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# Indirect Taxes, Social Expenditures and Poverty: What Linkage?

*Dolaylı Vergiler, Sosyal Harcamalar ve Fakirlik: Nasıl Bir İlişki Olabilir?*

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**ABSTRACT**

We shed light into the empirical relationship between social expenditures and poverty for Turkey over the period 1975-2005. We estimate first a series for the headcount index which is not exactly known due to measurement problems in countries such as Turkey, where the degree of unrecorded economy is higher. For this purpose, employing Kalman filter technique, we use social expenditures, public income and interest payments in our model. Then, cointegration analysis is used to investigate the relationship between the estimated headcount index and the share of indirect taxes in the total tax income. The study concludes that: first, the portion of poor population increases and it reaches 17.6 percent in 2005; second, social expenditures increase thanks to the rise in public income which is realized by the relative increase in the share of indirect taxes in total tax revenues. This policy impedes in the long run poverty reduction; and third, the increase in this share leads to a higher headcount index.

**Keywords:** Poverty, taxation, kalman filter, Turkey

**ÖZET**

Bu çalışmamiz 1975-2005 zaman dilimi dahilinde Türkiye'deki sosyal harcamalar ve fakirlik arasındaki ampirik ilişkiyi incelemektedir. Bu inceleme için standart olmayan bir metot kullanmayı tercih ettik. Öncelikle Türkiye'deki kayıtdışı ekonomi gözönüne alındığında ölçme problemleri yaşanılan kişibaşı endeksini veren zaman serisini kestirdik.Bu kestirimi yapabilmek için Kalman Filtresi tekniğini temel alarak, sosyal harcamalar, kamu gelirleri ve kamu borç stoğu faiz ödemeleri serilerinin veri kabul edildiği bir stokastik denklem takımını kullandık. Birim kök analizi neticesinde birinci derece bütünleşik olduğuna karar verdiğimiz bu serilerin yardımı ile yine birinci derece bütünleşik seri olduğunu kestirdiğimiz kişibaşı endeks serisi ve dolaylı vergilerin toplam vergiler içindeki payını veren birinci derece bütünleşik seri arasında ilişki olup olmadığını inceledik. Bu inceleme için eş-bütünleme testlerini kullandık. Çalışmalarımız neticesinde, fakir nüfusun oranının artarak 2005 yılı itibarı ile %17,6 ya ulaştığını, sosyal harcamaların da kamu gelirlerine ve dolaylı vergilerin payına paralel biçimde arttığını gözlemledik. Söz konusu zaman dilimdeki politikaların fakirliği azaltmada yeterince etkili olamadığı ve dolaylı vergilerdeki artışın bu etkinliği azalttığı sonucuna vardık.

**Anahtar Kelimeler:** Yoksulluk, vergilendirme, kalman filtresi, Türkiye

## 1. INTRODUCTION

Recent observations show that in contrast to the 70's and 80's, at the last two decades there has been no decline in the share of public social expenditures in GDP in developed countries (Pierson 1996: Gray 2004). Likewise, in the last decade we observe that the social policies in developing countries, which were omitted in previous periods, are now revisited and adopted more seriously. In spite of the country-based socio-economic structures leading social policy variations across those countries with different welfare-levels, the literature reports that a new welfare management perspective has recently emerged (Jessop, 1999;Bode, 2006;Tendler, 2004). This common perspective represents redistributive strategies followed by the governments through diverse partnerships between the governmental and non-governmental organizations in the provision of social care and public services.

The new welfare management perspective mostly influenced the social policies implemented in less developed countries where the role of the public sector in welfare provision has been recently recovered. The adoption of new policy perspectives does not address the consolidation of citizenship rights. Instead, they mainly focus on managing the limits of socio-economic insecurity determined by the social exclusion through the growing market relations. This observation is of particular significance for our analysis of the changing social policy environment in Turkey over the post-liberalization period.

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A first step towards managing the growth of poverty and reducing social risks arising from social exclusion requires to first identify and then measure them. We add to this literature by measuring the "accurate" share of poor population, which reveals the dynamics of social exclusion in Turkey from the period 1975 to 2005. To do this we provide a simple method based on the "announced" poverty level, which can be adopted to any other country by taking into account country-specific structue of public social expenditures.

As the main intention of development programmes implemented by governments and other governmental or non-governmental organizations is to reduce poverty, the efficiency of such programmes should be observed by measuring periodically the share of poor population in the country population. Especially in developing countries, this share is not known exactly and inconsistent estimations have been made, therefore, a policy maker should confront two difficulties: first, choosing an appropriate measure given this inconsistency; second, determining and implementing effective macroeconomic and social policies.

## 2. THEORETICAL FRAMEWORK AND LITERATURE REVIEW

Before we discuss our theoretical framework let us quote from a policy note published by OECD: "What ultimately matters for people is their income after taxes and transfers, which largely frames their consumption possibilities. The best and most comprehensive available income measure is household disposable income that has been adjusted for household size and for publicly-provided in-kind transfers, such as public spending on education and health care. This income concept which should ideally be adjusted to take indirect taxes into account is shaped by various factors" (OECD, 2012:3).

Following Atkinson (1977) we define the direct taxes as those that are adjusted to the individual characteristics of the taxpayer and as indirect taxes that are levied on transactions irrespective of the circumstances of buyer and seller.

