

# Labour Migration into Malta and the Effect on the Maltese Economy

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**Abstract:** Labour migration is a significant and yet still uncharted phenomenon in the context of the Maltese islands. This paper will examine the extent of the existence of the relationship between foreign workers and a set of macro-economic variables. Based on secondary data, time series data covering a 12-year period from 2006 to 2017 are used to establish and quantify the impact of inward labour migration onto the macroeconomic variables that make up the Maltese economy. These are tourism, minimum wage, gross domestic product, government expenditure, government revenue, the number of yearly crimes, total population, air pollution, unemployment rate, inflation, property prices, and inward foreign direct investment. The Pearson Correlation Coefficient is utilized to determine the association between the independent and the dependent variables and Simple Linear Regression to statistically estimate and quantify the correlation between the dependent and each independent variable. Results show that 11 out of the 12 macroeconomic variables have a statistically significant correlation with the increase of foreign workers as operationalized through the population of foreign workers. While the most statistically significant relationship was observed between foreign workers and the population, the least statistically significant relationship was observed between foreign workers and government revenue.

**Keywords:** Maltese economy, inward labour migration, foreign workers, economic impact

## Historic Perspective of the Maltese Context

Upon gaining independence in 1964, local governments started introducing innovative industries since the main pillars of the Maltese economy, at the time being the British services and the naval dockyard, had downsized their operations in Malta. Until the new sectors started to reap economic benefits, unemployment rates soared alarmingly, so much so that a United Nations study had suggested that the only practical solution for the long-term economic development of Malta was mass emigration (Stolper, Hellberg, and Callander 1964).

Along the years, the Maltese economy strengthened and its economic accomplishments transformed the perception of Malta and started attracting foreign workers. In 2000, the total foreign working population coming from EU member states stood at 900, a figure considerably lower than that of third-country nationals. By the time Malta joined the EU in 2004, the total population of workers from third countries had risen by 35.8%, still surpassing the total number of EU workers. The trend and proportionality among the foreign workers' nationalities changed drastically in the first three years of Malta's

membership in the EU. Statistics show that, had migration to Malta not occurred following Malta's accession to the EU, the working population in Malta would have declined by 1% (National Statistics Office 2015).

Since the 2008 economic crisis, local employment opportunities have been equally apportioned between Maltese and foreign workers. Whilst it is evident that the foreign workforce is heterogeneous in terms of its occupational composition, the majority of these employments involved technical staff, managers, and professionals. The engagement of foreign workers in fundamental corporate positions increased the probability for European workers to be absorbed in either managerial or clerical positions to more than twice that of Maltese workers (Grech 2016).

## Purpose Statement

In recent years, international labour migration and labour diversity have attracted the substantial attention of academics and literature; however, no consensus has been reached over the consequences of international migration, since significant studies presented contradictory conclusions (Borjas 2014; Fenech 2016; Peri 2012; Somerville and Sumption 2009). With a total population nearly double the figure of 100 years ago (National Statistics Office 2012), Malta ranks as the most densely populated country within the EU and is categorized amongst the most heavily populated countries in the world (Government of Malta 2015). The aim of this quantitative correlational study is to analyse how and to what extent foreign workers affect Malta's major macroeconomic variables through the conceptual framework illustrated in Figure 1.

## Research Objective

The study aims to assess the impact of foreign workers on a set of macroeconomic variables that contribute to the making of the Maltese economy over a 12-year period through the use Pearson Correlation Coefficient and Simple Linear Regression. The motivation behind this theme rests on the importance this topic has gained over the years, with the intent to uncover and redound exclusive results.

## Literature Review

### Macroeconomic Factors Affected by the Foreign Working Population

As a complex phenomenon, labour migration may influence various sectors and elements of host countries, similar to El-Bahlawan and Al-Maadeed's (2018) study where the macroeconomic variables of Saudi Arabia as a host country were used to determine the impact of foreign workers. This study investigated the impact of foreign workers on Malta by utilizing the country's major macroeconomic variables.

## Tourism

For small countries with limited natural resources, tourism is a major economic industry (Ellul 1999; Liu and Jenkins 1996; McElroy and Olazarri 1997), In Malta too the tourism

industry is a key economic driver and a major comparative advantage (Briguglio 2008), contributing to 27.1% of GDP in 2017 (World Travel and Tourism Council 2018). The nexus between tourism and foreign working populations is well-known; however, this is mainly associated and restricted to the Visiting Friends and Relatives component (VFR), referring to all individuals travelling to visit their friends or relatives that had formerly migrated to another jurisdiction (Feng and Page 2000; Williams and Hall 2002; Boyne, Carswell, and Hall, 2002; King 1994). Literature suggests that that inward migration is one of the main pull factors of the total inward tourist arrivals from the main markets of origin (Backer 2010; Dwyer *et al.* 2010; Seeteram and Dwyer 2009).

## Wages

The effect of inward migration on wages still remains ambiguous because, while a number of studies observe improvements in average native wages (Ottaviano and Peri 2006; Card 2007), others report an overall decline (Borjas 2003; Aydemir and Borjas 2006). The simple laws of demand and supply in economics attest that an increase in labour supply reflects into a reduction in the average wages for native workers in the short term. When labour supply exceeds the demand for labour (Somerville and Sumption 2009), Peri (2009) estimates that a 1% increase in foreign workers leads to a 0.5% growth in average income per worker.

## GDP

Literature suggests that the GDP is the macro-economic variable most affected by foreign labour immigration. Substantial findings from existing literature observe a long-term positive impact from foreign workers towards the host country's GDP in terms of labour-productivity and economic contribution (Peri 2012; Fenech 2016; Zaleha *et al.* 2011). A number of studies suggest that the optimal allotment of foreign labour provides a series of economic benefits to receiving countries, predominantly in efficiency, investment savings, increased financial transactions, and overall domestic expenditure of the country. All these enhance the overall quality of life and living standards of the nation (Somerville and Sumption 2009; Rodrik 2003; Palát 2012).

## Government Expenditure

Government expenditure tends to respond effectively to changes in the supply of workers in a country. Empirical evidence suggests that the relationship between foreign workers and increased government expenditure is positive; that is governments need to make up for the increased demand for state-aid benefits (Borjas 1995; Jensen 1988; Borjas and Trejo 1991). Correspondingly, population surges lead to greater governmental costs relating to congestible public goods, including public infrastructure, military defence, and public safety in order for the country to acclimatize with the changing needs of the economy (Wadensjö 2000; DeVoretz 2006).

