Journal of Business, Economics and Finance
Year: 2017 Volume: 6 Issue: 1

ECONOMIC FACTORS INFLUENCING THE DYNAMICS OF UNEMPLOYMENT IN THE G10 COUNTRIES: EMPIRICAL EVIDENCE FROM PANEL DATA MODELING

DOI: 10.17261/Pressacademia.2017.382
JBEF-V.6-ISS.1-2017(3)-p.17-30

Oguzhan Ozcelebi[1], Seval Ozkan[2]
Istanbul University, Department of Economics, Beyazit, Istanbul, Turkey. ogozc@istanbul.edu.tr
Istanbul University, Department of Labor Economics, Beyazit, Istanbul, Turkey. sevaloral@yahoo.com

To cite this document
Ozcelebi, O. and S. Ozkan, (2017). Economic factors influencing the dynamics of unemployment in the G10 countries: empirical evidence from panel data modeling. Journal of Business, Economics and Finance (JBEF), V.6, Iss.1, p.17-30.
Permemant link to this document: http://doi.org/10.17261/Pressacademia.2017.382

ABSTRACT

Purpose- The purpose of the study is to determine which macroeconomic factors and economic policy changes may affect unemployment in the G10 countries.

Methodology- Panel least squares approach is employed to estimate the role of economic factors inflencing unemployment in the G10 countries.

Findings- Our findings are in line with the Phillips curve approach, exposing the importance of expansionary macroeconomic policies triggering the aggregate demand along with maintaining economic and financial stability to reduce unemployment. Expansionary economic policies play a major role in providing an improvement in the labor market in the long run. An increase in the level of financial and economic integration and development may decrease unemployment in the G10 countries. An increase in the total value-added industry and education expenditures may lead to a decrease in the unemployment rates in these countries.

Conclusion- We suggest that these countries should focus on sustaining their financial stability and development to improve the conditions of the labor market permanently. Liberalization of foreign trade, financial flows and market capitalization are crucial factors for the development of productivity of production factors, technology and organizational capacity in the G10 countries. Policy makers in the G10 countries should identify the channels through which technology, human capital, government spending, investment-specific, foreign and other shocks and taxes affect unemployment.

Keywords : Unemployment, G10 Countries, economic factors, panel data, panel data least squares estimation.
JEL Codes: E30, E60, F16

1. INTRODUCTION

The negative effect of real GDP growth on unemployment has been debated over a sustained period of time as a reflection of "Okun's Law." Many recent studies have verified this negative relation (Ang and Loganathan, 2013; Dogru, 2013; Elshamy, 2013; Akeju and Olanipekun, 2014), whereas many others have stated that Okun's Law is not always valid (Lal et al., 2010; Kreishan, 2011; Bankole and Fatai, 2013; Akram et al., 2014). Parallel to the approach by Okun (1962), the Phillips curve approach proposed by Phillips (1958) and Samuelson and Solow (1960) revealed that an inverse relationship exists

between the rates of unemployment and the corresponding rates of inflation in the short run, showing a trade-off that may not be observed in the long run.

Considerable theoretical and empirical research has examined the determinants of unemployment, especially after the 1973 oil crisis, weakening the theoretical framework of the Phillips curve. In this respect, the theoretical framework of the Phillips curve approach has been expanded by incorporating the role of expectations (Henzel and Wollmershäuser, 2008; Zhang and Clovis, 2010; Basarac et al., 2011; Palley, 2012; Mavroeidis et al., 2014) and other macroeconomic variables (Kim and Ahn, 2008; Woodburne et al., 2012; Bowdler, 2009; Malikane and Mokoka, 2014). On the other hand, various econometric techniques have been adapted to estimate the Phillips curve relation adequately for different economies. Theoretical and econometric approaches adapted to Phillips curve analysis in the open-economy framework have also considered the role of economic agents and institutional factors (Karanassou et al., 2008; Cooke, 2010; Ciccarone et al., 2014; Correa-Lopez et al., 2014; Mandelman and Zanetti, 2014, Matsui and Yoshimi, 2015; Mumtaz and Zanetti, 2015; Petrosky-Nadeau and Wasmer, 2015; Wesselbaum, 2015). In this study, we attempt to contribute to the existing literature by analyzing the dynamics of unemployment and thus the labor market in line with the Keynesian framework. For the G10 countries, the macroeconomic factors and economic policies affecting the aggregate demand and supply are considered in alternative panel data models since certain institutional factors cannot be incorporated into the empirical exercise due to the lack of available data from 1995 to 2014. Hereby, we aim to test which macroeconomic factors and economic policy changes may affect unemployment in the G10 countries and whereupon we make policy implications.

The rest of the paper is organized as follows. Section 2 reviews the previous literature analyzing the dynamics of unemployment. In Section 3, the empirical data and methodology are presented. Section 4 examines the estimation results. Finally, Section 6 concludes and discusses some policy implications.

2. LITERATURE REVIEW

According to the Phillips curve approach proposed by Phillips (1958) and Samuelson and Solow (1960), the major macroeconomic factor affecting unemployment is the inflation rate. More recently, studies in the literature have confirmed the validity of the Philips curve approach (Henzel and Wollmershäuser, 2008; Kim and Ahn, 2008; Zhang and Clovis, 2010; Basarac et al., 2011; Malikane and Mokoka, 2014). Kim and Ahn (2008) showed that the standard New Keynesian Phillips curve (NKPC) incorporating intermediate input costs, a change in the market structure and the movement of the relative price of imported materials in constructing marginal cost measures is relevant to the Korean economy, especially for the period between the early 1980s and the currency crisis. In this respect, Zhang and Clovis (2010) stressed the importance of sticky price setting of backward-looking firms to test the validity of the New Keynesian Phillips curve (NKPC) model of rational expectations following the instrumental variable (IV) approach. Zhang and Clovis (2010) found that further lags of inflation could be needed in the hybrid specification of the NKPC. Unlike Zhang and Clovis (2010), Henzel and Wollmershäuser (2008) employed direct measures of inflation expectations to test the consistency of the hybrid New Keynesian Phillips curve for selected eurozone countries, the US and the UK. It was revealed that the forward-looking Phillips curve can be rejected in favor of the hybrid New Keynesian Phillips curve and the measure of the output gap could not be used as a proxy for the real marginal cost. Similarly, Basarac et al. (2011) evaluated the hybrid New Keynesian Phillips curve by estimating dynamic fixed effects model and found a cointegration relation between the inflation, the expected inflation and the output gap (as a proxy for the real marginal cost) in nine transition economies. Malikane and Mokoka (2014) addressed the misspecification of the real marginal cost by formulating a broader measure featuring the labor share, output gap and supply shock variables. Using an appropriate lag of the labor share in the Phillips curve, Malikane and Mokoka (2014) found evidence for the empirical validity of the NKPC from five developed and five emerging market economies. However, empirical evidence has also been presented in the literature opposing the validity of the Philips curve approach (Martins and Gabriel, 2009; Abbas and Sgro, 2011; Mazumder, 2011). Additionally, Bowdler's (2009) assertion that the slope of the Phillips curve is unrelated to openness in fixed exchange rate regimes as the slope might increase with trade openness amongst countries maintaining flexible exchange rate regimes can be regarded as important. Therefore, it can be suggested that the interactions between unemployment and inflation dynamics in future periods should be determined with the aim of implementing economic policies to overcome the unemployment problem permanently.

