Developing the Dynamic of Job Creation Augmented Model for Malaysian Manufacturing Sectors

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***Abstract*— The aim of this paper is to construct an Augmented Dynamic Model of Job Creation for Malaysian Manufacturing Sector. The previous studies on job creation model focus on the static model where the job creation influenced by real wages, real output, assets, expenditure of research and development (R&D), lag of R&D, export and foreign labour. However, the aggregate rate of unemployment in Malaysia could not explain the dynamic of labour market. The dynamic of labour market can be explained more precisely through the formula of job flows (including job creation and job destruction). Therefore, in this study, the augmented dynamic model of job creation constructed by added several variables including interaction variables. The augmented dynamic model of job creation is developed by using GMM model based on data 2005 to 2015 for Malaysian manufacturing sector. The augmented model of job creation is expected to be effective and informative guide policy maker to face unemployment rate especially Malaysia. This augmented model can portray a real situation of labour market and help the government as well as policy maker to plan of Malaysian economics in the future.**

***Keywords*—** *job creation, job flow, GMM-system, dynamic of job creation, augmented model*

1. Introduction

One of the purposes of economic restructuring in Malaysia on 2010 was to strengthen the manufacturing sector in order to support the country's GDP growth and global competition. According to the 2010/2011 Economic Report, the average growth in manufacturing output stood at 13% during 2001 to 2011. However, the global financial crisis in 2008 to 2009 turned negatively which lead to slowdown the output growth. To recover this problem, the government has conducted the Economic Transformation Programme (ETP) which is rooted in innovation.

In addition, most of the workers in Malaysia are involving in the manufacturing sector, apart from function to absorb surplus labour from agriculture and other sector [2]. The involvement of labour in manufacturing sector has helped to stabilize the unemployment rate in Malaysia. However, the low unemployment rate does not explain the actual performance of the labour market. The dispute exists in calculating the performance of the labour market with unemployment analysis. According to [12], the unemployment rate does not reflect the dynamic of the labour market. There are other methods used to measure the performance of the labour market, namely the calculation of the creation and destruction of jobs.

According to the Theory of Economics Restructuring by [20], the job creation and job destruction occurred simultaneously after or during the restructuring economy. Therefore, Malaysia is expected to experience the creation and destruction of jobs after the government introduce the Economic Transformation Programme (ETP) on September 2010, especially in the subsector of Electric and Electronics (E&E) as part of the manufacturing industry. The ETP is based on the innovation which expected to require a lot of talents to ensure it is work.

However, the cost of hiring an expensive skilled labour is resulting in the firms which less motivation to create high-skill jobs. Indeed, Malaysia is despite being built the level of developed countries, but still lack of high-skill jobs, especially in the key economic sectors that support the development countries. The situation is exacerbated by the presence of low-costs of foreign labour. Their presence has created circumstances of succession to the domestic high-skilled labour [18].

In contrast, the study of the factors that influences the firm's decision to create jobs even less attention from researchers, particularly in the manufacturing sector in Malaysia. Thus, this study aims to identify factors that

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influence the decision of firms to create jobs. Finally, it will contribute to construct an Augmented Dynamic Model of Job Creation for Malaysian Manufacturing Sector.

2. Literiture Review

Economic restructuring also influences the job creation. Several studies have been conducted on the several states and have undergone the process of economic restructuring such as Poland, Slovenia, Estonia and Russia. The findings from the study in these countries found that in the early stages of the process of economic restructuring led to the job creation rate lower than job destruction rate in all sectors. However, the restructuring process is approaching its peak, the rate of job creation is increasing while the rate of job destruction decreasing. This situation is proof of the success of a process of economic restructuring [1].

In addition, economic restructuring has caused a redistribution of work. In which he describes the efficiency of the labour market and the performance of an industry or sector. The study by [23] conducted in the textile and engineering sector found employment rate of redistribution is the lowest compared to the redistribution of jobs in the food and beverage sector. It explained that the textile and engineering industry is less important in the area of Northern Ireland.

Apart from restructuring economic on job creation, previous studies also examined the factors that influence the job flows. Among the factors that got the attention of researchers is the demography factors namely size and age of the plants. [12] and [14] found that the age factor and firm size is an important factor to the job creation in the manufacturing sector in US. The study found negative relationship between firm size and age on job creation and destruction. Supported by studies in Italy by [10] and German by [4]. The results showed that smaller firms are more likely to create more jobs than larger firms.

Besides the demography factors, macroeconomic indicators also attracted the attention of some previous researchers to investigate the relationship between macroeconomic indicators on the firm's decision to create jobs. Among the macroeconomic variables that have been used in previous studies is output (Gross Domestic Product – GDP as a proxy), wages, assets, capital and R&D expenditure.