The general presumption is that broader vertical equity and more equal income distributions need a more progressive tax system, implying that progressive direct taxes would be relatively more important than indirect taxes which are typically regressive in tax systems (Martinez-Vazquez et al., 2010). This perspective is pointed out by some authors. Based on the cross-country data from 1981 to 2002, Weller (2007) report positive effects of progressive taxation on income distribution. Similarly, Li and Sarte (2004) report that the Tax Reform Act (TRA) of 1986 in the U.S.A increased the progressivity and generated a significant effect on income inequality. The authors find that TRA results with a 20-to-24 % increase in the Gini coefficient of income. In a recent study, Duncan and Peter (2008) analyse the effects of the structural progressivity of national income tax systems on income inequality. The authors find that progressivity reduces observed inequality in both gross and net income. In the 80s, in order to open up their domestic markets to world trade Turkey and other developing countries have cut most trade taxes. Moreover to support private investment these countries decreased the share of direct taxes in the total tax revenues. Emran and Stiglitz (2005) report that those governments overwhelmingly used indirect taxes to compensate the tax revenue loss arisen from these liberalization policies. Albayrak (2010) report that these tax policies in the Turkish post-liberalization period result with greater and persistent increase in indirect taxes, achieving the largest share in total tax revenues (over 60%). The indirect taxes are known to be mostly borne by poor population, therefore the redistributive impact of these taxes is generally regressive. While the indirect taxes reduce expenditure inequality, they increase income inequality in Turkey (Albayrak, 2010).

Before we discuss the methods used for the measurement of poverty, we should note that different criteria have been used in the definition of poverty. The share of population that is unable to meet basic nutritional needs, physical (like food, shelter, health care or education) or nonphysical (like identity) requirements can be categorized as poor.[1] Recently awarded by Nobel Prize in economics, Amartya Sen (1976:219) indicates: "In the measurement of poverty two distinct problems must be faced, viz., (i) identifying the poor among the total population, and (ii) constructing an index of poverty using the available information on the poor." In the literature, two main categories of models are applied to measure poverty: absolute poverty and relative poverty approaches. The approaches reported in the literature are all based on the concept of "poverty line" in order to determine the share of poor population in country population. For a given set of living standards, the poverty line is defined

typically as the minimum income level required to purchasing the socially determined essentials for living. The poverty headcount (PR) measures the number (or percentage) of the population that falls below the poverty line. That is,

$$PR = \frac{POOR}{CP}$$

where POOR denotes the number of individuals below the poverty line and CP stands for the country population. There are several poverty lines used in the literature such as absolute, relative, food or complete poverty lines. For example, by constructing food and non-food poverty lines, World Bank (WB) measures the absolute poverty for each country in order to perform international comparisons. On the other hand, relative poverty line, which is used by OECD to estimate the size of poverty in OECD countries, is determined as to be 40 to 60 percent of median income per capita.

There are various difficulties that arise in determining an appropriate poverty line. For example, income is the variables used in the measurement of, but it is evident that a given income level may signify different standards of living across regions. Moreover, for international comparisons, in order to determine an international poverty line, differences in national rates of inflation and exchange rates, cultural differences in defining human needs, availability of different goods and services, various types and levels of transfer payments should be taken into account. Even though the poverty line has many drawbacks in applications, it is commonly used by policy makers in order to estimate the share of poor population.[2]

However, the drawbacks that the policy makers face are not limited with the static implications of poverty lines, which are tabulated above. The policies concerning with development programmes and addressing social transfers may temporally affect the share of poor population, bearing on the dynamical implications of poverty lines. Since the success of social policies depends on the measurement of poverty line, policy makers should confront this second problem, namely structuring and implementing an efficient development programme. Public revenue which is the main financial source of such programmes is acquired by taxation. On the other hand, it has long been understood that when governments change the tax structure of the economy, this will influence taxpayers' available income and thus may affect the share of poor population. As a result, social welfare expenditures and tax policy should be handled together in the analysis of poverty alleviation. In the related literature, much of the policy debate on poverty focuses only on the optimal taxation and transfer scheme (see for example, Kanbur and Keen, 1989; Kanbur et al., 1994; Pirttila and Tuomala, 2004). However, these studies do not explore how both tax policy and social programmes can affect the poverty.

Income distribution and poverty in Turkey have also been addressed by numerous studies.[3] Among others Celasun (1986), by estimating an absolute poverty line for the years 1973, 1978 and 1983 gives a poverty headcount of 32, 25 and 30 percent for the relevant years, respectively. Dumanli (1996), by using food poverty line, estimates the absolute poverty headcount to be 16 percent in 1994. Likewise, Dansuk (1997) argues that 15.1 percent of the country's population is below the poverty line in 1987. Furthermore, Erdogan (2000) reports that, in 1994, the ratio of the population for which total per capita income is less than the food poverty line, is about 8 percent. On the other hand, the author argues that, when we take into account the complete poverty line (i.e. sum of food and non-food poverty lines), for the same year, the share of poor population is found to be 24.3 percent. Moreover, TUSIAD (2000) and WB (2005) provide a broad overview of poverty assessment in Turkey. TUSIAD (2000) estimates the head-count ratio to be 15.5 percent in 1987 and 14.5 percent in 1994. For the year 2002, the same proxy is computed to be 14.7 percent (WB, 2005).[4]

The analyses conducted in the literature are all based on micro data sources. Besides the well-known methodological drawbacks, this method may be misleading.[5] Our study instead uses macro-economic data in order to estimate annual poverty headcount series. Therefore, these series provide more frequent observations for policy makers, a fact emphasized by Blackwood and Lynch (1994). The authors report that "if the intended end of a development program is to alleviate poverty or reduce inequality, then periodic assessments of the level of poverty or the degree of inequality may help to determine the degree of success or failure of a development program" Blackwood and Lynch (1994:567).