As increases in economic activity are crucial for reducing unemployment and ensuring sustainable development, it is critical to determine the role of macroeconomic factors in unemployment under the conditions of an open economy. More precisely, macroeconomic variables under the influence of monetary and fiscal policy decisions and exogenous shocks may affect the dynamics of unemployment. In this respect, a real interest rate shock is under the influence of both monetary and fiscal policy changes and it is one of the macroeconomic variables that increase unemployment as a result of their negative effect on capital accumulation and labor productivity (Bassanini and Duval, 2006). Feldmann (2012) also confirmed that a rise in the real interest rate increases the unemployment rate using data on 68 developing countries. Carruth et al.

(1998) incorporated the real price of oil into their analysis along with the real interest rate. They adopted a model with two prices (the real price of oil and the real interest rate) to explain unemployment from 1979 to 1995 in the US. Their study revealed that an increase in the real interest rate or the real price of oil decreased the wages and increased the unemployment rate. Similarly, Dogrul and Soytas (2010) examined the relationship between the real oil price, the real interest rate and the unemployment in Turkey for the period 1/2005–8/2009 and obtained parallel results to those of Carruth et al. (1998). On the other hand, Karanassou et al. (2008) developed both theoretical and empirical models for the analysis of unemployment dynamics for the case of Spain in terms of the interactions between money growth and nominal frictions. Karanassou et al. (2008) showed that a decrease in money growth leads to a permanent rise in unemployment of 5.3%, while a 10% decrease in money growth causes a permanent rise in unemployment of 3.7%. Ciccarone et al. (2014) developed the cash-in-advance New Keynesian dynamic stochastic general equilibrium (DSGE) model with frictions in both the labor and the credit market. Accordingly, they found that monetary policy shocks might cause an increase in employment under alternative specifications. Barigozzi et al. (2014) employed a structural dynamic factor model estimated on a large panel of euro area quarterly variables, emphasizing that the reactions to the European Central Bank monetary policy might differ between North and South Europe in terms of prices and unemployment due to the country-specific structures. Similar results were also obtained by Perry et al. (2015), who found that the differences in the responses of real wages to monetary policy shocks might arise from cross-state differences in unemployment, the share of agriculture in the state GDP, the unionization rate and the importance of intermediate goods in state production by estimating structural vector autoregression (SVAR) models. Herein, fiscal policy implementation should be coordinated with monetary policy and a financial stability measure to overcome the unemployment problem and to reduce income inequality, as suggested by Arestis (2015).

The possible effects on fiscal stimuli were taken into consideration by Faia et al. (2013), who calibrated their economic model to include monetary policy and fiscal policy regimes and labor market dynamics. Faia et al. (2013) showed that government spending shocks yield small multipliers, as they have little impact on hiring and firing decisions. In a similar effort, Matsui and Yoshimi (2015) developed a DSGE model with unionized and non-unionized workers and thus analyzed the dynamic labor market for Finland, Sweden, Denmark, Belgium, Norway, Italy, Luxembourg, Ireland, Austria and Canada. Simulations of their model revealed that the welfare loss to a monetary policy shock rises with the bargaining power of unions and thus monetary policy formulation becomes critical when unions are more influential. Additionally, Jovanovic and Petreski (2014) focused on the effects of the global economic crisis on economic policy in South-Eastern Europe and the Commonwealth of Independent States with a small New Keynesian model with price and wage rigidities. Jovanovic and Petreski (2014) estimated a panel-type generalized method of moments (GMM) model and found that fixed exchange rates and strong trade unions constrain the monetary policy in countries with weak trade unions and in countries with flexible exchange rates. Parallel results to those of Jovanovic and Petreski (2014) were also obtained by Cheng (2014), who used a small open-economy model with nominal rigidities and search-matching frictions. Cheng (2014) revealed that the optimal policy rule gives importance to unemployment targeting as well as inflation targeting, whereas the welfare gain from responding to unemployment fluctuations diminishes as the rate of exchange rate pass-through to import prices falls.

In line with DSGE modeling with New Keynesian features, the effects of fiscal policy on unemployment can be studied with consumption shocks, technology shocks, monetary policy shocks and terms of trade shocks. The theoretical approach by Rocheteau and Rodriguez-Lopez (2014) considered the effects of the supply and demand of liquidity on unemployment in their economic model. They found that public liquidity crowds out private liquidity and leads to an increase in unemployment, while scarce liquidity might lead to job creation. Similarly, Wesselbaum (2015) developed a discrete-time model for the US economy to study the effects of government spending and investment shocks. According to the model simulations, government investment is a driver of fluctuations in sectorial and aggregate outputs and labor market variables rather than consumption shocks. However, Wesselbaum (2015) discovered that government investment shocks lead to an increase in the unemployment rate. Along with the changes in government spending, taxes are also important in terms of affecting the changes in the labor market and unemployment. In their study, Daveri and Tabellini (1997) showed that higher labor taxes shift onto higher real wages, leading to the substitution of labor with capital and thus the deterioration of economic activity in Europe. Berger and Everaert (2013) employed a panel of 16 OECD countries over the period 1970–2005. It was found that labor tax increases influenced the unemployment positively in European and Nordic countries, while no significant impact was found in these countries as a result of labor tax decreases. Moreover, Berger and Everaert (2013) revealed that neither increases nor decreases in labor taxes had any impact on the unemployment in Anglo-Saxon countries. Agnello et al. (2014) also studied the effects of fiscal policies on labor market conditions and unemployment using a panel of 17 countries for 1978–2009. They found that tax-driven consolidations led to a rise in unemployment and labor market flexibility was a decreasing factor of long-term unemployment. In a similar empirical effort, Canale and Liotti (2015) studied the eurozone countries (Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, the Netherlands, Portugal and Spain) with a simple cross-section analysis including the role of the 2008 financial crisis. Their empirical results implied that fiscal tightening, especially in declining macroeconomic conditions, might

well worsen the unemployment problem in the eurozone. Accordingly, Canale and Liotti (2015) suggested that a reduction in the structural deficit has to be considered when the economies are on a growth path.

