Balkan Journal of Social Sciences

BJSS

Derginin ana sayfası: https://dergipark.org.tr/bsbd

Araştırma Makalesi ● Research Article

The Role of GDP on the New Job Vacancies in Turkey: ARDL Analysis

GSYH'nin Yeni Açık İşler ÜZerindeki Etkisi: ARDL Analizi

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MAKALE BİLGİSİ

Makale Geçmişi:
Başvuru tarihi: 22 Şubat 2020
Düzeltme tarihi: 20 Mart 2020
Kabul tarihi: 1 Nisan 2020

Anahtar Kelimeler:
GDP
Açık İş Oranı
ARDL

ÖZ

Bu çalışma, GSYİH ile Türkiye'deki yeni açık işler arasındaki ilişkiyi bulmaya çalışmaktadır. Bu amaçla 1960-2019 yılları arasındaki çeyreklik verilere dayanan ARDL model tahminlerinden yararlanılmıştır. Ampirik bulgular Türkiye'de GSYH ile yeni açık işler arasındaki uzun vadeli ilişkinin pozitif olduğunu göstermektedir. Ancak, Granger nedensellik ilgili değişkenler arasında iki taraflı sonuç vermemektedir. Granger nedenselliği GSYH'den yeni açık işler yönünde mevcut iken, nedensellik zıt yönde mevcut değildir.

ARTICLE INFO

Article history:
Received February 22, 2020
Received in revised form March 20, 2020
Accepted April 1, 2020

Keywords:
GDP
Job Vacancies
ARDL

ABSTRACT

This study attempts to find the relationship between GDP and new job vacancies in Turkey. For this aim, ARDL model estimates based on the quarterly data for the years between 1960 and 2019 are utilized. Empirical findings indicate that long-run association between GDP and new job vacancies is positive in Turkey. However, Granger causality is not bilateral between the variables concerned. While GDP Granger causes new job vacancies, the causality does not exist in the opposite direction.

1. Introduction

The expansion in the GDP provided by production is expected to expand existing job positions and increase the number of new job vacancies in the economy. A positive technology shock composed of inventions in the manufacturing sector does not necessarily cause an increase in the available job vacancies. It potentially leads to a rise in the productivity of the already employed workers. On the other hand, new investments without changing the existing technology level in the economy potentially increase the number jobs available in the economy. Therefore, there must be an increase in private or government investment projects in order for job vacancies to increase.

According to Mortensen and Pissarides (1997), there are only three possible ways by which new technologies adopted. First, new technologies can destroy the number of jobs available in

* First version of this study entitled "A Case Study for the Role of the GDP on New Job Vacancies: Turkey" was presented in the XIII. International Balkan and Near Eastern Congress Series on Economics, Business and Management, which was held on 5-6 October 2019 in Tekirdağ/Turkey.

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e-ISSN: 2149-4622.

the industry. Second, new technologies may create new jobs. Third, new technology can create a renovation of the existing equipment used in the production. If the economic cost of renovation is low, a positive productivity shock reduces unemployment by increasing the efficiency. However, unemployment increases if costs exceed an intolerable threshold level (Mortensen & Pissarides, 1997). Therefore, the use of new technology creates new job positions if it does not replace existing job opportunities. It also promotes renewal in the production process and reduces unemployment conditional on that the cost of the renovation is not high. The term job vacancy is always confused with unemployment. However, an inclusive definition of the job vacancy term can be the gap between the number of job openings and job placements (Miyamoto, 2011). Hence, if the newly implemented technology causes new job openings, market's response will be a sudden increase in the job vacancies in the short run. A new equilibrium will be reached in the labor market, but it will take time for market to clear.

Although studies in favor of the positive impact of the productivity shock on job vacancies constitute a large portion of the literature, there are many exceptions such as Petrosky-Nedeau. Petrosky-Nadeau (2014) claims that within the framework of a classical search and matching model, productivity shocks combined with a wage increase do not potentially affect profits. For, the net effect on the budget of the firm is zero. Therefore, there is no incentive for firms to hire new workers. So, there is no reason to post new job vacancies or change the technological infrastructure of the production process.

New technologies or different types of productivity shocks can increase GDP. They may modify the composition of the GDP as well. However, this study tries to shed light on the relationship of GDP and new job vacancies rather than exploring the elements of the GDP. In this context, job vacancies can be considered as one of the most important economic indicators that reveal the dynamics of an industry. For Zagorsky (1998), job vacancy plans give hints about the future labor market strategies of a firm. Therefore, it is a key indicator of the business cycle because it denotes the demand in the labor market. For this purpose, a long period covering more than half a century of the Turkish economy is discussed in this study.

