

Can Labor Market Flexibility Affect Unemployment? A Panel Data Analysis

Teheni EL Ghak Zribi¹, Hazar Temmi² and Nadia Zrelli³

Abstract

The paper estimates the impact of labor market flexibility on unemployment outcomes, for a large set of countries during 2000-2010. We estimated both static and dynamic model. Our empirical analysis shows that most of the macroeconomic and demographic variables and market labor flexibility indicators reduce unemployment and youth unemployment rates. By contrast, we cannot rule out a negative impact of macroeconomic variables when we consider long-term unemployment rate. Our finding suggests some policy conclusions that can help economic policymakers to reduce unemployment.

Keywords: unemployment; labor market flexibility; panel data; and GMM

Introduction

The most pressing economic problem after the Great Recession is the apparently endless surge in unemployment, especially youth unemployment. According to ILO estimates (ILO's Global Employment Trends), there is a backlog of global unemployment of 200 million, the number of unemployed has increased by 27 million units over the period 2007–2010.

¹ PhD, Laboratory of International Economic Integration, Faculty of Economic Sciences and Management of Tunis, University of Tunis El Manar, Post box 248 - 2092 Tunis El Manar II, Tunisia, Phone: +216 23729094 E-mail: elghateheni@yahoo.fr

² PhD Student, Laboratory of International Economic Integration, Faculty of Economic Sciences and Management of Tunis, University of Tunis El Manar, Post box 248 - 2092 Tunis El Manar II, Tunisia

³ PhD, LARIME, Higher School of Economics and Commercial Sciences of Tunis , 4, Rue Abou Zakaria El Hafsi, Montfleury, 1089 Tunis, Tunisia

The employment-to-population ratio has fallen from 61.2 to 60.2 per cent at the global level. Unemployment touch 197.3 person in the world in 2012 with 4.2 million persons in more compared to the previous year. The baseline projection suggests no change in the global unemployment rate until 2016, remaining at around 6 per cent of the global labor force. Besides, "*the world is facing a worsening youth employment crisis: young people are three times more likely to be unemployed than adults and over 75 million youth worldwide are looking for work and this level is not expected to come down until at least 2016*".

There is a body of literature that has examined the central question of what determines the unemployment rate? The steady increase in unemployment rates can be variously explained by employer-employee mismatches, the erosion of skills, excessive wages, technology shocks, preference for the public sector jobs, welfare payments,.... Among the possible solutions, most countries have embarked on an overall economic reform package that include policy and structural reforms in the labor market to better mold labor force characteristics to changes in demand, to improve job-search efficiency,....

Against this background, this paper attempts to examine the impact of policies aimed at increasing labor market flexibility on unemployment. We use an unbalanced panel data set for a large number of countries over the period 2000–2010. We mainly rely on three conventional measures of unemployment: Unemployment rate, Youth unemployment rate and Long-term unemployment. Both static and dynamic model are estimated.

The paper is organized as follows. Section I present a review of several existing research. Section II describes the dataset and the econometric method used in this paper. Section III summarizes the results. In section IV some policy conclusions are drawn and directions for future research in this area are suggested.

1. Might Labor Market Flexibility Reduce Unemployment?⁴

By affecting the movements of workers in and out of unemployment, labor-market institutions and policies, such as minimum wages, unemployment insurance, severance pay, advance notice, labor taxes, and so on, may influence unemployment rates over short and long time horizons. Consequently, the effects of these institutions should be taken into account when we try to explain unemployment. However, labor regulations and programs differ widely around the world. This diversity gives rise to important public policy question regarding the impact of more flexible regulations on unemployment outcomes.

⁴ This section does not present an exhaustive review of the literature. It highlights some of the main findings.

Labor market flexibility refers to the willingness and ability of workers and employers to respond to any shocks that may arise and their capacity to adjust to a constantly changing economic environment. This flexibility depends on several factors: The extent of labor migration, Wage flexibility, Local vs national pay bargaining, Making work pay, Skills and training, Barriers to entry and exit,.... A labor market with low flexibility is bound by rules and regulations such as minimum wage restrictions and requirements from trade unions.

Several economic theory and empirical studies try to assess labor market flexibility – unemployment nexus. Nevertheless, there is no consensus among researchers. Results are not robust to variations in variable specification, time period, and estimation method. Building on his earlier study with Layard and Jackman (1994), Nickell (1997) for example argue that European markets are characterized by an enormous variation in unemployment rates, and the countries with the highest unemployment rates are not necessarily the rigid ones. The empirical analysis of the effects of labor market institutions on unemployment in 20 OECD countries, observed in the two periods 1983-1988 and 1989-1994, suggest that high unemployment is associated with generous unemployment benefits, high unionization related to low bargaining coordination and high taxes.

Oppositely, labor market rigidities that do not increase unemployment significantly include strict employment protection or labor standards regulations, high benefits associated with pressure on the unemployed to take jobs and high unionization levels accompanied by high levels of bargaining coordination. Results of Elmeskov and al. (1998) differ from those obtained by Nickell (1997). They conclude that the tightening of eligibility conditions and the cut in unemployment benefits, as well as the relaxation of the regulation on fixed term contracts may have played a key role in the success of several OECD countries in reducing their unemployment rate. They find evidence for granger causality from higher unemployment to higher tax rates and employment protection in countries with a medium degree of centralisation. Furthermore, unemployment benefits have a larger effect in countries with relatively high levels of expenditures on active labor market policies.

Unlike Nickell (1997), Elmeskov et al. (1998) use annual data and a different data set, relying on OECD measures for the labor market institutions. According to Blanchard and Wolfers (2000), labor market rigidities cannot clarify why European unemployment is so much higher than US unemployment since the institutions generating these rigidities were much the same in the 1960s as they are today and in the 1960s, unemployment was much higher in the US than in Europe.

Stockhammer (2004a and 2004b) results suggest that labor market rigidities have only a weak effect on unemployment and that the slowdown of accumulation in Europe is by far the most significant determinant of European unemployment. Helpman and Itskhoki (2007) argue that differences in rates of unemployment do not necessarily reflect differences in labor market rigidities. The rate of unemployment can be higher or lower in the flexible country. Feldmann (2009), using data on 73 economies for the years 2000 to 2003, finds that greater labor market flexibility is correlated with lower unemployment. Breaking down the composite labor flexibility indicator, the results suggest that tight hiring and firing rules and military conscription most clearly seem to have adverse effects. More centralized collective bargaining seems to increase female unemployment. The size of most effects appears to be substantial, particularly among young people. However, the minimum wage is not significant. Using a panel of 97 countries from 1985 to 2008, the results found by Bernal-Verdugo et al. (2012) suggest that improvements in labor market flexibility have a statistically and significant negative effect on unemployment outcomes. Hiring and firing regulations and hiring costs are found to have the strongest effect.

