# Private Benefits, Fiscal Costs and Economic Resource Costs of the Private Defined-Contribution Pension Systems in Turkey

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# ABSTRACT

This study addresses some of the key economic issues associated with the private defined-benefit pension system in Turkey. The institutional arrangements in Turkey for administering the government securities in such pensions are quantitatively compared with those of two defined-contribution pension schemes in Canada. Private pensions in Canada can hold the insured securities of banks instead of government securities. In the Turkish private pension system, more than 20 percent of the total value of the pension investments in government bonds is lost through the costs of administration. In Canada such costs are eliminated for holdings of riskless bank securities.

**Keywords:** Private pensions, Turkey, pension administration costs, economic resource cost, Canada

# ÖZ

Bu çalışma, Türkiye'deki özel tanımlanmış fayda emeklilik sistemiyle ilişkili bazı temel ekonomik sorunları ele almaktadır. Türkiye'de bu tür emekli maaşlarında devlet tahvillerinin idaresine ilişkin kurumsal düzenlemeler, Kanada'daki iki tanımlanmış katkılı emeklilik planıyla niceliksel olarak karşılaştırılmıştır. Kanada'da bireysel emeklilik, devlet tahvilleri yerine bankaların sigortalı menkul kıymetlerini elinde tutabilir. Türk bireysel emeklilik sisteminde devlet tahvillerine yapılan emeklilik yatırımlarının toplam değerinin yüzde 20'sinden fazlası yönetim maliyetleri ile kaybedilmektedir. Kanada'da bu tür maliyetler, risksiz banka menkul kıymetlerinin elde tutulması için elimine edilir.

**Anahtar kelimeler:** Bireysel emeklilik, Türkiye, emeklilik yönetim maliyetleri, ekonomik kaynak maliyeti, Kanada

# To my Family

This work is dedicated to my husband, my two children, and all my loved ones. I very much appreciate their love, support, and encouragement throughout my years of education.

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# Chapter 1

# INTRODUCTION

The objective of this study is three-fold. First, it assesses whether the reform of the Turkish private pension system (the introduction and modification of private defined-contribution pension systems) has improved the financial wellbeing of individual contributors in terms of income replacement capability. Second, it quantifies how the reforms of the private defined-contribution system have affected the fiscal cost of such pension policies. Third, it quantifies the economic resource costs imposed on the economy by the cost of the administrative system designed by the regulations that created the private pension system.

The focus of the analysis is on the impacts of the administrative costs and the tax and subsidy provisions of the Turkish private pension system as applied to fixed-income investments. The institutional arrangements for investment in riskless assets of the defined-contribution component of Canada's private pension system are considered as an alternative against which the Turkish private pension system can be compared.

The net fiscal impact includes the net benefits derived by government from the taxation of the income streams that are used to finance the contributions to the pension system, the taxation of the income produced by the pension system and the fiscal cost of any government support given to these defined-contribution pension schemes. A major source of fiscal costs is the tax incentives often used by governments to encourage people to save more in pension schemes (Yoo & De Serres, 2004). The fiscal treatment

of pension plans therefore has an impact through the creation of tax expenditures and potentially the rate of capital formation through the required level of government borrowing.

Economic resource costs are the administrative costs associated with the specific institutional design for the management of a pension scheme. Such costs include those incurred for collecting funds, organizing records, investing funds, deciding eligibility and paying benefits (Mitchell, 1998; Tuesta, 2014). According to James and Palacios (1995), the efficiency of any pension scheme is substantially influenced by the associated administrative costs. This is due to the eroding effect such costs have on pensions and consumer welfare. Bateman et al. (2001) and Creighton and Piggott (2006) also show that these costs reduce pension returns significantly. Ceteris paribus, higher administrative costs lead either to higher rates of contribution being required during working years to achieve a target level of consumption during retirement or to less income and, hence, less consumption during retirement. The financial and economic cost of providing for a secure retirement can be significantly affected by the administrative costs of the pension plans (Bateman & Mitchell, 2004).

Furthermore, the potential economic benefit of additional domestic saving that is used to finance real investment in the economy can be completely or more than completely offset by the intermediation costs associated with the stimulation of this additional saving. The economic implication of real costs incurred through management fees in the Turkish pension system therefore requires special attention. According to Peker (2016), in 2014, Turkish pension administrators earned an average fee of 2.34 percent for generating just 0.19 percent average net return to the saver. This suggests that the

economic resource costs associated with the Turkish pension system at that time were very high.

Pension systems have several policy objectives. To the individual contributor, the goal is to achieve consumption smoothening over his or her lifetime. To governments, the goals may include increased domestic saving, increased tax revenue, improved income redistribution and poverty alleviation in old age (Barr & Diamond, 2009). It is therefore not uncommon for governments to reform their pension systems from time to time in accordance with their current policy objectives. For example, over the years the Turkish government has introduced reforms to its pension system for three major reasons.

The first was the need to reduce deficits of Turkish social security institutions that had drastically added to the debt burden of the government (Teksoz & Sayan, 2002). The publicly managed pay-as-you-go (PAYG) pension system previously used in Turkey became financially unsustainable after 1990. To reduce this burden over time, the government undertook major reforms in its public social security sector and, in addition, introduced privately managed defined-contribution pension schemes (Topal, 1999; Sayan & Kiraci, 2001).

The second reason was the need to deepen the capital markets and bolster economic growth by providing long-term savings to finance investment (Ozel & Yalcin, 2013). According to the IMF (2012), Turkey's low domestic savings make it highly reliant on capital inflows from abroad. This amplifies business cycles and increases instability within the country. Privately managed defined-contribution pension schemes have the

potential to provide long-term savings which, in turn, drive economic growth and stability (Mackenzie et al., 1997).

The third reason was to protect the welfare of pensioners. The financially unsustainable PAYG pension system puts the old age pension entitlement of Turkish citizens at great risk as it may not be able to pay the promised benefits to future retirees. The only way to ensure that pensioners are able to access their entitlements upon retirement was to reform the pension system.

Although the introduction of reforms by the Turkish government seems to be a step in the right direction, the reform process required the government to make choices between alternative pension systems and the types of institutions that would administer and manage such systems. There are various costs and benefits associated with each type of pension institution. It is thus important to examine whether the best possible set of reforms have been introduced and the most suitable pension system adopted.

In summary, if the private pension system is to achieve its three objectives of providing income support for retirement, stimulating incremental savings to finance real investment in the country and reducing the fiscal burden of the public pension system, it must have certain properties. First, it must provide better private returns than other financial instruments of a similar risk class. Second, the tax cost to the fiscal system required to produce this favourable return through private schemes must be small relative to other ways of achieving the same level of returns. Third, the economic resource costs (intermediation costs) of administering the system must be small or non-existent, otherwise it will be impossible to achieve the first two objectives simultaneously. These administrative costs reduce the net real returns from the

investment; this effect can only be offset in a given class of investment by incurring tax expenditures through favourable tax treatment. If the pension system is to deliver favourable private returns, higher administration costs will necessitate higher fiscal costs. Furthermore, the resource cost created by financial intermediation will result in economic waste and will lower the rate of economic growth of the economy.

# Chapter 2

# PENSION IN TURKEY

## 2.1 The Evolution of Pension Policies in Turkey

Three social security institutions were originally established in Turkey: (i) the Social Insurance Institution (SSK) was created in 1946 for public and private sector workers; (ii) the Retirement Fund (Emekli Sandiği) was created in 1950 for civil servants; and (iii) the Social Security Institution for Craftsmen, Tradesmen and other Self-employed People (Bağ-Kur) was created in 1971 for self-employed workers. The pension benefits from these social security systems are based on a PAYG system. It is a defined-benefit system in which pension payments to retirees are drawn from contributions made by the current workers and any deficit is guaranteed by the government.

Starting from the early 1990s, all three of the Turkish social security institutions were running deficits. The social security system deficit was projected to reach as high as 10.1 percent of gross domestic product (GDP) by 2050 if no changes were made to its structure (ILO, 1995). This triggered the first major reform, which was carried out in 1999. This reform introduced a two-pillar system in which the three social security institutions, after being restructured, made up the first pillar and newly introduced private pension schemes made up the second pillar. The focus of this reform was (i) setting up the Individual Pension System (IPS), a voluntary private pension system,

and (ii) setting up administrative reforms to control the deficit of the three social security institutions.

Although the reform succeeded in lowering the deficits of the social security institutions for a while, the deficits began to rise once again. As of 2004, the present value of the future deficits, inclusive of debt-servicing costs, was 475 billion Turkish Lira. This equated to about 110 percent of Turkish GDP (Brook & Whitehouse, 2006).

In 2006 a new set of reforms were implemented and two new social security laws were introduced. The first, the social security administrative reform law, was designed to unify the three social security institutions under a single umbrella. It was introduced to ease the monitoring of the number of insured people, revenues, expenses and the quality of customer service, and to accommodate mobility in the workforce. The second, the social insurance and health reform law, introduced a uniform pension formula based on sustainable parameters in the three social security institutions.

In 2012 the government of Turkey, having witnessed major improvements in the Turkish social security system, made further reforms to the existing private pensions law through the introduction of the 'Regulation on the Private Pensions System Law no. 6327', which created a reformed defined-contribution pension system (KPMG Turkey, 2013). The changes introduced in this new law were designed to encourage more savings that would, among other things, help to finance government infrastructure projects while generating a bigger asset pool for the financial sector. The ultimate objective was to establish Turkey as a regional financial hub. Key changes introduced included the introduction of government co-funding of private pensions and at the same time a reduction of the tax rate on the distributions at retirement, from

a minimum tax rate of 3.75 percent of the total cumulative value (contribution plus investment income) to 3.75 percent of the accumulated value of investment income only.

The most recent set of reforms were introduced in August 2016. The most prominent feature of these reforms is that voluntary participation in the scheme was converted to auto-participation. Every newly hired individual and every employee who changes jobs is automatically enrolled in the private pension system. The reform also compels any contributor who was automatically enrolled in the private pension system to remain a contributor for at least six to eight months. The new law ensures that participants who stay in the pension system and make regular contributions also receive a one-time subsidy of 1000 Turkish Lira. The 2016 reforms became effective as at January 2017 (McKenzie, 2016; CMS, 2016; Zhu, 2016).

In the Turkish private pension system, in order to ensure that pension contributions are invested in very low-risk assets, a significant portion of pension mutual funds are invested in government securities. For example, in terms of portfolio ceilings on pension fund investments according to asset classes, whereas there are no limits on how much can be invested in relatively secure bonds and equity, a cap of 20 percent is placed on retail investment funds and private investment funds. Bank deposits have a cap of 25%, 50 percent cap is placed on loans, while no investment is allowed in real estate (OECD, 2018).

## 2.2 Structure of the Canadian Private Pension System

The Canada Retirement Income System has consistently maintained an impressive global pension index grade of B over the past decade, and Canada has consistently

ranked among the top ten countries with the best pension systems over this period (Mercer Index, 2017). In addition, Canada has several times been ranked as the country with the highest share of pension income accounted for by private plans in the world (OECD, 2009).

Canada operates a multi-pillar pension system made up of both private and public components, with the principal objectives of poverty avoidance and income replacement for retirees (Tamagno, 2005). The first pillar is the non-contributory Old Age Security programme, and the second consists of the Canada and Quebec pension plans, which are defined-benefit plans introduced in 1965. The third pillar is the Tax-assisted Savings for retirement plan, or the Canadian private pension system. This is composed of two parts. The first is made up of pension schemes that are voluntary and occupational, generally referred to as Registered Pension Plans (RPPs). The RPPs are in the form of defined-contribution plans or defined-benefit plans, or a hybrid of the two. The second part of the private pension system, which is comparable to the Turkish system, consists of defined-contribution pension schemes that are voluntary and personal. This part is made up of the very successful Tax Free Savings Accounts (TFSAs) and a tax-free contribution account called the Registered Retirement Saving Plan (RRSP). The RRSP is a tax-deferred and tax-sheltered capital-accumulation pension account created to promote saving for retirement by employees and self-employed people. Up to a limit, contributions to RRSPs are tax-deductible. The deduction limit is calculated as the lesser of 18 percent of previous year's earned income and the RRSP annual limit, minus pension adjustments, plus pension adjustment reversals. Furthermore, income earned within the account is not taxed. All withdrawals from the account are, however, taxed as income. This type of institutional

arrangement for the taxation of pension savings is referred to as a Tax Free Contribution Account (TFCA) (Canada Revenue Agency, 2017).

The recently introduced (2009) TFSA is also becoming increasingly popular as a retirement savings plan. It is quite similar to the Roth individual retirement arrangement in the United States, but with fewer restrictions. In terms of tax treatment, the TFSA is the opposite of the RRSP. Contributions to the TFSA are made using after-tax income and, as the name implies, investment income and withdrawals are tax-free under this scheme (Canada Revenue Agency, 2017).

