# Evaluating the Sectoral-Shift, Diversification and Growth Dynamics Nexus in Nigeria and Selected Asian Economies

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**Abstract**
*This study examines and compares the channel through which sectoral shifts affect economic growth dynamics in Nigeria, Malaysia and China. The study employs dynamic generalized method of moments (GMM) and time series data spanning 1981 to 2014. While the study finds that the channel from the agricultural sector to economic growth through industrial and manufacturing sectors is negative and insignificant in the case of Nigeria, those of Malaysia and China are positive and significant. The study also reveals that manufacturing and services as well as agricultural and services channels on economic growth are negative and insignificant for Nigeria but otherwise in the case of Malaysia and China. The results imply that a shift away from agriculture through industry and manufacturing creates the basis for growth accelerations in Malaysia and China. However, a reallocation from agriculture to services without passing through industry and manufacturing is inconsistent with the linear pattern view. This study concludes that Nigeria is a tale of sectoral shift without diversification as a result of lack of interdependence among the agricultural, manufacturing and industrial sectors. This study therefore recommends that government should vigorously pursue a local-content initiative that would ensure proper diversification of the sectors so as to achieve sustained economic growth.*

**Keywords:** *agricultural*; *industrial; manufacturing; services; channels.*

## Introduction

Economic growth trajectory noticeable around the world is the sectoral shift of key sectors contributions to GDP over the years. The observed case in Nigeria is the decline pattern in average share of agricultural, industry and manufacture sectors to GDP. While agricultural sector contributions to GDP accounted for 64 percent in 1960, the figure declined to 48 percent in 1970. The declining structure left the average figure from 1981 to 1990 at 36 percent while that of 1991 to 2011 at 34 percent. The agricultural sector contributions to GDP accounted for around

29 percent as at 2014 (World Bank, 2015). The contributions of manufacturing sector to GDP which averaged 8 percent from 1981 to 1990, declined to 5 percent from 2001 to 2011 and stood at 2 percent from 2012 to 2014 periods. Meanwhile, services sector contribution has witnessed a significant increase from 23 percent from 1981 to 1990. The figure from 1991 to 2000 stood at 30 percent. Services as at 2014 accounted for an eye-watering 50 percent of the country's GDP, with the telecommunications sector rising from 0.9% to 8.7% of GDP (World Development Indicators, 2014). While the shift of share from agricultural sector to services has been observed in the case of Nigeria which seems to depart from the historical trajectory (Dasgupta & Singh, 2006), the pattern in Malaysia and China has gone from agricultural to industry to manufacturing and to service sectors (See figure 2 and 3 in the appendix). Rostow (1971) Chenery and Syrquin (1975) and Baumol, Blackman & Wolff (1989) have argued that before sectoral shift from agricultural to services can lead to economic growth diversification it must pass through the industrial and manufacturing sectors which are engine of growth.

The standard argument in this pattern is that economies at early stages of development specialize based on their comparative cost advantage which most often is in the agricultural sector. Linden and Mahmood (2007) believe that economic diversification would only emerge if there is a shift from the agriculture sector to services through the industrial sector. Again, this is in line with the Rodrik (2013) argument that sustained episodes of sectoral shift must be linear in pattern to involve diversification which is critical for sustained economic growth. While Kuznet (1996) and Rodrik (2013) for instance argue that this linear pattern is an established stylized fact, Castaldi (2009) put up an argument that certain patterns of development may not hold forever given the changing dynamics of the global economy. Maroto-Sanchez and Cuadrado-Roura (2009) in line with Castaldi's argument that several tertiary activities now show dynamic economic growth and that growth do not necessarily have to decline because of the rise in services. Mandeville and Kardoyo (2009) emphasize that in a knowledge-based economy, developing countries may be able to leapfrog the standard linear patterns of sectoral-shift that advanced countries historically passed through. This departure from the historical trajectory could mean that there has been a fundamental break with past regularities, owing to perhaps, the emergence of revolutionary new technologies. This may lead to the services sector replacing industry and manufacturing as a new engine of growth in developing countries. Based on the analytically interrelated argument that runs contrary to the historical pattern of sectoral shift, an important question is whether the Castaldi (2009)

tendencies in the developing countries should be viewed as non-conforming structure.