It has generally been accepted by economists that openness to trade is becoming a crucial factor in increasing competitiveness and economic growth in the long run. In this sense, liberal foreign trade policies have been recommended for developing countries with an unemployment problem by international institutions such as the World Bank and the IMF. Attanasio et al. (2004) investigated this assumption in their study on the effects of the drastic tariff reductions of the 1980s and 1990s in Colombia. They revealed that the overall probability of unemployment increased after liberalization and this increase was driven by non-traded sectors rather than traded sectors. Similarly, Dutt et al. (2009) detected an unemployment-increasing short-run impact of trade liberalization followed by an unemployment-reducing effect leading to a new steady state in their study using panel data modeling. According to Gamberoni et al. (2010), especially during the crisis, the role of trade openness had a reverse effect on employment but conversely provided a speedy upturn in the economy. In contrast to Attanasio et al. (2004) and Dutt et al. (2009), Felbermayr et al. (2011a) found that a 10% rise in trade openness reduced the unemployment rate by approximately 1% using panel data for 20 OECD countries and cross-sectional data on a large set of countries. Gozgor (2014) also emphasized the lowering impact of trade openness on the unemployment rate in the G7 countries using unbalanced panel data. Similarly, Gaston and Rajaguru (2013) proposed that trade improvements reduce unemployment based on the case of Australia. According to their study, high export prices, capital accumulation in tradable goods industries and low unemployment benefits are the factors that diminish the unemployment rate. Furthermore, Cooke (2010) developed a two-country general equilibrium model, revealing that a greater degree of openness might cause more aggressive usage of the short-run Phillips curve by policy makers since the terms of trade could be related to monopoly markups. Providing evidence from regional and micro data to analyze the effects of economic liberalization, Topalova (2010) stated that sectors in rural regions that are more exposed to liberalization experience a slower decline in poverty and lower consumption growth, thus implying that the trend of the decrease in unemployment might be relatively slower in these regions. Hasan et al. (2012) studied the Indian case using state- and industry-level unemployment and trade protection data. They found no supporting empirical evidence of any increasing effect of trade reforms in India. According to Hasan et al. (2012), trade liberalization may cause a fall in the unemployment rate in regions with flexible labor markets and larger employment shares in net exporter industries.

Productivity and therefore competitiveness are also key factors in the relation between foreign trade liberalization and unemployment (Felbermayr et al., 2011b). Felbermayr et al. (2011b) showed that the increase in aggregate productivity upon trade liberalization arises due to the weeding out of the least productive firms and the reallocation of labor to relatively more productive firms in a model of heterogeneous firm productivity. Analyzing trade liberalization effects on the unemployment rate of workers with different abilities, Michaelis and de Pinto (2014) implied that trade liberalization has a positive impact on high-skilled workers but a negative impact on low-skilled ones. From this point of view, they deduced that trade liberalization increases unemployment in countries with a considerable proportion of low-skilled workers. For the cases of Argentina, Brazil and Mexico, Ernst (2005) showed that trade openness primarily does not have a job-creating effect, but competitiveness in the exchange rate provides an expansion in production and then in employment. Menezes-Filho and Muendler (2007) implied that foreign import penetration and tariff reductions might trigger worker displacements but that neither comparative advantage industries nor exporters absorb displaced workers for years after trade liberalization policies. Nwaka et al. (2015) investigated the effects of trade policy on unemployment rates in Nigeria using vector error correction with data from 1970 to 2010. They implied that, in the long run, real output and income per capita lead to a decline in unemployment, but shocks in commodity prices and trade openness policy are associated with an increase in unemployment. Sectoral employment is also a crucial issue to be examined. In this respect, Yanikkaya (2013) examined the role of liberalization in the growth rate of sectoral employment in developed and developing countries and stressed that trade openness in the form of higher trade volumes is not successful in generating jobs in developing countries due to the negative output response to trade openness in these countries. It was also found by Yanikkaya (2013) that trade barriers have an adverse impact on employment growth in services in developed countries, whereas they have a positive effect on employment in industry and services in developing countries. Providing empirical evidence from the Indian manufacturing sector, Saha et al. (2013) revealed that greater import penetration would lead to an increase in the employment of contract workers, while greater export orientation would have the opposite effect on contract labor usage.

However, numerous studies in the literature have aimed to explain unemployment and structural unemployment as being driven by other institutional factors since the role of institutional complementarities in economic systems was recognized by the pioneering analysis by Blanchard and Wolfers (2000) and Aoki (2001). According to the article by Blanchard and Wolfers (2000), oil price shocks and a total factor productivity slowdown could help to explain much of the rise in unemployment. Based on a panel of institutions and shocks for 20 OECD nations since 1960, Blanchard and Wolfers (2000) emphasized that macroeconomic shocks had differential effects on unemployment and wage-setting when the labor market institutions differed. In this respect, Belot and van Ours (2001) studied the role of institutional factors in

unemployment for OECD countries. They reckoned that labor market institutions with a particular tax rate, replacement rate, employment protection, union density and level of bargaining caused a difference in the labor market conditions among OECD countries. Similarly, Autiero (2008) investigated 16 OECD countries for 5 periods from 1960 to 1995 with a panel data model incorporating the time effect. The empirical evidence of the study revealed that some of the institutional factors (the unemployment benefit replacement ratio, the index of unemployment benefit duration, the rate of total taxes on labor, income tax, consumption tax, the rate of owner occupation of the housing stock and the degree of non-market coordination) that caused labor market rigidities and usually higher unemployment may have the opposite effect when associated with a high coordination level. Otoiu and Titan (2012) also considered OECD countries with panel modeling for the period between 1999 and 2008 to analyze the impacts of economic and institutional factors, such as employment protection, tax wedges, unemployment density, income replacement rates and labor market structural mismatch factors, on structural unemployment. Otoiu and Titan (2012) found that increases in institutional factors caused a higher non-accelerating inflation rate of unemployment (NAIRU), while economic factors did not have a significant influence on the NAIRU. In addition, Otoiu and Titan (2012) detected that increases in unemployment rates' variability by occupation were associated with a decrease in the NAIRU, while increases in unemployment rates' variability by industry had the opposite effect. Conversely, institutional factors such as regular contracts, temporary contracts, collective dismissal, membership of a trade union and unemployment benefits caused not only changes in unemployment rates, but also persistence in unemployment rates (Cuestas et al., 2011). Examining 8 countries from Central and Eastern Europe that joined the EU in 2004, Cuestas et al. (2011) revealed that shocks were highly persistent, implying a slow rate of convergence to the natural rate of unemployment. Srinivasan and Mitra (2014) used a time-varying parameter model of the unemployment rate for the US, the UK, Germany and France. The estimated parameters of their model showed that, among the determinants of the natural rate, institutions that alter labor market incentives for workers are more important than institutions that affect the labor demand. Most recently, Pérez and Yao (2015) employed panel data modeling for 20 OECD countries over the period 1985–2009. Their estimations exposed that employment protection legislation and collective bargaining coverage had opposing effects on the job destruction and unemployment duration. Accordingly, Pérez and Yao (2015) inferred that the implementation of the right reforms could reduce job destruction rates by about 0.05–1.3% and unemployment rates by up to 4% in OECD countries.

3. DATA AND METHODOLOGY

3.1. EMPRICAL DATA

To specify the appropriate type of the panel data model, we use panel unit root testing that has a theoretical methodology parallel to unit root tests of single time series data. The panel unit root tests of Levin, Lin and Chu (LLC) (2002) are applied by assuming that the persistence parameters are common across cross-sections, while it is assumed that the persistence parameters vary across cross-sections in the panel unit root tests of Im, Pesaran and Shin (2003), Fisher-ADF and Fisher-PP. On the other hand, cross-sectional dependence is considered by applying the panel unit root test of Pesaran (2007) depending on Im, Pesaran and Shin (2003). The tests of Levin, Lin and Chu (2002), Im, Pesaran and Shin (2003), Fisher-ADF, Fisher-PP (proposed by Maddala and Wu (1999), Hadri (2000) and Choi (2001)) and Pesaran (2007) applied to the variables included in our empirical exercise. To specify the appropriate type of the model, we apply panel unit root tests with different assumptions, in which the possibility of panel cointegration relationships among the variables cannot be explored.