Generally, when the TFSA and RRSP are held by banks or other financial institutions, it is common for contributions to be invested in fixed-income securities issued by the same financial institutions. Contributions used to purchase Guaranteed Investment Certificates (GICs) from banks are guaranteed up to a limit by the Canada Deposit Insurance Corporation (CDIC). The regulatory policy of allowing banks to administer pension fund accounts has two advantages for the economy and the plan participants. First, these funds are available for lending by the banks to both private and public sectors of the economy. This will generally result in the financing of real investments that yield higher economic rates of return than if these funds were used to finance general government expenditure. Second, allowing the banks to source funds via these pension schemes helps them to reduce their risk of default. There is an implicit, though not legal, lock-in effect that is associated with such private pension holdings of the securities issued by the banks. To a great extent, funds obtained from securities that mature are reinvested in the securities of the same financial institution.

The management fees charged by the banks to administer these pension accounts are usually negligible or non-existent under the TFSA and RRSP. Even though interest income grows tax-free, the interest rates on contributions to the TFSAs and RRSPs are generally identical to those on direct investments in the institutions' securities of the same maturity that are subject to normal taxation. For example, in September 2018, the Canadian Imperial Bank of Commerce (CIBC) paid the same five-year interest rate of 1.25 percent both on GICs of five years' duration that are held by individuals outside their pension plan and on GICs held as a fixed-income investment that are either part of their RRSPs or part of their TFSAs (https://www.cibc.com/en/interest-rates/gic-rates.html). The Bank of Montreal likewise offers an interest rate of 2 percent on GICs, irrespective of whether they are held within their RRSPs or TFSAs or held outside of both (https://www.bmo.com/home/personal/banking/rates/gic-term-deposits). This similarity is not a new phenomenon. Mucaj (2006) compared interest rates offered on GICs within and outside RRSPs by 13 different Canadian banks for 2005 and found that the rates were exactly the same in most cases. This is as a result of the competition for TFSA and RRSP market share among service providers. Service providers offer various incentives, such as administrative fee waivers, in order to attract a larger share of the TFSA and RRSP markets. There is a benefit to the banks arising from the reduction in the overall risk of the institution as a result of their access to this source of financing. At the same time, the reduction in the level of financial intermediation costs is a benefit to the economy.

This risk-mitigating property of private pension funds being able to invest in risk-free bank securities is lost if the private pension funds are required to hold government bonds. If they are required to hold government bonds, then the pension fund

management will need to charge fees in order to cover for the economic resource costs of administration. Hence, the potential economic benefits of instituting such defined-contribution private pension plans are greatly reduced or lost.

# Chapter 3

# LITERATURE REVIEW

## 3.1 Administrative Costs of Pension Plans

Both Pension plans, the PAYG and the funded schemes have their own expenses, which are necessary for the institutions that has the mission of supervision of the pension operation, i.e. called administrative expenses. (Pokorný & Hejduková1, 2021).

The performance of a pension scheme can be studied by looking at the total administration of pension fund, and the investment management costs, incurred during the period of pension contributions till payments of retirement benefits. Generally, two ratios that are often discussed in any pension schemes are administrative costs, which are calculated as a percentage of total contributions taken in or as a total benefits paid to the pensioner. These Costs make a reduction in future benefits to pensioners and institutions which manage the pension funds. Lowering the costs of administration and investment will eventually increase the funds in pension pool that can be invested for future withdrawal. The funds which invested in pension portfolios will finally increase greater benefits, specifically, it maximizes the pension member, replacement ratio, and efficiency of pension fund. (Asher & Bali, 2015)

In defined contribution and Individual private pension schemes, the providers of pension plans cover their operating and administrating expenses through the fees charged from pensioners. The framework of charges across pension schemes are not

much different. Below I have showed the charges in some OECD countries, including Turkey which is of our major concern in this study.

Operating expenses of private pension schemes which were reported by some of OECD countries varied from 0.1% of assets to 1.5% in 2016. (OECD, 2017).

Although these costs may vary depending on the pension plan, whether it is DB or DC Donghyeok Jang and Youchang Wu (2020) find significant economies of scale in performance and administrative charges which are more significant for defined benefit (DB) plans than for defined contribution (DC) plans. (Donghyeok Jang and Youchang Wu, 2020).

Other things being equal, high costs imply that the pensioner may receive lower incomes at the time of retirement or he /she has to pay higher amount during working period. Heinz et al. (2010) found out that when short-term nominal investment pension returns are the only focus of attention, the reality that pension returns are solely one of the elements determining the pension funds' performance is ignored, other important factors that may affect the total performance of pension funds include administration, and management costs. Berthon et al. (2013) by referring to OECD figures which analyzes the real pension returns of some countries, stated that real returns of pension funds (i.e. Returns after inflation) were negative between the years 2007-2011 for most of the EU countries. This finding is applicable for any pension plan, whether it is voluntary or mandatory, publicly or privately, and funded basis or managed pay-as-you-go.

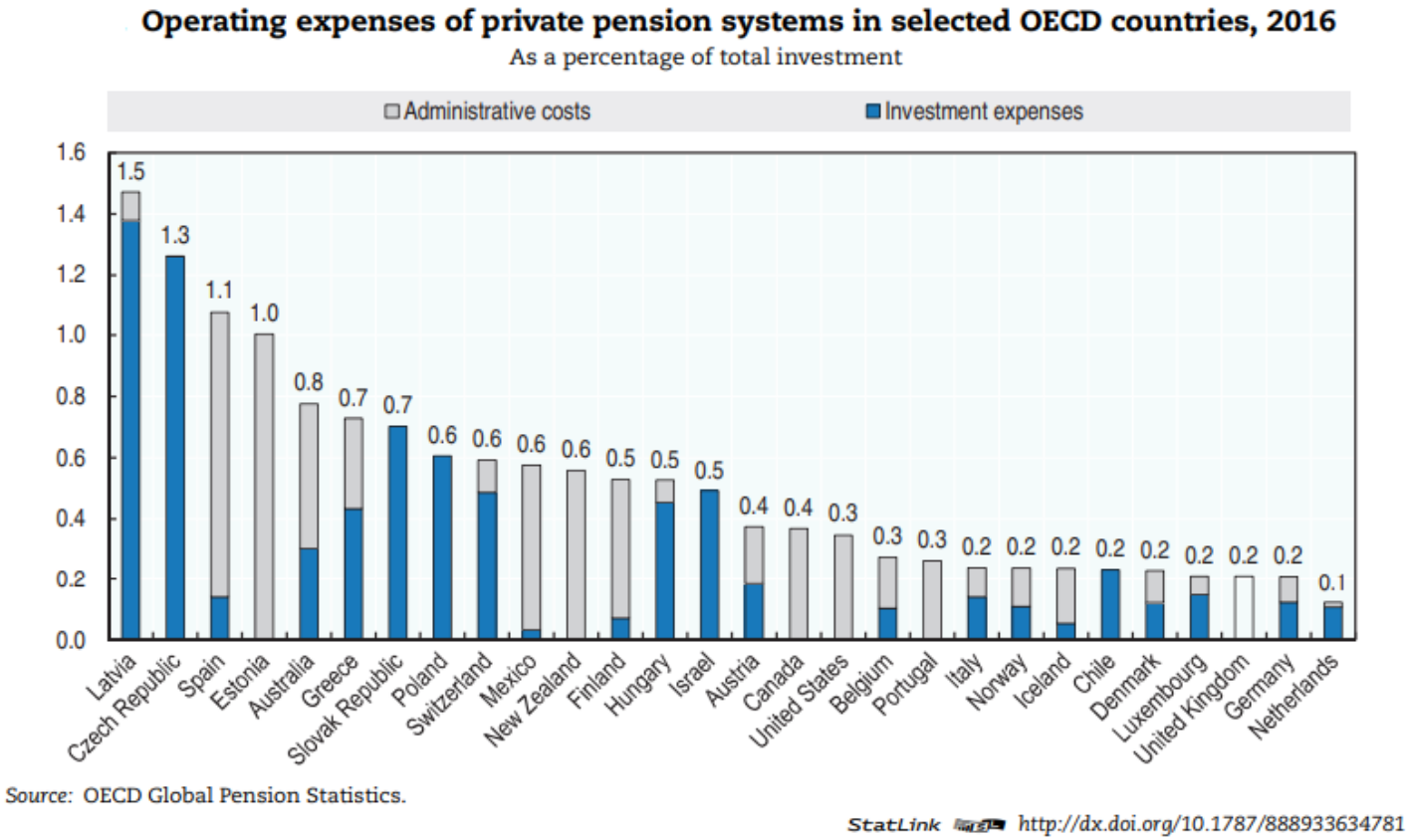


Figure 3.1: Administrative expenses in selective OECD Countries, 2016

**Fees or commissions charged to members by type of plan and by type of fee in selected OECD countries, 2016**

As a percentage of total investment

| | Fee on salaries | Fee on contributions | Fee on assets | Fee on return/ performance | Other fees (e.g. exit, entry, switching fees) |
|---|---|---|---|---|---|
| Chile Mandatory personal plans | 0.6 | x | x | x | x |
| Chile Voluntary personal plans | x | x | 0.8 | x | x |
| Czech Republic | x | x | 0.7 | 0.1 | .. |
| Estonia Mandatory plans | x | x | 1.2 | x | 0.0 |
| Hungary Voluntary personal plans in pension funds | x | 0.4 | 0.4 | x | .. |
| Israel DC plans | x | 0.4 | 0.3 | x | x |
| Latvia Mandatory state funded pension schemes | x | 0.0 | 1.4 | .. | x |
| Latvia Voluntary occupational plans | x | 0.5 | 0.3 | .. | x |
| Latvia Voluntary personal plans | x | 0.8 | 1.2 | .. | x |
| Mexico Personal plans | x | x | 1.0 | x | x |
| Poland Open pension funds | x | 0.0 | 0.5 | 0.0 | x |
| Slovak Republic 2nd pillar | x | 0.1 | 0.3 | 0.2 | x |
| Slovak Republic 3rd pillar | x | x | 1.3 | 0.0 | 0.1 |
| Slovenia Mutual pension funds | x | .. | 0.8 | x | 0.5 |
| Slovenia Pension and insurance companies | x | 1.2 | x | x | 0.2 |
| Spain Occupational plans in pension funds | x | x | 0.2 | x | x |
| Spain Personal plans in pension funds | x | x | 1.3 | x | x |
| Turkey Personal plans | x | 0.3 | 1.5 | x | 0.4 |

*Note:* ".." = Not available; "x" = Not applicable.
*Source:* OECD Global Pension Statistics.

StatLink http://dx.doi.org/10.1787/888933634800

Figure 3.2: Fees or commissions charged to members by type of plan and by type of fees in selected OECD countries, 2016

Ionescu and Robles (2014) also stated that administration and , investment management fees, custodian, guarantee , auditing, marketing and legal fees, would lower accumulated pension benefits over a 40 year period of contribution 39 per cent in for example Latvia, 31 per cent in Estonia and 20 per cent in Bulgaria. Barr and Diamond (2009) studies revealed that on average, for each percentage point deduction on commission fees, future pension benefits which will be accrued to pensioner will be decreased by 19.6 percent. (Ortiz et al., 2018)

Özel and Yalçın (2013) stated in their research that Turkey (which is our main focus in this article) has an opportunity to promote the domestic savings rate, but they claimed that the potentiality is mainly being restricted due to the voluntary nature of the participants in the system, and high management fees. Hence they recommended to reduce the high management fees in pension funds in order to promote national savings of the country.

Chybalsky (2016) mentioned 4 dimensions for analyzing pension systems: the distribution of GDP, the pension efficacy, the labor market influence and the administrative fees. (Mihai Daniel,et al ,2018)

Some other researchers believed that there are other factors which can affect the pension benefit. They believe the major factors influencing administrative costs include the number of members and the type of pension fund, i.e. whether the fund is open or selective closed (i.e for a defined geographic zone or economic sector). (Pokorný & Hejduková, 2021).

Ertugru et al. (2017) stated in their article that: If the fund management fees which is one of the administrative costs of pension funds are decreased to international average level, Third pillar pensioners can also choose to manage their own portfolio with lower costs based on pension fund return.

## 3.2 Determinants of Administrative Costs in Developed and Underdeveloped Countries

T As the infrastructure and the culture of developed and underdeveloped countries vary, the factors which may affect the costs of pension plans differ. The Several authors determine various variables for the administrative and investment costs in developed countries which we have summarized it as below: (Pokorný & Hejduková, 2021).

Table 3.1: Variables for the administrative and investment costs in developed countries

| Authors | Country | Important variable |
|---|---|---|
| De Vincentiis, Isaia & Zocchi [7] | Italy | Fund type (open/close) -<br>Minimum guaranteed return +<br>Guaranteed schemes' net asset value -<br>Squared natural logarithm of the guaranteed schemes' net asset value +<br>Share of the total financial assets invested in equities + |
| Campani & Riddier [8] | the Netherlands | Number of participants +<br>Ex-contributors (ratio) +<br>Real coverage ratio +<br>Logarithm of the assets per participants + |
| Bikker [5] | the Netherlands | Administrative costs:<br>Participants+<br>Type of funds +<br>Pensioners +<br>Inactive participants -<br>Assets per 1,000 participants +<br>Report invest cost -<br>Outsourcing +<br>Investment costs:<br>Total assets +<br>Type of funds +<br>Stocks +<br>Real estate + |
| Bikker, Steenbeek & Torracchi [9] | Australia, Canada, the Netherlands, the US | Number of participants +<br>Standardized CEM service quality score and complexity score +<br>Share of deferred participants -<br>Public sector (state or provincial government and municipality) + |

In developing or less developed countries, such as South Asia, the development of the labor market is assumed to be an important factor. Although Singapore and Malaysia have more developed labor markets, the opposite is true of Thailandand Vietnam.

