Inequality and Growth in Tunisia: Empirical evidence on the role of macroeconomic factors

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Abstract

The purpose of this paper is to explore the relationships between income inequality, economic growth and the main macroeconomic factors in Tunisia. We investigate two effects: the effect of inequality on growth, and particularly, the effect of growth on inequality. Also, attention has been focused on the role of the monetary policy, via introducing money supply as an independent variable, in affecting inequality and growth. Our empirical study is based on a series of annual data from 1975 to 2015 using the Dynamic Ordinary Least Squares (DOLS) method in order to estimate the cointegrating equations. The findings of the paper show that income inequality increase economic growth in Tunisia. Other factors having significant positive effect on economic growth include money supply and life expectancy at birth. However, inflation rate, primary education and unemployment have statistically significant and negative effect on economic growth. On the other hand, the results indicate that money supply, inflation rate, unemployment and savings are positively and significantly related to income inequality, whereas, life expectancy at birth and gross fixed capital formation decrease inequality in Tunisia. The policy implications of these results are discussed.

Keywords: Income Inequality; Economic Growth; Tunisia, Money Supply; Education; Unemployment; Health

JEL-Codes: C32, E52, I24, I14, O2

1. Introduction

Before its 2011 Jasmine revolution, Tunisia had showed its economic growth and macroeconomic performance, and was a success story in North Africa and the Middle East (MENA). Tunisia has built its growth strategy in potential sectors such as health, education, banking system, industry, trade, transport and infrastructure. It has achieved a relatively high average economic growth rate nearly 5% during the last decade. It has kept its inflation rates under control thanks to cautious monetary policy, reached at 2.4% in 2005 against 4.9% in 2015.

Moreover, Tunisia is always an example of a developing country which invested in education since the independence. It has a great deal to provide a free education for all in order to improve the economic well-being of the society and ameliorate the human capital. In 2015, the gross enrollment rate in primary education was 114.17% for both girls and boys combined highlighting that the country has achieved near universal primary education, as a key United Nation Millenium Development Goal.

According to the World Health Organisation, life expectancy at birth in Tunisia is among the highest in Africa and the Near East; it was reached at 74.97 years in 2015 against 56.79 years in 1975. This implies that Tunisia's health sector is characterized by a relatively balanced geographical distribution of public infrastructure, in primary and secondary health system, as well as by a dynamic private healthcare sector. Also, financial protection channels in health are well developed and cover over 80% of the population.

In addition, the country had a favorable attitude toward local and foreign direct investment and is working to create a favorable and certain climate and encourage investment in the interior regions. In this context, Gross fixed capital formation is the third driver of growth in Tunisia with a 26.71% contribution to GDP in 2010 against 21.64% in 2015. The public sector still insufficient to stimulate investment, thereafter, government has integrated a several policy reforms to improve the economic role of the private sector.

However, Unemployment rates are relatively high, it were reached 15% in 2015 against 16,1% in 1995 and 12,8% in 2005. Besides, Poverty rate has largely decreased but still high,

it went down from 23,1% in 2005 to 15,2% in 2015. In this way, Tunisia has attached a great deal of importance to facing a structural unemployment crisis and poverty problems for the past two decades, characterized with higher unemployment rate, especially among university graduates and an increase in the poverty rates.

Also, inequalities between the different regions of the country have intensified over time, reflecting major regional imbalances between the inland governorates and the coastal governorates, which triggered the Revolt of 11 January 2011. Indeed, Tunisian people are starting talking about the question of regional inequalities just after the revolution due to dictatorchip on the top of the state. Inequality has decreased since the 1995s, but remains high, leading the Gini index to hover around 30,9 in 2015, against 37,73 in 2005 and 41.66 in 1995 (Figure1).

