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Informal labor and the expansion of social security programs: evidence from Jordan and Tunisia

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Abstract

Social insurance could reduce incentives to search for jobs when there are generous unemployment benefits and the payroll taxes can provide incentives to operate informally. The non-contributory programs targeted to informal workers can also provide incentives to take informal jobs (Pagés, Rigolini and Robalino, 2013). In this paper we have analyzed the impact of social security programs on informal employment. Two main programs implemented in Jordan in 2010 and in Tunisia in 2004 have been considered. Tunisian reform introduced a new system with the merger of the sickness benefit programs of the various social security schemes into a new unified scheme. The new scheme provides the same benefits to insured and their family. Jordan reform has extended social security coverage to self-employed, micro-enterprise and to women out of labor market. To evaluate the program impact on the informality status of workers, we have used the difference in differences methodology, took into consideration the diversity within the economy (area, sectors, size of company, ...) and considered data from the Jordanian Labor Market Panel Survey (JLMPS) of 2010 and 2016 and Tunisian Labor Market Panel Survey (TLMPS) of 2014. The results suggest a non-significant effect of both reforms on formal employment. Our results highlight that workers are more likely to get out informal employment as they advance in their career.

1 Introduction

Unemployment in the Middle East and North Africa (MENA) is a phenomenon that is particularly linked to the youth school to work transition (Assaad and Krafft, 2015; Assaad, 2008, 2014). In the region, youth unemployment rates have been the highest in the world for the past 25 years with a peak in 2016 of 30.4% (ILO, 2017). These young people often fail to find formal employment and are likely to fall into the informal sector (Assaad Krafft, 2016). There is also a gender dimension on informality. Indeed, labour force participation among women in the region is very low; only 15 per cent among young women are involved in the formal market, as compared to 37 per cent worldwide (ILO, 2017). Women are often over-represented in informal employment. This situation represents a challenge for policy makers who need to constantly address issues associated with substantial size of the informal sector to get poverty alleviation in MENA countries (Loewe, 2000; Loewe, 2004; Loewe, 2013). In the region, social protection is far less established. Social security, that provide income security and access to essential services like health during active and inactive periods, is today a preferred instrument of the Millennium Development Goals. Furthermore, international institutions (ILO, the World Bank) advocate social protection as a key component of international poverty reduction strategies. Universality of coverage, non-discrimination and gender equality are the key principles of the ILO Social Protection Floors Recommendation (No. 202).

Our aim is to analyse the incentive effects of social security benefits on labour market informality exploiting a policy reform in Jordan and Tunisia (see annex A). These countries suffer from significant informal sector that by definition makes people more vulnerable to the slightest lifecycle shock such as a temporary job loss or period of illness that push many people into poverty. These countries have implemented social protection reforms, respectively, in 2010 and in 2004. Jordan reform added two main forms of social security scheme (maternity leave benefits and unemployment insurance). The implementation of maternity leave benefits' main goal is to reduce the obstacles facing the Jordanian female workforce in order to increase their labour market participation and their rights and entitlements during work such as providing pregnancy and maternity leaves, unemployment insurance's (payable for up to 6 months). The main goal is to increase overall labour market participation (Alhawarin and Selwaness; 2018).

Tunisia introduced a new system with the merger of the sickness benefit programs

of the various social security schemes into a new unified scheme. The new scheme provides the same benefits to insured and their family.

Our research question has been addressed particularly in Latin American countries. Researches dealing with this issue conclude that there is no consensus about the impact of social security coverage on labour informality. Azuara and Marinescu (2013) have estimated the impact of Seguro Popular program in Mexico and found no effect on informality in the overall population. Informality did increase by 1.7% for less educated workers, but the wage gains for workers who switch between the formal and the informal sector were not significantly affected. This suggests that marginal workers' choice between formal and informal jobs is not based on health insurance coverage. Aterido, Hallward-Driemeier and Pages (2016) find that Seguro Popular lowers formality by 0.4 to 0.7 percentage points, with adjustments largely occurring within a few years of the program's introduction. Rather than encouraging exit from the formal sector, Seguro Popular is associated with a 3.1 percentage point reduction (a 20 percent decline) in the inflow of workers into formality. Income effects are also apparent with significantly decreased flows out of unemployment and lower labour force participation. The impact is larger for those with less education, in larger households, and with one member in the household guaranteeing Social Security coverage. Other papers (Campos-Vazquez and Knox, 2011; Barros, 2009) failed to find any significant effect of the program on formality in the early years of the introduction of Seguro Popular.

Camacho, Conover and Hoyos (2014) find robust and consistent estimates of an increase in informal employment of approximately 4 percentage points after Colombian government decided to expand social programs in the early 1990s. Calderon and Marinescu (2011) find that changes in the legislation governing health and pension benefits (that took place between 2003 and 2008) in Columbia increased both full formality and full informality, but with larger positive effects on full formality. Gasparini, Haimovich and Olivieri (2009) analyze the Argentinean Programa Jefes de Hogar (PJH), implemented after the crisis in 2002, and find that although the initial impact of the program was pro-informality, this bias disappeared as the value of the transfer, fixed in nominal terms, lost purchasing power respect to the formal sector wages.

Garganta and Gasparini (2015) find a statistically significant and economically large disincentive to the labour market formalization of the Universal Child Allowance program beneficiaries in Argentina. In contrast, there is no sufficient

evidence for the existence of a significant incentive for registered workers to become informal. Amarante, Manacorda, Vigorito and Zerpa (2011) show that Uruguayan Plan de Atención Nacional a la Emergencia Social reduced formal employment and earnings, primarily among men. Although there is evidence of a modest rebound, by and large the adverse effects on formal labour supply and earnings persist even two years after the end of the program. Bérigolo and Cruces (2011) evaluate a 2008's health reform in Uruguay that extends coverage to children of registered workers and identify a 1.3 percentage point reduction in the labor informality rate. Gonzales- Rosada and Pinto (2011) report a positive significant effect of the Ecuadorean Bono de Desarrollo Humano in the transitions out of formal employment.

Da Costa, De Laiglesia, Martinez and Melguizo (2011) describes the relationship between pension coverage and labour informality in Bolivia, Brazil, Chile and Mexico by income level and find that labour formality is limited, even among the middle and the high-income groups. Correspondingly, coverage rates (measured by contributors or affiliates over workers) range between 10% of the labour force in Bolivia to up to 62% in Chile. 76% of formal workers are covered on average, while coverage among the self-employed in agriculture is below 7%. The researches dealing with this issue for MENA region are very limited and can be explained by the lack of information about various labour market flows in the labour force surveys available in MENA countries. The CRES (2017) led an empirical survey that examines the impact of two social protection programs on employees' formalization in Tunisia. The CRES suggest a disincentive to the labour market formalization of the PNAFN (National Program of Social Assistance for Needy Families or Programme National d'Aide aux Familles Nécessiteuses) and AMG2 (Access to Low-Cost Care Program or Programme d'Accès aux Soins à Tarifs Réduits) programs' beneficiaries in Tunisia. Contribution density of the most vulnerable groups is very low compared to other workers: women are more likely to contribute to the pension system and contribution density decreases with firms' size (Ben Braham and Marouani, 2016). Finally, Arouri and Cuong (2016) find that the receipt of contributory pension reduces the probability of working of people aged 15 to 60 as well as people above 60 years old in Egypt.

