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Fiscal Policy Implications for Labor Market Outcomes in Middle-Income Countries

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African Department

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Abstract

Many governments have initiated public employment programs or expanded the existing ones in response to high unemployment. However, in many middle-income countries, a relatively large government coexists with persistently high unemployment. This paper explores the question of whether public employment gives rise to distortions in the labor market in the medium to long-run. Our findings do not provide any evidence that public employment reduces unemployment rate. The analysis in this paper shows that large public employment does significantly affect labor market outcomes in middle-income countries and leads to job destruction in the private sector. The extent of the impact is largely influenced by the degree of substitutability between public and private production and the size of the rents in the public sector.

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I. INTRODUCTION

1. **Policymakers sometimes view the expansion of public employment as a useful tool to reduce high unemployment.** This is probably one of the reasons public employment accounts for an important share of total employment in many upper-middle-income countries (UMICs). However, in many UMICs, a relatively large size of government coexists with persistently high unemployment.
2. **The academic literature has largely concentrated on explaining the differences in unemployment rates across countries by the heterogeneity of labor market institutions.** Given significant heterogeneity of public employment across countries, it is worth exploring whether this heterogeneity could also explain cross-country differences in unemployment.
3. **In theory, creation of public jobs has an ambiguous impact on unemployment.** If private employment and the labor force are given, an additional public job would reduce unemployment. However, public employment can also affect unemployment indirectly, through private employment and labor-force participation. In this chapter, we analyze and evaluate the impact of public employment on labor market performance for 24 UMICs.
4. **This paper contributes to the literature in two ways.** First, it looks at the impact of public employment on labor market outcomes in developing countries.² Second, it explicitly examines the role of the rents in the public sector and the substitutability of public production in the transmission channels of the impact of public employment on labor market outcomes in developing countries. The focus of this study is primary UMICs, because: (i) economic conditions and relations are very deferent compared to low-income countries (LIC), where at the early stage of development public involvement might be necessary; (ii) these countries managed to achieve a certain level of development regardless of their different initial conditions; and (iii) data for public and private sector employment and wages are very limited for LICs.
5. **The results of our study confirm that public employment does play a significant role in the medium-to long-term performance of the labor market.** Our results do not support the hypothesis that creation of public jobs reduces unemployment. However, the results provide some evidence that creation of public-sector jobs destroys private-sector jobs. While the magnitude of the impact of public employment on private employment varies depending on the model specification, its impact increases with the degree of substitutability between public and private production and the size of job compensation in the public sector. Public employment affects private employment through the following channels: (i) increase in public employment in an environment of higher public sector rents increases expected returns on looking for a job in the public sector which attracts workers into the public sector

² To our knowledge the only other paper that looks at the impact of public employment on labor market outcomes in developing countries is Behar, A., and J. Mok, (2013), which has advanced economies in the sample and do not exclusively focus on developing countries.

at the cost of the private sector (if the relative rent between public and private sectors and the participation rate are constant) and increases wage pressure and decreases private employment; and (ii) increase in public employment—where public sector production is substitutable to the private sector production—puts competitive pressure on the private sector and the relative price of goods produced by the private sector decreases, negatively influencing the wages and participation rate in the private sector. This suggests that reforms aimed at reducing the rents and the size of the public employment may improve labor market performance and policy-makers should avoid using public employment as a tool for reducing unemployment in the medium-to long-run.

6. **The rest of the paper is organized as follows:** Section II provides the literature review; Section III covers the methodology; Section IV presents the empirical results and data issues; and Section V summarizes the main findings.

II. LITERATURE REVIEW

7. **To the best of our knowledge, very little has been written on the macroeconomic impact of public employment on the labor market, particularly for developing countries.** Two comprehensive surveys of public-sector labor markets, Ehrenberg and Schwarz (1986) and Gregory and Borland (1999) show that studies of public employment in industrialized countries have mainly focused on the internal organization of the public sector, especially the influence of trade unions, and on wage differentials between the private and the public sectors. Holmlund and Linden (1993) and Calmfors and Lang (1995) study the macroeconomic effect of temporary employment programs, arguing that temporary public jobs increase wage pressure in the private sector. These papers conclude that wage pressure from public jobs reduces private employment. Holmlund (1997) shows that public-sector expansion increases equilibrium unemployment if unions are relatively more powerful in the public sector than in the private sector. Finn (1998) analyzes the impact of goods purchases and employee compensation components of government spending on unemployment in a real business cycle model applied to the U.S. economy. The results suggest that positive shocks to government goods purchases increase private output and private employment, while positive shocks to government employment have the opposite effects.

8. **The empirical literature provides some evidence of crowding-out effect of public employment on private employment.** Some time series analyses done by Demekas and Kontolemis (2000) for Greece and by Malley and Moutos (2001) for Germany, Japan, and the United States suggest that public employment has a strong crowding-out effect on private employment. Edin and Holmlund (1997), using pooled cross-section and annual time series data for 22 Organization for Economic Co-operation and Development (OECD) countries in 1968–90, show that public-sector employment decreases unemployment in the short run, whereas there is no significant long-run effect. Boeri, Nicoletti, and Scarpetta (2000) include public employment, along with labor market institutions, as an explanatory variable for the nonagricultural employment rate for 19 industrialized OECD countries in 1982–95. Their estimate implies that one public job crowds out 0.3 private jobs. Algan, Cahuc, and Zylberberg (2002) in their study show that public employment is a significant factor

influencing the performance of labor markets. They find that creation of one public job crowds out 1.5 private jobs and increases the number of unemployed by 0.3. Behar and Mok (2013) analyze a large cross-section of developing and advanced countries and find full crowding-out effects of public employment on private employment.³ Feldmann (2009) uses data from 58 countries in 1980–2003 to analyze how the size of government affects unemployment in developing countries. According to the results, a large share of government consumption in total consumption and a large share of transfers and subsidies in GDP increase unemployment.