2. Data Set, Hypotheses, Basic Specification and Estimation Method

Whereas, almost all previous labor market studies only covered industrial countries, our data set covers a panel of 92 countries divided into two groups: 32 developed countries and 60 developing countries as shown in Table 1. This represents the largest number of countries of earlier studies of the determinants of unemployment. The criterion used to select the sample is the availability of data and we eliminate some countries to reduce outliers.

We mainly rely on three conventional measures of unemployment:

- Unemployment rate (UN): Percentage of the total labor force that is currently unemployed;
- Youth unemployment rate (UNY): Percentage of the total labor force of ages 15 to 24 that is currently unemployed;
- Long-term unemployment (LTUN): Unemployed with continuous periods of unemployment extending for a year or longer as a percentage of total unemployment.

The data come from the International Labour Office and the World Bank's World Development Indicators.

Table 1. The list of countries

Country Name	Code	Country Name	Code	Country Name	Code
Developed countries		Developing countries			
Australia	AUS	Algeria	DZA	Macedonia, FYR	MKD
Austria	AUT	Argentina	ARG	Malaysia	MYS
Belgium	BEL	Bahamas, The	BHS	Mauritius	MUS
Canada	CAN	Barbados	BRB	Mexico	MEX
Cyprus	CYP	Bolivia	BOL	Moldova	MDA
Czech Republic	CZE	Botswana	BWA	Morocco	MAR
Denmark	DNK	Brazil	BRA	Namibia	NAM
Estonia	EST	Bulgaria	BGR	Nicaragua	NIC
Finland	FIN	Chile	CHL	Niger	NER
France	FRA	China	CHN	Pakistan	PAK
Germany	DEU	Colombia	COL	Panama	PAN
Greece	GRC	Costa Rica	CRI	Paraguay	PRY
Hong Kong SAR, China	HKG	Croatia	HRV	Peru	PER
Iceland	ISL	Dominican Republic	DOM	Philippines	PHL
Ireland	IRL	Ecuador	ECU	Poland	POL
Israel	ISR	Egypt, Arab Rep.	EGY	Romania	ROM
Italy	ITA	El Salvador	SLV	Russian Federation	RUS
Japan	JPN	Georgia	GEO	South Africa	ZAF
Luxembourg	LUX	Guatemala	GRL	Sri Lanka	LKA
Malta	MLT	Guyana	GUY	Syrian Arab Republic	SYR
Netherlands	NLD	Honduras	HND	Thailand	THA
New Zealand	NZL	Hungary	HUN	Trinidad and Tobago	TTO
Norway	NOR	India	IND	Tunisia	TUN
Portugal	PRT	Indonesia	IDN	Turkey	TUR
Singapore	SGP	Iran, Islamic Rep.	IRN	Ukraine	UKR
Slovak Republic	SVK	Jamaica	JAM	Uruguay	URY
Slovenia	SVN	Jordan	JOR	Venezuela, RB	VEN
Spain	ESP	Kazakhstan	KAZ	Vietnam	VNM
Sweden	SWE	Kuwait	KWT		
Switzerland	CHE	Kyrgyz Republic	KGZ		
United Kingdom	GBR	Latvia	LVA		
United States	USA	Lithuania	LTU		

Data for labor market flexibility are taken from the Fraser Institute's Economic Freedom of the World database, which provides a composite measure of labor market flexibility and indicators of labor market flexibility on six policy areas (Table 2). All indicators are standardized on a 0–10 scale, with higher values of the indicator representing a more flexible labor market. A more flexible market will be associated with a lower unemployment rate.

Table 2. Labor market flexibility indicators

Variable name	Signle
AREA 5B: Labor market regulation	LMR
AREA 5Bi: Hiring regulations and Minimum wage	HRMW
AREA 5Bii: Hiring and firing regulations	HFR
AREA 5Biii: Centralized collective bargaining	CCB
AREA 5Bvi: Hours regulation	HR
AREA 5Bv: Mandated cost of worker dismissal	MCWD
AREA 5Bvi: Conscription	CON

We examine two sets of control variables commonly used in the literature that might influence unemployment (Table 3). The data come from the World Bank's World Development Indicators. Annual data from 2000 to 2010 are used because most of the relevant labor market indicators change slowly.

Table 3. Description of variables

Variables	Description	Expected signs
Macroeconomic variables		
GDP per capita	Based on purchasing power parity. Data are in constant 2005 international dollars.	A higher level of development will be associated with a lower unemployment rate.
Foreign direct investment	FDI net inflows as a percentage of GDP.	The interrelations between FDI inflow and unemployment are ambiguous.
Degree of economic openness	(log) (Exports+ Imports) /GDP, in percent (TR).	The effect of trade openness on unemployment is ambiguous.
Government size	(log) General government final consumption expenditure (% ofGDP).	A raise in the general government consumption will be associated with a higher unemployment rate in developed and developing countries. The difference in the impacts of government size on the unemployment rate in the developed and developing country groups is statistically significant.
Inflation		High inflation rates may decrease unemployment.
Demographic variables		
Country size	(log) Total population (in thousands).	Size influences unemployment rates positively.
Urbanization	(log) Urban population, as percent of total population.	A positive relationship between urbanization and unemployment.
Population density	(log) Number of people per square kilometer of land area.	A positive relationship between density and unemployment.

GDP per capita is examined to test whether unemployment rate vary with the level of economic development. FDI is also included to test the role of financial openness in affecting unemployment. The effects of FDI on labor market can change from one country to another. These effects can depend on the country features (a country is the FDI receiving or sending country) and specific forms of investment (FDI inflows in sectors with higher or lower added value). FDI impulse leads to decreasing of unemployment rate trough its potential effects on the quantity, quality and location of employment in a host country.

FDI inflows are an important source of scarce factors of production, such as capital, technology, managerial and organizational know-how for many countries. FDI inflows can increase employment:

- directly through creation of foreign affiliates or expanding existing affiliates which permit the utilization and absorption of an existing surplus labor factor that is relatively abundant and otherwise would have remained either underemployed and/or unemployed;
- indirectly by stimulating employment in suppliers and distribution stage of production. They facilitate access to markets through exports.

Inflows of FDI can also maintain employment by restructuring process that takes place once an existing firm is acquired. However, FDI can decrease employment through business closings due to strong competition within the domestic market. FDI can be directed in urban crowded areas. It can lead to displacement of local supplies and unemployment increase.

Theoretical and empirical literatures conclude that trade openness influences the rate of unemployment. However, there is a controversy concerning the sign of the relationship.

On the one hand, there is an intuition for the positive association between trade and unemployment. Matusz (1996) for example develops a model of intra-industry trade in intermediate products and efficiency wages unemployment with monopolistic competition. He finds that trading equilibrium features both a higher wage rate and lower unemployment than the autarky equilibrium. The reason is that trade results in a greater division of labour due to a wider range of inputs being made available in production. Dutt et al. (2009) as well as Felbermayr et al. (2011) also argue that trade liberalization, which improves aggregate labour productivity, reduces aggregate unemployment. Similarly, using state and industry-level unemployment and trade protection data from India, Hasan et al. (2009) show no evidence that protection is associated with lower unemployment. In fact, unemployment declines with trade liberalization especially in urban areas with flexible labour markets. Moreover, workers in industries experiencing greater reductions in trade protection were less expected to become unemployed, mainly in net export industries.

