Generational Accounting in Turkey

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Abstract

Generational Accounting (GA), developed by Auerbach. Gokhale and Kotlikoff (1991) is an alternative and dynamic method employed in measuring the impact of existing fiscal policies on current and future generations. In contrast to the traditional and static measures of fiscal sustainability, GA method reveals the intergenerational distribution of tax burden and helps identifying the policies that can alleviate the generational imbalance. This paper constructs and presents the first set of generational accounts for Turkey in an attempt to measure the generational gap and compare the Turkish intergenerational fiscal outlook to a number of developed and developing countries. Findings in the paper suggest that there exists a 24.3% fiscal imbalance to the disadvantage of future generations in Turkey. Several hypothetical policy experiments have been implemented in the paper to achieve the generational balance in Turkey.

Key Words: Generational Accounting, Fiscal Sustainability, Turkish Fiscal System
JEL Classification: H61, H62, E62, J18

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1. INTRODUCTION

Macroeconomic discussions have predominantly been centred on the monetary sphere in the past decades. However the recent developments, especially the Eurozone sovereign debt crisis is ushering that fiscal policy will be at least as of equal concern in the upcoming years. Massive bailout budgets combined with the ageing population problem and generous social security systems are likely to threaten the sustainability of fiscal balances both in the US and a number of European countries. While uncertainties about the future of many economies remain, it is evident that additional government debt burdens are likely to undermine the budgetary positions and alter the intergenerational fiscal equity. The need for a long term fiscal view will necessitate the utilization of new and dynamic tools, one of which is the Generational Accounting.

Generational Accounting (GA) was developed as a response to the common discontent with the static measures of fiscal sustainability and it has become increasingly popular as a method to assess the distribution of government's debt burden among different generations. After its introduction Gokhale, Auerbach and Kotlikoff (1991), the methodology has been revised, improved and applied to a number of developed and developing countries, especially in the late 1990's and early 2000's.

The main argument of those who favour GA is that deficit-the simple difference between government's aggregated revenues and expenditures- is a concept that can easily be manipulated. Depending on how the government chooses to label its receipts and payments, the deficit figure may vary substantially. The practice of dragging expenditures to the next fiscal year's budget to undervalue deficit, excluding deficit generating public institution's balances from the central budget sheet, creating extra-budgetary funds to hide certain liabilities, privatising state owned enterprises to raise revenue, resorting to one time taxes at times of downturns and practising rebates and amnesties as part of the political cycle are just few examples of how the concept of deficit can easily be manipulated according to the political and economic priorities. Moreover, major studies find mixed evidence about the direction and magnitude of the relation between deficit and key macroeconomic variables. Henceforth it is to be admitted that deficit is an ill-defined and arbitrary concept in understanding the fiscal structure and sustainability of a country.

The main contribution of this paper is to construct and present the first set of generational accounts for Turkey in order to evaluate fiscal sustainability by investigating the intergenerational distribution of debt burden and to give policy recommendations to alleviate the generational imbalance. In this respect, this will be the first study in Turkey to go beyond the standardized measures of budget deficit and primary balance and analyse the fiscal gap from an intergenerational perspective, namely how the government's debt burden is generated among different age and gender groups. In addition to that, the effect of different policy exercises on long term fiscal gap and intergenerational distribution of debt burden have been investigated. Foreseeing that the methodology will be revived in line with the recent and upcoming fiscal developments, we strongly believe that it is essential to acquire comparable figures for Turkey.

The study is organized as follows: development of the GA literature and the major studies will be presented in section 2. Section 3 will provide the GA methodology. Section 4 will summarize the data and statistics used in the study. The results, sensitivity analysis and policy experiments will be presented in Section 5. Finally the last section will conclude the discussion.

2. LITERATURE SURVEY

The GA methodology was developed in 1991 by the seminal paper of Auerbach, Gokhale and Kotlikoff yet the discussions that underpin the theoretical background of the methodology, especially the intergenerational aspect of fiscal policy and the necessity for a dynamic measure of government burden, dates back as early as 1960's.

Although there had been efforts to analyse the distributional effects of fiscal policy (Vickrey, 1961; Musgrave, 1963; Eisner, 1969; Minsky, 1973), these studies have remained rather static in nature, being merely concerned with the impacts of policy actions on various income and consumption groups among existing generations.

Being inspired by Modigliani's life cycle theorem (1963), Feldstein (1974) studied the negative effect of unfunded social security system on personal savings and eventually ignited a broader discussion on how the long term growth path of the economy can be altered by short term policy actions, regarding taxes and transfers (Auerbach and Kotlikoff, 1990). Kotlikoff (1979) and Summers (1981) analysed the impact of social security and tax reforms on individual consumption and saving behaviour by using a 55 period life cycle models and incorporating intergenerational transfers to capture the dynamic nature of the economy. Studies confirmed that both the choice of the social security system and the tax base have long run impacts on the capital stock of the economy and the generational distribution of welfare. Auerbach (1979), Boskin (1978) and Bradford (1981) were among others who were concerned with the long run distributional aspects of fiscal policy.

The idea that the long term growth path of the economy can be altered by short term policy changes in a dynamic framework where the existing individuals' consumption and saving behaviours in a given point in time can alter the distribution of wealth across generations was a turning point in the development of the GA methodology. It was confirmed by Kotlikoff (1989) and a number of other authors that both the size and the way through which the government finances its spending mattered in the long-run. Hence both the deficit concept itself and the idea of Ricardian Equivalence were put under critique. Evaluation and cross validation of these critiques by a number of writers combined with the necessity to incorporate the lifecycle decision theory and the intertemporal budget constraint driven the development of the GA.

As pointed out by Kotlikoff (1989), deficit- the simple difference between the annual revenues and expenditures of the government- is very much of an arbitrary concept that fails to reveal anything about the fiscal stance of the economy. Indeed the relation between budget deficit and the key macroeconomic variables such as GDP, growth rate, inflation, interest rate[2] and current account deficit is one of the most debated yet not resolved issues. There exists mixed evidence about the magnitude and direction of such correlation.

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[2] See Dwyer (1982), Boskin (1982), Plosser (1982, 1987), Mascaro and Meltzer (1983), Evans (1985, 1987), Hoelscher (1986), Barro (1987), Bohn (1998), Saleh (2003) and Catão and Terrones (2005) for unconventional evidence on the correlation among budget deficit and macro aggregates and discussions on causality.

Secondly, depending on how the government chooses to label its receipts and payments might alter the size of the deficit and the debt burden considerably. Kotlikoff (1989) points out that if, for example, the social security contributions were labelled as loans extended to the government by households (instead of taxes) and the social security benefits as the principal plus the interest payment (instead of transfers), then the US official debt would roughly be tripled by size.

Thirdly, there are many fiscal practices that the government might adopt to undervalue the deficit and the debt burden. The practice of dragging expenditures to the next fiscal year's budget to undervalue deficit figures, excluding deficit generating public institution's balances from the central budget sheet, creating extra-budgetary funds to hide certain liabilities, privatising state owned enterprises to raise revenue, resorting to one time taxes at times of downturns and practising rebates and amnesties as part of the political cycle are just few examples of how the concept of deficit can easily be manipulated according to the political and economic priorities.

A final and rather technical critique of conventional budget deficit measures by the GA literature relates to the Ricardian Equivalence and the traditional notion of "deficit sending". Ricardian Equivalence (also known as the Barro–Ricardo equivalence) postulates that it is only the size not the way through which the government finances its spending hence there is no difference between issuing bonds or levying taxes. Empirical evidence on the other hand asserts that there are indeed significant differences between the practice of taxation and borrowing (and any other policy action), especially regarding the intergenerational distribution of wealth and welfare (Pereira and Rodirguez, 2001).

As a response to the proclaimed drawbacks of the budget deficit, Auerbach, Gokhale and Kotlikoff (1991) developed the GA methodology as an alternative tool to assess the fiscal sustainability. The method did not only serve the purpose of constructing a meaningful way to evaluate the long term outlook of the budget balance but also revealed a number of undisclosed feature related to the intergenerational distribution of net tax burden in the US. The results were striking for that they revealed a 17%-24% fiscal gap among current and future generations, a gap much wider than what had been expected. Authors addressed the impact of a number of fiscal policy changes, namely the effect of a cut in the capital gains, faster growth in Medicare, slower government consumption growth, loan bailout and cancellation of the 1983 social security amendments. The follow up 1994 paper suggested

alternative fiscal measures to alleviate the US fiscal imbalance[3]. The 1999 and 2000 papers by Auerbach and Oreopoulos aimed to extend the baseline study under the immigration hypothesis. The most significant contribution of the study was incorporating a degree of heterogeneity to the members by differentiating among the tax and transfer schemes of the natives and the immigrants, which added further differentiation to the age-gender specification. The study did not make a conclusive statement about the impact of immigration on fiscal policy however it constituted an exemplar for the case studies especially for the European countries and Canada whose demographic profiles are expected to change significantly within the short run due to immigration.

While the original US case was under progress on one side, the GA literature started to mount up by studies from other countries. The initial seventeen of these country analysis[4] are compiled in the book titled "Generational Accounting around the World" edited by Auerbach, Kotlikoff and Leibfritz (1999). (See Table 1 for the summary of these seventeen studies as well as other independent papers).

In a number of countries, results indicated an imbalance among generations mainly to the disadvantage of those who are not yet born. Norway, with a percentage imbalance of 4018% ranked the first in terms of the size of fiscal burden inherited to the future generations however one point needs to be clarified; in contrary to the benchmark US case, education is not treated as a government consumption item but as a transfer in the Norwegian case study. Since such treatment inflates current generation's transfer receipt item drastically, the generational gap has widened to a level that cannot be compared to the rest of the studies.

Among the European countries, Netherlands, Germany, Italy and France accounts (for the base year 1995) displayed excessive imbalance mainly due to the generous transfer and social security schemes adopted. Population ageing problem that is deemed to suppress the pool of workers and inflate the elderly population is another factor that contributed to the accumulation of unfunded liabilities under the pay-as-you-go social security scheme and eventually the deterioration of generational equity. Latin American countries Argentina,

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[3] This part of the discussion was motivated by the US Congress proposal suggesting a 30% cut-down on the payroll taxes to avoid surplus accumulation in the Social Security trust fund (Auerbach, Gokhale and Kotlikoff, 1994). Authors emphasize that whatever fiscal measure is adopted, like the one stated, it inevitably comes with a long term cost that should be born either by the current and/or future generations.

[4] Argentina, Australia, Belgium, Brazil, Canada, Denmark, France, Germany, Italy, Netherlands, New Zealand, Norway, Sweden, Thailand, Japan, Portugal and an update for the USA.

Brazil and Mexico who have suffered from prolonged periods of debt crisis also appeared to generate significant degrees of intergenerational inequity given the existing fiscal structure and the level of debt.

Some of the country studies reviewed in Table 1 went beyond the standard methodology and contributed to the literature by examining the effect of structural changes or by incorporating different variables. The first one of these is the German case studied by Gokhale, Raffelhüschen and Walliser (1995) that aimed to measure the fiscal burden of the German unification, and constituted an exemplar for the Korean study (Auerbach, Chun and Yoo, 2004) that aimed to weigh the generational cost of such unification for Korea.

The former study emphasizes that the unification of East and West Germany had necessitated substantial transfers from the central government especially to support the economically disadvantaged citizens of former East Germany and to improve the infrastructure in the underdeveloped regions. Taking the additional fiscal burden created by these transfers into account, the study finds evidence of a noticeable intergenerational imbalance to the disadvantage of future generations. The latter paper suggest that due to the wide productivity and population gap between the North and the South Korea, a supposed Korean unification would be much costly compared to the German case. Results are indicative of a fiscal burden that would be borne by the future South Korean citizens.

The paper by Auerbach and Oreopoulos (1999) has also been noticeable in this sense. The paper addressed the long term fiscal impact of immigration in the US economy. Although the analysis did not reach a decisive conclusion about the ultimate effect of immigration, methodologically the paper was the first to construct heterogeneous accounts (for the natives and the immigrants) that went beyond age and gender specification. The "heterogeneity methodology" has not been fully incorporated to the literature. Nevertheless one should realize that policy recommendations arising from such an analysis would be much more precise[5].

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[5] The heterogeneity in this argument refers to the differentiation of cohort accounts according to various specifications like the occupation, region or level of educational attainment. If data permits, then the results gathered from such an analysis would enable researchers to develop more accurate policy recommendation. For instance, if the net tax burden of city and village inhabitants (two groups that differ drastically in terms of demography and productivity) could have been differentiated, then different and more "tailor made" policy measures could have been formulated. Unfortunately, even the basic age-gender specification comes with a myriad of technical problem, let alone introducing heterogeneity.

Follow-up studies have also been a major contribution to the GA literature. The paper by Kotlikoff and Stijns (1999) finds evidence of a 61% fiscal imbalance to the disadvantage of future generations in Belgium by using 1995 accounts. Decoster, Flawinne and Vanleenhove (2010) reconsider the Belgium case for 2007 and find out that the direction of the imbalance have been reversed in the course of time. Their results indicate a 251.9% higher fiscal burden for the current generations (although both the male and female accounts of current and future generations are calculated as negative-meaning Belgians receive more than what they pay; an inherently unsustainable fiscal pattern). The two consecutive studies by Sartor, Kotlikoff and Liebfritz (1999) and Cardarelli and Sartor (2000) verify the existence of an intergenerational imbalance to the advantage of current Italian generation, although the magnitudes of this imbalance are different (see Table 1). This kind of sequential studies are important for the GA literature because they enable us to see how the intergenerational distribution of government's debt burden has been reallocated among generations within the course of time. This serves the ultimate goal of making GA an annual and regular calculation that will replace the budget deficit figure.

