# Economic Growth and Kaldor's Laws: Recent Evidence from Kazakhstan Economy

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**Abstract**

*The paper attempts to evaluate manufacturing's role in Kazakhstan's economic growth during the post-independence period based on three laws of Kaldor. The first law states that manufacturing is the engine of economic growth in the long run. The second law states that manufacturing productivity growth is identified with the manufacturing sector's growth through static and dynamic returns to scale. Finally, the third law states a positive association between non-manufacturing productivity growth and manufacturing growth. The paper estimates Kaldor's growth laws using the Kazakhstan economy's time-series data from 2000 to 2018. The results imply that a comprehensive and all-round development of the manufacturing sector should be prioritized to ensure a stable and sustainable growth trajectory. The manufacturing industry has its spill-over effects on the remaining sectors of the economy.*

**Keywords**

Kaldor Laws, Kazakhstan, Kazakh Economy, Economic Growth, Economic Transition, Economic Productivity

**Introduction**

Achieving faster economic growth and acceptable living standards is the basic premise of all nations across the world. In pursuit of this objective, a set of countries have performed exceptionally well; while others have lagged miserably. Among the nations, wide variations in growth rates and living standards, measured in per capita incomes are observed. These cross-country variations have led the development economists to debate and re-examine the process of growth and development providing different explanations.

From classical to neoclassical and from exogenous theorists to endogenous theorists' different explanations have been advocated for such rampant income disparities across countries. Differences in the supply of production inputs such as workforce, technology, and resources are primarily considered. Kaldor (1967) challenged the idea that production factors' availability is the sole source of growth. According to him, economic growth is highly dependent on increasing returns in the economy, and higher economic returns in the manufacturing industry contribute to economic growth (Keho, 2018:1). He argued that surplus labor was typically available in the non-industrial and agriculture sectors so that a decline in the workforce levels would not lead to an associative decline in output (Bairam, 2006:1). Therefore, Kaldor concluded that a

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degree of migration from non-industrial low-performance sectors to the industrial sector's high profitability section determines the pace of productivity and output growth in the economy (Bairam, 2006: 1).

Kaldor laid down three laws whereby; the first law states that manufacturing is the long-term economic growth engine called the growth hypothesis. The second law is known as the Verdoorn's Law, which states that productivity growth is identified by static and dynamic returns to scale with manufacturing growth. Finally, the third law specifies that non-industrial productivity growth and growth in the manufacturing sector positively affect each other (Kaldor, 1966; Verdoorn, 1980; Thirlwall, 1983; Libanio and Moro, 2011; Kebede, 2020). These laws were first used in 1966 by Kaldor to explain the poorly performing British economy in a lecture. Since then, many countries have tested the laws to explain economic growth. Empirical results which indicated the presence of unique correlation proved that Kaldor's second and third law hold in the economic growth of the European region (Pons Novell and Elisabet, 1999).

Until now, several authors have emphasized further the pertinence of Kaldor's conjecture about the engine of growth. First, the manufacturing division is the driver of growth because of surplus labor and low productivity in non-industrial zones. It generates additional interest for goods and businesses caused by non-industry segments (Cornwall, 1976, 1977; Bairam, 2006). It is also advised that a rapidly industrializing region should generate numerous exports over the imports, thus escaping the balance of payments constraints and growth constraints (Dixon and Thirlwall, 1975; Cornwall, 1977; Bairam, 2006).

Given such paramount importance of the manufacturing sector in the overall development dynamics of an economy, this study examines the relevance of Kaldor's growth laws in the case of Kazakhstan's Economy. Specifically, we tried to investigate manufacturing growth in the Kazakhstan economy using time series data from 2000 to 2018[1].Our results obtained through a simple OLS regression validate Kaldor's laws in the case of the Kazakhstan economy since manufacturing output growth is found to have a positive and substantial impact on the productivity and growth of the non-manufacturing output.

