LABOR INCOME AND CONSUMPTION AGE PROFILES:

THE ECONOMIC LIFECYCLE FOR TURKEY

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ABSTRACT

Labor Income and Consumption Age Profiles:

Economic Lifecycle for Turkey

The purpose of this research is to build the aged based consumption and labor income profiles of the Turkish population following the National Transfer Accounts methodology. This methodology provides a system of measuring flows and stocks in an economy consistent with national accounts and allows the estimation of lifecycle patterns for labor income and consumption from public and private sources. In this paper, Turkey's per capita and aggregate lifecycle deficits and surpluses are obtained for the year 2006. Moreover, using the United Nations demographic projections, the aggregate lifecycle deficits for future years are presented. Results show that the productive period begins at age 29 and age of 62 marks an early exit from this period implying that the Turkish economic lifecycle has 33 years of surplus.

Keywords: Demography, population dynamics, consumption profiles, income profiles, National Transfer Accounts

ÖZET

Gelir ve Tüketim Yaş Profilleri:

Türkiye için Ekonomik Yaşam Döngüsü

Bu çalışmanın amacı Ulusal Transfer Hesapları (NTA) metodolojisine gore Türkiye için yaş temelli tüketim ve gelir profilleri kurmaktır. Ulusal Transfer Hesapları (NTA), milli gelir hesapları ile uyumlu yaş profillerine göre stok ve akım ölçüm sistemi kurma amaçlı bir tekniktir. Ulusal Transfer Hesapları gelir ve kamu ve özel sektör tüketimi için yaşam döngüsü profillerini tahmin etmeyi sağlar. Bu çalışmada Türkiyenin kişi başı ve toplam yaşam döngüsü açığı ve fazlası 2006 yılı için hesaplanmıştır. Ayrıca Birleşmiş Milletler nüfus projeksiyonları kullanılarak toplam yaşam döngüsü açıkları da gösterilmiştir. Sonuçlar, birikim döneminin 29 yaşında başladığını ve 62 yaşında da nispeten erken bi şekilde bittiğini göstermektedir. Türk ekonomik yaşam döngüsü ortalama 33 yıl boyunca artıda kalmaktadır.

Anahtar Kelimeler: Nüfus bilimi, nüfus dinamikleri, gelir profilleri, tüketim profilleri, Ulusal Transfer Hesapları

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1 INTRODUCTION

Turkey is one of the most populous countries in the world with 75.627.287 million inhabitants in 2012. 17.8% of population is living in Istanbul and in the other most populated cities such as Ankara (with 6.3%) and Izmir (with 5.3%). In Turkey half of the population is below the age of 28.3 and 66.5% of the total population is between 15-64 age group.[1]

According to the Address Based Population Registration System (ABPRS), even though Turkey is a young and dynamic country, its population is currently aging. The median age will change from 30.1 years in 2012 to 34 years in 2023 and to 42.9 years in 2050. The number of elderly (i.e. population 65 years and older) is 5.7 million in 2012 and will reach to 8.6 million in 2023[2]. Factors behind this change are low fertility rates, increased life expectancy. Life expectancy will increase from 79.2 years for females and 74.7 years for males in 2012 to 75.8 years for females and 80.2 years for males in 2023[3].

The demographic projections suggest that the number of elderly will be 8.6 million in 2023, 19.5 million in 2050 and 24.7 million in 2075. As shown in Figure 1.1, the proportion of elderly with respect to total population will increase from 7.5% in 2012 to 10.2% in 2023. From 2023 to 2050, that proportion will rise up to 20.8%[4].

[1] Turkish Statistical Institute, Youth in Statistics 2012
[2] Turkish Statistical Institute, Population Projections 2013-2075
[3] Turkish Statistical Institute, Women in Statistics 2012
[4] Turkish Statistical Institute, Population Projections, 2013-2075

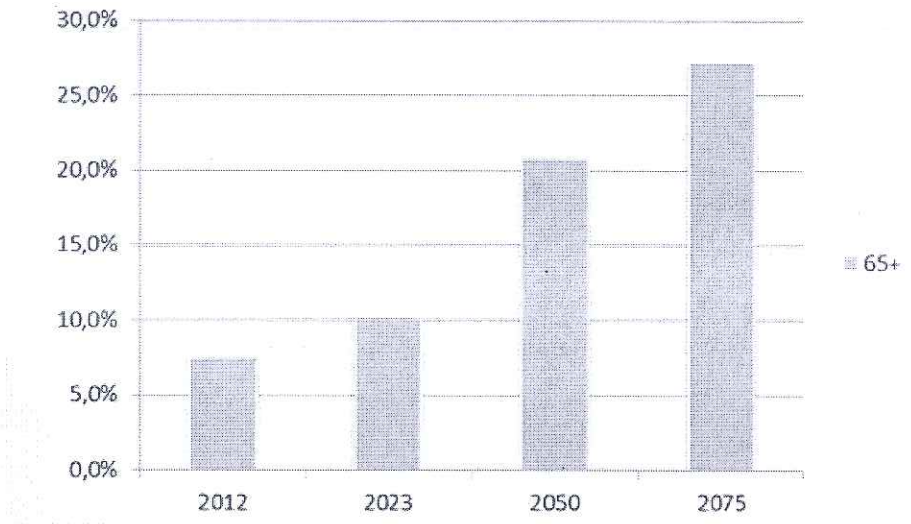

Figure 1.1: Elderly rates in total population, Turkstat

Estimations of statistical institutes shows that for the period 2010-2015, population growth rate of the world is 1.1% and Turkey is in the 92nd order among 187 countries. If the projections persist Turkey will be in 106th order for the period 2045-2050[5].

Population aging has become a real concern for many countries. There have been several studies to investigate the impacts of demographic changes on the economy. National Income Accounting consists of macro variables to gauge the impact of demographic change. National Income Accounting (NIA) has limited information on age profile of the population. Lee and Mason have introduced a new way of measuring flows and stocks in an economy consistent with NIA called National Transfer Accounts (NTA). National Transfer Accounts improves our understanding of the generational

[5] Turkish Statistical Institute, Demographic Structure of Turkey and Its Future, 2010-2050

economies at the national level. The main objective of this thesis is to build a NTA database for Turkey for the year 2006.

The fundamental interest of NTA is the shape of economic lifecycles. The economic lifecycle shows the age pattern of consumption and earning. On average in all societies, the young and the old consume more than they produce so they have lifecycle deficits (LCD) and working age adults consume less than they produce to generate a lifecycle surplus (LCS). Many behavioral and non-behavioral factors influence the age profiles of consumption and labor income. For instance, labor income influenced by unemployment, labor force participation, cultural political and social factors (Lee, 2011). Similarly, consumption influenced by historical events, political systems and preferences. Young individuals require fewer resources to meet basic needs such as food, clothing and housing (Tung, 2011).

This paper shows that, aggregate LCD for age [0, 28] is equal to 29.4% of total labor income and the aggregate LCD for age [63, 90] is equal to 4.9% of total labor income in 2006. Summing both young and old LCD covers 34.3% of total labor income (158 billion TL). Moreover the aggregate lifecycle surplus between for ages 29 and 62 is 10.6% of total labor income (51 billion TL).