Regarding the methodology, the paper by Decoster, Flawinne and Vanleenhove (2010) which is a sequel to Raffelhüschen (1999) is especially noticeable. The authors show that under transversality and no Ponzi game condition, the generational accounts can be represented as follows[6];

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\underbrace{\sum_{s=0}^{L} N_{t,t-s}}_{CU_t} + \underbrace{\sum_{s=1}^{\infty} N_{t,t+s}}_{FU_t} = B_t
$$

(8)

where CU_t denotes the present value of the primary balance generated by the current generations and FU_t represents the same for future generations and B_t stands for the explicit debt stock of the economy. The equation tells us that the amount of debt that has not been covered by the amount of primary balance created by the current generations should be

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[6] Authors use the standard law of motion of debt accumulation represented as $B_{t+1} = (1+r). B_t - PB_{t+1}$ where B_t is the debt stock in time t, r is the discount rate, PB_{t+1} is the primary balance of the next period. The debt stock in time $t+1, B_{t+1}$ is defined as the primary repayment plus the interest repayment on debt less the primary balance. Under the assumptions and calculations carried out by the authors, a convergence between this traditional approach and the GA is proven. See Decoster, Flawinne and Vanleenhove (2010) for a detailed discussion.

compensated by the primary balances of the future generations. This approach deserves additional credit for that it combined the generational perspective with the traditional measure of fiscal sustainability.

Before finishing this chapter and moving onto the calculation of Turkish generational accounts, one point should be made explicit. Apart from Denmark, Sweden, Belgium, and Thailand all studies in late 1990's indicated a generational imbalance to the disadvantage of future generations however the question whether these results are relevant to understand the current stance is an issue to be handled carefully. First of all, this was the pre-Maastricht period for the European countries meaning compared to the years thereafter; the fiscal policy was relatively loose and rather discretionary. Secondly, there had been significant changes in the legal framework underlying the pensionable age, tax base, social security system and the transfer payments. Moreover, policies have been developed against the frequently underlined problem of population ageing. That, combined with the fact that budgetary outlook of US and EU have been massively distorted within this four years' time, one should keep in mind that the results are not perfectly comparable to the current fiscal outlook of Turkey. However the aim of this study is to construct the very first generational accounts with the prospect of future comparison hence our efforts are still relevant.

Although there have not been any studies that work on generational accounting in Turkey. There are three papers that can be linked to this paper. Salman (2004) proposes an alternative to the static budget deficit calculation and call it Intertemporal Budget Gap (GAP). GAP is equivalent to Fiscal Gap or Fiscal Imbalance suggested by Gokhale and Smetters (2003). GAP measure for the government is the current debt held by the public plus the present discounted value in today's TL's of all projected non-interest spending minus all projected government receipts. Although GAP gives a longer run alternative to conventional debt and deficit measures and therefore is a more reliable measure of fiscal gap, it is not capable of fully reflecting the fiscal impacts of the all types of policy changes. A new policy change that increase the projected expenditures and revenues by the same amount leave the GAP unchanged but these policies might transfer net tax burdens from current to future generations. Therefore Salman (2004) is not able to measure these intergenerational transfers as a result of the policy changes.

The second effort of suggesting an alternative and better measure of public debt in Turkey is given by Erbil and Salman (2006), the authors suggest a new method of measuring the debt burden which they call debt burden (DB). The suggested measure takes the intertemporal

budget obligations of the government and therefore suggests a better measure for the fiscal burden. DB is calculated on a daily basis and it clearly identifies debt risks. This innovative measure is a good step towards a better and more meaningful measure of public burden but still do not incorporate the redistribution across generations as a result of the policy change.

As far as I know, the only study that includes information in terms of the generational fairness of the Turkish Fiscal system is Aydede(2007). The author calculates the aggregate social security wealth series for Turkey. Although the study is interesting, the author only concentrates on the pay-as-you-go social security system in Turkey but not the fiscal burden in Turkey as a whole and is different from this paper.

In addition to these studies Ünlükaptan (2009) includes a literature survey of Generational Accounting in Turkish. The author explains the GA methodology and summarizes the important papers in the GA literature but the paper does not include any calculation in terms of GA.

Table 1: Generational Accounts for Various Countries

Author	Country	Year	Currency	Current Newborns			Future Generations	Absolute Imbalance	Percentage Imbalance
				Males	Females	Total			
Altamiranda, Kotlikoff, Leibfritz	Argentina	1994	U.S. dollars, thsnd.	21,8	5,7	13,9	24,3	10,4	74.8
Ablett, Kotlikoff, Leibfritz	Australia	1994/95	U.S. dollars, thsnd.	105,1	52,8	79,6	105,2	25,6	32.2
Kotlikoff, Stijns	Belgium	1994	U.S. dollars, thsnd.	N/A	N/A	43,2	90,4	47,2	109.25
Decoster, Flawinne, Vanleenhove	Belgium	2010	Euros, thousands	-55,5	-186,0	-119,2	181,0	300,2	-251.9
Malvar, Kotlikoff, Leibfritz	Brazil	1995	U.S. dollars, thsnd.	17,3	2,8	10,2	22,1	11,9	116.4
Oreopoulos, Kotlikoff, Leibfritz	Canada	1995	U.S. dollars, thsnd.	88,7	22,1	56,3	58,0	1,7	3.1
Jensen ,Raffelhüschen, Leibfritz	Denmark	1995	U.S. dollars, thsnd.	35,0	-73,0	-18,0	26,0	-44,0	-244.4
Levy, Dore, Leibfritz	France	1995	U.S. dollars, thsnd.	82,2	37,2	105,0	117,3	57,6	96.4
Raffelhüschen, Walliser, Leibfritz	Germany	1995	U.S. dollars, thsnd.	155,2	36,0	97,1	248,8	151,7	156.1
Gal, Simonovitz, Szabo, Tarcali	Hungary	1996	U.S. dollars, thsnd.	N/A	N/A	8,4	43,9	35,5	422.6
Sartor, Kotlikoff, Leibfritz	Italy	1995	U.S. dollars, thsnd.	89,3	39,0	64,8	209,9	145,1	223.8
Cardarelli, Sartor	Italy	1998	Lire, millions	35,9	-80,8	-22,7	77,2	99,8	440.8
Sarrapy, Caso	Mexico	1997	U.S. dollars, thsnd.	7,4	7	7,2	6,4	0,6	-10.8

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Table 1: Generational Accounts for Various Countries (continued)

Author	Country	Year	Currency	Current Newborns			Future Generations	Absolute Imbalance	Percentage Imbalance
				Males	Females	Total			
Bovenberg, Rele, Leibfritz	Netherlands	1995	U.S. dollars, thsnd.	N/A	N/A	49,4	137,0	87,6	177.1
Baker, Kotlikoff, Leibfritz	New Zealand	1995	U.S. dollars, thsnd.	47,7	-13,3	18,0	16,0	-2,0	-10.8
Steigum, Gjersem, Leibfritz	Norway	1995	U.S. dollars, thsnd.	64,9	-65,8	1,4	57,3	55,9	4018.0
Takayama, Kitamura, Yoshida	Japan	1995	U.S. dollars, thsnd.	N/A	N/A	73,0	319,4	246,4	337.8
Jablonowski, Müller, Raffelhüschen	Poland	2007	Zloty, thousands	N/A	N/A	-55,0	125,0	180,0	-327.3
Cardarelli, Gobat, Lee	Singapore	1999	Singapore dlrs., thsnd.	70,9	-111,0	-20,1	-386,1	-366,0	-375
Auerbach, Chun, Yoo	South Korea	2004	Won, thousands	72,1	39,0	56,4	122,2	65,9	117
Hagemann, John, Leibfritz	Sweden	1995	U.S. dollars, thsnd.	213,6	153,6	184,4	143,5	-22,2	-22.2
Kakwani, Krongkaew,Leibfritz	Thailand	1993	Baht, thousands	-189,3	-97,4	-143,4	-215,8	-72,5	50.5
Haciibrahimoglu, Derin-Gure	Turkey	2008	TL, thousands	49,5	-1,30	24,2	30,3	6,1	24.3
McCarthy, Sefton, Weale	UK	2008	Pounds, thousands	N/A	N/A	68,4	159,7	91,3	133.5
Cardarelli, Sefton,Kotlikoff	UK	1997	U.S. dollars, thsnd.	52,4	1,5	26,9	39,0	12,1	44.9
Gokhale, Page, Sturrock	US	1995	U.S. dollars, thsnd.	77,4	51,9	64,7	194,2	129,5	200.3
Auerbach, Oreopoulos	US	1999,0	U.S. dollars, thsnd.	79,2	55,5	67,4	67,1	-0,3	-0.4

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3. THE METHODOLOGY

Generational accounting is based on the government's intertemporal budget constraint which principally requires that the present value of current and future generations' net tax payments plus the existing net wealth be sufficient enough to cover for government's future consumption. The analytical reasoning behind GA can simply be formulated in the following manner[7];

Present Value (PV) of Net Tax Payments of Current Generations (A)	+	PV of Net Tax Payments of Future Generations (B)	=	PV of Government's Future Consumption (C)	+	Government's Net Wealth (D)

or;

$$\sum_{s=0}^{L} N_{t,t-s} + \sum_{s=1}^{\infty} N_{t,t+s} = \sum_{s=t}^{\infty} G_s (1+r)^{-(s-t)} + W_t \qquad (1)$$

where;

$N_{t,t-s}$: Present value of the remaining net taxes for the current generation born in year *t-s;*

$N_{t,t+s}$: Present value of the net taxes for the future generation born in year *t+s;*

L : Maximum life span;

G_s : Government consumption;

W_t : Government's net wealth at time *t*;

r : The discount rate.

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[7] $B=C+D-A$, where A is the present value of the remaining net life time tax burden of the current generations, B is the present value of the net life time tax burden of the future generations, C is the present value of the government's future consumption and D is the government's net wealth (or indebtedness). The idea is that any liability of the government that remained unpaid by the current generation should be borne by the future generations. Therefore B is calculated as a residual.

The first term on the left-hand side of the equation represents the present value of the remaining net tax (all taxes paid less transfer received) burden of the existing generations. An individual born in the base year is represented by $N_{t,t}$ and is assumed to live a life span of $L - s(= 0) = L$ years while an individual born in year $t - L - 1$ will bear a net tax burden of just one year. Generational accounts of all cohorts will be added up in this fashion until the last member of the current generation dies. The second term on the left hand side of the equation, in a similar fashion to the first one, represents the present value of the net tax payments of future generations. The term initiates from the first future generation after the base year and sums the relevant net tax burdens until infinity. The notion of "discounting to the present value" is incorporated in the following way[8];

$$N_{t,k} = \sum_{s=\max(t,k)}^{k+L} T_{s,k} P_{s,k} (1+r)^{-(s-t)} \qquad (2)$$

where $N_{t,k}$ is the generational account of a cohort born in year k, $T_{s,k}$ represents the expected net tax payments received from the kth cohort in year s, $P_{s,k}$ is the number of individuals from the kth cohort alive in year s, $(1+r)^{-(s-t)}$ is the discount factor (r stands for the real interest rate). $s = \max(t,k)$ implies that if the individual is born before the base year ($k \le t$) then the remaining life time tax burden is discounted to the base year whereas if the individual is born after the base year ($k > t$) the whole life time burden is aggregated and discounted. This reflects the fact that generational accounts are forward looking calculations meaning payments made or benefits received from the government before the tax year is not taken into account.

The first term on the right hand side of the equation stands for the government consumption which is assumed to grow constant rate equal to the growth rate of the overall economy. It is discounted to present value by the term $(1+r)^{-(s-t)}$. The last term W_t stands for the negative net wealth (liabilities-assets) of the government. A positive W_t term would indicate that the liabilities of the government exceed its assets hence assuming a predetermined level of government consumption and tax revenue from the current generation, the amount borne by

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[4] The formulation is adopted from Auerbach, Kotlikoff and Leibfritz (1999).

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the future generations increase. W_t can also be considered as the net indebtedness of the government.

The initial step of constructing generational accounts is to calculate the age and gender specific distribution of net tax burden, namely the sum of all payments (income tax, corporate tax, indirect taxes, taxes on property, etc.) less all receipts (health care, education, widow orphan benefits, pensions, etc.) for current generations. Adopting from Raffelhüschen (1999), this can be represented as follows,

$$T_{s,k} = \sum_n \tau_{s,k,n} \tag{3}$$

where $\tau_{s,k,n}$ is the average per capita tax or transfer burden of an $s-k$ aged individual in year s, n being the various payment or receipt item. The second step is to project these tax and transfer aggregates to the future by making use of a valid growth assumption. In general it is assumed that the annual growth of taxes and the transfers realize at a rate equal to the productivity growth and it is constant throughout (meaning there will not be any fiscal structural change).

$$\tau_{s,k,n} = (1+g)^{s-t} \tau_{t,t-(s-k),n} \tag{4}$$

Equation 4 is critical in calculating the net tax burden of future generations. It says that the net tax burden borne by an unborn individual of a specific age group is a function of the net tax burden borne by the members of the current generations of that same age.

To visualize this discussion one can think of a very simplistic economy where individuals live for only two periods. At year t, two generations (Cohort 1 and 2) coexist and the relevant net tax burdens are a and b, respectively. In year $t+1$, Cohort 2 leaves the economy. Simultaneously, Cohort 1 reaches the age, hence the tax category of Cohort 2 thus the net tax burden borne amounts to $b*(1+g)$. In the following year (year $t+2$), the future generation represented as Cohort 0 joins the economy and bears a net tax burden of $a*(1+g)$.

	Year t	Year $t+1$		Year $t+1$	Year $t+2$
Cohort 1	a	$b(1+g)$	**Cohort 0**	$a(1+g)$	$b(1+g)^2$
Cohort 2	b	0	**Cohort 1**	$b(1+g)$	0

After the construction of future tax and transfer projections specific to the age and gender categories, these figures are aggregated as explained in Equation 2. For the current generations, the ratio of the remaining life time net tax burden to the number of cohort members alive in the particular base year yields that cohort's generational account;

$$GA_{t,k} = \frac{N_{t,k}}{P_{t,k}} \qquad (5)$$

As emphasized by Raffelhüschen (1999) and Bonin and Patxot (2004), different cohorts of the current generation cannot be compared to one another. Indeed, because of the forward looking nature of GA, there is no rationale in comparing the accounts of say a 25 year old male to those of 60 years old. Instead, in order to find the generational imbalance, the current and the future new-borns should be compared. This builds upon the idea that under the presence of perfect generational equality, the net tax burden of the current and the future new-borns should only differ by the productivity growth factor;

$$GA_{t,t} = (1+g)GA_{t+1,t+1} \qquad (6)$$

If that is not the case and there exists a wider gap among the fiscal burden of current and future generations (either to the favour of former or the latter), then it is calculated as follows;

$$\theta = \frac{GA_{t+1,t+1}}{GA_{t,t}(1+g)} \qquad (7)$$

If $\theta > 1$ then one shall conclude that there exists a generational imbalance to the advantage of the current generations and vice versa if $\theta < 1$. The $\theta = 1$ case would suggest generational equality, as denoted.