We add to the existing literature in two ways. Firstly, we introduce a new methodology to estimate the poverty headcount which enables us to observe its time-evolution. The new method that we propose contributes to the static implications of

poverty line, while the ability to observe the time-evolution of the poverty headcount reveals the dynamical implications. We perform the Kalman filter to measure the ratio of the population living in poverty over the period 1975 to 2005. This technique is certainly not a new tool in economic literature[6]. However, to the best of our knowledge, no study uses the Kalman filter technique in the estimation of the size of poor population. Our study shows that this approach enables researchers to calibrate the measurement of poverty in also other countries. Secondly, our study analyzes the effects of tax policy (direct versus indirect taxation) on the poverty. Moreover, the estimated poverty headcount series can be evaluated with other macro-economic variables to better understand their interactions in the poverty alleviation, which may therefore have further policy implications.

The remainder of the paper is organized as follows. In the next section after we describe briefly the sources of data used in our survey we present the methodological approach. We give the results of our poverty headcount estimation in Section 4. Section 5 investigates the effects of tax structure on poverty. Some concluding remarks are presented in the final section.

## 3. DATA, METHODOLOGY AND EMPIRICAL FINDINGS

World Bank estimates the relative poverty line for 2002 as 1.980.949 TL per day per adult in Turkey. In our model, we assume that poor population consists of individuals who receive only social expenditures as monthly income that remains below this poverty line. Again in 2002 in terms of average prices for a household consisting of 4 individuals, the relative poverty line is estimated to be 244.310.970 TL per month. On the other hand, at the post-1980 period the family structure in Turkey started to change and the extended family left its place to nuclear family (Bugra and Adar, 2008). According to Turkish Statistical Institute (TURKSTAT), in 2002, nuclear family represents 80.7 percent of households in Turkey. Thus, there is no loss of generality to assume that poor individuals much probably are members of nuclear family. In our framework, we refer to such individuals as "registered poor population" and denote to represent their share in the country population.

Besides the poor population data, this study uses public income PI, interest payments IR and social expenditures SOC in the analysis. All variables are expressed in per capita terms. The data for $PR_t^{reg}$ is reported by TURKSTAT. The PI and IR series are obtained from Republic of Turkey Prime Ministry Undersecretariat of Treasury (HM). The data for SOC is compiled from OECD Social Expenditures Database, State Planning Organization (SPO) and Boğaziçi University Social Policy Forum. The data for tax payments used in Section 5 are obtained from TURKSTAT and the Turkish Ministry of Finance.

We first determine the time series properties of the variables used in this study by employing the Augmented Dickey-Fuller (ADF) (Dickey and Fuller, 1979) and Phillips-Perron (PP) (Phillips and Perron, 1988) unit root tests. The null hypothesis of non-stationarity cannot be rejected by the unit root tests for the registered poor population ( $PR_t^{reg}$ ), we therefore find out that $PR_t^{reg}$ is integrated of order one, that is, I(1) (see Table A.1 in Appendix A for the results of the unit root analysis). Until we determine its time-evolution characteristics in Eq. (9), let us assume that the ratio of poor population (registered and nonregistered; $PR_t^c$ ) over the country population, which is the unobserved variable in the model, is also I(1). We consider then the following time series model:

$$PR_t^c = \gamma + \delta t + \beta PR_{t-1}^c + \varphi_t \qquad (1)$$

where $\gamma$ is a constant term and $\beta = 1$ provided by the ADF and PP unit root test results. On the other hand, $\varphi_t$ represents shocks to the system and is assumed to be i.i.d. with zero mean and constant variance. Given that $\beta = 1$ , Eq. (1) can alternatively be written as follows;

$$PR_t^c - PR_{t-1}^c = \Delta PR_t^c = \gamma + \delta t + \varphi_t$$

where $\Delta$ is the difference operator.

Table 1 and 2 present the estimation results for the linear regression of two alternative forms of Eq. (1). The results from Table 1 indicate that the constant term is not significant. We will introduce the estimated $PR_t^c$ equation in the Kalman filter (see Eq. (9)).

**Table 1:** Statistical Results of The Regression for The Equation $\Delta PR_t^c = \gamma + \delta t + \phi_t$

| Independent Variables | Coefficients | Standard Error | t-Statistics | Significance Level (P) |
|---|---|---|---|---|
| $\gamma$ | 0.016 | 1.228 | 1.04 | 0.309 |
| $t$ | 1.274 | 0.057 | 0.3 | 0.769 |