Literature on the vacancies primarily based on the relationship between vacancies and unemployment. Actually, this also gives hints about the link between vacancies and the production sector, so inferences can be made about the association between vacancies and GDP. For Dickerson (2003), distribution and the determinants of job vacancies have a potential to explain labor market dynamics in an economy. Relationship between vacancies and unemployment can explain most of the variation in the labor market and the working mechanism of the labor market in an economy. Álvarez and Hofstetter (2014) focus on establishing a national vacancy index for Colombia covering the period between 1976 and 2012. They find the vacancy rate is procyclical with the Colombian business cycles. And the empirical Beveridge curves pointing out the relationship between job vacancies and unemployment rate is downward sloping. Beveridge curve is a commonly used tool since 1980s showing the labor market performance of an economy (Diamond & Blanchard, 1989; Abraham & Katz, 1986, Antolin, 1994; Bleakley & Fuhrer, 1997). Movement along the curve indicates that how the unemployment reacts to the changes in the job vacancies. An effective matching process has a key role on filling the positions available in the labor market. But matching is highly likely to be efficient in a well-functioning economy. Thus, curve can also be a good indicator of the overall economic performance. Although, Beveridge curve is expected to be downward sloping, the characteristics of the curve reflects the structure of the labor market of the corresponding economy. Empirical findings of Justiniano and Michelacci (2011) reveal that the vacancies and unemployment are not necessarily in a negative association. While labor markets of US, Germany, Norway and Sweeden fit to general rules of Beveridge curve, UK and France do not represent the traditional properties of the curve. 1961- 1987 data show that Netherlands also follows the common properties of Beveridge curve (Van Ours, 1991). Although the efficiency of the labor market is not stable over the years, market fits to the negatively sloped Beveridge curve characteristics.

Increase in the vacancies in a period would be consistent with the expansion in the economy. And decrease in the vacancies is expected to be parallel with the slowing down of production. However, if a revolutionary technological development that substitute existing job vacancies with human-free methods of production occurred, then GDP would increase with a decline in the job vacancies. But, the change in the physical capital structure of the production in the industry would not respond very fast. So, the change in the statistics on the job vacancies would not be dramatic. Rather, a slow adjustment process would exist. Yet, Fujita and Ramey (2007) shows that vacancies' response to productivity shocks is excessively rapid. For them, that is the reason why adjustment of vacancy-unemployment ratio and employment itself is sluggish following productivity shocks.

According to Pissarides (1986), expansion in the aggregate demand affects vacancies very quickly but does not affect unemployment rapidly. Pissarides asserts that macroeconomic policy can have a temporary effect on the vacancies and unemployment. However, an expansion can improve the microeconomic efficiency of the labor market so that workers can be allocated to jobs in a better way. So, whole structure of the labor market may change.

Not only the number of job vacancies, but also the features of them are important on the functioning of the industry. If filling the vacancies is hard, or job vacancies last too long, these vacancies may become the indicators that restrain producers from investing more. So, they limit new capital investments in the economy (Van Ours, 1989). This is hazardous both for employment and for growth of the economy. In this context, unemployment insurance is crucial on the vacancy and

unemployment ratios. For, unemployment insurance affects an employee's decision on the duration to occupy a position. Or, workers may quit the job to benefit from unemployment insurance (Zhang, 2008). They are not counted as unemployed because they do not participate in the labor force. They do not actually search for a job while they collect benefits from unemployment insurance. It is also a fact that education, which can be seen as a partly preference of employee, and gender affect the duration of work or the duration of unemployment after leaving work. For instance, a married woman spends more time than a man does to find a job. Although, the duration of time a high-educated person spends to find a job is not longer than a less-educated individual, better-educated job-seekers do not stay unemployed significantly longer compared to the ones with secondary or primary education in Russian (Foley, 1997). But, Russian labor market at the beginning of the 1990s is not expected to perform similar to a market in a long-liberalized economy. Hence, market specific characteristics have an important role on the functioning of the labor market. So, response of the economy to the changes in the job vacancies would depend on the efficiency of the labor market mechanism. In the oppposite direction, reaction of the job vacancies to the changes in the GDP will be determined by the structure of the labor market as well.