For instance, [12] has done a survey study of firms in US to understand the dynamics of the business contribution to job creation and growth productivity. The study found that the current economic recession measured by the output growth has been increased the job destruction than job creation. The rate of job creation in 2009 was the lowest rate in the 30 years from 1980 to 2009. This can be concluded that negative output growth has significant impact on job creation.

Apart from factors being used to measure the economic cycle, the outputs also used to measure the wealth of a region. The assumption is the region with competitive output is rich and able to contribute to job creation at regional level. This is true when a study found a positive significant relationship between regional outputs on job creation is also true at the regional level. The region is classified based on the contribution's value on national output. This has been proved by [3] which using Shift-share Regression Analysis to estimate the degree of employment growth in the manufacturing sector at the regional economic condition in Malaysia. The result showed more jobs created found in rich states. The performance of job creation in rich states is competitive up to the national growth. This is because, rich states consists of the high inflow of foreign direct investment (FDI), encouraged by the basic facilities available in rich states, such as an easy access to the port and airport facilities.

With the intention to study the determinants of the factors encourage firms to create jobs; a study conducted by [9] in Catalonia, tested by using econometric technique. Firstly, employment growth is defined as job creation in this study. Secondly, this study is focused on the wages as the factor of interest on job creation. Thus, wages are defined as wages or salaries per hour paid to employees of the plant in Catalonia. The result demonstrated that the significant relation (but inverse direction) of wages per hour on jobs creation. This study concluded that the higher wages demotivated plant in Catalonia to create jobs.

Technology is a process of transferring work from the labour–based to machinery–based on the economy to accelerate the production process. Technology and innovation are believed to be the main sources of dynamic labour forced, especially in the jobs creation and destruction. Since 1990, the importance of technology and innovation is spread widely in all firms in every sector of the economy [8]. Therefore, a study has been conducted by [5] to investigate the effect of technology and innovation process in the business and manufacturing sector of Greek. Turned out, plants and labour force in these sector gained benefit from the technology and innovation, which technology and innovation have encouraged plants in both sectors to create jobs persistently.

Apart from that, a study using European Microdata has been done to test whether R&D expenditure is the substitutes or compliment to the firm's employment. Presumed that firm's employment is represented the job creation in the manufacturing sector. Hence, using econometric technique namely Least Square Dummy Variables Corrected (LSDVC), labour demand equation model is employed to test the hypotheses of [22] study. So, the finding of this study suggest that the R&D expenditure is significant and positive related to firm's employment at service and high-technology industries, but irrelevant in the traditional industries in the manufacturing sector

The other study conducted by [19] using descriptive analysis, fixed effect panel data regression and Pool Ordinary Least Square (POLS) to test the relationship of the R&D expenditure on employment growth as a proxy of job creation. This study summarized that the R&D expenditure have a positive relationship to job creation in the manufacturing sector. This imply that the higher intensity of R&D expenditure with a better human capital endowment, escalation employment growth by the persistent increasing in rate of gross job creation.

[7] has expanded the study by adding the factor of

immigrant on jo creation in the study. This study has divided immigrant into two group, namely low-skilled labour and high-skilled labour. It is introduced a model with assumptions namely, although the level of education among migrant labourers and local labour is similar but immigrant labour is not a perfect substitute to local workers if they have the variance experience. Based on data collected from 1980 to 2000 in his study, he found that the entry of foreign workers have significant effect on the decrease of the job creation, specifically in the group of low-skilled labour.

In conclusion, based on the discussion on the previous study above, we found that most past studies on job creation does not include the important of interaction variable. Thus, this study will develop an Augmented Dynamic Model of Job Creation for Malaysian Manufacturing Sector to identify factors that influence the decision of firms to create jobs.

3. Research Methodology

To achieve the objective of the study, we utilised secondary data which obtained from the Department of Statistics and Economic Planning Division (EPU). The data used in this study is the number of employment, real output (refer to the sector's output), real wages, assets, R&D expenditure, exports and foreign labour for the period 2005 to 2015. In addition, we employed the Augmented Model derived from the latest econometric methods which is Generalised Method of Moment- System Two-step (GMM-System Two-steps). Job creation is calculated using a formula that has been formed by [13], which have been used in the several studies such as in [16] and [24] studies. For the development of dynamic model of job creation, it will also involve the analysis on the factors affecting job creation, obtain from the regression result.