III. METHODOLOGY

9. **In this paper, we analyzed the sign and the magnitude of public jobs' impact on the unemployment rate and private employment.**⁴ This framework focuses on the role of rents in the public sector and the degree of substitutability of public and private employment. It does not incorporate the distortionary impact of taxes in financing for public jobs, thus providing a partial view. Our aim is to analyze medium-term effects of public job creation on labor market performance. This work does not capture the effects of nominal rigidities and demand movements that may play an important role in the impact of public-sector job creation on labor market outcomes in the short-run.

10. **In theory, the impact of public employment on unemployment is ambiguous.** Given the level of private employment and the labor force, an additional public job would reduce unemployment. However, public employment can affect private employment and labor-force participation and thus indirectly influence unemployment. In general, public jobs could affect private employment by (i) producing goods substitutable to those produced by the private sector; (ii) improving the expected gains of the unemployed people, which increases wage pressure and decreases private employment;⁵ and (iii) increasing distortionary taxes or giving rise to public expenditure switching to finance public job creation.

11. **The impact of public jobs on labor-force participation could also go either way.** To the extent that public job creation improves the job-finding and wage outlook for the unemployed people, it encourages labor-force participation and, other things equal, increases unemployment. However, if the public sector produces goods that increase incentives for their citizens to stay out of the labor force, it would negatively affect the participation rate.

12. **In our theoretical model a representative private-sector firm produces goods with decreasing returns to labor, while the public sector produces goods consumed by all individuals.**⁶ In the private sector all workers are represented by a trade union that

³ The work done by Algan, Cahuc, and Zylberberg (2002) and Behar and Mok (2013) are the most relevant to this paper. While, similar to our paper Algan, Cahuc, and Zylberberg (2002) have explored the role of rents in the public sector and substitutability of public employment for the impact of public employment on unemployment and private employment, Behar and Mok (2013) have looked only at the impact of public employment on unemployment rate and private employment on the aggregate level.

⁴ We followed a similar simple theoretical framework, as outlined in Algan, Cahuc, and Zylberberg (2002).

⁵ For more details see Holmlund and Linden, 1993; and Holmlund, 1997.

⁶ A detailed description of the theoretical model is presented in Appendix A.

bargains wages with the representative firm. In this model, some positive level of unemployment is needed to stabilize wages. Unemployed people can look either for a public or for a private job, but not for both types of jobs at the same time.⁷ We assume that firms have the right to manage their employment. Thus, the wage is equal to the marginal product of labor. Accordingly, the private wage and the unemployment rate in the private sector are determined by the intercept of a vertical wage curve and an increasing labor demand curve. In this situation, the private unemployment rate depends on the bargaining power of workers and on the features of the production function in the private sector.⁸

13. **A benevolent government sets public employment and negotiates the wage in the public sector with a trade union that represents public-sector workers.** The benevolent government aims at maximizing the difference between the social value of goods that public sector is producing and its cost. In equilibrium, the public–private wage ratio depends on the bargaining power of trade unions in both sectors, and on the elasticity of private and public labor demands (equation A14 in Appendix A). Public employment is determined in a way that ensures public wages are equal to the marginal benefits of public employment (equation A15 in Appendix A).

14. **The expected returns on looking for a job in the public sector are obviously increasing with the number of public jobs and with the public wage level.** Therefore, the share of the labor force that belongs to the public sector (including public employment and those looking for a job in the public sector) increases with the number of public jobs and the level of the public wages relative to private wages (equation A8 in Appendix A). Thus, public job creation attracts workers into the public sector at the cost of the private sector, if the relative wage between public and private sectors is constant. Given the participation rate, this will crowd out private jobs, and the crowding-out effect would be stronger when wages in the public sector are higher than private sector wages, attracting more workers to the public sector (equation A9 in Appendix A).

15. **The consequence of increased public jobs on the unemployment rate depends on the size of the crowding-out effect on the private sector.** The crowding-out effect of public job creation implies a reduction in private employment, which increases the marginal productivity of labor and therefore wages in the private sector. When the size of the labor force is taken as given, the creation of one public job decreases unemployment only if the crowding-out effect is less than one. Because the crowding-out effect increases with the relative level of rents in the public sector, the theoretical framework suggests that public job creation decreases the economy-wide unemployment rate only if rents in the public sector are below rents in the private-sector (equation A10 in Appendix A).

⁷ This assumption, while not essential for the qualitative results, simplifies our reasoning and may be realistic, because in many countries the public-sector hiring process is very different from that in the private sector.

⁸ Because the (steady state) equilibrium private unemployment rate does not depend on the size of the labor force, it is independent of the number of workers who belong to the private sector.

16. **The role of the substitutability between private and public production can be demonstrated through public jobs' impact on labor-force participation.** By improving employment opportunities, public job creation is likely to increase the size of the labor force (equation A11 in Appendix A). However, public jobs can influence private-sector productivity as well. If by creating public jobs the government produces goods not substitutable to private goods, such as justice and police, it increases productivity and pushes up wages in the private sector, positively influencing the participation rate. If public jobs produce goods that are substitutable to those produced by the private sector, the relative price of goods produced by the private sector will decrease, negatively influencing the wages and participation rate in the private sector.

IV. EMPIRICAL RESULTS

Data

17. **Our empirical analysis is based on the data for 24 upper-middle-income countries in 1995–2011.**⁹ The main sources for standard labor market data are the Key Indicators of the Labor Market (KILM) and LABORSTA databases from the International Labor Organization (ILO), and different publications of countries' statistical offices and other agencies.¹⁰ We used a narrow definition of public employment, which does not include employment by state-owned enterprises.¹¹ To remove the effect of cyclical fluctuations, we averaged the time-dependent macroeconomic variables over three-year periods.¹² Because of joint determination of public employment's and aggregate unemployment's evolution over time, we instrument public employment using variables meant to capture fairly general features of economic and sociological cross-country variation. We use the urbanization rate as measures of economic development, which is related to public infrastructures, spending, and employment growth on the basis of "Wagner's law."¹³ The population density is used to capture the fixed cost of providing government services. We use exposure to international trade, which is predicted by many theories to have important effects on public employment. Higher foreign exposure should reduce the size of the public sector if international tax competition is an important constraint on public policy, but a larger public sector may be observed in a risk-reducing role when economies are more significantly exposed to external shocks (Rodrik, 1997). Also five features of the wage-setting and labor-employer framework

⁹ The sample size was subject to the availability of data across of our cross-country sample.