All the panel root tests reveal that all the variables are not integrated in the same order at the 10% significance level[1]. In this case, the possibility of panel cointegration relationships among the variables cannot be explored. Thus, we ignore the unit root properties of the variables and employ panel least squares as an estimation strategy, considering random or fixed effects.

3.2. THEORETICAL METHODOLOGY

In this study, we employ panel data modeling to estimate the effects of consumer price inflation (cpi), the annual growth rate of final consumption expenditure (fce),[2] the annual growth rate of gross fixed capital formation ($gfcf$),[3] the

[1] Panel unit root test results' can be provided upon request.

[2] Final consumption expenditure is the sum of household final consumption expenditure (formerly private consumption) and general government final consumption expenditure.

[3] Gross fixed capital formation includes land improvements (fences, ditches, drains and so on); plant, machinery and equipment purchases; and the construction of roads, railways and the like, including schools, offices, hospitals, private residential dwellings and commercial and industrial buildings.

degree of openness ($open$),[4] foreign direct investments (fdi), the market capitalization of companies listed on the country's stock exchanges at the end of the year – as a percentage share of the GDP ($mark$), waged and salaried workers – as a percentage share of the total employment ($wage$), the value added in industry – as a percentage share of the GDP ($vind$), social contributions – as a percentage of revenue (soc),[5] the tax rate – as a percentage share of the GDP (tax), the tax rate – as a percentage share of the total profits ($taxi$), the education expenditure – as a percentage share of the GNI (edu) and the age dependency ratio – dependent people younger than 15 or older than 64 as a percentage of the working-age population (age) on unemployment – as a percentage share of the total employment ($unemp$) due to the availability of data.[6] For the same reason, we use the time series of the variables of Belgium, Canada, France, Germany, Italy, Japan, the Netherlands, the United Kingdom, the United States and Sweden for the period from 1995 to 2014.[7] Thus, our empirical analysis is carried out for the G10 countries except for Switzerland (playing a minor role) within the Keynesian framework. In this respect, we assume that increases/decreases in cpi , fce , $gfcf$, $open$, fdi , $mark$ and $wage$ have a lowering/raising impact on unemployment rates, whereas increases in age , $soci$, tax and $taxi$ have an increasing impact on unemployment rates due to the increased burden on the productive part of the population. Our economic model also considers the assumption that the influence of changes in education expenditures and productivity (proxied by added value in industry) on unemployment may vary, either increasing or decreasing the labor demand and supply. Conversely, we do not include interest rates and exchanges rates in our model since it is assumed that they influence unemployment rates particularly through the changes in final consumption expenditure, gross fixed capital formation, exports and imports and foreign direct investments in line with the Keynesian output–expenditure model.

$$unemp = f(\underset{-}{cpi}, \underset{-}{fce}, \underset{-}{gfcf}, \underset{-}{open}, \underset{-}{fdi}, \underset{-}{mark}, \underset{-}{wage}, \underset{-,+}{vind}, \underset{+}{age}, \underset{+}{soci}, \underset{-,+}{edu}, \underset{+}{tax}, \underset{+}{taxi}) \quad (1)$$

In this respect, we estimate alternative panel data models to show the evolution of the model parameters and test whether the coefficients of the models are in line with our theoretical assumptions.

4. FINDINGS AND DISCUSSIONS

Since the time dimension is relatively larger than the number of countries in our empirical exercise, we can infer that heterogeneity or individuality is most likely to exist among countries. Parallel to Hahn and Kuersteiner (2002), we employ panel least squares to estimate the effects of the annual growth rate of final consumption expenditures, annual growth rate of gross fixed capital formation, consumer price inflation, degree of openness, foreign direct investments, market capitalization, share of waged and salaried workers in employment, value added in industry, social contributions, tax/GDP and tax/profits, income and wages, education expenditure/GNI and share of dependent people younger than 15 or older than 64 in the working-age population on unemployment for the G10 countries. Within this context, the possible impacts of macroeconomic factors and policies on the aggregate demand and supply and thus on unemployment are studied. The evolution of our alternative panel data models' parameters is also shown to make inferences in that respect. For the identification of our modeling approach, the Hausman test imposed fixed-effects models, as shown in Table 4 below. Table 1 also indicates that our models have no serial correlation since the p-values of Pesaran's (2004) test of cross-sectional independence, shown in parentheses in Table 2, are higher than 0.1.

[4] We compute the degree of openness to trade as (exports+imports)/GDP.

[5] According to the World Bank, soc includes social security contributions by employees, employers and self-employed individuals and other contributions for which the source cannot be determined.

[6] We intended to include labor market institution and product market regulation variables, such as the degree of union density and union coverage, employment protection legislation, active labor market policies, minimum wages, average rate of wage taxes, average replacement rate of unemployment insurance, degree of coordination and/or centralization, incidence of part-time contracts, regulation of product markets and size of the informal economy. However, these variables cannot be added due to a lack of available data up to the year 2015.

[7] All the series are extracted from the statistical database of the World Bank and they are all in levels. Some series with missing values are filled with plausible techniques. The estimations are carried out using Stata 13.

Table 1: Panel Models' Estimation Results

Method: Panel least squares
Model 1 – R-squared-overall: 0.5701
Model 1 – Effect specification: fixed
Model 1 – Pesaran's test of cross-sectional independence = 8.463, prob. = 0.112
Model 2 – R-squared-overall: 0.704
Model 2 – Effect specification: fixed
Model 2 – Pesaran's test of cross-sectional independence = 2.793, prob. = 0.178
Model 3 – R-squared-overall: 0.775
Model 3 – Effect specification: fixed
Model 3 – Pesaran's test of cross-sectional independence = 2.530, prob. = 0.131
Model 4 – R-squared-overall: 0.727
Model 4 – Effect specification: fixed
Model 4 – Pesaran's test of cross-sectional independence = 3.996, prob. = 0.155

Variable	**Model 1**	**Model 2**	**Model 3**	**Model 4**
c	16.591 (0.000)	18.051 (0.000)	12.350 (0.006)	12.739 (0.001)
fce	-0.161 (0.023)	-0.107 (0.003)	-0.193 (0.012)	-0.146 (0.024)
gfcf	0.104 (0.009)	0.078 (0.003)	0.100 (0.012)	0.083 (0.025)
cpi	-0.237 (0.011)	-0.032 (0.082)	-0.206 (0.019)	-0.021 (0.009)
open	-0.015 (0.031)	-0.026 (0.059)	-0.005 (0.007)	-0.017 (0.023)
fdi	-0.045 (0.003)	-0.062 (0.000)	-0.039 (0.011)	-0.057 (0.000)
mark	-0.028 (0.000)	-0.002 (0.131)	-0.025 (0.000)	-0.029 (0.000)
wage	-0.026 (0.407)	-0.050 (0.001)	-0.038 (0.027)	-0.057 (0.073)

age	0.017 (0.027)	0.016 (0.034)	0.227 (0.022)	0.012 (0.048)
vind	-0.177 (0.001)	-0.202 (0.000)	-0.171 (0.001)	-0.200 (0.000)
edu	----	-0.877 (0.000)		-0.859 (0.000)
soci		0.006 (0.009)	----	0.021 (0.077)
tax	----		0.117 (0.003)	0.009 (0.093)
taxi	----		0.1805 (0.001)	0.128 (0.054)

Notes: p-values of the coefficients are in parentheses.