**Table 2**: Statistical Results of The Regression for The Equation

$$\Delta PR_t^c = \delta t + \phi_t$$

| Independent Variable | Coefficient | Standard Error | t-Statistics | Significance Level (P) |
|---|---|---|---|---|
| $t$ | 0.077 | 0.026 | 2.88 | 0.007 |

$$SOC_t = \alpha_1 PR_t^c + \alpha_2 PI_t + \alpha_3 IR_t + \omega_t \quad (2)$$

Eq. (2) specifies the social expenditures (SOC) as the sum of total poor population ratio $PR^c$, public income (PI) and interest payments (IR). On the other hand, $\alpha_1$, $\alpha_2$ and $\alpha_3$ are the coefficients of the relevant variables which need to be estimated using an appropriate econometric technique. Note that the dynamical properties of $\omega_t$ and $\varepsilon_t$ should be identical, implying that εt follows an i.i.d process. In the next section, we analyze the dynamic properties of $\omega_t$ in order to perform the Kalman filtering. In the empirical literature it has been already determined that macro-economic variables mostly exhibit a non-stationary stochastic behavior. Therefore, first we perform a non-stationarity analysis to the variables in Eq. (2). By applying the ADF and PP unit root tests, we found out that these variables are also integrated of order one, that is, I(1) (full results are given in Table A.1 in Appendix A). Secondly we test whether there exists any cointegrating relationship among these I(1) series. Eq. (3) deals with this issue.

$$\beta_1 SOC_t + \beta_2 PR_t^c + \beta_3 PI_t + \beta_4 IR_t \sim I(0) \quad (3)$$

More specifically we search for a cointegration vector $b$, which can be represented as given in Eq. (4).

$$b:\left[1;\frac{-\beta_2}{\beta_1};\frac{-\beta_3}{\beta_1};\frac{-\beta_4}{\beta_1}\right] \Leftrightarrow b:\left[1;\alpha_1;\alpha_2;\alpha_3\right] \quad (4)$$

The results of the cointegration test, which rely on the Johansen maximum likelihood approach (Johansen, 1988; Johansen and Juselius, 1990) are presented in Table 3.

According to Table 3, the trace test indicates 2 cointegrating relations with 95% confidence level. Moreover, the components of the cointegration vector given in Eq. (4), which are the unknown coefficients in Eq. (2), are all significant at the 5% level. The estimated signs for the explanatory variables PI, PRc and IR are all positive.

In Table 3, the coefficient of the variable $PR^c$ reveals that the impact of an increase in the share of total poor population on social expenditures is approximately 11 percent. This coefficient shows us the average success level of Turkish governments in preventing "social exclusion due to the inability of certain segments of the population to have access to basic minimum means of social integration" (Bugra and Adar, 2008:6). One can consider this effect relatively low. However, this result clearly indicates that the reaction of Turkish governments to increasing poverty has been relatively slow until 2001 crisis, a fact emphasized by Bugra and Adar (2008).

In Table 3, we also observe that the coefficient

**Table 3:** Johansen Test for The Number of Cointegrating Relationships

| Eigenvalue | $H_0 : r =$ | Trace | L Max | Critical Values at 95% | |
|---|---|---|---|---|---|
| | | | | Trace | L Max |
| 0.457771 | 0 | 44.14212 | 17.74992 | 39.89 | 23.80 |
| 0.403973 | 1 | 26.39220 | 15.00661 | 24.31 | 17.89 |
| 0.205633 | 2 | 11.38559 | 6.676085 | 12.53 | 11.44 |
| 0.149896 | 3 | 4.709508 | 4.709508 | 3.84 | 3.84 |
| Unrestricted Cointegrating Coefficients | | $\beta_1$ | $\beta_2$ | $\beta_3$ | $\beta_4$ |
| | | -1.330994 | 0.149940 | 0.177838 | 0.371110 |
| Normalized Cointegrating Coefficients | | | $\alpha_1$ | $\alpha_2$ | $\alpha_3$ |
| | | 1 | 0.112653 | 0.133613 | 0.278822 |

(**Note:** $r$ indicates the number of cointegrating relationships. One lag is included in the cointegration tests. The critical values for Maximum eigenvalue and trace test statistics are given by Johansen and Juselius (1990).)

of interest payments (IR) is estimated to be positive, implying that an increase in interest payments leads to an increase in social expenditures. At first glance this finding can be considered counterintuitive; therefore we have to focus on how the social expenditures are financed. Based on debt management commission report of the State Planning Organization (Dikec, 2001), and Treasury Operations Report 1998 - 1999 released by Turkish Court of Accounts (TCA), we understand that over the period 1992-1996, the Treasury issued Holding G-bonds for the stock of contingent liabilities of State Economic Entreprises (SEE), Social Security Institutions (SSI), and Extrabudgetary Funds (EBF). As

a result, the debts of these public sector entities were held by the Treasury. Moreover in 1984 and 1992, the contingent liabilities of Local Authorities (LA) and SEEs to SSIs, State Banks, CBRT and the debts of LA and SEEs to each other are consolidated by Treasury (by issuance of Consolidation G-bonds). In addition to these, according to the IMF's Report on the observance of standards and codes (IMF ROSC, 2002) at the end of 1999, duty loses reach approximately %15 of GNP. In 1999 and 2000, a share of duty loses is securitized by issuance of Consolidation G-bonds. Eichengreen (2001) and Ertugrul and Selcuk (2001) point out that in 1999 the main part of the duty loses was still contingent (unsecuritized). Turkish authorities declared that these activities (IMF Staff Country Report, 2000 pg. 12) took the form of some state banks' (Ziraat and Halkbank) providing subsidized credits to certain groups such as farmers and small businesses. Reinhart and Rogoff (2011) report that contingent public liabilities accumulate outside the budgetary system mainly in the form of informal lending/borrowing relationships among public sector entities to finance their government programs and subsidies. Polackova-Brixi et al. (2001) indicate that hidden public debts result from contingent liabilities (contingent explicit such as the obligations of state-guaranteed institutions and deposit insurance, and contingent implicit such as local government obligations, foreign credit of the domestic corporate and financial sectors, and banking failures). Above arguments enable us to shed light on the financial sources for social expenditures. At post-liberalization period, public sector in Turkey accumulated significant amount of contingent liabilities[7] through fiscal operations outside the budgetary system in order to finance the government programs, subsidies and incentives. At 90's this hidden public debt stock generated a persistent increase in the public sector borrowing requirement. Ozkan (2005), Akyuz and Boratav (2003) report that given the gap between the public sector borrowing requirement and the size of the domestic capital markets, the outcome was ever-increasing interest rates on domestic borrowing, which, in turn, became the source of further deterioration in public balances. The increase in public debt stock today yields an increase in interest payments tomorrow. Therefore, a share of social expenditures today is financed through the contingent liabilities generated today.