On the other hand, some evidences conclude that the effect of trade liberalization on overall unemployment is ambiguous. Moore and Ranjan (2005), using a cross sectional data, conclude that the aggregate unemployment is likely to decline in a skilled-labor abundant country and raise in an unskilled-labor abundant country. Janiak (2006) studies the link between trade exposure and equilibrium unemployment. He shows that the higher equilibrium unemployment is associated with the higher trade exposure.

This result is due to larger high-productivity firms expanding and hiring more workers, while smaller low-productivity firms go bankrupt. In a general equilibrium model of trade with two countries, Helpman and Itskhoki (2010) also show that labor market flexibility is a source of comparative advantage for firms. The aggregate unemployment is affected due to workers moving from one sector to another. Lower trade impediments improve the profitability of exporting firms, thus leading to an expansion of the trading sector. Depending on whether the country's comparative advantage is in the high unemployment or low unemployment sector, trade liberalization could raise or reduce aggregate unemployment. Helpman et al. (2010) adopt a framework similar to Helpman and Itskhoki (2010) and find that the opening of trade enhances wage inequality and can either increase or decrease unemployment. According to Kim (2010), trade liberalization can lead to higher unemployment in the presence of rigid labor market institutions. Conversely, if the labor market is characterized by flexibility, it may reduce aggregate unemployment.

On empirical grounds, studies investigating the relationship between government expenditure and unemployment are relatively rare until recently. A number of studies assess the negative effects of government expenditure on unemployment because such a government requests a higher income tax, which reduces the incentive to work and makes the cost of unemployment low (Karras 1993; Abrams 1999; Christopoulos and Tsionas, 2002; Feldmann, 2006). However, these studies focus on developed countries rather than developing economies. Feldmann (2010) finds that a large government sector is correlated with a higher unemployment rate in developing countries. Abrams and Wang (2006) find that government size, measured as total government outlays as a percentage of GDP, plays a significant role in affecting the steady-state unemployment rate.

Unlike government expenditures on goods and services, government transfers and subsidies play a crucial role in the rise of unemployment rates in OECD-Europe. Government spending crowds out the private sector, in particular private investment, which could raise productivity and foster technological change and thus can decrease job growth (Afonso and Aubyn, 2009). According to Yongjin (2011), greater government size is associated with a higher unemployment rate in developing and developed countries. The relative impact of government size on the unemployment rate in developing countries is almost three times higher than in advanced countries. Some other studies suggest that government expenditure may reduce unemployment. Monacelli et al. (2010) for example investigate the effects of fiscal policy on the labor market in US data. They show that positive shocks to government spending reduce the unemployment rate and the separation rate, and raise vacancies and the job finding rate.

Ramey (2012) find a positive impact of government spending financed by an increase in tax rates on unemployment. All of the impact is through an increase in government employment, not private employment.

Following Yongjin (2011), our study tests the relative impact of government size on the unemployment rate in both developing and developed countries. We consider interaction terms (GOV*DEV_i) between Government size and country's development degree (DEV). DEV₁ and DEV₂ represent developed countries and developing countries, respectively.

Finally, among the widely used macroeconomic variables is the inflation. If the actual price level exceeds the expected price level, real wages are lower than expected, during the wage bargaining process, and consequently unemployment decreases.

Demographic variables are introduced to test whether agglomeration factors have an effect on unemployment (Bernal-Verdugo et al., 2011).

We estimate the causes of unemployment using the standard static model below:

$$U_{it} = c + \alpha LMF_{it} + \sum \lambda X_{it} + \varepsilon_{it} \quad (1)$$

Where, indices i and t designate, respectively, year and country, c is the intercept, U is the unemployment rate in percentage points, α and λ are variable coefficients, LMF represents labor market flexibility indicator, X is a standard set of control variables and ε is the error term.

The importance of time and country dummies cannot be minimized. The time dummies may alleviate the reverse causality problem if the timing of adverse shocks is correlated between countries. Country fixed effects capture all time-invariant institutional and economic features explaining why one country has a different-than-average unemployment rate. So the study employs a panel data regression that is run with both year- and country-specific fixed effects to control for all unobserved time-invariant differences across countries and all country-invariant year trends common to all countries. Therefore,

$$\varepsilon_{it} = \mu_t + \gamma_i + v_{it}$$

Where, γ_i : the country-specific residual; it differs between country, but for any particular country, its value is constant;

μ_t : the time-specific residual;

v: the stochastic residual.

The coefficients are estimated using the feasible generalized least squares (FGLS). The main benefit of the selected procedure is that it helps control for unobserved country effects and provides efficient estimates of standard errors. The Breusch-Pagan, Cook and Weisberg and White general tests are employed to confirm the presence of heteroscedasticity. In addition, the Wald test for group-wise heteroscedasticity is applied. All test results indicate that there is heteroscedasticity at conventional level (results are not reported here). In response, we apply the technique developed by White (1980) to correct for heteroskedasticity.

The static model produces a quite satisfactory explanation of the unemployment outcomes. Therefore, we investigate a dynamic model, where labor market flexibility indicators determine the change in unemployment over time. The lagged level of unemployment may be added to examine persistence effects. The standard dynamic model is below:

$$\Delta U_{it} = c + \beta U_{it-1} + \alpha LMF_{it} + \sum \lambda X_{it} + \varepsilon_{it} \quad (2)$$

We estimate equation (2) using the Arellano-Bover (1995) and Blundell-Bond (1998) System-GMM estimator, and the two-step procedure is applied with Windmeijer's (2005) correction method for the variance covariance matrix. The error term ε_{it} is assumed to be serially uncorrelated, which implies that there should be no evidence of second-order correlation in ε_{it} (Arellano-Bover, 1995 and Blundell-Bond, 1998). This condition is essential to obtain consistent parameter estimates. We perform Arellano-Bond test for serial correlation in the first-differenced errors. The moment conditions are valid only if there is no serial correlation in the idiosyncratic errors. An additional condition is to use valid moment conditions. We can test whether the over-identifying moment conditions are valid by performing Sargan test (Arellano and Bond, 1991). However, it becomes baseless when the standard errors are corrected for heteroskedasticity. We report the statistic by estimating the model without such a correction.

3. Empirical Findings

3.1. A Look at the Data

Table 4 supplies descriptive statistics for the labor market regulation indicators, the controls variables and the measures of unemployment used in the model. The number of observations for different variables is not identical. This is explained by the number of missing data for the main variables used.

By comparing the standard deviations for all variables and by groups, we can see that groups are heterogeneous and that the gap between developed and developing countries is obvious.