Thanks to the labor force surveys developed by Economic Research Forum (ERF), we are able to conduct our analysis on Jordan and Tunisia.

The paper is structured as follows. In section 2, we discuss the informality. Section 3 outlines the theoretical background, data and results. The last section concludes.

2 Informal Sector, informal employment and informal economy

The term "informal" is still used for many purposes (informal sector, informal enterprises, informal employment and informal economy).

In 1993, the 15th International Conference on Labour Statisticians (ICLS) resolution's defined that "informal sector may be broadly characterized as consisting of units engaged in the production of goods or services with the primary objective of generating employment and incomes to the persons concerned. These units typically operate at a low level of organization, with little or no division between labour and capital as factors of production and on a small scale. Labour relations where they exist are based mostly on casual employment, kinship or personal and social relations rather than contractual arrangements with formal guarantees". An informal enterprise satisfies one of these criteria : small size of the enterprise in terms of employment; non-registration of the enterprise (defined as for informal own-account enterprises) and non-registration of its employees (ILO,1993). In 2003, the 17th ICLS adopted new guidelines about "informal employment" which complements the 15th ICLS resolution. Informal employment refers to "the total number of informal jobs, whether carried out in formal sector enterprises, in- formal sector enterprises and/or households, during a given reference period." (ILO, 2003). The figure 6 (see annex) summarizes the conceptual framework for informal employment. Thus, ILO decided to dedicate one of its eight areas of critical importance (ACIs). The main objective is to promote the formalization of the informal sector and economy in accordance with the sustainable development goal 8.3. The ILO recommendation No. 204¹ defines as "informal economy" "all economic activities by worker and economic units that are in law or in practice not covered or insufficiently covered by formal arrangements". Further, another widely used approach to define the informal economy takes into accounts workers and economic units that operate within the formal economy.

¹ILO, Recommendation No. 204, Article 19, ILO (2015)

<p>1. Targeted policies for specific groups of workers and economic units in the informal economy</p> <ul style="list-style-type: none"> ■ Formalization of micro- and small enterprises ■ Sector-based approaches to formalization ■ Non-standard forms of employment and formalization 	<p>2. Policies tackling structural drivers of informality</p> <ul style="list-style-type: none"> ■ Extension of social security coverage ■ Improved compliance with the law (including with international labour standards) ■ Labour market institutions and formalization ■ Organization of informal workers and employers ■ Integrated approaches to formalization
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Figure 1: Policies to promote the transition to the formal economy (ILO,2015)

In our research, we will take into account this definition of informal workers to evaluate the effects of the social security programs on formal and informal workers.

3 Methodology and data

3.1 Conceptual framework

Our conceptual framework, inspired from Azuara and Marinescu (2013) and Levy (2008) consider two groups of workers in the economy L^A and L^B (i.e. $L^A + L^B = L$). Given that "A" workers have full valuation of social security while "B" workers do not, we have the following relation : $1 = b^A > b^B \geq 0$. From the (formal and informal) firms' side, two condition have to be fulfilled as two types of workers have to be employed :

$$\begin{aligned} \frac{dQ_f}{dL_f} - (w_f + T_f) &= 0 \\ (p^w \frac{dQ_i}{dL_i}) - w_i &= 0 \end{aligned}$$

From employee's side, the equilibrium is given by

$$w_f + b_f^A T_f = w_i$$

and

$$w_f + b_f^B T_f = w_i$$

To find equilibrium, we suppose that for a given wage, "A" workers prefer employment in formal sector than "B" workers do. Three situations can occur : $L^A \leq > L_f^*$. In the first situation $L^A = L_f^*$, as a result $L^B = L_i^*$, $w_f + (b_f^A T_f) = (w_f^* + T_f)$ and "B" workers get w_i^* , the equilibrium point is D on the graph.²

In the second case, $L^A < L_f^*$, then w_f^* have to increase to provide an incentive for some "B" workers to move to formal sector. As a result, the new wage in the formal sector is w_f^* ($w_f^* < w_f^j$), firms in the formal sector reduce employment ($L_f^* > L_f^j$) while wage in the informal sector w_i^j if inferior to w_i^* . Equilibrium move to points C and E³.

In the third case, $L^A > L_f^*$: formal enterprises hire more employees than L_f^* if wage in formal sector is inferior to w_f^* . On the other side, w_i^* would increase then "A" workers would be encouraged to work in the informal sector as their utility to work in the informal sector would be superior to $w_f^* + (b_f^A T_f)$ (the utility to work in

²see annex B

³see annex C

the formal sector). Then formal and informal employment are respectively L_f^* and L_i^* . Then in this case some "A" workers are in the informal sector and get wage w_i^* which compensates the lack of social security benefits.

Moreover, with same preferences for social security in rural and urban areas, the regional disparities in terms of public infrastructures quality will result in higher informal employment in the area with lower quality. For the Tunisian case, the perception of health infrastructures quality is much lower in west regions (particularly in center and south west) and south east than in urban and littoral areas (World Bank, 2013). For example, maternal mortality rate is more than three times higher in rural and isolated areas than urban areas. Market accessibility is also a main factor as south regions are isolated. Thus, differences in terms of public infrastructures and service delivery (education, health and roads/transports) explain 75% of the consumption differences between urban rural households (World Bank, 2013). In Jordan we observe also regional differences as health indicators are slightly better in south than in North and Center regions (Jordan Department of Statistics, 2019). One could expect in our estimate positive effects of reforms on formalization in South region in Jordan and in North East in Tunisia compared to other regions.

Furthermore, informal employment is a main issue for the young people who enters labour market as they are more likely to accept jobs which does not afford social security. Informal employment rate is very high for the 15-19 and 20-24 years old groups (respectively 84% and 42%) and then decreases quickly for 25-59 years old workers group. As a result, 60% of men and 83% of women in informal employment are under 40 (ILO, 2015).

3.2 Data

To carry out this study, we use the "Tunisian Labor Market Panel Survey" (TLMPS) of 2014 round and "Jordanian Labor Market Panel Survey" (JLMPS) of 2010 and 2016 round implemented by the Economic Research Forum (ERF). The survey includes detailed current employment and unemployment information as well as labour market histories that allow for an assessment of employment, unemployment and informality dynamics. The survey elicits information on detailed individual and household characteristics, allowing for an assessment of the impact of these characteristics on unemployment dynamics for instance, showing whether highly educated individuals have experienced improving or worsening unemployment dynamics relative to less educated individuals.

The 2010 JLMPS sample includes 5,102 households and 25,953 individuals, the 2016 JLMPS 2 950 households with 13 423 individuals by using 30 strata based on a combination of the 12 governorates of Jordan. The representativeness of 2010 and 2016 JLMPS rounds data in terms of demographic characteristics and labour market information have been assessed by comparing major indicators with the Jordanian Employment and Unemployment Survey and the 2015 Population Census led by the Department of Statistics (DoS) (Krafft and Assaad; 2018).

The 2014 TLMPS sample includes 4 521 households with 16 430 individuals by using 46 strata comprised of the urban/rural areas of all Tunisia's governorates. The same methodology have been used to assess the representativeness of 2014 TLMPS round by comparing with the Enquete Nationale sur la Population et l'Emploi and the 2014 Population Census led by the Institut National de la Statistique (INS) (Assaad and al.; 2016).