From the foregoing, the objective of this study is to determine whether the historical sectoral shift pattern observed in the case of Nigeria, Malaysia and China in the last three decades conform to a linear sectoral pattern or has suddenly broken down and become irrelevant. This would be mirrored through sectoral-shift from agriculture to industry to manufacturing and to service sectors. This study focuses on Nigeria while benchmarking its analysis with China and Malaysia, unlike earlier studies that focused on the advanced countries (Rodrik, 2007; Yaki, 2008; Antonooulos & Sakellaris, 2010). Hence, this study will be able to establish whether the standard linear relationship of sectoral-shift observed in growth dynamics over the years will continue to hold for Nigeria while comparing its trajectory with that of China and Malaysia.

Following this introduction, section 2 discusses the methodology; Section 3 presents the results; section 4 will discuss the results in detail and 5 will conclude.

**Methodology**

The Schumpeterian idea of innovation as creative destruction implies that economic growth is inherently linked with sectoral shift and diversification. However, the pattern of shift remains controversial more than ever. This controversy is further deepened by the neoclassical economist submission that attributes equal weight to all sectors for economic growth with the intuition that reallocation of resources is not sacrosanct in the growth process. Contrarily, Rostow (1971) Chenery and Syrquin (1975) and Baumol, Blackman & Wolff (1989), Kaldor (1966) argue that sustained episodes of economic growth must involve a shift that involve diversification from agriculture to services through industry and manufacturing.

The hypothesis is therefore whether sectoral shift results in diversification and growth dynamics in Nigeria, Malaysia and China individually and comparatively. To this end, the study would interact agriculture contributions to other sectoral share and tested for the significance for Nigeria, Malaysia and China. In order to ensure that the interaction terms do not proxies for agriculture share, these variables were also included in the regression separately. The parametric agricultural sectoral share-growth dynamics model can be written as follows:

$$GDPCG_t = \beta GPCG_{t-1} + \beta_1 X_i + \mu_t \ldots\ldots\ldots\ldots 1$$

where $GDPCG_t$ is a measure of the annual rate of per-capita GDP growth average over the period 1981-2014, $GDPCG_{t-1}$ is the lagged per-capita GDP growth. X represents the set of explanatory variables in the value added share of agriculture, industry, manufacturing and services; u is the error term, the subscripts *t* represents time period and $\beta s$ are parameters to be estimated. Estimating model (1) directly will generate biased estimators as a result of the inclusion of lagged dependent variable as part of independent variables (Arellano & Bond, 1991). This study handles this problem by introducing a set of instruments (lagged explanatory variables) that correlate with the independent variables but not with error term. Then we can express agriculture value added/ industry value added $(AVA/IVA)_t$ in terms of these instruments $G_{i,t}$ as

$$(AVA/IVA)_t = g(G_t) + \mu_t \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ 2$$

where, for simplicity, $g(G_{i,t})$ is assumed to be parametric, say $g(G_{i,t}) = b'G_{i,t}$.
Thus, (2) can be written as

$$(AVA/IVA)_t = b'Z_{t-1} + \mu_t \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 3$$

where *Z* represents all the explanatory variables in (3)

We assume that $E(\varepsilon_t / Z_{t-1,} u_t) \neq E(\varepsilon_t / u_t)$. It then follows that $E(\varepsilon_t / u_t) \neq 0$ since $E(\varepsilon_t / AVA_t / IVA_t) \neq 0$. Hence, one can decompose $\varepsilon_t$ into $\xi_t(u_t) + \varepsilon_t$ where $\xi_t(u_t) = E(\varepsilon_t / u_t)$ and $\varepsilon_t = \varepsilon_t - E(\varepsilon_i / u_t)$. Equation (2) then becomes

$$GDPCG_t = \beta GDPCG_{t-1} + \beta' X_t + \xi(\mu_t) + \varepsilon_t$$

……..4

We replace the unobservable $u_t$ by the observable $\hat{\mu}_t = (AVA/IVA)_t - \hat{\beta}' Z_{t-1.}$. Then equation (4) becomes

$$GDPCG_t = \beta GDPCG_{t-1} + \hat{\beta}' X + \xi(\hat{\mu}_t) + \varepsilon_{i\square} \quad \ldots\ldots\ldots\ldots 5$$

Where the error $\varepsilon_{t^*} = \varepsilon_{t^*} + \xi_t(u_t) - \xi(\hat{u}_t)$ .