## 4. KALMAN FILTERING

Following the pioneering works by Kalman (1960) and Kalman and Bucy (1961), there have been an increasing number of researches especially on the signal processing, i.e. in aerospace tracking, underwater sonar, and the statistical quality control. Later on, developments in the time series econometrics literature have permitted the use of the Kalman filter in economics. One can understand the main idea of the Kalman filter in the following way. It is an algorithm for sequential correction of a linear projection for a dynamical system which is represented in a particular form called state-space modeling. Thus the Kalman Filter and its extensions are used to determine unobserved states of the dynamical system, based on its observed (measured) states.[8] The general form of the state-space modeling is given in Eqs. (5) and (6).

$$x_t = Fx_{t-1} + v_t \text{ (Stateequation)} \quad (5)$$

$$y_t = A'x_t + H'z_t + e_t \text{ (Observation equation)} \quad (6)$$

where ( r x 1 ) vector $x_t$ denotes unobserved variables at date t and $y_t$ denotes vector of variables observed at date t . F, A' and H' are matrices of parameters with dimensions ( r x r ) , ( n x k ) and (n x r ) respectively.

The ( r x 1) vector $v_t$ and the (n x 1) vector $e_t$ are the white noise vectors (normally distributed i.i.d. errors). They are assumed to be uncorrelated and to have covariance matrices Q and R, respectively. Furthermore, $z_t$ represents the vector of exogenous variables in the model. Consequently, using the cointegration test results reported in Table 3, the observation equation can be written in a scalar form as given by Eq.(7)

$$SOC_t = 0.112653PR_t^c + 0.133613PI_t + 0.278822IR_t + \omega_t \quad (7)$$

Test results indicate that the observation noise is not a white noise (see Table B.1 in Appendix B), but follows an AR(1) process ( $\omega_t \sim AR(1)$ ). The regression results for $\omega_t$ are shown in Table 4.

**Table 4:** Statistical Results of The Regression for The Equation

$$\omega_t = \varphi\omega_{t-1} + u_t$$

| Independent Variable | Coefficient | Standard Error | t-Statistics | Significance Level (P) |
|---|---|---|---|---|
| $\omega_{t-1}$ | 0.356 | 0.133 | 2.68 | 0.012 |

Following from Table 4, the estimated equation for $\omega_t$ is given in Eq.(8)

$$\omega_t = 0.3569\omega_{t-1} + u_t \quad (8)$$

where $u_t$ is i.i.d ( $u_t \sim N(0,R)$ with $R \in I$ ). Since the Kalman filter algorithm requires that the observation noise should be a white noise, we have to replace Eq. (8) by $\omega_t$ given in RHS of Eq. (7). According to test results given in Table 2, the state equation is obtained by Eq. (9).

$$PR_t^c = 0.0774t + PR_{t-1}^c + \varphi_t \quad (9)$$

In Eq. (9) $\varphi_t$ is determined to be a white noise (see Table B.1 in Appendix B).

From Table 2 and Eq.(9) it is straightforward to conclude that over the period under consideration, the estimated share of poor population exhibits a non-stationary character, it is I(1) and particularly it is a random walk with time trend. For our purposes it is important to explain the reasons for this time-series property.

First, because of the Turkish electoral politics, the governments supported the agricultural policies aiming at sustaining peasant agriculture, and ignored informal access to urban public land or to the land on which there was no permission to build (Buğra and Adar, 2008).

At the post - liberalization period, Turkish governments came under pressure and these mechanisms for social protection have deteoriated. Following from the commercialisation of agriculture, rural urban migration accelerated and the detoriated public fiscal balance made it impossible to sustain agricultural production through subsidies, instead generated contingent liabilities. In the 90s, urban population exceeded rural population at an increasing rate[9]. The accelarated migration process that shapes social exclusion at increasing rate, inherently has time-dependent character, which reflects the persistent liberalization policies through 90's and is consistent with the estimated time trend. Likewise, the random walk characteristics indeed depict that even though the emergence of novel forms of poverty and social exclusion since the 1980s, poverty hardly appeared as a serious social problem that deserves sustainable government programmes to combat social exclusion until the economic crisis of 2001 (Bugra and Adar, 2008).

That said, we are now able to apply the Kalman filter procedure in order to estimate the new state vector $x_t$ ( $PR_t^c$ in our model).