The general model specification for job creation is as follows:

$$JCit = \alpha + \beta 1\ LRyit + \beta 2LRwit, + \beta 3LRait + \beta 4LRr\&dit + \beta 5LRr\&di(t-1) + \beta 6LRexit + \beta 7Lflit + \varepsilon it \quad (1)$$

Table 1: Operational Definition

Symbol	Operation definition
jc_{it}	Job creation calculated from a formula introduced Davis (1999)
LRy_{it}	The value of real output manufacturing sector produced (RM)
LRw_{it}	The value of real wages paid to the employees in the manufacturing sector (RM)
LRa_{it}	Assets, consists of machinery, fixed asset etc. after deducting the depreciation (RM)
$LRr\&d_{it}$	Research and development expenditure consists of systematic study of new process, technique and application of the product and producing product (RM)
$LRlagr\&d_{i(t-1)}$	One year lagged of research and development expenditure
$LRex$	The value of industry's export value off total Malaysian export value (RM)
Lfl_{it}	The number of foreign labour engaged in the manufacturing sector

Model (1) is known as a static model of job creation. It is described the expected relation of real output, real wages, asset, R&D expenditure, lag (1) R&D expenditure, export and foreign labour on job creation. In addition, this study also included elements of lag R&D expenditures as variables affecting job creation, assuming the impact of R&D expenditure cannot be seen immediately. It is expected that all of the factors have a positive relationship to the job creation in Malaysian manufacturing sector. This static model is tested using Pooled Ordinary Least Square (POLS), Random Effect (RE) and Fixed Effect (FE) technique.

Since, the previous studies traced out one of the characteristics of job creation is continuous and persistent, hence, this study took a step to alter the static equation by incorporating elements of lag job creation as additional variables that affect the current job creation. Therefore, the static equation has changed to the dynamic equation and will be tested using the econometric technique name Generalized Method of Moment System-Twosteps (GMM-Sys Twosteps).

The specification of dynamic model of job creation is as follows:

$$JCit = \alpha + \beta 1jci(t-1) + \beta 2LRyit + \beta 3LRwit + \beta 4LRait + \beta 5LRr\&dit + \beta 6LRr\&di(t-1) + \beta 7LRexit + \beta 8Lflit + \beta 9L(flitRyit) + \beta 10L(flitRr\&di(t-1)) + \varepsilon it \quad (2)$$

Table 2: Operational Definition

Symbol	Operation definition
JC_{it}	Job creation calculated from formula introduced by Davis (1999)
$JC_{i(t-1)}$	One year lagged of job creation
LRy_{it}	The value of real output manufacturing sector produced (RM)
LRw_{it}	The value of real wages paid to the employees in the manufacturing sector (RM)
LRa_{it}	Assets, consists of machinery, fixed asset etc. after deducting the depreciation (RM)
$LRr\&d_{it}$	Research and development expenditure consists of systematic study of new process, technique and application of the product and producing product (RM)
$LRlagr\&d_{i(t-1)}$	One year lagged of research and development expenditure
$LRex$	The value of industry's export value off total Malaysian export (RM)
Lfl_{it}	The number of foreign labour engaged in the manufacturing sector
$L(fl_iRy_{it})$	The interaction between foreign labour and real output
$L(fl_{it}Rd_{it})$	The interaction term between foreign labour and R&D expenditure

4. Findings

As mentioned earlier, this study has employed the POLS, RE and FE regression to test the static model. The result shows that LM test has failed to accept the null hypotheses, which has proved the hypotheses; one of the characteristics of the job creation is persistent and continuous. The details of the result are in Table 3.

Table 3: Static Model Regression

Variables	POLS	RE	FE
Constant (α)	0.2035*** [10.13]	0.1688*** [4.86]	0.1528*** [7.95]
*log*ry	-2.49e-08 [-0.62]	-5.91e-08 [-1.41]	-6.86e-08 [-1.54]
*log*rw	3.23e-06*** [4.28]	3.87e-06*** [4.95]	4.26e-06*** [5.13]
*log*assets	-3.13e-09 [-1.44]	-1.85e-09 [-0.84]	-1.69e-09 [-0.73]
*log*R&D	-2.56e-08 [-1.29]	-3.25e-08 [-1.65]	-3.59e-08* [-1.75]
*log*R&D(1)	2.29e-08 [0.80]	3.41e-08 [1.22]	3.93e-08 [1.36]
*log*export	4.30e-09*** [8.37]	5.65e-09*** [10.42]	6.22e-09*** [10.75]
*log*fl	2.29e-09 [0.01]	3.26e-07 [1.46]	4.63e-07* [1.96]
LM test		0.0000	
Hausman test			0.0289

Hence, this study proceeds to test the dynamic model of job creation using GMM-System two-step technique.