One can use Arellano and Bond (1991) two-step white period, Arellano and Bover (1995) weighting matrix estimators to obtain consistent estimation of α and $\psi$ in the, say $\hat{\alpha}$ and $\hat{\psi}$ . Then substitute $\hat{\alpha}$ and $\hat{\psi}$ into the model

$$GDPCG_t = \beta GDPCG_{t-1} + \psi' X_t + \xi(\hat{u}_t) + \varepsilon_{t^*} \ldots . 6$$

where $\varepsilon_{t^*}$ denotes the new composite error term that accounts for the estimation of β and $\psi$ .

To obtain consistent estimates this study estimates the Klein GMM model of $f(AVA/IVA)_t$ and $\xi_i(\hat{u}_{i,t})$, say $\hat{f}(AVA/IVA)_t$ and $\hat{\xi}_i(u_{i,t})$ . It is of course $\hat{f}(AVA/IVA)_t$ the estimated function that we are interested in, since it captures the marginal effects of the agricultural, industrial, manufacturing and services and their interactive terms on growth clean of any endogeneity.

**Results**

Table 1 below presents the results using the Generalized Method of Moment (GMM) estimators described above. Data on gross domestic product per capita (GDPCG), lagged of gross domestic product per capital $(GDPCG)_{t-1}$, agricultural share (AVA), industrial share (IVA), Manufacturing (MVA) and Services (SVA) all based on percentage of GDP.

**Table 1: Empirical results for Sectoral-Shift, Diversification and Growth Dynamics**

| Dynamic GMM | Malaysia | Nigeria | China |
|---|---|---|---|
| GDPCG(-1) | 0.4834 | 0.3741 | 0.5815 |
| | (4.4004) | (5.4407) | (4.7373) |
| | ***0.0001*** | ***0.0000*** | ***0.0001*** |
| AVA | 18.7551 | -11.5310 | 0.4593 |
| | (2.0854) | (-1.7003) | (0.0973) |
| | ***0.0443*** | ***0.1002*** | ***0.9231*** |
| MVA | 0.7648 | -5.5687 | 0.0987 |
| | (1.1812) | (-4.3864) | (0.1507) |
| | ***0.0002*** | ***0.0001*** | ***0.0026*** |
| IVA | 42.1306 | -13.8007 | 65.3262 |
| | (1.3724) | (-1.6233) | (1.3954) |
| | ***0.1808*** | ***0.1157*** | ***0.1739*** |
| SVA | 56.9695 | 0.3989 | 13.3554 |
| | (2.0396) | (0.5885) | (1.0084) |
| | ***0.0509*** | ***0.0392*** | ***0.0000*** |
| MVA*SVA | 56.9695 | -5.5687 | 2.1807 |
| | (2.0396) | (-4.3864) | (1.2449) |
| | ***0.0509*** | ***0.0001*** | ***0.0884*** |

| | | | |
|---|---|---|---|
| AVA*IVA | 18.7551 | -13.8007 | 65.3262 |
| | (2.0854) | (-1.6233) | (1.3954) |
| | ***0.0403*** | ***0.1157*** | ***0.1739*** |
| IVA*SVA | 56.9695 | -13.8007 | 5.3262 |
| | (2.0396) | (-1.6233) | (1.3954) |
| | ***0.0509*** | ***0.1157*** | ***0.0427*** |
| AVA*MVA | 19.9516 | -11.5309 | 0.0987 |
| | (2.1812) | (-1.7003) | (0.7001) |
| | 0.0474 | 0.1002 | 0.1610 |
| AVA*SVA | 18.7551 | 9.3897 | -2.1807 |
| | (2.0854) | (-1.1417) | (0.8084) |
| | 0.0558 | 0.2632 | 0.1761 |
| Observation(time series) | 34 | 34 | 34 |
| $R^2$ | 0.66 | 0.56 | 0.58 |
| F Statistics | 0.0000 | 0.0000 | 0.0000 |
| J. Statistics | 22.08 | 3.7956 | 32.31 |
| Prob(J-Stat) | 0.0355 | 0.0352 | 0.0255 |
| Instrument rank | 7 | 7 | 7 |

*Notes: * denote 5 percent levels of significance, respectively. T-statistics are in parentheses. When performing the Hansen test for over-identification, the "collapse" option in Eview was used to reduce the lag range and avoid instrument proliferation, in conjunction with the Windmeijer (2005) correction for robust standard errors. Note that the data for this study were from the world development indicator (1981-2014). We started from 1981 based on unavailability of before then.*