For a broader and more established labor market, the organization of funded pensions is better and the participation of active members is high. (Current Problems of the Corporate Sector 2021).

## 3.3 Private Pension Administrative Tasks

The administration of a pension system is essentially the same for all pension systems, regardless of the structure or type of member covered. This is explained by the fact that the process of administering any pension system entails some crucial tasks that must be completed in order for the system to achieve its fundamental goals. These tasks include:

Collecting, processing, managing investments, keeping records and reporting, calculating and paying benefits, and in some cases sales and marketing. (Fried & Arnaboldi, 2002).

According to Bikker and de Dreu (2006), the administration of pension funds entails maintaining records, interacting with participants, developing policies, and adhering to reporting and regulatory obligations.

If the pensioner and the private pension business agree on a fee in exchange for a higher return on the managed fund or more successful management, this type of charges may become a little more sophisticated. The identification of these functions is critical in assessing the efficiency of pension fund management across countries.

These costs may vary due to the nature of pension scheme, whether it is public or private, although it is assumed that private pensions may have lower administrative costs due to high competition but evidence shows that due to lack of economies of scales and high expenses of advertising the administrative costs are higher.

These costs may vary due to the nature of pension scheme, whether it is public or private, although it is assumed that private pensions may have lower administrative costs due to high competition but evidence shows that due to lack of economies of scales and high expenses of advertising the administrative costs are higher (Elveren, 2008).

### 3.3.1 Collecting and Processing

First and foremost, in every pension scheme, a system for collecting contributions or taxes from working people must be in place. Following data and information collection, the pension contributions that determine the retirement benefit amount, are transferred to either a private pension fund, that invests these amount of contributions in various equities, or state pensions, such as social security, where taxes collected from pension contributors are utilized to pay to current retired members on a pay-as-you-go basis (CBO, 2004).

According to Rofman and Demarco (1999), the nature of the benefits and how they are funded, to some extent, affect the administrative cost of collecting and processing payment. (1999).

This is because the pension system's parameters establish the amount of data that must be gathered and delivered. i.e., a defined benefit pay-as-you-go pension plan, in which the only data collected is the amount of each worker's contributions to pension fund

and individual earnings, is less administratively costly than a defined contributions pay-as-you-go pension plan (notional accounts), in which more specific information is needed and the choice of investment funds is included. Furthermore, in the event of a defined contribution plan, the consequences of any inaccuracy or delayed collection and crucial information transmission are more serious.

Moreover, the cost of collecting contributions or payments of benefits could increase due to the underdeveloped country's inadequate banking and communications infrastructure. (James & Palacios, 1995).

In a study done for the IMF, Barrand et al (2004) claim that there are two primary administrative models that apply to public pension institutions: a full-service social insurance institution model, where the pension institution handles the primary duties, such as the collection of contributions and the payment of benefits, and a benefit payment model, where the tax collection process is handled

### 3.3.2 Investment Management

After collecting and processing of pensioner's contributions, a pension system's next major responsibility is to manage the investments of these amounts (Gruber, 1997). It is the set of tasks that a pension fund must carry out in order to invest the contributions collected from the pensioners, in the capital market. This duty is especially crucial for private pension funds, where the amount of contributions, distributed among several asset classes to reflect the preferences of the covered workers.3.2.2/1-Determinanats of Investment management costs.

#### 3.3.2.1 Determinants of Investment Management Costs

It is highly important that most of the confusion about pension charges is related to the costs of investment management that can entail more than 90 percent of overall total

costs. There are five views regarding the investment policies which determines the costs of investment management.

**Investment asset mix:** The more liquid an investment product is, the more individuals are trading it on the market, and as a result, the more quickly and transparently prices are formed Hedge funds and other illiquid investments are opaque and difficult to evaluate, therefore the costs of investing in illiquid assets may be higher than those of shares or bonds, but the trade-off is considerably greater potential long term returns for a particular level of risk, which is a key factor for DC pension funds.

**The limit of active/passive (trading) equities management:** Compared to passive management, which is based on market indexes, active management has higher costs.

**The administration of internal or external funds:** If the pension fund asset management is implemented by the pension fund itself (internal management) it is less costly than asset management done by a commercial fund manager (external management).

**Direct asset holding or indirect investment (investing in an asset pool):** A pension fund may keep the investment assets in separate or pooled accounts while making an indirect investment (investing in an asset pool). The latter can lower costs and foster economies of scale. In contrast, the party providing the fund may levy a fee for fund administration. Because all managed funds have management costs, "fund of funds" frequently has greater fees.

**Scale:** Generally speaking, an asset fund gets more effective as it grows because it gains the market strength to bargain for lower pricing with asset managers. (UNISON, 2018).

#### 3.3.2.2 Investment Strategies

This section expands on Mitchell's (2002) argument that the pension manager should choose from a variety of techniques in order to meet the unique pension fund's investment goals. The following are the strategies.

**Diversification:** In order to meet risk-return and liquidity needs, pension funds are expected to own a variety of assets.

**Active vs. passive administration:** Due to frequent trading, active management involves a high turnover rate in order to achieve high returns that exceed the market, but at the cost of greater costs. On the other hand, passive management typically mimics the performance of the market by, for example, investing in an indexed portfolio like the S&P 500 in return for lower costs and risk.

**Investing internally versus externally:** The plan's sponsors, who work on-site, have the option of investing the funds or contracting with an outside investment provider, providing external money managers or financial organizations to handle the pension fund's assets.

**Asset allocation alternatives:** Pension fund managers should know and manage the asset allocation across industries and in international level versus domestic investments. Asset allocation is the process of selecting asset classes in which to invest funds. Cash, fixed-income securities, and stocks can all be included in a plan's asset.

Courses to students who wish to acquire knowledge of another language.

### 3.3.3 Documentation and Reporting

Record-keeping and reporting are the third and final major functions of a pension system. In the case of a public pension fund (pay-as-you-go scheme), keeping record task refers to the process of keeping track of each worker's contributions to the account for retirements together with information on the wages of all covered employees. Contrarily, a private pension system requires the recording of account balances, changes in asset allocations, transfers of account balances to other funds, and the appropriate corrections to be made when errors are made in documenting the amount of contributions or profits, in addition to the previously mentioned tasks (Hart et al., 2001).

Avgi Gregory stated that a key reason for reporting is to show and describe the performance of pension scheme which consists of the following tasks (Fleming & Thornton, 2011)

- Membership statistics;
- case-work turnover for all significant types of case;
- Service quality in comparison with agreed targets;
- Complaints;
- Cash flow and contributions monitoring;
- Significant activities (bulk communications with members, benefit t statements); and
- Confirmation that no regulatory breaches have occurred.

The pension system's record-keeping and reporting functions, like the collecting process, can be centralized.

In Sweden, for example, mandated private pension funds use the services of a clearinghouse, which is a central government body, to collect contributions and maintain records. In the United Kingdom, on the other hand, voluntary private pension plans employ a centralized system for gathering pension contributions from pension members, while record-keeping is decentralized, meaning that each pension fund is in charge of its own data, (Thompson, 1999).

The correctness of the records is especially critical. This is due to the fact that the pensioners' benefit levels will be heavily influenced by these records. Furthermore, correcting data record inaccuracies is costly for the pension provider. The so-called reporting role increases the administrative burden of the pension fund. It refers to the procedures that the pension fund should have in place to convey account balance information and other relevant notifications to participants. In addition, the pension fund is required to provide annual reports to the country's supervisory or monitoring bodies. In Australia, for example, every pension schemes with more than five participants are governed by the Australian Prudential Regulatory Authority (APRA), which requires annual reports including details on the kind of plan and sponsor, the assets managed, the asset allocation, the governance of the plan, the features of outsourcing, and other administrative matters (Bateman & Mitchell, 2004)

### 3.3.4 Benefits Calculation and Payment

The calculation (method) and payment (time) of benefits is a pension fund's fourth responsibility. When employees reach retirement age and become eligible for a pension, benefit entitlements must be calculated and payments should begin. The

social security benefits formula considers a variety of characteristics, including past earnings, marital status, age, and projected wages and salary for the following year (Genetski, 1999).

The type of payout option chosen by retirees (lump-sum vs. annuity) has implications for the tasks and costs associated with drawing down pension benefits.

According to Poterba and Warshawsky (1999), defined contribution pension plans do not specify the payout option at retirement, whereas defined benefit pension plans, whether offered by private companies or the government, provide retirees with the option of drawing down the benefit in the form of a mandatory life annuity. Because retired workers rely substantially on their pension income, according to CBO (2004), timely computations and payments are deemed important to a well-functioning, efficient retirement system

### 3.3.5 Sales and Marketing

The final role that a pension system can do is marketing and sales. In general, private pension plans perform this duty, using advertisements and sales agents as a means of communicating with and selling their financial products to customers. Latin American countries with required private pension plans spend a significant amount of money on marketing and sales commissions (Devesa-Carpio & Vidal-Melia, 2002).

Marketing activities, as discussed by James et al. (2001), are often linked with active management because they are used to sell a specific skills of asset manager.

Almost 30 percent of the administrative costs of some countries such as Chilean AFPs are accounted for advertising and sales costs, which may provide crucial information to consumers but largely is a kind of economic welfare. (James & Palacios, 1995).

## 3.4 Calculation Methods of Costs of Administration

Administrative expenses can be calculated in a variety of ways. One method of quantifying these expenditures is to show them as a percentage of the assets managed. This measure, according to John and Davis (1998), is the best since it matches the way, fees of investment management are normally charged and spreads the expenses across the whole investment. Additionally, it might encourage investment managers to increase the amount of assets they are responsible for managing. (Chlon, 2002). However, from the contributor's point of view, they can grow as the account size expand over time, suggesting that large account holders subsidize small account owners. Pension funds in Europe and the United States favour this measure. The administrative costs could also be expressed as a proportion of annual donations. In general, pension funds in Latin American nations with required private pensions levy administrative fees as a percentage amount of contributions to every account holder. The disadvantage of this strategy is that, in comparison to the prior metric, it does not drive pension managers to improve their performance. Finally, administrative expenses can be represented as a cost per participant, in which all pension participants shall bear part of the administrative costs which will be deducted from the final benefit they receive. Because the social security system is an underfunded (pay-as-you-go) system, the latter measure is frequently employed to analyze the administrative costs spent by the system (Mitchell, 1996). Nonetheless, in nations with more generous public pension programs, this indicator is lower. As a result, no perfect estimate of

administrative costs exists because, as previously stated, all techniques may be biased towards specific drivers of pension benefits or participants.

Administrative costs are deserving of special attention for a variety of reasons. They have a significant role in determining how effectively the pension funds are run. Because, as Hoexter (1970) put it, "essentially every dollar spent on administration that could otherwise go to the plan participants is a $1 that could go to the plan participants." Furthermore, the degree of charges charged on pension participants is determined by these costs. Other factors being equal, the more a pension system's administration costs are, the higher the charges that covered workers must pay. As a result, the amount of benefit entitlements supplied by pension funds to retirees may be lowered. In a study for the World Bank, James and colleagues (2001) calculated that a 1% yearly fee would reduce the value of a lifetime contributor's retirement savings by 20%. Mitchell (1996) believes that administrative expenditures should reflect the genuine economic value of the resources used in order to avoid eroding the assets amassed in the pensioners' accounts (Mitchell, 1996).

Apart from the impact of administrative expenses on the realized net return of pensioners, as Whitehouse (2000) points out, higher administrative costs combined with poor net returns can cause governments to increase their guaranteed spending. This is explained by the fact that some governments provide mean-tested plans as implicit or explicit guarantees of the level of private pension payouts. When administrative costs approach high levels, which suggests a low net return, the number of persons eligible for these programmers will rise. Furthermore, according to James (2004), large administrative costs might increase the government's budgetary expenditures. This is true in the case of public pension programmers, where the

pension benefit amount is normally predetermined. The more the administrative costs of maintaining the public pension system, the greater the government's burden to meet these expenditures).

Finally, as Mitchell (1999) and Whitehouse (2000) point out, pension administration costs must be carefully monitored since, if they rise too high, low-wage workers will be enticed to circumvent the pension plan. This is mostly caused by high administrative costs combined with high charges which may deter workers from contributing to a pension plan, as they will view payments as a tax rather than a savings opportunity.

# Chapter 4

# INVESTMENT ALTERNATIVES IN TURKEY

## 4.1 Modelling Alternative Investment Systems

It is noteworthy that in Turkey, contributions made to defined-contribution pension plans can be held in a wide variety of financial instruments. For example, according to Capital Markets Board of Turkey data, in 2015, 57 percent of private pension assets were invested in government bonds, 12.5 percent were invested in equities, 7.5 percent in reverse repurchase agreements, 1.3 percent in foreign securities, 1 percent in money markets and the remaining 21 percent in other savings vehicles (Paakkinen, 2015). These figures show that Turkish private pension savings are heavily invested in government bonds.