In the study searching for the features of the Thailand labor market, vacancies and employment, Pholphirul (2013) focuses on the effects of immigrant workers. Pholphirul asserts that job vacancies are filled by both unskilled and skilled immigrant workers. Unskilled immigrants are employed especially in food and textile industries while skilled immigrants work for manufacturing and equipment firms in general. Because of wars and conflict in the neighboring countries of Turkey, there exists an ongoing migration process towards Turkey. So, it is highly likely that a likewise immigrant situation is on the agenda in Turkey as well. Therefore, expected new job vacancies as a result of increase in GDP may not be posted in Turkey. Thus, economic growth may not result in an increase in job vacancies. Or the impact of economic growth on job vacancies cannot be fully determined.

The rest of the study is as follows. The second part summarizes the data and method. In the third part, empirical findings are discussed. The last part is for the conclusion of the study.

2. Data and the Methodology

The research area of this study is based on two variables for Turkey. Quarterly GDP data are utilized first. 2015 GDP data is chosen as 100. Total new job vacancies are the second variable used in the study. The period subject to research covers the years between 1960 and 2019. OECD Main Economic Indicators-complete database (2019) is used to reproduce the data by Federal Reserve Bank of St. Louis (2019). Complete dataset is for the main economic indicators of the OECD-member countries. Both series are seasonally adjusted. Logarithmic transformations of the series are used for a more intuitive interpretation of the empirical findings.

The job vacancies data is mainly produced to show estimates of the unfilled job vacancy numbers for the whole national economy. It represents the demand side in the labor market OECD (2020). On the other hand, unemployment can be seen as the indicator of the supply side. So, the Beveridge curve in the literature combining the vacancies and unemployment data in one graph actually show the equilibria in the labor market in an economy.

To perform an ARDL analysis, the stationarity of the series must be checked as an initial step. For this aim, unit root tests are conducted. Phillips-Perron test statistics are used to decide on the stationarity. Next, based on the appropriate information criterion, the best model specification has to be selected. Akaike information criterion is used for this analysis. Then, to determine whether there is a long-term relationship between the variables, ARDL bounds test is conducted. If the F-statistcs is lower than the critical value of I(0) bound, we will fail to reject null hypothesis. If the F-statistcs lies in between the I(0) and I(1) bound critical values, test will be inconclusive. If the F-statistcs is larger than the critical value of I(1) bound, the null hypothesis is rejected. The null hypothesis is that there exists no long-run relationship.

If the bounds test results show that there is a long-run relationship between the series concerned, cointegrating form and long-run coefficients are estimated. After, heteroscedasticity and serial correlation tests are conducted. Then CUSUM stability test is done. Finally, Granger causality tests are carried out.

3. Empirical Findings

Checking the stationarity status is the first step of the ARDL analysis. For this aim, unit root tests are conducted and documented in Table 1. The null hypothesis of the first test is that log vacancies have a unit root. The null hypothesis cannot be rejected at 1% significance level. Therefore, the series is non-stationary. But the first difference of the series is stationary because the null hypothesis of unit root is rejected. In addition, null hypothesis indicating that there is a unit root in the log GDP index at level cannot be rejected as well. And it is rejected after the first difference is considered. So, log GDP is non-stationary at level, and becomes stationary after the first difference is used. Thus, both series are integrated of order 1, i.e. I(1).

Table 1. Stationarity

Null: Log Vacancies has a unit root

	Adj. t-stat	Prob.	%1 Critical Value
Phillips-Perron test statistic	-1.1804	0.9115	-3.9974

Null: ΔLog Vacancies has a unit root

	Adj. t-stat	Prob.	%1 Critical Value
Phillips-Perron test statistic	-19.5689***	0	-3.9976

Null: Log GDP has a unit root

	Adj. t-stat	Prob.	%1 Critical Value
Phillips-Perron test statistic	-2.7733	0.2087	-3.9974

Null: ΔLog GDP has a unit root

	Adj. t-stat	Prob.	%1 Critical Value
Phillips-Perron test statistic	-13.6747***	0	-3.9976

*** indicates 1% level of significance

20 of the ARDL models that are tested are listed in Table 2 according to Akaike information criteria. The lowest Akaike information criterion, -0.756041, belongs to model 7 which has ARDL (3.3) specification. The result is robust even the Bayesian or Hannan-Quinn information criterion are used for model selection criteria.