Table 4. Summary Statistics

Variable	United Model				Developed countries				Developing countries						
	Obs	Mean	Std. Dev.	Min	Max	Obs	Mean	Std. Dev.	Min	Max	Obs	Mean	Std. Dev.	Min	Max
LTUN	483	34.32588	18.14857	.7	84.9	333	30.71111	15.83884	3.4	73.1	150	42.35067	20.30927	.7	84.9
UN	934	8.822697	5.545525	.8	37.6	352	6.630682	3.101194	1.8	20.1	582	10.14845	6.237196	.8	37.6
UNY	781	18.77348	10.58716	3.2	65.7	352	14.64034	6.934654	4.4	41.6	429	22.16477	11.80074	3.2	65.7
CCB	922	6.348482	1.544217	1.8	9.5	345	5.916812	1.90199	1.8	9.5	577	6.606586	1.214106	2.1	8.9
CON	988	6.048583	4.185379	0	10	352	6.727273	3.857068	0	10	636	5.672956	4.31368	0	10
HFR	922	4.461714	1.473685	1	8.8	345	4.457101	1.8196	1.3	8.5	577	4.464471	1.22276	1	8.8
HRMW	929	6.257481	2.737222	0	10	326	6.81135	2.46708	2.2	10	603	5.958043	2.829821	0	10
HR	903	7.227907	2.033183	2.5	10	325	6.939692	2.252583	2.5	10	578	7.389965	1.881462	3.3	10
LMR	950	6.020632	1.444438	2.3	9.5	345	6.353333	1.611025	2.8	9.5	605	5.830909	1.304102	2.3	9.4
MCWD	780	6.06718	3.168114	0	10	270	7.893704	2.297647	1	10	510	5.100196	3.14078	0	10
FDIN	1006	4.993229	10.27088	-161.2402	172.7155	347	6.486232	16.23866	-161.2402	172.7155	659	4.20708	4.546198	-16.06889	51.89585
y	996	16610.83	13632.65	597.0553	74021.45	352	31289.44	9910.112	11512.5	74021.45	644	8587.746	7180.342	597.0553	49952.16
GOV	1001	16.35686	5.010293	6.028538	29.78844	352	19.51808	4.199084	8.418386	29.78844	649	14.6423	4.562422	6.028538	28.05154
DEN	1012	267.7287	947.1152	2.30276	7252.429	352	565.9705	1554.293	2.493134	7252.429	660	108.6665	128.7939	2.30276	635.6535
POP	1012	5.70e+07	1.81e+08	267511	1.34e+09	352	2.88e+07	5.59e+07	281205	3.09e+08	660	7.21e+07	2.19e+08	267511	1.34e+09
TR	997	95.10793	61.21519	20.25789	460.4711	352	114.0973	87.29576	20.25789	460.4711	645	84.74476	36.57074	21.71996	220.4068
URPOP	1012	64.88761	19.89183	10.833	100	352	78.30022	12.74356	49.959	100	660	57.73422	19.31838	10.833	98.242
INF	976	5.329842	6.484618	-4.479938	96.09412	352	2.416801	1.990784	-4.479938	12.67819	624	6.973095	7.488455	-3.846154	96.09412

The standard deviation of the unemployment rate in developing countries is almost twice as that in developed country (6.23 against 3.101). In regards to the long-term unemployment, a wide deviation of about 18.148 is observed for the entire sample and especially more pronounced for developing countries (varying from a minimum of 3.4 to a maximum 73.1 for developed countries and from 0.7 to 84.9 for developing countries). The youth unemployment, in developed as well as developing countries, has also higher deviations, ranging respectively between 4.4 and 41.6 and between 3.2 and 65.7.

Among the macroeconomic variables, the net inflow of FDI in going from a minimum -161.240 to a maximum 172.715 recorded a gap of about 16.238 and reveals a strong heterogeneity in the developed countries.

In light of the findings in Table 4, we can see that the mean of all labor market flexibility indicators are much lower than the maximum score. It's clear that there is a gap in terms of labor market flexibility between the developed and the developing countries, although the entire sample has experienced greater improvements in this regard. Developed countries have higher scores for the centralized collective bargaining (9.5) and Labor Market Regulations (9.5) than the developing countries. Among the developed countries with the lowest unemployment rate and higher score of labor market flexibility, we find Hong Kong with scores ranging from 7.8 to 10, followed by United States and the United Kingdom.

Table 5. Correlation matrix

	LTUN	UN	UNY	CCB	CON	HFR	HRMW	HR	LMR	MCWD
LTUN	1									
UN		1								
UNY			1							
CCB	0,089*	0,022	0,000	1						
CON	0,051	0,042	0,064*	0,011	1					
HFR	-0,187***	-0,144***	-0,197***	0,525***	-0,121***	1				
HRMW	-0,118**	-0,112***	-0,119***	0,177***	0,082**	0,308***	1			
HR	-0,259***	-0,037	-0,047	0,230***	0,181***	0,325***	0,498***	1		
LMR	-0,124**	-0,050	-0,073**	0,412***	0,611***	0,467***	0,648***	0,603***	1	
MCWD	-0,151**	-0,008	-0,072*	0,001	0,114**	0,195***	0,170***	-0,017	0,519***	1