Figure1: Gini Index in Tunisia, 1975-2015
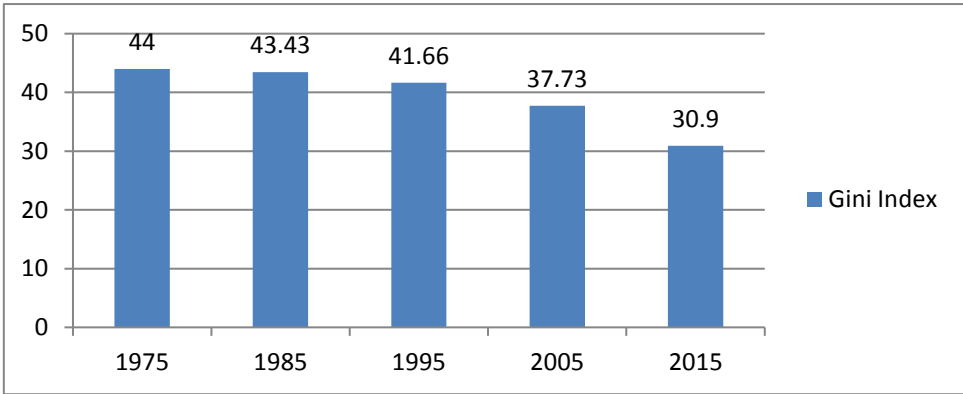
Source: World Bank, National Institute of Statistics. Own computation.

Fighting regional inequalities and ensuring the proper sharing of the economic growth's benefits still presents a challenge for Tunisian governments after the revolution of January 11, 2011. Southern and interior regions are the most affected of inequalities and are the first to revolt against the old regime. Regional disparities have produced social tensions that are transformed into a revolt movement.

Tunisia realized a great successful fight against gender inequalities just after the independence; the legislation allows fundamental rights to Tunisian women and children[1] (Decreed in August, 13th, 1956) came into effect (January, 1st, 1957). Unfortunately, Tunisian governments couldn't find a solution to regional and socio economic inequalities. Regional inequality is still a major challenge in Tunisia for some decades.

In this way, economic literature is mainly focusing on how inequality affects economic growth. However, it will be very interesting to explore the effect of growth on inequality because this topic has gained less attention in the empirical studies than the reverse relation. Moreover, this paper tries to answer to the following questions: what's the impact of monetary policy on inequality and economic growth in Tunisia? Do macroeconomic factors, such as unemployment, inflation, savings, real GDP per capita and others, affects inequality in Tunisia?

The purpose of this study is to investigate empirically the main factors causing inequality in Tunisia and its consequences on the country's economic performance, using the Gini index as a mesure of the income inequality. Also, our goal is to study the effect of inequality and macroeconomic series, such as unemployment, inflation, savings and others, on economic growth. To our knowledge, this paper represents the first attempts to introduce the money supply, as an independent variable, to explore the impact of the monetary policy on inequality and growth.

The rest of the paper is organized as follows. Section 2 presents a review of the related literature on the interactions between inequality, growth and macroeconomic factors. Section 3 outlines the data description and empirical strategy. Section 4 presents and analyzes the empirical results. The last section summarizes the main conclusions reached.

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[1] Civil rights such as : woman can travel abroad without the consent of her father or husband, criminalizing rape and violence against women and children, right of children custody guardianship, Tunisian Democratic Women Association (ATFD) and some activists in civil society.

2. Literature review

The implementation of a development strategy in a given country is based on the relationship between three main objectives of economic policy: economic growth, poverty reduction and income distribution. In this way, the links between poverty-growth, poverty-inequality and growth-inequality have always been the subject of several research studies attempted to clarify the development debate. Bourguignon (2004) suggest that development strategy, within a population, is totally functioning of economic growth rate and income inequality. So, he stated that poverty reduction reside more in the interaction between distribution and growth than in the relationships between poverty-growth and poverty-inequality.

From a theoretical point of view, Kuznets (1955) investigates the theoretical starting point of the relation between the inequality and the growth via the Kuznets curve. He suggests that in the long run, modern economic growth would generate an early industrialization phase of rising inequality, followed by a mature industrialization phase of declining inequality. On the other hand, Kaldor (1957) presented an economic model in which the marginal propensity to save would be higher among the rich than the poor. Considering the income distribution between profits and wages, profit holders tend to save more of their income than employees. As a result, higher income inequality increases the saving and improves the capital accumulation, thereby fostering the economic growth. According to Kaldor, assuming a positive correlation between GDP growth rate and national saving, unequal economic growth would then be faster. In the same way, according to D'Arvisenet (2015), inequality could be considered as a favorable factor for growth, as it stimulates the incitement to work, to save and to invest. Barro (2000) conclude that inequality reduces (increases) growth in the initial phase (the stable phase) of economic development. Also, he finds a positive relationship between growth and investment and no evidence link between investment and income inequality.