The following table presents some basic descriptive statistics from the dataset. We observe that in Tunisia every worker in informal sector do not have any social security protection, at least 10% of the workers in the formal sector do not have the social security. One could observe in the tables 2, 3, 4 and the formal employment rate for Tunisia and Jordan.

For Tunisia, we observe higher formal employment in the great Tunis (governorates of Tunis, Ariana, Ben-Arous and Manouba and in the North-East region (governorates of Bizerte, Zaghuan, Nabeul, Sousse and Monastir). Governorates with large rural areas in the west and center-west regions (Béja, Silliana, Kasserine, Le Kef) have a low formal employment ratio.

For Jordan, we perceive higher formal employment rates in the governorates of Aqaba, Tafilah and Karak, all are located in south west region. Governorates in the north and south east (Mafraq and Ma'an) have also high formal employment rates. Governorates in the center including the national capital Amman have the lowest rates.

Finally, we calculate informal employment rate by age. We note a decline of this rate for workers aged between 15 and 35 in Tunisia and remains stable around 60-65% for workers over 35. In Jordan, the rate falls to 45% for workers at 30 and then increases up to 60% for workers at 65. These results are similar to ILO ones for Arab states (see annex D).

Item	Percent
Sex	
Male	48
Female	52
Education Levels	
Illiterate	34
Read and Write	17
Basic Education	31
Secondary Education	10
Post-Secondary	3
University	3
Post-Graduate	1
Region	
Tunisia-North	31
Tunisia-North West	15
Tunisia-Center East	22
Tunisia-Center West	16
Tunisia-South East	10
Tunisia-South West	5
Urban/Rural	
urban	43
rural	57
Marital status	
Single	49
Married	45
Divorced	1
Widowed	5
Age	
0-5	10
6-11	10
12-14	5
15-19	8
20-29	14
30-39	13
40-49	13
50-59	11

Item	Percent
60–64	5
65 and plus	11
Institutional Sector Prim. Job	
Self-Employed Agri.	9
Self-Employed Non-Agri.	7
Employer	5
Unpaid Fam. Work. Agri.	17
Unpaid Fam. Work. Non-Agri.	1
Irregular Wage	13
Informal Private Regular Wage Sector	12
Formal Private Regular Wage Sector	16
Public Enterprises	5
Government	14
Sector of prim. job	
Informal	52
Formal	48
Incidence of work social insurance in prim. job	
No	57
Yes	43

Source: TLMPS, 2014 round

Table 2: Descriptive Statistics for Tunisia

Sector	Formal employment		
	No	Yes	Total
Informal	1,939	0	1,939
Formal	204	1,591	1,795
Total	2,143	1,591	3,734

Source: TLMPS, 2014 round

Table 3: Distribution of formal and informal employment vs formal and informal sector

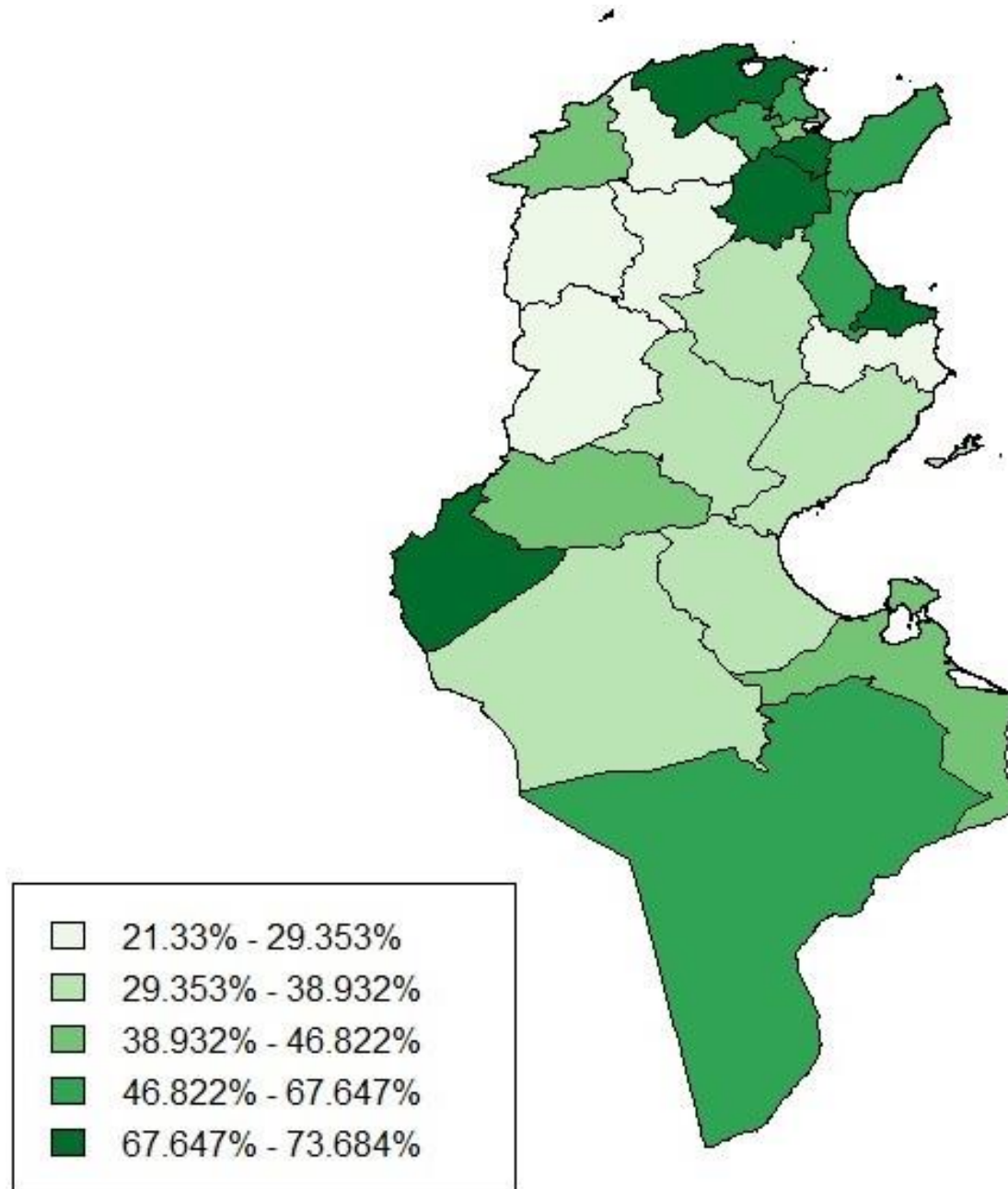


Figure 2: Formal employment rate in Tunisia (Author's calculation based on TLMPS)