Since there are no restrictions on private purchase of government bonds, individual contributors may choose to save for retirement by personally investing in Turkish government bonds (TGBs) rather than in pension schemes, thereby avoiding the payment of management fees associated with the pension schemes. No management fees are charged for holding government bonds. In Turkey, the purchase of TGBs, outside of any pension scheme, is an alternative low-risk savings vehicle in which to invest one's savings. Investments in TGBs are used in the current study as a benchmark against which all other pension facilities are compared.

To make this comparison, a model is constructed to show how investments in TGBs are treated by the tax system to determine the net benefit to the contributor and the net fiscal impact on the government budget. A set of models are then constructed to show how the contributions to four other types of pension facilities (TFSA, TFCA, the initial Turkish defined-contribution private pension system that existed between 1999 and 2012 (OTPS), and the new Turkish defined-contribution pension system (NTPS)) are treated. Estimates are made of the eventual net benefit to the contributor, the net fiscal impact on the government budget and the associated economic resource costs arising from the administration of each of the pension arrangements.

The same personal income tax rates (tj) are assumed across all cases in order to make the different institutional arrangements comparable. We also assume that the same amount of pre-tax income (Cj) is contributed yearly in each of these five alternative savings vehicles. In this way, we guard against the potential impact of pension size differences. Each of the models can be simulated for a number of different parameter values.

In the absence of fiscal adjustments and management costs, this baseline gross of tax yearly contribution may be accumulated and computed in year 1's price level. Equation 1 is a representation of how the accumulated annual contributions gross of tax are compounded over the time period when the investments are being made. The accumulation is made using a nominal interest rate and then deflating the result with the price index to arrive at the real accumulated portfolio.

$$A_y^r = \frac{\left\| \sum_{j=0}^{y} \left( C_j \sum_{j=1}^{y-1} \left[ \prod_{u=j+1}^{y} (1+i) \right] \right) \right\|}{p_y} \quad (1)$$

where $A_y^r$ i is defined as the real accumulated portfolio gross of tax after y years of contributing to the pension scheme, y represents the number of years over which contributions are made, Cj is the annual nominal contribution gross of tax yearly income that is used to make the contribution to the investment scheme, i refers to the annual nominal rate of return earned from the stock of investment, and $py$ stands for the price index in year y.

We recognise that many different kinds of financial assets can be held within each of the institutional pension types examined in this study. However, this study considers only the part of the facilities that is held in government bonds or similar low-risk financial assets. The simulation model that has been built to carry out this comparative analysis is flexible to accommodate different rates of inflation, real interest rates and contribution levels

## 4.2 Analysis of an Individual Savings Programme in Turkish Government Bonds (TGBs).

To calculate the value of the accumulated portfolio over y years, we assume that the baseline before-tax real income of Cj in year 1's price level is set aside annually for the purchase of TGBs as a savings instrument over y periods. First, an amount is deducted from this gross of tax income as income tax and the remainder (disposable income) is used to purchase the government bonds. The tax rate can be varied with the scenario under consideration. It is assumed that the amount invested in TGBs yields a rate of return equal to a real rate (r). The real bond rate is converted into a market (nominal) bond rate in order to account for the influence of inflation. The market bond rate is calculated using the formula (Fisher, 1977):

$$i = r + R + (1+ r + R)\, gPe \qquad (2)$$

Where i = nominal market bond rate, r = real bond rate, R = risk factor (TGBs are assumed to have zero risk premium) and gPe = the expected inflation rate.

No tax relief is given for the amounts invested in bonds; therefore, savings investments are made from disposable income. The investment income obtained in the form of interest on the government bonds is taxed annually according to Turkey's investment income tax legislation (TR Ministry of Finance Revenue Administration, 2016).

At the end of the y periods, we calculate the value of the accumulated investment (principal + interest) and indicate the net benefit to the investor by estimating the net present value (NPV) and internal rate of return (IRR) of the investment programme. We also determine the net fiscal impact on the government budget and measure the economic resource costs associated with the administration of the government bonds. In equation 3, the accumulation of yearly contributions net of income tax is compounded over the y periods with a nominal interest rate. In addition, an investment income tax on the interest is deducted in each period. The real accumulated portfolio net of tax ($A_y^{net}$) is then obtained by deflating the value obtained with a price index py

$$A_y^{net} = \frac{\left\| \sum_{j=0}^{y} \left( C_j (1 - t_j) \sum_{j=1}^{y-1} \left[ \prod_{u=j+1}^{y} (1 + i - i.t_R) \right] \right) \right\|}{p_y} \quad (3)$$

Where $A_y^{net}$ = accumulated portfolio net of tax after y years of contributing to the pension scheme, $t_j$ = rate of income tax on the income used to make the contribution, and $t_R$ = effective tax rate on investment income.

In equation 4, the real accumulated portfolio net of tax is discounted to the first year (j = 0) at a discount rate equal to the assumed real rate of return, to arrive at the NPV of the accumulated portfolio.

$$A_0^{NPV} = \frac{A_y^{net}}{(1+\delta)^y} \quad (4)$$

Where: $A_0^{NPV}$= NPV of the accumulated portfolio net of tax at time j = 0, and $\delta$ = discount rate.

Equation 5 shows how the accumulation of the addition of income tax ($t.C_j$) paid in each period and investment income tax collected from interests on annual contributions net of income tax ($C(1-t).i.t_R$) is deflated with a price index to arrive at the NPV of the net fiscal impact of bond investment at time j = 0.

$$NFI_0^{NPV} = \sum_{j=0}^{y} \left[ \frac{[t.C+C(1-t).i.t_R]_j / p_j}{(1+\delta)^y)} \right] \quad (5)$$

Where $NFI_0^{NPV}$ = NPV of the net fiscal impact at time j = 0.

## 4.3 Calculating Tax Free Savings Account (TFSA) Contributions

T The tax structure of the TFSA is quite similar to that of TGBs, the only difference being that interest is not taxed under the TFSA and there are no management fees charged to cover the administration costs because we are considering the part of the pension portfolio held in government guaranteed securities issued by banks. The TFSA tax structure is, in fact, identical to that of TGBs held by residents of jurisdictions such as North Cyprus and many Middle Eastern countries, where the interest income of TGBs is also not taxed. Investments held in a TFSA are modelled assuming that the contributions to the TFSA are made from after-tax income, that there is no tax paid when the funds are withdrawn at a later date, and that the interest earned on the accumulated investments in the TFSA is also not taxed, even when withdrawn.

We again begin with a baseline annual gross of tax contribution of $C_j$. A particular amount of income tax, depending on the scenario under consideration, is paid on this

contribution and the remainder is committed to the pension system. While in the pension system, the contributions generate some investment income at a nominal interest rate equivalent to the Turkish government bond rate of i percent.

At the end of the y periods, the value of the accumulated portfolio (contribution + investment income) is calculated, the net benefit to the contributor (measured through NPV and IRR) is determined and the net fiscal impact on government budget is estimated. We also examine whether there are any associated economic resource costs. Equation 6 is a mathematical representation of how the accumulated annual contributions net of income tax are compounded over the time period when the investments are being made. The accumulation is made using a nominal interest rate and then deflating with the price index to arrive at the real accumulated portfolio.

$$A_y^{net} = \frac{\left\| \sum_{j=0}^{y} \left( C_j (1-t_j) \sum_{j=1}^{y-1} \left[ \prod_{u=j+1}^{y} (1+i) \right] \right) \right\|}{p_y} \quad (6)$$

Equation 7 shows how the real accumulated portfolio net of tax is discounted to the first year (j = 0) with a discount rate of δ to arrive at the NPV of the accumulated portfolio.

$$A_0^{NPV} = \frac{A_y^{net}}{(1+\delta)^y} \quad (7)$$

In equation 8, the accumulated value of income tax paid on annual contributions (t.c) is deflated annually with price index and discounted to the first year (j = 0).

$$NFI_0^{NPV} = \sum_{j=0}^{y} \left[ \frac{(t.C)_j / p_j}{(1+\delta)^y} \right] \quad (8)$$

## 4.4 Calculating Tax Free Contribution Account (TFCA) Contributions

A unique feature of the TFCA is that although it gives a tax deduction when contributions are made, it leaves the contributor with a future tax obligation. We model the TFCA contributions based on this understanding.

We likewise begin with a baseline annual gross of tax contribution ($C_j$) which is tax-deductible. Thus, the entire contribution goes into the pension system, where it yields some investment income in each period at a Turkish government bond rate of i percent. The accumulated portfolio (contribution + investment income) is also not taxed while in the pension system and no management fees are charged by the banks on holdings of the banks' GICs. Tax is, however, paid on the accumulated portfolio when withdrawals are made. We then calculate the value of the accumulated portfolio after taxation, estimate the net benefit to the contributor by its NPV and IRR, and determine the net fiscal impact and examine whether there are associated economic resource costs. Equation 10 shows how the accumulated annual contributions gross of tax are compounded over the time period when the investments are being made. The accumulation is made using a nominal interest rate. Equation 9 shows how a pension tax is deducted from this nominal accumulated portfolio ($A_y(1 - t_p)$) and the result deflated in $y^{th}$ period by price index to obtain the real accumulated portfolio net of tax ($A_y^{net}$).

$$A_y^{net} = (A_y(1 - t_p))/p_y \tag{9}$$

$$A_y = \sum_{j=0}^{y}(C_j \sum_{j=1}^{y-1} \left[\prod_{u=j+1}^{y}\langle 1 + i\rangle\right] \tag{10}$$

Where $A_y$ = accumulated portfolio and $t_p$ = pension tax rate.

As shown in equation 11, the NPV of the accumulated portfolio net of tax at time j = 0 is again obtained by discounting the real accumulated portfolio to the first year (j = 0) with a discount rate of δ.

$$A_0^{NPV} = A_0^{NPV} = \frac{A_y^{net}}{(1+\delta)^y} \quad (11)$$

In equation 12, the value of the pension tax on nominal accumulated portfolio $(t_p . A_y)$ is deflated with a price index in the $y^{th}$ year and discounted to the first year (j = 0) to arrive at the net fiscal impact.

$$NFI_0^{NPV} = \frac{(t_p . A_y)/p_y}{(1+\delta)^y} \quad (12)$$

## 4.5 Evaluation of the original defined Turkish Private Pension System (OTPS) Contributions

The Turkish defined-contribution pension system (OTPS), legislated in 1999 and reformed in 2013, was also a tax-free contribution account in structure, like the TFCA but with administrative costs. It is interesting to evaluate this system to observe its outcomes and the incentives it created, which resulted in the reforms that followed.

The OTPS calculations start with the same baseline annual gross of tax contribution of $C_j$. The tax treatment of the initial contributions is the same as in the case of TFCA, which exempts income paid into such a pension scheme from tax. Thus, the entire contribution is invested in the pension system. The contributor, however, pays to the pension fund administrator an entrance fee ($f_e$) of 470 Turkish Lira. A contribution fee ($f_c$) of 3.3 percent from each period's contribution is also earned by the pension fund administrator. Finally, a pension fund management fee ($f_m$) of 2.3 percent of the accumulated portfolio in each period (present contribution net of charges + previous contributions + interest on investment) is also charged by the pension fund

administrator. At the end of the $y^{th}$ year, the accumulated portfolio is again taxed at a rate ($t_p$) of 3.75 percent.

The accumulated portfolio is calculated, the net benefit to the contributor is estimated, the net fiscal impact is determined and the associated economic resource costs are estimated. Equation 13 shows how the nominal accumulation of yearly contributions net of contribution fee ($f_c c_j$) is compounded over y years. A management fee ($f_m$) is charged on the compounded amount yearly. In equation 14, a pension tax ($t_p$) is subtracted from the nominal accumulated portfolio ($A_y(1 - t_p)$). The result is further deflated with a price index in $y^{th}$ year to obtain the real accumulated portfolio net of tax($A_y^{net}$),

$$\text{Where } A_y = \sum_{j=0}^{y}[(C_j\,[1 - f_c]\sum_{j=1}^{y-1}\left[\prod_{u=j+1}^{y}\langle 1 + i\rangle\right]).(1 - f_m)] \quad (13)$$

$$A_y^{net} = (A_y(1 - t_p))/p_y \quad (14)$$

Where $f_c$ = contribution fee rate in the particular year and $f_m$ = management fee in the particular year.

The NPV of the accumulated portfolio net of tax at time j = 0 is once again given as:

$$A_0^{NPV} = \frac{A_y^{net}}{(1+\delta)^y} \quad (15)$$

The net fiscal impact for the initial Turkish pension system at time j = 0 is also given as:

$$NFI_0^{NPV} = \frac{(t_p.A_y)/p_y}{(1+\delta)^y} \quad (16)$$

In equation 17, the economic resource cost is shown as the sum of three components: (i) lump sum entrance fee; (ii) contribution fee deflated annually with price indices; and (iii) management fee on the accumulation of yearly contribution net of contribution

fee compounded with interest rate i and deflated annually with corresponding price indices. Overall, these fees are set at a level to cover administrative costs associated with the management of the pension funds.

$$EC= f_e + \sum_{j=0}^{y}((f_c C)_j/p_j) + \sum_{j=0}^{y}[((1-f_c)C_j \sum_{j=1}^{y-1}\left|\prod_{u=j+1}^{y}\langle 1+i\rangle\right|).f_m]/p_j \quad (17)$$

Where EC = economic resource cost and $f_e$ = entrance fee.