**Discussion of Results**

Table 1 below presents the results using the Generalized Method of Moment (GMM) estimators described above. The regression results pass battery of diagnostic and sensitivity tests. For these models, the instruments were the lagged independent variables. The Stock and Yogo (2004) instrument validity test shows that instruments employed are valid and based on full rank matrix. The Instrument Orthogonality test, also known as the C-test or Eichenbaum, Hansen and

Singleton (EHS) Test, evaluates the Othogonality condition of a sub-set of the instruments. The joint null hypothesis in this case is that the instruments employed are uncorrelated with the error term. Again, these tests confirm the adequacy of our models. In all regressions this study control for both log of

lagged level of GDP per capita, agricultural share; industrial share, manufacturing share and services share to GDP. Across all estimations, the study finds that past realization of growth explains positive and significant impact of about 0.37, 0.48 and 0.58 for Nigeria, Malaysia and China respectively in its current values growth within the sampled periods.

As these results show, elasticity of economic growth with respect to agricultural value added in the case of Nigeria is about -11.53, with 0.1002 probability values. These suggest that economic growth is not responsive to changes in agricultural sector growth. Meanwhile the results for Malaysia signify positive and significant relationship with 18.76 coefficients and at 5 percent level of significance and China shows positive relationship. Thus, economic growth is responsive to changes in agricultural sector growth in Malaysia. The elasticity of economic growth with respect to manufacturing sector share is significant at all levels with a coefficient of -5.56 percent. The results for Malaysia and China show that, the elasticity of economic growth with respect to manufacturing value added is about 0.76 percent and to 0.09 percent. These suggest if manufacturing sector share goes up by 10 percent on average, economic growth goes up by about 0.76 percent in Malaysia and 0.09 in China. The results show that manufacturing remains fundamentally linked to economic growth in Malaysia and China. Again, the results from industrial sector are very similar to that of manufacturing sectors as shown in table 1. The reason for the unexpected outcome might not be unconnected with the harsh business environment especially in terms of high interest rates and lack of funds. Another reason might be as a result of the over dependence of Nigeria manufacturing sector on imported raw materials as argued by (Central Bank of Nigeria, 2008). This is also in line with the view of Adejugbe (1979), who opined that, Nigeria's manufacturing industries consists largely of assembly plants with little backward linkages in the economy, since most of the inputs are imported.

As expected, the regression results for service share index are reasonably satisfactory in all the countries. The elasticity of economic growth with respect to services value added in Nigeria is about 0.49, suggesting that if services go up by 10 percent, on average; economic growth goes up by about 0.49 percent. Thus economic growth is very responsive to changes in services sectoral share. The positive and significant impact of services on economic growth on one hand, the negative relationship between industrial-manufacturing sectors share and economic growth in Nigeria signifies a departure from the historical trajectory. This mean there is a fundamental break with past regularities, owing to perhaps,

to the emergence of revolutionary new technologies. This is why Maroto-Sanchez and Cuadrado-Roura (2009) in line with Castaldi (2009) argue that several tertiary activities now show dynamic economic growth rates and that growth does not necessarily have to decline because of the rise in services.

The coefficient of elasticity of economic growth with respect to manufacturing and services is about -5.56 percent and that of industrial and services are about -13.80 percent. These negative coefficients suggest lack linkages between the sectors and growth in Nigeria. Unlike the results for Malaysia and China that suggest that 10 percent increase in manufacturing and services improves economic growth by 5.69 percent and 2.18 percent respectively. Thus, economic growth is very responsive to changes in manufacturing and services and industrial and services sector share. The results for agriculture and industry and agriculture and manufacturing on growth show no link in Nigeria. This is unlike the results for Malaysia which indicates that 10 percent increment in agricultural and industry channel would improve economic growth by 18.76 percent on average. The result is similar to that of China, where the elasticity of economic growth with respect to agriculture and manufacturing is about 19.95 percent; suggesting that if agriculture and manufacturing increase by 1 percent, on average, economic growth increase by about 19.95 percent. Thus, economic growth is having a robust link with changes in agriculture and manufacturing and agricultural and industry channels.

In general, while the basis for growth in Nigeria is a shift away from agriculture to services, without passing through the industry and manufacturing, the basis for growth acceleration in Malaysia and China from agriculture to services passes through the industry and manufacturing.