## Analytical Framework

### *Kaldor's First Law (Growth Hypothesis)*

Kaldor's First Law asserts that manufacturing is the engine of economic growth. There is a positive relationship between manufacturing growth and output growth in an economy (Kaldor, 1966; Stoneman, 1976; McCombie, 1983; Atesoglu, 2006; Kebede, 2020). The following estimable linear function can represent this proposition:

$$Q=\alpha_1+\beta_1 M+\mu 1,\beta_1>0, \quad (1)$$

Where Q denotes the growth rate of actual aggregate output and M is real manufacturing output. $\mu 1$ is the white noise error term, which is assumed to be independently and identically distributed. In the above regression equation, a positive value of $\beta_1$ shows that a unit change in the manufacturing sector leads to a positive shift in real aggregate output, supporting Kaldor's 1st law. An increasing return to scale geared by the manufacturing industry positively impacts the other sectors of an economy like the services and processing industry.

***Kaldor's Second Law (Verdoorns Law)***

Kaldor's Second Law states that growth in manufacturing productivity is undoubtedly associated with a change in manufacturing yield, which is not valid in diverse sectors such as agriculture and services (Kaldor, 1966; Stoneman, 1976; Verdoorn, 1980; McCombie, 1983; Yamak et al., 2016; Kebede, 2020). This law is also known in the literature as Verdoorn's law. An industrialized country that faces no demand restrictions can leverage different economies of scale to move on a prominent, sloping path to growth. Initially, the law can be mathematically denoted in the following equation:

$$P_m = \alpha_2 + \beta_2 M_g + \mu 2, \quad \beta_2 > 0, \quad (2)$$

$P_m$ as the dependent variable represents the growth rate in labor productivity in the manufacturing sector and $M_g$ as an independent variable represents manufacturing output growth. It is also defined as the difference between the output's rate of growth ($Q_m$) and the employee's rate of growth ( $E_m$ ) in the manufacturing sector of the economy, i.e. (Pm = Qm-Em). $\mu 2$ is the error term that is generally distributed with a mean of zero and constant variance $\sigma 2$. $\beta_2$ is at times called the Verdoorn's coefficient, which has been estimated to be 0.5 empirically. It is calculated as an indicator of any dynamic or static increasing returns to scale in the sense that the output growth endogenously induces any changes in returns to scale. Kaldor was controversial with Verdoorn's formulation. According to Kaldor, it resulted in a spurious correlation. As a result, Kaldor came up with his version:

$$E_m = \alpha_2 + \beta_2 Q_m + \mu 2$$

Where $E_m$ is the rate of growth of employment in the manufacturing sector. Kaldor stated that ¬if $\beta_2$ is significantly different from one, then it follows that for every 1% increase in the output from the manufacturing sector, employment grows by less than 1%. Such a case would imply that productivity increased consequently with production growth (Onakaya, 2010).

***Kaldor's Third Law***

Kaldor's Third Law states that productivity growth in an economy is positively linked to manufacturing output growth (Kaldor, 1966; Alexiou and Tsaliki, 2017; Kebede, 2020). This law explains that productivity in any economy positively correlates with output growth in the manufacturing sector. This implies that as the manufacturing sector grows, the other non-manufacturing sectors of an economy grow simultaneously. As production in the manufacturing sector grows, it draws surplus labor employed in various sectors. As a result, this measure reduces the disguised unemployment implying increased productivity in other economic sectors. This is mathematically expressed as:

$$P_{nm}=\alpha_3+\beta_3 M_g+\mu3, \ \beta_3> 0, \quad (3)$$

Where $P_{nm}$ is the rate of growth of productivity in the non-manufacturing sector of the economy and $M_g$ is the output growth in the manufacturing sector. This law holds in dualistic economies where the transfer of labor from less productive sectors (agricultural) to high-value sectors (manufacturing) will not result in loss of output to the economy (Mamgain, 1999). μ3 is again an error term with zero mean and constant variance. And according to this law, the coefficient, $\beta_3$ attached to the independent variable in the above equation is expected to take a positive value.