Equation 18 represents how the economic resource cost is discounted to arrive at its NPV.

$$EC_0^{NPV} = \frac{EC}{(1+\delta)^y} \quad (18)$$

**Calculating the New Turkish Pension System (NTPS) contributions**. The NTPS is a modification of the OTPS. The key distinguishing features are: (i) in place of the tax exemption given under the OTPS, the government provides the contributor with a cash subsidy equal to gc percent (25% in 2018) of the amount of his or her after-income-tax contribution; (ii) a one-time lump sum subsidy of 1000 Turkish Lira is given to the contributor; and (iii) lower administrative fees (entrance fee, contribution fee and management fee) are paid to the administrators of the NTPS.

The modelling proceeds as follows. An amount of income tax is deducted from the baseline contribution (Cj), a government cash contribution is received at a rate of gc percent of the baseline contribution net of tax, and a one-time lump sum subsidy of 1000 Turkish Lira is added. The sum of these three contributions (individual's contribution + one-time lump sum subsidy + government contribution) is transferred into the pension system.

In the pension system, a one-time entry fee of 102 Turkish Lira is deducted. Subsequently, a contribution fee equal to 1.5 percent of each contribution made over the accumulation period is also deducted and a tax subsidy equal to 25 percent of the contribution fee paid in each period is given. A fund management fee of 1.09 percent is also levied annually on the accumulated portfolio arising only from the individual's contribution. While in the system, the pension contributions generate investment income in the form of interest at the government bond coupon rate, and the accumulated investment income is taxed at a rate of 3.75 percent at the end of the $y^{th}$ year.

The part of the total contribution provided by the government also generates investment income at the government bond coupon rate. A tax of 3.75 percent is likewise levied on the accumulated investment income at the end of the $y^{th}$ year. A fund management fee of 0.37 percent is also charged annually on the accumulated portfolio arising from the government contribution.

At the end of the $y^{th}$ year, we again measure the net benefit to the contributor and the net fiscal impact, and determine whether there are any associated economic resource costs. In equation 19, a one-time lump sum subsidy is given and a lump sum entrance fee is charged. Furthermore, the accumulation of yearly contributions $[C_j(1-t_j)]$, minus the annual contribution fee $[f_c C_j(1-t_j)]$ plus tax subsidy $[t_s f_c C_j(1-t_j)]$, plus government contribution $[g_c C_j(1-t_j)]$ minus tax levied on government contribution $[\,g_t g_c[C_j(1-t_j)]]$ is compounded with an interest rate, the fund management fee rate ($f_m$) is levied on the accumulated fund annually and a one-time investment income tax

is paid on the accumulated fund at the end of the $y^{th}$ year. The remaining amount is then deflated with a price index to arrive at the net accumulated portfolio$A_y^{net}$.

$$A_y^{net} = S - f_e + \frac{\sum_{j=0}^{y}[C_j(1-t_j)](1-f_c+t_s f_c+g_c) - g_t g_c[C_j(1-t_j)]\sum_{j=1}^{y-1}\left[\prod_{u=j+1}^{y}(1+i)(1-f_m)\right](1-\sigma)}{p_y} \quad (19)$$

Where S = one-time lump sum subsidy, $t_s$ = subsidy rate, $g_c$ = government contribution rate and σ = one-time tax rate on investment income.

To obtain the NPV of the accumulated portfolio net of tax, equation 19 is once again discounted thus:

$$A_{yNPV}^{net} = \frac{A_y^{net}}{(1+\delta)^y} \quad (20)$$

Equation 21 shows how the NPV of the net fiscal impact is calculated. The NPV of the net fiscal impact is made up of three components. In the first component, the accumulation of the income tax ($t_j c_j$) and the tax paid on the government contribution are added together to obtain the total taxes paid. The addition of the tax subsidy on annual contributions is calculated as a share of the contribution fee $[t_s f_c[C_j(1-t_j)]]$, and the total government subsidy in the form of the contribution is obtained to arrive at the total volume of subsidy received by contributors. The difference between total tax and total subsidy is calculated and discounted to year zero with a discount rate. In the second part, a one-time tax on investment income is levied and the tax amount is then deflated with a price index and discounted to year zero with a discount rate. The third part is the one-time lump sum subsidy S.

The NPV of the net fiscal impact in this case is:

$$\mathrm{NFI}_0^{\mathrm{NPV}} = \sum_{j=0}^{y} \frac{[t_j C_j/p_j]+[\,g_t g_c[C_j(1-t_j)]/p_j]-[t_s f_c[C_j(1-t_j)]/p_j]-[[g_c[C_j(1-t_j)]/p_j]}{(1+\delta)^j} +$$

$$\sum_{j=0}^{y} \frac{\left\|[\sum_{j=1}^{y-1} i]\ \sigma\right\|/p_y}{(1+\delta)^j} - S \qquad (21)$$

The economic resource cost is:

$$EC= f_e\ + \sum_{j=0}^{y}(f_c C_j(1-t_j)/p_j) + \frac{\left\|\left(\sum_{j=0}^{y}[C_j(1-t_j)](1-f_c+t_s f_c+g_c)\sum_{j=1}^{y-1}\left[\prod_{u=j+1}^{y}(1+i)\right]\right).f_m\right\|}{p_y}$$

(22)

As specified in equation 22, the economic resource cost is made up of the sum of three components: (i) entrance fee; (ii) accumulation of contribution fees deflated by price index; and (iii) sum of management fees levied in each pension accumulation of yearly contributions.

We again obtain the NPV of the economic resource cost using the formula:

$$\mathrm{EC}_0^{\mathrm{NPV}} = \frac{\mathrm{EC}}{(1+\delta)^y} \qquad (23)$$

# Chapter 5

# RESULTS

This section begins by presenting the evaluation results obtained from the simulation experiments described by equations 1 to 23 using the base case data. Table 1 presents the parameters used in the simulations.

The estimations are made in four steps. First, the IRR for each pension scheme is computed from the point of view of the pension contributor. The IRR is obtained by calculating the real discount rate which equates the final accumulated value of the pension asset at the time of retirement to the value of all the gross of tax contributions used to purchase the investment. Second, we estimate the accumulated portfolio (net of tax) for each pension scheme. This refers to the amount of contributions accumulated over the forty-year period after all taxes have been paid. The accumulated portfolio is calculated as present value and expressed as a percentage of the present value of before-tax contributions made to the pension scheme[1].

[1] Steps one and two measure the benefits from the perspective of the pension contributor from their investing in the pension scheme.

Table 5.1: Parameter Values. Source: Authors' calculations

| TGB rates | | TFSA rates | | TFCA rates | |
|---|---|---|---|---|---|
| Marginal income tax rate ($t_j$) | 20.00% | Marginal income tax rate ($t_j$) | 20.00% | Marginal income tax rate ($t_j$) | 20.00% |
| Real rate of return (r) | 3.00% | Real rate of return (r) | 3.00% | Real rate of return (r) | 3.00% |
| Inflation rate (gpe) | 8.12% | Inflation rate (gpe) | 8.12% | Inflation rate (gpe) | 8.12% |
| Govt. bond coupon rate (i) | 11.36% | Govt. bond coupon rate (i) | 11.36% | Govt. bond coupon rate (i) | 11.36% |
| Govt. bond tax rate on annual interest earnings ($t_{R)}$ | 10.00% | Withdrawal tax rate on final accumulation balance ($t_p$) | 0.00% | Withdrawal tax rate on final accumulation balance ($t_p$) | 20.00% |
| **OTPS rates** | | **NTPS rates** | | **Common Parameters** | |
| Real rate of return (r) | 3.00% | Marginal income tax rate ($t_j$) | 20.00% | Duration of contributory period (y) | 40 years |
| Inflation rate (gpe) | 8.12% | Real rate of return (r) | 3.00% | Frequency of contribution | Annual |
| Govt. bond coupon rate (i) | 11.36% | Inflation rate (gpe) | 8.12% | | |
| Entrance fee ($f_e$) | 470TL | Govt. bond coupon rate (i) | 11.36% | | |
| Contribution fee rate ($f_c$) | 3.30% | Govt. contribution ($g_c$) | 25.00% | | |
| Fund management rate ($f_m$) | 2.30% | Entrance fee ($f_e$) | 102TL | | |
| Pension tax on the final balance ($t_p$) | 3.75% | Contribution fee rate ($f_c$) | 2.00% | | |
| | | Fund management rate ($f_m$) | 1.09% | | |
| | | Govt. fund mgt. fee rate ($f_m$) | 0.37% | | |
| | | One-time-only subsidy (s) | 1000TL | | |
| | | Tax subsidy ($t_s$) | 25.00% | | |
| | | Pension tax on the final balance ($t_p$) | 3.75% | | |

Note: Annual contributions of a real value of 1000 Turkish Lira over a 40-year period is assumed for all cases in our simulations. The results are not significantly changed for any constant profile of contribution over the contributory period of the pension.
TGB, Turkish government bonds; TFSA, Tax Free Savings Account; TFCA, Tax Free Contribution Account; OTPS, old Turkish pension system; NTPS, new Turkish pension system; TL, Turkish Lira.

This ratio measures the proportion of the present value of the contributions[2] that is retained by the pension participant. If this ratio is equal to 1 then it means that the pension participant will have paid no tax on the income contributed nor any tax at any point on the returns or the cumulated value of the investment. In such a circumstance, the IRR will be equal to the gross rate of returns or yield of assets held in the pension fund[3]

Third, an estimation of the net fiscal impact of each pension scheme is made. The net fiscal impact is simply the difference between the taxes received and subsidies given by the government. This is again expressed as a proportion of the present value of all the gross of tax contributions made into the pension system. Fourth, an estimation of the management costs associated with each pension scheme is carried out. The management cost refers to the cost associated with the operation and maintenance of a pension scheme. The management fees and other administrative costs are, in the main, used to employ labour and pay for all the economic resource costs of these financial intermediation efforts. These resource costs are a direct cost to the economy and represent the deadweight loss or economic cost created by the particular pension scheme. This economic cost is very different in nature to the net fiscal burden, which is a transfer of income between the pension participant and the government treasury. All the figures in step four are again converted into their present values and measured as a percentage of the real value of the accumulated gross of tax contribution (equation 1).

[2] Either cumulated at the gross of tax real rate of returns for that particular asset class or discounted by that same rate, to any particular calendar year.

[3] Alternatively, the IRR can be estimated as gross of tax rate of return times this ratio

Results when marginal income tax rates are the same during the contribution period as at the time of pension pay-out. Considering a situation where the marginal income tax rate does not change over time, the following results (summarized in Table 5.2) are obtained from our analysis. For the case of TGBs, we find that investors who use gross of tax income to buy these will ultimately be able to retain approximately 62.7 percent of the value of the gross of tax income they used to purchase these bonds. Expressed in terms of the rate of return, the investor earns an IRR that is estimated to be 1.8 percent (Table 5.2, row 1)

Both the TFSA and TFCA types of institutional set-up yield to the pension participant 80 percent of the initial gross of tax income that they invest in the pension scheme (Table 5.2, columns 2 and 3). These two institutional arrangements, in which bank securities guaranteed by a deposit insurance system are purchase, do not have any associated intermediation costs that are passed on to investors. Hence, the difference between the yield of these two schemes and that of investment in government bonds arises entirely due to the greater tax burden on investments in government bonds, 37.35 percent versus 20 percent in the TFSA and TFCA schemes.

Table 5.2: Scenario 1. Present values of savings plan components to the first year (j=0) of savings programme ($t_j^0 = t_j^{40} = 20\%$). Source: Authors' calculations

| # | Variables | TGB | TFSA | TFCA | OTPS | NTPS |
|---|---|---|---|---|---|---|
| 1 | Gross of tax contribution | 100.00 0% | 100.00 0% | 100.00 0% | 100.00 0% | 100.00 0% |
| 2 | IRR | 1.805 % | 2.427 % | 2.427 % | 1.528 % | 2.449 % |
| 3 | Net fiscal impact | 37.265 % | 20.000 % | 20.000 % | 2.191 % | −4.287 % |
| 4 | Economic efficiency cost | 0.000 % | 0.000 % | 0.000 % | 41.584 % | 23.583 % |
| 5 | Value of accumulated portfolio net of tax | 62.735 % | 80.000 % | 80.000 % | 56.225 % | 80.705 % |

Accumulated portfolio net of tax ranking: NTPS > TFSA = TFCA > TGB >OTPS

IRR ranking: NTPS > TFSA = TFCA > TGB > OTPS

Welfare cost ranking: OTPS > NTPS > TFSA = TFCA = TGB

Net fiscal impact ranking: TGB > TFSA = TFCA > OTPS > NTPS

Note: IRR, internal rate of return; TGB, Turkish government bonds; TFSA, Tax Free Savings Account; TFCA, Tax Free Contribution Account; OTPS, old Turkish pension system; NTPS, new Turkish pension system.