## Government Revenue

Empirical evidence shows that the impact of foreign workers on local government revenue is strongly dependent upon the labour market performance of the foreign workers. Theories hold that tax contributions from foreign-born workers reaches a climax at midlife and is lowest at the earliest and latest stages of the human life-cycle (DeVoretz 2006). Accordingly, Simon (1984) suggests that, since foreign workers contribute positively to the treasury, a country is to admit foreign workers until their contribution becomes insignificant.

## Crime

Crime is believed to be a critical economic variable in the context of labour migration. The difference in crime propensities between local and foreign populations has a direct impact on crime rates. According to the economic theory of crime, this stems from the inequalities in the labour market among local and foreign workers (Becker 1968; Ehrlich 1973). Devadason (2013) argues that since foreign workers may be tempted to work in inadequate working conditions, they are easily more prone to be involved in crime to make up for the inadequate earnings. On the other hand, Bianchi, Buonanno, and Pinotti, (2008), Plecas, Evans, and Dandurand (2002), Butcher and Piehl (1998), Albrecht, (1997), and Francis (1981) claim that economic migrants are less involved than locals in criminal activities in Germany, Italy, Australia, Canada, and the United States respectively.

## Population Growth and National Fertility Rate

Labour migration is a fundamental variable that accounts for increases in the total population of the receiving countries. In recent history, migrant-receiving countries, predominantly in Western Europe, have experienced a 0.1% increase in the average fertility rate, as a direct result of population diversity. The difference in the demographic profile and fertility rate among native and foreign populations affects the birth rates of the host country. This may stem from the fact that workers from developing countries would experience an improved standard of living and hence procreate more (Sobotka 2008; Westoff and Frejka 2007). Bloom, Canning, and Fink (2008) suggest that changes in population structure may lead to economic difficulties, particularly due to eccentricities in the age structures. Remarkably, Borjas (2003) argues that the convergence and concentration of foreign populations discourages natives and leads them to migrate to other regions.

## Carbon Dioxide

Pollution is a severe threat to human and environmental health in almost every country in the world (Brennan 1996). Although there are various pollutants, one of the most common is carbon dioxide to which has been attributed adverse impacts on cardiovascular, respiratory, and neurological systems, in addition to the unfavourable effects on agriculture, woodlands, eco-systems, and vegetation. It is argued that population growth increases demand for services operated by non-renewable energy such as transportation, which in the long-term causes highway congestions and encourages deforestation for highway widening, leading to higher pollution proportions (Klasen *et al.* 2010; Grimm and Klasen 2015). Consequently, pressures on natural resources, deforestation and land degradation in destination countries rises (Bremner and Hunter 2014; Fraser 1998; Amelung and Diehl 1992; Kartasubrata 1993; World Bank 1990) for the provision of goods, services, and housing facilities, implying that it would result in increased greenhouse gases and synthetic pollution, causing greater health implications.

## Inflation

It is generally argued that increases in the supply side of labour stimulates economic demand for goods, services, and housing, the demand and supply of which influence regional market prices (Sighvatsson 2007). In fact, elasticities in the labour supply contribute to changing inflationary pressures on domestic economic activity (Engler and Razin 2007). Meanwhile, other studies suggest that inflation is either impacted solely by the short-term temporary patterns of the aggregate demand and supply (Nickell 2010)

or that on the short-term inflationary pressures are eased (Blanchflower, Saleheen, and Shadforth 2007).

## Unemployment

An expansion in the labour supply of a country has a direct impact on the general employment of the whole economic workforce. A study by De Voretz (2006), whose results are also supported by Jimenez and Jean's (2007) study using panel data from 1984 to 2003, shows that foreign workers substitute native workers and prompt unemployment among the local workforce. However, Ortega (2000) shows that labour migration has a positive effect on unemployment, aligning with the findings of Aragonès, Salgado, and Rios (2012) indicating that growth in the number of foreign workers and foreign direct investments in France and the United Kingdom reduced national unemployment rates significantly.

## Property Price Index

Economic migrant population growth has a great impact on property price indexes owing to increased demand for local housing because markets with a high inelastic supply result in inflated prices due to the increased demand from a larger population (Saiz 2007). Although considerable research finds that labour migration and general house prices have a positive association (Ottaviano and Peri 2007; Gonzales and Ortega 2013), or a significant but slight effect (Ayede and Akbari 2012), Sá (2011) shows that labour migration decreased property prices in the United Kingdom; similarly, Accetturo *et al.* (2014) find that house prices in regional areas in Italy suffered reduced price growth as a consequence of foreign populations.

## Foreign Direct Investment

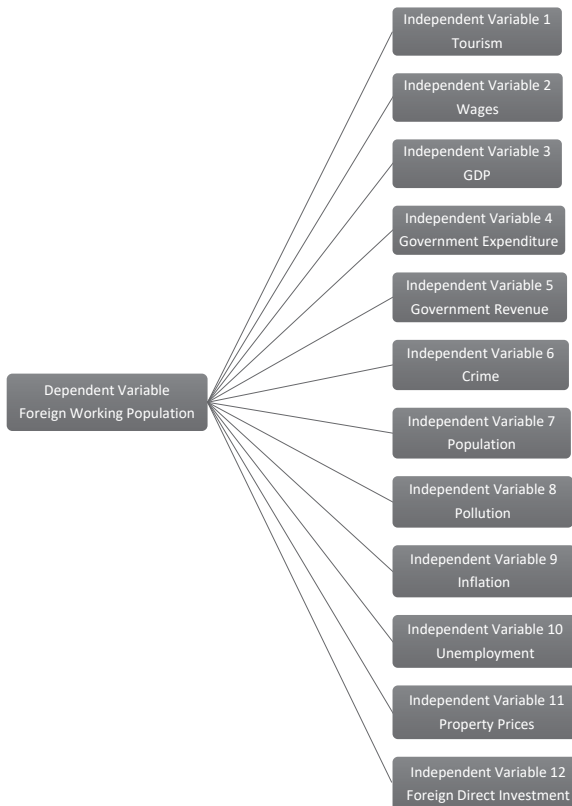
There is abundant theoretical and empirical literature investigating the connection between economic migration and inward foreign direct investments. A clear and positive relationship is observed between increased foreign populations, trade, and inward foreign direct investment (Aroca and Maloney 2005; Buch *et al.* 2006; Kugler and Rapoport 2007; Tong 2005), mainly due to foreign diasporas exerting great demands for their home country products and services (Dubey and Mallah, 2015). Other reputable studies find that highly educated foreign economic migrants have a positive impact on foreign direct investment in host countries (Foley and Kerr 2008; Kugler and Rapoport 2007). Nevertheless, other researchers discover that a negative and significant impact on foreign direct investments (Aroca and Maloney 2005; Foad 2012).