The main objective of this research is to build the aged based consumption and labor income profiles and life cycle deficit in 2006 for Turkey following the NTA methodology. Section 2 presents general information on health,

education and labor market in Turkey. Section 3 reviews the literature on generational accounting. Section 4 introduces the NTA methodologies to build income and consumption expenditures for each age using Household Budget Surveys on individual and consumption datasets for year 2006. Section 4 provides also the main findings on consumption and labor income per age groups. Section 5 presents per capita and aggregate LCDs together with some cross country comparisons. Section 5 also provides the aggregate LCD based on demographic projections from 1950 to 2050. Section 7 concludes the thesis.

2 EDUCATION, HEALTH and LABOR MARKET IN TURKEY

2.1 Education

Educated population is essential for every country's social and economic well-being. Education has a crucial importance in our lives especially when time comes to find a good job. In the past, high school diploma was enough but today people are satisfied with the university diploma as they proceed with graduate studies. In the OECD countries the average of earning the equivalent of a high school degree is 74% which is much higher than Turkey, %33[6]. According to the Turkish Statistical Institute 35% of men's population and 26% of women's population completed high school education. This %9 difference is much higher than the OECD average, 2%.

[6] OECD better life index

2.2 Health

Between 1960 and 2008, life expectancy in Turkey has increased about 25 years. In the OECD countries the average life expectancy for men and women is 6 years higher than Turkey[7]. Life expectancy is associated with the health care spending per person, living standards, education and environmental factors. In 2006, total health care expenditure is accounted for 5.8% of GDP in Turkey, a rate much than the OECD average.

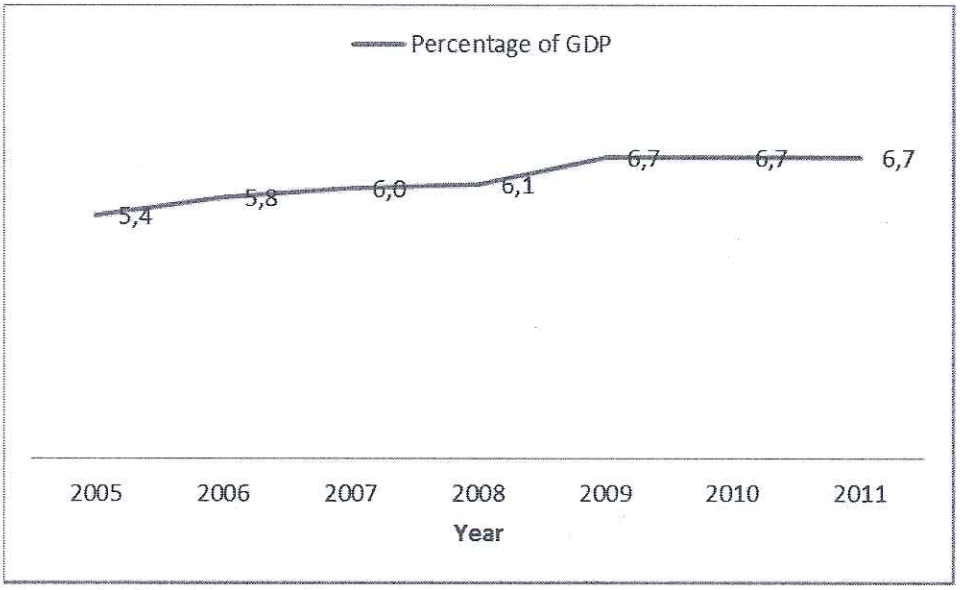

Figure 2.1:Health expenditures in Turkey, Turkstat

Turkey has one of the lowest GDP per person comparing with the OECD countries. In the surveys 71% of men and 61% of women reported that they have a good health[8]. Not surprisingly older people with less income and unemployed people reported poorer health.

[7] OECD better life index
[8] OECD better life index

2.3 Labor Market

In early 80s in Turkey, the highest growth rate of working age population has occurred. From 1980 to 2003 working age population increased about 20.5 million. This jump corresponds more than 80% comparing with the initial level.

Labor force participation rate is low comparing with the OECD countries. This rate is high in rural areas than in urban areas. In addition, the women's labor force participation rate is lower than the one of the men's. These differences occur because of cultural, institutional and sociological factors. To give an example; in rural areas people are more likely to work in agricultural production.

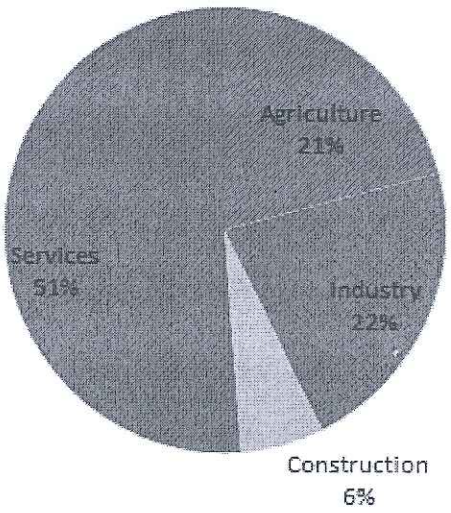

Figure 2.2: Employment shares, 2006, Turkstat

Statistics show that 26% of women are actively working. This rate is much lower than the OECD average of 59%. Especially in urban areas most

married women choose to devote themselves to their children. Young, unmarried women are more likely to stay in labor market. (Tunalı, 2003) .

By educational status, unemployment rate for people with high education level is also high in Turkey. People aged between 15-24 face serious difficulties finding a job.

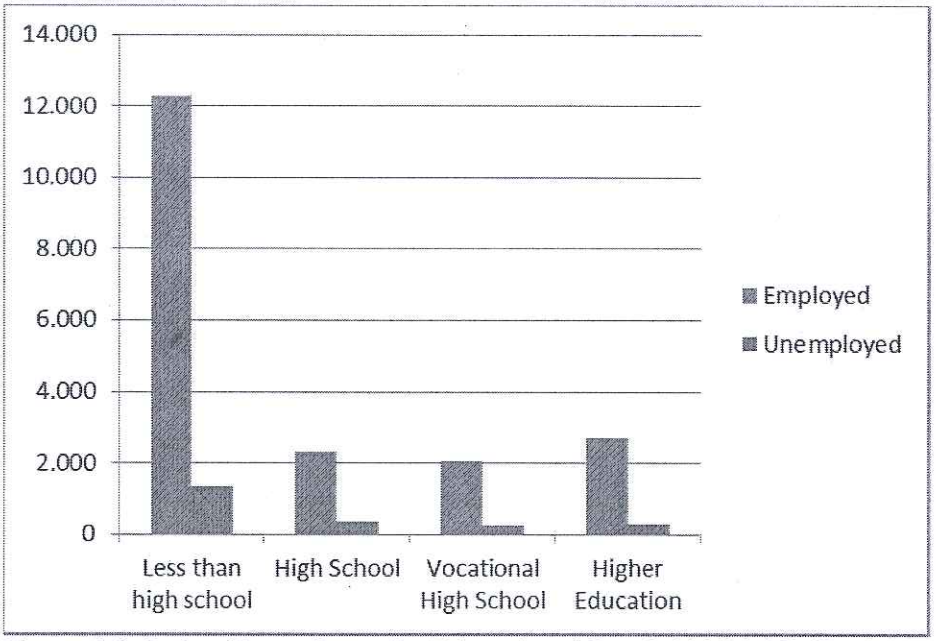

Figure 2.3: Labor Force Status by Educational Level, 2006 (+15), Turkstat

3 LITERATURE REVIEW

The idea that an aging population in Turkey would affect the economy is straightforward. The individuals' economic behaviors, such as schooling, childbearing, working, retiring, saving and consuming vary through their life. With the age structure changing, the proportions of those individuals who are in school, in the labour market, or in retirement are also changing. One of the effects of population aging is the burden for the working age generations in a social security scheme. However, an older population also brings some positive effects. For example, an aging population would carry

more wealth into the economy because middle age people save. This would increase the productivity of labour thanks to a higher capital per worker (Lee and Mason, 2013).

