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An Empirical Assessment of the Relationships between the Manufacturing Sector, Economic Growth and Changes in Price Indexes: The Case of Poland

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The manufacturing sector, as a traditional economic sector, is still the backbone of the economies of many countries around the globe. The sector contributes as much as 16.9 percent to global employment, 15.7 percent to global GDP and had a growth rate of 1.9 percent in 2017. The focus of this study is on the manufacturing sector in Poland. Manufacturing in Poland, an upper-middle income country, is also still the dominating economic sector in the country, contributing 17.6 percent to GDP and had a growth rate of 6.1 percent in 2017. The primary aim of the study was to analyse the causal relationships between the manufacturing sector, economic growth, and changes in price levels (CPI, PPI and PMI) in Poland. A quantitative methodology was used in an econometric time series analysis of the relationships between the variables. The results of the analysis confirmed both long and short-run relationships between the variables. It was also established that all the independent variables caused changes in the manufacturing sector. Conclusions were listed based on the analysis and include the importance of the industry for economic growth and the impact of changes in prices should be limited as it has a negative impact on the main sector.

Key words: *Econometric analysis, economic growth; manufacturing, Poland, price indexes.*

Introduction

On a global scale, manufacturing is still an important sector and the sector is a major contributor to economic growth (Zalk, 2014). An innovative and expanding manufacturing

sector is still seen as a significant forecaster for economic growth (Rodseth, 2016; Leke et al., 2010). In Poland specifically, the manufacturing sector's contribution to GDP has been increasing since the beginning of the 2000s, from 14.3% in 2004 to its current level of 17.6% of GDP. Compared to the Polish situation, the global contribution to GDP has declined from 17.3% in 2004 to 15.6% in 2018 (World Bank, 2018). Since the early 1990s, Poland has grown to be one of the world's leading manufacturing economies. According to UNCTAD, (2015), Poland had the 18th largest manufacturing output in the world, with an output of $100 billion. China and the US had the highest outputs, of $2010 billion and $1867 billion respectively. The leading European country was Germany, with $700 billion worth of manufacturing output. For Poland, the percentage contribution of manufacturing to the national output was 20%, compared to 23% for Germany and only 11% for France. Poland contributed only 1% of global manufacturing while Germany contributed 7%. On a global scale, Poland has the highest percentage of the population employed in the manufacturing sector, with a total of 20.2% with 3.54 million people working in this sector. Germany has the second highest percentage of the population in manufacturing of 19%, followed by Italy with 18.5% (International Labour Organization (ILO), 2017).

Economists regularly speculate about the relationships between the manufacturing sector, economic growth and changes in price indexes such as inflation or consumer price index (CPI), producer price index (PPI) and the purchasing managers' index (PMI). All three prices indexes are seen as predictors of general economic activities in the business cycle of an economy, but each variable has a different focus in the economy. During periods of economic growth and expansion, such economic activities could lead to an increase in demand for employment, leading to rising levels of income and increased consumer demand and expenditure on goods and services. In fast growing economies, demand usually outperforms supply, and such a situation usually results in rising prices indexes and instability, with higher levels of inflation due to higher production costs and demand (IHS Markit, 2017). The research question that is under investigation in this research is focused on the inter-relationships between the predicting index variables of CPI, PPI and PMI and the impact and relationship with the manufacturing sector with its associated economic growth effects. The overall objective of the study is therefore to determine the relationships between all the variables, including the performance of the manufacturing sector, economic growth and price indexes. This study is significant in that limited studies have analysed these variables together. This study analysed the situation in Poland. This country has experienced rapid growth over the last two decades.

Fourie and Burger (2017), defined CPI as "the general, continuous and sustained escalation in price levels of services and goods in an economy." According to Mohr (2001), the CPI is one of the most commonly used economic indicators and the CPI is used to calculate inflation rates on a monthly basis. In addition to CPI, according to Dornbusch et al., (2014), PPI is also

used as a measurement of the cost of a basket of goods, similar to CPI. But, PPI is different to CPI as it has a more limited and different range of goods included in the measurement. The PPI includes only raw materials and semi-finished goods and measures goods in the early stage of the distribution and supply chain system. Mohr (2001) states that PPI is also estimated on a monthly basis and measures the price level of the "first significant commercial transaction." Prices of manufactured goods are for example measured where they leave the factory. PPI is therefore different to CPI, as it measures the cost of production, whereas CPI measures the cost of living. According to Mohr (2001), the link between CPI and PPI is that changes in PPI indicate possible movements or changes in CPI.