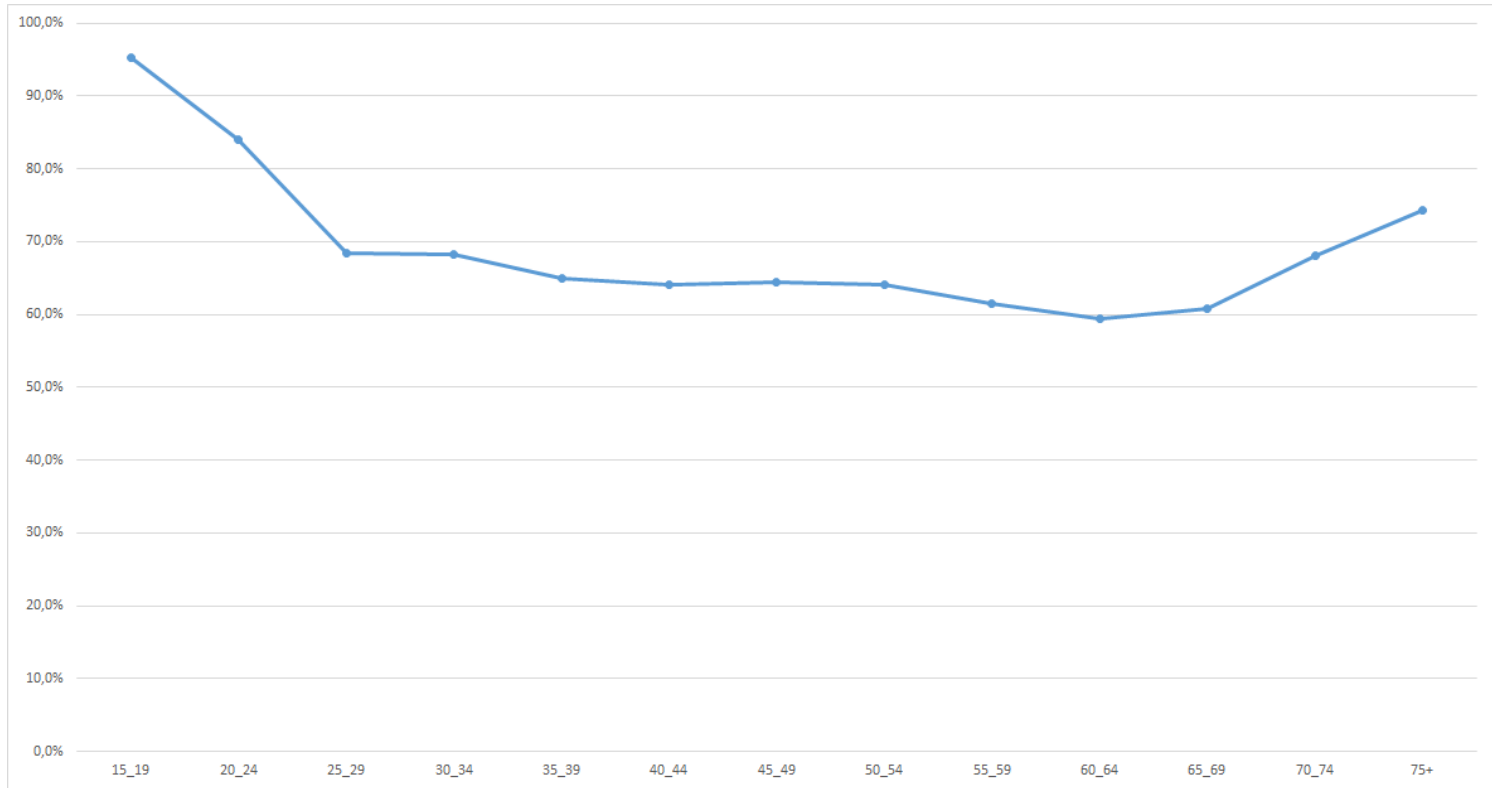


Figure 3: Informal employment rate in Tunisia by age group (Author's calculation based on TLMPS)

Item	Percent
Sex	
Male	50
Female	50
Education Levels	
Illiterate	24
Read and Write	23
Basic Education	24
Secondary Educ	13
Post-Secondary	6
University	9
Post-Graduate	1
Urban/Rural	
urban	73
rural	27
Region	
Jordan-Middle	49
Jordan-North	36
Jordan-South	15
Marital status	
Single	42
Married	53
Divorced	1
Widowed	4
Age	
0-5	16
6-11	14
12-14	7
15-19	11
20-29	18
30-39	13
40-49	10
50-59	6
60-64	2
65 andplus	4

Item	Percent
Institutional Sector Prim. Job	
Self-Employed Agri.	1
Self-Employed Non-Agri.	9
Employer	5
Unpaid Fam. Work. Agri.	3
Unpaid Fam. Work. Non-Agri.	0
Irregular Wage	4
Informal Private Regular Wage	14
Formal Private Regular Wage	21
Public Enterprises	1
Government	42
Formality of prim. job	
Informal	35
Formal	65
Incidence of work social insurance in prim. job	
No	43
Yes	57

Source: JLMPS, 2010 & 2016 round

Table 5: Descriptive Statistics for Jordan

Sector	Formal employment		
	No	Yes	Total
Informal	2,391	0	2,391
Formal	0	3,569	3,569
Total	2,391	3,569	5,960

Source: JLMPS, 2010 & 2016 round

Table 6: Distribution of formal and informal employment vs formal and informal sector