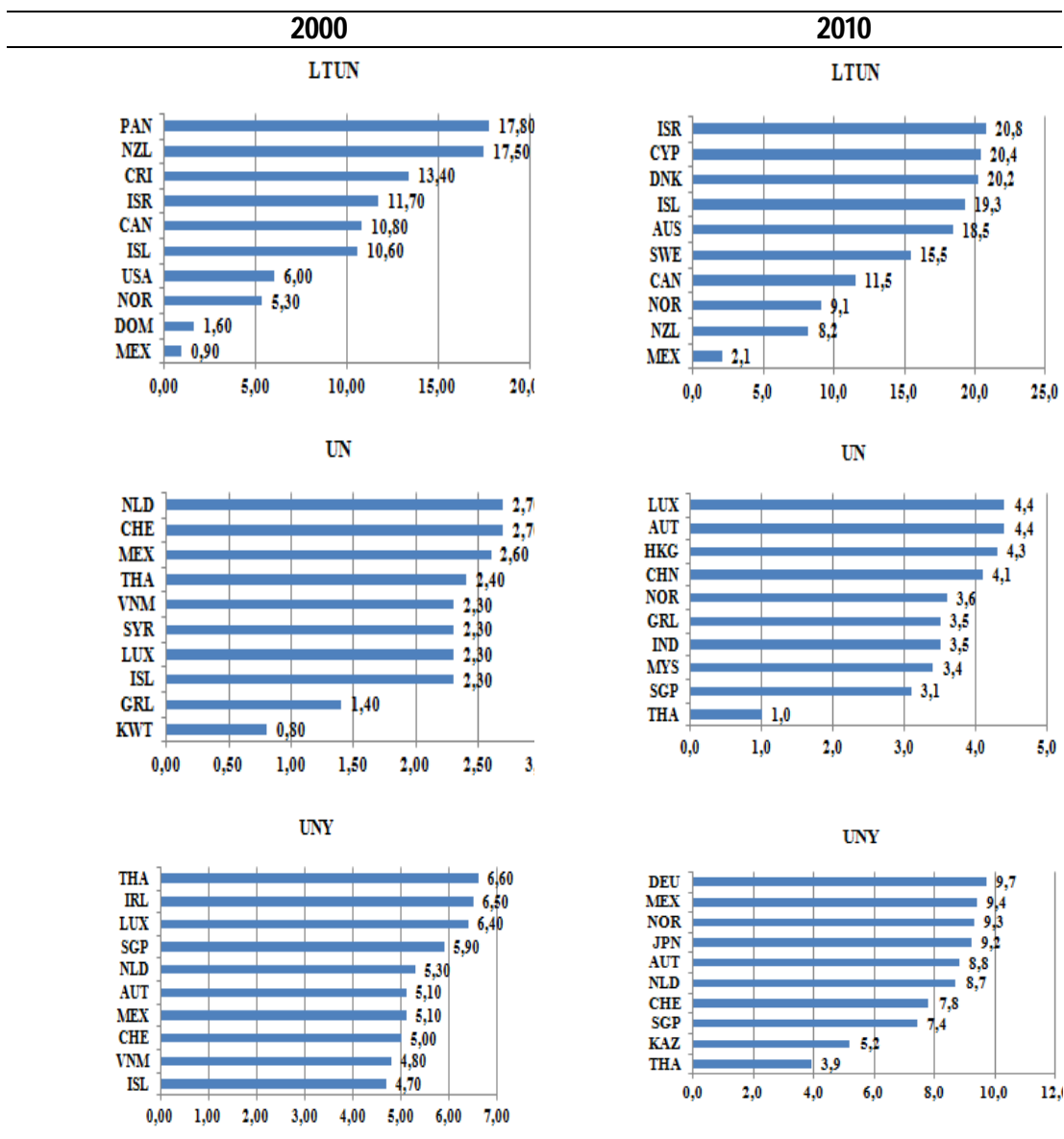
***(**/*) denotes statistically significant at the 1%(5%/10%).

To look for a “direct link” between labor market flexibility and unemployment outcomes, we analyze the correlation matrix (Table 5). The data indicates that selected indicators are in most of the cases negative and statistically significant, with hiring and firing regulation and youth unemployment having the strongest negative correlation (-0.197). However, both centralized collective bargaining and conscription are positively correlated to all unemployment outcomes.

The sub-components of the composite index of labor market flexibility are correlated, by itself: higher regulations in one area with lower regulations in another (negative correlation) or the opposite (positive correlation). This finding indicates that economic policymakers may consider the different sub-components as a share of a global set. Among the sub-components of the composite index of labor market flexibility, the strongest correlation is between hiring regulations and minimum wage and Hours regulation (0.498).

Figures 1 and 2 show the unemployment rates for the years 2000 and 2010, for the 10 countries in the sample with lowest (highest) unemployment rates. The highest youth unemployment rate is still recorded by Macedonia, which experienced a slight fall in going from 59.9% in 2000 to 53.7% in 2010. This country has also recorded higher scores of labor market flexibility indicators ranging from 7.2 to 10 except for hiring and firing regulation a score of 5.6. South Africa has kept the second position during this period, but with an upward trend indicator ranging from 44.2% to 50.50%. Thailand with a level of 3.9%, Kazakhstan 5.2% and Singapore 7.4% were the only Member States with a youth unemployment rate below 10 % in 2010. In 2010, the highest unemployment rate is historically recorded also in Macedonia (32%), South Africa 24% and Guyana 21%. The lowest rates were observed in Thailand 1%, Singapore 3.1% and Malaysia 3.4%. In regard to the long-term unemployment, Guyana held the second position with a level of 73.70% after Macedonia with a level of 83.10%. Commonly, the youth unemployment rate is in most countries at least twice as high as the total unemployment rate.

Figure 1. The 10 countries in the sample with lowest unemployment rates (%)



The labor market regulation index has varied substantially over time in developing countries to a much larger extent than in developed countries. But, developed countries has significantly higher labor market regulation index than developing countries (Figures 3 and 4).

Figure 2. The 10 countries in the sample with highest unemployment rates (%)