The expected change of population structure is a general problem for most OECD countries and their governments are searching for accurate solutions such as pushing back the age of retirement, encouraging couples to have more children, attracting more immigrants, and investing in human capital to eventually increase the productivity of labour (Lee and Mason, 2013).

Although some of these policies may favor certain generations at the expense of others, it remains a difficult task for economic models to assess these effects properly because these models are calibrated to data from National Income Accounting for which the age dimension is absent. Herein, heroic assumptions have to be made to generate income and consumption age profiles. Of course, these assumptions affect the simulation results which limit their validity. To mitigate these problems, NTA has been designed so as to build a database consistent with NIA but including age.

Historically, NTA has developed from a large range of studies on the lifecycle of an individual. Samuelson introduced the lifecycle concept into an overlapping generation model so as to be able to emphasize transfers among generations (Samuelson, 1958). Studies by Arthur and McNicoll and Lee combined more precise demographic data into the overlapping generation model, and more precise age profiles of labor income and consumption (Arthur, 1978) (Lee R. , 1980). Mason applied Lee (1980)'s

approach to study aggregate savings, while Willis (1988) studied public and private transfers and wealth (Mason, 1987) (Willis, 1988). Willis (1988) derived the identities of the age accounting system, hence providing the foundation of NTA, while Lee (1994a, 1994b) extended Willis' research.

Auerbach et al. investigated intergenerational income reallocation in public sector through generational accounts, which are used to assess the fiscal issues (relevant with government policies) among current and future generations (Auerbach, 1991). Therefore, generational accounts only capture the intergenerational reallocation in public sector. It does not capture private (i.e. familial) transfer. Thereafter, several researchers made efforts on developing the generational accounting system from theoretical to empirical studies, and from public sector to private sector, such as Lee (1994a, 1994b), Lee and Tuljapukar (1998), and Miller (1998). For example, Lee and Tuljapurkar (1998) applied taxes and benefits age profiles on the U.S. social security system. Mason and Miller (1998) expanded the generational accounting system on the savings and capital accumulation with demographic projections, while addressing the significance of familial and public transfer for young and old generations. Lee (1980) and Mason (1977) provide useful empirical results on the impact of the demographic transition on the pattern of consumption and labour income. A guide to NTA (Lee and Mason, 2013) which emphasizes the practical steps require to build NTA has recently been published.

These theoretical and practical studies are the foundation of the NTA framework for the United States. In 2002, NTA turned into an international

project, including beyond the U.S., Taiwan, Japan, Indonesia, Brazil, Chile and France. At the time of writing, there are 41 countries included in the NTA network.[9] Lee and Mason (2011) present the state of the art of NTA methodology through contributions emphasizing different aspects such as fundamental principles and concepts, and including several countries studies.

4 NATIONAL TRANSFER ACCOUNTS for TURKEY

4.1 Building NTA

The main NTA identity is given by an equation where "inflows" or "resources" equals "outflows" or "uses" for an individual of age a, that is:

$$\underbrace{Y_L(a) + Y_A(a) + Tr_I(a)}_{\text{Inflows}} = \underbrace{C(a) + S(a) + Tr_O(a)}_{\text{Outflows}}, \qquad (1)$$

where the inflows include labour income, $Y_L(a)$, asset income, $Y_A(a)$ (i.e. returns to capital, land and credit), and transfer inflows, $Tr_I(a)$.[10] The outflows include consumption, $C(a)$, saving, $S(a)$ which is equal to investment in capital, land and credit, and transfer outflows, $Tr_O(a)$. Note that this identity is assumed to hold at the individual level, not at the

[9] These 41 countries are Australia, Cambodia, China, India, Indonesia, Japan, Philippines, Republic of Korea, Taiwan, Thailand, Vietnam in Asia-Pacific; Argentina, Brazil, Canada, Chile, Colombia, Costa Rica, El Salvador, Jamaica, Mexico, Peru, United States, Uruguay in the Americas; Austria, Finland, France, Germany, Hungary, Italy, Poland, Slovenia, Spain, Sweden, Turkey, United Kingdom in Europe; Benin, Kenya, Mozambique, Nigeria, Senegal, South Africa in Africa.

[10] The asset income in the private sector includes imputed rent, operating surplus, capital share of mixed income, and property income. In the public sector it includes capital, other non-financial assets (e.g. land and minerals), and credit (e.g. public debt and student loans) (Lee and Mason, 2013).

household level. The transfer inflows and outflows exist in both private and public sectors. Eq. (1) can be rearranged as follows:

$$\underbrace{C(a) - Y_L(a)}_{\text{Lifecycle Deficit}} = \underbrace{\underbrace{Y_A(a) - S(a)}_{\text{Asset-based Reallocations}} + \underbrace{\underbrace{[Tr_I(a) - Tr_O(a)]_{\text{pri}}}_{\text{Net Private Transfers}} + \underbrace{[Tr_I(a) - Tr_O(a)]_{\text{pub}}}_{\text{Net Public Transfers}}}_{\text{Net Transfers}}}_{\text{Age Reallocations}}$$

, (2)

which holds at the individual level. The left-hand side of Eq. (2) is defined as the per capita LCD. The right-hand side terms represent ways to finance the LCD by asset-based reallocation (first term), or by private and public transfers (second and third terms). In the public sector, the age reallocation is driven by local, regional, and central governments through public programs, such as education, pensions, health care, and national defence. In the private sector, the age reallocation is mediated by markets, households, families, voluntary agreements, social traditions, and other behaviour patterns, such as savings, borrowing, or dissaving. Transfers include household transfers, in-kind transfers, and cash transfers (e.g. grants, taxes, social security, and pensions).

This identity also holds if we multiply each component with the number of population in each age group, that is:

$$Y_L(a)^{Agg} + Y_A(a)^{Agg} + Tr_I(a)^{Agg} = C(a)^{Agg} + S(a)^{Agg} + Tr_O(a)^{Agg},$$

Where

$$Y_L(a)^{Agg} = Y_L(a).Pop(a); \qquad Y_A(a)^{Agg} = Y_A(a).Pop(a);$$
$$C(a)^{Agg} = C(a).Pop(a); \qquad S(a)^{Agg} = S(a).Pop(a);$$

$$Tr_I(a)^{Agg} = Tr_I(a).Pop(a); \qquad Tr_O(a)^{Agg} = Tr_O(a).Pop(a). \quad (3)$$

By summing each component in Eq. (3) across all age groups, this identity holds at the aggregate level:

$$\sum_a Y_L(a).Pop(a) + \sum_a Y_A(a).Pop(a) + \sum_a Tr_I(a).Pop(a) \quad (4)$$
$$= \sum_a C(a).Pop(a) + \sum_a S(a).Pop(a) + \sum_a Tr_O(a).Pop(a).$$

In short, it is written as:

$$Y_L + Y_A + Tr_I = C + S + Tr_O, \quad (5)$$

where S, aggregate national saving is equal to, I_K, the investment in capita, land, and credit. The objective of section 3.3 is to build the per capita consumption age profile,$C(a)$, and the per capita labour income age profile, $Y_L(a)$.