## Substitutability

Whilst it is likely that migrant and local workers have different sets of skills, potential employers are inhibited from putting them on the same level playing field as perfect substitutes. The lack of relevant local experience, cultural knowledge, and language articulatory forces migrants to seek employment in industries that require minimum skills and sectoral cognitive skills (Somerville and Sumption 2009). According to theory *'the impacts of immigration on wages and employment of existing workers critically depend on whether and to what extent migrants' skills are complements or substitutes to the skills of existing workers'* (Ruhs and Vargas-Silva 2012: 3).

## The Conceptual Framework

Founded on local and foreign literature, this study investigates the relationship between the dependent variable, being the foreign working population in Malta, and each independent variable highlighted in Figure 1 through a Pearson Correlation Coefficient analysis and Simple Linear Regression. According to Kelle (2005) and Reichertz (2010), studies based on secondary research should be conducted by exploiting extensive sources of literature and encouraging new ideas without generating new biases. Furthermore, Figure 1 portrays the conceptual framework established for this study.



**Figure 1:** Conceptual Framework

## Methodology

### *Methodology Utilized*

The methodology of this study is based on secondary data, more specifically time-series data of a period of 12 years from 2006 to 2017. This exploratory study is to involve measurements of tangible and countable variables associated with macro-economics. Moreover, the reliability and accurateness of the collected secondary data, obtained from reputable sources, allowed for the Pearson Correlation Coefficient, a measure of strength developed by Karl Pearson in 1948 (Pearson 1994), and the Univariate Regression to be used as the main data analysis techniques.

## Pearson Correlation Coefficient

Pearson's correlation co-efficient measures the direction and strength of the linear association between two variables with a range from -1 to +1. In this study, the relationship between the foreign working population over the years will be evaluated against the macroeconomic variables. Furthermore, the strength of the relationship will be expressed with arithmetical numbers between -1 and 1, where 0 would indicate no relationship, and 1 would indicate a strong and perfect relationship between the two assessed variables (Blecic and Deborah 1999).

## Simple Linear Regression

This univariate regression is a statistical method that estimates the correlation between a dependent variable ( $y$ ) and an independent variable ( $x$ ), mainly to serve three major purposes: description, control, and prediction (Neter *et al.* 1996). Kleivbo (2017) asserts that simple linear regression is a statistical model that provides a numerical description about the variation in one variable in relation to a change in another variable. Furthermore, the relationship between an independent variable ( $x$ ) and a dependent variable ( $y$ ) can be quantified by constructing an equation for a straight line in the form of:

$$y = a + bx + e$$

*Equation 1: General Univariate Regression Model*

The regression parameter  $a$  is the intercept on the  $y$  axis, while the regression parameter  $b$  is the slope of the regression line. The term  $e$  denotes the random error, which is assumed to be uncorrelated; with a mean of 0 and having a constant variance. Moreover, this analysis method is generally utilized to model casual associations, inferencing, hypothesis testing, and predicting of time-series data. In addition, the effect of one variable on the other is estimated through the 'Beta Coefficient', indicating an increase or decrease of ( $y$ ) for every unit of ( $x$ ) (Zou, Tuncali, and Silverman 2003).

## Data Description

The presented literature provided a firm underpinning on various macroeconomic variables that can be affected by economic migrants. These variables were initially analysed to determine their practicality on the local economy and were consequently considered and applied to the local economic spectrum. Subsequently, these variables were examined against the dependent variable to determine whether there is a correlation; assess the corresponding strength if there had been a relationship; and quantify the impact of the dependent variable onto each independent variable.

## The Dependent Variable

The dependent variable which will be investigated in this study is the total population of foreign workers in Malta over 12 years between 2006 and 2017. This variable is projected to affect the economic and social aspects of Malta, hence the Pearson Correlation is to implicitly conclude how the set list of macroeconomic variables are affected by the foreign working population in Malta. Subsequent to the Pearson's Correlation, the Simple Linear Regression is to enumerate the impact of foreign workers on each macroeconomic variable. The data for the total number of foreign workers in Malta was obtained from Jobsplus.

## The Macroeconomic Variables

Founded on existing literature, various macroeconomic variables were utilized to investigate their association with inward foreign workers in Malta. In this section, a priori expectations of the associations are given. According to presented literature, inward economic migration is expected to act as a pull factor to the inward tourist flows, thus implying a positive relationship. The statistics of tourists in Malta was obtained from data published by the Central Bank of Malta which includes tourists from all nations, represented in terms of thousands of tourists. Wages is considered to be another macroeconomic variable which is affected by foreign workers. The expected relationship between inward labour migration and national wages is positive, since other countries with similar economic characteristics found a strong and positive relationship. For this study Malta's national minimum wage is used to represent the wages in Malta; this data was acquired from a published report by Eurostat.

Based on previous studies, GDP is another important variable which is commonly taken into consideration to evaluate the impact of foreign workers on host economies. The data for the GDP, expressed at current market prices in millions, was obtained from the Central Bank of Malta. Furthermore, GDP is expected to have a significantly positive correlation with the level of inward foreign workers. In addition, government expenditure and government revenue are two other variables used in this study and are expected to be positively affected by inward foreign workers. The data indicating the total government revenue and expenditure was obtained from published statistics of the Eurostat, represented as a percentage of the current year's GDP.

Population, another macroeconomic variable used in this study, is anticipated to increase the local population as well as the birth rates of the country. Data for the population of Malta was obtained from published reports by Eurostat, representing all Maltese nationals residing in Malta. Another important variable that is expected to have a positive relationship is inflation, for which data was collected from the Central Bank of Malta, measured by the Harmonized Index of Consumer Prices (HICP). Also, unemployment rate is considered to be a major macroeconomic variable for this study. Substantive literature suggests that labour migration conveys a positive effect on unemployment. The unemployment rate figures of Malta were attained from published statistics of the Labour Force Survey.

Additionally, the Property Price Index is another variable that has been widely studied in the international spectrum and which is anticipated to be highly influenced by the level of foreign workers in Malta. The Property Price Index figures of Malta, based on advertised prices, were obtained from the Central Bank of Malta. Lastly, significant sources of literature include foreign direct investment as a variable that is affected by the foreign stock of labour. The data for the total foreign direct investment (FDI) in Malta was obtained from NSO; stated figures are represented in billions.

The collected data pertaining to each variable was put in a table as represented in Table 1. In order for the data to be utilized effectively and according to the objective of this study, the data had a shared principal factor being the year to which data pertained to, thereby allowing for comparative analysis to be performed accurately.