4. DATA AND STATISTICS

The very first step of generational accounting is to construct age and gender specific tax profiles for a particular year. In order to do so, we have utilized the *"Household Budget Survey"* of 2008 conducted by Turkish Statistical Institute (Turk Stat). Survey contains detailed information about the consumption structure, income sources and income levels of 33,287 individuals from 8640 households and compiles statistics about the employment, union membership, social security status, healthcare benefits, pension payments and miscellaneous transfers for thirteen age categories in a gender specific classification. Despite being comprehensive, budget survey lacks many of the essential variables and details that could have been significant for the purposes of this study; nonetheless such information is approximated from macro aggregates in a reasonably consistent way.

Statistics about the aggregate budget figures are gathered from Revenue Administration and Ministry of Finance databases. Age and gender specific population statistics and projections for the years 2008-2025 are taken from Turk Stat. These are appended with the "UN Population Prospects" provided for the years 2030, 2035, 2040, 2045 and 2050.

Before presenting the calculations, it is essential to evaluate whether our survey sample is a good representative of the 2008 Turkish population. The first benchmark is provided by the Eurostat's "Comparative EU Statistics on Income and Living Conditions: Issues and Challenges" report that aims to standardize the variables and methodologies for gathering micro level data from EU countries. In the report, the minimum effective household sample size for cross sectional studies are specified as 7250 and 8250 for France and Germany, respectively. Although there is no such figure identified for Turkey, retaining that Turkish population is remains between these two; one can claim that the sufficiency criterion is met. Another yardstick is the demographic structure of the sample. Table 2 summarizes and compares the age and gender specific demographic characteristics for the sample and the population. Statistics reveal that women, individuals younger than 15 and those who are aged above 65 are slightly overrepresented in the sample. When interpreting the results this should be kept in mind as well.

Table 2: Age and Gender Specific Distribution of Individuals in the
Sample and the Population

Distribution of Men (%)			Distribution of Women (%)		
Age Interval	Sample	Population	Age Interval	Sample	Population
0- 4	4.95	4.51	0- 4	4.71	4.31
5-14	8.93	9.16	5-14	8.89	8.75
15-19	4.37	4.42	15-19	4.68	4.20
20-24	2.91	4.46	20-24	4.16	4.30
25-29	3.58	4.64	25-29	4.34	4.53
30-34	3.47	4.07	30-34	3.91	3.97
35-39	3.75	3.72	35-39	3.94	3.68
40-44	3.28	3.32	40-44	3.67	3.24
45-49	3.25	2.98	45-49	3.36	2.96
50-54	2.82	2.52	50-54	2.72	2.51
55-59	2.11	1.95	55-59	2.12	2.00
60-64	1.58	1.41	60-64	1.61	1.59
65+	3.18	2.97	65+	3.67	3.84
Total	**48.21**	**50.13**	**Total**	**51.79**	**49.87**

Source: Turk Stat (database), Population Statistics

Although the demographic characteristics are compatible, survey based statistics deviate significantly from the key aggregate accounts; a problem that needs to be justified on a reasonable basis.

First of all it is evident that dealing with micro level data involves problems whatever county and whichever macro variable is dealt with. This has been emphasized in the literature quite often and it will be beneficial to quote some of these concerns, especially the ones relevant to this study. In their analysis of the life cycle saving model for six developed countries, Börsch-Supan and Lusardi (2003) state that saving statistics obtained from micro level data is inconsistent with the aggregate figures due to unrealized capital gains. The same problem exists for Turkish budget surveys as well. Since we can only account for the traditional sources of annual income but cannot grasp the changes in the household wealth, the understatement of income is quite expected. Studying the relative consumption and budget profiles of the newly emerging countries China and India, Chaudhuri and Ravallion (2006) underline the discrepancy between survey based statistics and the national account figures. They indicate corporate and public portion, namely the *non-household portion* of domestic absorption as an explanation for the GDP differences which indeed is a reasonable defence.

Heterogeneity among the population, incalculable income inequalities, sample selection bias are ubiquitously emphasized problems mainly specific to the studies in African and Latin American countries. Apart from these major statistical problems, volitional underreporting and misrepresentation are inevitable data problems specific to micro level studies. Against all limitations, household surveys can provide valuable information about the population under valid assumptions.

The second problem which is the lack of transparency and consistency among budget statistics has already been mentioned in the literature review part in quiet detail. The problem constituted the starting point of the debates about fiscal policy and led the foundation of generational accounting methodology as an alternative measure. To concretize the point, for the year 2008, Ministry of Finance reports a total tax receipt of 168 billion TL which corresponds to 80.2% of the total central government revenue. 38 billion TL of this amount is reported as personal income tax while 68.61 billion TL is declared as the sum of Domestic Value Added Tax (VAT) and Special Consumption Tax (SCT). On the other hand, Revenue Administration declares that tax revenues sum up to 189.98 billion TL and they accounts for 84% of the general government revenue. 44.43 billion TL of this amount is labelled as personal income tax and 72 billion TL is the declared sum of VAT and SCT.

The drastic deviation among these two numbers stems from the fact that local administration budgets and fund shares as well as tax disallowances and returns have been added to the central government revenue for the years 2006-2011 and the Revenue Administration prefers to present these gross figures. Ministry of Finance on the other hand reports statistics net of tax disallowances, cost-of-living allowance and returns. Neither the reasoning behind the fiscal change nor the rationale behind presenting different statistics has been justified in any source but it is true that such dilemmas blur the fiscal outlook. They do not only puzzle citizens about the amount of tax they pay but also cause underrated budget deficit figures. Furthermore, the social security system, which can at best be labelled as a "huge fiscal gap" is left outside the central government budget. Exclusion of the social security deficit again represents an undervaluation of the budget deficit. The inherent meaninglessness of the deficit concept is exacerbated by these data manipulation problems.

4.1 Tax, Transfer and Social Security Statistics

To construct the generational accounts we need to calculate the amount of net taxes, in other words the amount of tax paid less transfer received for specific age-gender group. In the literature there are numerous ways to reach these figures but we can broadly categorize them into two classes as the direct (micro level) and the indirect (macro level) calculation methodology.

In US and EU countries where extensive and harmonized micro level data exists, the methodology is to collect tax and transfer figures directly from the personal declarations. Grouping these figures according to gender and age specifications and harnessing them with the population projections, one can get the intergenerational distribution of the government deficit burden. The other stream of methodology which we call indirect or macro based involves countries where national figures are presented with some information on the demographic distribution. This is a rather arbitrary methodology yet it is not invalid to expect that on average what we get from micro and macro variables will more or less converge, provided that we do not have sample selection bias or external validity problem. The nature and availability of Turkish data dictates us to choose a methodology in between these two. The tax and transfer items in the budget survey and the method through which the aggregate figures are obtained will be explained in this chapter.

4.1.1 Taxes

Household Budget Survey provides extensive information about the source and level of household's income. Listed income items are salaries, agricultural income, and income from entrepreneurial activity, annual income from immovable property and estates, interest payment receipts from foreign and domestic bank accounts, dividend payments and rents[9].

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[9] Salaries represent the net annual income derived from salary, wage and daily fee payments net of pension, social security deductions and taxes. Gratuities, bonuses, premiums, income from extra tasks and expert's fees are classified elsewhere. Tax refunds are recorded under transfer payments. Agricultural income is the annual sum of harvest revenue, increase in the livestock inventory, expenses made for animal products, lease income from agricultural equipment and machinery, income from forestry, fishing and hunting and share cropper's profit less harvest expenses and revenue from animal products. Income from entrepreneurial activity is the net annual disposable (gross revenue less direct taxes and investment expenditures) cash income received by the entrepreneur. Copyright income is included. Income from immovable property is the receipts of renting real estate, commercial space and warehouses.

All income records are annual and net figures hence the initial step is to calculate the gross figures and the relevant tax payments. It is to be emphasized that the calculations can at best be arbitrary since we need to assume a pre-specified tax rate on each income item whereas in reality these vary to the extent that allowances and exemptions apply.

Once the income and tax figures are obtained from raw data, the contribution of each age and gender group is calculated as the ratio of tax payments to the total receipt. These values (the percentage contributions) can be thought as the expected income tax payment of each group[10]. Multiplying these expected values (might be perceived as probabilities as well) with the de facto income tax revenue of 2008, the actual income tax burden of each group is obtained. Per capita tax burden values are achieved by dividing aggregate tax receipts borne by each group to the relevant population figure.

Statistics show that the large share of the income tax is borne by males aged between 45-49 and it is 2410 TL per individual. As for women, the income tax burden peak is reached within the 35-39 age interval yet the per capita payments are almost one fifth of the male accounts. At first glance, these amounts might seem unacceptably low for annual figures however one should keep in mind that these are not the "tax per taxpayer" but "average tax per individual" figures, meaning that the tax aggregates are homogenously distributed within the age-gender groups, regardless of whether the individual makes an actual payment or not.

The second largest direct tax item in the budget sheet is the corporate tax which amounted to 16 billion TL in 2008. Although it is not the natural but the legal persons such as corporations, joint stock companies and ventures who are liable to pay the corporate tax, this tax liability represents transfer of resources from private hands to those of the public. Thinking it as an amount that could have been distributed to natural persons in the form of profit for instance, the corporate tax burden needs to be considered as a burden as well.

It is to be emphasized that Household Budget Survey does not provide direct information about the corporate tax burden borne by individuals. Henceforth, an arbitrary yet consistent methodology is developed. First, those who own or share an enterprise are filtered from the

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[10] $p_{ij} = \dfrac{X_{ij}}{\sum\limits_{j=1}^{11}\sum\limits_{i=1}^{2} X_{ij}}$, $i = m, f$ $j = 1,...,11$ where p_{ij} is the expected income tax contribution of the

i^{th} gender and the jth age group given the sample tax payments X_{ij} .

survey sample. Then the records from the same household (spouse ownership) are deleted to prevent repetition and double calculation of corporate tax. Whoever declared a larger income is regarded as the owner of the enterprise. It is not possible to estimate the firm revenue or the profit however it can be assumed that entrepreneurship income declared by the individuals is a good proxy for the enterprise revenue. Hence, those who own an enterprise and raise entrepreneurial income are ranked and categorized according to age and gender groups[11]. The final step is to calculate the share of each group in percentages and multiplying these percentages with the aggregate corporate tax revenue of 2008.

The Household Budget Survey does not contain information about the consumption expenditures of individuals. If it did, it could have been much easier and straightforward to get the distribution of excise taxes among age and gender groups. Instead, a different dataset (Household Consumption Survey) with detailed information about how much monthly expenditure has been spent on specific consumption good items have been provided by Turk Stat. One possible approach could have been matching the individual and the household level surveys however this does not provide the information needed. That's because even if the two datasets are stacked flawlessly, one cannot know which specific household member made the recorded expenditure. A rather different approach is developed to overcome the problem in hand.

Instead of utilizing the household level data, the aggregated figures provided by Turk Stat are used. As presented in Table 4, this data compiles information about the distribution of consumption expenditure among income quintiles (income brackets of 20%).

First the individuals in the budget survey are ranked according to their income levels. The tip of the calculation is to take both the regular sources of income (wage, salary, etc.) and the transfer receipts into account because from whatever source the income is gathered from, it enables the individual to make an expenditure. Then this data, which has been ranked in ascending order, is divided into five groups each one representing a quintile. Each of these five groups is differentiated according to age and gender specifics. The rest of the calculation is simplistic and involves stacking this data with the information provided by the consumption figures. Once the sample statistics are revealed, it is easy to distribute various indirect tax items by using the same method utilized in the computation of income and corporate tax.

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[11] For spouse ownerships, the co-owner's income is added on that of the lead owner.

Table 4: Distribution of Consumption Expenditure (All Items)

	Income Quintile 1	Income Quintile 2	Income Quintile 3	Income Quintile 4	Income Quintile 5
Food and Non-Alcoholic Bev.	3.1	3.8	4.5	5.1	6.3
Alcoholic Bev. and Tobacco	0.5	0.6	0.8	0.8	1.1
Clothes and Footwear	0.4	0.6	0.9	1.2	2.3
Water, electricity, gas and fuel	2.8	4.4	5.5	6.7	9.6
Furniture and house appliances	0.5	0.8	1.0	1.4	2.2
Health	0.2	0.2	0.3	0.4	0.8
Transportation	0.7	1.5	1.9	3.3	6.7
Communication	0.3	0.6	0.8	1.0	1.6
Cultural Expenses	0.1	0.3	0.4	0.6	1.2
Education Services	0.1	0.1	0.3	0.4	1.1
Restaurants, food services, hotels	0.2	0.5	0.7	1.0	1.9
Miscellaneous goods and services	0.3	0.4	0.6	0.9	1.9
Total Consumption Expenditure	**9.1**	**13.8**	**17.7**	**22.8**	**36.7**

Source: Turk Stat (database), Household Consumption Survey, 2008

Table 5: Distribution of Consumption Expenditure (Selected Items)

	Income Quintile 1	Income Quintile 2	Income Quintile 3	Income Quintile 4	Income Quintile 5
Petroleum and Natural Gas Products	9.56	15.22	18.84	23.19	33.06
Alcoholic Beverages/Tobacco Products/Cola Beverages	13.49	16.61	19.70	22.38	27.82
Motor Vehicles	4.90	10.46	13.84	23.22	47.57
Other	6.50	10.08	15.74	21.36	46.32

Source: Turk Stat (database), Household Consumption Survey, 2008

We shall concretise the relevant calculations by giving a detailed example. In 2008, the revenue gathered from VAT realized as 16.85 billion TL. Roughly 9.1% of this gross amount was born by the individuals in the lowest income quintile whereas 36.7% was paid by the individuals in the highest income bracket. Hence the VAT payments made by the income brackets can be approximated as 1.5, 2.3, 3.0, 3.9 and 6.1 billion TL in ascending order. Adjusting these population aggregates by the sample population figures (each quintile is comprised of 2453 individuals) VAT burden of each income group is calculated as 620, 945, 1211, 1561, 2511 million TL respectively. Given the age and the gender specifications, this aggregate burden is distributed among individuals. (See Appendix A for the detailed distribution of tax items among age and gender groups). Different items have been used for the calculation of different taxes. For instance, to compute SCT and the Motor Vehicles tax,

the items specified in Table 5 have been utilized. Import VAT (using domestic VAT as a proxy), Communication Tax (using communication expenditures as a proxy), Banking and Insurance Tax, Gambling Tax, Stamp Duty and Fees (using miscellaneous goods and services as a proxy) are distributed in a similar way. Unfortunately, there is no proxy data to make a valid estimation about the distribution of succession duty among age and gender groups. Assuming that the income and the wealth of the individual are correlated, we have adopted the income distribution pattern to handle succession duty. This is not an invalid assumption and to the extent that succession duty constitutes a very minor share of the tax revenues, the arbitrariness can be tolerated.