The (PMI) is seen as an important index which could predict changes in the manufacturing sector. The index is scrutinised by central banks and and economists (Khundrakpam & George, 2013; Ursel, 2008). The PMI is defined as a composite index with a focus on the manufacturing sector, analysing changes in activities and conditions (Chien & Morris, 2016; Kuepper, 2016; Buro of Economic Research, 2015; Soni, 2014). The PMI is measured on a scale between 0 and 100, and when the index is above 50, this usually indicates possible expansion of the sector, while a value of below 50 indicates contraction in activities (Barnes, 2015).

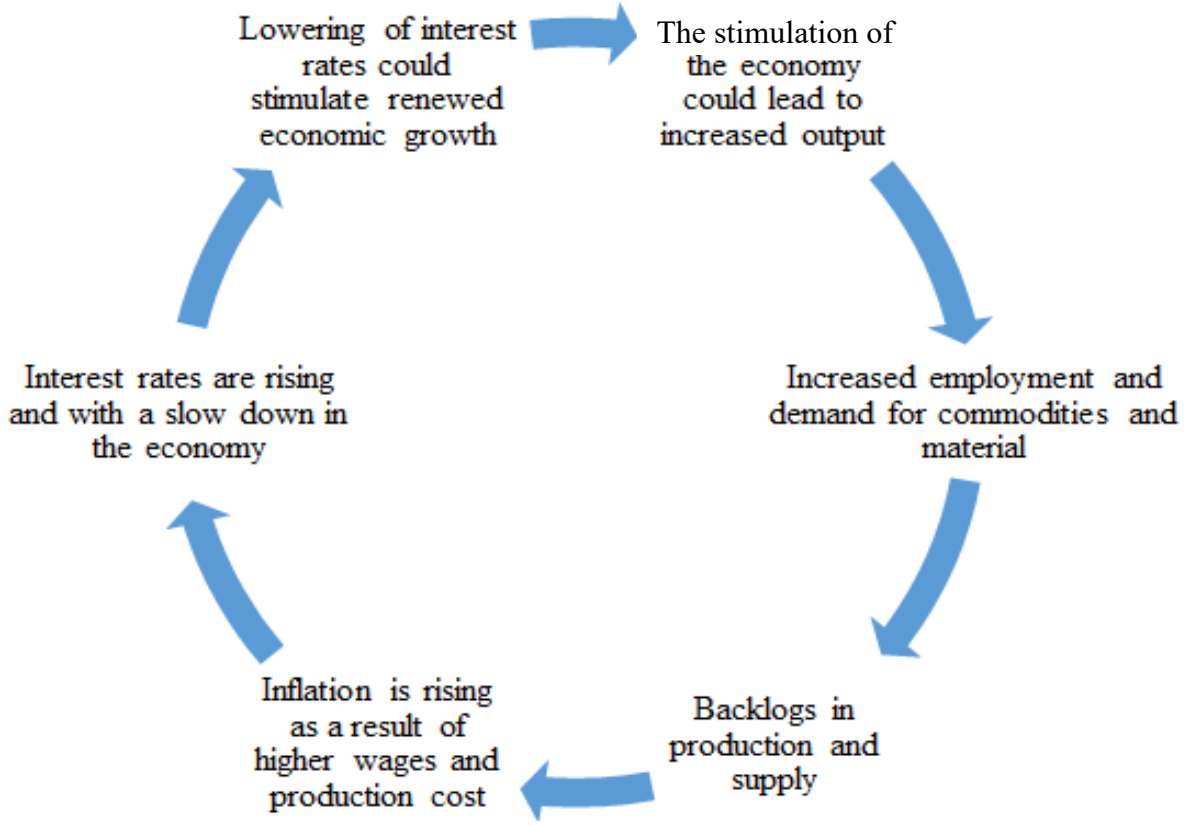
In addition, Aprigliano (2011) states that PMI provides timely information on the spread of improvement or deterioration of business conditions. Purchasing managers are surveyed on their short-run purchases and production conditions and decisions and could therefore be classified as a leading economic indicator (Khundrakpam & George, 2013; Pelaez, 2003; Tsuchiya, 2012). One of the main reasons for the importance of the PMI with its association with the manufacturing sector is the linkages with the important primary and secondary sectors, allowing also for forward and backward linkages. According to Laubscher (2003), the relationship via correlation is significant between the two variables, PMI and the manufacturing sector.