4.2 Data and Methodologies

This section describes the procedure to construct age based per capita consumption and labor income age profiles. NTA manual (2013) is used to obtain these profiles for Turkey.

There are three purposes of consumption for both public and private consumption; education, health and other consumption. Labor income is measured consisting of earning of employees and self-employed persons. NTA consumption and labor income profiles must refer to individuals, not households.

4.2.1 Private Consumption

Private consumption is the value of goods and services consumed by individuals or households (HH) .Household Budget Survey (HBS) consists of individual and consumption datasets from Turkstat is used that we can find information about 8640 households. The survey includes; household members with their age, sex, gender, status of employment and school enrollment, relationship with the reference person of the HH, education status, consumption of education, health and others, etc.

4.2.1.1 Private Education Consumption

Private education consumption includes all expenditures for pre-primary, primary, secondary and post-secondary school levels. In the survey, an individual who is not enrolled in an education institution but taking courses and who are preparing graduate exams outside school are not considered as students. To allocate private education expenditure, the following regression model is used.

Consumption of education (CFE_j) is,

$$CFE_j = \sum_a \alpha(a)E_j(a) + \sum_a \beta(a)NE(a) + \varepsilon_j \quad (6)$$

where $E_j(a)$ is the number of enrolled HH members in HH j aged a, $NE(a)$ is the number of not enrolled HH members. After using this method, there may be negative coefficients for some ages. These negative variables should

be replaced by zero. In addition, education consumption profile should not be smoothed because using the unsmoothed profile is the best approach for the final estimates.[11]

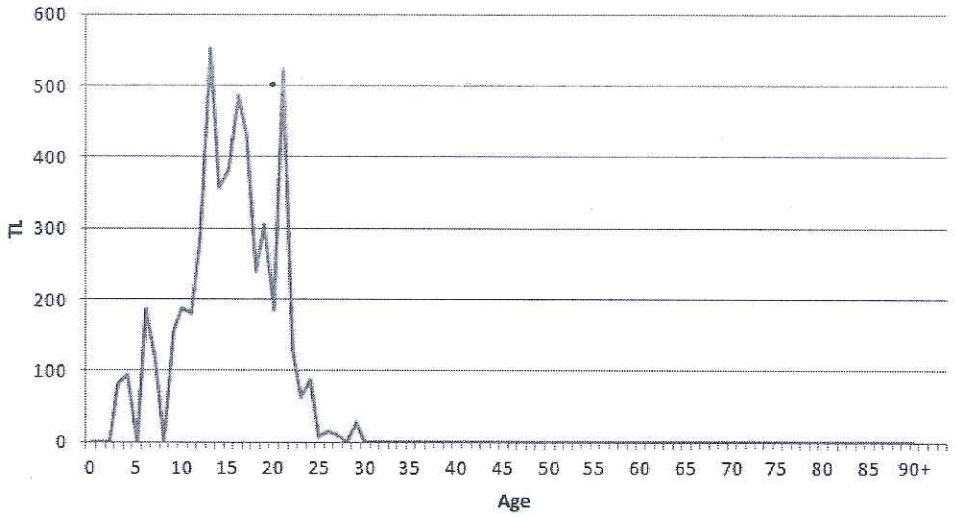

Figure 4.1: Per Capita Private Education Consumption, 2006

This profile reflects the reality in Turkey children begin their education at age 7. After completing primary school, many students prepare themselves for high school exams and this preparation period lasts around three years. For the university entrance exam this period could last up to four years. This is why education expenditures in these years are relatively higher.

4.2.1.2 Private Health Consumption

There are many ways to estimate private health consumption age profiles depending on the availability of data. A simple regression method is used since there is no additional individual data for which individuals receive health care services. Household survey includes expenditures of medical,

[11] National Transfer Accounts Manual, 2013

hospital, dental services and pharmaceutical products. Private health expenditure is allocated to individuals using regression, restricting the regression to relevant age groups at the household level. These age groups can belong to a single year or to a broader age groups but using the broader age groups, we can reduce noise and eliminate negative values produces by regression method.

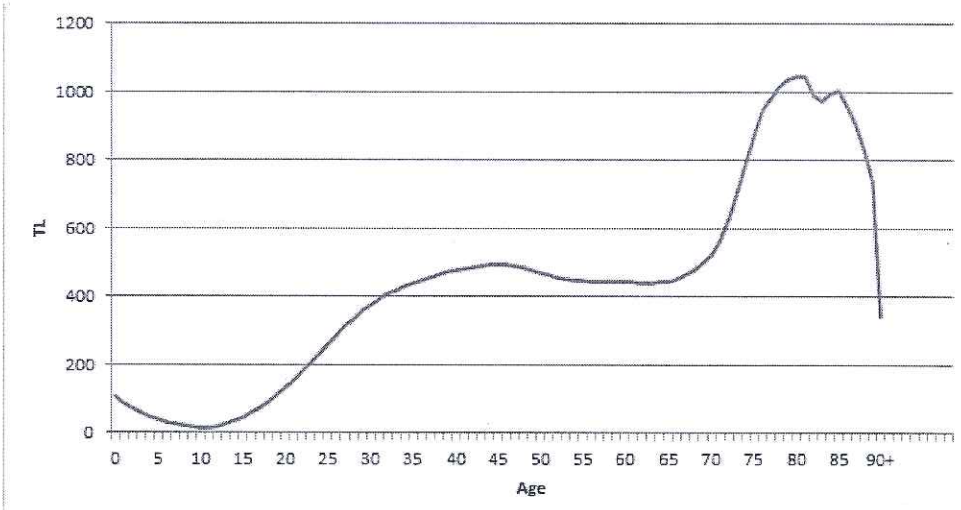

Figure 4.2: Private Health Consumption per Capita Age Profile, 2006

The result of per capita private health care consumption per age is shown in Figure 3.2. Children below age 10 are more likely than other children to be sick. As shown in the Figure 3.2 health care consumption for elder people is higher comparing with younger children.

4.2.1.3 Other Private Consumption

The third part of the private consumption is other private consumption consisting durables, housing and the rest of consumption variables reported in the survey.

Equivalence scale method is used to allocate all other consumption. A formula for scaling is:

$$\propto (a) = 1 - 0.6 * D(4 < a < 20) * (\frac{20 - a}{16} - 0.6 * D(a \leq 4)) \quad (7)$$

where $D(x)$ is the dummy variable. $D(x) = 1$ when condition x is met, otherwise $D(x) = 0$. Consumption of individuals assumed to be proportional with equivalence scale (i.e. for age 4 and younger it is constant at 0.4, increases from age 4 to age 20, and for age 20 and older it is equal to 1).

Moreover the scale calculated above is used to calculate the expenditure for each household j to household i.

$$CFX_{ij}(x) = CFX_j \propto (x) / \sum_a \propto (a) M_j (a) \quad (8)$$

where $CFX_{ij}(x)$ is other private consumption by household member i in household j, CFX_j is total other private consumption and $M_j(a)$ is the numberof members in household j.