Dependent Variable (y)	Independent Variable 1	Independent Variable 2	Independent Variable 3	Independent Variable 4	Independent Variable 5	Independent Variable 6	Independent Variable 7	Independent Variable 8	Independent Variable 9	Independent Variable 10	Independent Variable 11	Independent Variable 12
Year	Employed Foreign Workers in Malta	Minimum Wage (€)	GDP in € Billions	Government Expenditure (as a % of GDP)	Government Revenue (as a % of GDP)	Total Crime Rates	Population (Thousand)	Co2 (Tonnes per capita)	Total unemployment rate (%)	Annual Inflation Rate HICP (%)	Property Prices Index	FDIs (Stock Position in € Billions)
2006	6,839	584.24	5.39	42.3	39.8	16,538	404.99	8.2	5.0	83.79	177.0	46.84
2007	8,191	601.90	5.76	41.1	39.0	15,050	405.61	8.4	4.5	84.38	178.9	75.97
2008	9,987	617.21	6.13	42.6	38.5	13,800	407.83	8.4	4.1	88.33	174.1	84.20
2009	9,530	634.88	6.14	41.9	38.6	11,951	410.93	7.8	4.8	89.95	165.3	87.01
2010	10,687	659.92	6.60	41.1	38.7	13,306	414.03	7.9	4.6	91.79	167.1	97.20
2011	12,388	664.95	6.84	41.2	38.8	14,248	414.90	8.1	4.2	94.10	169.3	113.12
2012	14,842	685.14	7.17	42.7	39.2	15,618	417.55	8.4	4.3	97.13	170.1	125.54
2013	18,585	702.82	7.65	42	39.5	17,584	422.51	7.5	4.5	98.08	173.7	133.47
2014	23,582	717.95	8.51	41.3	39.6	16,648	429.42	7.5	4.1	98.84	185.7	142.82
2015	28,613	720.46	9.64	40.1	39.0	17,138	439.70	5.8	3.0	100.00	197.4	152.20
2016	35,738	728.04	10.34	37.1	38.1	17,298	450.42	5.0	1.9	100.90	219.7	162.25
2017	44,564	735.63	11.34	36.2	40.5	17,136	460.30	5.0	1.3	102.18	245.6	171.04

**Table 1: Data Set (Sources: Eurostat, CBM, NSO, CrimeMalta)**

## Data Analysis

### Descriptive Statistics

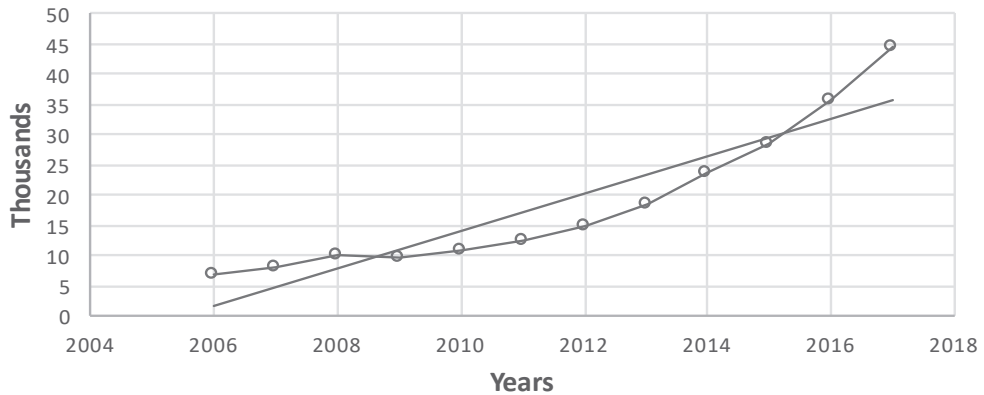
		Minimum	Maximum	Mean	Standard Deviation	Unit
Dependent Variable (y)	<b>Employed Foreign Workers</b>	6,839	44,564	18,629	12,103	Thousands
Independent Variable 1	<b>Tourists</b>	1.12	2.27	1.53	0.35	Millions
Independent Variable 2	<b>Minimum Wage</b>	584.24	735.63	671.10	52.18	Euro
Independent Variable 3	<b>GDP</b>	5.39	11.34	7.63	1.93	Euro Billions
Independent Variable 4	<b>Government Expenditure</b>	36.2	42.7	40.80	2.08	Percentage
Independent Variable 5	<b>Government Revenue</b>	38.1	40.5	39.11	0.66	Percentage
Independent Variable 6	<b>Total Crime</b>	11,951	17,584	15,526	1844	Thousands
Independent Variable 7	<b>Population</b>	404.99	460.30	423.18	18.20	Thousands
Independent Variable 8	<b>Co2</b>	5.0	8.4	7.33	1.3	Tonnes
Independent Variable 9	<b>Unemployment</b>	1.3	5.0	3.86	1.14	Percentage
Independent Variable 10	<b>Inflation Rate</b>	83.79	102.18	94.12	6.40	Index
Independent Variable 11	<b>Property Price Index</b>	165.30	245.60	185.33	24.41	Index
Independent Variable 12	<b>Inward Foreign Direct Investment</b>	46.84	171.04	115.97	38.37	Euro Billions

**Table 2:** Descriptive statistics

The data in Table 2 provided a general depiction of the dependent variable and the independent macroeconomic variables. Furthermore, Table 2 presents the dependent variable and the twelve independent variables with their respective unit and provides a summary of the mean, standard deviation, and minimum and maximum values for each variable.

## The Dependent Variable

### Employed Foreign Workers in Malta

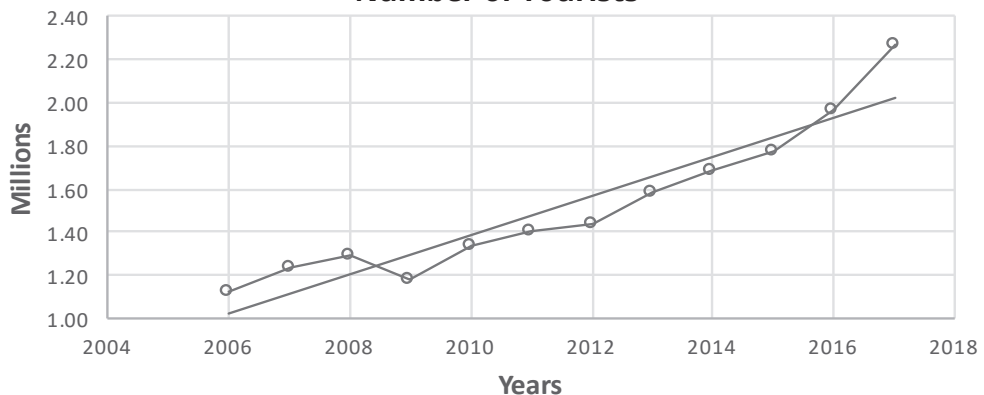


**Figure 2:** Foreign workers in Malta (Source: Jobsplus)

The average number of foreign workers in Malta, as indicated in Table 2, is that of 18,629. Figure 2 shows a positive trend in the data, implying that the number of foreign workers in Malta has been increasing over the past 10 years. The highest point of foreign workers was registered at 44,564 in 2017 and the lowest at 6,839 in 2006.