Figure 1 and 2 displays the cumulative distribution of direct taxes for males and females, respectively. It is observed that in aggregate terms, males between 35-39 bear the highest portion of direct taxes, although males make their peak per capita tax payment between 45-50 (see Table 6). This deviation between the aggregate and the per capita figures stems from the fact that the 35-39 age group is more populous than the 45-50 category (see Appendix A for the detailed distribution of 2008 Turkish population among age and gender groups). Figures suggest that females make the largest aggregate contribution to direct tax revenues between the age 30-34.

While income tax constitutes the highest tax burden on both genders, males are also faced with an excessive payment of the corporate tax as well. Same applies for the motor vehicle taxes whereas succession duty appears to constitute only a negligible share for both genders at all ages.

Figure 1: Cumulative Distribution of Direct Taxes (Males)
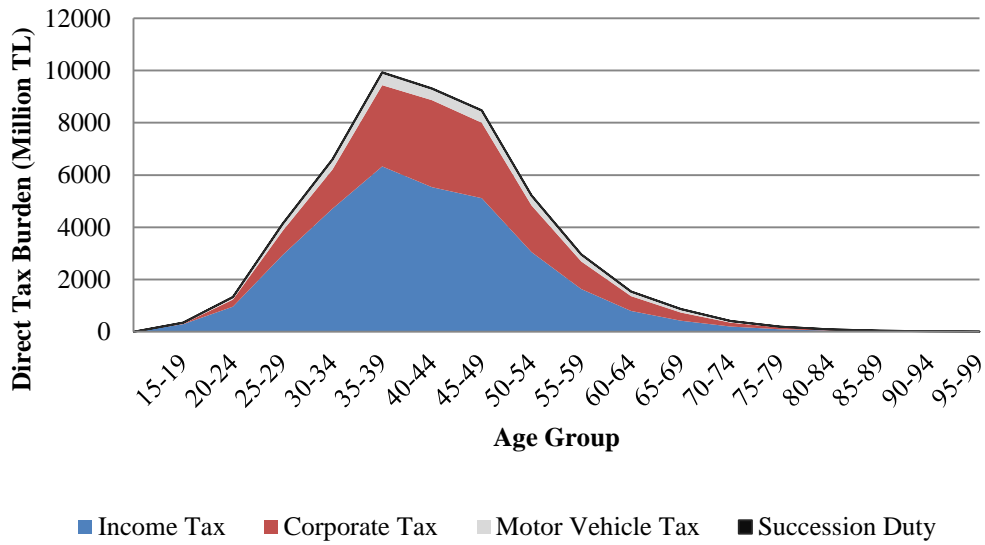
Source: 2008 Household Budget Survey, Author's own calculations

Figure 2: Cumulative Distribution of Direct Taxes (Females)
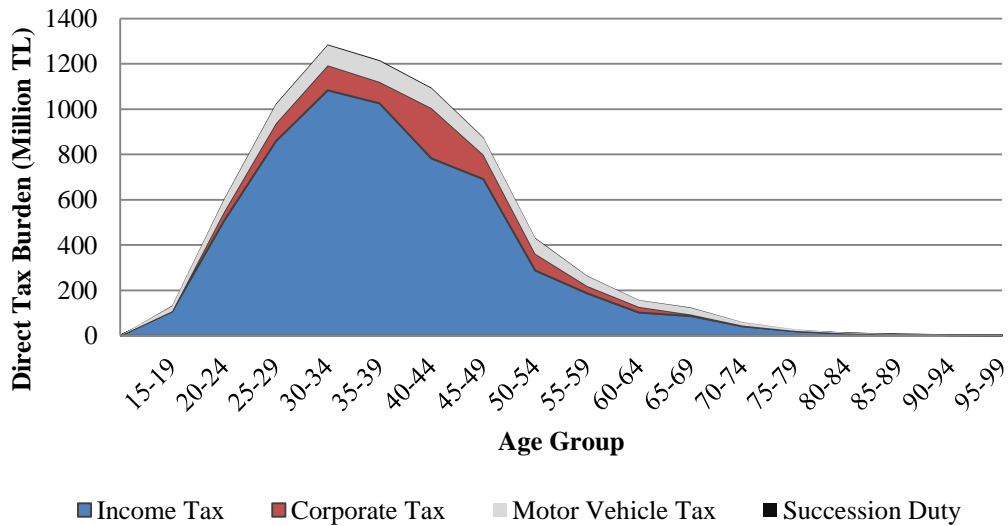
Source: 2008 Household Budget Survey, Author's own calculations

The Figures 3 and 4 provide the cumulative distribution of indirect taxes in a similar fashion. The pattern is closer to that of direct taxes yet the break in the male accounts at the 45-49 age interval and a similar hump in the female accounts between 65-69 are discernible.

Figure 3: Cumulative Distribution of Indirect Taxes (Males)
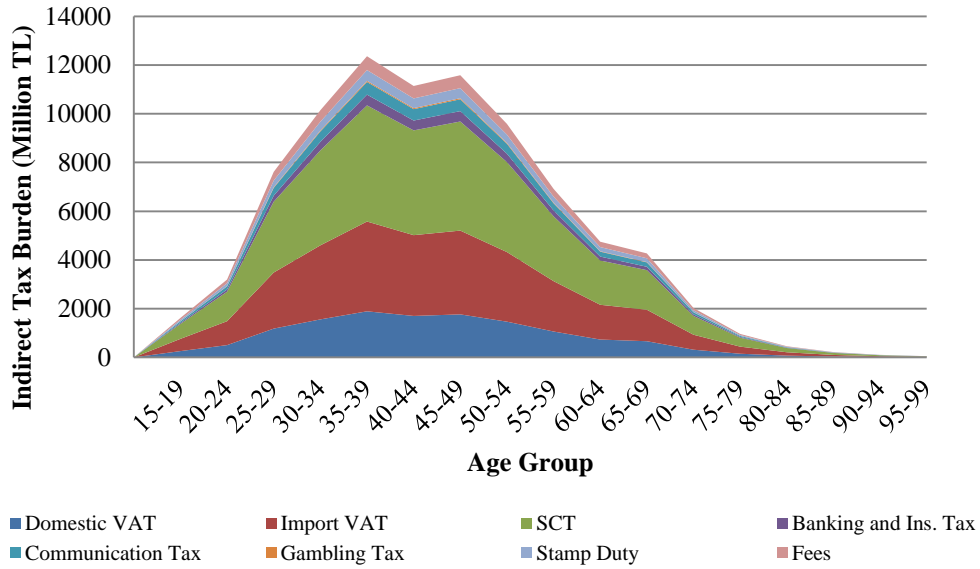
Source: 2008 Household Budget Survey, Author's own calculations

Figure 4: Cumulative Distribution of Indirect Taxes (Females)
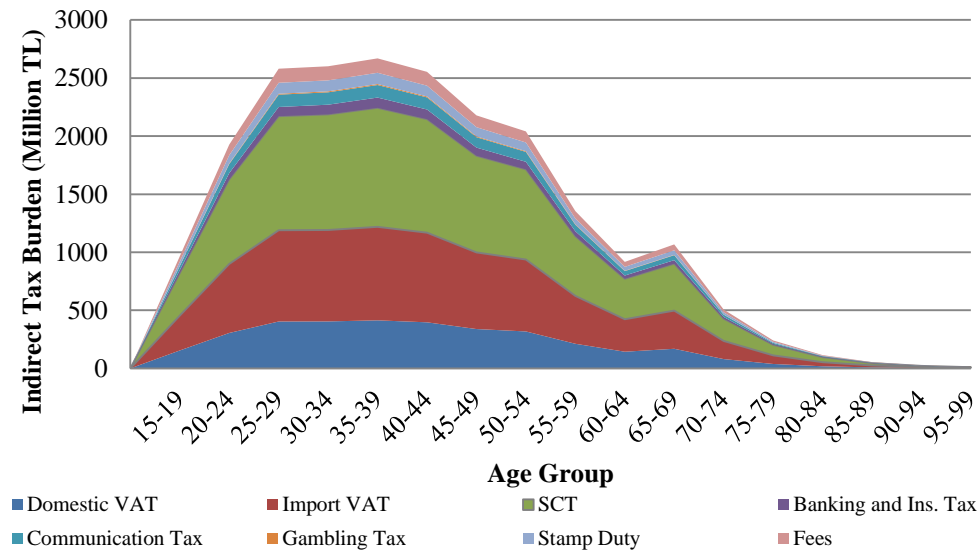
Source: 2008 Household Budget Survey, Author's own calculations

As shown in the analysis of direct taxes, the population hence the aggregate tax burden of the age group 30-34 is noticeably high. The second peak in the 45-49 interval is partly due to the high per capita taxes born by this group and partly because the pension payments make a jump for some members of this interval. The latter can be explained by the fact that a part of this age group is subjected to the old pensionable age regulations. For females, the second of the two peaks is observed at the age interval 65-69. This can again be explained by the extent of social security benefits received.

4.1.2 Transfers to Households and Social Security Balances

Receipts items specified in the Household Budget Survey are retirement pensions, old age benefits, widow's and orphan's annuities, disability payments, welfare funds, family allowances, war pensions, student grants, unemployment benefits and various supports. As indicated, there is substantial match between the items specified in the survey and the ones classified in the general budget as well as the social security budget. The aggregate figures are distributed to age-gender groups with the same methodology as in taxes.

Table 6: Per Capita Payments and Receipts, Males (TL)

Tax/Transfer	0-5	5-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65+
						Generation's Age in 2008							
Income Tax	0	0	92.9	303.3	892.3	1629.2	2393.7	2345.4	2410.0	1704.5	1179.1	795.6	424.9
Corporate Tax	0	0	5.6	85.5	280.6	517.9	1175.5	1410.8	1361.2	998.1	761.4	565.1	311.6
VAT	0	0	82.1	158.5	358.3	539.1	715.0	720.7	831.5	818.6	764.4	728.9	596.6
SCT	0	0	194.7	381.4	882.4	1347.5	1803.0	1822.5	2110.2	2063.7	1916.4	1810.3	1464.8
Import VAT	0	0	160.1	309.1	698.5	1050.9	1394.0	1405.0	1621.1	1596.0	1490.3	1421.1	1163.2
Banking and Ins. Tax	0	0	13.5	29.1	75.2	121.2	167.3	171.0	200.4	192.1	175.1	160.6	124.2
Communication Tax	0	0	20.0	41.2	96.7	147.8	196.1	198.0	229.2	226.2	211.1	200.5	162.1
Gambling Tax	0	0	1.2	2.8	7.6	12.6	17.4	17.7	20.8	20.0	18.2	16.5	12.6
Stamp Duty	0	0	19.3	37.2	84.1	126.5	167.8	169.1	195.1	192.1	179.3	171.0	140.0
Fees	0	0	24.7	47.6	107.6	161.9	214.8	216.5	249.7	245.9	229.6	218.9	179.2
Motor Vehicles Tax	0	0	66.2	72.2	88.9	91.1	105.6	99.1	101.2	99.3	104.0	114.1	135.7
Succession Duty	0	0	1.3	1.9	3.3	4.2	5.2	5.1	5.7	5.8	5.7	5.8	5.4
Social Security Premium	0	0	70.1	448.3	1541.8	2555.5	3922.5	3759.5	3643.8	2149.2	1266.7	753.0	358.6
TOTAL PAYMENTS (1)	0	0	751.4	1451.2	4047.6	6684.4	10120.5	10163.0	10463.6	7839.3	5997.6	4772.8	3297.6
Education	0	126.6	78.5	19.9	6.3	3.0	3.2	1.4	0.1	0	0	0	0
Other Transfers	0	0	8.9	20.7	28.3	37.0	40.9	43.8	47.5	60.9	96.7	178.4	796.7
Health	83.0	73.4	73.0	72.2	214.1	244.0	266.9	299.0	363.2	430.6	555.3	767.7	2160.7
Pension	0	0	0	0	0	0	25.4	160.2	2435.1	5144.7	5640.0	5974.5	6726.0
Widow/Orphan Benefits	0	0	8.9	8.8	9.0	1.6	3.2	10.0	0	0	6.3	27.3	32.4
Old Age Benefits	0	0	0	0	0	0	0	0	0	0	0	4.2	110.9
TOTAL RECEIPTS (2)	83.0	199.9	169.2	121.6	257.8	285.5	339.6	514.5	2845.9	5636.2	6298.3	6952.0	9826.7
NET TAX (1)-(2)	-83.0	-199.9	582.2	1329.6	3789.8	6398.9	9780.9	9648.5	7617.7	2203.1	-300.7	-2179.2	-6529.1

Table 7: Per Capita Payments and Receipts, Females (TL)