The value of the accumulated contributions net of tax under the OTPS is equivalent to just 56 percent of the accumulated gross of tax contribution and the IRR yield is 1.53 percent (Table 2, column 4). It is easy to see why the OTPS was a failure. It did not yield as high a return as simply holding the same government bonds without any preferential tax treatment.

Under the NTPS, the final value amounts to 81 percent of the accumulated gross of tax contribution with an IRR of 2.45 percent. Based on the accumulated portfolio net of tax and IRR figures, the NTPS comes first in terms of benefit to the contributor, the TFSA and TFCA jointly come second, the TGBs come in fourth and the OTPS comes last.

With regard to the net fiscal impacts, the amount of tax collected under TGBs is equivalent to 37 percent of the accumulated gross of tax contribution. A further breakdown of the 37 percent tax shows that the first 20 percent is taken at the beginning from the application of the normal income tax to income that is represented by the gross of tax contribution. The remaining 17 percent arises from the tax paid on the interest received on the cumulated investment. TGBs do not receive any subsidies; therefore, the present value of the net fiscal impact is positive and equal to 37 percent of the present value of the gross of tax contributions.

Under the TFSA, the value of the taxes collected is equivalent to 20 percent of the accumulated gross of tax contribution. This entire amount is due to the income tax paid on the income represented by the gross of tax contribution to the savings scheme. No form of subsidy is received by the pensioner from the government. The net fiscal

impact is thus exactly equal to the amount of tax paid. This amounts to 20 percent of the accumulated gross of tax contribution.

Under the TFCA, the total amount of tax collected also equals 20 percent of the accumulated gross of tax contribution. The total amount is paid when withdrawals are made from the pension scheme. Again, no subsidies are given by the government under this scheme; therefore, the net fiscal impact is equal to 20 percent of the accumulated gross of tax contribution.

As for the OTPS, the total tax collected amounts to only around 2 percent of the accumulated gross of tax contribution. All contributions of income to this pension system were not subject to income tax. When withdrawals were made from the pension scheme, 15 percent of the cumulated amount was exempt from this income tax and a tax rate of 3.75 percent was then levied on the remaining 85 percent. This scheme does not involve subsidies being given to contributors; therefore, the net fiscal impact also amounts to approximately 2 percent of the accumulated gross of tax contribution.

Under the NTPS, while the amount of tax collected is 20.3 percent of accumulated gross of tax contribution, the amount of subsidy given is 25 percent of accumulated gross of tax contribution. This results in a negative net fiscal impact equal to a net subsidy of 4.29 percent of the present value of the gross of tax contributions. Under this scheme, out of the total tax collected, approximately 20 percent is collected from the gross of tax income used for the contribution at the beginning, 0.24 percent of the gross of tax contribution is collected from the interest received on the pensioner's contribution, and 0.071 percent of the gross of tax contribution is collected from interest received on the government's contribution. A breakdown of the total subsidy

given under the NTPS is as follows: an amount equal to 20 percent of the accumulated gross of tax contribution is given as the government's contribution to the pension scheme[4], an amount equal to 4.2 percent of the accumulated gross of tax contribution is given as a one-time-only subsidy to the contributor by the government, and a total accumulated value of tax subsidy equal to 0.4 percent of the accumulated gross of tax contribution is also given by the government.

In summary, TGBs make the most contribution to government coffers, followed by the TFSA and TFCA, which contribute equal amounts. They are followed by the OTPS. Meanwhile, the NTPS, on balance, depletes government finances as a result of the large subsidies received by contributors under this scheme

A critical aspect determining the economic impact of any pension scheme is the level of economic resource costs required to manage the system. These costs are reflected in the level of management fees and other charges that are levied on components of the pension. No such costs are incurred under the TGB, TFSA and TFCA schemes because there is empirical evidence that they do not need to involve institutional management arrangements that impose net intermediation costs. However, substantial economic resource costs are created in the form of pension management costs under both the OTPS and NTPS. Under the OTPS, the value of the management cost incurred is equivalent to 41.58 percent of the present value of the total contributions. Under the NTPS, although the economic resource costs are lower than for the OTPS, they are still quite substantial, at 23.58 percent of the total contributions to the system.

[4] This is equivalent to a 25% subsidy on the net of income tax amount invested when the rate of income tax is 20% on the initial gross of tax income that is to be used for this purpose.

The government of Turkey wisely closed down the OTPS and replaced it with the NTPS. Under the old system, the private participants, the government and the economy all lost, relative to just investing in government bonds. The only individuals attracted to this system were private investors in very high income tax rate brackets, who could use this scheme as a tax-avoidance strategy. They could contribute to the pension and obtain a tax deduction for the amount of their contribution and then, as soon as possible, they would cancel their pension plan and end up paying a much lower 3.75 percent exit tax. As a result, they could make a net financial gain even after paying the applicable pension fund fees.

The NTPS has rectified the problem of the OTPS by providing private investors with a better return than just buying government bonds. However, this is achieved at a tremendous fiscal and economic resource cost. Although the total intermediation cost has been reduced from 41.58 percent under the OTPS to 23.58 percent under the NTPS, it is still very substantial. The attractive yield of the NTPS of 80.71 percent of total contributions and an IRR of 2.45 percent is only achieved by the provision of a government subsidy. This yield to the investor is achieved by starting with total gross of tax contributions of 100 percent, subtracting the economic resource cost of 23.58 percent, and then adding the net fiscal transfer of 4.29 percent. This results in a net yield of 80.71 percent of the gross of tax contributions to the private pension participant

## 5.1 Sensitivity Analysis

Income tax rate during contribution period is greater than the tax rate during pension pay-out. Different private pension systems will be attractive to different types of investors, depending on their tax situation. The four tax schemes are now considered

in the case where the marginal income tax rate of the individual investor is higher during the period in which they are contributing to the scheme as compared to the rate of tax at the time of pension pay-out. This is a typical retirement scenario for middle-aged contributors where the income tax rate on their wage or business income at the time of making contributions is expected to be higher than the marginal rate of income tax that is expected to be paid on pension income upon retirement. In this case, it is assumed that the marginal income tax rate of the individuals at the time they make pension contributions is 25 percent, while the marginal income tax rate at the time the pensions are paid out is 15 percent. All other parameters of the simulation are kept the same as in the base case. The results are summarized in Table 5.3

Starting with the IRR (Table 5.3, row 2), this higher income tax rate on ordinary income clearly has a greater negative impact on the returns on investment in TGB, TFSA and NTPS than those in TFCA and OTPS. The TFCA ranks first with an IRR of 2.58 percent, the NTPS ranks second with an IRR of 2.29 percent, the TFSA ranks third with an IRR of 2.26 percent, the TGB is fourth with an IRR of 1.64 percent, while the OTPS is still last with an IRR of 1.53 percent. Consistent with these results, the accumulated contributions are highest under the TFCA, where the contributor is able to retain 85 percent of the accumulated gross of tax contributions. The NTPS provides the next best outcome, allowing the pensioner to reclaim 76 percent of their total contributions. Following very closely is the TFSA, under which the pensioner is able to reclaim 75 percent of their accumulated gross of tax contributions. The TGB is ranked next, as it allows the retention of 59 percent of the pensioner's total accumulated gross of tax contributions. The contributor retains the least amount of only 56 percent under the OTPS.

Table: 5.3: Scenario 2. Present values of savings plan components to the first year (j=0) of savings programme ($t_j^0 = 25\%,\ t_j^{40} = 15\%$). Source: Authors' calculations

| # | Variables | TGB | TFSA | TFCA | OTPS | NTPS |
|---|---|---|---|---|---|---|
| 1 | Gross of tax contribution | 100.00 0% | 100.00 0% | 100.00 0% | 100.00 0% | 100.00 0% |
| 2 | IRR | 1.642 % | 2.262 % | 2.582 % | 1.528 % | 2.289 % |
| 3 | Net fiscal impact | 41.186 % | 25.000 % | 15.000 % | 2.191 % | 1.969 % |
| 4 | Economic efficiency cost | 0.000 % | 0.000 % | 0.000 % | 41.584 % | 22.221 % |
| 5 | Value of accumulated portfolio net of tax | 58.814 % | 75.000 % | 85.000 % | 56.225 % | 75.810 % |

Accumulated portfolio net of tax ranking: TFCA > NTPS> TFSA> TGB>OTPS

IRR ranking: TFCA > NTPS> TFSA > TGB> OTPS

Welfare cost ranking: OTPS>NTPS>TFSA= TFCA =TGB

Net fiscal impact ranking: TGB > TFSA > TFCA > OTPS > NTPS

Note: IRR, internal rate of return; TGB, Turkish government bonds; TFSA, Tax Free Savings Account; TFCA, Tax Free Contribution Account; OTPS, old Turkish pension system; NTPS, new Turkish pension system.

It is worth noting that when the marginal tax rate is higher in the contributing phase than in the pay-out phase, the TFCA benefits the contributor more than the TFSA and NTPS. The benefit to the contributor under the TFCA was previously lower than that of the NTPS and equal to that of TFSA under scenario 1.

With regard to the fiscal impacts, as reported in Table 3, rows 3 and 4, under the TGB, the total tax collected is 41 percent of the accumulated before-tax contributions and the net fiscal impact is likewise equal to 41 percent of the gross of tax contribution. Under the TFSA, the total tax received is equal to 25 percent of the accumulated gross of tax contribution, no subsidy is given to contributors and hence, the net fiscal impact is exactly equal to the entire 25 percent. Meanwhile, under the TFCA, the total tax collected is equal to the tax rate on the final payment of the pension, which in this case is assumed to be 15 percent.

Finally, with regard to economic resource costs, the TFSA, TFCA and TGB do not create such costs. The OTPS generates the highest management costs, equivalent to 42 percent of the accumulated gross of tax contribution. The management costs incurred under the NTPS amount to 22 percent of the accumulated gross of tax contributions; this is a 2 percent decline in management costs when compared with scenario 1, as a smaller amount of net of tax contributions are made. The NTPS still results in a very substantial waste of economic resources. This inefficiency in intermediation is only overcome by a fiscal subsidy equal to 23.3 percent of the before-tax value of the contributions.

Income tax rate during contribution period is lower than the tax rate during retirement. We now consider the situation in which the marginal income tax rate is lower in the

present than in the future. This may happen if the contributions start when the individual is young and earning a level of income that is normally expected to rise in real terms, so that by the time of retirement the individual will be taxed at a higher marginal income tax rate than during the period of contributions. In these simulations we are assuming that the marginal income tax rate during the period of accumulation is 15 percent and then rises to 25 percent during retirement. Table 4 presents a summary of our findings

Considering the IRR (Table 5.4, row 2), the NTPS ranks first (2.60%), the TFSA ranks second (2.58%), the TFCA ranks third (2.26%), the TGB ranks fourth (1.96%) and the OTPS is last (1.53%). Compared with the previous evaluation, the rankings of the NTPS, TFSA and TFCA are reversed. Accordingly, the accumulated net of tax contributions (Table 4, row 5) are highest under the NTPS (86%), followed by TFSA (85%), TFCA (75%) and TGB (67%). Finally, the OTPS provides the lowest figure when only 56 percent is retained.

The net fiscal impact is a positive 33 percent for TGB and a positive 15 percent for TFSA. Net fiscal impacts for the TFCA, OTPS and NTPS are 25 percent, 2 percent and negative 11 percent, respectively.

When the marginal tax rate is lower in the present than in the future, the TFSA raises more revenue for government than the TFCA does. Furthermore, the size of the net negative fiscal impact incurred by government because of subsidies under the NTPS increases by 7 percent (from 4 percent to 11 percent) as compared with scenario 1.

Table 5.4: Scenario 3. Present values of savings plan components to the first year (j=0) of savings programme ($t_j^0 = 15\%,\ t_j^{40} = 25\%$). Source: Authors' calculations

| # | Variables | TGB | TFSA | TFCA | OTPS | NTPS |
|---|---|---|---|---|---|---|
| 1 | Gross of tax contribution | 100.00 0% | 100.00 0% | 100.00 0% | 100.00 0% | 100.00 0% |
| 2 | IRR | 1.960 % | 2.582 % | 2.262 % | 1.528 % | 2.600 % |
| 3 | Net fiscal impact | 33.336 % | 15.000 % | 25.000 % | 2.191 % | −10.54 3% |
| 4 | Economic efficiency cost | 0.000 % | 0.000 % | 0.000 % | 41.584 % | 24.945 % |
| 5 | Value of accumulated portfolio net of tax | 66.629 % | 85.000 % | 75.000 % | 56.225 % | 85.599 % |

Accumulated portfolio net of tax ranking: NTPS> TFSA > TFCA > TGB>OTPS−

IRR ranking: NTPS > TFSA> TFCA > TGB> OTPS

Welfare cost ranking: OTPS>NTPS>TFSA= TFCA =TGB

Net fiscal impact ranking: TGB > TFCA > TFSA > OTPS > NTPS

Note: IRR, internal rate of return; TGB, Turkish government bonds; TFSA, Tax Free Savings Account; TFCA, Tax Free Contribution Account; OTPS, old Turkish pension system; NTPS, new Turkish pension system.