Literature Review

According to IHS Markit (2017), the relationship between the performance in output of the manufacturing sector, economic growth, and price indexes (CPI, PPI and PMI) is well explained by means of the patterns of "boom-bust" business cycles within any economy. Figure 1 provides a summary of this process. Economic growth and expansion usually lead to demand for more jobs and increases in income. This higher level of income gives rise to increased demand for commodities and raw material (Popp, Oláh, Farkas Fekete, Lakner, & Máté, 2018). The higher level of demand from consumers leads to higher levels of supply by firms. Output will increase as firms produce more to supply in the demand. Due to the rising demand, it is expected that prices of goods and services could increase. This rise in demand

could be accompanied by rising wages and subsequent increases in inflation. The rising pressure on wages has a negative impact on production costs. With the inflation rising, the possibility of interest rate increases is a reality, which could put brakes on spending and a reduction in growth in the economy.

Figure 1. Boom-bust business cycles



Source: IHS Markit, 2017.

The PMI is an important indicator of general economic conditions and the health of the manufacturing sector as most recessions starts and end in this sector (Barnes, 2017). The PMI is an index between 0 and 100 and an index of 50 for example indicates that an equal number of managers indicated that conditions are better compared to getting worse. A PMI of 50 and above therefore indicates possible expansion of specifically the manufacturing sector (Koenig, 2002). PMI has in the past being used as a prediction indicator for changes in economic output, inflation and manufacturing activity (Lindsey & Pavur, 2005; Tsuchiya, 2012). Various studies have found PMI as an important and significant indicator for the prediction and forecasting of economic growth and changes in manufacturing activities (Kuepper, 2016; Tsuchiya, 2012; Banerjee & Marcellino, 2006). Due to its timeliness, and high density of primary data collection, the index is an important variable in analysing the manufacturing sector (Harris, 1991).

According to Min (2005), the changes in prices (CPI, PPI) processes lags behind the production and consumption process. Changes in the PPI, indicating changes in the production costs, is in most cases the first sign of changes in the economy and specifically in the manufacturing sector. Government and policy makers should follow the trends in this index and make adjustments to policy if needed. The PMI is used by most central banks to assess the direction and strength of economic activity. Khundrakpam and George (2013), analysed the relationship between PMI and the wholesale price index (WPI) for 2005 to 2012. The results indicated that PMI has significant predictive power of the changes in wholesale price index (WPI). De Bondt (2012), also analysed the usefulness of PMI in its predictiveness of the Euro Zone from 2003-2010 and found that PMI surveys are valuable in the assessment of the economy.

Laubscher (2003), has found that in South Africa, PMI and the manufacturing sector has a relatively strong relationship, with a correlation coefficient of 0.83. Chien and Morris (2016), also found a correlation coefficient of 0.75 and 0.73 between economic growth and PMI in the US and China respectively. According to Soni (2014), the PMI has the capabilities to possibly predict changes in the manufacturing sector and is seen as a leading indicator for the economy in general but also for the manufacturing sector (Rodseth, 2016). This statement by Rodseth is confirmed by Harker (2017), in a study in Spain from 2006 to 2017 and also by a study by Khundrakpam and George (2013), in India from 2005 to 2012. Banerjee and Marcellino (2006), tested the relationship between PMI, inflation and economic growth in the US and found significant long and short-run relationships between the indicators. Rossiter (2010), analysed the relationships between global quarterly economic output, imports, and PMI. The results of the study indicated that the PMI is valuable in predicting changes in the economy, but is mostly valuable for short-term forecasting. Paterson (2014), analysed the relationship between inflation and PMI in the UK and found that PMI was causing changes in CPI on the short-term.