Table 2. Model Selection Criteria

Dependent Variable: log Vacancies

Model	LogL	AIC	BIC	HQ	Adj. R-sq	Specification
7	95.078819	-0.756041	-0.652362	-0.714233	0.953065	ARDL(3, 3)
6	95.836557	-0.753962	-0.635471	-0.706181	0.953162	ARDL(3, 4)
2	95.097907	-0.747622	-0.629131	-0.699841	0.952864	ARDL(4, 3)
1	95.921363	-0.746106	-0.612804	-0.692353	0.952987	ARDL(4, 4)
12	90.241379	-0.723102	-0.634234	-0.687266	0.951290	ARDL(2, 3)
11	90.661290	-0.718123	-0.614443	-0.676315	0.951251	ARDL(2, 4)
9	84.600573	-0.683267	-0.60921	-0.653404	0.949098	ARDL(3, 1)
8	85.213919	-0.679948	-0.59108	-0.644112	0.949142	ARDL(3, 2)
10	82.836884	-0.676711	-0.617466	-0.652821	0.948547	ARDL(3, 0)
4	84.605764	-0.674728	-0.58586	-0.638892	0.948876	ARDL(4, 1)
3	85.222570	-0.671438	-0.567759	-0.62963	0.948921	ARDL(4, 2)
17	83.127664	-0.670624	-0.596567	-0.640761	0.948451	ARDL(1, 3)
5	82.837161	-0.66813	-0.594074	-0.638267	0.948322	ARDL(4, 0)
14	81.515481	-0.665369	-0.606124	-0.641479	0.947960	ARDL(2, 1)
16	83.127688	-0.66204	-0.573172	-0.626205	0.948223	ARDL(1, 4)
13	82.093821	-0.66175	-0.587693	-0.631887	0.947991	ARDL(2, 2)
15	79.857900	-0.659724	-0.61529	-0.641807	0.947444	ARDL(2, 0)

19	75.657991	-0.623674	-0.57924	-0.605756	0.945515	ARDL(1, 1)
20	73.959955	-0.617682	-0.588059	-0.605737	0.944954	ARDL(1, 0)
18	75.880102	-0.616997	-0.557751	-0.593106	0.945381	ARDL(1, 2)

Table 3 summarizes the ARDL bounds test results. The F-statistic is computed based on the ARDL(1,1) model. There are three possible results that bounds test can reveal. If the corresponding F-statistics is below the critical value of the lower bound, i.e. I(0), there is no long run association between the variables because the null hypothesis stating that there is no long run relationship cannot be rejected. If the corresponding F-statistics is above the critical value of the upper bound, i.e. I(1), there is long run association between the variables. For, the same null hypothesis is rejected. If the corresponding F-statistics is in between the lower and upper bounds, test will be inconclusive. Since the F-statistics is larger than the I(1) bound critical value (6.319996> 6.02) at 1% level of significance, the null hypothesis is rejected. So, there is a long run relationship between new job vacancies and GDP in Turkey between 1960 and 2019.

Table 3. ARDL Bounds Test

Null Hypothesis: No long-run relationships exist

	Value	**k**
F-statistic	6.319996	1

Critical Value Bounds

Significance	**I(0) Bound**	**I(1) Bound**
10%	2.44	3.28
5%	3.15	4.11
2.50%	3.88	4.92
1%	4.81	6.02

Cointegration term has the statistically significant negative sign as expected in Table 4. So, there is a cointegrating relationship between new job vacancies and GDP in Turkey for the period analyzed. 1% increase in GDP results in a 2.4% increase in new job vacancies in the long run. In addition, it takes a quarter to correct 1.7% of the errors of the previous quarter. It means, deviation from the long run equilibrium because of a one-time shock is cleared in 58.82 quarters, i.e. 14.7 years.