¹⁰ Data for unemployment do not include discouraged workers.

¹¹ In some of the countries the public employment may include temporary public workers. However, the share of temporary public workers in the total public employment is very small.

¹² Data limitations prevent us from averaging time-varying series over a five-year period, which may not fully assume away the impact of transitory shocks. However, To the extent that private-sector labor demand is lower during periods of weak economic activity, this will be controlled for by the GDP per capita growth in the simultaneous equation regression.

¹³ See Musgrave (1985). In addition, Grant (2012) in their study showed that countries with similar level of urbanization rate have different level of unemployment because of low level of education (particularly among youth) and socio-economic factors, such as the strength of local markets and an individual's own networks. This suggests that urbanization rate independently does not affect unemployment.

from the World Economic Forum are included: an index of cooperation in labor-employer relations; flexibility of wage determination; rigidity of employment; hiring and firing practices; and redundancy costs.

Stylized Facts

18. **Our data analysis over time and across countries reveals significant heterogeneities.** The share of public employment in total employment averages 13 percent across countries in the sample for 1995–2011, and in 60 percent of countries it increased over time (Table 1). In 2011, the share of public employment in total employment ranged from 4.7 percent in Kazakhstan to 33.4 percent in Namibia, highlighting the heterogeneity in public employment among UMICs.

19. **There is a high degree of heterogeneity in the dynamics of public employment as well.** In two countries (Mexico, Costa Rica) of our sample, public employment as a share of working-age population was stable over time; for five countries (Belarus, Chile, Malaysia, Peru, Thailand) the share of public employment increased steadily in 1995–2008; in three countries (Jordan, Kazakhstan, Turkey) the share of public employment in the working-age population has steadily decreased over time; and in the remaining countries there were large swings in the share of public employment.

20. **In many countries, policymakers respond to a high level of unemployment by creating new public jobs or expanding existing public employment programs.** Half of the countries in our sample have positive correlation between public employment and unemployment rate, while in the remaining half the correlation is negative. However, the correlations are statistically significant in six (Brazil, Colombia, Malaysia, Mauritius, Panama, and Ukraine) out of 12 countries with positive correlation and five (Albania, Belarus, Peru, Turkey, and Uruguay) out of 12 countries with negative correlations. The positive correlation could reflect governments' response to increasing unemployment in these countries. The cross-country dimension of the data suggests a negative, though statistically insignificant, correlation between the public employment and unemployment rates (Figure 1).¹⁴

¹⁴ Ukraine and Belarus play a significant role in generating the negative slope correlation. This reflects the fact that in both countries the share of public employment in working age population was broadly stable at relatively high level, while unemployment has decreased and stabilized at low level.

Table 1. Selected UMICs: Public Employment and Unemployment Rate, 1995–2011

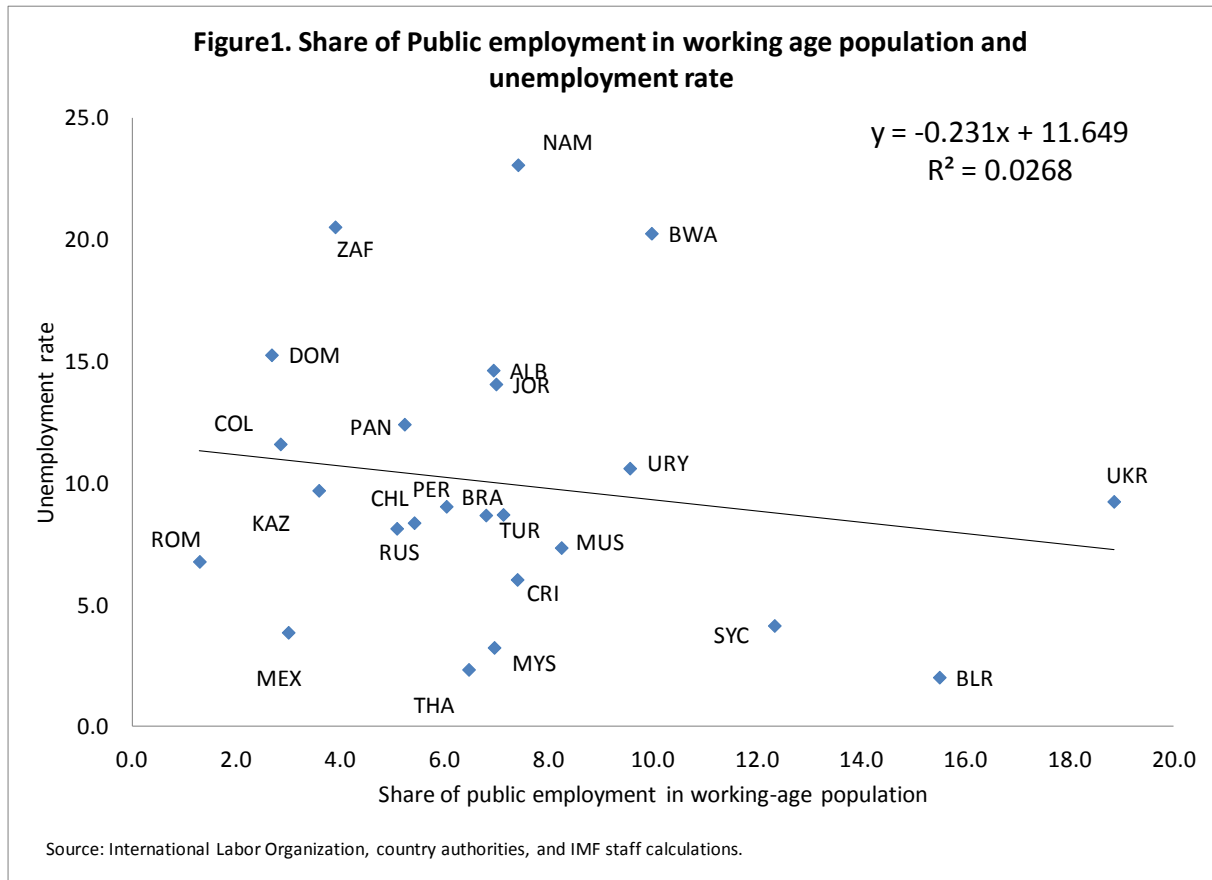
	Public Employment in Total		Standard deviation		Correlation (u, Lg)
	1995–2011	The Latest Available	Unemployment (u)	Public employment (Lg)	
Albania	14.5	17.7	5.8	0.8	-0.51 *
Belarus	24.0	23.9	1.0	0.4	-0.54 *
Botswana	16.0	20.9	2.7	0.3	0.26
Brazil	10.6	10.9	2.5	0.9	0.74 *
Chile	9.4	10.3	3.7	0.4	0.39
Colombia	5.3	5.0	3.1	0.9	0.62 *
Costa Rica	12.3	11.8	1.4	0.6	-0.32
Dominican Republic	4.6	4.8	2.0	0.2	-0.53
Jordan	18.0	15.8	3.4	1.5	0.07
Kazakhstan	5.2	4.7	2.8	0.9	0.38
Malaysia	10.8	12.5	1.8	1.3	0.74 *
Mauritius	14.0	13.8	4.6	0.2	0.63 *
Mexico	4.9	5.0	1.3	0.1	-0.27
Namibia	20.9	20.1	4.2	0.2	-0.56
Panama	9.6	8.8	4.0	0.1	0.54 *
Peru	9.0	9.7	1.5	0.4	-0.84 *
Romania	3.5	4.8	2.3	0.3	0.06
Russian Federation	7.6	7.8	2.1	0.3	0.15
Seychelles	29.2	19.7	1.7	1.0	-0.53
South Africa	11.4	12.5	5.3	2.3	-0.07
Thailand	8.2	10.0	1.1	0.6	-0.28
Turkey	14.6	13.3	1.7	0.7	-0.84 *
Ukraine	32.4	19.6	2.2	6.5	0.82 *
Uruguay	14.2	14.8	3.0	0.9	-0.57 *