According to the alternative panel data estimations presented in Table 4, the variables reflecting the situation of economic activity may have a positive impact on unemployment, except for gross fixed capital formation, in line with Bande and Riveiro (2012), who found that consumption shocks had a lowering impact on unemployment, while we show that investment shocks led to an increase in the unemployment rates in these countries. Thereby, it can be deduced that increases in consumption and investments and rising inflation may have consequences for the labor market by affecting the labor demand and supply, similar to Karanassou et al. (2008), Ciccarone et al. (2014), Gozgor (2014) and Nwaka et al. (2015). Moreover, we can infer that growth in the aggregate demand may lead to a push in the demand for labor in the G10 countries, which in turn may increase the real wage and promote an increase in the labor supply. We can interpret the institutional environment of goods market, goods market frictions, degree of unionization in the labor market, labor market frictions and financial frictions as crucial factors to explain the dynamics of labor markets, in line with Ciccarone et al. (2014), Correa-Lopez et al. (2014) and Mandelman and Zanetti (2014). Despite the increases in the inflation rate lowering the real wage and thus decreasing the labor supply, we estimate that the inflation rate positively affects the employment in the G10 countries, parallel to the outcome of studies refuting the validity of the NKPC (Martins and Gabriel, 2009; Mazumder, 2011). This finding can be interpreted as the impact of rising economic conjuncture with rising inflation; more precisely, the effect of the increase in the labor demand due to the rising economic conjuncture is higher than the effect of inflation decreasing the labor supply in the G10 countries. Due to the coefficients of gross fixed capital formation, it can also be implied that investment-specific technological progress may deepen the unemployment problem and cause persistence in the unemployment rates in the G10 countries, in line with Collard and Dellas (2007), Schubert (2011), Mandelman and Zanetti (2014) and Hove et al. (2015) but in contrast to Canova et al. (2007), Mumtaz and Zanetti (2015) and Sunakawa (2015). Thus, we can state that labor and physical capital may be important alternatives to each other in the production process of the G10 countries. More precisely, we reveal that increases in investments and thus in gross fixed capital formation may be mainly under the influence of investment-specific technology shocks in these countries, which in turn lower the need for labor in the production process. Thus, in line with Iacovoiu (2012), we assert for the G10 countries that investments related to the modernization of the existing production capacity may affect unemployment negatively since these kinds of investments may increase the labor productivity and thus reduce the need for labor.

Along with the changes in supply dynamics, an increase in the share of waged and salaried workers in the total employment is critical for the sustainable increase in the aggregate demand in the long run. Moreover, this phenomenon increases the contributions to the social security system, which is essential for sustainable development. Our panel data estimations show that the coefficients of the share of waged and salaried workers in employment have negative signs in all the models, implying that rises in the share of waged and salaried workers in the total employment are a factor that lowers unemployment. However, increases in the share of waged and salaried workers cannot be accepted as a separate factor influencing the labor demand and supply. The level of the real wage, which is under the influence of labor productivity, is

another factor for analyzing the dynamics of the labor demand and supply. In our empirical exercise, an increase in the value added of the industrial sector is also found to be a factor that boosts the real economic activity, which in turn may increase the labor demand and employment, parallel to Mumtaz and Zanetti (2015), Sunakawa (2015) and Wesselbaum (2015) but in contrast to Collard and Dellas (2007) and Mandelman and Zanetti (2014). In this respect, education expenditures are also critical since they may cause technology and human capital shocks and may increase the productivity level of labor in the long run, consistent with the labor-augmenting technical progress in the Solow model (for the specification of Hicks-neutral, Solow-neutral and Harrod-neutral technological progress, see Fisher (2006), Michelacci and Lopez Salido (2007) and Altig et al. (2011)). The coefficients of education expenditures are negative and statistically significant in Models 2 and 4, exposing the positive impact on the unemployment problem in line with Mortensen and Pissarides (1999).

In line with the Keynesian view, it can be assumed that fiscal policy decisions influence the social security system and thus the dynamics of the aggregate demand significantly. We find that the coefficient of social contributions is positive and statistically significant, showing that social contributions cause a decrease in the aggregate demand. Our finding also implies that an increase in the role of the social security system can be accepted as a factor that lowers the spending capacity of economic agents. Moreover, social contributions may trigger unemployment by increasing the reservation wages of the unemployed. Hence, social contributions to the unemployed in the G10 countries should be studied, briefly considering this increasing effect on unemployment. Similarly, our panel estimations show that rises in the age dependency ratio may become a factor that increases the burden on the productive part of the population and thus may lower the spending capacity of economic agents. Our panel model estimation results are somewhat in line with the lowering impact of expansionary economic policies on the unemployment rate. Similarly, analyzing the impact of the public sector on the economy, the majority of the coefficients of taxes show that increases in taxes may lead to an increase in the unemployment rate in the G10 countries, revealing that contractionary economic policies decrease employment, in line with Tagkalakis (2013) and Agnello et al. (2014). Our findings related to the tax rate are in line with the theoretical expectations and the empirical findings in the context of the studies by Thomas (1998), Autiero (2008), Berger and Everaert (2013) and Agnello et al. (2014), who implied that a rise in tax rates, especially in payroll tax, affects the labor costs, which in turn may lead to job losses and a rise in unemployment. Moreover, in contrast to the view that fiscal policy can be productive and increase the economic activity in the long run, we find that the coefficients of tax rates from profits in Models 3 and 4 have statistically significant positive signs, implying that an increase in tax from the total profits of firms does not lead to changes increasing the total level of efficiency in production. Moreover, it may be interpreted that government expenditures funded by corporate tax do not lead to significant changes in real economic activity that might increase employment.

Considering that the wind of economic and financial liberalization has been prevalent over the last two decades, the dynamics of unemployment are studied in an open-economy framework in this study. The estimation results show that increases in the degree of openness may lower the unemployment rate in the G10 countries by boosting economic activity, parallel to Felbermayr et al. (2011a), Loganathan et al. (2011) and Gozgor (2014) but in contrast to Attanasio et al. (2004), Dutt et al. (2009) and Nwaka et al. (2015). Similarly, the coefficients obtained from our panel estimations point out that foreign direct investment may also lower unemployment by boosting economic activity. Accordingly, the liberalization of foreign trade and financial flows can be accepted as key factors for analyzing the dynamics of labor markets in the G10 countries. In contrast to the theoretical assumptions of the positive impact of financial development, the coefficient of market capitalization in Model 2 is not statistically significant, revealing that market capitalization has no impact on the dynamics of unemployment in the G10 countries.