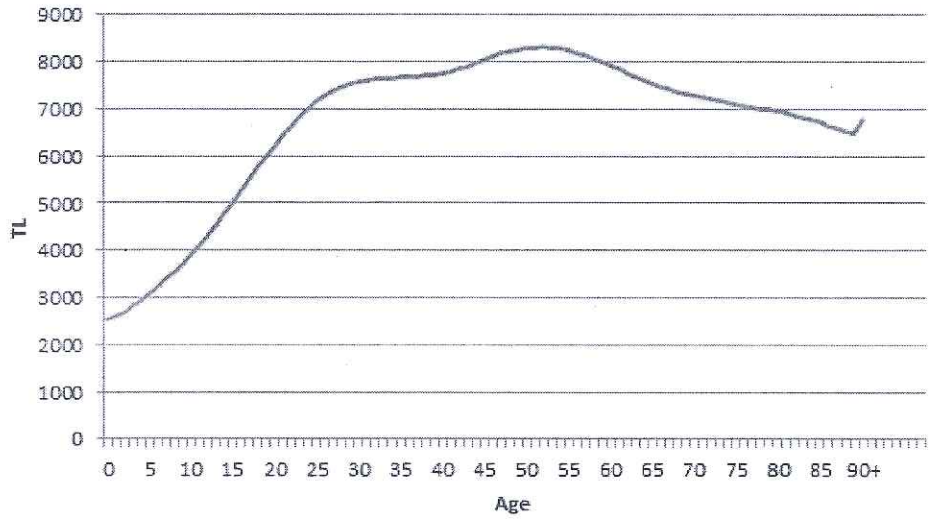

Figure 4.3: Other Private Consumption per Capita Age Profile, 2006

Other private consumption, shown in Figure 3.3, has maximum values between ages 27 and 50 because after the shape of 27 schooling has been completed and most individuals are in the labor force. So, the demand for durable goods and services are likely to be higher than younger individuals.

Finally, total per capita private consumption $CF(a)$ is defined as the sum of private education consumption ($CFE(a)$), private health consumption ($CFH(a)$) and private other consumption ($CFX(a)$):

$$CF(a) = CFE(a) + CFH(a) + CFX(a) \quad (9)$$

4.2.2 Public Consumption

As for private consumption, also public consumption consists of three parts: public education consumption, public health consumption and public other consumption. For Turkey, data about public education and health consumption by age are not available. Thus a different method is used to allocate age profiles.

4.2.2.1 Public Education Consumption

Public education consumption includes government spending on pre-primary, primary, high school and colleges. In order to estimate public education consumption "Government expenditure on education 2002" profile is used. This study is the latest available data on public education in groups. Since many countries have the same problem, unit cost per student per education level and number of students at each education level are used to obtain public education consumption age profiles.

$$E_g^f = \sum_l e_l(a)c_l \tag{10}$$

where l is the school level, c_l is unit cost per student and $e_l(a)$ is the number of student each level.

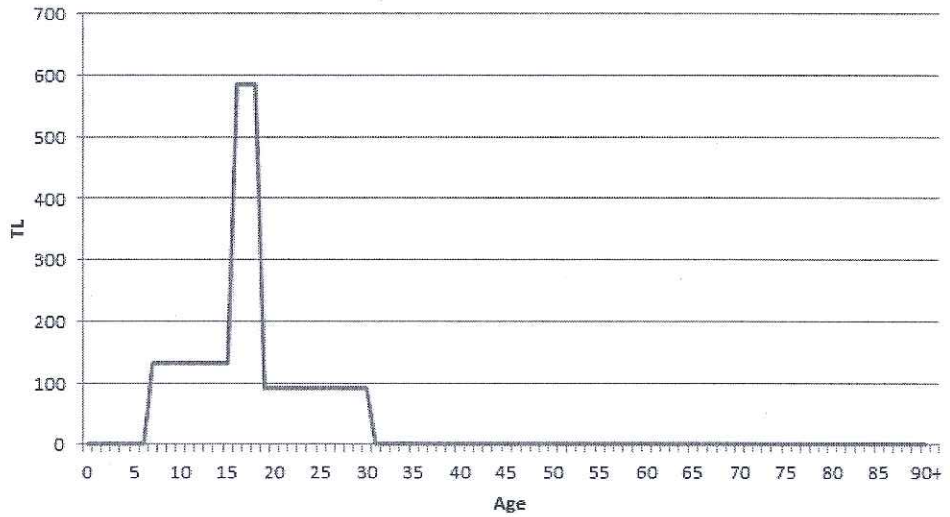

Figure 4.4: Public Education Consumption per Capita Age Profile

4.2.2.2 Public Health Consumption

Public health consumption includes health care costs paid by individuals and reimbursed through public programs, direct spending on health care services offered by government institutions to the public[12].

Since the data for public health consumption is available by age groups, public health consumption can be estimated using the methods described in private health consumption. Thus household budget survey is used to obtain age based public health consumption profiles.

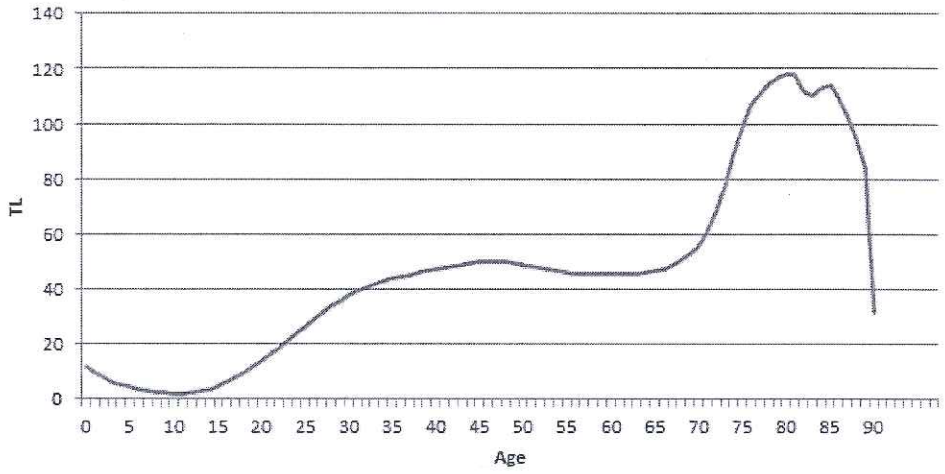

Figure 4.5: Public Health Consumption per Capita Age Profile, 2006

4.2.2.3 Public Other Consumption

Public other consumption includes other than health and education (e.g public services, defense, housing and community amenities, social protection). These are allocated equally to all members of population.

$$CGX(a) = \sum_{a} pop(a).c \qquad (11)$$

[12] National Transfer Accounts Manual: Measuring and Analyzing the Generational Economy, Version May 2013

where $pop(a)$ is the number of population and c is the average other public consumption. The value of c is given in Figure, at 475.467 Turkish Liras.