Source: International Labor Organization, country authorities, and IMF staff calculations.
* p<0.05.

21. **In general, unemployment is more volatile in our sample than public employment.**¹⁵ On average, unemployment volatility measured by standard deviation was 2.7, while public employment volatility was 0.9 over the period 1995–2010 (Table 1). Countries with highest volatility in the sample are Albania (5.8), South Africa (5.3), and Mauritius (4.6), while Mexico, Thailand, and Belarus are the ones with the lowest volatility in unemployment. Ukraine (6.5) has the highest volatility in public employment, which probably reflects considerable downsizing of the government that picked up in 2000. Other countries with high public employment volatility are South Africa and Jordan. In Mexico and Panama public employment had the lowest volatility in the sample.

¹⁵ Public employment is measured as a share in working age population.

Figure 1. Public Employment and Unemployment Rate, Average 1995—2011



Econometric analysis

22. **The literature traditionally explains unemployment dispersion across countries by the underlying heterogeneity in national labor market features.** As illustrated in Table 1, there is a significant heterogeneity among countries regarding their level of public employment. Therefore, we test whether this cross-country variation in public employment also matters in explaining the variation in unemployment. First, we link unemployment to traditional labor market institutional variables. Then we add public employment and estimate the impact of this variable on unemployment. We also control for global shocks by introducing a full set of period dummies. For each model specification, we report pooled ordinary least squares (OLS), generalized least squares (GLS), fixed effect¹⁶ estimates, and estimates with errors robust to the country clustering. To further explore the channel through which public employment affects unemployment, we estimate its impact on private employment as well.

¹⁶ The variables describing labor market institutions have displayed small variations over the last few decades. Therefore, traditionally they are considered as time invariant in this literature and capture fixed country effects.

Table 2. Estimates of Unemployment Based on Labor Market Institutions and Public Employment

	OLS: Institutions and Public Employment	Fixed Effect: Institutions and Public Employment	GLS: Institutions and Public Employment	GLS: Institutions and Public Employment	
	1	2	3	4	5
Public employment		-0.0448 (0.13)	0.232** (0.11)		0.19* (0.11)
Cooperation in labor-employer relations	-2.367*** (0.87)	-1.989** (0.94)		-2.465 (1.59)	-2.105 (1.65)
Flexibility of wage determination	0.626 (0.72)	0.46 (0.83)		0.621 (1.67)	0.938 (1.68)
Rigidity of employment	-0.138*** (0.03)	-0.126*** (0.04)		-0.14* (0.07)	-0.136* (0.08)
Hiring and firing practices	-4.304*** (1.01)	-3.742*** (1.19)		-4.224* (2.61)	-5.177** (2.64)
Redundancy costs	0.0310* (0.02)	0.0315* (0.02)		0.0332 (0.03)	0.0406 (0.03)
Time effect	Yes	Yes	Yes	Yes	Yes
Number of observations	148	128	128	148	
R-squared	0.268	0.235	0.183		

(Standard errors).
*** p<0.01, ** p<0.05, * p<0.1

23. Labor market institutions provide some explanation for the cross-country differences in the unemployment rate in the equations without public employment.

However, most of them become insignificant when using GLS estimators (columns 1 and 4 of Tables 2 and 3). The only significant factor in all specifications is hiring and firing practice, which suggest a more flexible labor market practice is associated with lower unemployment. The cooperation in labor-employer relations and rigidity of employment has significant negative impact on unemployment only in the OLS specification. Public employment appears to have a statistically significant effect on unemployment at least at the 10 percent level for fixed effect and GLS methods, suggesting public employment is a key factor in explaining unemployment in addition to institutional variables. Public employment is statistically significant at the 5 percent level and has a negative impact on private employment only in the OLS regression (Table 3). However, all estimates presented in Tables 2 and 3 are distorted by the endogeneity bias, because public employment, private employment, and unemployment are jointly determined.