5. CONCLUSION

According to our estimations, the changes in domestic economic activity are in line with the theoretical expectations. An increase in final consumption expenditure may lead to a fall in the unemployment rate in the G10 countries. Thus, we can infer that expansionary economic policies play a major role in providing an improvement in the labor market in the long run. Although these policies may also lead to a rise in inflation, we found that rising inflation may cause a fall in the unemployment rates in the G10 countries. Therefore, it can be asserted that our alternative panel data model estimations are in line with the Philips curve framework and they stress the importance of expansionary economic policies for the decline in unemployment rates in the G10 countries. On the other hand, expansionary policies may lead to the deterioration of financial and economic stability, which in turn may affect long-term unemployment negatively. Despite the possibility of economic policies aimed at ensuring financial stability to increase the unemployment rates in the short run, we suggest that these countries should focus on sustaining their financial stability and development to improve the conditions of the labor market permanently.

To examine the effects on unemployment in the G10 countries, we also incorporated variables reflecting the level of financial development along with macroeconomic variables in alternative panel data models. The coefficients of openness, foreign direct investments and market capitalization were mainly found to be negative in the models. We interpret this result as meaning that an increase in the level of financial and economic integration and development may decrease unemployment in the G10 countries. These variables are also critical in the open-economy framework since foreign shocks transmit to the labor market, particularly over the last decade. Thus, the liberalization of foreign trade, financial flows and market capitalization can be exposed as crucial factors for the development of productivity of production factors, technology and organizational capacity in the G10 countries, which should be studied briefly.

Sustaining the stability in the aggregate demand and supply is also vital in terms of decreasing the unemployment rate in the long run. In this respect, as automatic stabilizers, contributions to the social security system and taxation are also crucial. We found that an increase in the contributions to the social security system may have a negative impact on the unemployment rate in the G10 countries. More precisely, we can assert that an increase in the contributions to the social security system may lead to deterioration in the aggregate demand in these countries. This phenomenon shows that the social security system has a role as an automatic stabilizer, helping to maintain economic stability in the G10 countries. Another automatic stabilizer, taxes, was also considered in our empirical exercise. The signs and p-values of the coefficients imply that changes in the taxation policy may play a significant role in the aggregate demand and supply, which in turn affects the dynamics of unemployment in the G10 countries. However, fiscal policy, as a policy tool, can have an impact on the labor market by manipulating the aggregate demand and supply in the G10 countries since we found a significant impact of contributions to the social security system. Along with the burdening effect of increased tax rates on spending capacity and employment, we found that increases in the ratio of dependent people younger than 15 or older than 64 to the working-age population influence the unemployment problem negatively in the G10 countries.

Conversely, our alternative panel data estimations reveal that an increase in the share of waged and salaried workers in the total employment is a factor that maintains persistence and stability in the aggregate demand. In this respect, we assert that increases in the real wages of the employed are also important for the decline in unemployment rates in the long run. For the determination of the wage level, labor productivity is another crucial issue to be considered. We found that an increase in the total value-added industry and education expenditures may lead to a decrease in the unemployment rates in the G10 countries, implying that increases in the total factor productivity of labor raise the aggregate supply and output, which in turn lead to a fall in unemployment rates in the G10 countries. In contrast, our estimations reveal that increases in gross fixed capital formation arising from investment-specific technological progress may lead to an increase in unemployment since the need for labor in the production process may be decreased. Consequently, policy makers in the G10 countries should identify the channels through which technology, human capital, government spending, investment-specific, foreign and other shocks and taxes affect unemployment in the DSGE framework with frictions in goods and labor markets.

REFERENCES

Abbas, S.K. & Sgro, P.M. 2011, “New keynesian phillips curve and inflation dynamics in Australia”, Economic Modelling, vol. 28, no. 4, pp. 2022–2033.

Agnello, L. Castro, V., Jalles, J.T. & Sousa, R.M. (2014), “Fiscal adjustments, labour market flexibility and unemployment”, Economics Letters, vol. 124, no. 2, pp. 231–235.

Akeju, K.F. & Olanipekun, D.B. 2014, “Unemployment and economic growth in Nigeria”, Journal of Economics and Sustainable Development, vol. 5, no. 4, pp. 138–144.

Akram, M., Hussain, S., Raza, S.H. & Masood, S., 2014, “An empirical estimation of Okun’s law in context of Pakistan”, Journal of Finance and Economics, vol. 2, no. 5, pp. 173–177.

Altig, D., Christiano, J., Eichenbaum, M. & Linde, J. 2011, “Firm-specific capital, nominal rigidities and the business cycle”, Review of Economic Dynamics, vol. 14, no. 2, pp. 225–247.

Ang, S.H. & Loganathan, N. 2013, “Interactions between economic growth and unemployment condition in Asian region”, International Journal of Economics and Empirical Research, vol. 1, no. 12, pp. 135–146.

Aoki, M. 2001, Toward a comparative economic analysis, MIT Press, Cambridge.

Arestis, P. 2015, “Coordination of fiscal with monetary and financial stability policies can better cure unemployment”, Review of Keynesian Economics, vol. 3, no. 2, pp. 233–247.

Attanasio, O., Goldberg, P.K. & Pavcnik, N. 2004, "Trade reforms and wage inequality in Columbia", Journal of Development Economics, vol. 74, no. 2, pp. 331–366.

Autiero, G. 2008, "Labor market coordination systems and unemployment performance in some OECD countries", Journal of Socio-Economics, vol. 37, no. 5, pp. 1846–1855.

Bande, R. & Riveiro, D. 2012, "The consumption–investment–unemployment relationship in Spain: An analysis with regional data", MPRA Working Paper, No. 42681.

Bankole, A.S. & Fatai, B.O. 2013, "Empirical test of okun's law in Nigeria", International Journal of Economic Practices and Theories, vol. 3, no. 3, pp. 227–231.

Barigozzi, M., Conti, A.M. & Luciani, M. 2014, "Do Euro area countries respond asymmetrically to the common monetary policy?", Oxford Bulletin of Economics and Statistics, vol. 76, no. 5, pp. 693–714.

Basarac, M., Škrabić, B. & Sorić, P. 2011, "The hybrid Phillips curve: Empirical evidence from transition economies", Finance a úvěr – Czech Journal of Economics and Finance, vol. 61, no. 4, pp. 367–383.

Bassanini, A. & Duval, R. (2006), "The determinants of unemployment across OECD countries: Reassessing the role of policies and institutions", OECD Economic Studies, vol. 2, no. 1, pp. 7–86.

Belot, M. & van Ours, J.C. 2001, "Unemployment and labour market institutions: An empirical analysis", Journal of the Japanese and International Economies, vol. 15, no. 4, pp. 403–418.

Berger, T. & Everaert, G. 2013, "Is the impact of labor taxes on unemployment asymmetric?", Macroeconomic Dynamics, vol. 17, no. 1, pp. 143–154.

Blanchard, O. & Wolfers, J. 2000, "The role of shocks and institutions in the rise of European unemployment: The aggregate evidence", Economic Journal, vol. 110, no. 462, pp. C1–C33.