## Macroeconomic Variables

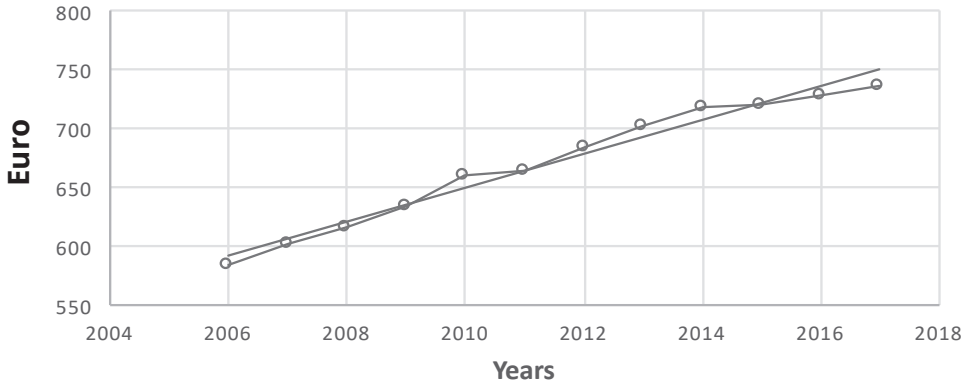
### Number of Tourists



**Figure 3:** Number of Tourists (Source: Central Bank of Malta)

Figure 3 shows the total number of tourists that visited Malta during the period 2006–17. Table 2 indicates that the average number of tourists totalled to 1.53 million with a standard deviation of 350,000. During the 12-year sample, the highest number of tourists (2.27 million) was registered in 2017, while 2006 was documented to have hosted 1.12 million tourists, the lowest tourist population during the period.

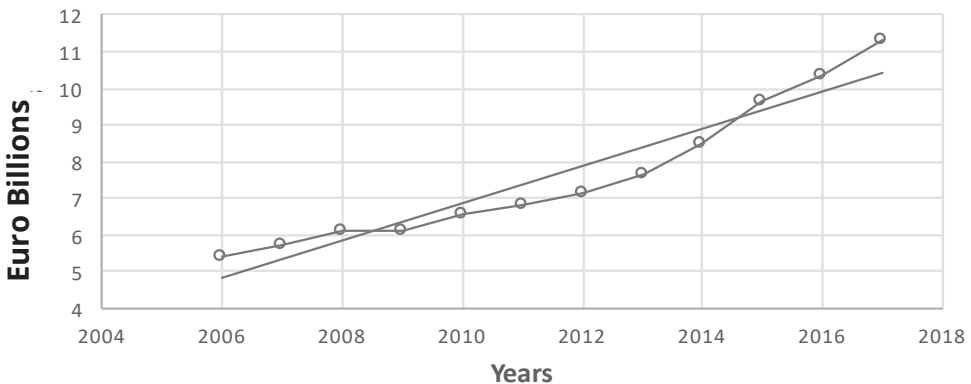
### Minimum Wage



**Figure 4:** Minimum wage in Malta (Source: Eurostat)

Table 2 indicates that the average minimum wage in Malta stood at €671.10 with a standard deviation of 52.18. Overall, Figure 5 depicts a positive and upward trend, increasing gradually from €584.24 in 2006 to €735.63 in 2017.

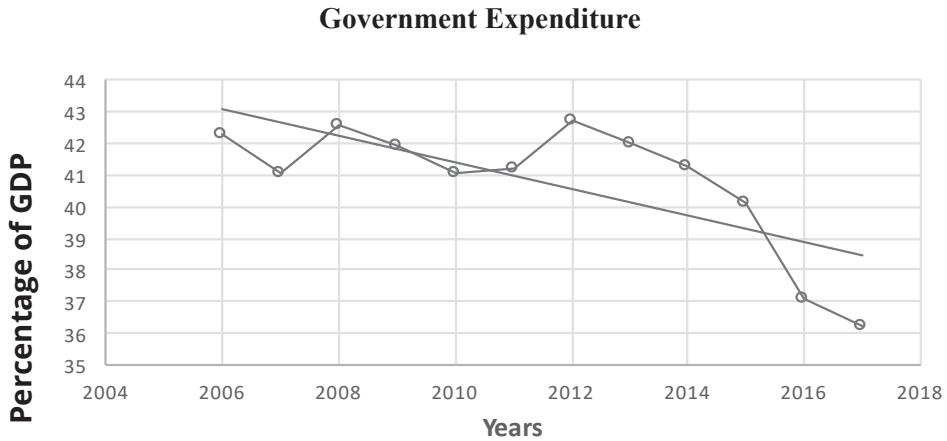
### Gross Domestic Product



**Figure 5:** Gross Domestic Product (Source: Central Bank of Malta)

Figure 5 depicts a positive and surging trend line, suggesting that the gross domestic product is increasing over time and that the economy is expanding year on year; based on the GDP figures presented. The average GDP was noted at €7.63 billion with a standard deviation of 1.93. The highest GDP figure of €11.34 billion was registered in 2017, whereas the lowest GDP was recorded at €5.39 billion in 2006.

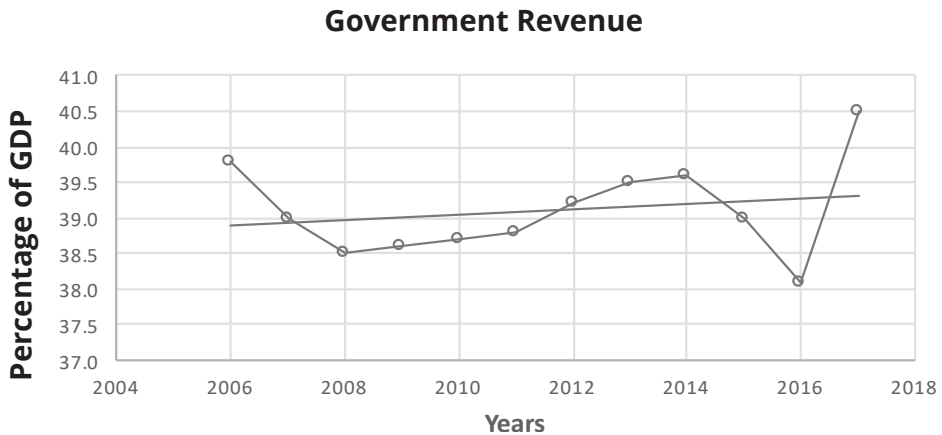
## Government Expenditure as a Percentage of GDP



**Figure 6:** Government expenditure (Source: Eurostat)

Table 2 indicates that on average, the government expenditure as a percentage of total GDP stood at 40.8%. The highest government expenditure was recorded in 2012 with 42.7%, while the lowest government expenditure was recorded in 2017 with 36.2%. A downward trend is shown in Figure 6, most notably between 2012 and 2017.