24. To address the inherent endogeneity bias, we estimated simultaneous equation regressions.¹⁷ Based on our theoretical model, the unemployment rate or private employment is defined as a function of public employment, productivity, and labor market institutions. Meanwhile, public employment is linked with productivity, labor market institutions, and valuation of public goods. The weight attached to public goods in policymaking is

¹⁷ We used two-stage least squares estimation method as well, which produced broadly similar results.

determined by the urbanization rate, population density, and trade openness.^{18, 19} The level of productivity entering the equations is proxied by GDP per capita, which is specified in first differences consistent with “Okun’s law.” Similar to TSLS, we estimate simultaneous equations in two specifications: (i) with variables on labor market institutions and (ii) with country-specific effects instead of labor market institutions.

Table 3. Estimates of Private Employment Based on Labor Market Institutions and Public Employment

	OLS: Institutions and Public Employment		Fixed Effect: Institutions and Public Employment	GLS: Institutions and Public Employment	
	1	2	3	4	5
Public employment		-0.696** (0.32)	0.15 (0.37)		-0.0467 (0.43)
Cooperation in labor-employer relations	3.562 (2.26)	2.648 (2.26)		3.223 (4.72)	3.164 (4.78)
Flexibility of wage determination	-5.023** (1.97)	-5.972*** (1.99)		-4.654 (4.07)	-4.715 (4.08)
Rigidity of employment	0.165* (0.09)	0.157* (0.09)		0.254 (0.19)	0.253 (0.19)
Hiring and firing practices	7.975*** (2.69)	10.21*** (2.83)		8.716 (6.38)	8.868 (6.40)
Redundancy costs	0.0866** (0.04)	0.0715* (0.04)		0.113 (0.01)	0.112 (0.10)
Time effect	Yes	Yes	Yes	Yes	Yes
Number of observations	124	124	124	124	124
R-squared	0.166	0.201	0.057		

(Standard errors).
*** p<0.01, ** p<0.05, * p<0.1

25. **The impact of public employment on the unemployment rate is still positive and statistically significant in the specification with country-specific effects (Table 4).** The coefficient is very close to the one obtained in the fixed effects and GLS regressions (0.299 against 0.232 and 0.190 respectively), highlighting the robustness of this relationship. To interpret this result, it is helpful to compute explicitly the impact of public employment on the number of unemployed workers. The coefficient of the impact of public employment on unemployment is 0.299 with a standard error of 0.11. This implies that creation of 100 public jobs adds about 20 unemployed workers with the 95 percent confidence interval of [10, 40].²⁰ In this specification the impact of public employment on private employment, while negative, is not statistically significant.

¹⁸ J test of over-identifying restriction failed to reject the null hypothesis that the coefficients on the instruments are zero.

¹⁹ All instruments included in the first stage individually have statistically significant impact on public employment. F statistics of the first stage of TSLS regressions for both equations is about 2. While this assumes that coefficients of all instruments jointly are different from 0 at 95 percent confidence level, it also suggests that our instruments are not very strong.

²⁰ If the unemployment rate in the regression is a fraction of labor force (LF), while the public employment (PE) is a fraction of working-age population (WA), we have $dU = 0.299 * (LF/WA) * dPE$. As (LF/WA) on average is 0.696, we have the estimated 0.2 effect on the number of unemployed people.

26. We find that public employment's impact on private employment is negative and statistically significant in the regression specification with labor market institutions.

The coefficient is very close to the one obtained in the OLS regression (-0.706 against -0.696). This negative relationship suggests that public employment crowds out private employment, implying that creation of 100 public jobs destroys 70 private jobs on average with the confidence interval of [-137, -5].²¹ This is a larger effect than the one identified by Boeri, Nicoletti, and Scarpetta (2000), who estimate a distraction of 30 private jobs in response to the creation of 100 public jobs, but smaller than the estimates by Algan, Cahuc, and Zylberberg (2002) and Behar and Mok (2013), who estimated 150 and 100 crowding-out effects respectively.

27. Trade openness appears to be the most significant variable determining public employment.

It is significant at least at the 10 percent level in all specifications of the three-stage least squares regressions. This is also consistent with Rodrik's (1997) findings. Although productivity growth increases public employment in line with Wagner's law, its effect is not statistically significant. Population density is significant in the regression with country-specific effects but loses its significance when labor market institutions are added to the regression. In contrast, the urbanization rate is significant in the regression with labor market institutions and insignificant in the regression with country-specific effects. These estimates should be interpreted with caution, because the magnitude of the impact of public employment varies across different model specifications. However, one would expect similar picture, because the theory predicts that the impact of public employment should depend on the size of rents in the public sector, the substitutability of public production, and the impact of public employment on labor force participation.

28. The analysis below looks at the countries where public employment destroys many jobs.

The theoretical model suggests that these interactions should differ across countries according to two main criteria: (i) the size of rents in the public sector and (ii) the degree of substitutability between public and private production. As a natural proxy for the public-sector rent, we use the relative wage of the public sector with respect to private sector.²² However, wage differentials do not fully account for the relative attractiveness of public employment, which also depends on working conditions, power and hierarchy aspects, job security, and other hard-to-measure characteristics. Therefore, we also use the Corruption Perception Index as an indirect measure of public-sector rent. Based on the relative wage indicator, in about 80 percent of the countries considered, average public wages are above average private wages. Given that the data on the shares of employment across different public activities is not available for a large set of countries, we use public expenditure based measures to cluster our countries by the substitutability criteria.

²¹ Because both public and private employment (*PRE*) are fractions of working-age population, we have that $dPRE = -0.7*d.PE$.

²² We do not have relative wage data for two countries in our sample.