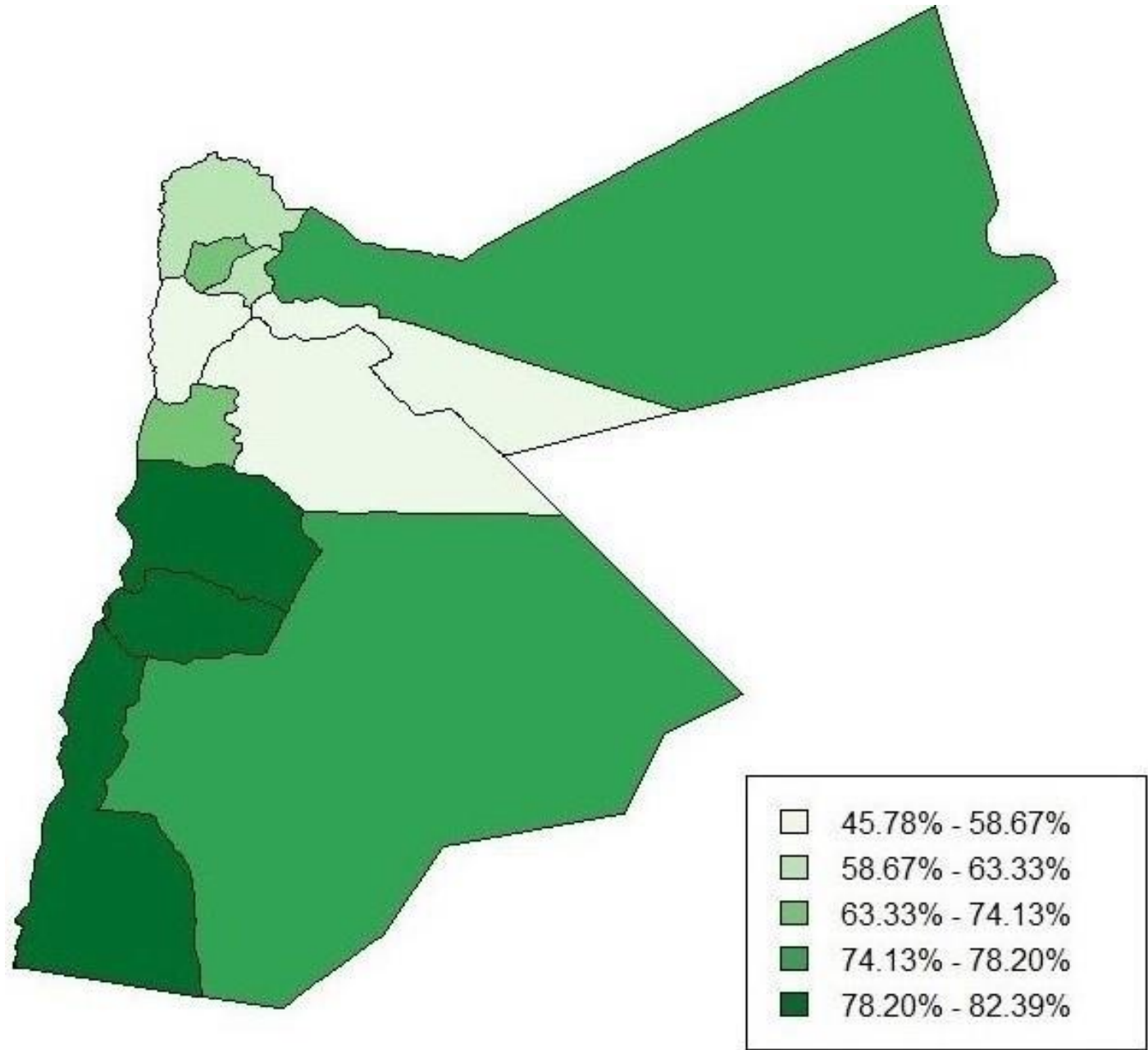


Figure 4: Formal employment rate in Jordan (Author's calculation based on JLMPS)

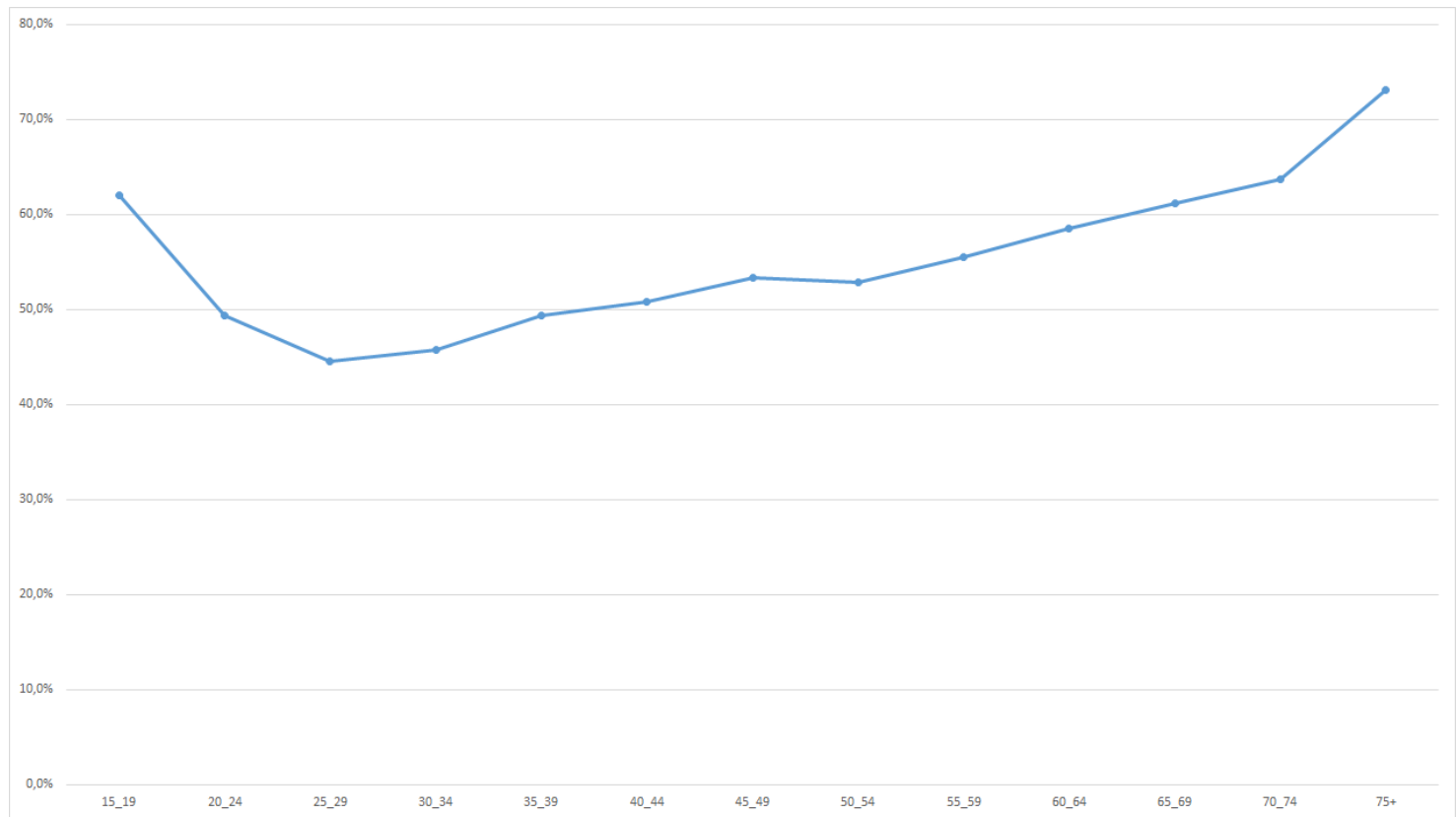


Figure 5: Informal employment rate in Jordan by age group (Author's calculation based on JLMPS)

3.3 Empirical specification and results

To evaluate the program impact on the informality status of workers, we use the difference in differences methodology (DD). This method allows us to compare the differences in the outcome of interest between the treatment and control group, before and after the policy implementation (Card, 1990; Card and Krueger, 1994). To evaluate the impact of the treatment program (P) on the probability for informal workers of moving to a formal job, we use the following formula:

$$\alpha = (Y | P = 1) - (Y | P = 0)$$

The causal impact (α) of a program (P) on an outcome (Y) is the difference between the outcome (Y) with the program (in other words, when $P = 1$) and the same outcome (Y) without the program (when $P = 0$). The identification assumption in this paper is that in the absence of social coverage program the labor formalization trends for both treatment and control groups would have been similar.

As Garganta and Gasparini (2015), we consider the standard linear specification of the DD model to estimate the impact of social program coverage on formal employment:

$$y_{it} = \alpha \times time_t + \beta \times treated_i + \Gamma did_{it} + \Delta X_{it} + \varepsilon_{it}$$

where y_{it} is a dummy variable for individual i and year t being employed formally (i.e. work afford social security), $time_t$ is equal to 1 if the job started before the reform at time t , $treated_i$ is equal to 1 if the worker is an employee and did_{it} is the difference-in-differences estimator. X_{it} is a set of controls for year of birth/ year of birth in quadratic ($brthyr$ and $brthyr2$), sex (man), small-enterprise (SE), permanent job⁴ ($permanentjob$) married ($married$), private sector ($privatesector$), contract job ($contract$), urban ($urban$) and region (North East and Center are respectively the references for Tunisia and Jordan) dummies. ε_{it} is the error term. We use a logit model to estimate the causal effect of the treatment program on the probability for informal workers of moving to a formal job.