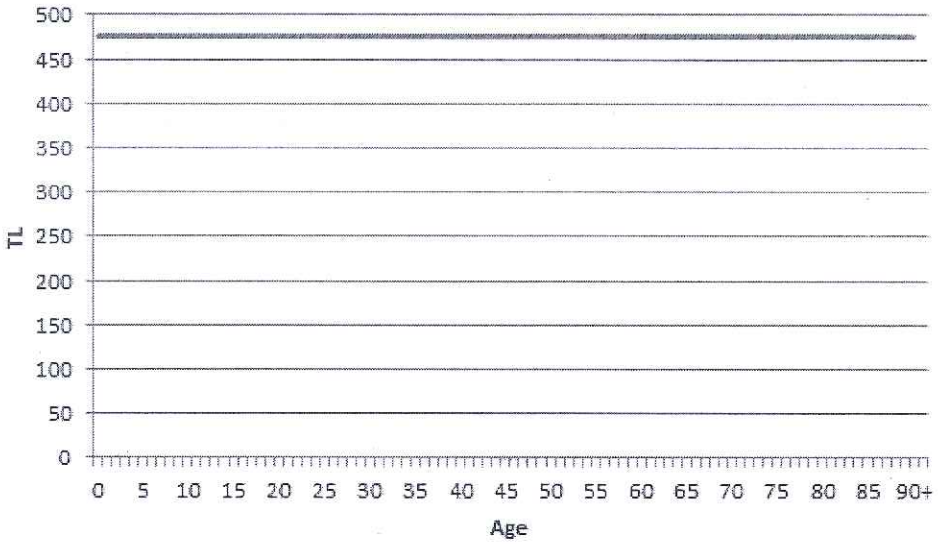

Figure 4.6: Per Capita Other Public Consumption, 2006

Finally total per capita public consumption $CG(a)$ is defined as the sum of public education consumption ($CGE(a)$), public health consumption ($CGH(a)$) and public other consumption ($CGX(a)$).

$$CG(a) = CGE(a) + CGH(a) + CGX(a) \qquad (12)$$

4.2.3 Labor Income

Labor income consists of earning of employees and self-employed persons. Both age profiles are estimated from household individual survey easily because all information about employment status, wage income and self-employment income by age can be found. In survey earning of employees is defined as "income paid to persons as wage, salary excluding pensions, social insurance contributions and taxes that person earns in a year" and self-employment income is defined as "income left after deduction of

overhead costs, taxes paid as entrepreneur"[13]. In addition survey covers the individuals of ages above 15.

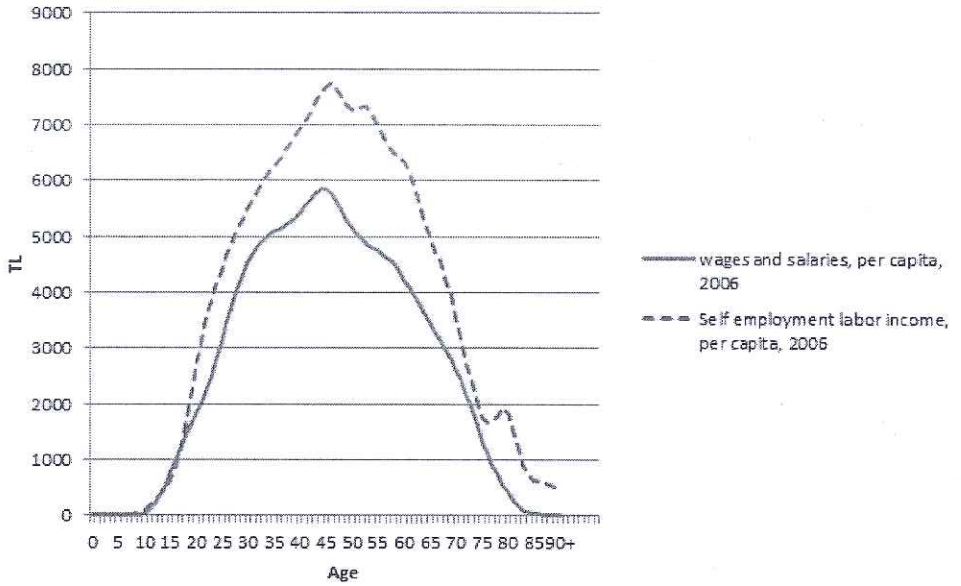

Figure 4.7:Per Capita income profiles, 2006

According to the results, self-employment income is higher than wages and salaries in 2006. According to the Turkstat Press Release 2011 44.8% of total income comes from wages and salaries. Entrepreneurial income follows with 21.4%.

4.2.4 Smoothing

Each per capita age profiles except other public consumption are noisy partly because the number of observations for some age groups in survey is small. The noise occurs because of variations and other sources of errors. Thus, per capita profiles must be smoothed except for private education consumption. The profile should not be smoothed because the unsmoothed profile is the best approach for the final estimates. Smoothing should be

[13] Household Individual Survey, Turkstat

done by using "lowess" method in STATA or "supsmu" method in R program. In addition, smoothing is undertaken at the disaggregate levels. For example, both public and private consumption age profiles must be smoothed separately. Similarly, the elements in labor income should be smoothed separately. Then, when we sum these profiles and obtain the lifecycle deficit, we will not need to smooth again.

4.3 Macro Control

The purpose of macro control is to ensure that under the paths of aggregate age profiles, weighted by the population size for each age group, are equal to their corresponding values given in National Accounts Turkey. Per capita consumption age profiles must be adjusted using macro control variables shown in the Table 2.1 and 2.2. Labor income per capita age profiles must be adjusted with National Income Accounts shown in Table 2.3.

Code	Item	Bn TL
Cfe	Education, private	6.36297
Cfh	Health, private	20.5564
Cfr	Housing, private	2.54322
Cfd	Durables, private	58.3537
	Tobacco, private	0.79058
	Alcohol, private	0.04355
Cfx	Other, private	446.199
Cf	Total private expenditure	534.849

Table 4.1: Household final consumption expenditure, Turkstat

Code	Item	Bn TL
Cge	Education, public	5.08537
Cgh	Health, public	2.12245
Cgx	Other, public	33.5614
Cg	Total public expenditure	40.7693

Table 4.2: General Government final consumption expenditure, Ministry of Finance

Code	Item	Bn TL
Yls	Self employment imcome	199.006
yle	Earnings	265.762

Table 4.3: National Income Accounts, Turkstat

Let $x(a)$ be the per capita age profile, $N(a)$ the population and X aggregate control. Factor teta;

$$\theta = \sum x(a)N(a)/X \tag{13}$$

Final per capita profiles,

$$\tilde{x}(a) = \frac{x(a)}{\theta}$$
$$\tilde{X}(a) = \tilde{x}(a)N(a) \tag{14}$$

5 PER CAPITA and AGGREGATE LIFECYCLE DEFICIT

This section constructs the per capita and aggregate lifecycle deficit (LCD) based on per capita consumption and labor income age profiles. According to the NTA; LCD is the difference between consumption $C(a)$ and labor income $Y(a)$

$$LCD(a) = C(a) - Y(a) \tag{15}$$

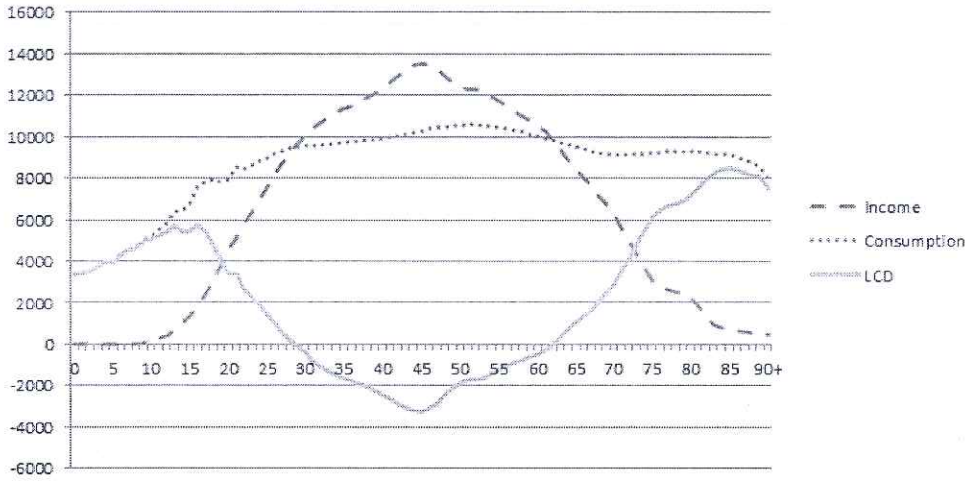

Figure 5.1: Per Capita Income, Consumption and Lifecycle Deficit, 2006

Naturally, very young children and elderly have low income or no income. Below age 28 and above age 63, per capita total consumption exceeds per capita labor income. From ages 29 to 62 mean labor income is greater than mean consumption.