Liping, Gang and Jiani (2008), investigated the relationship between CPI and PPI in China from 2001 to 2008. The methodology used in the study was a Granger-causality model and the results indicated that movement in CPI causes changes in PPI. PPI reacted to changes in CPI on the short-run, with a 1-3- month time lag. This result indicates that demand-side factors are more dominating than supply-side factors in the Chinese economy. In addition, Akcay (2011), also investigated the CPI and PPI relationship in selected European countries from 1995 to 2007, also using a Granger causality test. The study had interesting results in that the results were different for the countries involved. Some countries indicated a uni-directional causality from PPI to CPI, while other countries presented a bi-directional causality between the two variables. Lastly, Caporale, Katsimi and Pittis (2002), also tested this relationship in the G7 countries, employing a causality testing method with results confirming a uni-directional causality from PPI to CPI.

Tiwari (2012), analysed the relationship between PPI and CPI in Australia from 1969 to 2010. The findings suggest that CPI Granger-causes PPI. CPI is therefore a leading indicator for PPI. Fan, He, and Hu (2009), stated that the CPI and PPI are interrelated but significantly different concepts and tested the relationship between the two concepts in China from 2001 to 2008. The results are again interesting in that CPI Granger causes changes in PPI with a lag of about1-3 months. This result indicates that in the Chinese economy, demand-side factors have played a more important role than supply-side factors on price impacts. Ghazali, Yee and Muhammad (2008), also examined the relationship between CPI and PPI in Malaysia with data from 1986 to 2007. It was found that a long-run equilibrium relationship exists between these two variables, and that the Toda-Yamamoto causality tests indicated a uni-directional causality running from PPI to CPI. Su, Khan, Lobont, and Sung (2016), in a study in Slovakia, also analysed the importance of the relationship between PPI and CPI. The results from a Granger causality analysis indicated causality from PPI to CPI and therefore, the central bank have improved control over inflation by attempting to keep production input prices under control. Tiwari, Suresh, Arouri, and Teulon (2014), also examined this relationship for Mexico. In the case where causality runs from PPI to CPI, the phenomenon of cost-push inflation exists, while vice versa, demand-pull inflation could exist. The results from the study indicate that over the short-run (1 to 7 month's scale), CPI is leading PPI, while over the long-run (8 to 32 months scale), PPI is the leading variable.

In conclusion, literature on the relationships between the selected indexes is available for a large number of countries using different methods with different results. Findings from the literature indicate that PMI is a leading indicator that can be successfully utilised to predict changes in other indexes and macro-economic indicators regarding the general economic conditions, but more specifically the manufacturing sector. Other researchers have also confirmed that PPI could in most cases cause changes in CPI. The general consensus from the literature is therefore that the order of causality affecting changes in the general economy and specifically the manufacturing sector is as follows: PMI causes PPI to change which causes CPI to change.

Research Methodology

This study follows a quantitative research methodology and uses monthly time series data for the period 1995 to 2018. The data for all of the variables were retrieved from Statistics Poland (2019), OECD (2019a), Trading Economics (2019) and St. Louis Fed (2019) data bases. The variables included in the analysis are:

Manufacturing Production Index (MANIX): The dependent variable of the study is the production index of the manufacturing sector.

Gross domestic product (GDP): The GDP is the total value of all final services and goods that were produced in a country during a specific period of time (Tucker, 2011).

Consumer Price Index (CPI): The CPI is an index that measures changes in prices on a monthly basis for a range of consumer products (StatsSA, 2019).

Production Price Index (PPI): PPI is the measurement of changes "in the prices of goods either as they leave their place of production or as they enter the production process" (OECD, 2019b).

Purchasing managers' index (PMI): The PMI includes components such as inventory levels, new orders, production, supplier deliveries and employment status of businesses in the manufacturing sector (IHS Markit, 2017).