The Kalman Filter response is plotted out in Fig. 1.[10]

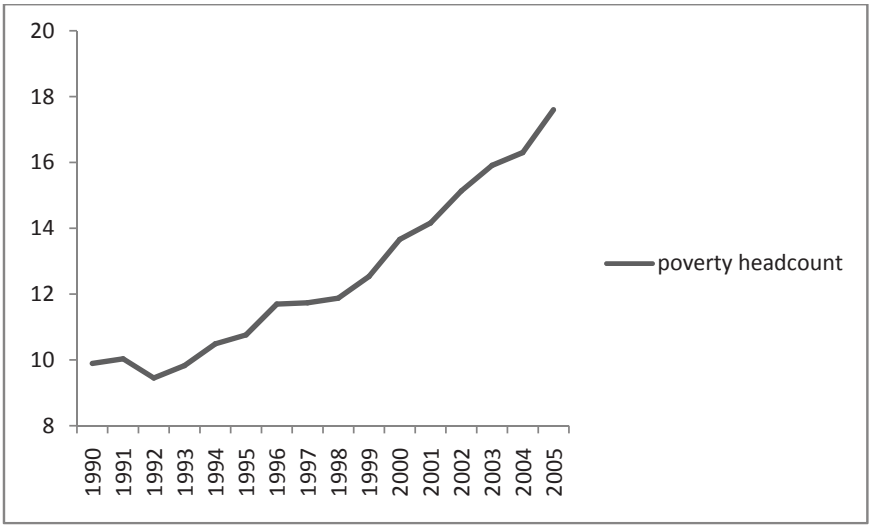


**Figure 1:** Plot of The Poverty Headcount (Per Hundred Individuals).

From Fig. 1, it follows that the share of total poor population in Turkey, given by the Kalman filter output, is increasing during the last decade and it reaches 17.6 percent of the country population in 2005. This result clearly shows the failure of poverty alleviation policies in Turkey. However, it does not enable us to explain the exact reason or at least one of the reasons why the social welfare policies could not reduce poverty. In the next section we shall deal with this issue and corroborate our conclusion that there is a long-run relationship between tax structure and poverty in Turkey.

## 5. TAX STRUCTURE OF TURKISH ECONOMY

Fig. 2 gives a rough idea about the tax policy in Turkey over the period 1975-2005. It can be easily seen that tax revenues per capita obtained from both indirect and direct taxes increased over the 30 years period. Especially after 1983 the revenues from indirect taxes have exceeded those from direct taxes. Public income which consists of majorly tax revenues has also increased in the same period.

To understand clearly whether the tax policy over the period 1975-2005 is an outcome of government-independent strategies (sustainable tax policies) or is consisted of individually developed government-dependent strategies (non-sustainable tax policies), we have to focus on the time series behavior of indirect tax series. Without no loss of generality, in econometrics the sustainability[11] of an economic policy can be better tested by its time-series properties. That is, a policy is sustainable if it exhibits