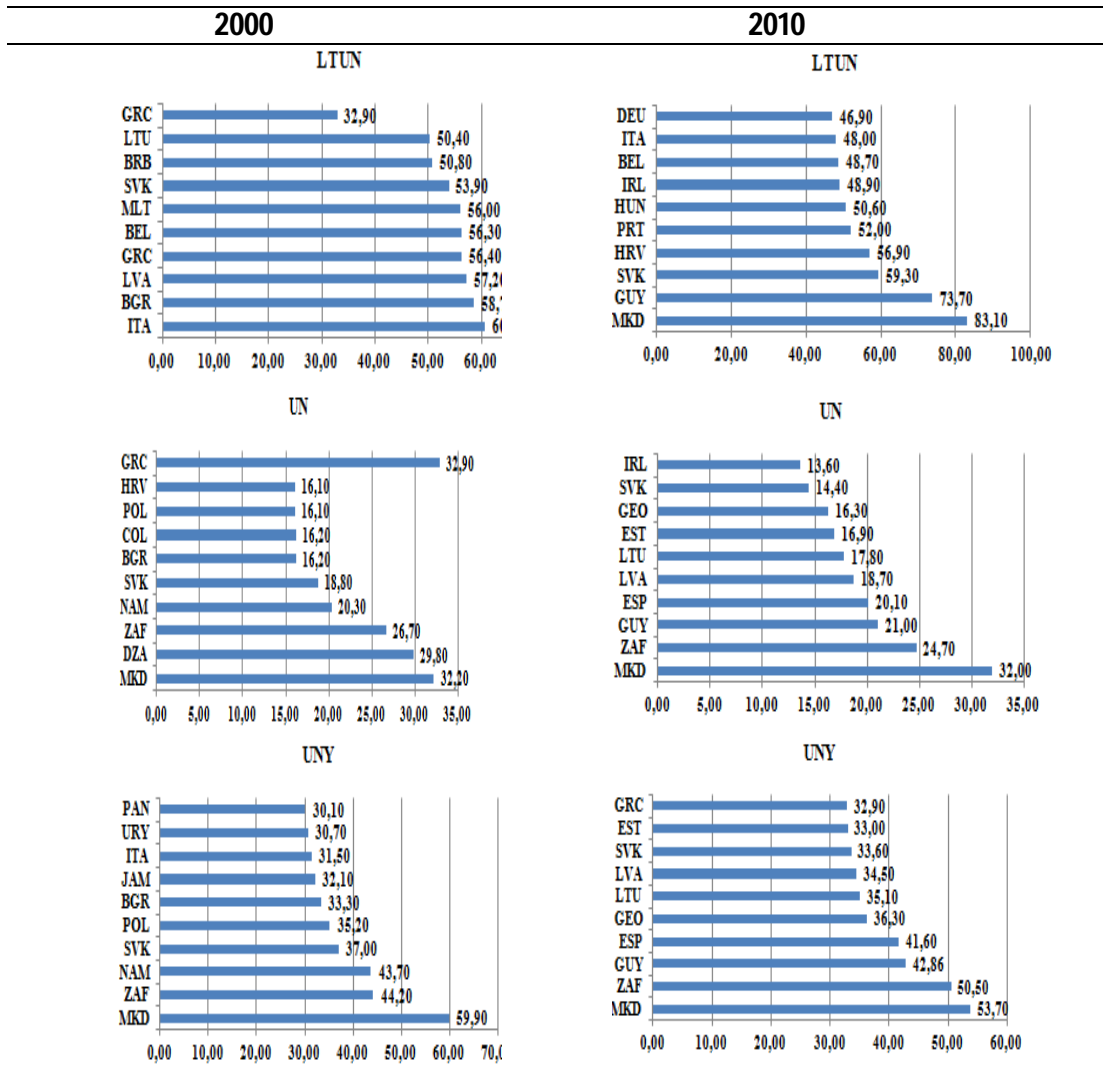


Figure 3. Spatial distribution of Labor market regulation index in 2000

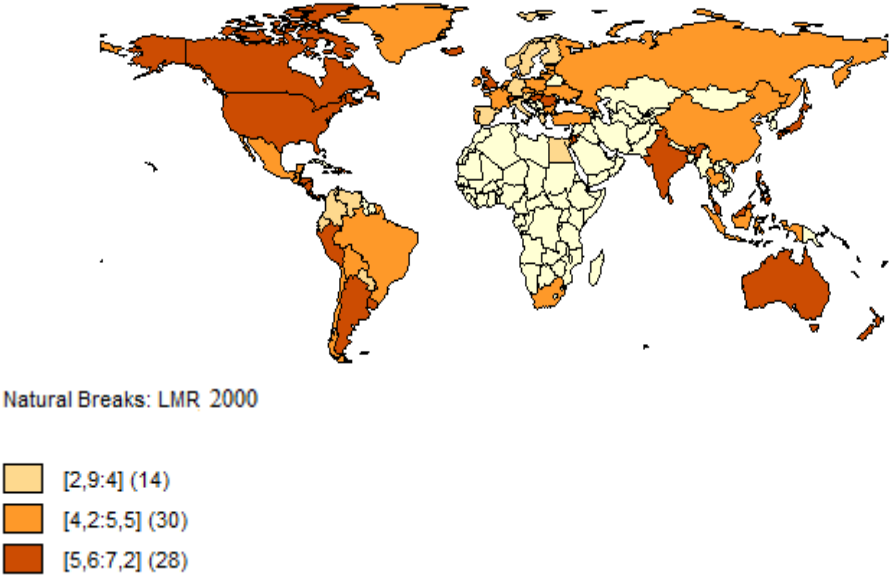
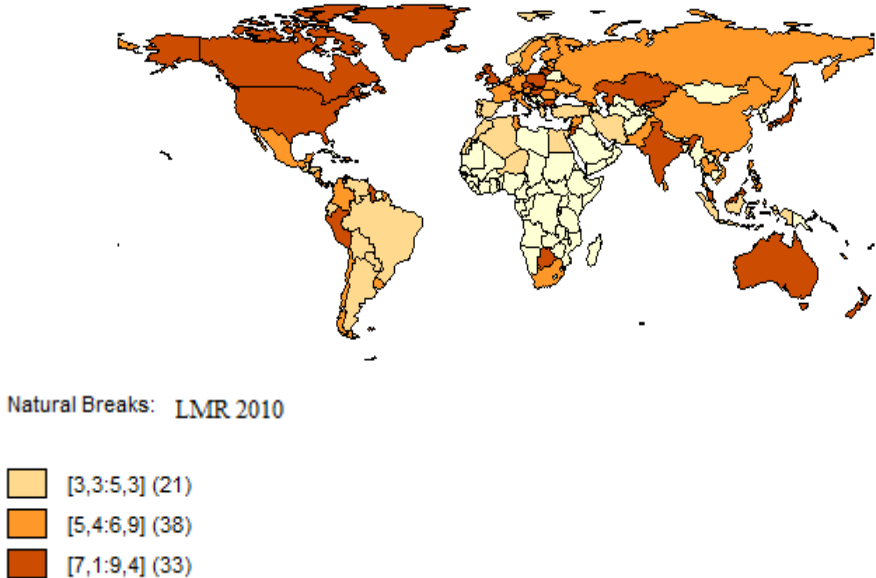


Figure 4. Spatial distribution of Labor market regulation index in 2010



3.2. Assessing the Theories

In this subsection, we produce our own empirical estimates of the effects of labor-market flexibility on unemployment outcomes. Tables 6, 7 and 8 report the econometric results obtained by estimating equation (1) under different specifications and sets of controls⁵.

The estimates of Tables 6 and 7 are similar, apart from the lack of significance of the composite index of labor market flexibility and its sub-components, foreign direct investment inflows and urbanization. The estimates of Tables 5-6 and Table 7 are dissimilar, apart from the significance of the composite index of labor market flexibility and its sub-components.

In the light of the previous literature, an increase in the flexibility of labor market regulation (LMR) has a statistically significant negative impact on the unemployment outcomes (Tables 6, 7 and 8). The composite labor market flexibility (LMR) and its sub-components have the strongest effect on long term unemployment rate (their magnitude changed) (Table 8). The inclusion of various control variables does not change the sign and significance of labor market flexibility indicators, thus reflecting the robustness of our findings. For youth unemployment, centralized collective bargaining, mandated cost of worker dismissal and conscription does not seem to play an important role, as their coefficients are not significantly different from zero in our estimations. The other sub-components have a statistically significant negative effect (Table 7).

As regards the macroeconomic variables, the impact of some of these variables on unemployment is obvious. There is evidence that unemployment outcomes vary with the level of economic development (Tables 6, 7 and 8). Government size is statistically significant in the regression to explain the overall unemployment rate. It has a large significant effect in reducing unemployment and youth unemployment rates in developing countries (Tables 6 and 7). This result is consistent with previous empirical evidence. However, the relative impact of government size on the long-term unemployment rate in developed countries is higher than in developing countries (Table 8). According to our regression results, foreign direct investment is likely to substantially reduce youth unemployment rate. We find statistically significant negative effects of economic openness on unemployment and youth unemployment rates (Tables 6 and 7). These results provide evidence of the importance of macroeconomic factors. Table 8 indicates, instead, that these factors are not robust to changes in the measure of unemployment. The inflation rate has generally a statistically significant negative effect on unemployment outcomes.

⁵ For more details on results, contact authors.

Other research has suggested that unemployment changes because of movements in aggregate demand; this is likely to be reflected in changes in the rate of inflation.