Table 4. ARDL Cointegrating and Long Run Form
Dependent Variable: log Vacancies

Cointegrating Form

Variable	**Coefficient**	**Prob.**
Dlog(Vacancies(-1))	-0.2780***	-4.486279
Dlog(Vacancies(-2))	-0.1933***	-3.116889
Dlog(GDP)	0.8381	1.610793
Dlog(GDP(-1))	0.3879	0.740522
Dlog(GDP(-2))	2.4408***	4.648386
CointEq(-1)	-0.0170***	-3.563099

Long Run Coefficients

Variable	Coefficient	t-Statistic
log(GDP)	2.402487***	9.273254

Results of the ARCH Heteroskedasticity Test reveals that there is no heteroskedasticity problem in the ARDL model. In addition, Breusch-Godfrey Serial Correlation LM Test results show that there is no autocorrelation problem in the model as we

Table 5. Heteroskedasticity and Serial Correlation Tests

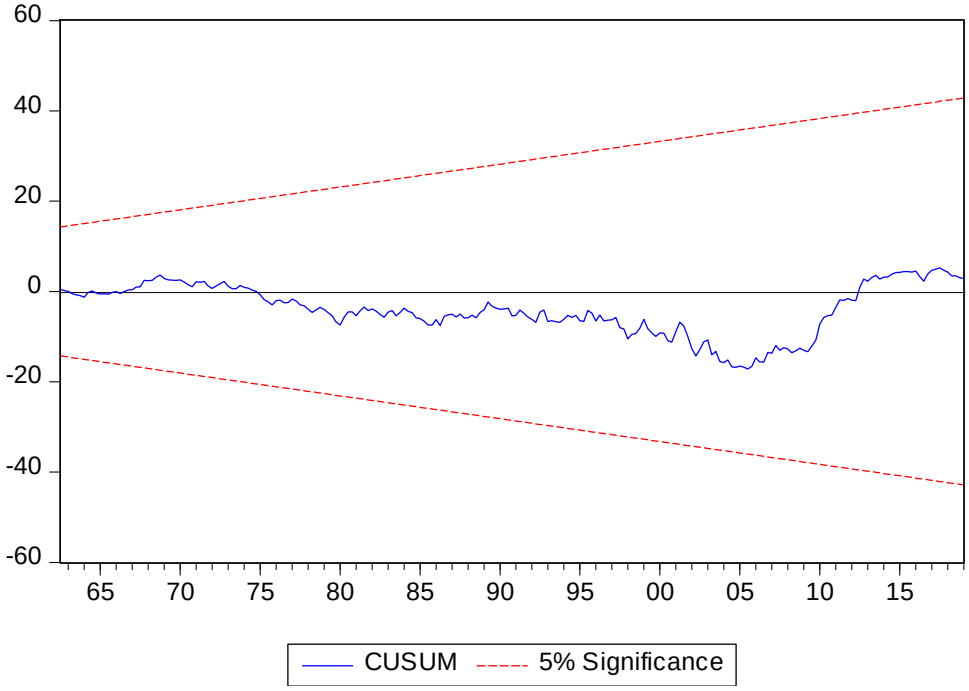
ARCH Heteroskedasticity Test	
F-statistic	**Prob. F(1,231)**
1.135	0.2878

Breusch-Godfrey Serial Correlation LM Test	
F-statistic	**Prob. F(2,225)**
1.7657	0.1734

Cumulative sum of residues lies inside the bounds of 5% level of significance.

So, the coefficients of the model are stable, regarding the CUSUM coefficient stability test.

Figure 1: CUSUM Coefficient Stability Test



A VAR(p) model has to be estimated, where p=k+dmax, to check the causality relationship between the variables. Optimal lag length is 3 (i.e., k=3) based on the Akaike information criteria of the possible Vector Autoregression Estimations listed in Table 6. Besides, the unit root test results of Table 1 show that the maximum integration order is 1 (i.e. dmax = 1). Hence, A VAR(4) model has to be estimated because the proper order of the Vector Autoregression is p= 3+1=4. Table 6 summarizes the statistics of Vector Autoregressive models from 1 to 4.

Table 6. Vector Autoregression Estimations

VAR(k) Model	AIC
VAR(1)	-5.6098
VAR(2)	-5.6319
VAR(3)	-5.7079
VAR(4)	-5.6799

The statistics to check Granger causality based on VAR(4) model are summarized in Table 7. Granger causality is statistically significant in only one direction. GDP Granger causes new job vacancies in Turkey between 1960 and 2019. But new job vacancies do not Granger cause GDP.

Table 7. VAR Granger Causality/Block Exogeneity Wald Tests

Dependent variable: log Vacancies

Excluded	Chi-sq	df	Prob.
log GDP	30.2066	4	0.0000

Dependent variable: log GDP

Excluded	Chi-sq	df	Prob.
log Vacancies	1.6140	4	0.8063

4. Conclusion

This study sheds light on the cointegrating relationship between GDP and new job vacancies in Turkey between 1960 and 2019. Direction of the causality in the framework of this long run association is unilateral from GDP to new job vacancies. 1% increase in the GDP index causes a 2.4% increase in the number of new job vacancies in the long run. However, new job vacancies that have increased because of the rise in GDP growth will only increase if the boost in the production is due to new investments in the economy.