These variables were chosen given their significant forecasting value in the economy and the relationship that might exist amongst the variables. Numerous econometric models and approaches exist to determine or test long-run effects amongst economic and time series variables. During the last few decades, the impact of works of scholars such as Engle and Granger (1987), Johansen (1988), and Pesaran and Shin (1998) are recognised in the econometric field. Nonetheless, to achieve the objective of this study, the Autoregressive Distributed Lag (ARDL) model, introduced by Pesaran and Shin (1998) and revised by Pesaran *et al*. (2001), was chosen. The choice of this model was made based on the numerous advantages of the model. Firstly, the ARDL model has the ability to simultaneously estimate the long and short-run relationships. Secondly, it can be applied to variables that have a mixture of stationary, both I(0) and I(1). Thirdly, the ARDL model allows the utilisation of different numbers of optimum lags. In this process the Bounds test for cointegration is used to test for the existence of a long-run relationship amongst variables. The short-run relationship was determined and tested via an error correction model (ECM). Lastly, the causal relationships between the variables was tested by means of a Granger causality test.

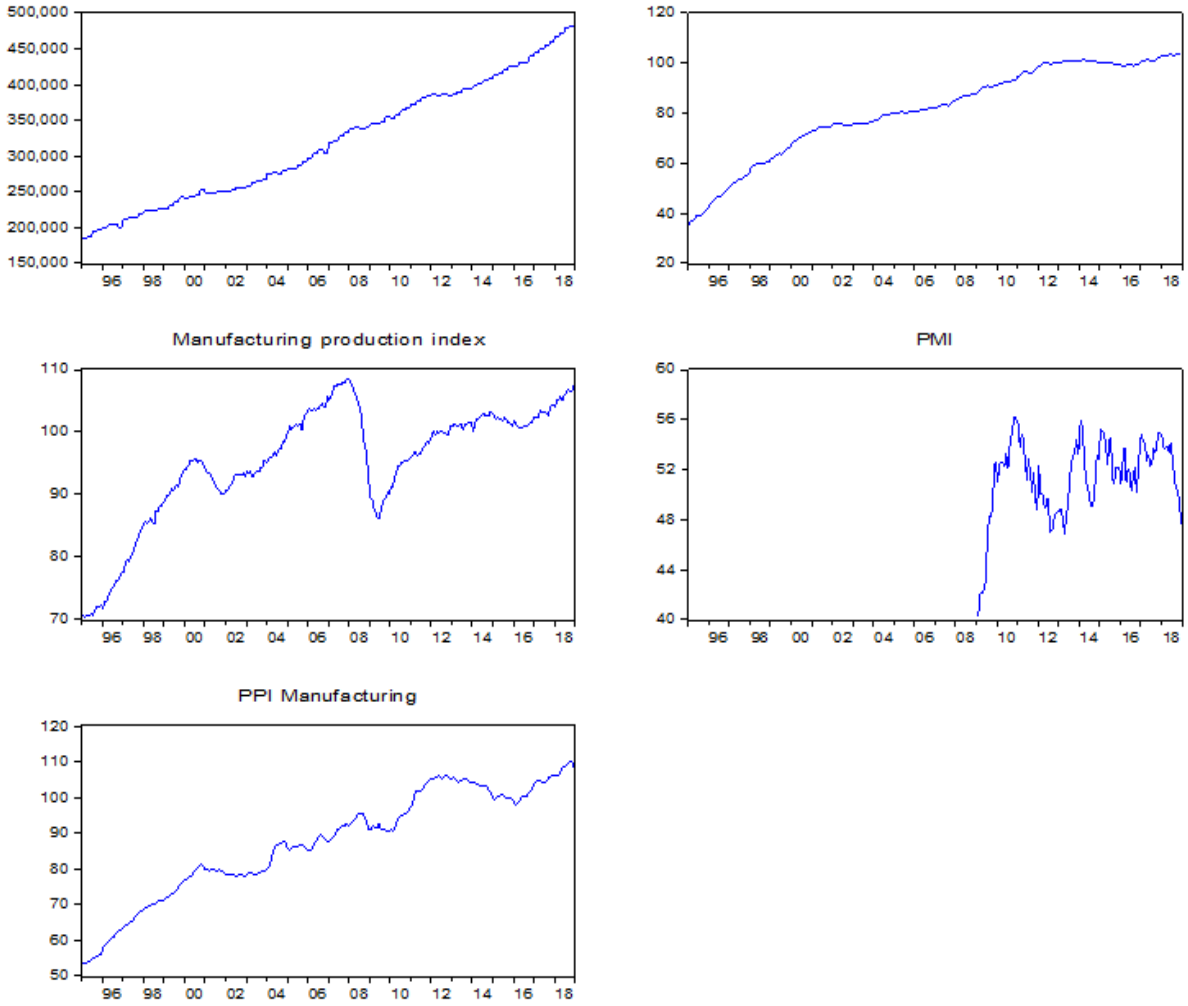
In the analysis via an econometric methodology, all variables were transformed into natural logarithms in order to simplify the explanation of outcomes from the model. A systematic process was followed in the econometric analysis starting with trend analysis and correlation, followed by unit root tests (Augmented Dickey-Fuller (ADF) method) (Ouattara, 2004). Due to the mixture of stationarity of variables, the ARDL model was used to test for cointegration (Dritsakis, 2011). The following model was estimated to determine the long-run relationship:
$LMANIX_t = \alpha_0 + \sum_{i=1}^{k} \beta_i \ LMANIX_{t-i} + \sum_{i=1}^{k} \delta_i \ \mathrm{LGDP}_{t-i} + \sum_{i=1}^{k} \theta_i \ \mathrm{LCPI}_{t-i} + \varphi_1 LPPI_{t-i} + \varphi_2 \mathrm{LGDP}_{t-i} + \varphi_3 \mathrm{LPMI}_{t-i} + e_t$ .....(1).