Table 7 and 8 presents some descriptive statistics of the treatment and control groups. On average, the treatment and control group have the same characteristics. However, we do observe some differences in relation to the level of education obtained in higher education and the family situation (married).

⁴Permanent job is defined as a work based on a regular basis

Variables	Control (i)	Treatment (ii)	Diff (i)-(ii)	t	p-value
Man	0.898	0.562	0.336	16.981	0.00
Age	55.9	28.3	27.6	51.31	0.00
Urban	0.539	0.665	-0.125	-5.50	0.00
Private sector	0.880	0.785	0.094	5.43	0.00
Married	0.915	0.287	0.628	34.86	0.00
University graduate	0.031	0.176	-0.144	-10.126	0.00
Small-enterprise	0.575	0.500	0.074	3.218	0.999
Permanent job	0.407	0.496	-0.088	-3.85	0.999
Observations	829	1,051			

Source: TLMPS, 2014 round

Table 7: Descriptive statistics, mean-tests for treatment and control groups in Tunisia, Note: means correspond to pre-intervention panels.

Variables	Control (i)	Treatment (ii)	Diff (i)-(ii)	t	p-value
Man	0.938	0.750	0.188	10.709	0.000
Age	50.9	27.2	23.6	61.130	0.00
Private sector	0.505	0.532	-0.027	-1.263	0.103
Married	0.928	0.402	0.525	26.49	0.00
University graduate	0.248	0.377	-0.129	-6.225	0.00
Small-enterprise	0.286	0.282	0.004	0.199	0.578
Permanent job	0.670	0.760	-0.089	-4.69	0.00
Observations	653	2,659			

Source: JLMPS, 2010, 2016 round

Table 8: Descriptive statistics, mean-tests for treatment and control groups in Jordan. Note : means correspond to pre-intervention panels.

For Tunisia and Jordan, the main result of the regression indicates that the reform has a non-significant disincentive effect on labour market formalization.

Workers are more likely to get out informal employment as they advance in their career but the effect becomes null in the ending stages of the career. Being a man, married have a significant effect on formal employment in Tunisia, contrary to Jordan where men are more likely to fall in informal employment. Furthermore the disincentives are significant for small enterprises.

For Tunisia, workers in private sector and living in south west region are more likely to fall into informal employment. Furthermore, women living in the South and in the center are more prone to work in the informal sector.

Our results confirm those obtained in the surveys led by the CRES to evaluate the impact of specific programs (PNAFN and AMG II) on labour formalization.

For Jordan, workers with permanent jobs are more prone to be in formal employment. Workers in private sector are more expected to be in informal employment. In addition to that, we note some differences according to the region. Indeed, workers located in north are more likely to to be in informal employment. Finally, workers in small enterprises (less than 10 employees) are more prone to be in informal employment.

An explanation for the non-significant effect of 2004's and 2010's reforms on labour formalization is that individuals are not willing to change their status. Our results are most likely explained by the fact that workers do not value health benefits much regarding to the scheme contribution. Even a very significant change in the health benefits provided by switching to formal employment is unlikely to affect most workers' decisions to work formally. This could be explained by low quality in health infrastructure (as estimates for South West region in Tunisia and North region in Jordan tend to show).

As 2010's reform in Jordan introduced unemployment insurance and maternity benefit systems, we evaluate the program impact considering university graduates and women under 45 years old. We focused on these groups as long as the university graduates are more likely to fall in unemployment and women under 45 years are entitled to maternity benefits. The main results for these two groups indicate that the reform has a non-significant effect on labour market formalization.

Variable	Coefficient (Std. Err.)	Variable	Coefficient (Std. Err.)
time	0.005 (0.035)	Contract	0.265*** (0.023)
treated	0.025 (0.031)	Permanent job	0.147*** (0.018)
did	-0.027 (0.038)	Private sector	-0.105*** (0.023)
Year of birth	0.461** (0.228)	Urban	0.005 (0.019)
Year of birth ²	0.000** (0.000)	Man	0.072*** (0.017)
Other workers have SS	0.357*** (0.020)	Small-enterprise	-0.048** (0.021)
North West	-0.041 (0.027)	Married	0.040** (0.019)
Center East	-0.034 (0.021)	Intercept	-452.692** (225.306)
Center West	-0.039 (0.031)	N	1522
South East	-0.012 (0.029)	R ²	0.541
South West	-0.162*** (0.034)	F (18.1503)	98.241
		Significance levels :	* : 10% ** : 5% *** : 1%

Table 9: Effect of the reform on the probability of becoming formal. Results for Tunisia

Variable	Coefficient (Std. Err.)	Variable	Coefficient (Std. Err.)
time	-16.136 (893.150)	Permanent job	1.169*** (0.439)
treated	-14.505 (893.150)	Man	0.963** (0.405)
did	14.732 (893.150)	Private sector	-0.739* (0.445)
Age	0.439 (0.388)	Urban	0.248 (0.552)
Age ²	-0.007 (0.006)	Small enterprise	-1.309*** (0.454)
North west	1.560 (1.050)	Married	0.287 (0.463)
Center east	0.175 (0.514)	Intercept	8.446 (893.171)
Center west	-0.353 (0.955)		
South east	0.348 (0.667)	N	216
South west	0.665 (0.740)	Log-likelihood	-89.8
		χ^2 (16)	79.375

Significance levels : * : 10% ** : 5% *** : 1%

Table 10: Effect of the reform on the probability of becoming formal. Results for university graduates group in Tunisia

Variable	Coefficient (Std. Err.)	Variable	Coefficient (Std. Err.)
time	-0.293 (0.569)	Permanent job	1.342*** (0.272)
treated	0.246 (0.510)	Private sector	-1.093*** (0.288)
did	-0.296 (0.630)	Urban	1.341*** (0.296)
Age	0.376*** (0.141)	Small enterprise	-1.145*** (0.301)
Age ²	-0.005** (0.002)	Married	0.153 (0.265)
North west	-1.066** (0.437)	Intercept	-6.857*** (2.366)
Center east	-0.466 (0.292)		
Center west	-1.064** (0.518)	N	514
South east	0.056 (0.510)	Log-likelihood	-228.881
South west	-0.118 (0.493)	χ^2	239.652
		(15)	
		Significance levels :	* : 10% ** : 5% *** : 1%

Table 11: Effect of the reform on the probability of becoming formal. Results for women under 45 in Tunisia

Variable	Coefficient (Std. Err.)
time	-0.047 (0.051)
treated	0.127*** (0.038)
did	0.032 (0.053)
Year of birth	0.831*** (0.255)
Year of birth ²	0.000*** (0.000)
Permanent job	0.213*** (0.017)
Private sector	-0.129*** (0.015)
North	-0.040*** (0.015)
South	0.032* (0.018)
Man	-0.117*** (0.016)
Small enterprise	-0.412*** (0.017)
Married	0.006 (0.015)
Intercept	-822.243*** (252.346)
N	3936
R ²	0.343
F (12,3923)	170.481

Significance levels : * : 10% ** : 5% *** : 1%

Table 12: Effect of the reform on the probability of becoming formal. Results for Jordan