Bowdler, C. 2009, "Openness, exchange rate regimes and the Phillips curve", Journal of International Money and Finance, vol. 28, no. 1, pp. 148–160.

Canale, R.R. & Liotti, G. 2015, "Structural adjustment and unemployment in selected Eurozone countries", Australian Economic Review, vol. 48, no. 2, pp. 113–121.

Canova, F., Lopez-Salido, D. & Michelacci, C. 2007, "Schumpeterian technology shocks", Universitat Pompeu Fabra Working Paper, No. 1012.

Carruth, A.A., Hooker, M.A. & Oswald, A.J. 1998, "Unemployment equilibria and input prices: Theory and evidence from the United States", Review of Economics and Statistics, vol. 80, no. 4, pp. 621–628.

Cheng, C.H.J. 2014, "Exchange rate pass-through, unemployment and optimal implementable monetary policy rule for emerging economies", Global Economic Review: Perspectives on East Asian Economies and Industries, vol. 43, no. 3, pp. 221–243.

Choi, I. 2001, "Unit root tests for panel data", Journal of International Money and Finance, vol. 20, no. 2, pp. 249–272.

Ciccarone, G., Giuli, F. & Liberati, D. 2014, "Incomplete interest rate pass-through under credit and labor market frictions", Economic Modelling, vol. 36, pp. 645–657.

Cooke, D. 2010, "Openness and inflation", Journal of Money, Credit and Banking, vol. 42, no. 2–3, pp. 267–287.

Correa-Lopez, M., Garcia-Serrador, A. & Mingorance-Arnaiz, C. 2014, "Product market competition, monetary policy regimes and inflation dynamics: Evidence from a panel of OECD countries", Oxford Bulletin of Economics and Statistics, vol. 76, no. 4, pp. 484–509.

Cuestas, J.C., Gil-Alana, L.A. & Staehr, K. 2011, "A further investigation of unemployment persistence in European transition economies", Journal of Comparative Economics, vol. 39, no. 4, pp. 514–532.

Daveri, F. & Tabellini, G. 1997, "Unemployment, growth and taxation in industrial countries", IGIER Working Paper, No. 122.

Dogru, B. 2013, "The link between unemployment rate and real output in Eurozone: A panel error correction approach", Procedia – Social and Behavioral Sciences, vol. 99, pp. 94–103.

Dogrul, H.G. & Soytas, U. 2010, "Relationship between oil prices, interest rate, and unemployment: Evidence from an emerging market", Energy Economics, vol. 32, no. 6, pp. 1523–1528.

Dutt, P., Mitra, D. & Ranjan, P. 2009, "International trade and unemployment: Theory and cross-national evidence", Journal of International Economics, vol. 78, no. 1, pp. 32–44.

Elshamy, H. 2013, "Okun's law and its validity in Egypt", Journal of Emerging Issues in Economics, Finance and Banking, vol. 1, no. 2, pp. 67–74.

Ernst, C. 2005, "Trade liberalization, export orientation and employment in Argentina, Brazil and Mexico", Employment Strategy Papers, No. 15.

Faia, E., Lechthaler, W. & Merkl, C. 2013, "Fiscal stimulus and labor market policies in Europe", Journal of Economic Dynamics and Control, vol. 37, no. 3, pp. 483–499.

Felbermayr, G., Prat, J. & Schmerer, H.J. 2011a, "Trade and unemployment: What do the data say?" European Economic Review, vol. 55, no. 6, pp. 741–758.

Felbermayr, G., Prat, J. & Schmerer, H.J. 2011b, "Globalization and labor market outcomes: Wage bargaining, search frictions, and firm heterogeneity", Journal of Economic Theory, vol. 146, no. 1, pp. 39–73.

Feldmann, H. 2012, "Real interest rate and labor market performance in developing countries", Economic Letters, vol. 117, no. 1, pp. 200–203.

Fisher, J. 2006, "The dynamic effects of neutral and investment-specific technology shocks", Journal of Political Economy, vol. 114, no. 3, pp. 413–451.

Gamberoni, E., Von Uexkull, E. & Weber, S. 2010, "The role of openness and labour market institutions for employment dynamics during economic crises", ILO Employment Working Paper, No. 68.

Gaston, N. & Rajaguru, G. 2013, "How an export boom affects unemployment", Economic Modelling, vol. 30, no. 2013, pp. 343–355.

Gozgor, G. 2014, "The impact of trade openness on the unemployment rate in G7 countries", Journal of International Trade and Economic Development: An International and Comparative Review, vol. 23, no. 7, pp. 1018–1037.

Hadri, K. 2000, "Testing for stationarity in heterogeneous panel data", Econometrics Journal, vol. 3, no. 2, pp. 148–161.

Hahn J. & Kuersteiner, G. 2002, "Asymptotically unbiased inference for a dynamic panel model with fixed effects when both n and T are large", Econometrica, vol. 70, no. 4, pp. 1639–1657.

Hasan, R. Devashish Mitra, D., Ranjan, P. & Ahsan, R.N. 2012, "Trade liberalization and unemployment: Theory and evidence from India", Journal of Development Economics, vol. 97, no. 2, pp. 269–280.

Henzel, S. & Wollmershäuser, T. 2008, "The new keynesian Phillips curve and the role of expectations: Evidence from the CESifo world economic survey", Economic Modelling, vol. 25, no. 5, pp. 811–832.

Hong, I. 2014, "Italian welfare in the aftermath of the economic crisis: Neoliberal reforms and limits to the path dependency approach", Journal of Sociology and Social Welfare, vol. XLI, no. 2, pp. 73–91.

Hove, S., Mama, A.T. & Tchana Tchana, F. 2015, "Monetary policy and commodity terms of trade shocks in emerging market economies", Economic Modelling, Vol. 49, pp. 53–71.

Iacovoiu, V.B. 2012, "Impact of capital investments on unemployment in the context of economic crisis: The case of Romania", Economic Insights – Trends and Challenges, vol. 1 (LXIV), no. 4/2012, pp. 36–47.

Im, K.S., Pesaran, M.H. & Shin, Y. 2003, "Testing for unit roots in heterogeneous panels", Journal of Econometrics, vol. 115 no. 1, pp. 53–74.

Jovanovic, B. & Petreski, M. 2014, "Monetary policy, exchange rates and labor unions in SEE and the CIS during the financial crisis", Economic Systems, vol. 38, no. 3, pp. 309–332.

Karanassou, M., Sala, H. & Snower, D.J. 2008, "Long run inflation–unemployment dynamics: The Spanish Phillips curve and economic policy", Journal of Policy Modeling, Vol. 30, No. 2, pp. 279–300.

Kim, B. G. & Ahn, B.K. 2008, "An assessment of the new keynesian Phillips curve in the Korean economy", Economic Analysis, vol. 14, no. 3, pp. 85–131.

Krause, M.U. & Uhlig, H. 2012, "Transition in the German labor market: Structure and crisis", Journal of Monetary Economics, vol. 59, no. 1, pp. 64–79.

Kreishan, F.M. 2011, "Economic growth and unemployment: An empirical analysis", Journal of Social Sciences, vol. 7, no. 2, pp. 228–231.