Tax/Transfer	0-5	5-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65+
							Generation's Age in 2008						
Income Tax	0	0	35.8	165.6	266.7	383.6	392.1	339.4	328.8	161.1	131.7	90.3	66.8
Corporate Tax	0	0	0.3	12.8	24.5	39	36.2	96.5	51.4	41.4	22.8	22.3	5.1
VAT	0	0	51.7	99.8	125.5	143.2	158.1	172.1	161.2	178.2	149.3	127.3	130.4
SCT	0	0	122.4	238.2	305.3	352.4	391.8	424.1	396.2	435.1	362.4	308.8	311.9
Import VAT	0	0	100.6	194.2	244.2	278.8	307.8	335	313.8	346.8	290.5	247.9	253.8
Banking and Ins. Tax	0	0	8.4	17.5	24.6	29.6	33.7	36.1	33.3	36.1	29.4	24.9	23.5
Communication Tax	0	0	12.2	25.3	33	37.7	41.2	45.2	42.6	47.7	39.8	33.7	33
Gambling Tax	0	0	0.7	1.6	2.4	2.9	3.3	3.5	3.3	3.6	2.9	2.4	2.1
Stamp Duty	0	0	12.1	23.4	29.4	33.6	37	40.3	37.8	41.7	35	29.8	30.5
Fees	0	0	15.5	29.9	37.6	43	47.4	51.6	48.3	53.4	44.8	38.2	39.1
Motor Vehicles Tax	0	0	7.4	17.4	25.7	31.2	35	37.3	34.8	37.6	30.3	25.4	22.3
Succession Duty	0	0	0.9	1.3	1.4	1.5	1.6	1.8	1.6	1.8	1.5	1.4	1.7
Social Security Premium	0	0	38.7	304.6	475	515.7	605	515.2	356.7	146.1	41.2	58.9	0
TOTAL PAYMENTS (1)	0	0	406.6	839.7	1.223.90	1.466.60	1.619.80	1.586.30	1.330.70	1.001.10	739.2	634.4	538.3
Education	0	129.2	81.0	20.1	5.5	2.9	1.1	0.4	0.3	0	0	0	0
Other Transfers	0	0	0	32.2	63.8	62.2	60.2	61.2	59.3	60.7	67.0	85.6	295.7
Health	76.1	62.1	80.8	78.9	94.7	107.9	116.5	132.2	307.7	362.1	455.4	573.3	1386.2
Pension	0	0	0.0	0.0	0.7	5.0	8.8	265.7	644.2	1318.5	1289.5	1043.2	758.6
Widow/Orphan Benefits	0	0	32.4	29.6	20.8	39.5	115.5	189.4	225.7	398.8	687.3	776.8	1278.4
Old Age Benefits	0	0	0	0	0	0	0	0	0	0	0	10.4	123.1
TOTAL RECEIPTS (2)	76.1	191.3	194.3	160.8	185.5	217.4	302.1	649.0	1237.2	2140.1	2499.2	2489.4	3842.1
NET TAX (1)-(2)	0	-129.2	-113.4	-81.9	-90.8	-109.5	-185.6	-516.8	-929.5	-1777.9	-2043.8	-1916.0	-2455.8

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4.2 Government Consumption

Government consumption is defined as the government expenditure less current transfers and interest payments. More formally it represents the amount spent on the purchase of goods and services, wage payments, defence, education, judicial system expenditures, etc.

Table 8: Centralized Government Budget, 2008 (million TL)

Receipts		Expenditures	
Tax Revenue	**168.109**	**Expenditures Net of Interest Payment**	**176.369**
Income Tax	38.030	Wages	48.856
Corporate Tax	16.905	Social Security Contribution	6.408
Succession Duty	144	Purchases of Goods and Services	24.412
Motor Vehicle Tax	3.944	Current Transfers	70.360
Domestic VAT	16.805	Capital Expenditures	18.516
Special Consumption Tax	41.832	Capital Transfers	3.174
Petr. and Ntr. Gas Products	23.941	Lending	4.644
Motor Vehicles	3.805	**Interest Payment**	**50.661**
Alcoholic Beverages	1.987		
Tobacco Products	10.888		
Cola Beverages	205		
Other	1.005		
Bank. and Ins. Trans. Tax	3.695		
Gambling Tax	376		
Communication Tax	4.551		
VAT on Import	32.781		
Stamp Duty	3.945		
Fees	5.050		
Non-Tax Revenue	**41.490**		
Enterprise and Owns. Revenues	7.422		
Gifts Received	850		
Interest. Share and Fine revenues	17.126		
Capital Income	9.114		
Other	6.979		
TOTAL RECEIPT	**209.599**	**TOTAL EXPENDITURE**	**227.031**
Deficit (-)	17.432		
Primary Surplus	33.230		

Source: Ministry of Finance (database), Budget Figures and Budget Realizations,2012

The relevance of government consumption to the GA calculations is that this sum represents an amount that cannot be distributed according to age and gender specifics. Hence it is taken as an aggregate and projected to the future by using a predetermined growth rate. For the year

2008 government consumption realized as 100 billion TL according to the economic categorization of central government budget aggregates.

4.3 Government's Net Wealth

The government net indebtedness, or the negative of the government net wealth, is the difference between government's outstanding liabilities and assets at a given point in time. In the GA literature there are different views about the accurate calculation of this amount and depending on the availability of data; different authors make use of different variables or aggregates. In essence what the study needs is a variable that The Total Public Net Debt Stock data taken from the Undersecretaries of Treasury database provides the best approximation for this variable, regarding the purposes of this study. The Total Public Net Debt Stock is calculated as the Total Public Gross Debt Stock less the Central Bank Assets, Public Assets and Unemployment Insurance Fund's Assets. Total Public Net Debt Stock was 268 billion TL for the year 2008.

4.4 Population Projections

The population projections constitute a crucial part of the generational account calculations since the burden born by different generations vary significantly under different assumptions of fertility, mortality and dependency ratio scenarios.

Figure 5: Median Age for Turkey under High, Medium and Low Fertility Assumptions (1950-2100)
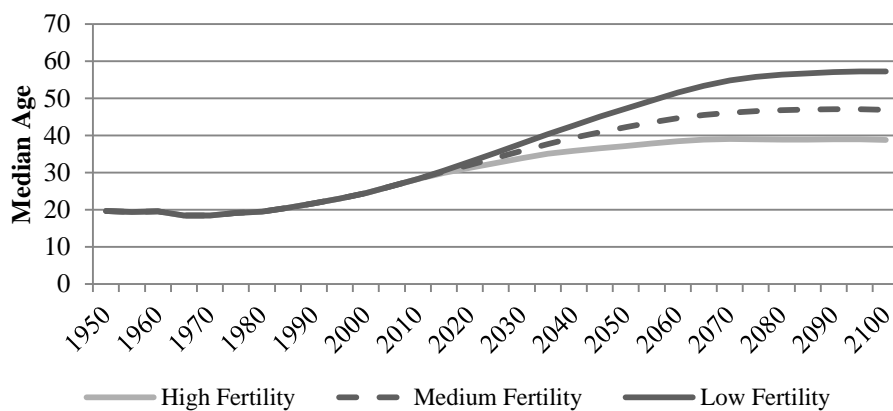
Source: UN World Prospects (database) - World Population Prospects, 2010 Revision

Figure 6: Old Age and Child Dependency Rates for Turkey[12] (1950-2100)
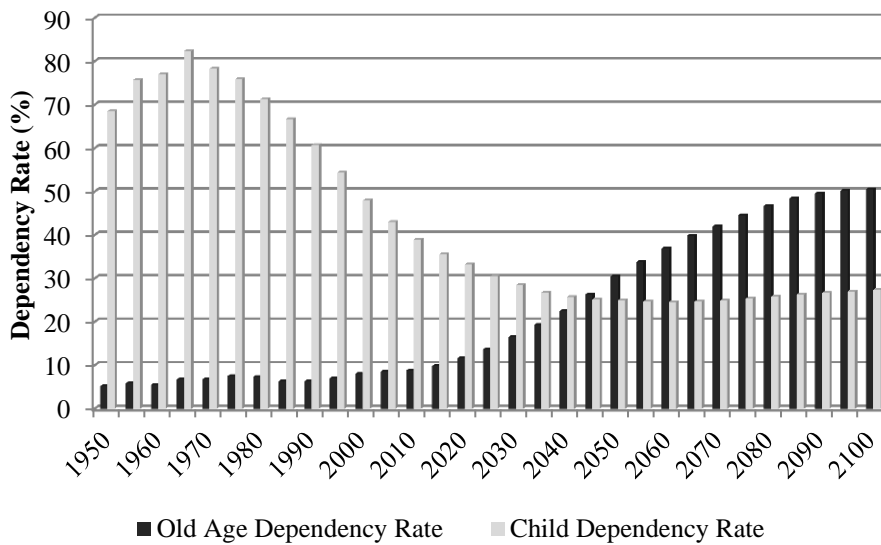
Source: UN World Prospects (database) - World Population Prospects, 2010 Revision

Figure 5 displays the evolution of median age for Turkey under high, medium and low fertility assumptions, projections starting from 2010 and extending to 2100. Results indicate that even under the high fertility assumption, the median age of Turkish population will roughly be doubled in 2100 compared to the 2010 figures. This means that population ageing problem is relevant for the Turkish generational accounts as well as it is for the US and the European economies. Comparing Turkey's demographic projections with those of the countries studied in the literature (see Appendix B), one shall observe that the median age is discernibly low and will remain as such in the foreseeable future. However as of 2100 Turkey is expected to have more or less equivalent figures with the rest of the world. Figure 6 presents the old age and child dependency ratios for the same projection horizon. Projections indicate that in the long run, the active workers class will be faced by an overwhelming pressure to support and compensate for the young and the elderly population. The urgency of a reform movement becomes more evident when these projections are investigated.

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[12]Old-age dependency rate is defined as the ratio of the total number of senior individuals (those who are aged 65 and above) to the total number of those who are at the working age (those who are aged between 15 and 64). Child dependency ratio is defined as the total number of those who under the legal working age (those who are aged between 0 and 14) to the total number of those who are at the working age (those who are aged between 15 and 64). UN offers three other indices of old age and child dependency ratio for different age intervals however these two are the most conventional ones and they fit the legal working and retirement age for Turkey. Old age and child dependency ratios are indicative of the "supporting capacity" of the population.

Table 9: Demographic Projections for Selected Age Intervals between 2013-2100

	Population (thousands)				Dependency Ratio (%)		
Year	0-14	15-64	65+	Total	Old Age	Child	Total
2013	18,864	51,517	5,430	75,811	10.5	36.6	47.2
2014	18,883	52,246	5,578	76,707	10.7	36.1	46.8
2015	18,890	52,970	5,741	77,601	10.8	35.7	46.5
2016	18,885	53,660	5,933	78,478	11.1	35.2	46.3
2017	18,874	54,307	6,156	79,337	11.3	34.8	46.1
2018	18,845	54,901	6,427	80,173	11.7	34.3	46.0
2019	18,838	55,469	6,676	80,983	12.0	34.0	46.0
2020	18,831	56,003	6,944	81,778	12.4	33.6	46.0
2021	18,819	56,513	7,226	82,558	12.8	33.3	46.1
2022	18,806	57,001	7,521	83,328	13.2	33.0	46.2
2023	18,778	57,450	7,825	84,053	13.6	32.7	46.3
2024	18,746	57,877	8,118	84,741	14.0	32.4	46.4
2025	18,708	58,264	8,435	85,407	14.5	32.1	46.6
2030	17,000	59,784	9,881	86,665	16.5	28.4	45.0
2035	16,275	60,766	11,729	88,770	19.3	26.8	46.1
2040	15,678	60,928	13,695	90,302	22.5	25.7	48.2
2045	15,179	60,241	15,831	91,251	26.3	25.2	51.5
2050	14,716	58,931	17,969	91,617	30.5	25.0	55.5
2055	14,254	57,707	19,478	91,438	33.8	24.7	58.5
2060	13,823	56,214	20,764	90,800	36.9	24.6	61.5
2065	13,464	54,561	21,755	89,780	39.9	24.7	64.5
2070	13,193	53,014	22,270	88,478	42.0	24.9	66.9
2075	12,979	51,205	22,813	86,998	44.6	25.3	69.9
2080	12,790	49,498	23,138	85,426	46.7	25.8	72.6
2085	12,606	47,978	23,239	83,823	48.4	26.3	74.7
2090	12,437	46,663	23,127	82,227	49.6	26.7	76.2
2095	12,298	45,521	22,854	80,673	50.2	27.0	77.2
2100	12,197	44,509	22,494	79,200	50.5	27.4	77.9

Source: UN (database), Population Prospects, 2012

5. RESULTS AND DISCUSSION

Table 10 displays the baseline[13] generational accounts of males and females alive in the base year 2008 through five year intervals[14] and compares these values with the net tax burden of future new-borns. The accounts are presented for males, females separately and the total population. The initial observation is that there exists a huge gender gap among male and female accounts. Whereas a new-born male (i.e. born in 2008) bears a 49,510 TL life time net tax burden, a new-born female appears to be a net beneficiary through nearly the whole life cycle. However this should not be regarded as an evidence of gender inequality to the disadvantage of males. Turkish females are engaged in income generating activities that are not typically exchanged in the market. Moreover the life expectancy for females is higher than that of males, which means that women receive higher benefits at the elderly period of their life cycle due to old age benefits, widow funds and inherited pensions from their deceased spouses[15]. The second remarkable finding is that similar to a number of countries studied in the literature, there exists a fiscal imbalance to the disadvantage of those who are not yet born in Turkey as well. The gap among current and future generations' accounts on the other hand remains relatively modest with a percentage difference of 24.3%. The results might seem puzzling at first sight given the frequently uttered discontent with the fiscal balances and the level of debt however a closer attention to the tax, transfer and social security dynamics will help understanding the relative smallness of the imbalance.