As for the relationship between inequality and growth, it has been the subject of an important debate in the economic literature because it is not defined in the same way by all authors. There is a vast literature focusing on the effect of income inequality and redistribution on economic growth but a few empirical studies explore the reverse relationship. In this way, a large body of econometric evidence has been dedicated to the analysis of this effect which can be positive or negative, taking into consideration the trends of macroeconomic factors. In this context, Attanasio and Binelli (2004) studied the main contributions related to the impact

of non-equal resources distribution on development process, highlighting some implications for redistribution policies. According to them, income inequality reinforces growth through three arguments: individual savings based on Kaldor hypothesis, incentive to invest and considerations of workers' motivation. However, income inequality reduces growth prospects through three channels: social and political instability, fiscal policy and capital accumulation in presence of imperfect credit markets and inefficiency of financial markets. According to Barro (2000), the effect of income inequality on growth can be positive or negative depending on the level of economic development of the country. In addition, Sbaouelgi and Boulila (2013) examine the causality between income inequality and economic growth in a bivariate VAR structure for nine countries of MENA region over the period 1960-2011. Their findings indicate that a long-run relationship between income inequality indicators and growth exist where cointegration is detected in the case of Iran, Israel, Morocco, Tunisia and Turkey. They find that in the cases of Iran, Israel, Tunisia and Morocco, the effect of income inequality on long-run growth is positive. Moreover, they find a positive effect of growth on income inequality for Iran and Tunisia, and a negative effect for Morocco and Turkey. Using Granger causality tests, their results indicate that evidence was found of bidirectional causality and causality from growth to inequality. Using the Granger pair-wise causality tests, Ogbeide and Agu (2015) examine the causal relationship between inequality and poverty in Nigeria for the period 1980 to 2010. Their findings indicate that there is a feedback causality effect between inequality and poverty in Nigeria. They find that unemployment and life expectancy rate causes inequality while there is no causality between poverty and unemployment in Nigeria.

According to Bourguignon (2004), poverty reduction is an objective of development through growth strategies, determined by the average income growth rate, and distributive policies, determined by changes in the income distribution. He stressed that gradual income redistribution strategy for a certain time accelerates poverty reduction and stimulates growth by providing economic policy instruments to ensure that this growth benefit the poor than the rich. In addition, Bourguignon considers that redistribution must focus on wealth rather than current income or consumer spending in order to stimulate growth and economy efficiency in favor of disadvantaged groups. Ravallion (1997) finds empirical evidence for a positive relationship between inequality and poverty despite seemingly favorable growth prospects for 23 developing countries. Moreover, Sboui (2012) evaluates the effects of growth and inequality on the dynamics of poverty in Tunisia from 1985 to 2005. The results show that the

reduction of poverty in Tunisia is mainly due to economic growth. He concluded that changes in inequality that accompanied the process of growth have never been strictly pro-poor in this country. Ncube et al. (2013) analyze the patterns of inequality and investigate the effect of income inequality on economic growth and poverty in the MENA region using a cross-sectional data for the period 1985-2009. Their empirical results show that income inequality reduces economic growth and increases poverty in the region.

On the relationship between inequality and other macroeconomic variables, Parker (1999) finds positive correlations between unemployment and income inequality. However, he supports a modest inverse relationship between inflation and inequality. In this context, Using a Panel System GMM estimation, Yannick and Ekobena (2014) find a positive correlation between unemployment and inequality for the United States and the countries of the Economic and monetary Community of Central Africa (EMCCA). Also, they conclude that monetary policy shocks can reduce significantly the inequality via an increase in the interest rate in the countries of the EMCCA. On the other hand, Maestri and Roventini (2013) conclude that unemployment is negatively correlated with consumption inequality. Also, they find a negative correlation between inflation, share prices and inequality and a positive correlation between private consumption and consumption inequality, also, there are no long run equilibrium relationships between inequality and most macroeconomic series. Amaral (2017) presents the main channels between monetary policy and inequality by reviewing the inflation tax channel, savings redistribution channel, interest rate exposure channel, earning heterogeneity channel and income composition channel.

3. Data description and empirical strategy

Our approach consists in investigating empirically the relationships between inequality and economic growth in Tunisia. In addition, this paper contributes to the literature by testing the impact of the macroeconomic series (e.g unemployment, investment, saving, ect) on inequality with a special focus on the relationship between monetary policy and inequality using the Dynamic Ordinary Least Squares (DOLS) estimator developed by Stock and Watson (1993).

The data sources are the World Development Indicators (WDI) of the World Bank and the World Institute for Development Economics Research (WIDER) and The National Institute of Statistics.