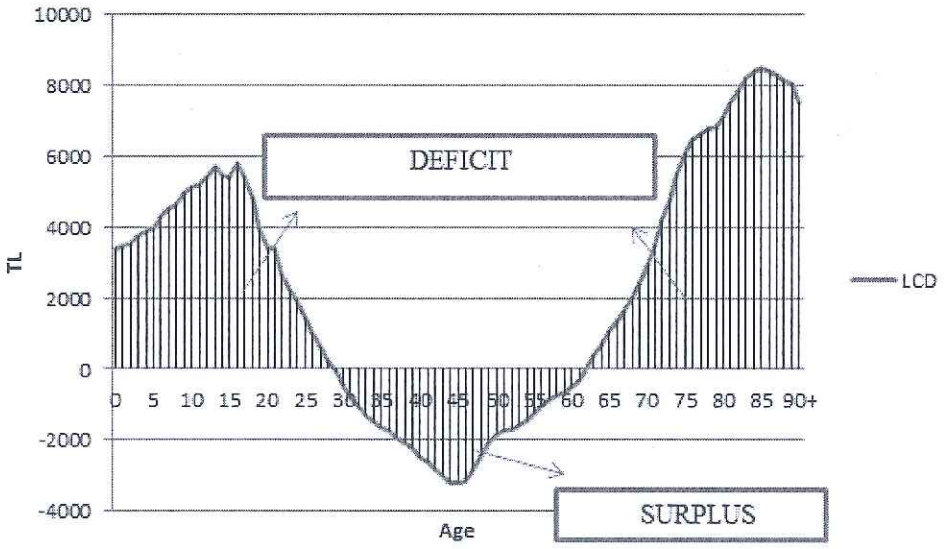

Figure 5.2: Per capita lifecycle deficit, 2006

It is important to note some general points about the lifecycle deficit. First, the deficit is equal to the mean consumption when the mean income is zero.

Second, at the point where the mean labor income crosses mean consumption on either side of profile, the lifecycle deficit is equal to zero. Third, when the difference between consumption and labor income is largest, the lifecycle deficit is at minimum value. (Germabo Mwabu)

From per capita lifecycle deficit age profile we can compute the aggregate LCD by multiplying the per capita LCD by population size per age group.

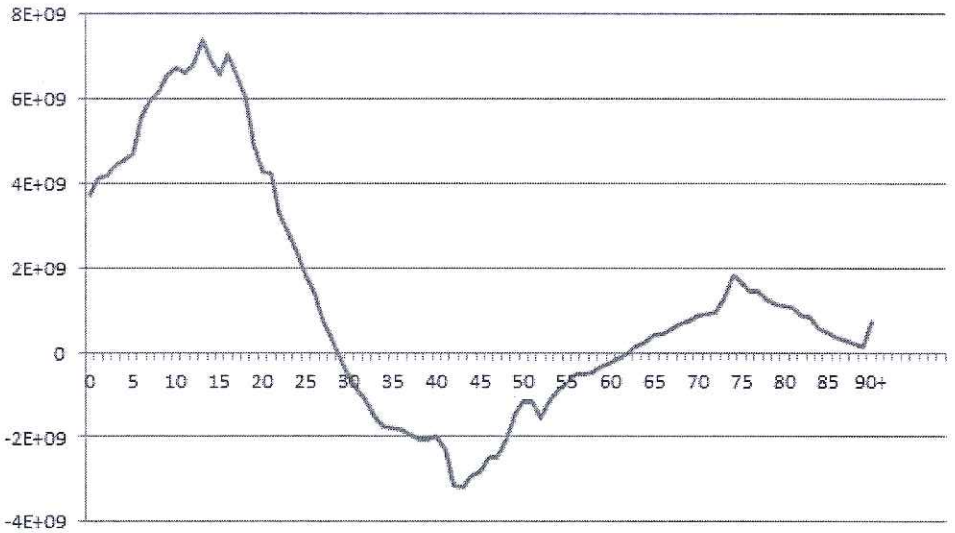

Figure 5.3: Aggregate LCD, 2006

The lifecycle deficit in 2006, shown in Figure 4.3, productive period begins at age 29 and age of 62 marks an early exit from this period. The Turkish economic lifecycle has 33 years of surplus. The brevity of this period may be attributed to the late departure from education period, the early exit from labor market due to retirement classifications and high unemployment rates for older people.

As a result, aggregate LCD for age [0, 28] is equal to 29.4% of total labor income and the aggregate LCD for age [63, 90] is equal to 4.9% of total

labor income in 2006. Summing both young and old LCD covers 34.3% of total labor income. Moreover the aggregate lifecycle surplus for age 29 and 62 is 10.6% of total labor income. The net aggregate LCD for Turkey is therefore 23% of total labor income (i.e., about 106 billion TL)

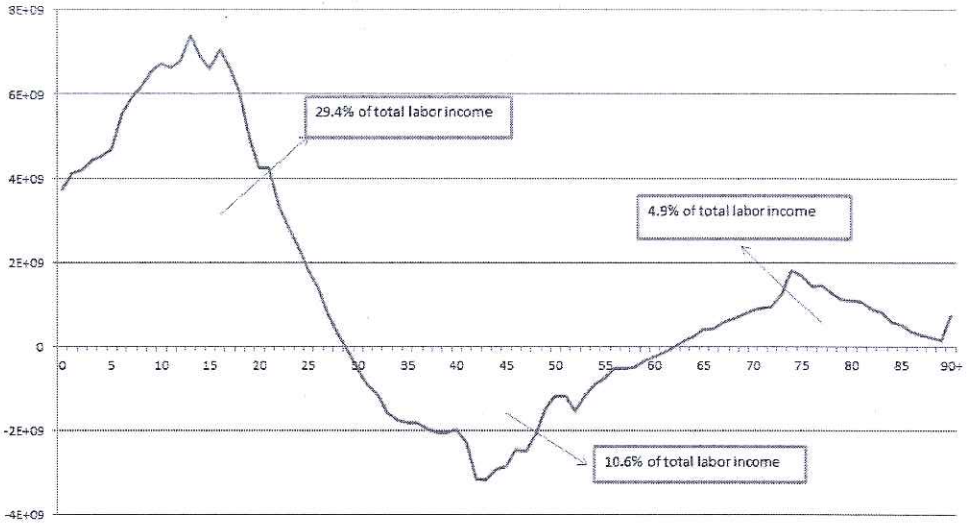

Figure 5.4: Aggregate Age Profile of LCD

5.1 Cross-Country Comparisons

This section compares Turkey's per capita LCD with the ones of Philippines and Thailand. Productivity period for Turkey starts at age 29-62, while for Thailand this period is between age 26-56, and for Philippines it is between age 28-58. Labor income per capita is higher in Turkey than in Thailand and Philippines. Moreover, per capita labor income in Turkey starts to decline later than these two countries.