**Table 4. Three-Stage Least Squares Estimates of Simultaneous Equations:
Unemployment-Public Employment and Private Employment-Public Employment**

	Unemployment	Public Employment	Private Employment	Public Employment
Country-specific effects:				
Public employment	0.299*** (0.11)		-0.15 (0.28)	
Change in productivity	-3.277*** (0.90)	0.999 (0.72)	4.107* (2.31)	0.96 (0.75)
Urbanization rate		0.141 (0.09)		0.12 (0.09)
Population density		0.0894*** (0.03)		0.0960*** (0.03)
Foreign trade openness		2.183* (1.14)		3.106** (1.25)
Fixed effect	Yes	Yes	Yes	Yes
Time effect	Yes	Yes	Yes	Yes
Number of observations	109	109	105	105
R-squared	0.941	0.929	0.937	0.925
Institutional variables:				
Public employment	-0.192 (0.13)		-0.706** (0.33)	
Change in productivity	-0.072 (3.00)	0.20 (2.00)	7.372 (7.49)	0.223 (2.01)
Urbanization rate		0.0841*** (0.03)		0.0750*** (0.03)
Population density		0.0013 (0.00)		0.000628 (0.00)
Foreign trade openness		4.638*** (0.97)		4.334*** (0.98)
Cooperation in labor-employer relations	-2.394** (1.05)	-2.362*** (0.73)	4.929* (2.63)	-2.358*** (0.74)
Flexibility of wage determination	0.40 (0.89)	-1.530*** (0.59)	-7.193*** (2.20)	-1.448** (0.58)
Rigidity of employment	-0.144*** (0.04)	(0.03) (0.03)	0.189* (0.10)	-0.0311 (0.03)
Hiring and firing practices	-3.344*** (1.25)	3.255*** (0.81)	9.970*** (3.10)	3.245*** (0.80)
Redundancy costs	0.0314* (0.02)	-0.0178 (0.01)	0.0852* (0.05)	-0.0139 (0.01)
Fixed effect	No	No	No	No
Time effect	Yes	Yes	Yes	Yes
Number of observations	109	109	105	105
R-squared	0.243	0.384	0.214	0.372
Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1				

We use two indicators: (i) the share of public spending on the health sector in total government spending—high substitutability and (ii) the share of public spending in total

public expenditure devoted to defense, justice, and general administration—low substitutability. As in other cases, we run three-stage least square estimates in two specifications: (i) with country-specific effects and (ii) with variables that describe labor market institutions instead of country-specific effects.

29. **The distortionary impact of public employment is stronger in countries with high public-sector rents and highly substitutable public production compared with the private sector.** We estimate simultaneous equation regressions based on splitting the sample according to the rent in the public sector and degree of substitutability. When we use country-specific effects, in all country group regressions, but substitutability based on health expenditure, public employment has a positive and statistically significant effect on the unemployment rate (Table 5). However, when we use variables describing labor market institutions instead of country-specific effects, the impact of public employment on unemployment rate becomes insignificant in the country group regression based on high wage premium as well (Appendix 2 Table A2.I). In addition, estimated coefficients of public employment based on split samples, even if they are statistically significant, are not statistically different from the coefficients estimated based on the full sample. In contrast the estimated impact of public employment on private employment is negative and statistically significant in the regressions based on split samples using both country-specific effects and variables for labor market institutions. Moreover, the impact of public employment on private employment is much more negative with statistically significant differences from the coefficient estimated based on the full sample. This implies that public employment destroys more jobs in countries where public-sector rents are higher relative to private-sector rents and the public sector produces goods highly substitutable with private production.

Table 5. Three-Stage Least Squares Estimates of Public Employment Impact on Unemployment and Private Employment Based on the Size of Public Rent and the Substitutability of Public Production

	High Wage Premium	High Corruption	High Public Goods Substitutability (Spending on Defense)	High Public Goods Substitutability (Spending on Health)
Unemployment rate				
Public employment	0.464* (0.28)	0.219** (0.10)	0.334*** (0.09)	0.321 (0.35)
Productivity	-2.480** (1.21)	-2.646*** (0.94)	-4.751*** (0.91)	-2.819* (1.62)
Fixed effect	Yes	Yes	Yes	Yes
Time effects	Yes*	Yes*	Yes*	Yes*
R-squared	0.935	0.94	0.967	0.924
Number of observations	83	54	48	60
Private employment				
Public employment	-1.451** (0.69)	-0.192 (0.36)	-1.125*** (0.30)	-1.882** (0.82)
Productivity	3.961 (3.11)	6.832* (3.63)	10.1 (6.29)	1.27 (4.11)
Fixed effect	Yes	Yes	Yes	Yes
Time effects	Yes*	Yes*	Yes*	Yes*
R-squared	0.935	0.868	0.43	0.947
Number of observations	80	53	45	56

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

V. CONCLUSIONS

30. **Policymakers often use public employment programs as a response to persistently high level of unemployment.** While in the short-run there might be some gains, in the medium to long-run, public employment may well increase unemployment. Public job creation could cause the destruction of private jobs through, for example, increasing labor taxes or exerting competitive pressure on private producers' output and wages in the labor market in general.

31. **We do not find any evidence that public employment reduces unemployment rate in the medium to long-run.** If anything we found some evidence that creation of public jobs may increase unemployment rate. However, this impact is not robust across different model specifications.

32. **Our analysis provides support to the hypothesis that creation of public jobs in the medium to long-run destroys private sector jobs.** More importantly, the negative impact of public employment on labor market outcomes is amplified when rents in the public sector are higher relative to the private sector and the government hires workers to produce goods substitutable with private sector goods, putting competitive pressure on private producers' output. A large pool of well-paid public jobs creates biased incentives and attracts many people into the public sector, influencing their schooling decisions and eventually giving rise to a skill mismatch in the labor market. Our findings support the need for reforms to reduce the rents and the size of the public sector, which can improve labor market performance.

33. **However, our results should be interpreted with caution.** They do not provide an assessment for the optimal level or size of public employment in MICs. To determine the optimal level of public employment for these countries, policymakers should take into account a number of other country-specific features, such as exposure to international trade, the level of education, the size of the country, the degree of urbanization, and access to natural resources.²³ However, our results underscore the need for aligning public-sector wages with those of the private sector, and for the public sector to provide complementary goods to the private sector, to improve labor market outcomes in these countries.