First of all, Turkey does not have a generous and redistributive transfer system that is capable of distorting fiscal balances to the favour of future generations. The amount of in cash and in kind benefits transferred to the households is significantly low compared to a number of countries and it is deemed to remain the same in both in the short and long run. More important than that, the pay-as-you-go system is not as deadlocked as it is in the European welfare states who are faced with the problem of ageing population in the near future. As of the old dependency rate, Turkey ranks the second among countries listed in Appendix B.

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[13] Baseline scenario: Discount rate (r) =5%, Growth Rate (g) =1.5%, Medium Population Growth

[14] The generational accounts have been calculated for all those who were aged between 0-100 in 2008 however for convenience the results are presented in five year intervals and population among 80, which is a negligible portion of the population in 2008, has been excluded.

[15] See Tables 11, 12 and 13 for the distribution of GA according to payment and receipt items for females, males and the total population, respectively.

Table 10: Generational Accounts under Baseline Scenario* (TL)

Generation's Age in 2008	Net Lifetime Payments		
	Males	**Females**	**Total**
0	49,510	-1,030	24,240
5	58,860	-1,190	28,835
10	70,460	-0,560	34,950
15	89,510	0,160	44,835
20	104,800	-0,160	52,320
25	116,010	-2,640	56,685
30	133,060	-8,070	62,495
35	131,540	-15,650	57,945
40	106,500	-26,680	39,910
45	67,390	-38,190	14,600
50	20,000	-41,480	-10,740
55	-3,010	-46,580	-24,795
60	-17,690	-47,440	-32,565
65	-31,140	-56,580	-43,860
70	-34,660	-49,430	-42,045
75	-40,640	-49,250	-44,945
80	-43,550	-47,520	-45,535
Future Newborns	58,990	1,610	30,300
Percentage Difference			24.3%

*Discount rate (r) =5%, Growth Rate (g) =1.5%, Medium Population Growth

Figure 7: Net Life Time Payments, Receipts and GA (Males)
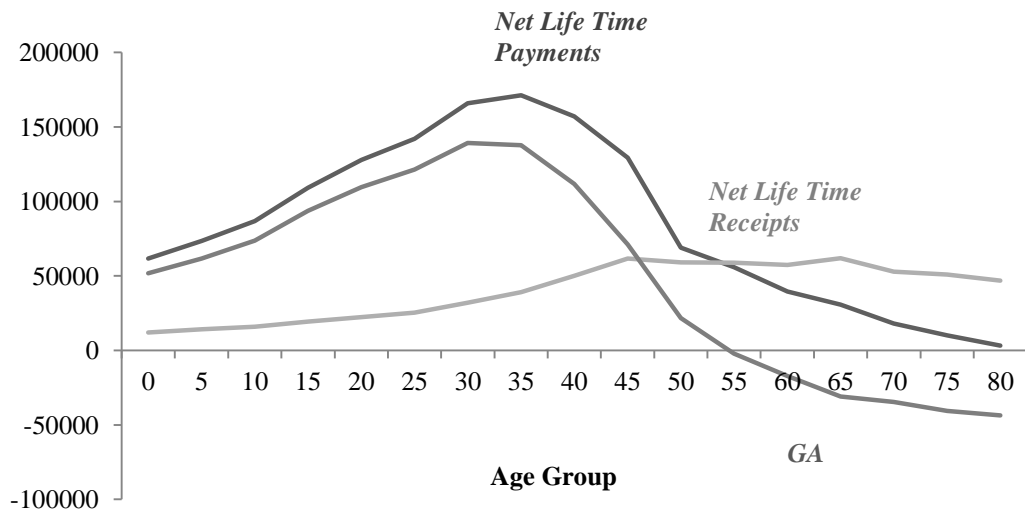
Figure 8: Net Life Time Payments, Receipts and GA (Females)
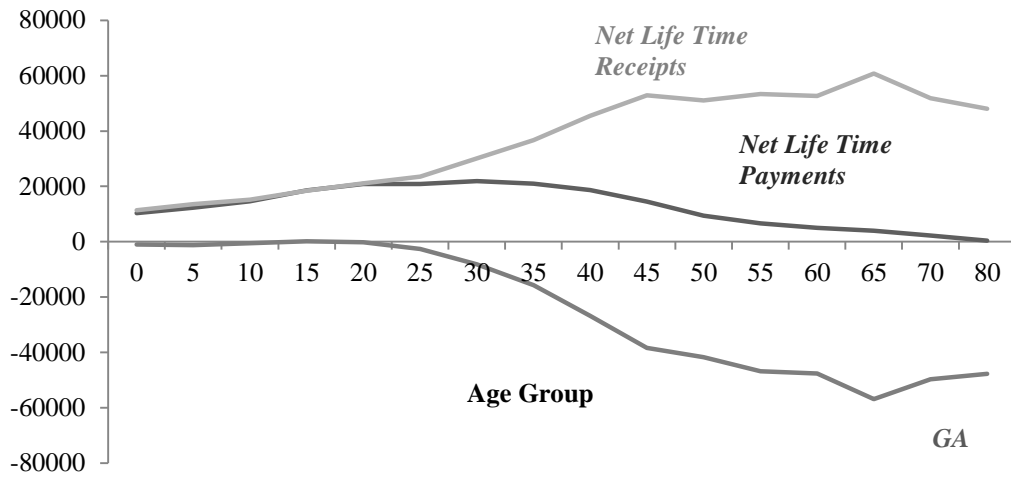
Table 11: Composition of Generational Accounts for the Base Case (TL)-FEMALES

Age in 2008	Net Tax	Payments								Receipts					
		Income Tax	Corporate Tax	VAT	Other Taxes	SCT	Import VAT	Social Security Premium	Pension	Widow Orphan	Health	Education	Old Age	Other
0	-1,030	544	289	1,343	352	2,538	1,716	3,518	-1,058	-4,821	-2,713	-1,886	-344	-508
5	-1,196	651	346	1,617	424	3,057	2,065	4,187	-1,277	-5,866	-3,113	-2,233	-409	-644
10	-563	771	412	1,923	505	3,640	2,457	4,937	-1,538	-7,097	-3,622	-1,667	-482	-801
15	159	974	521	2,450	644	4,638	3,126	6,214	-1,977	-9,159	-4,519	-1,086	-606	-1060
20	-161	1,130	627	2,656	711	5,107	3,428	7,256	-2,463	-10,830	-5,103	-660	-735	-1286
25	-2,656	1,152	683	2,624	712	5,097	3,466	7,101	-2,989	-12,573	-5,575	-174	-873	-1308
30	-8,117	1,232	795	2,833	772	5,511	3,744	7,057	-4,035	-16,517	-6,838	-62	-1157	-1451
35	-15,733	1,103	819	2,816	767	5,479	3,753	6,243	-5,240	-20,453	-7,976	-31	-1475	-1537
40	-26810	913	857	2,719	738	5,290	3,619	4,542	-7,046	-24,992	-9,733	-13	-2013	-1691
45	-38,379	673	507	2,357	639	4,587	3,198	2,532	-8,280	-28,610	-11,464	-6	-2701	-1812
50	-41,680	338	292	1,713	463	3,333	2,387	854	-7,349	-28,143	-10,702	-3	-3147	-1716
55	-46,799	243	166	1,259	339	2,451	1,835	314	-5,768	-30,037	-11,464	-1	-4214	-1923
60	-47,657	172	113	918	248	1,787	1,521	225	-4,161	-28,726	-12,018	0	-5580	-2155
65	-56,832	154	51	704	190	1,370	1,453	0	-3,233	-31,295	-14,922	0	-8426	-2880
70	-49,648	91	30	414	112	806	761	0	-2,671	-25,837	-13,794	0	-6968	-2593
80	-47,721	16	5	73	24	142	77	0	-2,212	-21,371	-16,460	0	-5774	-2242

Future Generations: 1,610

Table 12: Composition of Generational Accounts for the Base Case (TL)-MALES

Age in 2008	Net Tax	Payments							Receipts					
		Income Tax	Corporate Tax	VAT	Other Taxes	SCT	Import VAT	Social Security Premium	Pension	Widow Orphan	Health	Education	Other	Old Age
0	49,510	14,175	5,648	4,852	1,343	9,459	6,594	19,648	-5,126	-232	-3,948	-1,620	-710	-304
5	58,860	16,844	6,715	5,807	1,608	11,326	7,902	23,210	-6,129	-290	-4,650	-1,926	-866	-361
10	70,460	19,902	7,950	6,899	1,911	13,462	9,407	27,269	-7,297	-356	-5,499	-1,333	-1,048	-425
15	89,510	25,027	10,011	8,735	2,421	17,050	11,921	34,075	-9,259	-465	-6,963	-688	-1,337	-533
20	104,800	29,354	11,973	10,097	2,805	19,714	13,784	40,073	-11,365	-436	-8,198	-213	-1,571	-646
25	116,010	32,696	13,637	11,094	3,091	21,668	15,253	44,572	-13,594	-391	-8,772	-100	-1,759	-766
30	133,060	38,440	16,809	12,864	3,595	25,135	17,571	51,456	-18,051	-373	-10,424	-76	-2,177	-1,014
35	131,540	39,092	18,827	13,363	3,743	26,121	18,361	51,824	-23,079	-449	-11,687	-66	-2,545	-1,291
40	106,500	34,918	17,821	13,116	3,676	25,659	17,783	44,115	-31,045	-521	-13,536	-54	-3,127	-1,758
45	67,390	27,611	14,065	12,032	3,371	23,564	16,612	32,166	-39,921	-476	-15,120	-51	-3,775	-2,354
50	20,000	15,665	8,384	8,685	2,428	17,044	1,1461	15,587	-37,454	-535	-14,418	-41	-3,960	-2,740
55	-3,010	10,037	5,740	6,835	1,909	13,461	9,311	8,673	-33,945	-694	-15,848	-37	-4,792	-3,670
60	-17,690	6,627	3,939	5,223	1,462	10,346	6,806	5,126	-28,817	-817	-17,122	-30	-5,658	-4,856
65	-31,140	5,258	3,065	3,979	1,131	8,005	5,512	3,679	-24,036	-793	-21,686	-17	-7,786	-7,590
70	-34,660	3,164	1,800	2,329	680	4,810	3,211	2,157	-19,860	-655	-19,069	-13	-7,084	-6,277
75	-40,640	1,705	916	1,179	365	2,585	2,246	1,096	-17,878	-589	-20,289	-9	-6,494	-5,653
80	-43,550	590	257	327	126	889	713	307	-16,444	-541	-19,444	0	-5,312	-5,201

Future Generations: 58,990

Table 13: Composition of Generational Accounts for the Base Case (TL)-TOTAL

Age in 2008	Net Tax	Payments							Receipts					
		Income Tax	Corporate Tax	VAT	Other Taxes	SCT	Import VAT	Social Security Premium	Pension	Widow Orphan	Health	Education	Old Age	Other
0	24,375	7,360	2,968	3,098	848	5,999	4,155	11,583	-3,092	-2,526	-3,330	-1,753	-324	-609
5	28,996	8,747	3,531	3,712	1,016	7,191	4,983	13,698	-3,703	-3,078	-3,881	-2,080	-385	-755
10	35,140	10,337	4,181	4,411	1,208	8,551	5,932	16,103	-4,418	-3,727	-4,561	-1,500	-454	-925
15	45,077	13,001	5,266	5,592	1,532	10,844	7,523	20,144	-5,618	-4,812	-5,741	-887	-569	-1,198
20	52,605	15,242	6,300	6,376	1,758	12,411	8,606	23,665	-6,914	-5,633	-6,650	-437	-691	-1,428
25	56,987	16,924	7,160	6,859	1,901	13,383	9,359	25,836	-8,291	-6,482	-7,173	-137	-819	-1,534
30	62,819	19,836	8,802	7,849	2,184	15,323	10,657	29,257	-11,043	-8,445	-8,631	-69	-1,086	-1,814
35	58,241	20,097	9,823	8,090	2,255	15,800	11,057	29,034	-14,160	-10,451	-9,832	-49	-1,383	-2,041
40	40,119	17,916	9,339	7,917	2,207	15,474	10,701	24,329	-19,045	-12,757	-11,634	-33	-1,885	-2,409
45	14,673	14,142	7,286	7,194	2,005	14,076	9,905	17,349	-24,100	-14,543	-13,292	-28	-2,528	-2,794
50	-10,787	8,001	4,338	5,199	1,445	10,189	6,924	8,220	-22,401	-14,339	-12,560	-22	-2,944	-2,838
55	-24,910	5,140	2,953	4,047	1,124	7,956	5,573	4,494	-19,856	-15,366	-13,656	-19	-3,942	-3,358
60	-32,714	3,399	2,026	3,071	855	6,066	4,163	2,675	-16,489	-14,771	-14,570	-15	-5,218	-3,907
65	-44,056	2,706	1,558	2,341	661	4,688	3,483	1,840	-13,634	-16,044	-18,304	-9	-8,008	-5,333
70	-42,227	1,627	915	1,372	396	2,808	1,986	1,079	-11,266	-13,246	-16,431	-6	-6,622	-4,839
75	-44,270	860	460	626	195	1,364	1161	548	-10,045	-10,980	-18,374	-4	-5,713	-4,368
80	-44,756	299	130	179	71	475	412	154	-9,175	-9,465	-19,131	0	-5,082	-3,623

Future Generations: 30,300

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Sensitivity Analysis

One of the major empirical criticisms toward generational accounting is about the choice of exogenous parameters namely the growth and the discount rate. Hence we present a sensitivity analysis with three discount rate and three growth rate assumptions. The magnitude of fiscal imbalance changes but the direction of the imbalance does not change.

The highest generational imbalance suggested by the figures is 80.84%, realized under the 1% growth rate and 7% discount rate combination. A growth rate of 2% accompanied by a 3% discount rate yields the lowest fiscal gap; 7.43% to be precise. The variation among percentage imbalances might seem puzzling however GA results are very much susceptible to the changes in the exogenous parameters, which is confirmed by other studies as well (see Appendix C for sensitivity analysis results from Japan, Germany, Canada, Italy and Thailand). The change in the direction of the generational account is a much less interpretable result than the change in the magnitude. Our results indicate that regardless of the choice of exogenous variables, a fiscal imbalance exists to the disadvantage of those who are not yet born.