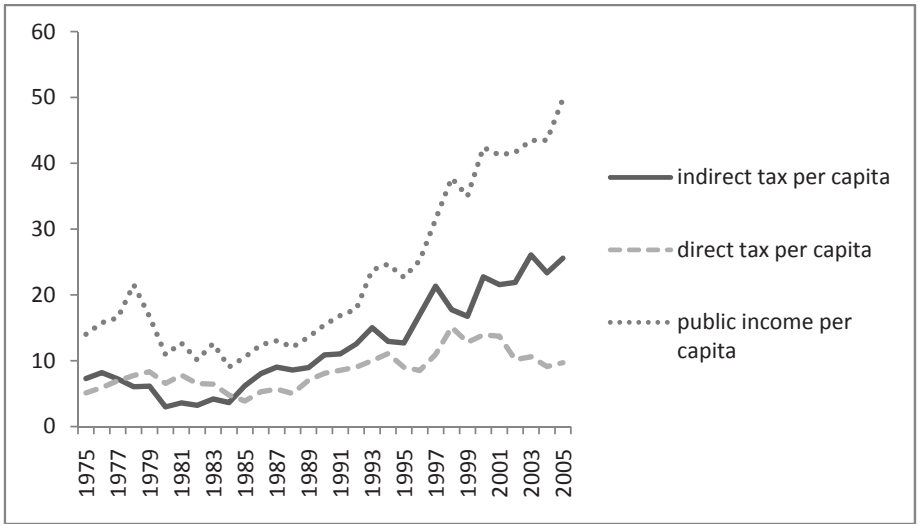


**Figure 2:** Tax Revenues (TL At Fixed 1995 Prices) Per Thousand People.
(**Sources:** HM And TURKSTAT)

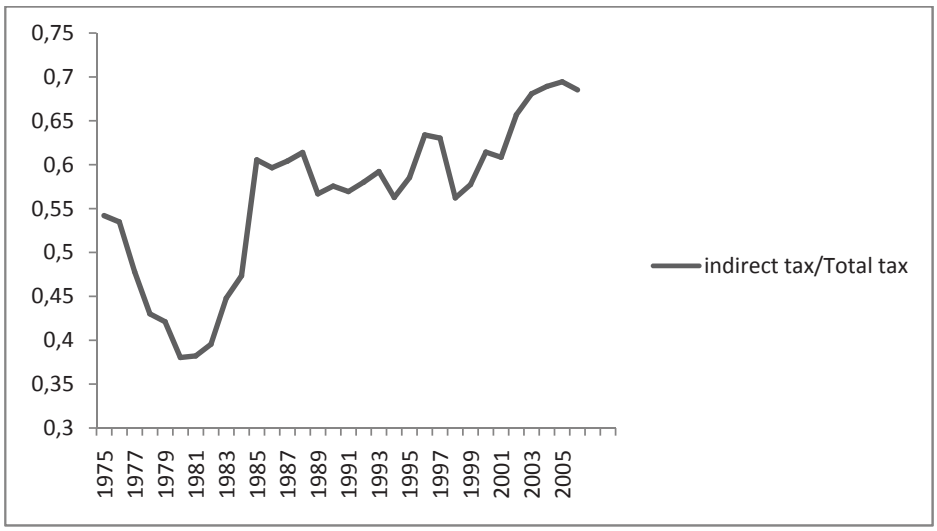


**Figure 3:** Share of Indirect Taxes in The Total Tax Revenue.
(**Source:** TURKSTAT)

stationary behavior over the periods. Otherwise, it is not sustainable. To identify this, we computed first the share of indirect taxes in the total tax revenues (ITAXR) and then we applied the ADF and PP unit root tests to the ITAXR series. We found out that ITAXR is integrated of order one, that is I(1) (see Table A.1 in Appendix A). This non-stationary stochastic characteristic signifies the absence of sustainable tax policy through consecutive governments; on the contrary Turkish tax policy is government dependent and nearly each government implements its own tax policy on indirect taxes (Albayrak, 2010). Interestingly, as it can be seen from both Fig. 3, these tax policies all aimed at increasing the indirect taxes.[12] From 38 percent in 1980 this ratio reaches a maximum of 69 percent in 2004.

The next step involves cointegration test which is, as above used, based on the Johansen maximum likelihood approach (Johansen, 1988; Johansen and Juselius, 1990). The test results for the possible cointegration relation between the poverty headcount and the share of indirect taxes in the total tax revenues are summarized in Table 5.

According to Table 5, both Maximum eigenvalue and trace tests indicate 1 cointegration relation with 95% confidence level. Therefore, the estimated equation for the relevant variables can be written by Eq. (10)

$$PR_t^c = 73.703 ITAXR_t - 28.455 + \varepsilon_t \qquad (10)$$

Eq. (10) reveals a positive long-run relationship between the poverty headcount and the share of indirect taxes in total taxes. Thus, the more is the share of the indirect taxes, the larger is the share of total poor population and from Eq. (7), the more the social expenditures made by the government. As a result, although it is evident that the primary objective of social expenditures is to reduce poverty, since 1975 Turkish governments have implemented inappropriate tax policies, leading to a fair increase in the poor population in the country. At the outset of the present study we have already indicated that numerous studies point out the negative effects of decreasing direct taxes to indirect taxes ratio on income distribution.

**Table 5:** Johansen Test For The Number of Cointegrating Relationships

| Eigenvalue | $H_0 : r =$ | Trace | L Max | Critical Values at 95% | |
|---|---|---|---|---|---|
| | | | | Trace | L Max |
| 0.427725 | 0 | 21.29523 | 16.18591 | 19.96 | 15.67 |
| 0.161536 | 1 | 5.109319 | 5.109319 | 9.24 | 9.24 |
| Unrestricted Cointegrating Coefficients | | $\beta_1$ | $\beta_2$ | $\beta_3$ | |
| | | 0.239520 | -17.65344 | 6.815745 | |
| Normalized Cointegrating Coefficients | | | $\alpha_2$ | C | |
| | | 1 | 73.70329 | -28.45581 | |

(**Notes:** r indicates the number of cointegrating relationships. One lag is included in the cointegration tests. The critical values for Maximum eigenvalue and trace test statistics are given by Johansen and Juselius (1990))

## 6. CONCLUSION

In the 1980s, Turkish economic model based on heavy state intervention has been transformed to a market-based model, followed by an overall institutional change laying down the foundations of a market economy. In this context, at 90's the transformation of the social security system also was brought to the scene, mostly influenced by contemporary international social policy environment. In less developed countries, the acquired social rights were not well established, therefore the initial implementation of new social policy mechanisms constitutes a short-term remedy to the danger of social disruption arisen from social exclusion, which is an inherent consequence of inability of the inefficient social protection mechanisms in immature market economies. This is what happened in Turkey.

The primary objective of social-welfare policies is, of course, to reduce poverty. However, in the literature some studies (e.g. Murray, 1984; Hirschman, 1991; Tocqueville, 1997) point out that those policies may fail to decrease poverty. In this paper, we have followed this literature and analyzed the size of poor

population and how it is affected by this kind of policies in Turkey over the period 1975-2005.

We examined first the time-series properties of the variables under consideration. We performed non-stationarity analysis and investigated whether the PR contains an autoregressive unit root. Then the state equation was derived from the OLS estimation. The random walk characteristics indeed depict that even though the emergence of novel forms of poverty and social exclusion since the 1980s, poverty hardly appeared as a serious problem that deserves sustainable social-welfare policies to react the growth of social exclusion until last decade.

Secondly, in order to determine the observation equation, we explored the long-run relationship among the series of SOC, PR, PI and IR. The estimated cointegrating vector suggests that there is a long-run relationship among these variables.

All in all, this paper contributes to the literature first, by employing the Kalman filter technique in the estimation of the size of total poor population and second, by testing the effect of tax policy on the ability of social expenditures to reduce the poverty in Turkey. We found out that the share of poor population is varying between 12 to 17.6 percent over the period from 1995 to 2005. The conventional estimations of TURKSTAT which rely on household surveys fluctuate around 14 to 16 percent over the period 2002-2005, which support our findings.