## Methodology

The time-series data set required in the form of output and employment at the aggregate and sectoral levels have been extracted from the World Development Indicators (WDI) data bank of the World Bank and the International Labour Organization (ILO). The data set is used for the period 2000-2018 and all the values are taken at 2010 constant prices in terms of Local Currency Unit (LCU). The description of variables is as:

| Variable | Description | Data Source |
|---|---|---|
| Economic growth | $Log(GDP)_t - Log(GDP)_{t-1}$ | World Development Indicators Data Bank |
| Manufacturing growth | $Log(Manufacturing\ output)_t - Log(Manufacturing\ output)_{t-1}$ | World Development Indicators Data Bank |
| Growth of Productivity in Manufacturing | $Log(Manufacturing\ Productivity)_t - Log(Manufacturing\ Productivity)_{t-1}$ | World Development Indicators Data Bank and ILO Estimates |
| Growth of Productivity in Non-Manufacturing | $Log(Non\text{-}Manufacturing\ Productivity)_t - Log(Non\ Manufacturing\ Productivity)_{t-1}$ | World Development Indicators Data Bank and ILO Estimates |

*Data Source: World Development Indicators Data Bank (Authors calculation)*

### *Econometric Modelling*

We first applied the unit root test to avoid the problem of spurious regression. We followed the Augmented Dickey-fuller test of unit root to examine whether variables are stationary or not. The results of the unit root test are presented in table 1. The results confirm that all the variables are stationary at level I (0). Therefore, OLS estimates will provide efficient results. We applied a simple bivariate OLS regression to test the validity of above stated three laws given by Nicholas Kaldor. In all the cases, the statistical inference is conducted at a 95% confidence level with associated p-values reported. The fit of the model represented by R square is also reported to be good, thus highlighting the reliability and precision of our estimated models.

*Table 1: Unit Root Test (Augmented Dickey-Fuller test without constant and trend)*

| Variable | T-Statistics | P-Value | Decision |
|---|---|---|---|
| GDP Growth | -1.692722 | 0.0849 | I (0) |
| Manufacturing Growth | -2.254225 | 0.0277 | I (0) |
| Growth of Productivity in Manufacturing | -2.439101 | 0.0187 | I (0) |
| Growth of Productivity in Non-Manufacturing | -1.627760 | 0.0959 | I (0) |

*Source: Author's calculation using EViews 10*

## Results and Discussion

### *Interpretation of Kaldor's First Law*

Table 1 reports the results of the estimated model captured in equation (1) used for empirical validation of Kaldor's first law in which the GDP growth rate is regressed on the growth of manufacturing output. The results are in line with general theoretical expectations. It shows that the coefficient of growth of manufacturing output is positive and statistically significant. Thus, validating Kaldor's first law in the case of Kazakhstan's economy. This validation of Kaldor's first law enables us to claim that manufacturing is the engine of growth for Kazakhstan's economy. More specifically, a unit change in manufacturing output growth increases the overall GDP growth by 0.63 percent.

*Table 2: Kaldor's First Law: Relation between the growth of manufacturing output and growth of GDP*

| **Dependent Variable Growth of GDP** | | | | | |
|---|---|---|---|---|---|
| | ***Coefficients*** | ***T-Stat*** | ***P-Value*** | | |
| Constant | 3.32 | 4.38 | 0.00 | | |
| Growth of Manufacturing Output | 0.63 | 6.12 | 0.00 | | |
| Standard Error | 2.05 | | | | |
| R Square | 0.73 | | | | |
| Adjusted R Square | 0.71 | | | | |
| **ANOVA Statistics** | | | | | |
| | ***DF*** | ***SS*** | ***MS*** | ***F*** | ***P-Value*** |
| Regression | 1 | 156.84 | 156.84 | 37.47 | 0.00 |
| Residual | 14 | 58.60 | 4.19 | | |
| Total | 15 | 215.44 | | | |