Table 4 demonstrated the detail of the GMM-System two-steps estimator analysis of job creation dynamic model. The results is worth to be highlighted where all the added variables are significant to job creation, namely job creation (lag one year), and both interaction term (fl*ry and fl*rd). Regression outcome also failed to accept null hypotheses, Hence, job creation is a persistent phenomenon, proved by the significant value and positive sign of lag(1) job creation. This imply that current rate of job creation in Malaysian manufacturing sector is positively influenced by the rate of job creation (lag 1 year) by 0.07.

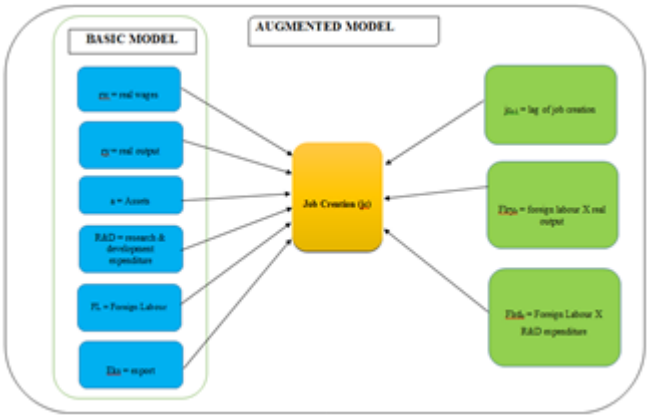
Table 4: GMM-System two-step regression result

Variables	Coefficient value	Standard error	z-value	p > |z|
jc(1)	0.0714	0.0009	73.14	0.000***
*log*ry				
*log*rw	-0.1961	0.008	-23.82	0.000***
*log*assets	0.2013	0.0121	16.58	0.000***
*log*r&d	-0.1926	0.0195	-9.87	0.000***
*log*r&d(1)	0.0407	0.0154	2.64	0.000***
*log*exp	-0.0259	0.0046	-5.68	0.000***
*log*fl				
*log*flry	-0.0616	0.0088	-7.03	0.000***
*log*flr&d	0.1499	0.0193	7.74	0.000***
Constant (α)	-0.1004	0.0349	-2.88	0.004***
Sargan value				0.5170
AR(1)				0.0006**
AR(2)				0.6083

Note: *,** *and* *** *are 10%,5% and 1% level of significant*

Based on the finding, the Augmented Dynamic Model of Job Creation for Malaysian Manufacturing Sector is illustrated in Figure 1. According to the initial theory of job creation, the static model is shown on the left side of the diagram, with the variables identified affecting the rate of job creation is the real output, real wages, assets, exports and research and development (R&D) expenditure as well as R&D of previous year. Since the phenomena of job creation are assumed to be a continuous phenomenon, this study employed GMM to confirm, finally constructing the Augmented Dynamic Model of Job Creation. The dynamic model of job creation portrayed by the whole diagram, with augmented variables added which are job creation (lag-1), interaction variables between real output and foreign workers and interactions between (R&D)(lag-1) and foreign workers.

Figure 1: Augmented Dynamic Model of Job Creation



5. Conclusion

In summary, the analysis of job flow patterns and job reassurance can explain the labour market that is dynamic. This can help policy makers in the labour market to ensure labour market efficiency. In addition, the dynamic model of job creation is expected to be more effective in helping policy makers in addressing labour market efficiency issues, particularly in the manufacturing sector in Malaysia. This study can help policymakers analyse the true patterns of job creation in the manufacturing sector, as well as identify the determinants of job creation. Therefore, this study can help the government and policymakers in planning the economic transformation in Malaysia, in particular the manufacturing sector in the future.

The finding in this study proves that R&D spending as an innovation in the manufacturing sector in Malaysia. Following the significant and positive R&D spending on employment creation, the Malaysian government should encourage R&D spending by reducing taxes or reviewing tax policies related to R&D spending to encourage firms to create jobs, particularly in firms in the manufacturing sector which investing in R&D.

The dependence of firms on foreign workers also has an important impact on the creation of jobs in the manufacturing sector. Therefore, the Malaysian government should control the entry and recruitment of foreign workers. The Malaysian government should constantly give foreign workers take part only on low-skilled economics sector in order to control and protect highly-skilled local workers. In addition, the Malaysian government should also encourage firms to create jobs that require high skills to complement skilled local employment, and provide non-skilled job creation to equip low skilled foreign workers.

Finally, Malaysia is a country that practices open economy and conducts international trade. Therefore, the government needs to encourage exports since the exports having a positive and significant impact on job creation. Export-oriented industries should be encouraged to venture into international markets for example, encouraging small and medium industries to penetrate global market. The increase in output of the sector at the international level will cause firms to create more jobs in order to meet international demand for output.

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