The $lMANIX_t$ indicates possible changes in manufacturing production at time t, LGDP, LCPI, LPPI and LPMI also indicate changes in GDP, CPI, PPI and PMI at time t. The α_0 denotes the intercept, k represents the optimum number of lag, whilst e_t stands for error term. β_i , δ_i and θ_i indicates the short-term model dynamism. In Equation (1) the long-run coefficients are represented by φ_1 , φ_2 , φ_3. It is expected that all of the independent variables (GDP, CPI, PPI and PMI) should have a positive relationship with the manufacturing sector. This means that the value of coefficients δ_i *and* θ_i are likely to be positive; thus $\delta_i > 0$ and $\theta_i > 0$.

Results

Figure 2 is a visual presentation of the variables using raw data with monthly data from 1995 to 2018. Poland has had constant strong growth in GDP from 1995 to 2018, with average growth exceeding 4% per annum. GDP growth was not even significantly affected during the 2008 to 2009 global financial crisis. Regarding manufacturing production output, the country achieved rapid growth from 1995 to 2000, but had a negative period for production from 2000 to 2002. A second period of rapid growth followed up to mid-2007, but production was severely negatively affected by the financial crisis up to mid-2009. However, the manufacturing sector bounced back quickly up to 2013, but again experienced a slow growth period up to 2016, but fast growth continued up to 2018. The trends as indicated in the PPI graph clearly follows the trends of the manufacturing production index, indicating a strong visual correlation between the two indexes. The CPI graph shows constant increases from 1995 up to 2013, but since 2013 to 2018 the increases in the index have been relatively low and even stagnating. Data for the PMI was only used from 2008 and the graph indicated rapid improvement up to 2011 above an index of 56. This period was followed by a negative period up to 2013 with a low point in the index of below 48. Since then the index has been volatile with many ups and downs in the graph, ending at below the index of 50 threshold with a downward trend.

Figure 2. Trends analysis of variables from 1995 to 2018



Sources: Statistics Poland (2019), OECD (2019), Trading Economics (2019) and St. Louis Fed (2019)

Table 1 is a summary of the correlation analysis with correlation coefficients and p-values. From the table, the results confirmed positive and statistical significant relationships between all of the variables included in the study. Similar results were also confirmed by Laubscher (2003) and Kuepper (2016) in studies using similar variables. Of all the coefficients, the coefficients between CPI and MANIX and between PPI and CPI were the highest, while that between PMI and PPI was surprisingly the lowest.

Table 1: Correlation analysis

Variables	MANIX	GDP	CPI	PPI	PMI
MANIX	1.0000				
GDP	0.8626 [0.0020*]	1.0000			
CPI	0.9649 [0.0018*]	0.8178 [0.0026*]	1.0000		
PPI	0.8635 [0.0035*]	0.6891 [0.0076*]	0.9120 [0.0019*]	1.0000	
PMI	0.4479 [0.0085*]	0.3841 [0.0262*]	0.3559 [0.0187*]	0.2294 [0.01178]	1.0000

Notes: [ ] indicates the p-value and * denotes the rejection of the null hypothesis at 5% level of significance.