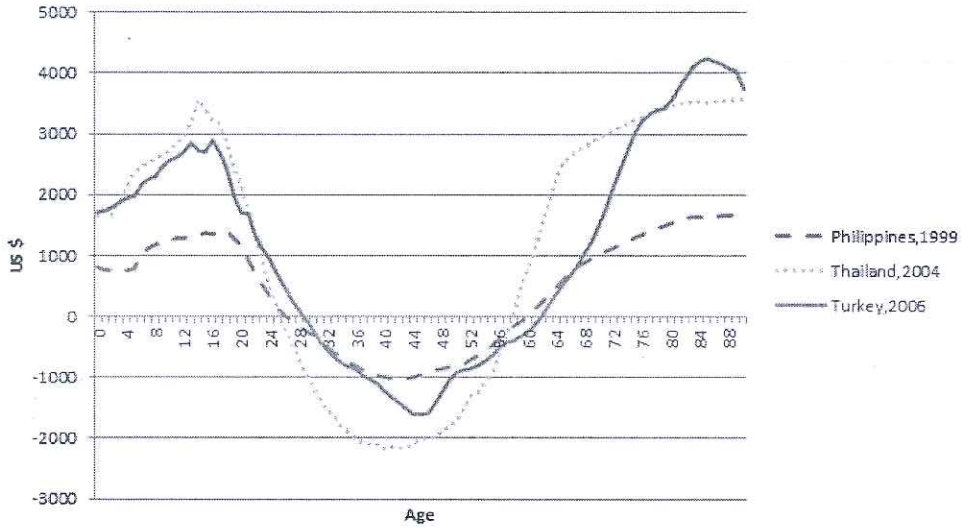

Figure 5.5: Per capita lifecycle deficits for Philippines, Thailand and Turkey

The shape of total consumption age profiles for these countries is quite similar but still there are some important differences. Especially although Turkey and Thailand have similar consumption patterns for younger individuals Turkey has higher consumption pattern at the middle age than the Thai economy. The peak age for labor income in Turkey is similar to other two countries.

6 PROJECTION

This section projects the aggregate LCD assuming a constant per capita LCD for 2006. In other words, we assume that per capita consumption and labor income profiles remain at the same level as in 2006. Thus, we are able to project the aggregate level of LCD using United Nations demographic projections assuming no change will occur in the individuals' behavior and economic status.

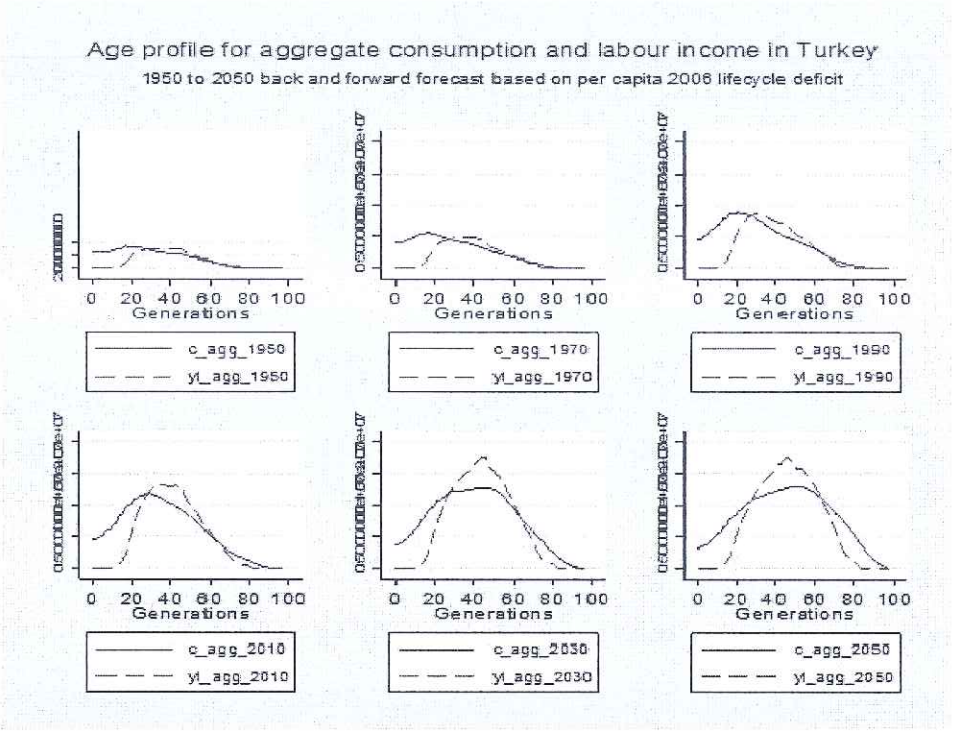

Figure 6.1: Aggragate consumption and labor income profiles for 1950, 1970, 1990, 2010, 2030

As shown in Figure 5.1 the area under consumption in 2050 will be much more than in other years so LCD will grow due to population projections. There may be two reasons driving this result. First reason is the increasing population and the second reason is aging population. According to the Turkish Statistical Institute population is aging and age structure of population is changing.

7 CONCLUSION

This paper builds a NTA database for Turkey, in particular the per capita and aggregate LCD for year 2006. In the first step, our estimates are based on national representative household surveys. Household surveys allow us to derive age-specific consumption and labor income profiles. In this

research, per capita age profiles of consumption and labor income and finally lifecycle deficit for Turkey obtained using National Transfer Accounts calculations. The estimates rely on Household Budget Survey of 2006, conducted by Turkstat and on macro controls derived from Turkstat and Ministry of Finance. Household survey has individual and consumption datasets. In addition, the survey includes age-specific profiles of NTA variables. Then, in a second step, we reconcile these age specific profiles with the National Income Accounting through a macro-control procedure.

Per capita consumption and labor income profiles provided the basis for constructing the economic lifecycle for Turkey in 2006. Compared with some selected countries, these per capita age profiles are broadly similar, but some key differences are notable. Results show that private consumption is 92.91% of total consumption and public consumption represents only 7.09% of the total. At age 46, maximum labor income is observed and many Turkish people continue working after the retirement. At age 29 lifecycle deficit turns negative and lifecycle surplus occurs at age 29-62. Aggregate LCD profile shows that both young and old LCD covers 34.3% of total labor income. Finally, surplus is 10.4% of total labor income.

By applying Turkish demographic data to a constant per capita LCD, we project an aggregate LCD. The active labor market participation for Turks starts at 29 and ends at the age of 62. The Turkish economic lifecycle has 33 years of surplus. The brevity of this period may be attributed to the late departure from education period, the early exit from labor market due to retirement classifications and high unemployment rates for older people.

As a result, aggregate LCD for age [0, 28] is equal to 29.4% of total labor income and the aggregate LCD for age [63, 90] is equal to 4.9% of total labor income in 2006. Summing both young and old LCD covers 34.3% of total labor income. Moreover the aggregate lifecycle surplus for age 29 and 62 is 10.6% of total labor income. The net aggregate LCD for Turkey is therefore 23% of total labor income (i.e., about 106 billion TL)

Both population growth and population aging have an impact on these results, but most of it is due to population aging. With no adjustment in fertility rates, or other channels, the government budget would face serious challenges for health care, pension and other public programs. Finding ways to reduce the expected pressure on the aggregate LCD during the next five decades should be a priority for policy makers.

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