This reallocation from agriculture to services without passing through industry and manufacturing signifies a departure from the historical trajectory. While the results for Nigeria signify a fundamental break with past regularities, the results for Malaysia and China are consistent with the linear pattern argument. The next section will conclude and provide policy recommendations.

**Conclusion**

This study examines and compares the impact of sectoral shifts on growth in Nigeria, China and Malaysia. The main question is whether sectoral shift and growth adjustments depart from the historical trajectory due to perhaps the emergence of revolutionary new service technologies in its impacts are

equilibrium phenomena. This study uses the data from 1981-2014 and applies dynamic GMM model which takes into cognizance the endogeneity problem. Specifically, the study estimates a growth regression model based on sectoral shift from agriculture to industry, agriculture to manufacturing and agriculture to services. After controlling for a number of growth determinants in terms of agricultural value added share, industrial value added, manufacturing value added, services value added and their channels, the study reveals that, shift from agricultural jumps to services without passing through industrial and manufacturing sectors in Nigeria. Meanwhile the results for Malaysia and China indicate that shift from agricultural to services passes through industrial and manufacturing. The results for Nigeria imply that the jump from agricultural sector to services without passing through industrial and manufacturing sectors results in growthless job while the results for Malaysia and China do ensure diversified economic growth. The results imply that the increasing economic growth associated with rising agricultural and services relationship may suggests jobless-growth phenomenon in Nigeria. This study concludes that Nigeria is a tale of sectoral shift without diversification as a result of lack of forward and backward linkages among agricultural sector, manufacturing and industrial sectors. This study therefore recommends that Nigeria government should vigorously pursue and implement policies that can boost the engine of growth sectors- industry and manufacturing to ensure forward and backward linkages among the key sectors.

**References**

Adejugbe, A. (1979). *Manufacturing*, In Olaloku, F.A. et al (eds.), *Structure of the Nigerian economy.* London: Macmillan Education.

Aggarwal, A. & Kumar, N. (2012). Structural change, industrialization and poverty reduction: The case of India. *United Nations Economic and Social Commission for Asia and the Pacific ESCAP South and South-West Asia Development Papers 1206*

Antonopoulos, C., & Sakellaris, P. (2010). The contribution of information and communication technology investments to Greek economic growth: An analytical growth accounting framework. *Information Economics and Policy* 21, 171-191.

Arellano, M. & Bond, S.R. (1991). Some tests of specification for panel Data: Monte Carlo evidence and an application to employment equations. *Review of Economic Studies* 58(2), 277-297.

Baltagi, B.H. (1998). *Econometric analysis of panel data*. 3rd edition. Chichester: John Wiley & Sons Ltd.

Baltagi, B.H. & Levin, D. (1986). Estimating dynamic demand for cigarettes using panel data: The effects of bootlegging, taxation, and advertising reconsidered. *Review of Economics and Statistics* 68, 148-155.

Baumol, W.J., Blackman, S., & Wolff, E. (1989). Unbalanced growth revisited: asymptotic stagnancy and new evidence. *American Economic Review* 75, 806-817.

Bhattacharyya, S. (2009). Root causes of African underdevelopment. *Journal of African Economies* 18, 745-780.

Castaldi, C. (2009). The relative weight of manufacturing and services in Europe: an innovation perspective. *Technological forecasting and Social change*, 76, 709-722.

Central Bank of Nigeria (2008). *Annual Report and Statement of Accounts* 31st Dec. 2008, Abuja.

Chenery, H. & M. Syrquin (1975). *Patterns of Development 1950-70*. Oxford: Oxford University Press.

Collier, P. and Gunning, J., (1999). Explaining African economic performance. *Journal of Economic Literature* 37, 64-111.

Dasgupta, S. & Singh, A. (2006). Manufacturing, Services and Premature Deindustrialization in developing countries: A Karldorian Analysis. *United Nations University, UNU-WIDER World Institute for Development Economics Research*, Research Paper No. 2006/49.

Holtz-Eakin, D., Newey, W. & Rosen, H.S. (1988). Estimating vector autoregressions with panel data. *Econometrica* 56, 1371-1395.

Kaldor, N (1966). *Causes of the slow economic growth of the United Kingdom*, Cambridge: Cambridge University Press.