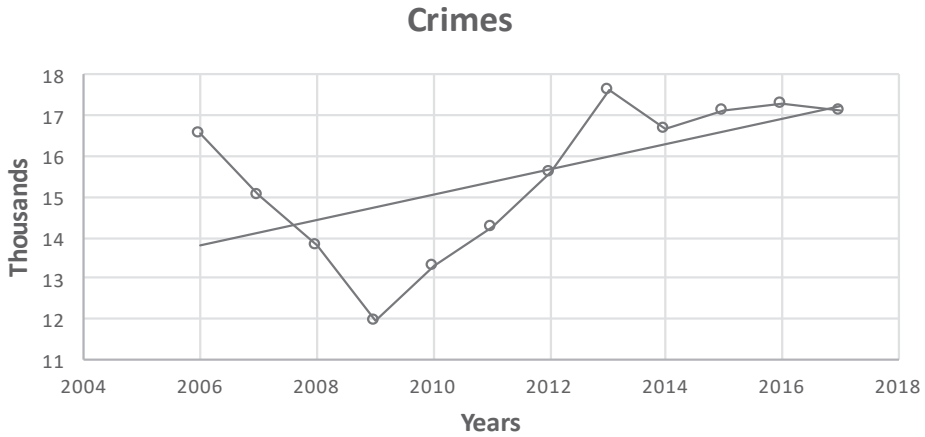
## Government Revenue as a Percentage of GDP



**Figure 7:** Government revenue (Source: Eurostat)

Table 2 indicates that the average government revenue in Malta stood at 39.11% of the country's GDP with a standard deviation of 0.66. Over the years government revenue varied incessantly however, a positive trend line was still recorded. The highest level of government revenue was registered in 2017 with a total of 40.5% with a positive overall trend.

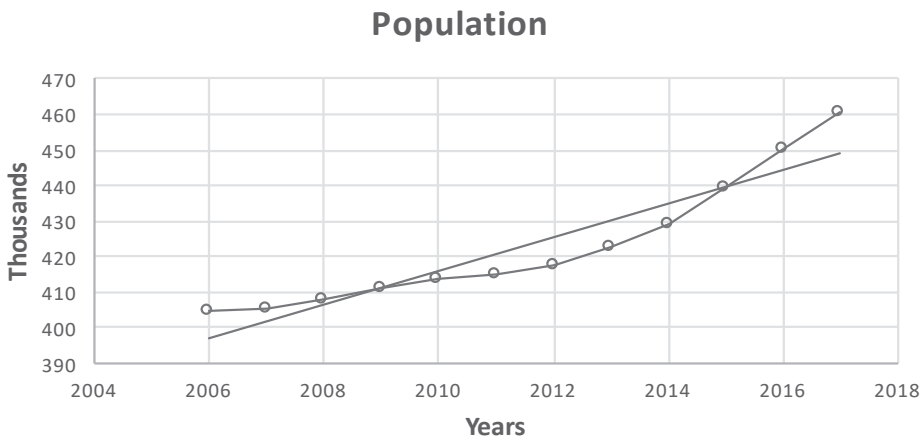
## Crime Rates



**Figure 8:** Crime rates (Source: CrimeMalta)

Table 2 shows that on average 15,526 yearly crimes take place in Malta and, with a standard deviation of 1,844, it is implied that on average crime rates increase or decrease by 1,844 reported offences on a yearly basis. Meanwhile, with a total of 17,584 reported offences, 2013 registered the most crimes in Malta within the period of investigation.

## Population

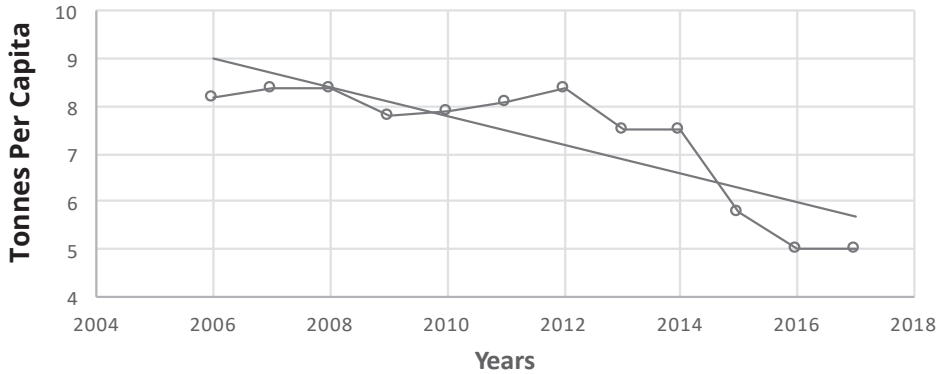


**Figure 9:** Population (Source: Eurostat)

The average population in Malta stood at 423,180 and, with a standard deviation of 18.20, it grew from 404,990 in 2006 up to 460,300 in 2017 as shown in Figure 9. Although Malta is one of the smallest countries in Europe, it has been ranked as having the highest population density in Europe (Azzopardi-Muscat *et al.* 2017).

## Carbon Dioxide

### Carbon Dioxide Emissions

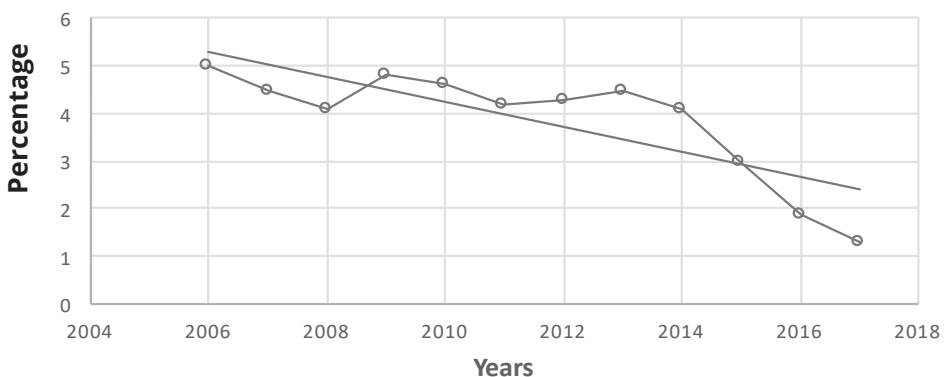


**Figure 10:** Carbon Dioxide (Source: Eurostat)

Figure 10 shows that over the 12-year period the level of Co2 decreased significantly, from 8.2 tonnes per capita in 2006 to 5 tonnes per capita in 2017. The overall trend line is downward sloping, mainly as a result of the continued efforts by local governments to decarbonize the energy sector in Malta, with the aim to eradicate carbonized energy by 2050 (Ministry for Sustainable Development, the Environment and Climate Change 2017).