We use annual data covering 1975 – 2015. We will estimate the effect of inequality on growth and the reverse relationship using a semi-logarithmic linear specification taking the following forms:

$$\ln Y_t = \alpha_0 + \alpha_1 \ln INEQ_t + \alpha_2 \ln RM2_t + \alpha_3 \pi_t + \alpha_4 \ln HEAL_t + \alpha_5 \ln EDUC_t + \alpha_6 \ln INVES_t + \alpha_7 \ln SAV_t + \alpha_8 U_t + \varepsilon_t \qquad (Eq1)$$

$$\ln INEQ_t = \alpha_0 + \alpha_1 \ln Y_t + \alpha_2 \ln RM2_t + \alpha_3 \pi_t + \alpha_4 \ln HEAL_t + \alpha_5 \ln EDUC_t + \alpha_6 \ln INVES_t + \alpha_7 \ln SAV_t + \alpha_8 U_t + \varepsilon_t \qquad (Eq2)$$

Where Y is the growth rate of GDP per capita, INEQ is the income inequality measured by the Gini index, RM2 is the real money stock, π is the rate of inflation, HEAL is the life expectancy at birth indicating the number of years, EDUC is the gross primary school enrollment ratio, INVES is the gross fixed capital formation as a % of GDP, SAV is the gross saving as a % of GDP, U is the unemployment rate. Also, α_0, α_1, α_2, α_3, α_4, α_5, α_6, α_7 and α_8 are the coefficients to be estimated and ε_t is the error term. The error term represents the influence of the omitted variables in the construction of the data.

Our empirical study is divided in three steps. The first step is to test the degree of integration of the variables using the unit roots tests applying the technique of Augmented Dickey-Fuller (ADF). The second step is to check for cointegration in order to verify the presence of a long-run relation between the variables using the Johanson cointegration tests. Finally, the third step is to estimate a stable long-run equilibrium relationship between inequality and growth using the Dynamic Ordinary Least Squares (DOLS) estimator.

4. Empirical results

Test for stationarity

Table 1 reports unit root tests in order to assess the time series properties of the data. The Augmented Dickey Fuller (ADF) test rejects the null hypothesis of non stationarity at the 1 % and 5% level. The results of the test with constant only indicate that all series are integrated

I(1), implying that they are non stationary in levels but stationary in first differences. So a cointegration vector may be estimated.

Table1. Unit root results using ADF test

	Levels	**First difference**
Variables	**Test statistic**	**Test statistic**
lnY	-1.967509	-7.559348***
lnINEQ	0.209053	-5.139999***
lnRM2	-1.883115	-6.398902***
π	-2.372205	-11.20634***
lnHEAL	-1.193746	-5.600028***
lnEDUC	-1.661353	-3.284577**
lnINVES	-0.605555	-8.700983***
lnSAV	-0.315873	-8.008888***
U	-1.780449	-7.455612***

H_0 is that the variable has a unit root. *** , ** and * denote rejection of the null hypothesis at the 1%, 5% and 10% significance level.

Since the time series of the variables are integrated of order one i.e. I (1), they would be tested for the existence of a long run relationship. The next step is to study the cointegration tests between inequality, economic growth, monetary policy and the other variables.   The computations are based on the Johansen maximum likelihood procedure to determine the number of cointegration vectors in the regression.

Table 3 shows a strong evidence for at least one cointegrating relation in the (lnY, lnINEQ, lnRM2,π, lnHEAL, lnEDUC , lnINVES, lnSAV and U) system at the 5 % level of significance. The existence of a long run relationship between the variables was assessed using three lags[2]. The null hypothesis of no cointegration based on both the maximum eigenvalue and the trace tests between the variables is rejected at a (5%) level of significance, it also shows that we can't reject the hypothesis of eight cointegrating vectors. According to Granger (1988), the existence of cointegration between the variables under consideration suggests that there is a long run equilibrium relationship between inequality, economic growth, monetary policy and the other variables, and that there exists causality in at least one direction between the variables.

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[2] The Akaike Information Criterion was used to determine the lag length of the VAR model.