²³ For more details see Hart O., A. Shleifer and R. Vishny, 1997; Rodrik, 1998; IMF (February 2013), "Macroeconomic Issues in Small States and Implications for Fund Engagement.

Appendix 1. Theoretical Model

We consider a labor market with private and public jobs. Working-age population is normalized to 1, and $N \leq 1$ denotes labor market participation. In the private sector, a representative firm produces output using labor as the only factor in the production function:

$$AF(L_p) = AL_p^a/a, a \in [0, 1], A > 0,$$

where L_p denotes private employment.

There are L_g jobs in the public sector, each producing a unit of a good. All individuals have the same preferences, and an individual whose income is w has the following utility:

$$w + H(L_g), \text{ with } H'(\bullet) > 0, H''(\bullet) < 0.$$

Unemployed workers have no income, and only derive utility from the goods produced by the public sector. There is no job-to-job mobility. The unemployed workers ($U = N - L_p - L_g$) can search either for a public job or for a private job. In equilibrium, they must be indifferent between the two choices on the basis of rational expectations as to wages and employment prospects in the two sectors.

A trade union aims at maximizing the total utility of the N_p workers who belong to the private sector. If the expected utility of an unemployed worker in the private sector is

$$Z_p = u_p H(L_g) + (1 - u_p)[w_p + H(L_g)] = H(L_g) + (1 - u_p)w_p \quad (\text{A1})$$

where w_p and $u_p = (N_p - L_p)/N_p$ are the wage and the unemployment rate in the private sector. The objective of the trade union is

$$V_p = L_p[w_p + H(L_g)] + \text{Max}(N_p - L_p, 0)Z_p \quad (\text{A2})$$

The implications of this simple model are qualitatively similar to those of a model with explicit flows between employment and unemployment.²⁴ A standard right-to-manage Nash (1950) bargaining program with $\pi \in [0, 1]$ bargaining power of workers and disagreement payoffs $N_p Z_p$ for the union and zero for the firm yields the following condition:

$$\max_{w_p} L_p^\pi [w_p + H(L_g) - Z_p]^\pi [F(L_p) - w_p L_p]^{1-\pi} \text{ s.t. } AF'(L_p) \quad (\text{A3})$$

$$AF'(L_p) = w_p = \mu_p [Z_p - H(L_g)], \mu_p = \frac{a+\pi(1-a)}{a} \geq 1 \quad (\text{A4})$$

²⁴ See Layard, R., S. Nickell, and R. Jackman (1991).

This provides an interior solution with $L_p < N_p$.²⁵ The Cobb–Douglas technology implies that the unemployment rate is independent of the labor-force size, and only depends on the wage markup μ_p in the private sector. By substituting (A4) in (A1) we have.

$$u_p = \frac{\mu_p^{-1}}{\mu_p} \quad (\text{A5})$$

Thus, private-sector unemployment is not directly influenced by public employment, which can affect aggregate unemployment by altering the allocation of N_g and N_p workers to the two sectors. Hence, the private wage, $w_p = AF'[N_p(I - u_p)]$, is also influenced by the size of the public sector through changes in N_p .

In the public sector, the job-finding probability is L_g/N_g . Thus, the expected utility of a worker who looks for a job in the public sector is

$$Z_g = H(L_g) + \frac{L_g w_g}{N_g} \quad (\text{A6})$$

where w_g denotes the wage in the public sector. For simplicity, let the wage in the public sector be proportional to the private wage, $w_g = \lambda w_p$, where $\lambda > 0$ measures the relative level of public-sector wages with respect to private-sector wages.²⁶

In equilibrium, unemployed workers must have the same expected utility in the private and public sectors:

$$Z_p = Z_g \equiv Z, \quad (\text{A7})$$

Which, combined with equations (A1), (A5), (A6), and (A7), yields:

$$N_g = \lambda \mu_p L_g \quad (\text{A8})$$

Hence, the number of workers in the public sector increases with the number of public jobs, and does so more strongly when λ is large (public wages are high relative to private wages). Using (A5), (A8), and the identity $u_g N_g = N_g - L_g$ yields

$$\lambda(I - u_g) = I - u_p$$

This suggests that the unemployment rate is higher in the public sector than in the private sector if and only if $\lambda > 1$, i.e., if wages are higher in the public sector.

From equations (A5) and (A8) and the identity $N = N_p + N_g$ we have

$$L_p = \frac{N}{\mu_p} - \lambda L_g \quad (\text{A9})$$

²⁵ An efficient bargaining model as in MacDonald and Solow (1981) would have the same qualitative implications.

²⁶ It could be shown that such proportionality can be rationalized by an explicit model of collective bargaining in the public sector.

This suggests that private jobs are necessarily crowded out by public jobs, and the effect is stronger when λ is larger. We can derive an expression for the aggregate unemployment rate using the identity $U + L_p + L_g = N$ together with (A5) and (A9).

$$u = \frac{U}{N} = \frac{L_g}{N}(\lambda - 1) + \frac{\mu_p^{-1}}{\mu_p} \quad (\text{A10})$$

Public-sector expansion decreases the unemployment rate if and only if $\lambda = w_g/w_p < 1$. Derived results above took the participation rate as given. It is not difficult, however, to study the effects of public employment on participation. Let individuals enjoy different utility levels \bar{Z} when out of the labor market. The distribution of utility levels is denoted $F(\bar{Z})$. Labor market participation is only attractive for individuals whose Z is such that utility out of the labor force, $\bar{Z} + H(L_g)$, is lower than the Z level of utility defined in (A7). Using equations (A6) and (A8) and the relationship $w_p = AF'(L_p) = AF'[\frac{N}{\mu_p} - \lambda L_g]$, we can write the participation rate $F[z - H(L_g)]$ of the unitary population as follows:

$$N = F\left[\frac{AF'\left[\frac{N}{\mu_p} - \lambda L_g\right]}{\mu_p}\right] \quad (\text{A11})$$

This equation implies that the participation rate increases with public employment, which crowds out private jobs, increases marginal productivity and wages in the private sector, and therefore attracts workers into the labor market. According to equation (A9), there are $N/\mu_p - \lambda L_g$ private jobs: hence, higher participation increases private employment, and reduces the crowding-out effect of public jobs on the private sector. Accordingly, our basic model suggests that the response of participation to public employment tends to soften the crowding-out effect of the public sector. Public jobs, however, may influence participation through several other channels. They can affect the out-of-labor market welfare \bar{Z} by producing goods valuable in that state, and they can also influence productivity in the private sector.