## Unemployment Rate

### Unemployment Rate

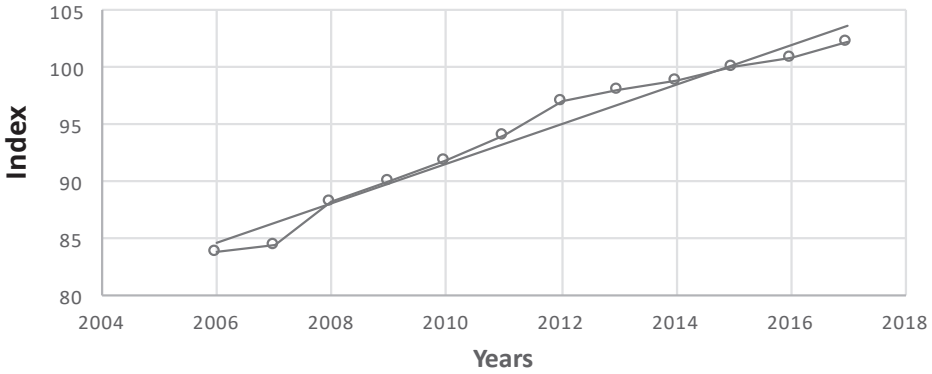


**Figure 11:** Unemployment rate (Source: Labour Force Survey)

Table 2 shows that the average unemployment rate in Malta stood at 3.8% with a standard deviation of 1.13. Overall, as Figure 11 shows, data for unemployment illustrates a downward trend, decreasing from an all-time high of 4.8% in 2006 to 1.3% in 2017.

## Inflation Rate

### Annual Average Price Index

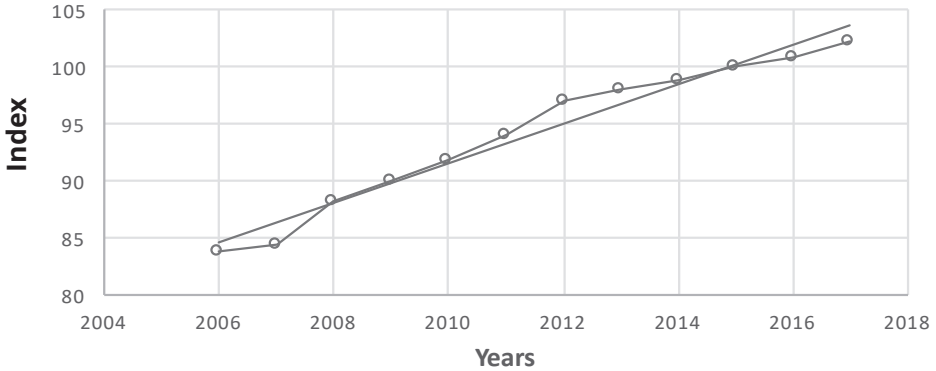


**Figure 12:** Annual Average Price Index (Source: Central Bank of Malta)

Figure 12 portrays the performance of the Harmonized Index of Consumer Prices in Malta from 2006 to 2017. It is evident that the overall trend is positive and upward sloping, rising progressively from 83.79 in 2006 to 102.18 in 2017. In addition, the average index stood at 94.12 with a standard deviation of 6.40.

## Property Price Index

### Property Price Index



**Figure 13:** Property Price Index (Source: Central Bank of Malta)

As shown in Figure 13, the year 2017 attained the highest index of 245.6, implying that property prices increased by 145.6% since 2000. While a decrease was noted between 2007 and 2009 as a consequence of the contagion and systemic effects that the global financial crises prompted worldwide, the average index was of 185.33 with a standard deviation of 24.41. Moreover, Figure 13 shows an overall upward trend due to the positive trend line.



## Inward Foreign Direct Investment



**Figure 14:** Foreign direct investment (Source: National Statistics Office)

Figure 14 illustrates the total stock position of foreign direct investment in Malta over the 12-year period. The average stock position of foreign direct investment stood at €115.97 billion with a standard deviation of 38.37 implying that on average the stock position of foreign direct investment in Malta increased or decreased by €38.37 billion around the mean value of €115.97 between 2006 and 2017. The year 2017 was observed to have attained the most foreign direct investments over the period with a total stock position of €171.04 billion. Consequently, the upward and positive trend line indicates that from the collected data the stock position of foreign direct investments in Malta increased.

## Data Analysis

### *Pearson Correlation Analysis*

From the collected data, the strength of the relationship between the paired data was measured by employing the Pearson Correlation Coefficient using SPSS. Moreover, correlation figures represent the extent of the relationship between the variables and indicate in which degree they correlate in a straight line. In addition, according to the guide set out by Zou, Tuncali, and Silverman (2003), correlations close to  $\pm 1$  indicate a strong correlation whereas correlations close to 0 signify a weak correlation.

## Summary of Results of the Pearson Correlation Coefficient

Independent Variable	Pearson Correlation Coefficient
Number of Tourists	0.990**
Minimum Wage	0.862**
Gross Domestic Product	0.990**
Government Expenditure as a % of GDP	-0.886**
Government Revenue as a % of GDP	0.318
Crime Rates	0.649*
Population	0.996**
Carbon Dioxide	-0.942**
Unemployment Rate	-0.947**
Inflation Rate	0.852**
Property Price Index	0.930**
Inward Foreign Direct Investment	0.903**
**Correlation is significant at the 0.01 level *Correlation is significant at the 0.05 level	

**Table 3:** Summary Results of the Pearson Correlation Coefficient

Table 3 provides a summary of the results obtained from the Pearson Correlation Coefficient Tests carried out using SPSS. It can be noted that 10 out of 12 tested macroeconomic variables are statistically significant at the 0.01 level. Meanwhile, from the other two variables, crime rates were found to have a statistically significant correlation at the 0.05 level, while government revenue as a percentage of GDP was noted not to have a significant correlation with the total number of foreign workers.

Also, from the results obtained it can be concluded tourists, minimum wage, GDP, population, inflation rate, Property Price Index, and inward foreign direct investment have a strongly positive relationship with foreign workers. meanwhile, unemployment rate, carbon dioxide, and government expenditure were noted to have a strongly negative relationship with the total of foreign workers in Malta over the 12-year period.