Table2. Cointegration test results

Hypothesis on the number of cointegrating vectors	Trace Statistic		max –eigenvalue statistic	
	Test statistic	CV** 5%	Test statistic	CV 5%
r=0	463.8773*	197.3709	147.6301*	58.43354
r<=1	316.2472*	159.5297	100.1902*	52.36261
r<=2	216.0571*	125.6154	64.75248*	46.23142
r<=3	151.3046*	95.75366	53.27792*	40.07757
r<=4	98.02666*	69.81889	36.94564*	33.87687
r<=5	61.08102*	47.85613	23.48765*	27.58434
r<=6	37.59337*	29.79707	21.19349*	21.13162
r<=7	16.39988*	15.49471	11.75181*	14.26460
r<=8	4.648070*	3.841466	4.648070*	3.841466

Note: r is the number of cointegrating vectors.

* denotes rejection of the hypothesis at the 5% level. CV is the critical value

Table 3 indicates the estimation results of the long run relationships between inequality, growth and macroeconomic series in Tunisia, highlighting the monetary policy effects' on inequality using the Dynamic Ordinary Least Squares (DOLS) method. So, the existence of a long-run relationship between variables shows that there is a causal relation, but it doesn't address its direction.

In equation (1), the results implies that there is a positive relationship between inequality, mesured by the Gini Index, and the growth rate of GDP per capita in Tunisia. The estimated coefficient (3,42) is significant with a high magnitude indicating that higher inequality is associated with greater economic growth. This stimulating effect of the income inequality on growth may be explained by the unequal wealth distribution's effects and the process of growth which is not pro-poor in Tunisia. This means that a certain resource concentration allows a fraction of the population, especially in coated regions, to accumulate wealth and create a wealth concentration causing a successful economic development to the detriment of the poor regions.

Table3. Long run estimations using DOLS method

Eq(1)			Dependant variable : lnY					
lnINEQ	lnRM2	π	lnHEAL	lnEDUC	lnINVES	lnSAV	U	C
3.420 (5.106)***	0.583 (5.017)***	-1.734 (-2.055)*	10.416 (5.278)***	-3.026 (-6.719)***	0.040 (0.839)	0.038 (0.283)	-17.226 (-5.726)***	-37.159 (-4.184)***
Eq(2)			Dependant variable : lnINEQ					
lnY	lnRM2	π	lnHEAL	lnEDUC	lnINVES	lnSAV	U	C
-0.071 (-0.299)	0.124 (4.239)***	0.473 (3.339)***	-2.090 (-5.409)***	0.024 (0.129)	-0.042 (-5.459)***	0.251 (5.653)***	5.802 (9.017)***	11.325 (4.766)***

t-ratios are in the parentheses, ***, **, * indicates significance at 1, 5, 10 percent level, respectively.

Another finding is that money supply, introduced to present the monetary policy, is positively and significantly correlated to economic growth in Tunisia. An expansionary monetary policy, which leads to an increase in money supply, results in lowered nominal interest rate. This allows an improvement of investment, and therefore, enhances the economic activities as well as the growth rate of GDP per capita. Moreover, there is a statistically significant negative relationship between inflation rate and growth rate of GDP per capita. This means that an increase in inflation rate will slow down economic performance while a low rate of inflation is good for economic growth. In addition, we find that higher life expectancy at birth increases the economic growth. This result indicates that a rise in life expectancy, which leads to reduce the mortality rate and improve the population growth and the human capital dynamics, may provide a better education and better conditions for economic development in Tunisia.

The gross primary school enrollment ratio is negatively related to economic growth, and is insufficient alone to accelerate the growth rate of GDP per capita in Tunisia. The effect of the gross fixed capital formation, as a net investment measure, is insignificant and positive on economic growth. The level of savings is a major factor impacting the economic growth. In Tunisia, there is a positive and insignificant relationship between saving and growth rate of GDP per capita. Our results indicate that the unemployment rate is statistically significant and negatively highly correlated with Tunisia's economic growth. Tunisia has a strong

unemployment rate, particularly among university graduates, due to imbalance between supply and demand in labor market, which create a mismatch between higher education and needs in private and public sectors. This implies that economic growth reacts negatively when the labor market weakens.

Equation (2) indicates the estimation results of the effects of economic growth, macroeconomic series and monetary policy on inequality income. The results show that the effect of the growth rate of GDP per capita is negative and not significant on inequality.

Our results indicate also that money supply is significant and positively correlated to inequality in Tunisia. An expansionary monetary policy may lead to an increase in asset price and inflation, which results a higher income inequality. The gross primary school enrollment ratio is insignificant and positively related to inequality. The effect of the gross fixed capital formation is significant and negative on inequality. This result suggests that investment in many industrial sectors, especially in Tunisian interiors regions, may reduce inequality.