Urbanization is positively correlated with unemployment rate (Table 6). Unemployment is generally lower in rural areas than in urban areas because greater self-employment, larger informal sectors in rural areas and weak unionization and weaker enforcement of minimum wages (Squire, 1981; Rosenzweig, 1988; Bernal, 2009). The process of urbanization may be related to increasing unemployment if the inflow of workers in the urban sector exceeds urban labor demand: workers crowd into urban areas to seek scarce but high-paying jobs (Harris and Todaro, 1970). However, the results suggest that countries with a higher share of urban population are typically characterized by lower long term unemployment (Table 8). This can be explained by the fact that there is more efficient matching of workers and jobs in small communities in the long term. Population density is statistically significant and raises unemployment (tables 6, 7 and 8). By contrast, population is not signed in a manner consistent with conventional understandings of the impact of demographic variables on unemployment and youth unemployment (tables 6 and 7, we expected a positive relationship). To check if there are further revealing results, we also estimated the model by considering the demographic variables separately, not simultaneously and by excluding certain variables (the results are not reported here). There is clear evidence of the consistency of results. In practice, some countries did experience at the same time an important growth in the youth population and a rise in youth unemployment. In other countries, a decreasing youth population was accompanied with falls in youth unemployment. Other countries faced falling youth populations alongside increasing unemployment. The inclusion of percentage of young (or old) people on total populations as control variable may be more relevant.

Tables 9 and 10 show the results from the system-GMM estimation⁶. The Sargen test indicates that the null hypothesis that the error term is uncorrelated with the instruments is not rejected. The validity of the instrumental variables of the regression is therefore confirmed. Arellano- Bond tests show the presence of a first-order autocorrelation, while we cannot reject the null hypothesis that there is no autocorrelation of order 2.

⁶ In view of the results of Sargan test, we will not focus on the parameter estimates resulting from model including long-term unemployment rate as endogenous variable, for which the validity is not confirmed. The number of instruments is above that of countries even when we limit the number of lags for both the dependent and explanatory variables to one. So it produces biased results in GMM estimation (Roodman, 2009). For more details on results, contact authors.

Labor market flexibility has a positive, but no significant effect on changes in the youth unemployment rate (except Hiring and firing regulations and Hiring regulations and Minimum wage). These results are not consistent with those for static specification. Consistent with previous finding (table 6), Hiring and firing regulations, Centralized collective bargaining and Conscription appear to play a role in changes in total unemployment (Table 9).

Among the control variables, apart from lagged unemployment and government size, level of economic development, inflation, FDI and openness have a negative and statistically significant effect on changes in unemployment outcomes. This result suggests that trade and financial openness are key factors in reducing unemployment. The positive association between lagged unemployment and changes in unemployment outcomes indicates that countries that were initially characterized by a higher level of unemployment have recorded higher changes in both total and youth unemployment. The coefficients associated to demographic variables have generally not a statistically significant effect on changes in unemployment outcomes. This result is not consistent with our previous findings.

4. Conclusion

The objective of this paper was to contribute to the debate about the determinants of the unemployment rate, taking into account recent advances in both theoretical and empirical analysis. More precisely, we investigate the impact of labor market flexibility on unemployment in 92 countries over the period 2000-2010. Three endogenous variables are used: unemployment rate, youth unemployment and long-term unemployment. We examined the impact of seven indicators of labor market flexibility taken from the Fraser Institute's Economic Freedom of the World database. We consider additional potential determinants of unemployment (macroeconomic and demographic variables). Both static and dynamic specifications are considered.

The empirical investigations conducted as part of this research bring main results as regard the labor market flexibility-unemployment nexus. The relationship depends on the model adopted. The results of the static modal show that most of labor market flexibility indicators have the expected signs and are negatively correlated to the unemployment outcomes. These results are in some variance with the results reported by the dynamic model. In fact, we find that increases in the flexibility of labor market regulations have a statistically significant negative impact on the change of total unemployment. By contrast, no significant and negative impact of labor market flexibility on changes in youth unemployment is found in general. The results show also a positive relationship between government size and unemployment outcomes, as the existing literature has discussed. These findings are robust across specifications.

The estimation of the static model also confirms that the relative effect of government size on the unemployment and youth unemployment rates in developing countries is higher than in developed countries.

The coefficient on trade openness is negative and statistically significant when we consider unemployment and youth unemployment rates and changes in unemployment as endogenous variables. The interrelations between FDI inflow and unemployment are ambiguous (negative impact on youth unemployment rate and positive effect on long-term unemployment). By contrast, there is clear evidence that FDI decrease changes on total and youth unemployment. In the light of the previous literature, inflation and level of economic development hamper unemployment. Regardless of the model applied, these findings are robust. A higher population density is likely to result in a higher unemployment rate. However, our results conflict with the existing literature, in which population and urban population influence unemployment and youth unemployment rates positively. This effect appears only with long-term unemployment. The GMM results show that the coefficients associated to demographic variables have generally not a statistically significant effect on changes in unemployment outcomes.

All in all, what do these results mean for economic policymakers? Appropriate labor market reforms –deregulation of labor market and more flexible structures – should be pursued in all dimensions as a basic tool to reduce unemployment. To maximize their effect, the governments should enhance the level of economic activity and implement a restrictive macroeconomic policy. In other words, policymakers should introduce substantial reductions in public spending to minimize the size of the public sector. More economic liberalization may be required. These measures are likely to be helpful for some countries and not for others. It is useless to reform the labor market and employment systems by making countries into a single standardized model. This set of policies may serve to reduce unemployment but further research is needed to investigate the effect of interactions across labor market flexibility and macroeconomic shocks on unemployment (Fitoussi et al., 2000; Blanchard and Wolfers, 2000; Bertola et al., 2001,...).