As part of the process to determine the type of econometric model to be used, unit root tests were performed to determine the level at which the variables are stationary. The Augmented Dicky-Fuller (ADF) test was performed for unit root testing. Table 2 is a summary of the outcomes of the tests. As indicated, the variables under investigation comprise of I(0) and I(1) variables, supporting the choice of the use of an ARDL model for cointegration analysis, indicating a mixture of unit root test, with only LGDP and LCPI integrated at first difference [I (1)].

Table 2: Unit root test results using ADF testing

Variables	Level I(0)		First difference I(1)		Outcome
	t-stat	p-value	t-stat	p-value	
LMANIX	-2.9012	0.0464*	-4.0828	0.0012*	I(0)
LGDP	-0.4729	0.8929	-4.0163	0.0016*	I(1)
LCPI	-2.0083	0.2832	-3.1407	0.0248*	I(1)
LPPI	-3.3520	0.0135*	-9.2365	0.0020*	I(0)
LPMI	-3.7987	0.0038*	-10.4790	0.0038*	I(0)

Note: * denotes the rejection of the null hypothesis at 5% level of significance

The next step in the process was to estimate the lag selection for the model. The Akaike Information Criteria (AIC) top 20 model for lag selection indicated a model with the following lags, (1,0,0,1,0) in an ARDL model. Table 3 indicates the ARDL Bounds test for co-integration. For this study, the Bounds test results indicate an F-value of 5.7674. This value is greater than the upper bound of the critical value at 5 percent significance. This result therefore confirms the existence of a co-integrating and long-run relationship amongst the variables, and therefore the null hypothesis of no co-integration is rejected.

Table 3: ARDL Bounds Test results

The estimate F-value: 5.7674		
Critical Value	**Pesaran *et al.* (2001) Table values**	
	Lower Bound Value	Upper Bound Value
1%	3.81	5.10
5%	2.91	4.12
10%	2.52	3.49

Note: The table of unrestricted intercept without trend table was used for critical values (Pesaran *et al.,* 2001).

Equation (2) presents the long-run results. It is noted that all of the dependent variables, (LMANIX) has positive relationships with all of the independent variables included in the model. For the equation, it could be concluded that if LGDP increased by one percent, the manufacturing index (LMANIX) could possibly grow by approximately 0.13 percent. This part of the equation confirms the overall positive relationship between the two important economic variables. The manufacturing sector is still one of the main drivers of the economy as confirmed by Meyer and Tasci (2012) and Dumitrescu *et al*. (2009). When the three price indexes are compared with regards to their impact or effect on LMANIX, the equation indicated surprisingly that LCPI has a higher impact than both LPPI and LPMI. Equation (2) is listed as:

$LMANIX_t$= 1.3911 + 0.1289*LGDP + 0.6956*LCPI + 0.1695*LPPI + 0.2148*LPMI ….(2)
The next phase in the process is to estimate and test for short-run relationships between the variables by using an Error Correction Model (ECM). As illustrated in Table 4, which indicates the short-run results, all of the variables are significant predictors of manufacturing production in the short-run, except for LPPI. Any disruption in the model could make an impact on the equilibrium and takes approximately 4.3 months to move back to equilibrium.

Table 4: Results of short-run relationships and Error Correction Model (ECM)

Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
D(LGDP)	0.0212	0.0111	1.9097	0.0487*
D(LCPI)	0.1625	0.0581	2.7934	0.0061*
D(LPPI)	0.0240	0.0849	0.2830	0.7777
D(LPMI)	0.0501	0.0092	5.4257	0.0006*
CointEq(-1)	**-0.2336**	**0.0398**	**-5.8675**	**0.0009***

Note: * rejection of the null hypothesis at 5 percent level of significance.