*Regression analysis of the growth of GDP of Kazakhstan concerning the growing manufacturing sector output for the years 2000-2018.*

### *Interpretation of Kaldor's Second Law*

Table 3 reports the estimated model results of equation (2) representing Kaldor's second law. The growth of productivity in manufacturing is regressed on the growth of manufacturing output. Again, the results are in line with general theoretical expectations. The results from table 2 reveal that the coefficient of growth of manufacturing output is positive and statistically significant. Thus, validating Kaldor's second law in the case of Kazakhstan's economy. The results indicate that a unit change in manufacturing output growth increases productivity in manufacturing by 0.77 percent. The size of the coefficient is comparable with Stoneman's (1979) estimate of 0.66 for the U.K. economy and Mizuno and Ghosh's (1984) estimate of 0.712 for the Japanese economy.

*Table 3: Kaldor's Second Law: Relation between the growth of manufacturing output and growth of productivity in manufacturing*

| **Dependent Variable Growth of Productivity in Manufacturing** | | | | | |
|---|---|---|---|---|---|
| | ***Coefficients*** | ***T - Stat*** | ***P-value*** | | |
| Constant | 0.85 | 0.69 | 0.50 | | |
| Growth of Manufacturing Output | 0.77 | 4.54 | 0.00 | | |
| Standard Error | 3.35 | | | | |
| R Square | 0.60 | | | | |
| Adjusted R Square | 0.57 | | | | |
| **ANOVA Statistics** | | | | | |
| | ***DF*** | ***SS*** | ***MS*** | ***F*** | ***P-Value*** |
| Regression | 1 | 231.74 | 231.74 | 20.60 | 0.00 |
| Residual | 14 | 157.51 | 11.25 | | |
| Total | 15 | 389.25 | | | |

*A regression analysis of the growth of productivity in manufacturing with the growth of manufacturing sector output for the years 2000-2018.*

### *Interpretation of Kaldor's Third Law*

Table 4 reports the estimated model results of equation (3) related to Kaldor's third law. The growth of productivity in the non-manufacturing sector is regressed on the growth of manufacturing output. The results from table 3 reveal that the coefficient of growth of manufacturing output is positive and statistically significant. Thus, validating Kaldor's third law as well in the case of Kazakhstan's economy. More specifically, a unit change in manufacturing output growth increases productivity in manufacturing by 0.60 percent.

*Table 4: Kaldor's Third Law: Relation between the growth of manufacturing output and growth of productivity in other sectors*

| Dependent Variable Growth of Productivity in Other Sectors | | | | | |
|---|---|---|---|---|---|
| | ***Coefficients*** | ***T - Stat*** | ***P-value*** | | |
| Constant | 1.71 | 1.76 | 0.10 | | |
| Growth of Manufacturing Output | 0.60 | 4.54 | 0.00 | | |
| Standard Error | 2.63 | | | | |
| R Square | 0.60 | | | | |
| Adjusted R Square | 0.57 | | | | |
| **ANOVA Statistics** | | | | | |
| | ***DF*** | ***SS*** | ***MS*** | ***F*** | ***P-Value*** |
| Regression | 1 | 142.52 | 142.52 | 20.60 | 0.00 |
| Residual | 14 | 96.86 | 6.92 | | |
| Total | 15 | 239.39 | | | |

*Regression analysis of productivity growth in non-manufacturing concerning manufacturing sector output growth for the years 2000-2018.*

## Conclusion

Kaldor's growth laws, which appear controversial in some instances, often help theoretically and in empirical economic analysis. The practical method applied in this research to investigate the significance of Kaldor's growth laws has produced clear evidence that the manufacturing sector is the main driver for Kazakhstan's economy. Moreover, apart from the sector in question contributing the most to the GDP growth levels, it has a significant impact on the rest of the economy. The three laws mainly apply in dualistic economies. The transfer of labor to productive sectors of the economy from less productive sectors (service and agriculture) will not lead to a loss of output.