Variable	Coefficient (Std. Err.)
time	-1.152 (0.877)
treated	1.603*** (0.417)
did	0.776 (0.877)
Age	0.199* (0.114)
Age ²	-0.003* (0.002)
Permanent job	0.734*** (0.187)
Man	-0.506*** (0.147)
Private sector	-0.073 (0.157)
Small-enterprise	-1.527*** (0.181)
North	0.195 (0.168)
South	0.363* (0.208)
Married	0.189 (0.166)
Intercept	-3.369* (1.961)
<hr/>	
N	1474
Log-likelihood	-687.001
χ^2 (12)	251.
<hr/>	
Significance levels : * : 10% ** : 5% *** : 1%	

Table 13: Effect of the reform on the probability of becoming formal. Results for university graduates group in Jordan

Variable	Coefficient (Std. Err.)
time	-13.192 (735.460)
treated	2.296** (1.162)
did	13.085 (735.460)
Age	0.196 (0.135)
Age ²	-0.003 (0.002)
Permanent job	1.171*** (0.237)
Private sector	-0.239 (0.215)
Small-enterprise	-1.481*** (0.238)
North	-0.249 (0.219)
South	0.442 (0.288)
Married	0.455** (0.206)
Intercept	-4.997** (2.418)
N	805
χ^2 (12)	615.783

Significance levels : * : 10% ** : 5% *** : 1%

Table 14: Effect of the reform on the probability of becoming formal. Results for women under 45 in Jordan

4 Concluding remarks

Expanding the social security programs (pension, unemployment, maternity and health insurance) are effective mechanisms that reach out the workers outside the system (Winkler, 2017). However, these programs can become an implicit tax on formal jobs and reduce incentives to enroll for informal workers. In this paper, using data from Tunisian and Jordan Labor Market Panel Survey (TLMPS and JLMPS), we assess the impact of social security programs on informal employment. Two main programs were implemented in Jordan in 2010 and in Tunisia in 2004 with the objective to formalize informal workers. Our results suggest a non-significant effect of both reforms on formal employment and highlight that workers are more likely to get out informal employment as they advance in their career.

The informal economy is complex and multi-dimensional. The prominent presence of informal economic activity and low tax collection remain primary challenges in Tunisia and Jordan. As shown previously, the number of workers employed in the informal economy was estimated to reach 50.2% in North-Africa (40.2% in Tunisia, 40.7% in Algeria, 70.1% in Morocco)⁵ and 55% in the private wage sector in Jordan⁶. Extending social security coverage to workers in the informal sector is becoming crucial given their fragile socio-economic conditions (irregular income, frequent activities changes, absence of employer's participation, etc.). To expand the coverage of social security benefits, it is critical to adopt flexible and progressive approaches that take into account the conditions of workers in the informal economy. With regard to the transition from the informal to formal economy, the ILO (2015)⁷ highlights that "members should progressively extend the coverage of social insurance to those in the informal economy and, if necessary, adapt administrative procedures, benefits and contributions, taking into account their contributory capacity". Economic incentives have also to be considered. Indeed, it is impossible to design social insurance mechanisms and protect workers without changing economic incentives (Barr and Diamond, 2006). Reducing the time required to enroll in a social insurance scheme (Thornton and al. 2010), adopting new advances in technology (Holmes and Scott, 2016) and relying on local and financial agencies such as microfinance institutions (MFIs) can help workers formalization.

⁵Charmes J., Vers une résurgence de la préoccupation des pouvoirs publics à l'égard de l'économie informelle sur la rive sud de la Méditerranée in *Annuaire IEMed. de la Méditerranée*, 2015

⁶Assaad, R., The Structure and Evolution of Employment in Jordan. In *The Jordanian Labour*

Market in the New Millennium, edited by Ragui Assaad, 138. Oxford, UK: Oxford University Press, 2014.

⁷ILO, Recommendation No. 204, Article 19, ILO (2015)

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6 Appendix

Appendix A : Social security, 2004's and 2010's reforms

Tunisia has 7 social security schemes covering the majority of the working population :

- CNRPS for the workers in public sector
- CNSS-RSNA for the workers in the non-agricultural private sector
- RSAA for the workers in the agricultural sector with the exception of those employed for less than 45 days per quarter by the same employer
- RTNS for the self-employed workers in the non-agricultural sector
- RTNSA for the self-employed workers in the agricultural sector
- RTFR for the low-income workers
- PNAFN is a monthly cash-transfer program (180 TND) for the needy families
- AMG2 provides an access to low-cost care program in the public health system for the poorest families

The 2004's reform in Tunisia introduced a new system with the merger of the sickness benefit programs of the various social security schemes into a new unified scheme. The new scheme provides the same benefits to insured. The new system ensures greater coherence between basic statutory cover and the various other forms of supplementary schemes and covers workers from both the public and private sectors, as well as their families, through a system combining fixed fee and health vouchers. The basic health insurance scheme is financed by contributions, levied at a rate of 6.75% of salary or income. Of these, 4% are paid by the employer and 2.75% by the employee insured. Self-employed persons pay the whole contribution themselves and pensioners pay 4%.

The 2010's reform in Jordan introduced two new systems which were implemented in 2011. First, an unemployment insurance which covers all workers subject to the rules of the Labour Law regardless of their sex or nationalities ranging between (16-60) years old for males and (16-55) for females, as well as public employees

not subject to civil or military retirement law, and Jordanians employed at foreign political, military or international missions in Jordan. Monthly contributions apportioned by the employer of 0.5% of the insureds' wages and monthly contributions deducted by the employer of 1% of insureds' wages are the financial resources for this unemployment insurance.

The second system is a maternity benefit through a 0.75% payroll contribution paid by the employer on behalf of both male and female employees. All employees between (16-60) years old for males and (16-55) for females are covered. Self-employed persons are excluded from the coverage.

Appendix B :

Production units by type	Jobs by status in employment									
	Own-account workers		Employers		Contributing family workers	Employees		Members of producers' cooperatives		
	Informal	Formal	Informal	Formal	Informal	Informal	Formal	Informal	Formal	
Formal sector enterprises					1	2				
Informal sector enterprises ^(b)	3		4		5	6	7	8		
Households ^(c)	9					10				

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Notes

(a) Cells shaded in dark grey refer to jobs, which by definition do not exist in the type of production unit in question. Cells shaded in light grey refer to formal jobs. Unshaded cells represent the various types of informal jobs.

(b) As defined by the 15th ICLS resolution (excluding households employing paid domestic workers).

(c) Households producing goods exclusively for their own final use and households employing paid domestic workers.