These results are valid only for Turkey for the period between 1960 and 2019. The behavior of the relationship can change from period to period. So, additional analyses based on the subperiods may have different results. 1980 is a turning point for most of the developing economies including Turkey. For, markets are begun to be liberalized especially after 1980s. In 1990 most of the economies, including their financial system, production sector and labor markets had already been liberalized. Hence, results may change for the years before 1980 or after 1990s. Findings of Justiniano and Michelacci (2011) show that the relationship between vacancies and unemployment does not represent the same structure in different economies. That is, the relationship between vacancies and the real sector cannot be identical in different economies. Cross-country studies may reveal the similarity and the differentiation across countries.

References

Abraham, K. G., & Katz, L. F. (1986). Cyclical unemployment: sectoral shifts or aggregate disturbances?. *Journal of political Economy*, 94(3, Part 1), 507-522.

Álvarez, A., & Hofstetter, M. (2014). Job vacancies in Colombia: 1976–2012. *IZA Journal of Labor & Development*, 3(1), 1-11.

Antolín, P. (1994). Unemployment flows and vacancies in Spain (No. 158). *University of Oxford, Institute of Economics and Statistics*.

Bleakley, H., & Fuhrer, J. C. (1997). Shifts in the Beveridge curve, job matching, and labor market dynamics. *New England Economic Review*, 28, 3-19.

Diamond, P., & Blanchard, O. J. (1989). The beveridge curve. *Brookings Papers on Economic Activity*, 1, 1-76.

Dickerson, A. (2003). The distribution and determinants of job vacancies: evidence from the 2001 employers skill survey. *Institute for Employment Research Working Paper*, University of Warwick.

Foley, M. C. (1997). Determinants of unemployment duration in Russia. *The Davidson Institute Working Paper Series*, Working paper No.81. The William Davidson Institute at the University of Michigan Business School.

Federal Reserve Bank of St. Louis (2019). FRED Economic Data. (16.08.2019), Retrieved from: https://fred.stlouisfed.org/series/LMJVTTNVTRQ647S

Fujita, S., & Ramey, G. (2007). Job matching and propagation. *Journal of Economic dynamics and control*, 31(11), 3671-3698.

Justiniano, A., & Michelacci, C. (2011). The cyclical behavior of equilibrium unemployment and vacancies in the US and Europe. *National Bureau of Economic Research*, Working paper No.17429. National Bureau of Economic Research.

Miyamoto, H. (2011). Cyclical behavior of unemployment and job vacancies in Japan. *Japan and the World Economy*, 23(3), 214-225.

Mortensen, D. T., & Pissarides, C. A. (1998). Technological progress, job creation, and job destruction. *Review of Economic dynamics*, 1(4), 733-753.

OECD (2019). Main Economic Indicators-complete database. (16.08.2019), Retrieved from: https://www.oecd-ilibrary.org/economics/data/main-economic-indicators/main-economic-indicators-complete-database_data-00052-en

OECD (2020). OECD.Stat. (15.05.2020) Retrieved from: https://stats.oecd.org/Index.aspx?DataSetCode=LAB_REG_VAC

Petrosky-Nadeau, N. (2014). Credit, vacancies and unemployment fluctuations. Review of Economic Dynamics, 17(2), 191-205.

Pholphirul, P. (2013). Immigration, job vacancies, and employment dynamics: Evidence from Thai manufacturers. *Journal of Asian Economics*, 24, 1-16.

Pissarides, C. (1986). Unemployment and vacancies in Britain. *Economic policy*, 1(3), 499-541.

Van Ours, J. C. (1989). Durations of Dutch job vacancies. *De Economist*, 137(3), 309-327.

Van Ours, J. C. (1991). The efficiency of the Dutch labour market in matching unemployment and vacancies. *De economist*, 139(3), 358-378.

Zagorsky, J. L. (1998). Job vacancies in the United States: 1923 to 1994. *Review of Economics and Statistics*, 80(2), 338-345.

Zhang, M. (2008). Cyclical behavior of unemployment and job vacancies: a comparison between Canada and the United States. *The BE Journal of Macroeconomics*, 8(1).