Knight, J. (2007). China, South Africa and the Lewis model, research paper, *World Institute for Development Economic Research* (UNU-WIDER).

Kuznets, S. (1996). *Modern economic growth, rate, structure and spread.* New Haven: Yale University Press.

Linden, M. & Mahmood, T. (2007). Long run relationships between sector shares and economic growth: A panel data analysis of the Schengen region. *India Journal of Agri Economics*, 44, 140-149.

Mandeville, T., & Kardoyo, H. (2009). Services, ICTs and the changing nature of economic development processes in the KBE era. *Prometheus*, 27, 17-25.

Maroto-Sanchez, A., & Cuadrado-Roura, J. (2009). Is growth of services an obstacle to productivity growth? A comparative analysis. *Structural Change and Economic Dynamics* 20, 254-265.

Rodrik, D. (2013).Economic structural change Vital to successful Development. *International Monetary Funds Survey.*

Rodrik, D. (2007). Industrial development: some stylised facts and policy directions. In *United Nations, Department of Economic and Social Affairs, Industrial Development for the 21st Century*. New York.

Rostow. W. W. (1971). *The stages of economic growth.* Cambridge: Cambridge University Press.

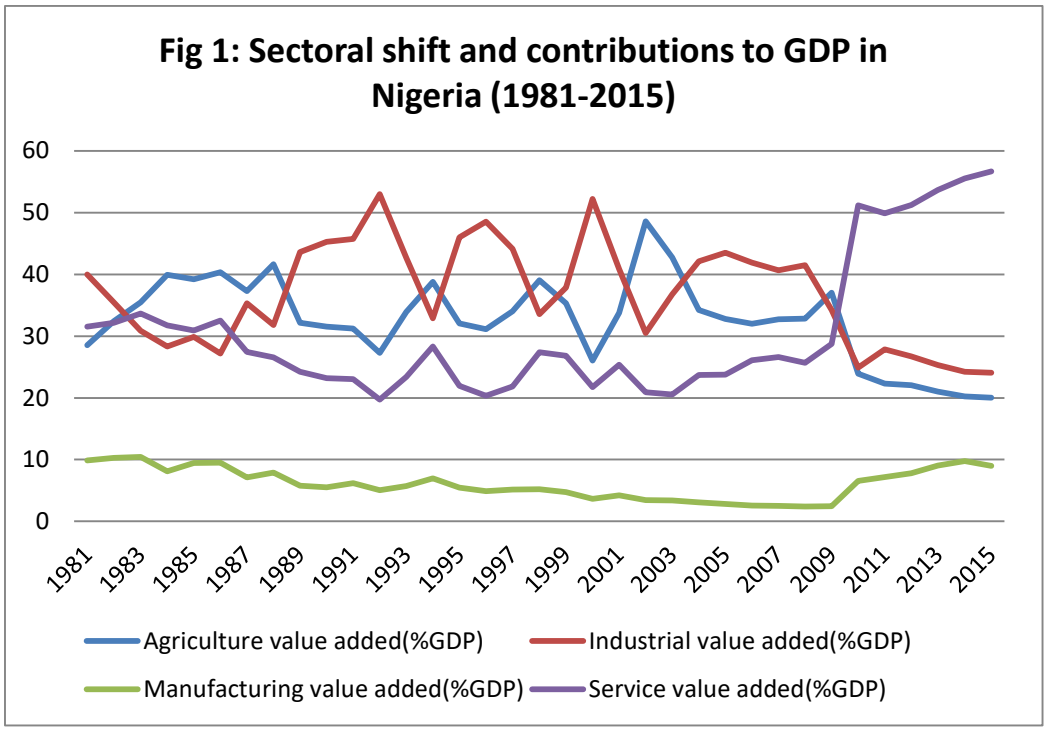
Singariya, M.R. (2015). Dynamic patterns of structural change and economics Growth during the high growth regime in India: A panel data analysis. *International Journal of Econometrics and financial management* 3(2), 76-83.

Stock, J.H. & Yogo, M. (2004). Testing for Weak Instruments in Linear IV Regression, *MIMEO*.

