (0.87) demonstrated substantial but secondary impacts, with no negative correlations observed, indicating positive interrelations between the economic indicators.



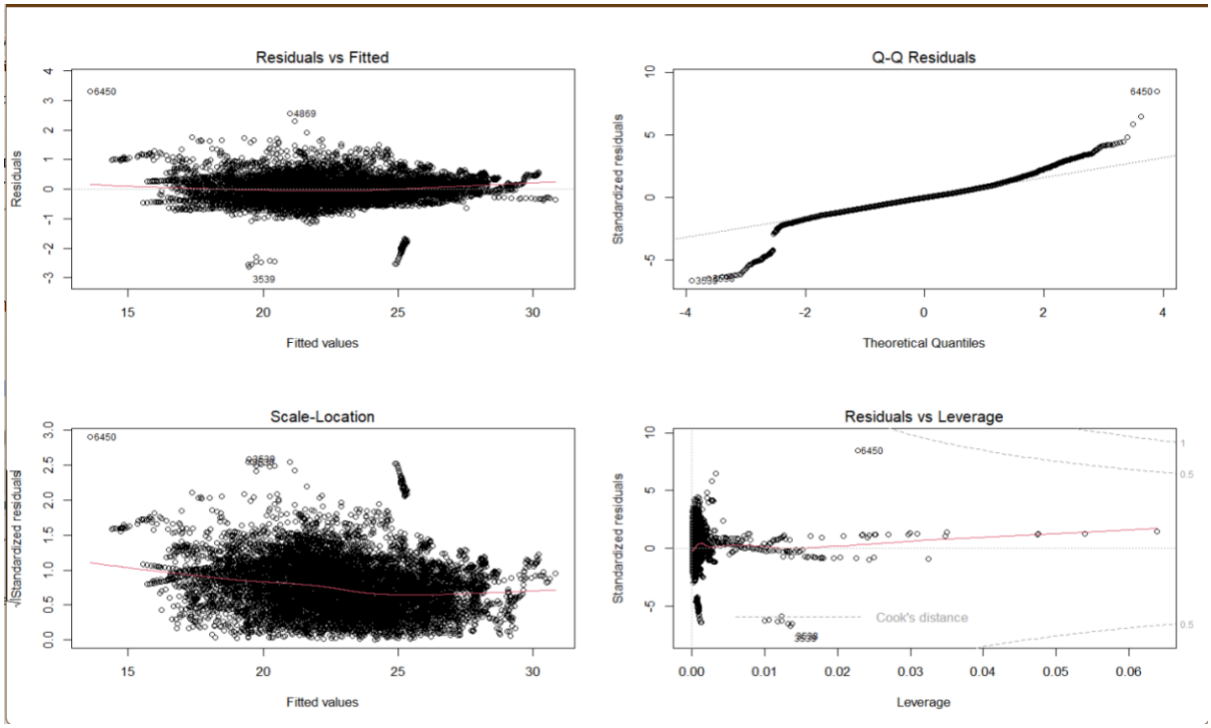
d. Regression Analysis

The regression model ($R^2 = 0.9774$) demonstrated the significant impact of sectoral contributions on GDP. Key findings include:

- A near-perfect correlation (0.999) was observed between GDP and GNI. As we can see, they correlate being results of the economic output.
- Based on the impact on services sector high and almost perfect significant figures of 0.99 with both GDP per capita and GNI confirm this sector's function as an economy enabler.

- Manufacturing conveys high correlations (0.92); this testifies the commodity sector's significance; agrarian, on the other hand, reveals moderate correlation (0.61), less significant in large economies.

• Finally, and intending to be exhaustive, imports (0.92) and exports (0.87) also have moderate positive relationships with gdp and no negative relationships were found, this connotes harmonized economic development.



6. Conclusion

In conclusion, this study demonstrates the unified participation of the sectors include agriculture manufacturing and services and how they required in the economy and its development and growth of both developed and developing countries. It pointed out the fact that with the progress in the economy, the sector of dominant productive activity moves from agricultural to manufacturing (industrial) and finally – to service. , are comparatively more service integrated thus, their GDP, represent a well-set growth trajectory while the developing

countries greatly rely on Ag & manufacturing in their contemporary transformation & evolution process.

The different correlation analysis conducted by me mostly led to the conclusion that came from the name of the project, where the service sector has a rather strong positive relationship with the economic growth especially in the developed high-income countries that underlined its importance for their economy. Apart from this manufacturing is also important throughout all the regions while agriculture means less important in developed countries but is important in the developing world. More specifically, imports and exports as trade activities helped the economy to grow although in the second place.

These findings have been confirmed by the regression results indicating how sectoral contributions have affected growth of GDP. The nonexistence of negative covariation coefficients across different economic indicators suggests equipoise growth characteristics and a low level of coupling between these variables.

In all, this examination underscores the imperative of promoting sectoral balance so as to develop synergistically. Such knowledge can be applied by policymakers to create relevant policies and programs compatible with their economy's developmental stage and produce both, sustainable and equitable growth.

7. References

- Kaggle Dataset: Global Economy Indicators - https://www.kaggle.com/datasets/prasad22/global-economy-indicators/data
- **Rodrik, D. (2013).** "Structural Change, Fundamentals, and Growth: An Overview." *International Association for Research in Income and Wealth*.
- **Kuznets, S. (1973).** "Modern Economic Growth: Findings and Reflections." *The American Economic Review*.
- **Wooldridge, J. M. (2015).** *Introductory Econometrics: A Modern Approach.*
- **Greene, W. H. (2018).** *Econometric Analysis.*