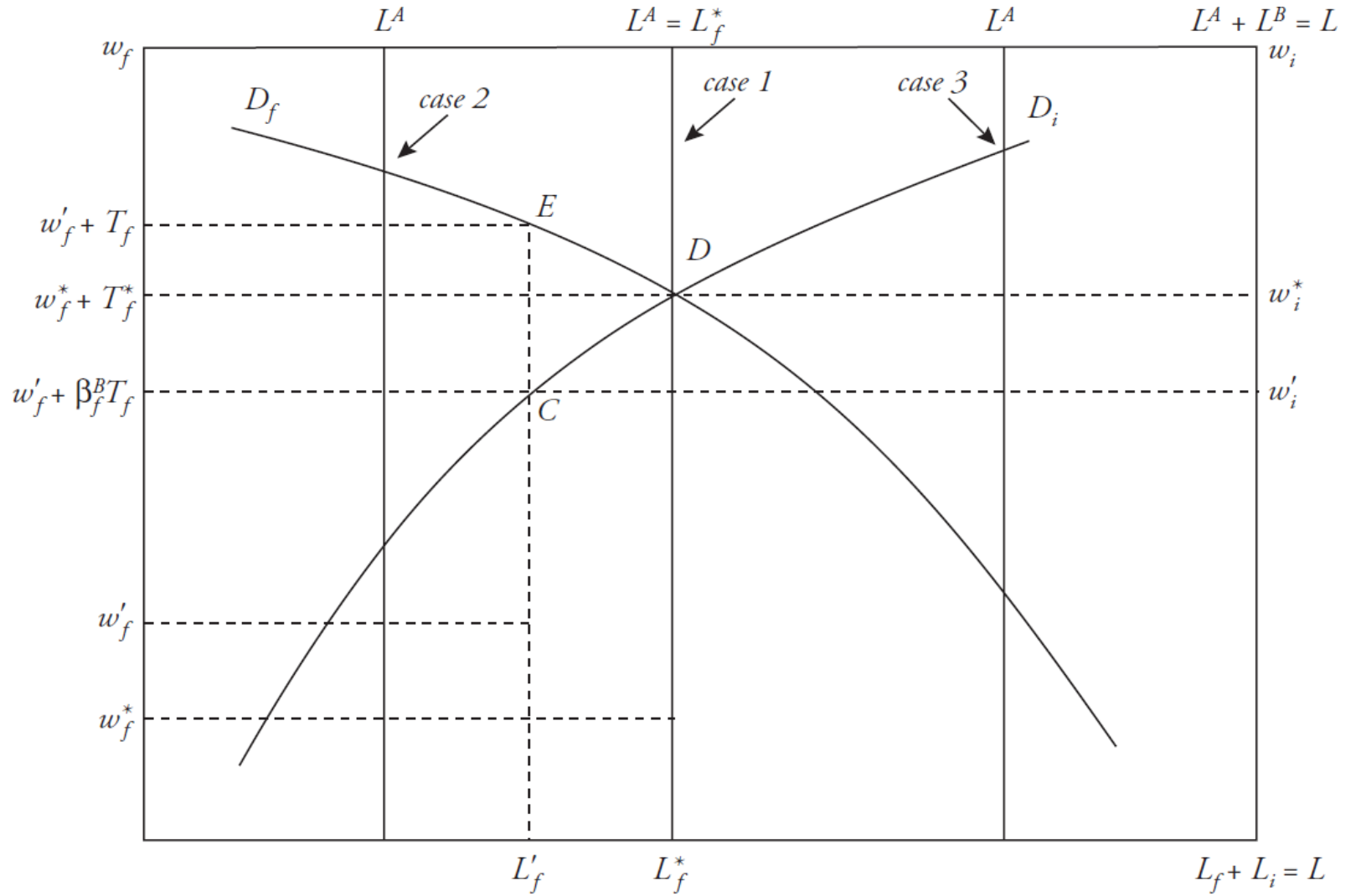
Informal employment: Cells 1 to 6 and 8 to 10.

Employment in the informal sector: Cells 3 to 8.

Informal employment outside the informal sector: Cells 1, 2, 9 and 10.

Figure 6: Conceptual framework for informal employment (ILO,2013)

Appendix C :



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Figure 7: Equilibrium in the Labor Market with Differences in Workers Social Security Valuation (Levy, 2008)

Appendix D :

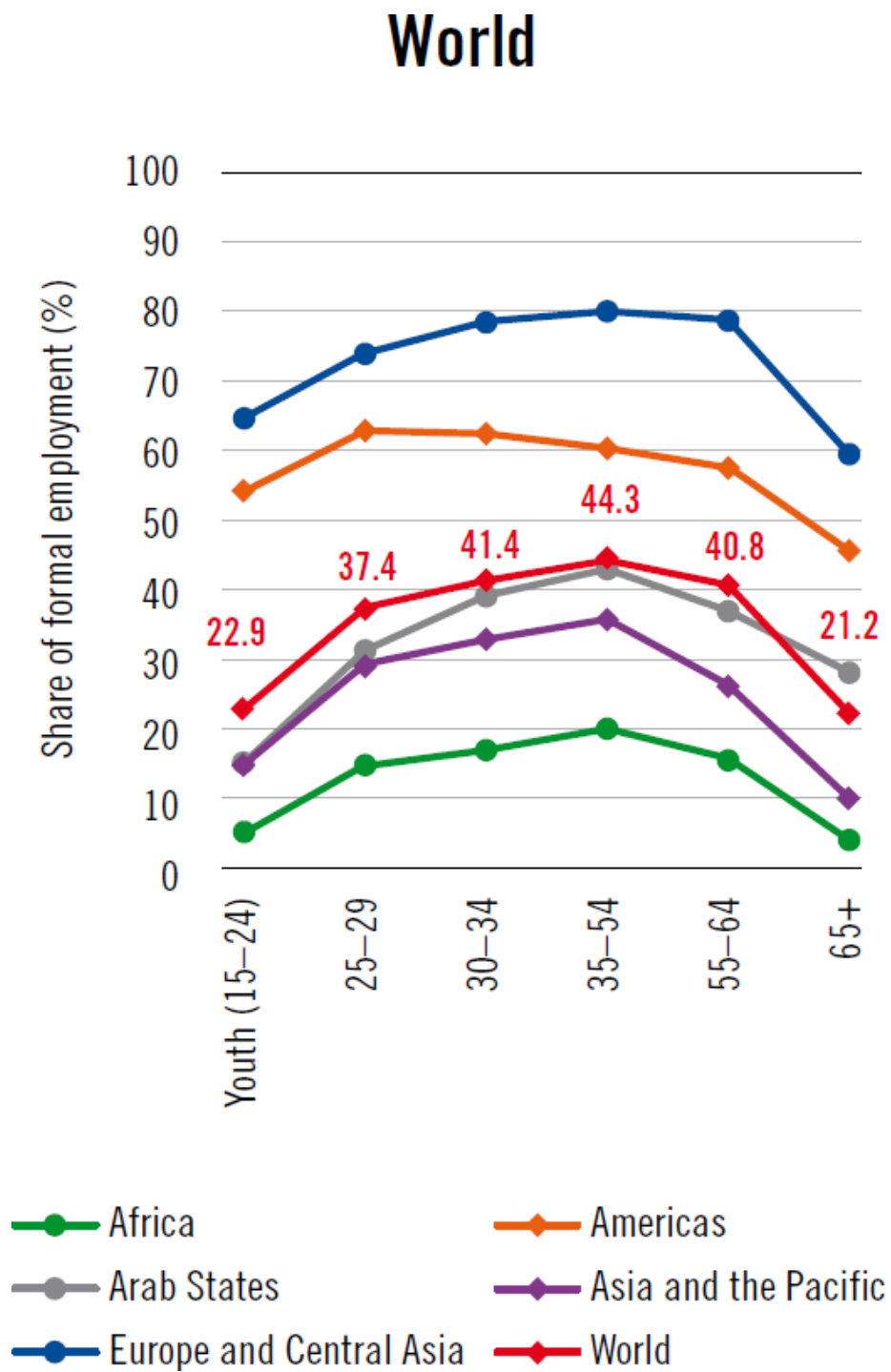


Figure 8: Share of formal employment in total employment by age(ILO, 2018)