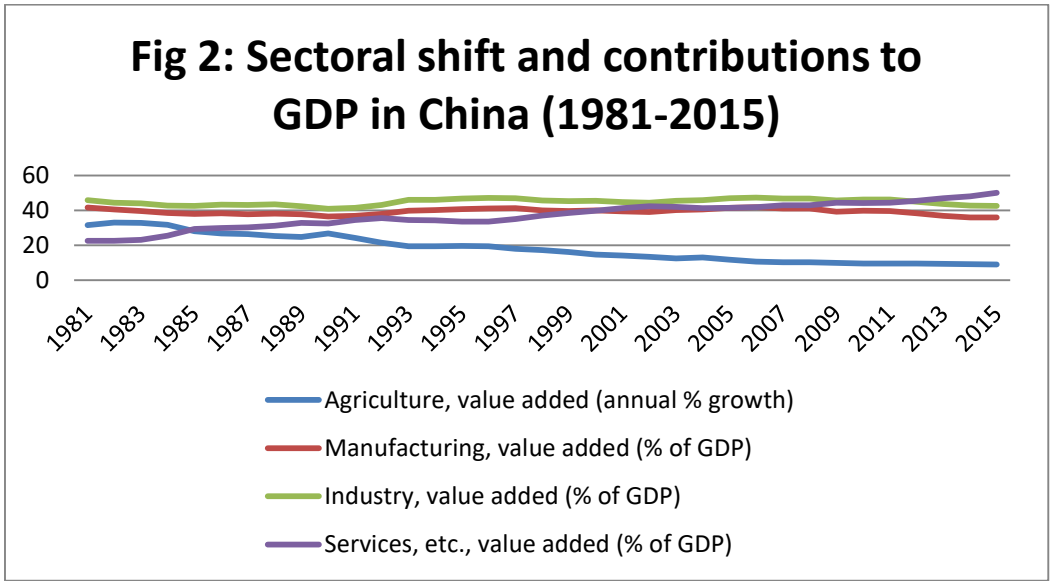
World Bank (2015). *World Development Indicators*, Washington D.C.

Yaki, K. (2008). Sectoral shift, wealth distribution, and development. *Macroeconomic Dynamics* 12, 527-559.

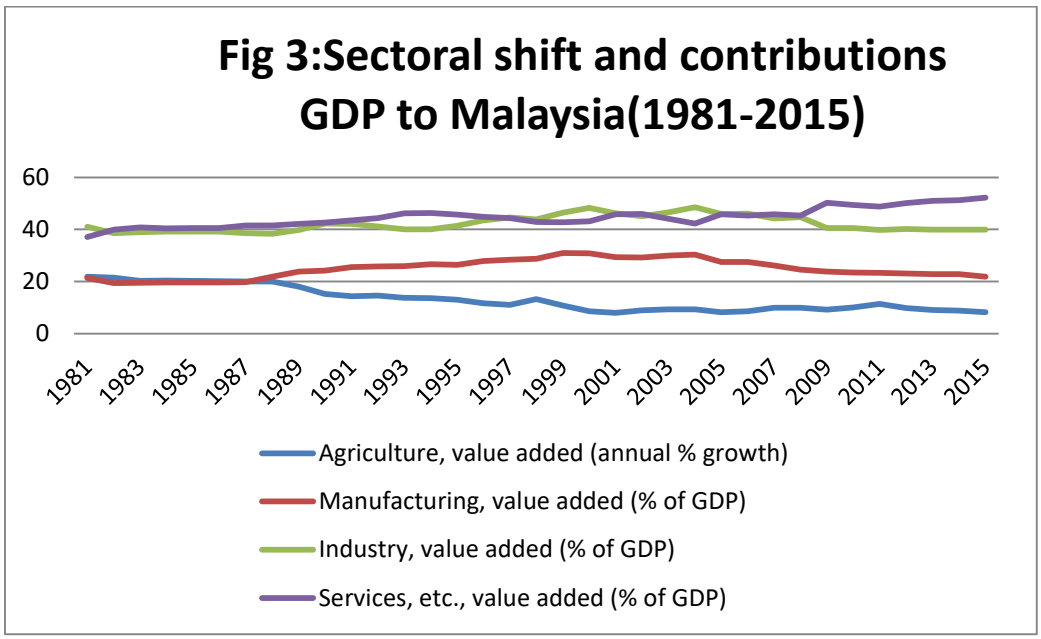
## Appendix 1




**Source:** *Authors' derivation. Data are from World Development Indicators*



**Source:** *Authors' derivation. Data are from World Development Indicators*




**Source:** *Authors' derivation. Data are from World Development Indicators*