Table 5 is a summary of the VAR Granger causality test with P-values indicating short-run causality relationships between all the variables. Regarding the main dependent variable, namely the manufacturing production index, all of the independent variables do cause

changes in the dependent variable. Interesting results were found when GDP is the dependent variable, none of the other variables cause changes to GDP on the short-run. CPI is caused to change by GDP and PPI only, while PPI as a dependent variable is only affected by CPI on the short-run. Lastly, PMI is also not affected by any of the other variables in this study.

Table 5: VAR Granger causality test results (P-values)

	Dependent variables					
Independent variables		LMANIX	LGDP	LCPI	LPPI	LPMI
	LMANIX	----------	0.8688	0.1056	0.2039	0.9563
	LGDP	0.0461*	--------	0.0956**	0.1456	0.9567
	LCPI	0.0399*	0.7785	--------	0.0004*	0.5800
	LPPI	0.0975**	0.8309	0.0053*	--------	0.1275
	LPMI	0.0012*	0.1693	0.7025	0.0372*	--------

Notes:* rejection of null hypothesis at 5% level of significance
**rejection of null hypothesis at 10% level of significance

A number of diagnostic tests were utilised to test for reliability and stability of the model. Table 6 shows results of tests of the three different tests. The null hypotheses for all of the tests could not be rejected with probability values higher than 5 percent level of significance.

Table 6: Diagnostic test results tests

Item	**Applied test**	**P-value**	**Decision**
Serial Correlation	Breusch-Godfrey LM test	0.1327	No Serial correlation
Normality	Jarque-Bera probability test	0.1527	Variables normally distributed
Heteroscedasticity	Breusch-Pagan-Godfrey test	0.5122	No Heteroscedasticity

Note: *null hypothesis rejected at 5 percent significance level of significance

Conclusion

The manufacturing sector is of significant importance in Poland due to its contribution to national output and employment. This study had its focus on the manufacturing sector and the sectors relationships with independent variables including GDP, CPI, PPI and PMI in the Polish economy from 1995 to 2018. The causality between all of the variables were also analysed. A cointegrating long-run relationship was found amongst the variables, the series with manufacturing production in Poland as the dependent variable with CPI having higher coefficients than GDP, PPI and PMI. The ECM confirmed the long-run quality of the equation, but also indicated that all of the independent variables had a significant relationship with the manufacturing sector, except PPI, with CPI again having the highest coefficient. In

addition, causality tests were also performed and the outcomes revealed interesting results: firstly, all of the independent variables caused changes in the manufacturing sector with PMI having the lowest p-value of 0.0012. Also, GDP and PPI caused changes in CPI, while PMI causes changes in PPI.

The relationships between manufacturing, GDP, CPI, PMI, and PPI are important in formulating economic policies. Interesting to note from this study is that the results are mostly what were expected and what were found during the literature review process. Findings from the literature indicate that PMI is a leading indicator that can be successfully utilised to predict changes in other indexes and macro-economic indicators regarding the general economic conditions (Máté, Oláh, Laknern, & Popp, 2017), but more specifically the manufacturing sector (Lakner et al., 2019). Other researchers have also confirmed that PPI could in most cases cause changes in CPI. The general consensus from the literature is therefore that the order of causality is as follows: PMI causes PPI to change, which causes CPI to change. In this study on the Polish situation, it was found that the causality between the variables are similar to the literature review. PMI do predict changes in the manufacturing sector and the PPI, while PPI does cause changes in CPI.

The significance, implications and contributions of the research is the confirmation of the importance of relationships between the manufacturing sector, GDP and price indexes, which are both significant in the long and short-run. The study confirmed the critical importance of price indexes and their relationship with other macro-economic variables. The results of this study indicate that more research is needed on the relationship between these variables and also other variables could be introduced. The study has interesting and significant impacts for macro-economic and monetary policy formulation. Each country is unique and has different set relationships between economic variables. Finally, it can be concluded that economic indexes are still important predictors for economic conditions, but causality between variables differs from region to region. A growth and development strategy to facilitate improvements in the manufacturing sector is important for rapid, sustainable economic and employment growth. The manufacturing sector is the economic sector with in most cases the strongest forward and backward linkages with multiplier effects. Incentives are indicated for improved production and productivity, advances in innovation, employment and exports incentives. Continued research on the manufacturing sector, which is still one of the main sectors in the economy, where the majority of recessions and growth periods, is needed.

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