A standardized practice in the GA literature is to calculate the relevant accounts under different fertility assumptions, which might be thought as an extension of the sensitivity analysis. Table 15 presents the generational accounts under low, medium and high fertility assumptions. In line with our expectations, the fiscal gap narrows down to 21.69% under high fertility scenario whereas it widens to 27.73% under low fertility projections.

Table 14: Sensitivity Analysis

	g=1%			g=1.5%			g=2%		
	r=3%	r=5%	r=7%	r=3%	r=5%	r=7%	r=3%	r=5%	r=7%
Current Males	105.410	49.510	23.790	106.040	49.750	23.961	129.070	60.390	28920
Future Males	111.540	58.770	38.670	112.060	58.990	38.770	135.990	69.050	42690
Current Females	-10.230	-1.029	209	-10.280	-1.030	210	-15.980	-2.030	150
Future Females	-8.700	16.200	4.730	-8.750	1.610	4.720	-14.500	320	4.210
Current Newborn	47.590	24.241	12.000	47.880	24.360	12.086	56.545	29.180	14.535
Future Newborn	51.420	37.485	21.700	51.655	30.300	21.745	60.745	34.685	23.450
Absolute Imbalance	3.830	13.245	9.701	3.775	5.940	9.660	4.200	5.505	8.915
Percentage Imbalance	8.05	54.64	80.84	7.88	24.38	79.93	7.43	18.87	61.33

Author's own calculations.

Table 15: Generational Accounts under Low, Medium and High Population Assumptions (thousand TL)

Generation's Age in 2008	Net Tax Burden								
	Low			Medium			High		
	Males	Females	Total	Males	Females	Total	Males	Females	Total
0	53.4	-0.6	26.4	49.5	-1.0	24.2	46.6	-1.0	22,8
5	61.9	-0.6	30.6	58.9	-1.2	28.8	57.0	-1.1	27,9
10	73.2	0.2	36.7	70.5	-0.6	35.0	69.8	-0.3	34,7
15	92.8	1.2	47.0	89.5	0.2	44.8	90.0	0.6	45,3
20	110.2	1.3	55.8	104.8	-0.2	52.3	107.6	0.3	53,9
25	124.6	-1.0	61.8	116.0	-2.6	56.7	120.0	-2.3	58,8
30	139.2	-7.0	66.1	133.1	-8.1	62.5	132.8	-8.2	62,3
35	130.8	-15.6	57.6	131.5	-15.7	57.9	126.9	-16.1	55,4
40	102.6	-27.5	37.6	106.5	-26.7	39.9	102.8	-27.2	37,8
45	65.6	-39.9	12.8	67.4	-38.2	14.6	66.6	-39.1	13,8
50	22.5	-52.4	-14.9	20.0	-41.5	-10.7	19.0	-42.1	-11,6
55	-7.4	-66.8	-37.1	-3.0	-46.6	-24.8	-3.8	-46.6	-25,2
60	-32.9	-76.6	-54.7	-17.7	-47.4	-32.6	-17.0	-45.2	-31,1
65	-49.7	-82.8	-66.3	-31.1	-56.6	-43.9	-29.9	-54.4	-42,2
70	-57.9	-77.6	-67.7	-34.7	-49.4	-42.0	-35.9	-50.8	-43,3
75	-58.9	-69.4	-64.2	-40.6	-49.3	-44.9	-42.6	-51.3	-47,0
80	-49.8	-54.2	-52.0	-43.6	-47.5	-45.5	-43.1	-47.0	-45,1
Future Newborns	65.0	2.5	33.7	59.0	1.6	30.3	54.2	1.3	27.7
Percentage Diff.			27.73			24.30			21.69

7. POLICY EXPERIMENTS

The final contribution of this paper is to extend the Turkish GA analysis by making various policy experimentations. In this respect, one can implement and measure the effect of a myriad of policy amendments however the most sensible approach is to seek policies that can remedy the fiscal imbalance. Three of the policy experiments discussed in this section will serve this purpose whereas an additional experiment will be carried out to show how the generational balances will be distorted by a change in the corporate tax rate.

Table 16: Generational Accounts under Alternative Scenario 1 (TL)

(56% Reduction in the Government Consumption)

Generation's Age	Net Lifetime Payments		
in 2008	Males	Females	Total
0	38,460	-1,610	18,425
5	45,720	-1,890	21,915
10	54,900	-1,390	26,755
15	69,920	-0,880	34,52
20	81,370	-1,420	39,975
25	89,290	-4,020	42,635
30	100,060	-9,710	45,175
35	94,480	-17,370	38,555
40	71,340	-28,520	21,41
45	39,540	-39,390	0,075
50	3,310	-42,270	-19,48
55	-14,520	-47,130	-30,825
60	-25,660	-47,880	-36,77
65	-37,420	-56,930	-47,175
70	-38,410	-49,710	-44,06
75	-42,650	-49,490	-46,07
80	-44,250	-47,730	-45,99
Future Newborns	38,780	1,610	20,195
Percentage Difference			0.96%

*Discount rate (r) =5%, Growth Rate (g) =1.5%, Medium Population Growth

Table 16 presents the generational accounts for current and future generations under a 56% cut in the government consumption scenario. Although it is not a realistic experiment, the results indicate that a policy action that strives to alleviate the generational imbalance by cutting down government consumption would necessitate unattainable deductions. The relevant balance can be attained by less costly policy actions. One of such policy actions is to increase the social security contributions by 10%. Table 17 present the results of such a policy action.

Table 17: Generational Accounts under Alternative Scenario 2 (TL)

(10% Increase in Social Security Contributions)

Generation's Age in 2008	Net Lifetime Payments		
	Males	**Females**	**Total**
0	51,860	-650	25,600
5	61,640	-750	30,450
10	73,720	-400	36,840
15	93,600	820	47,210
20	109,610	610	55,110
25	121,340	-1,900	59,720
30	139,190	-7,360	65,910
35	137,690	-15,070	61,310
40	111,710	-26,320	42,690
45	71,120	-38,110	16,500
50	21,740	-41,590	-9,920
55	-2,110	-46,770	-24,440
60	-17,240	-47,630	-32,430
65	-30,900	-56,830	-43,860
70	-34,580	-49,650	-42,120
75	-40,710	-49,460	-45,080
80	-43,700	-47,720	-45,710
Future Newborns	52,710	-510	26,100
Percentage Difference			1.95%

*Discount rate (r) =5%, Growth Rate (g) =1.5%, Medium Population Growth

As the results suggest, it is possible to attain generational imbalance by simply increasing the social security contributions by 10% which is a smaller sacrifice and a more realistic policy action. Even a more efficient way of alleviating fiscal gap is to increase the tax revenue sourced from the highest income bracket. It is a possible remedy (and even slightly to improve compared to the current generations) the fiscal burden of future generations by increasing the income tax revenue by 0.2% which can simply be achieved through a 1.42% increase in the revenue gathered from the highest income bracket.

Table 18: Generational Accounts under Alternative Scenario 3 (TL)

(0.2% Increase in the Income Tax Revenue)

Generation's Age in 2008	Net Lifetime Payments		
	Males	Females	Total
0	51,890	650	25,620
5	61,670	750	30,460
10	73,760	30	36,860
15	93,650	820	47,240
20	109,660	620	55,140
25	121,410	-1,900	59,750
30	139,270	-7,360	65,950
35	137,770	-15,060	61,350
40	111,770	-26,320	42,730
45	71,170	-38,110	16,530
50	21,780	-41,590	-9,910
55	-2,090	-46,770	-24,430
60	-17,220	-47,630	-32,430
65	-30,880	-56,830	-43,860
70	-34,580	-49,650	-42,110
75	-40,700	-49,460	-45,080
80	-43,700	-47,720	-45,710
Future Newborns	52,630	-540	25,310
Percentage Difference			-1.21%

*Discount rate (r) =5%, Growth Rate (g) =1.5%, Medium Population Growth

Our final experiment is based upon a hypothetical scenario that involves a 50% increase in the corporate tax revenues hence the adoption of pre-1983 corporate tax rates. Results presented in Table 19 indicate that the generational impact of such practice would be to distort the fiscal balances in favour of future generations. Considering the magnitude of the change, the results are not surprising. Moreover they indicate that the fiscal balances of the economy are sensitive to the changes in the corporate tax and amendments in this particular item should be handled rigorously.

The first thing that should be noted regarding the policy experiments is that these calculations are carried out in a partial equilibrium framework hence it is not possible to compute or estimate the impact of these policy amendments on the price of capital and labour. The ultimate effect can be either narrower or wider depending on the repercussions and second

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round effects. Hence the results should not be interpreted as the exact solutions to the generational imbalance problem but as indicators of the policy actions that can potentially reduce fiscal gap in an idealized framework. Secondly, generational accounts do not make any statement about the behavioural patterns that can arise from fiscal policy actions. It is possible to say that a 0.2% rise in the income tax revenues would remedy the imbalance but whether this rise will be reached through a cut or an increase in the income brackets is open to debate. Likewise, a 50% rise in the corporate tax revenues appears to alleviate the imbalance given the current fiscal structure yet it is unknown whether such policy will encourage tax evasion and informality. The literature on tax morale and informality is very limited yet they could have been exceedingly relevant and complementary to GA analysis. This should be remarked as further research.

Table 19: Generational Accounts under Alternative Scenario 4 (TL)

(50% Increase in the Corporate Tax Revenue)

Generation's Age in 2008	Net Lifetime Payments		
	Males	**Females**	**Total**
0	55,130	-760	27,185
5	65,550	-870	32,340
10	78,380	-170	39,105
15	99,480	650	50,065
20	116,720	430	58,575
25	129,560	-2,010	63,775
30	149,690	-7,360	71,165
35	150,070	-14,960	67,555
40	123,960	-26,000	48,980
45	81,070	-37,900	21,585
50	28,060	-41,400	-6,670
55	2,430	-46,640	-22,105
60	-14,030	-47,550	-30,790
65	-28,370	-56,780	-42,575
70	-33,10	-49,620	-41,360
75	-39,950	-49,450	-44,700
80	-43,490	-47,720	-45,605
Future Newborns	41,660	-4,610	18,525
Percentage Difference			-31.85%

*Discount rate (r) =5%, Growth Rate (g) =1.5%, Medium Population Growth

7. CONCLUSIONS

The contribution of this paper is to construct the first set of generational accounts for Turkey and through the policy analysis the paper provides alternative policy suggestions to get rid of the fiscal imbalance. The results indicate that there exists a 24.3% fiscal imbalance to the disadvantage of future generations. The basic observation regarding the generational accounts is that there exists a huge gap among genders since women are net beneficiary of the government's redistributive policies and typically make one fifth of the tax contribution made by men. This pertains both to the fact that labour force participation rate is low for females in Turkey and women are traditionally engaged in activities that are not exchanged in the market. Turkish men appear to reach peak tax burden in the middle of their life cycle whereas women relish redistributive policies for more than half of their expected lifetime.

The policy experimentations revealed that in order to attain generational balance, a 56% decline in the government consumption, a 0.2% increase in the income tax revenue sourced from the highest income bracket and 10% decline in the social security contributions can be adopted. A change in the corporate taxes to pre-1983 levels would cause a 31% generational gap to the disadvantage of current new-borns.

To conclude, despite the frequently underlined problem of informality, presence of a huge tax wedge and generational imbalance, the Turkish fiscal sustainability is not as alarming as it is in many countries but the government should still be consider the fact that there exists a fiscal imbalance between current and future generations and government policies should be implemented accordingly.

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APPENDIX A

AGE AND GENDER SPECIFIC DISTRIBUTION OF TAXES, TRANSFERS AND SOCIAL SECURITY COMPONENTS (DETAILED)

Table 20: Distribution of Income Tax (Males)

Age Interval	Share in the Income Tax Payment (%)	Amount of Tax Paid (Thousand TL)	Number of Individuals in the Population (Thousands)	Income Tax per Individual (TL)
15-19	0.77	291,699	3,141	92.87
20-24	2.53	962,445	3,173	303.32
25-29	7.73	2,941,159	3,296	892.34
30-34	12.39	4,711,645	2,892	1,629.20
35-39	16.64	6,328,845	2,644	2,393.66
40-44	14.55	5,535,085	2,360	2,345.38
45-49	13.45	5,114,108	2,122	2,410.04
50-54	8.02	3,051,106	1,790	1,704.53
55-59	4.30	1,636,578	1,388	1,179.09
60-64	2.10	798,757	1,004	795.57
65+	2.36	896,620	2,110	424.94
Total	**84.85**	**32,268,047**	**25,920**	**1,244.91**

Source: 2008 Household Budget Survey, Author's own calculations

Table 21: Distribution of Income Tax (Females)

Age Interval	Share in the Income Tax Payment (%)	Amount of Tax Paid (Thousand TL)	Number of Individuals in the Population (Thousands)	Income Tax per Individual (TL)
15-19	0.28	106,939	2,985	35,83
20-24	1.33	506,691	3,059	165,64
25-29	2.26	858.154	3,218	266,67
30-34	2.85	1,083,313	2,824	383,61
35-39	2.70	1,025,632	2,616	392,06
40-44	2.06	782,286	2,305	339,39
45-49	1.82	691,076	2,102	328,77
50-54	0.76	287,768	1,786	161,12
55-59	0.31	186,974	1,420	131,67
60-64	0.31	101,852	1,128	90,29
65+	0.48	182,282	2,727	66,84
Total	**15.15**	**5,812,967**	**26,170**	**222,12**

Source: 2008 Household Budget Survey, Author's own calculations

Table 22: Distribution of Corporate Tax (Males)

Age Interval	Share in the Corporate Tax Payment (%)	Amount of Tax Paid (Thousand TL)	Number of Individuals in the Population (Thousands)	Corporate Tax per Individual (TL)
15-19	0.10	17.513	3.141	5,58
20-24	1.61	271.419	3.173	85,54
25-29	5.47	924.875	3.296	280,61
30-34	8.86	1.497.765	2.892	517,90
35-39	18.39	3.108.054	2.644	1.175,51
40-44	19.70	3.329.509	2.360	1.410,81
45-49	17.09	2.888.360	2.122	1.361,15
50-54	10.57	1.786.665	1.790	998,14
55-59	6.25	1.056.805	1.388	761,39
60-64	3.36	567.329	1.004	565,07
65+	3.89	657.477	2.110	311,60
Total	**95.27**	**16,105,771**	**25.920**	**621,36**