Furthermore, the analysis of the tax structure in Turkey showed that the increase in public income is majorly provided by the rise in indirect tax revenues. Based on the cointegration analysis we found that the public income influences positively the social expenditures. Accordingly, the estimated poor population data are used in the cointegration analysis to explore the long-run equilibrium relationship between the share of indirect taxes in the total taxes and the poverty headcount. We found out that there is a positive relationship among these variables and this result conducted our study to investigate the efficiency of social welfare expenditures. As a result, we can argue that using indirect taxes to finance social expenditures hampers the Turkish governments' poverty alleviation efforts. On the other hand, note that the first attempt to struggle with poverty is formally accepted in 1998 by the Turkish government. In the context of our results, we suggest that the governments, to implement an effective poverty alleviation policy, should not omit to reduce the share of indirect taxes in the total tax revenues and should broaden the direct tax base to offset the loss of revenue caused by declines in the indirect taxes.

Another implication of our findings is that in Turkey cash transfers have little redistributive impact because they are small in size, a fact emphasized by OECD (OECD, 2012). Moreover, OECD reports for Turkey that the size of direct tax system is also small and that both inequality in household disposable income and the poverty rate are well above the OECD average (OECD, 2012).

## END NOTES

[1] Other important countries are Argentina, Brazil, Mexico, Greece and Venezuela.

[2] As Atkinson (1987) points out, there is no consensus not only on the level of poverty line but also on its structure. This is mostly due to the fact that any method applied in the construction of a poverty line reflects implicit or explicit differences in the understanding of "poverty" and therefore different methods may provide conflicting results (UNDP, 2002).

[3] In this study we would like to contribute to the controversial discussion on the measurement of poverty and to investigate whether there is a relationship between tax structure and poverty in Turkey. Hence, our study does not provide an international comparison of poverty. In the literature one can find a large number of publications discussing related issues for different countries. See for example Andress (1998) for empirical studies on poverty in a comparative perspective. Furthermore, a critical analysis of the poverty alleviation policies and programmes implemented in the developing countries can be found in Salama and Valier (1994).

[4] The relative poverty line used for the analysis conducted in World Bank (2005) is drawn as 60 percent of median consumption per capita. The results would be different if the percentage is changed. For instance, in TUSIAD (2000), the head-count ratio for the year 1994 is found to be 7.9, 14.5 and 22.3 percent when the study uses a relative poverty line specified as, respectively, 40, 50 and 60 percent of median income per capita.

[5] This method of the sample survey will be biased if the respondents do not tell the truth and choose not to cooperate with the interviewer.

[6] See, for instance, Karanfil and Ozkaya (2007) for the measurement of the size of unregistered economy; Leu and Sheen (2011) for the estimation of potential output and forecasting of unemployment; Hoffmann et al. (2012) for the derivation of an optimal growth forecast from observed changes in productivity.

[7] Please refer to Ozkaya (2012) for the computation of exact magnitude of contingent liabilities and hidden public debt stock in Turkey from the period 1980 to 2010.

[8] We do not discuss the methodology here to conserve space. Detailed explanations can be found in Brown and Hwang (1997) and in Hamilton (1994) ch.13.

[9] According to UNICEF statistics, the share of urbanized population in 2005 was 67 percent. See http://www.unicef.org/infobycountry/Turkey_statistics.html.

[10] Programme codes are available from authors upon request.

[11] For example, the debt stock of public sector is sustainable if it is stationary (see Hamilton and Flavin, 1986; Bohn 1995)

[12] Although there are some studies (e.g. Can, 2003; Pinar, 2004) that investigate the tax structure and tax policy in Turkey, to the best of our knowledge, there is not any similar finding mentioned here. There is no doubt that this result has important policy implications and deserves more detailed analysis, thus, it should be taken into account in the future research.

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**APPENDIX**

**1) Appendix A.1:** Unit Root Test Results

**Table A.1:** Results Of Unit Root Tests

| Variables | Augmented Dickey-Fuller (ADF) | | Phillips-Perron (PP) | |
|---|---|---|---|---|
| | Levels | First differences | Levels | First differences |
| *IR* | -1.01 (1) | -5.01 (0)*** | -1.15 (3) | -5.10 (3)*** |
| *PI* | 1.08 (1) | -5.67 (0)*** | 1.19 (3) | -5.67 (3)*** |
| $PR_t^{reg}$ | -0.53 (2) | -4.05 (1)*** | -0.13 (3) | -7.20 (3)*** |
| *SOC* | -0.97 (2) | -2.27 (1)* | -0.70 (3) | -3.54 (3)** |
| $PR_t^{c}$ | 0.70 (1) | -4.38 (0)*** | 1.18 (3) | -4.30 (3)*** |
| *ITAXR* | 0.98 (1) | -4.42 (0)*** | -1.01 (3) | -4.45 (3)*** |

( **Notes:** The numbers in parentheses are the lag orders in the ADF and PP tests. The lag parameters are selected based on the Akaike Information Criterion (AIC).*, **, *** indicate significance at the 10, 5, and 1 percent levels, respectively.)

**2) Appendix B.1:** White-Noise Test Results on Residuals

**Table B.1:** Results of Portmanteau Tests For White Noise

| Residuals | Portmanteau (Q) statistic | Prob > chi2 |
|---|---|---|
| $\omega_t$ | 119.83 | 0.00 |
| $\phi_t$ | 11.01 | 0.61 |

(**Notes:** The null hypothesis is that the series of residuals exhibits no autocorrelation.)