## Simple Linear Regression

A simple linear regression computation using SPSS was carried out on each independent variable to test the significance of the relationship and conduct comparative predictions. Subsequent to the collation of the regression results, an analysis of the most significant variables was conducted.

## Summary of Results of the Simple Linear Regression

Variable	$\beta$	T	B	Significance (P)
Tourists	0.991	22.785	28.376	0.000
Minimum Wage	0.862	5.372	0.004	0.000
Government Expenditure	-0.886	-6.047	0.000	0.000
Government Revenue	0.318	1.062	1.729	0.313
Gross Domestic Product	0.990	22.577	152142.064	0.000
Population	0.996	34.521	1.497	0.000
Property Price Index	0.930	7.978	0.002	0.000
Crime	0.649	2.699	0.099	0.000
Carbon Dioxide	-0.942	-8.898	0.000	0.000
Inflation (HICP)	0.852	5.140	0.000	0.000
Foreign Direct Investment	0.903	6.666	2864.135	0.000
Unemployment	-0.947	-9.324	-9.170	0.000

**Table 4:** Summary results of the Simple Linear Regression

The unstandardized coefficient (B) represents the regression coefficient and the quantified impact of the independent variable over the dependent variable. Meanwhile, the beta ( $\beta$ ) shows what the regression coefficients would be if the model were fitted to standardized data, while the t-statistic (T) is an inferential statistic used to determine whether there is significant difference between the mean of the variables being tested. Subsequently, the significance value (P) describes the mathematical association between the two variables being tested.

The outcomes of Table 4 show that eight out of 12 macroeconomic variables are significantly affected by foreign workers in Malta. The values obtained for government expenditure, government revenue, carbon dioxide, and inflation are either not significant or not impacted by inward foreign workers, contradicting existing literature. Meanwhile, the coefficient for unemployment is recorded to be -9.170; it can be deduced that, for every additional worker in Malta, unemployment decreases by an average of 0.09% workers. This result disproves the outcomes obtained by Withers and Pope (1985) and Gross (1999).

On the other hand, the coefficient for tourists of 28.376 aligns with the findings of other existing studies (Basch, Schiller, and Blanc 1994; Gmelch, 1992). This implies that for every additional foreign worker in Malta, the number of tourists visiting the island increases by an average of 29. Additionally, the results for minimum wage support the works of Peri (2008) and Ottaviano and Peri (2008). With a coefficient of 0.004, it can be implied that, on average, an increase of 250 foreign workers increases the national minimum wage by €1.

Moreover, the coefficient for GDP in Malta, recorded as €152,142.064, is in parallel with the conclusions of Alesina and Rapoport (2016) and Ortega and Peri (2014). It suggests that, for every additional foreign worker, the GDP increases by an average of €152,142.06. Likewise, similar to the results obtained by Chanpiwat (2013), the coefficient for the Property Price Index is recorded to be 0.002; thus property price in Malta increase by 1% for every 500 additional foreign workers in Malta. Furthermore, the coefficient obtained for the population is recorded to be 1.49; hence, for every two additional foreign workers in Malta's workforce transmits an increase in the Maltese population by an average of three citizens, in line with the findings of Sobotka (2008) and Westoff and Frejka (2007).

In addition, this paper finds that the relationship between crime and foreign workers is directly proportional, supporting the works of Bianchi, Buonanno, and Pinotti (2010). The coefficient for crime is recorded to be 0.099 thus, an increase of 101 foreign workers in Malta increases the total crimes by 10 offences, on average. Finally, the coefficient for inward foreign direct investment is recorded to be 2864.135, implying that a total of €2,864.14 worth of inward foreign direct investment, is on average introduced in Malta for every additional foreign worker. This result is also in line with that obtained by Buch *et al.* (2006), Aroca and Maloney (2005), Tong (2005), Kugler and Rapoport (2007), Bhattacharya and Groznik (2008), Javorcik *et al.* (2010) and Federici and Giannetti (2010), all of whom observed a positive relationship between the two variables.

## Implications of the Study

The results derived from this study indicate that foreign workers are impacting Malta's macroeconomic variables strongly and signify that foreign workers alleviated the economic growth of the country, mainly by increasing productivity through improved local skills base and enhanced innovation. Earlier in 2019, in an interview with the *Times of Malta*, Mr Clyde Caruana, the head of Jobsplus, mentioned that, in order for the country to retain its economic activity, an addition of 13,000 foreign workers should be introduced by the end of 2019 (Macdonald 2019). Consequently, based on the results of this study, an addition of 13,000 foreign workers in the Maltese economic system infers that tourists will increase by 377,000 over the course of a year and that the national minimum wage will increase by €52.

In addition, *ceteris paribus*, an increase of 13,000 foreign workers will increase the country's GDP by €1.97 billion in 2019; which amount incorporates the multiplier effect caused by an inflated population and excludes economic leakages. Furthermore, the population of Malta will expand by 19,461 and the advertised property prices will increase by an overwhelming 26%, along with an increase of 1,287 in the recorded offences in Malta. Similarly, as a result, the inward foreign direct investment will be expected to increase by €37.2 million and, subsequently, the unemployment will be expected to decrease by 91.7% thus furthering the assertion that the country will remain in full employment.

## Recommendations for Further Study

Further studies may be carried out investigating other macroeconomic or microeconomic variables to identify other possible outcomes that did not feature in this study. Alternatively, another possible area for further research would be for a meta-analysis to be conducted using this study for Malta, and a similar study conducted in another European country that holds similar characteristics. In this manner, a greater understanding of the local

environment could be drawn when compared with other countries with comparable characteristics.

## Conclusion

The results, based on collected secondary data from reputable sources, show that foreign workers as an economic variable is a living phenomenon that largely affects most economic variables that contribute to the making of the Maltese economy as indicated in Table 4. Based on the analyses of this study, it can be concluded that there is co-integration between the level of foreign workers in Malta and eight of the 12 employed macroeconomic variables, these being: tourism, minimum wage, GDP, population, property prices, crime, foreign direct investment, and unemployment. This indicates that there is a long-run relationship between the variables and that changes in the number of foreign workers alter the structure of the aforementioned variables. Although the majority of the findings in this paper portray a positive impact on the Maltese economy, studies on inward labour migration are to be continuously performed as this phenomenon is appearing to become more prominent as time goes by. Furthermore, since the fertility rates in Malta have dropped significantly, along with a considerable decline in death rates as a consequence to longevity, the inflow of foreign workers could possibly serve as a potential solution to the ageing pressures Malta is currently facing by contributing to the sustainability of the local economy and pension system.

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