The economic resource cost associated with the management of the schemes is equal to 42 percent of the accumulated gross of tax contributions under the OTPS but reduces to 25 percent under the NTPS.

**Different rates of inflation**. One of the important features to be judged when evaluating any private pension scheme is how well it accommodates different rates of inflation without reducing the net after-tax real yield of the pension assets received by the individual owning the assets. We evaluate each of the three currently operational pension alternatives – TFSA, TFCA and NTPS – along with government bonds. The results of this analysis are presented in Table 5 for inflation rates of 5 percent, 10 percent and 15 percent. In each case it is assumed that the nominal interest fully adjusts for the rate of inflation.

The impact of inflation and the tax treatment of government bonds (Table 5, row 2) clearly shows the tremendous inflation risk that is imposed on such investments because of the taxation of their nominal interest earnings. As inflation increases from 5 percent to 15 percent, the real returns on government bonds falls from 1.97 percent to 1.49 percent and the ratio of the accumulated portfolio to the gross of tax contribution falls from 66.8 percent to 55.4 percent

On the other hand, the net positive fiscal impact increases from 33.2 percent to 44.55 percent. To avoid this increase in the taxation of fixed-income securities, investors usually choose to place them in pension plans illustrated by the TFSA, TFCA and NTPS. Under the same base case assumptions, there is no impact of inflation on the real rate of return of fixed-income securities held in TFSA and TFCA (Table 5.5, column 3).

Table 5.5: Sensitivity analysis for different inflation rates. Source: Authors' calculations

| | Inflation rate | TGB | TFSA & TFCA | NTPS |
|---|---|---|---|---|
| IRR | 5.000% | 1.970% | 2.430% | 2.451% |
| | 10.000% | 1.720% | 2.430% | 2.449% |
| | 15.000% | 1.493% | 2.430% | 2.447% |
| Accumulated portfolio | 5.000% | 66.782% | 80.000% | 80.743% |
| | 10.000% | 60.541% | 80.000% | 80.683% |
| | 15.000% | 55.447% | 80.000% | 80.627% |
| Net fiscal impact | 5.000% | 33.218% | 20.000% | −4.369% |
| | 10.000% | 39.459% | 20.000% | −4.240% |
| | 15.000% | 44.553% | 20.000% | −4.122% |
| Resource cost | 5.000% | 0.000% | 0.000% | 23.626% |
| | 10.000% | 0.000% | 0.000% | 23.558% |
| | 15.000% | 0.000% | 0.000% | 23.495% |

Note: IRR, internal rate of return; TGB, Turkish government bonds; TFSA, Tax Free Savings Account; TFCA, Tax Free Contribution Account; NTPS, new Turkish pension system.

In the case of the NTPS, the interaction of inflation, taxation and the various administrative changes and government subsidies has only a very mild negative impact on the return received by the investor.

As in the other cases, the Turkish government through its NTPS pension system is able to give the private investor holding fixed-income securities a favourable private rate of return, but only at a high cost to the national treasury and an economic resource cost of over 23 percent of the contributions made to this private pension system

## 5.2 Different Rates of TGB Coupon Rate

We also examine how the alternative pension schemes – TFSA, TFCA, NTPS – and TGBs respond to variations in the TGB coupon rate. This is necessary because the Turkish government bonds issuances' coupon rate is allowed to vary within a range in the country. Table 6 presents the results of this analysis for TGB coupon rates of 5%, 10% and 15%. In row 2 of Table 6, the first important observation is that investing in TGBs will generate negative real returns if the rate becomes as low as 5%. The second observation is that there is a positive relationship between the rate and real returns generated. As the rate increases from 5% to 15%, the real returns also increase from −0.81% to 3.68%, the accumulated portfolio to the gross of tax contribution increases from 22.12% to 129.68% and the net fiscal impact also increases from 24.22% to 55.01%. As shown in row 3 of Table 6, while a TGB coupon rate as low as 5% brings about a negative real rate of returns in both TFSA and TFCA, an increase in the rates has a positive correlation with their real rate of returns and the size of the accumulated portfolio. Changes in the rate, however, have no net fiscal impact under the TFSA and TFCA arrangement, the net fiscal impact remains 20% of accumulated portfolio to gross of tax contribution as TGB coupon rate increases from 5% to 15%. In row 4 of

Table 6, the following can be observed; a rate as low as 5% also induces a negative real rate of returns under the new NTPS, the accumulated portfolio rises as the rate rises, increase in the rate has a mild positive effect on the net fiscal impact and the associated resource costs increase with rising rates.

Table 5.6: Different rates of real discount rate

| | TGB coupon rate | TGB | TFSA and TFCA | NTPS |
|---|---|---|---|---|
| IRR | 5.000% | −0.810% | −0.620% | −0.470% |
| | 10.000% | 1.170% | 1.690% | 1.730% |
| | 15.000% | 3.680% | 4.610% | 4.590% |
| Accumulated portfolio | 5.000% | 22.121% | 23.928% | 25.390% |
| | 10.000% | 48.866% | 59.864% | 60.939% |
| | 15.000% | 129.862% | 185.958% | 184.474% |
| Net fiscal impact | 5.000% | 24.216% | 20.000% | −4.554% |
| | 10.000% | 33.172% | 20.000% | −4.390% |
| | 15.000% | 55.009% | 20.000% | −3.685% |
| Resource cost | 5.000% | 0.000% | 0.000% | 13.146% |
| | 10.000% | 0.000% | 0.000% | 20.336% |
| | 15.000% | 0.000% | 0.000% | 37.602% |

Source: Authors' calculations.

Sensitivity analysis is also conducted to determine how changes in the real returns used as the proxy for discount rate affect the overall performance of the alternative schemes examined. The results are reported in Table 5.7. In general, increasing the discount rate has no effect on the real rate of returns. This stands to reason as the discount rate is the same as the real rate of returns. Increasing discount rate however lowers the size of the accumulated portfolio in all cases. Increasing discount rate also lowers the net fiscal impact in all cases and lowers the resource costs in NTPS.

Table 5.7: Evaluation of the likely impact of the NTPS on National Savings

| | Real discount rate | TGB | TFSA and TFCA | NTPS |
|---|---|---|---|---|
| IRR | 5.000% | 1.810% | 2.430% | 2.450% |
| | 10.000% | 1.810% | 2.430% | 2.450% |
| | 15.000% | 1.810% | 2.430% | 2.450% |
| Accumulated portfolio | 5.000% | 29.070% | 37.069% | 37.395% |
| | 10.000% | 4.522% | 5.766% | 5.817% |
| | 15.000% | 0.764% | 0.974% | 0.983% |
| Net fiscal impact | 5.000% | 25.975% | 9.267% | −4.090% |
| | 10.000% | 13.164% | 1.442% | −4.18% |
| | 15.000% | 8.421% | 0.244% | −4.200% |
| Resource cost | 5.000% | 0.000% | 0.000% | 15.410% |
| | 10.000% | 0.000% | 0.000% | 6.696% |
| | 15.000% | 0.000% | 0.000% | 3.822% |

Source: Authors' calculations.

A stated goal of the government in its promotion of the new private pension plan is to increase the level of savings in the country. The relevant measure of savings for this analysis is total savings, both private and public savings. The reduction in government revenue or increase in expenditures due to the subsidization of the private pensions will necessitate an incremental increase in government borrowing. This represents a net loss in public savings. The increase in the rate of return of such private pensions results in both a shift of private savings in other financial instruments to private pensions and a stimulation of new private savings.

From the analysis above, the tax impact of an investor saving through the purchase of government bonds is that some amount in taxes will be paid on the income used to purchase the bonds and additional taxes will also be paid on the interest earned over the lifetime of the investment. This is found to be equal to 37% of the income used to purchase the bonds. In the case of a person saving via the current private pension system, the net fiscal impact is a negative of 4.29% of the income used to purchase the bonds.

As a large proportion of the investments in the private pension schemes is required to be held as government bonds, the major impact of the private pensions will be to shift the holdings of government bonds from private holdings to inside the private pension plans. Hence, the fiscal impact of this switch of the holdings of government bonds from outside to inside the private pensions will result in a net reduction of public savings equal to 41.29% of the value of the income used to invest in the private pensions. Even if new savings were to come into the NTPS the fiscal cost as compared to simply consuming the income would be equal to 25% of the value of the new savings, with an accompanying economic resource cost of 23.58% of this new savings.

Considering the results of the base case simulations reported in Table 2, the real rate of return to the investor is 1.80% if they invested in government bonds, while the net effect of the pension subsidies and the administrative costs of the private pension system would yield a real rate of return of 2.45% in the NTPS. There is no credible empirical estimation of the elasticity of private savings that would suggest that an increase of the real rate of return by 0.65% would be enough to increase net private sector savings by enough to offset a loss in tax revenue of between 25% and 41.29% of the increase in the value of private pensions.

In an important paper on this topic, summers concluded that the estimate of the elasticity of savings by Boskin of 0.4 was an extreme upper bound for the elasticity of savings to the rate of return savings. Even if this estimate were used to estimate the response of this 36% increase in the rate of return on pension savings, the net increase in the total quantity of pension savings would only increase by about 14%. This is well below the loss in public savings of between 25% and 41.29% that would occur as a con- sequence of the subsidy and favorable tax treatment required to offset the administrative costs of the NTPS. Hence, the objective of the government of Turkey to use the NTPS as a way to increase the overall level of savings and investment in the country is highly unlikely to be realized.

# Chapter 6

# CONCLUSION

The newly introduced privately managed defined-contribution pension scheme (NTPS) in Turkey has been implemented to serve as a complement to the nation's social security system. This study has addressed some of the economic issues created by this defined-benefit pension system by comparing the outcomes of the new pension system with the previous one and also with the two very successful Canadian defined-contribution pension schemes (TFSA and TFCA) that can be administered by banks and trust companies. Estimates are made of the IRR, accumulated portfolio, net fiscal impact and economic resource cost (administration costs) associated with each of the retirement savings schemes.

Our findings show that the three existing pension schemes for individual investors are more beneficial as savings vehicles than direct investment in TGBs. However, the improved performance by the NTPS, from the point of view of the individual investor, is being produced by a loss in tax revenue by the government and an economic resource cost to the country.

In contrast, the institutional arrangements in Canada for such defined-contribution private pension plans do not induce individuals to invest in government bonds. Instead, individuals are allowed to purchase riskless GICs of the commercial banks and trust companies. Because this source of funds is long term and stable for these financial

institutions, these institutions have, in exchange, lowered the management fees for holding such investments in a pension account to zero. As a consequence, these plans yield almost the same return as the NTPS, and at the same time allow the government to collect substantial tax revenues, thus creating no economic resource costs.

We conclude that the institutional structure of pension schemes plays a vital role in determining their level of success. If the bank-administered TFSA and/or TFCA were adopted in Turkey and the requirement of holding government securities were lifted, such schemes would provide contributors with benefits similar to those they currently enjoy under the new Turkish scheme, while eliminating the economic resource costs of administration and improving their net fiscal impact.

However, the adoption of pension schemes structured like these two Canadian systems would require some caution, since the distribution of their benefits changes with variations in the marginal income tax rate. Our results show that the TFCA is superior to the TFSA in terms of the private returns in cases where the marginal income tax rate is higher in the present than in the future. Hence, it would appear prudent to introduce schemes similar to both the TFSA and TFCA simultaneously. Contributors should be able to choose the option that best suits their individual situation. Alternatively, contributors may choose to operate both schemes in order to manage the uncertainty of their future tax position and hence be able to take advantage of the unique characteristics of each scheme.

# REFERENCES


Asher, M., Bali, A. S. (2015) Public pension programs in Southeast Asia: an assessment. *Asian Economic Policy Review*, *10*, 225-245.

Barr, N., & Diamond, P. (2009). Reforming pensions: principles, analytical errors and policy directions. *International Social Security Review*, *62*(2): 5-29.

Barrand, P., Ross, S. & Harrison, G. (2004). *Integrating a unified revenue administration for tax and social contribution collections: experiences of central and Eastern European countries* (Publication No. WP/04/237). International Monetary Fund.

Bateman, H., & Mitchell, O. (2004). New Evidence on Pension Plan Design and Administrative Expenses: The Australian Experience, *Journal of Pension Economics & Finance*, *3*(3): 63-76.

Bateman, H., & Mitchell, O. S. (2004). New evidence on pension plan design and administrative expenses: the Australian experience. *Journal of Pension Economics & Finance*, *3*(1), 63-76.

Bateman, H., Kingston, G., & Piggott, J. (2001). *Forced saving: mandating private retirement incomes*. Cambridge: Cambridge University Press.

Bikker, J & de Dreu, J. (2006). *Pension fund efficiency: the impact of scale, governance and plan design*, DNB Working Paper No. 109/2006. Retrieved

from http://vgacordis.nl/2006-12-26%20Kosten%20pensioenfondsen%20(engels).pdf

Brook, A. M., & Whitehouse, E. R. (2006). The Turkish pension system: Further reforms to help solve the informality problem. OECD Economics Department Working Papers 529, OECD Publishing.

Canada Revenue Agency (2017). Registered Retirement Savings Plan (RRSP). Retrieved from http://www.cra-arc.gc.ca.