Source: 2008 Household Budget Survey, Author's own calculations

Table 23: Distribution of Corporate Tax (Females)

Age Interval	Share in the Corporate Tax Payment (%)	Amount of Tax Paid (Thousand TL)	Number of Individuals in the Population (Thousands)	Corporate Tax per Individual (TL)
15-19	0.00	742	2.985	0,25
20-24	0.23	39.027	3.059	12,76
25-29	0.47	78.762	3.218	24,48
30-34	0.65	110.143	2.824	39,00
35-39	0.56	94.682	2.616	36,19
40-44	1.32	222.415	2.305	96,49
45-49	0.64	108.045	2.102	51,40
50-54	0.44	73.927	1.786	41,39
55-59	0.19	32.422	1.420	22,83
60-64	0.15	25.095	1.128	22,25
65+	0.08	14.014	2.727	5,14
Total	**4,73**	**799,274**	**26.170**	**30,54**

Source: 2008 Household Budget Survey, Author's own calculations

Table 24: Distribution of Indirect Taxes (Males)

Age Interval	Share in Indirect Taxes (%)	Amount of Tax Paid (Thousand TL)	Number of Individuals in the Population (Thousands)	Indirect Taxes per Individual (TL)
15-19	1,48	1.618.993	3.141	515,44
20-24	2,93	3.194.873	3.173	1.006,89
25-29	6,98	7.614.661	3.296	2.310,27
30-34	9,30	10.143.704	2.892	3.507,50
35-39	11,34	12.361.642	2.644	4.675,36
40-44	10,22	11.140.260	2.360	4.720,45
45-49	10,62	11.582.042	2.122	5.458,08
50-54	8,79	9.584.728	1.790	5.354,60
55-59	6,34	6.918.281	1.388	4.984,35
60-64	4,35	4.746.930	1.004	4.728,02
65+	7,43	8.107.872	2.110	3.842,59
Total	**79,79**	**87,013,987**	**25.920**	**3.357,02**

Source: 2008 Household Budget Survey, Author's own calculations

Table 25: Distribution of Indirect Taxes (Females)

Age Interval	Share in Indirect Taxes (%)	Amount of Tax Paid (Thousand TL)	Number of Individuals in the Population (Thousands)	Indirect Taxes per Individual (TL)
15-19	0,89	965.659	2.985	323,50
20-24	1,77	1.927.065	3.059	629,97
25-29	2,37	2.580.692	3.218	801,96
30-34	2,39	2.601.737	2.824	921,30
35-39	2,45	2.669.635	2.616	1.020,50
40-44	2,34	2.553.650	2.305	1.107,87
45-49	2,00	2.178.804	2.102	1.036,54
50-54	1,87	2.040.666	1.786	1.142,59
55-59	1,24	1.354.751	1.420	954,05
60-64	0,84	917.103	1.128	813,03
65+	2,06	2.247.910	2.727	824,32
Total	**20,21**	**22,037,672**	**26.170**	**842,10**

Source: 2008 Household Budget Survey, Author's own calculations

Table 26: Distribution of Transfer Payments (Males)

Age Interval	Share in Transfer Payments (%)	Amount of Transfer Received (Thousand TL)	Number of Individuals in the Population (Thousands)	Transfer per Individual (TL)
15-19	0.28	23.051	3.141	7.34
20-24	0.79	65.017	3.173	20.49
25-29	1.07	87.832	3.296	26.65
30-34	2.08	171.187	2.892	59.19
35-39	2.90	238.498	2.644	90.20
40-44	2.44	201.076	2.360	85.20
45-49	5.06	417.050	2.122	196.54
50-54	6.37	524.912	1.790	293.25
55-59	7.26	597.687	1.388	430.61
60-64	6.59	542.396	1.004	540.24
65+	13.46	1.108.240	2.110	525.23
Total	**48.29**	**3,976,946**	**25.920**	**153.43**

Source: 2008 Household Budget Survey, Author's own calculations

Table 27: Distribution of Transfer Payments (Females)

Age Interval	Share in Transfer Payments (%)	Amount of Transfer Received (Thousand TL)	Number of Individuals in the Population (Thousands)	Transfer per Individual (TL)
15-19	1.06	87.375	2.985	29.27
20-24	1.90	156.217	3.059	51.07
25-29	1.66	136.655	3.218	42.47
30-34	3.61	297.226	2.824	105.25
35-39	4.09	336.464	2.616	128.62
40-44	3.73	307.472	2.305	133.39
45-49	4.48	369.324	2.102	175.70
50-54	5.02	413.150	1.786	231.33
55-59	5.37	442.230	1.420	311.43
60-64	4.65	383.162	1.128	339.68
65+	16.14	1.328.841	2.727	487.29
Total	**51.71**	**4,258,115**	**26.170**	**162.71**

Source: 2008 Household Budget Survey, Author's own calculations

Table 28: Distribution of Social Security Institution Benefits (Males)

Age Interval	Share in Transfer Payments (%)	Amount of Transfer Received (Thousand TL)	Number of Individuals in the Population (Thousands)	Transfer per Individual (TL)
15-19	0.28	271.527	3.141	86.45
20-24	0.79	765.867	3.173	241.37
25-29	1.07	1.034.622	3.296	313.90
30-34	2.08	2.016.494	2.892	697.27
35-39	2.90	2.809.392	2.644	1.062.55
40-44	2.44	2.368.575	2.360	1.003.63
45-49	5.06	4.912.640	2.122	2.315.10
50-54	6.37	6.183.205	1.790	3.454.30
55-59	7.26	7.040.462	1.388	5.072.38
60-64	6.59	6.389.166	1.004	6.363.71
65+	13.46	13.054.530	2.110	6.186.98
Total	**48.29**	**46,846,479**	**25.920**	**1.807.35**

Source: 2008 Household Budget Survey, Author's own calculations

Table 29: Distribution of Social Security Institution Benefits (Females)

Age Interval	Share in Transfer Payments (%)	Amount of Transfer Received (Thousand TL)	Number of Individuals in the Population (Thousands)	Transfer per Individual (TL)
15-19	1.06	1.029.241	2.985	344.80
20-24	1.90	1.840.157	3.059	601.56
25-29	1.66	1.609.734	3.218	500.23
30-34	3.61	3.501.179	2.824	1.239.79
35-39	4.09	3.963.377	2.616	1.515.05
40-44	3.73	3.621.868	2.305	1.571.31
45-49	4.48	4.350.454	2.102	2.069.67
50-54	5.02	4.866.709	1.786	2.724.92
55-59	5.37	5.209.250	1.420	3.668.49
60-64	4.65	4.513.457	1.128	4.001.29
65+	16.14	15.653.095	2.727	5.740.04
Total	**51.71**	**50,158,521**	**26.170**	**1.916.64**

Source: 2008 Household Budget Survey, Author's own calculations

Table 30: Distribution of Premium Payment (Males)

Age Interval	Share in Social Security Premia (%)	Amount of Tax Paid (Thousand TL)	Number of Individuals in the Population (Thousands)	Social Security Premia per Individual (TL)
15-19	0.39	220.254	3.141	70.12
20-24	2.53	1.422.509	3.173	448.32
25-29	9.05	5.081.792	3.296	1.541.81
30-34	13.16	7.390.441	2.892	2.555.48
35-39	18.47	10.371.040	2.644	3.922.48
40-44	15.80	8.872.396	2.360	3.759.49
45-49	13.77	7.732.151	2.122	3.643.80
50-54	6.85	3.847.052	1.790	2.149.19
55-59	3.13	1.758.106	1.388	1.266.65
60-64	1.35	756.041	1.004	753.03
65+	1.35	756.565	2.110	358.56
Total	**85.86**	**48,208,662**	**25.920**	**1.859.89**

Source: 2008 Household Budget Survey, Author's own calculations

Table 31: Distribution of Premium Payment (Females)

Age Interval	Share in Social Security Premia (%)	Amount of Tax Paid (Thousand TL)	Number of Individuals in the Population (Thousands)	Social Security Premia per Individual (TL)
15-19	0.21	115.429	2.985	38.67
20-24	1.66	931.679	3.059	304.57
25-29	2.72	1.528.423	3.218	474.96
30-34	2.59	1.456.440	2.824	515.74
35-39	2.82	1.582.544	2.616	604.95
40-44	2.11	1.187.454	2.305	515.16
45-49	1.34	749.806	2.102	356.71
50-54	0.46	260.898	1.786	146.08
55-59	0.10	58.533	1.420	41.22
60-64	0.12	66.447	1.128	58.91
65+	0.00	0	2.727	0.00
Total	**14.14**	**7,938,445**	**26.170**	**303.31**

Source: 2008 Household Budget Survey, Author's own calculations

APPENDIX B

DEMOGRAPHIC PROJECTIONS FOR SELECTED COUNTRIES

Table 32: Demographic Figures and Projections for Selected Countries for 2000, 2050 and 2100

Countries	Dependency Ratios (%)						Median Age		
	Old Age			Child					
	2000	**2050**	**2100**	**2000**	**2050**	**2100**	**2000**	**2050**	**2100**
Argentina	15.8	30.3	49.0	44.9	28.3	28.2	27.9	40.2	45.8
Australia	18.6	39.0	51.0	31.0	30.3	30.4	35.4	41.7	45.0
Austria	22.9	53.3	55.1	25.1	24.3	29.2	38.2	49.3	46.8
Belgium	25.7	44.2	47.3	25.9	30.2	30.5	39.1	43.2	44.0
Brazil	8.5	35.8	55.1	43.4	29.4	29.2	25.4	44.9	47.5
Canada	18.4	42.3	51.8	27.9	27.5	29.5	36.8	44.0	45.8
Czech R.	19.7	48.6	47.8	23.9	27.3	29.6	37.4	45.8	44.9
Denmark	24.7	40.9	48.7	27.7	29.0	30.8	38.4	43.3	44.2
France	24.0	43.4	50.1	28.9	30.6	30.6	37.7	42.7	44.7
Germany	22.1	56.5	51.7	23.1	26.6	30.2	39.9	49.2	45.3
Hungary	27.1	43.6	44.7	24.7	26.4	29.7	38.5	45.3	43.9
Italy	25.2	61.7	54.1	21.2	27.0	29.3	40.2	49.6	46.4
Japan	20.8	69.6	59.8	21.4	26.2	29.4	41.3	52.3	47.8
Netherlands	20.0	46.0	49.9	27.4	28.7	30.4	37.3	44.8	44.7
New Zealand	18.0	38.8	49.1	34.7	31.1	30.8	34.3	41.3	44.3
Norway	23.4	40.5	48.9	30.9	30.5	30.7	36.9	42.0	44.2
Poland	18.0	47.9	47.4	28.3	25.6	29.6	35.3	47.4	44.7
Portugal	23.9	63.5	56.6	23.9	23.4	28.6	37.7	52.1	47.7
S. Korea	10.2	60.7	57.1	29.2	24.4	29.7	32.1	51.8	46.9
Singapore	10.3	57.6	58.8	30.1	16.8	18.0	34.1	51.4	47.0
Spain	24.7	61.9	57.0	21.6	27.7	29.1	37.6	48.9	47.5
Sweden	26.7	42.3	50.9	28.6	29.8	30.3	39.4	43.0	45.1
Thailand	10.0	41.4	48.6	34.7	23.8	22.8	30.2	46.8	45.5
Turkey	8.0	30.5	50.5	47.9	25.0	27.4	24.5	42.3	46.9
UK	24.3	39.9	50.0	29.2	29.1	30.4	37.7	42.9	44.7
US	18.7	35.4	45.4	32.3	31.4	30.9	35.3	40.0	43.2
WORLD	10.9	25.7	37.4	48.0	32.4	30.0	26.7	37.9	41.9

Source: UN World Prospects, World Population Prospects, the 2010 Revision

APPENDIX C

SENSITIVITY ANALYSIS FOR SELECTED COUNTRIES

Table 33: Sensitivity analysis for Selected Countries

		g=1%			*g=1.5%*			*g=2%*		
		r=3%	*r=5%*	*r=7%*	*r=3%*	*r=5%*	*r=7%*	*r=3%*	*r=5%*	*r=7%*
Japan	Newborn	242.1	120.1	62.4	291.1	143.4	73.8	349.8	171.4	87.4
	Future	510.6	356.5	283.3	571.5	386.2	297.6	644.3	421.6	314.9
	Imbalance	110.9	196.8	354.0	96.3	169.3	303.3	84.2	146.0	260.3
Germany	Newborn	255.7	140.2	72.6	292.3	165.0	86.7	329.1	193.1	103.0
	Future	431.8	284.3	196.7	472.8	316.8	214.6	504.3	353.3	235.8
	Imbalance	68.9	102.8	170.9	61.8	92.0	147.5	53.2	83.0	128.9
Italy	Newborn	157.2	101.1	62.5	171.6	114.2	70.9	183.2	128.4	80.5
	Future	312.6	249.5	212.8	331.5	264.8	221.0	347.6	282.1	230.9
	Imbalance	98.9	146.8	240.5	93.2	131.9	211.7	89.7	119.7	186.8
Canada	Newborn	190.1	93.1	44.8	231.9	113.8	54.8	281.8	138.5	66.9
	Future	198.3	94.2	44.3	232.8	114.0	49.6	271.9	129.6	57.2
	Imbalance	4.3	1.2	-1.1	0.4	0.2	-9.5	-3.5	-6.4	-14.5
Thailand	Newborn	14.1	7.0	3.9	17.2	8.3	4.5	21.1	9.9	5.3
	Future	6.1	-0.1	-2.5	8.9	1.0	-2.0	12.6	2.4	-1.5
	Imbalance	-56.7	-101.4	-164.1	-48.3	-88.0	-144.4	-40.3	-75.8	-128.3

Source: Taken from Auerbach, Kotlikoff and Leibfritz (1999)