For public employment we consider the case where its level is chosen by a benevolent government to maximize the difference between a public good's social value, $H(L_g)$, and its cost, $w_g L_g$. For simplicity, suppose public employment is financed on a lump-sum basis. Then, public labor demand is given by the following condition $H'(L_g) = w_g$. Also for simplicity, let participation be exogenous ($N = 1$), and suppose public wages are bargained by a representative trade union and the government.²⁷ Then, the objective function of the public-sector trade union is similar to the private-sector one above:

$$V_g = L_g[w_g + H(L_g)] + \text{Max}(N_g - L_g, 0)Z_g \quad (\text{A12})$$

With the $\gamma \in [0, 1]$ relative bargaining power of public sector workers, wages are set by the Nash program as follows:

²⁷ Holmlund (1993) makes similar assumptions in a model focused on distortionary taxation effects.

$$\max_{w_g} L_g^\gamma [w_g + H(L_g) - Z_g]^\gamma [H(L_g) - w_g L_g]^{1-\gamma} \quad \text{s.t. } H'(L_g) = w_g,$$

whose interior solution satisfies

$$H'(L_g) = w_g = \mu_g [Z_g - H(L_g)], \quad \mu_g = \frac{\beta + \gamma(1-\beta)}{\beta} \geq 1 \quad (\text{A13})$$

where $\beta = L_g H'(L_g) / H(L_g)$. Equation (A13), together with equation (A4) and the arbitrage condition (A7) implies:

$$w_g = \lambda w_p, \text{ with } \lambda = \frac{\mu_g}{\mu_p} \quad (\text{A14})$$

Thus, relative wages in the two sectors are determined by wage markups, which in turn depend on labor demand elasticity and bargaining power parameters. According to Ehrenberg and Schwarz (1986), labor demand elasticity is empirically similar for public and private jobs. Trade union density, however, is usually higher in the public sector. Thus, employees may enjoy higher rents in the public rather than the private sector.

Because the public wage is equal to the marginal productivity in the private sector, (A9), (A13), and (A14) yield:

$$H'(L_g) = \lambda A F' \left[\frac{1}{\mu_p} - \lambda L_g \right] \quad (\text{A15})$$

This equation shows that the government creates public jobs up to the point where the marginal utility of the public good is equal to its marginal social cost. As the marginal cost of the public good increases with the ratio $\lambda = w_g/w_p$, a high wage in the public sector induces the government to create fewer public jobs.

Appendix 2. Results of Three-Stage Least Square Estimations with Labor Market Institutions

Table A2.I. Three-Stage Least Squares Estimates of Public Employment Impact on Unemployment and Private Employment Based on the Size of Public Rent and the Substitutability of Public Production with Labor Market Institutions instead of country-specific effects

	High Wage Premium	High Corruption	High Public Goods Substitutability (Spending on Defense)	High Public Goods Substitutability (Spending on Health)
Unemployment rate				
Public employment	0.314 (0.28)	0.169* (0.10)	0.268*** (0.09)	0.253 (0.35)
Productivity	-2.484** (1.21)	-2.642*** (0.94)	-4.671*** (0.91)	-2.789* (1.62)
Cooperation in labor-employer relations	2.351** (1.04)	3.197*** (1.00)	2.087*** (0.57)	5.612*** (0.69)
Flexibility of wage determination	-2.588*** (0.98)	-1.255* (0.68)	-3.000*** (0.41)	3.173 (3.34)
Rigidity of employment	0.0432** (0.02)	-0.0271 (0.02)	-0.025 (0.03)	-0.132 (0.11)
Hiring and firing practices	2.902*** (1.00)	0.353 (0.76)	0.858 (0.98)	-9.298*** (1.61)
Redundancy costs	3.70E-05 (0.02)	0.0828*** (0.02)	0.209*** (0.01)	0.147*** (0.05)
Time effects	Yes*	Yes*	Yes*	Yes*
p-value of the interaction coefficient ¹	0.687	0.733	0.713	0.83
R-squared	0.935	0.94	0.968	0.924
Number of observations	83	54	48	60
Private employment				
Public employment	-2.009*** (0.48)	-0.0615 (0.36)	-1.125*** (0.30)	-2.694*** (0.81)
Productivity	9.85 (9.00)	6.168* (3.62)	10.1 (6.29)	1.588 (4.11)
Cooperation in labor-employer relations	8.06*** (2.81)	-16.56*** (3.77)	-5.381 (4.16)	6.203*** (1.61)
Flexibility of wage determination	-6.369* (3.36)	25.67*** (2.57)	-3.413 (2.85)	38.95*** (7.72)
Rigidity of employment	0.00184 (0.11)	0.0231 (0.09)	0.243 (0.17)	-1.127*** (0.25)
Hiring and firing practices	6.294* (3.63)	-1.8 (2.87)	14.03*** (4.03)	-18.98*** (3.70)
Redundancy costs	0.0834* (0.05)	0.0789 (0.06)	0.134** (0.06)	-0.523*** (0.12)
Time effects	Yes*	Yes*	Yes*	Yes*
p-value of the interaction coefficient ¹	0.004***	0.003***	0.000***	0.000***
R-squared	0.345	0.867	0.43	0.946
Number of observations	80	53	45	56

Standard errors in parentheses

¹ this is the p-value from a test that the interaction coefficient on higher rent in the public sector and higher substitutability of public production in a full-sample specifications is equal to zero

*** p<0.01, ** p<0.05, * p<0.1

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