References

- Abrams B. A., & Wang, S. (2006). The Effect of Government Size on the Steady-State Unemployment Rate: A Structural Error Correction Model. Working Paper Series, Department of Economics Alfred Lerner College of Business & Economics University of Delaware Working Paper No. 2006-05.
- Abrams, B. A. (1999). The Effect of Government Size on the Unemployment Rate. *Public Choice*, 99, 3-4, 395-401.
- Afonso, A. & St. Aubyn, M. (2009). Macroeconomic Rates of Return of Public and Private Investment: Crowding-in and Crowding-out Effects. *Manchester School*, 77 (S1), 21-39.
- Arellano, M., & Bond, S. (1991). Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. *Review of Economic Studies*, 58, 277-297.
- Arellano, M., & Bover, O. (1995). Another look at the instrumental variable estimation of error-components models. *Journal of Econometrics*, 68, 29-51.
- Ball, L., De Roux, N., & Hofstetter, M. (2011). Unemployment in Latin America and the Caribbean. IMF Working paper 11/252.
- Bernal, R. (2009). The Informal Labor Market in Colombia: identification and characterization. *Desarrollo y Sociedad*, Universidad de los Andes, 147.
- Bernal-Verdugo, Lorenzo E., Furceri, D., & Dominique Guillaume M. (2012). Crises, Labor Market Policy, and Unemployment. IMF Working Paper WP/12/65.
- Bernal-Verdugo, Lorenzo E., Furceri, D., & Dominique Guillaume, M. (2012). Labor Market Flexibility and Unemployment: New Empirical Evidence of Static and Dynamic Effects. IMF Working Paper WP/12/64.
- Bertola, GI, Francie, D. Blau, & Lawrence, M. Kahn. (2001). Comparative Analysis of Labor Market Outcomes: Lessons for the United States from International Long-Run Evidence. NBER Working Paper No. 8526.
- Blanchard, O., & Wolfers, J. (2000). The Role of Shocks and Institutions in the Rise of European Unemployment: The Aggregate Evidence. *The Economic Journal*, 110, 462, 1-33.
- Blundell, R., & Bond S. (1998). Initial conditions and moment restrictions in dynamic panel data models. *Journal of Econometrics*, 87, 115-143.
- Botero, Juan C., Djankov S., La Porta R., Lopez-de-Silanes, F., & Shleifer A. (2004). The Regulation of Labor. *Quarterly Journal of Economics*, 119, 4, 1339-382.
- Christopoulos, Dimitris K., & Tsionas, Efthymios, G. (2002). Unemployment and Government Size: Is there any Credible Causality. *Applied Economics Letters*, 9, 12, 797-800.
- Daveri, F. & Tabellini G. (2000). Unemployment, Growth and Taxation in Industrial Countries. Discussion Paper series n°1.
- Djankov, S., Ganser T., McLiesh C., Ramalho R., & Shleifer A. (2010). The Effect of Corporate Taxes on Investment and Entrepreneurship. *American Economic Journal: Macroeconomics*. American Economic Association, 2, 3, 31-64.

- Dutt, P., Davinash, M., & Ranjan P. (2009). International Trade and Unemployment: Theory and Cross-national Evidence, *Journal of International Economics*, 78, 32-44.
- Elmeskov, J., Martin J. & Scarpetta S. (1998). Key Lessons for Labor Market Reforms: Evidence from OECD Countries Experience. *Swedish Economic Policy Review*, 5, 2, 205- 252.
- Felbermayr, G., Prat J., & Schmerer, H.-J. (2011). Trade and Unemployment: What Do the Data Say?. *European Economic Review*, 55, 741-758.
- Feldmann, H., (2006). "Government Size and Unemployment: Evidence from Industrial Countries," *Public Choice*, Vol. 127 (3-4), pp. 451-67.
- Feldmann, H., (2009). The Unemployment Effects of Labor Regulation around the World. *Journal of Comparative Economics*, 1, 37, 76-90.
- Feldmann, H., (2010). Government size and unemployment in developing countries. *Applied Economics Letters*, 17, 3, 289-292.
- Fitoussi, Jean-Paul, Jestaz, D., Phelps, E., & Zoega, G. (2000). Roots of the Recent Recoveries: Labor Reforms or Private Sector Forces?. *Brookings Papers on Economic Activity* 1.
- Harris, J. R., & Todaro, M. P. (1970). Migration, unemployment and development: a two sector analysis. *American Economic Review*, 60, 126-142.
- Hasan, R., Mitra, D., & Ranjan, P. (2009). Trade liberalization and unemployment: Evidence from Indian states. mimeo.
- Hausman, J.A. (1978). Specification Tests in Econometrics. *Econometrica*, 46, 1251-1271.
- Helpman E., & Itskhoki, O. (2007). Labor Market Rigidities, Trade and Unemployment. NBER Working Paper No. 13365
- Helpman, E., & Itskhoki, O. (2010). Labor Market Rigidities, Trade and Unemployment. *Review of Economic Studies*, 77, 3, 1100-1137.
- Helpman, E., Itskhoki, O., & Redding, S. (2010). Inequality and Unemployment in a Global Economy. *Econometrica*, July, 78, 4, 1239-1283.
- Janiak, A. (2006). Does Trade liberalization Lead to Unemployment? Theory and Some Evidence. ECARES, Université Libre de Bruxelles.
- Karras, G. (1993). Employment and Output Effects of Government Spending: Is Government Size Important?. *Economic Inquiry*, 31, 3, 354-369.
- Kim, J. (2010). The Effects of Trade on Unemployment: Evidence from 20 OECD Countries. Mimeo, Stockholm University.
- Layard, R., Nickell, S., & Jackman, R. (1994). *The Unemployment Crisis*. Oxford: Oxford University Press.
- Matusz, S. J. (1996). International Trade, the Division of Labour, and Unemployment. *International Economic Review*, 37, 1, 71-83.

- Monacelli, T., Perotti, R., & Trigari, A. (2010). Unemployment Fiscal Multipliers. *Journal of Monetary Economics*, Carnegie-Rochester Conference, 57, 531–553.
- Moore, M. P., & Ranjan P. (2005). Globalisation vs Skill-Biased Technological Change: Implications for Unemployment and Wage Inequality. *Economic Journal*, 115, 503, 391-422.
- Nickell, S. (1997). Unemployment and Labor Market Rigidities: Europe versus North America. *Journal of Economic Perspectives*, American Economic Association, 11, 3, 55–74.
- Ramey, V. A. (2012). Government Spending and Private Activity, University of California, San Diego and NBER January.
- Ravn, M., & Uhlig, H. (2002). On adjusting the Hodrick–Prescott filter for the frequency of observations. *The Review of Economics and Statistics*, 84, 2, 371–375.
- Roodman, D. (2009). A Note on the Theme of Too Many Instruments. *Oxford Bulletin of Economic and Statistics*, 71, 1, 135-158.
- Rosenzweig, M. (1988). Labor Markets in Low Income Countries: Distortions, Mobility and Migration., In H. Chenery, & T.N. Srinivasan (Eds.), *Handbook of Development Economics*. North Holland, Vol. 1.
- Squire, L. (1981). *Employment Policy in Developing Countries. A survey of Issues and Evidence*. Oxford, Oxford University Press.
- Stockhammer, E. (2004a). Explaining European unemployment: testing the NAIRU theory and a Keynesian approach. *International Review of Applied Economics*, 18, 1, 1-26.
- Stockhammer, E. (2004b). The rise of European unemployment: a synopsis. Political Economy Research Institute Working Paper No76, University of Amherst.
- Swamy, P. A. V. B. & S. S. Arora (1972), "The Exact Finite Sample Properties of Estimators of Coefficients in the Error Components Regression Models. *Econometrica*, 40, 253-260.
- White, H. (1980). A heteroskedasticity-consistent covariance matrix estimator and a direct test for heteroskedasticity. *Econometrica*, 48, 817-838.
- Windmeijer, F. (2005). A Finite Sample Correction for the Variance of Linear Efficient Two-Step GMM Estimators. *Journal of Econometrics*, 126, 25-51.
- Yongjin, S.A. (2011). Government Size, Economic Growth and Unemployment: Evidence from Advanced and Developing Economy Countries (A Time Series Analysis, 1996-2006). *International Review of Public Administration*, 16, 2, 95-116.