Chlon, A. (2002). *Administrative Costs of Pension Funds in Poland in International Perspective,* Regional Meeting for the Eastern and Central European Countries. Retrieved from https://www.oecd.org/pensions/private-pensions/2067320.pdf.

CMS (2016). *A New Era for the Private Pension System in Turkey*. Retrieved from www.cms-lawnow.com/ealerts/2016/08/a-new-era-for-the-private-pension-system-in-turkey

Creighton, A., & Piggott, J. (2006). The structure and performance of mandated pensions. In G. L. Clark, A. H. Munnell & J. M, Orszag (Ed.), *The Oxford Handbook of Pensions and Retirement Income*, (pp. 241-267). London, Oxford University Press.

Devesa-Carpio, J. & Vidal-Melia, C. (2002). *The Reformed Pension Systems in Latin America*. Washington, D.C.: The World Bank

Elveren A. Y. (2008). Social Security Reform in Turkey: A Critical Perspective. *Review of Radical Political Economics*, *40*(12), 16-20.

Ertugru, H. M., Gebesoglu, P. F., & Atasoy, B. S. (2017) Mind the gap, Turkish case study of policy change in private pension scheme, *Borsa Istanbul Review*, *18*(2), 140-149.

Fisher, I. (1977). *The Theory of Interest*. Philadelphia: Porcupine Press.

Fleming, D. & Thornton P., (2011), *Good Governance for Pension Schemes*, Cambridge University Press: New York.

Fried, J. and Arnaboldi, F. (2002). *Canadian Retirement Savings Plans and Italian Pension Reform*, RBC Financial Group, Economic Policy Research Institute, EBRI Working Paper Series, No. 2002-7, Canada.

Genetski, R. (1999). *Administration Costs and the Relative Efficiency of Public and Private Social Security Systems*. Retrieved https://www.cato.org/sites/cato.org/files/pubs/pdf/ssp15.pdf.

Gruber, J. (1997). *Social Security and Retirement in Canada* (Publication No. 6308). National Bureau of Economic Research.

Hart, L. E., Kearney, M., Musil, C. & Olsen K. (2001). *SSA`s Estimates of Administrative Costs under a Centralized Program of Individual Accounts*.

Social Security Administration. Retrieved from http://www.ssa.gov/policy/docs/research/rr2000-01rev.pdf.

Hoexter, E. (1970). *Administrative Expenses of Welfare and Pension Plans*, US Department of Labor, Labor Management Services Administration, Washington, D.C.

IMF (2012). *Turkey: Concluding Statement of the IMF Mission for the 2012 Article IV Consultation*. Retrieved from https://www.imf.org/en/ News/Articles/ 2015/09/28/ 04/52/mcs100912.

International Labour Organization (1995). *Turkish government social security and health insurance project*. The Under-Secretariat of Treasury. Retrieved from www.hazine.gov.tr.

James, E. (2001). *Comparative Costs of IA Systems*, World Bank, Institute Pension Reform Seminar, Budapest.

James, E., & Palacios, R. (1995). Costs of Administering Public and Private Pension Plans. *Finance and Development*, *32*(2): 12.

John, D. C. & Davis, G. G. (1998). The Costs of Managing Individual Social Security Accounts, Center for Data Analysis, The Heritage Foundation Backgrounder, Working Paper, NO. 1238, Washington, D.C.

KPMG Turkey (2013). *Turkish Pension System Amendments: What is ahead?*. Retrieved from https://www.kpmgvergi.com/PDF/Yayinlar/KPMG-Global-Yayinlar/Turkish-Pension-System-Amendments.pdf.

Mackenzie, G. A., Gerson, P. & Cuevas A. (1997). Can public pension reform increase saving? *Finance and Development*, 34(4): 46.

McKenzie, B. (2016). Turkish Employees to be Automatically Enrolled to the Private Pension System. Retrieved from https:// www.lexology.com/library/detail.aspx?g=c0c7575a-6eec-4326-b02b-f47cdb823164.

Mercer Index (2017). *Melbourne mercer global pension index*. Retrieved from https://www.mercer.com.au/content/dam/mercer/attachments/asia-pacific/australia/ mmgpi-2017/au-2017-mmgpi-report.pdf.

Mitchell, O. S. (1996). Administrative Costs in Public and Private Retirement Systems, National Bureau of Economic Research, NBER Working Paper, No. 5734, Cambridge, MA 02138.

Mitchell, O. S. (1998). *Administrative costs in public and private retirement systems, in Privatizing Social Security*. Chicago: University of Chicago Press.

Mitchell, O. S. (1999). *New Trends in Pension Benefit and Retirement Provisions* (Publication No. 7381), National Bureau of Economic Research (NBER), Cambridge. Retrieved from https://www.nber.org/papers/w7381

Mitchell, O. S. (2002). *Redesigning Public Sector Pensions in Developing Countries Pension Research Council* (Publication No. WP2002-09), Pension Research Council of University of Pennsylvania. Retrieved from https://pensionresearchcouncil.wharton.upenn.edu/publications/papers-2018/redesigning-public-sector-pensions-in-developing-countries/

Mucaj, B. (2006). Efficiency of Pension Funds Management in OECD Countries: Registered Retirement Savings Plan in Canada, *Development Discussion Papers*, 40(10): 2004-2006.

OECD *(2017), Operating costs of private pension systems and fees charged to members,* in Pensions at a Glance 2017: OECD and G20 Indicators, OECD Publishing, Paris.160-161

OECD, (2009). *Pensions and the Crisis*. Retrieved from https://search.oecd.org/insights/46154604.pdf.

OECD, (2018). *Survey of investment regulation of pension funds*. Retrieved from http://www.oecd.org/finance/private-pensions/annualsurveyofinvestmentregulationofpensionfunds.htm.

Ortiz, I, Durán-Valverde, F., Urban, S., Wodsak, V., Yu, Z. (2018). *Reversing Pension Privatization: Rebuilding public pension systems in Eastern European and Latin American countries (2000-18).* Retrieved from Available at SSRN: https://ssrn.com/abstract=3275228.

Ozel, O., & C. Yalcin (2013). Domestic savings and private pension system: An evaluation of the Turkish case. *Iktisat Isletme Ve Finans*, 28(327): 31-66.

Paakkinen, R. (2015). *Turkey: Private fund growth on track*. Retrieved from https://www.ipe.com/pensions/pensions/regulation/turkey-private-fund-growth-on track/10008675.article.

Peker, I. (2016). Analysing Turkish Individual Pension System Fees and Returns. *Journal of Economics Finance and Accounting*, *3*(1): 34-62.

Pokorný, J., & Hejduková, P. (2021). Pension Funds: Administrative and Investment Cost, *Current Problems of the Corporate Sector*, *115*(2021): 2-6.

Poterba, J. M. & Warshawsky, M. J. (1999). The Costs of Annuitizing Retirement Payouts from Individual Accounts. In J. B. Shoven, *Administrative Aspects of Investment-Based Social Security* (pp. 173-206). Cambridge: National Bureau of Economic Research.

Roman, M. D., Toma Roşu, G. C., Tuchiluş, G., (2018), Efficiency of Pension Systems in the EU Countries, *Romanian Journal of Economic Forecasting*, *21*(4): 161-173.

Sayan, S., & A. Kiraci (2001). Identification of parametric policy options for rehabilitating a pay-as-you-go based pension system: an optimization analysis for Turkey. *Applied Economics Letters, 8*(2): 89-93.

Tamagno, E. (2005). *The Canadian Pension System*. The General Assembly of the Japan Pension Research Council. Retrieved from https://www.ier.hit-u.ac.jp/jprc/English/conferences/GA2005/Tamagno-paper.pdf

Tapia, W., & Yermo, J. (2008). *Fees in Individual Account Pension Systems: A Cross-Country Comparison, OECD Working Paper on Insurance and Private Pensions* (Publication No. 27). Retrieved from https://Www.Oecd.Org/Finance/Private-Pensions/41488510.Pdf.

Teksoz, A. T., & Sayan, S. (2002). Simulation of benefits and risks after the planned privatization of the pension system in Turkey: Is the expected boost to financial markets feasible? *Emerging Markets Finance & Trade*, *38*(5): 23.

Thompson, L. H. (1999). *Administering Individual Accounts in Social Security: The Role of Values and Objectives in Shaping Options* (Publication No. 1), Urban Institute. Retrieved from https://www.urban.org/sites/default/files/publication/69561/307906-Administering-Individual-Accounts-in-Social-Security.pdf

Topal, N. (1999). Is the Turkish social security system in need of reform?. *Papers, 1999*:1.

TR Ministry of Finance Revenue Administration (2016). *Turkish Taxation System.* Retrieved from www.gib.gov.tr/sites/default/ files/fileadmin/ taxation_system2016.pdf.

Tuesta, D. (2014). Factors behind the administrative fees of private pension systems: an international analysis. *Journal of Pension Economics & Finance*, *13*(1): 88-111.

UNISON, (2018). *Pension Fund Cost Transparency: A How-To Guide for Trade Unions*. The Global Unions Committee on Workers. Retrieved from www.workerscapital.org/IMG/pdf/cwc_pension_fund_cost_transparency.pdf

Whitehouse, E. (2000). *Administrative Charges for Funded Pensions: An International Comparison and Assessment* (Social Security Protection Paper Series, No. 0016). World Bank. Retrieved from https://mpra.ub.uni-muenchen.de/14172/1/0016.pdf

Yoo, K. Y., & De Serres A. (2004). *Tax treatment of private pension savings in OECD countries and the net tax cost per unit of contribution to tax-favoured schemes*. Retrieved from https://www.oecd-ilibrary.org/economics/tax-treatment-of-private-pension-savings-in-oecd-countries-and-the-net-tax-cost-per-unit-of-contribution-to-tax-favoured-schemes_387535760801.

Zhu, C. L. (2016). *Turkey Approves New Auto-Enrolment Law for Private Pensions*. Retrieved from https://international-adviser.com/turkey-approves-auto-enrolment-law-private-pension.

# APPENDIX

**Same Marginal Tax Rate Now and Later (20%)**

| S/N | Variables | TFSA | SPC | TFCA | SPC | OTPS | SPC | NTPS | SPC | TGB | SPC |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **1** | **B/4 tax contribution** | **23808.22** | **1.00** | **23808.22** | **1.00** | **23808.22** | **1.00** | **23808.22** | **1.00** | **23808.22** | **1.00** |
| 2 | Govt contribution to pension | 0.00 | | 0.00 | | 0.00 | | 4761.64 | | 0.00 | |
| 3 | One-time only subsidy | 0.00 | | 0.00 | | 0.00 | | 1000.00 | | 0.00 | |
| 4 | Tax subsidy | 0.00 | | 0.00 | | 0.00 | | 95.23 | | 0.00 | |
| **5** | **Total subsidy (2+3+4)** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **5856.88** | **0.25** | **0.00** | **0.00** |
| 6 | Tax liability on contribution | 4761.64 | | 0.00 | | 0.00 | | 4761.64 | | 4761.64 | |
| 7 | Tax liability on withdrawal | 0.00 | | 4761.64 | | 521.54 | | 0.00 | | 0.00 | |
| 8 | Tax liability on pensioners interest | 0.00 | | 0.00 | | 0.00 | | 57.60 | | 4110.45 | |
| 9 | Tax liability on govt interest | 0.00 | | 0.00 | | 0.00 | | 16.88 | | 0.00 | |
| **10** | **Total tax liability (6+7+8+9)** | **4761.64** | **0.20** | **4761.64** | **0.20** | **521.54** | **0.02** | **4836.12** | **0.20** | **8872.09** | **0.37** |
| **11** | **Net fiscal impact (10-5)** | **4761.64** | **0.20** | **4761.64** | **0.20** | **521.54** | **0.02** | **-1020.75** | **-0.04** | **8872.09** | **0.37** |
| 12 | Entrance fee | 0.00 | | 0.00 | | 470.00 | | 102.00 | | 0.00 | |
| 13 | Contribution fee | 0.00 | | 0.00 | | 785.67 | | 380.93 | | 0.00 | |
| 14 | Fund Management Fee | 0.00 | | 0.00 | | 8644.75 | | 4767.72 | | 0.00 | |
| 15 | Govt fund management fee | 0.00 | | 0.00 | | 0.00 | | 363.96 | | 0.00 | |
| **16** | **Management cost (12+13+14+15)** | **0.00** | **0.00** | **0.00** | **0.00** | **9900.42** | **0.42** | **5614.62** | **0.24** | **0.00** | **0.00** |
| 17 | Value of accumulated portfolio net of tax (1+5-10-16) | 19046.57 | 0.80 | 19046.57 | 0.80 | 13386.25 | 0.56 | 19214.35 | 0.81 | 14936.12 | 0.63 |
| **18** | **IRR** | **2.43%** | | **2.43%** | | **1.53%** | | **2.45%** | | **1.81%** | |

Notes: (1) NPV ranking: NTPS> TFSA=RRSP> TGB>OTPS. (2) IRR ranking: NTPS> TFSA=RRSP> TGB> OTPS. (3) Welfare cost ranking: OTPS>NTPS>TFSA=RRSP=TGB. (4) Net fiscal impact ranking: TGB > TFSA = RRSP > OTPS > NTPS.