Our results imply that a comprehensive and all-around development of the manufacturing sector should be prioritized to ensure a stable and sustainable growth trajectory. The manufacturing sector has its spill-over effects on the remaining sectors of the economy.

### Notes

1. The data period is decided based on availability.

### References

Acemoglu, D. (2007). *Introduction to Modern Economic* Growth. USA: Massachusetts Institute of Technology.

Alexiou, C., & Tsaliki, P. (2010). An Empirical Investigation of Kaldor's Growth Laws: Evidence from the Mediterranean Region. *The Quarterly Journal of the Indian Economic Association, 58*(3), 144-155.

Bairam, E. (2006). Economic growth and Kaldor's law: the case of Turkey, 1925–78, *Applied Economics, 23*(8)*,* 1277-1280*,* DOI: 10.1080/00036849100000048

Constantinos, A. & Tsaliki, P. (2010). An empirical investigation of Kaldor's growth laws: Evidence from the Mediterranean region. *The Indian Economic Journal*: *the quarterly journal of the Indian Economic Association, 58*(3): 144-155. Doi 10.177/0019466220100309.

Cornwall, J. (1977). *Modern Capitalism: Its Growth and Transformation*. London: Martin Robertson.

Kaldor, N. (1966). Causes of the Slow Rate of Economic Growth of the United Kingdom, an inaugural Lecture. Cambridge: Cambridge University Press.

Kebede G. S. (2020). Manufacturing Sector in the Ethiopian Economy: An Empirical Test of Kaldor's Growth Hypothesis

Keho, Y. (2018). Economic Growth of ECOWAS Countries and the Validity of Kaldor's First Law. *Journal of Global Economics, 6*(2), 1-6.

Lankausklene, T., & Tvaronavlclene, M. (2013). Economic Sector Performance and Growth: Contemporary approach in the Context of Sustainable Development. *Intellectual Economics, 7*(3), 355-374.

Libano, G., & Moro, S. (2011). Manufacturing Industry and Economic growth in Latin America. Anais do XXXVII Encontro Nacional de Economia [Proceedings of the 37th Brazilian Economics Meeting] 86, ANPEC - AssociaÃ§Ã£o Nacional dos Centros de PÃ³s-GraduaÃ§Ã£o em Economia [Brazilian Association of Graduate Programs in Economics].

Mamgain, V. (1999). Are the Kaldor-Verdoorn Laws applicable in the newly industrializing countries? *Review of Development Economics*, *3*(3), 295-309.

McCombie, J. (1983). Kaldor's Laws in retrospect. *Journal of Post Keynesian Economics, 5*, 414-429.

Mulungu, K., & Ng'ombe, J.N. (2017). Sources of Economic Growth in Zambia, 1970–2013: A Growth Accounting Approach. *Economies*, *5*(2), 15.

Necmi S. (2010). Kaldor's growth analysis revisited *Applied Economics Journal, 31,* 653-660. Doi 10.1080/000368499324093.

Pons-Novel Jordi, Elisabet Viladecan-Marsal. (1999). Kaldor's laws and special dependence: evidence for the European regions. *Regional Studies*, *33* (5), 443-451.

Stoneman, P. (1976). Kaldor's Law and British Economic Growth: 1800-1970, *Working Economics Research Paper No. 93.*

Thirlwall, A.P. (1983). A plain man's Guide Kaldor's growth laws. *Journal of Post Keynesian Economics*, *5*(3), 345-358.

Verdoorn, P.J. (1980). Verdoorn's Law in Retrospect: a comment. *Economic Journal, 90*(358), 382-385

Yamak, R., Erdem, H.F. & Kocak, S. (2016). A Re-Examination of Kaldor's Engine of Economic Growth Hypothesis for the Turkish Economy. *Economica, 12*(4), 247-357.