Lal, I., Sulaiman D. Jalil, M.A., Hussain, A. 2010, "Test of Okun's law in some Asian countries cointegration approach", European Journal of Scientific Research, vol. 40, no. 1, pp. 73–80.

Levin, A., Lin, C.-F. & Chu, C.-S. J. 2002, "Unit root tests in panel data: Asymptotic and finite-sample properties", Journal of Econometrics, vol. 108, pp. 1–24.

Loganathan, N., Sukemi, M.N. & Kogid, M. 2011, "Dynamic causal relationship between trade balance and unemployment scenario in Malaysia: Granger non-causality analysis", Economics and Finance Review, vol. 1, No. 3, pp. 13–20.

Maddala, G.S. & Wu, S. 1999, "A comparative study of unit root tests with panel data and a new simple test", Oxford Bulletin of Economics and Statistics, vol. 61 no. S1, pp. 631–652.

Malikane, C. & Mokoka, T. 2014, "The new keynesian Phillips curve: Endogeneity and misspecification", Applied Economics, vol. 46, no. 25, pp. 3082–3089.

Mandelman, F.S. & Zanetti, F. 2014, "Flexible prices, labor market frictions and the response of employment to technology shocks", Labour Economics, vol. 26, pp. 94–102.

Martins, L.F., Gabriel, V.J. 2009, "New keynesian Phillips curves and potential identification failures: A generalized empirical likelihood analysis", Journal of Macroeconomics, vol. 31, no. 4, pp. 561–571.

Matsui, M. & Yoshimi, T. 2015, "Macroeconomic dynamics in a model with heterogeneous wage contracts", Economic Modelling, vol. 49, pp. 72–80.

Mavroeidis, S., Møller, M.P. & Stock J.H. 2014, "Empirical evidence on inflation expectations in the new keynesian Phillips curve", Journal of Economic Literature, vol. 52, no. 1, pp. 124–188.

Mazumder, S. 2011, "The empirical validity of the new keynesian Phillips curve using survey forecasts of inflation", Economic Modelling, vol. 28, no. 6, pp. 2439–2450.

Menezes-Filho, N.A. & Muendler, M.A. 2007, "Labor reallocation in response to trade reform", CESifo Working Paper Series, No. 1936.

Michaelis, J. & de Pinto, M. 2014, "International trade and unemployment –the worker-selection effect", Review of International Economics, vol. 22, no. 2, pp. 226–252.

Michelacci, C. & Lopez-Salido, D. 2007, "Technology shocks and job flows", Review of Economic Studies, vol. 74, no. 4, pp. 1195–1227.

Mortensen, D.T. & Pissarides, C.A. 1999, "Unemployment responses to 'skill-biased' technology shocks: The role of labour market policy", Economic Journal, vol. 109, no. 455, pp. 242–265.

Mumtaz, H. & Zanetti, F. 2015, "Labor market dynamics: A time-varying analysis", Oxford Bulletin of Economics and Statistics, vol. 77, no. 3, pp. 319–338.

Nwaka, I.D., Uma, K.E. & Tuna, G. 2015, "Trade openness and unemployment: Empirical evidence for Nigeria", Economic and Labour Relations, vol. 26, no. 1, pp. 117–136.

Okun, A.M. 1962, "Potential GNP: Its measurement and significance", in Proceedings of the Business and Economic Statistics Section of the American Statistical Association, American Statistical Association, Alexandria, VA, pp. 89–104.

Otoiu, A. & Titan, E. (2012), "Main drivers of structural unemployment in times of relative prosperity", Procedia – Social and Behavioral Sciences, vol. 62, pp. 109–113.

Palley, T. 2012, "The economics of the Phillips curve: Formation of inflation expectations versus incorporation of inflation expectations", Structural Change and Economic Dynamics, vol. 23, no. 3, pp. 221–230.

Pérez, E. & Yao, Y. 2015, "Can institutional reform reduce job destruction and unemployment duration? Yes it can", Empirical Economics, vol. 49, no. 3, pp. 961–983.

Perry, B., Phillips, K.L. & Spencer, D.E. 2015, "State-Level variation in the real wage response to monetary policy", Annals of Economics and Finance, vol. 16, no. 1, pp. 1–17.

Pesaran, M.H. 2004, "General diagnostic tests for cross section dependence in panels", IZA Discussion Paper Series, No. 1240.

Pesaran, M.H. 2007, "A simple panel unit root test in the presence of cross–section dependence", Journal of Applied Econometrics, vol. 22, no. 2, pp. 265–312.

Phillips, A.W. 1958, "The relationship between unemployment and the rate of change of money wage rates in the United Kingdom 1861–1957", Economica, vol. 25, no. 100, pp. 283–299.

Rocheteau, G. & Rodriguez-Lopez, A. 2014, "Liquidity provision, interest rates, and unemployment", Journal of Monetary Economics, vol. 65, pp. 80–101.

Saha, B., Sen, S. & Maiti, D. 2013, "Trade openness, labour institutions and flexibilisation: Theory and evidence from India", Labour Economics, vol. 24, pp. 180–195.

Samuelson, P.A. & Solow, R.M. 1960, "Analytical aspects of anti-inflation policy." American Economic Review Papers, vol. 50, no, 2, in Papers and Proceedings of the Seventy-Second Annual Meeting of the American Economic Association, pp. 177–194.

Schubert, S.F. (2011), "The effects of total Factor productivity and export shocks on a small open economy with unemployment", Journal of Economic Dynamics & Control, vol. 35, no. 9, pp. 1514–1530.

Srinivasan, N. & Mitra, P. 2014, "The European unemployment problem: Its cause and cure", Empirical Economics, vol. 47, no. 1, pp. 57–73.

Sunakawa, T. 2015, "Optimal monetary policy with labor market frictions: The role of the wage channel", Journal of Money, Credit and Banking, vol. 47, no. 6, pp. 1119–1147.

Tagkalakis, A.O. 2013, "The unemployment effects of fiscal policy: Recent evidence from Greece", IZA Journal of European Labor Studies, vol. 2, no. 11, pp. 1–32.

Thomas, A. 1998, "The fffects of tax wedges on hours worked and unemployment in Sweden", IMF Working Paper, No. 152.

Topalova, P. 2010, "Factor immobility and regional impacts of trade liberalization: Evidence on poverty from India", IMF Working Paper, No. 128.

Wesselbaum, D. 2015, "Sectoral labor market effects of fiscal spending", Structural Change and Economic Dynamics, vol. 34, pp. 19–35.

Woodburne, P.R. 2012, "The dynamic Phillips curve revisited: An error correction model", International Journal of Advances in Management and Economics, vol. 1, no. 5, pp. 1–4.

Yanikkaya, H. 2013, "Is trade liberalization a solution to the unemployment problem?", Portuguese Economic Journal, vol. 12, no. 1, pp. 57–85.

Zhang, C.S., Clovis, J. (2010), "The new keynesian Phillips curve of rational expectations: A serial correlation extension", Journal of Applied Economics, vol. 13, no. 1, pp. 159–179.

NOTE: Please see the previously published issues for unnoted details.