In Tunisia, there is a positive and significant relationship between saving and inequality through the positive effect of savings on investment and capital accumulation centralized in Tunisian coasted regions, which boost inequality. Also, empirical results show that inflation is significant and positively correlated to inequality. That means that inflation weakens the household's purchasing power especially for low income households than high income households. On the other hand, the effect of unemployment on inequality is positive and statistically significant. This implies that unemployment aggravates inequalities in Tunisia. Moreover, we find that life expectancy at birth decrease inequality. Tunisia's health care system provides an extensive network of public hospitals and health centers to develop the population health in the 24 governments, which reduce inequality.

5. Conclusion and policy recommendations

The main purpose of this paper is to study the relationships between income inequality, economic growth and macroeconomic factors in Tunisia. We investigate two effects: the effect of inequality on growth, and particularly, the effect of growth on inequality. Also, attention has been focused on the role of the monetary policy, via introducing money supply as an independent variable, in affecting inequality. Our main findings are obtained through

using the Dynamic Ordinary Least Squares (DOLS) method to estimate the long run relationships between the variables.

About the effect of inequality on growth, empirical results imply that stimulating effect of income inequality on growth in Tunisia may be explained by the process of growth which is not pro-poor in Tunisia. This means that a certain resource concentration allows a fraction of the population to accumulate wealth causing a successful economic development. Another finding is that an increase in money supply, results in lowered nominal interest rate, which improves the investment, and therefore, enhances the economic activities as well as the growth rate of GDP per capita. Moreover, we found that inflation rate and primary education are negatively related to economic growth. Our results show that economic growth reacts negatively when strong unemployment rate, particularly among youth, because there is an imbalance between supply and demand in labor market, which creates a mismatch between higher education and needs in private and public sectors. In addition, we find that higher life expectancy at birth increase the economic growth.

This study conducts an empirical analysis on effects of growth, macroeconomic series and monetary policy on inequality. Our findings indicate that economic growth does not affect income inequality in Tunisia. Moreover, the results indicate that an expansionary monetary policy, via an increase in money supply, may lead to an increase in asset price and inflation, which leads to a higher income inequality. Also, this paper showed that savings, inflation and unemployment rate are positively correlated to inequality. In addition, gross fixed capital formation and life expectancy at birth decrease the income inequality in Tunisia.

These findings point to some key policy recommendations for fighting inequality and unemployment reduction growth in Tunisia. First, after the revolution and in the framework of the Tunisia's 2014, Tunisian governments adopts a positive discrimination programs for poor and interiors regions in order to tackle problems related to unemployment, poverty and regional disparities. So, a development funds allocated to provide employment opportunities and encourage thousands of unemployed to create their proper projects, especially from interior regions, particularly Gafsa, Kasserine, Medenine, Sidi Bouzid, Siliana, Beja, El Kef and Jendouba. Tunisia needs to improve basic infrastructure in interior region to attract foreign direct investment via national development strategies at a regional level in order to reduce unemployment.

Second, inflation rate increase inequality in Tunisia. After the revolution, the inflation rate stood at 5,3 % in 2012 and 4,9% in 2015, against 3,3% in 2010, indicate the latest statistics published by the National Institute of Statistics (INS). Inflation may weakens purchasing power of the consumer of Tunisian due to the increase of the price for all products, especially consumer products and usual recent increase of petroleum products, which aggravate more the social instability, the protests and the sit-ins in the country. So, the Tunisian policymakers need to control inflation through a better management of monetary and fiscal policies in order to protect the purchasing power of the Tunisian people.

Third, an expansionary monetary policy, via an increase in money supply, allows to a higher income inequality in Tunisia. Since post-revolution, monetary growth is associated with a surge in labour wages in public and private sectors, which increase the asset price and cause inflation, this leads to improve inequality.

The problem of unemployment in Tunisia is rather complex to overcome. Tunisia needs to develop job creation and entrepreneurship via strategically actions such as: improvement of work experience courses, support programs for employment and creation of income's sources, aid and financing funds and regional development programs.

Finally, after the political wake of 2011 revolution, the Tunisian government needs to engage in more active production sector and labour market policies that enable economic growth, which in turn triggers a permanent redistribution schemes, it looks necessary to control the level of inequality in a transition economy.

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