Modeling General Equilibrium for Socially Responsible Macroeconomics:

Seeking for the Alternatives to Fight Jobless Growth in Turkey[1]

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Despite rapid growth and a significant surge in exports, Turkish economy could not generate jobs at the desired rate. In the post-2001 crisis period Turkish GDP expanded by a cumulative 25% in real terms, and yet the unemployment rate could not be brought below the 10% mark. By some, the meager job creation of the economy is due to the excessive regulatory framework and the tax burden; while others from the structuralist tradition see the joblessness problem as a global phenomenon due to the deflationary environment under the finance-led global economy.

In this paper we utilize a computable general equilibrium model to study the jobless growth problem in the Turkish context and examine various policy alternatives to generate more conducive conditions for employment creation. The model is in the Walrasian tradition with nine production sectors, two labor categories and a government operating within an open macroeconomy environment. It accommodates flexible production functions, imperfect substitution in trade; segmented labor markets and open unemployment.

The model spans the 2003-2010 period for Turkey with explicit recognition of the current IMF program targets. The model results suggest significant employment gains due to a policy of lower employment taxes. In returns for lowering effective employment tax rates by 5 percentage points, the unemployment rate is observed to fall by 2 percentage points over its base-path. However, as a result of lower tax revenues, the policy suffers from the insufficiency of fiscal funds for public investments and the consequent fall in the quality of public services. If the current IMF program is followed through 2010 without any adjustments on the primary budget targets, we observe that public investments need to be lowered to 2.7% of the GDP. As an alternative, we find that a heterodox program with expanded direct income taxes replacing lower employment taxes, and expanded public investments together with a lower primary surplus target for the public sector may produce socially superior macroeconomic outcomes.

Currently Turkey is suffering from a phenomenon widely known as "*jobless growth*". Open unemployment rate which stood at 6.5% in 2000, has jumped to 10.3% in 2002 in the aftermath of the February 2001 financial crisis. Since then the Turkish gross domestic product has increased by a cumulative 25% in real terms. Yet, employment generation capacity of this rapid growth had been dismal, and the open unemployment rate could not be brought down below 10% by the end-of 2005. Despite rapid expansion of production in many sectors, civilian employment increased sluggishly at best, and labor participation remained below its levels as observed during the 1990s.

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One of the explanations of the jobless growth phenomenon rests its arguments on the rigid regulatory framework and the excessive tax burden claimed to be prevalent in the Turkish labor markets. Turkey indeed has one of the highest tax burdens in its labor markets in comparison to the OECD averages. Tunalı (2003), for instance, reports that the social security contributions of the employers reach to 22%, and together with other taxes on labor employment, create an additional cost burden for employers reaching as much as 35% over net wages. Tunalı further argues that employment protection laws may have increased the insecurity faced by the workers as employees try to avoid severance payments by shifting their labor demand to workers mostly from the informal market. This undoubtedly has adverse consequences for tax revenues and also on the formal industrial relations.

Ercan and Tansel (2006), on the other hand, report that it is the new Labor Act (2003) which is the main source of the problem. The Law is criticized (mostly by the employers' wing) with the arguments that job security clauses make the employers reluctant about expanding employment. Ercan and Tansel also summarize the workers' unions' opposition to this argument stating that it is the first time with the new act that the "flexi-time" and "flexible work" *de*-regulations enter the Turkish labor scene. Yet despite conducive policies towards the desired "flexibilities", still not enough jobs have been created. In fact, existing studies claim in this regard that labor market regulations and other "distortions" in the *formal* economy may actually not be binding for the larger segment of the labor market (Agénor *et. al.* 2006). Onaran (2002) for instance argue that wages actually exhibit a high degree of flexibility as the power of trade unions has eroded significantly in the past two decades.

On another background, the jobless growth problem is regarded as a direct symptom of the current IMF program as implemented in Turkey together with an excessively open capital account and widespread financial speculation. According to this line of thought, due to virtually unregulated capital account and given the high real rates of interest prevalent in the Turkish financial markets, Turkey is observed to receive massive inflows of short term finance capital. As a result, the domestic currency, *YTL*, appreciates and Turkey suffers from a widening current account deficit. Appreciated currency brings forth a surge in imports together with a contraction of labor intensive, traditional export industries such as textiles, clothing, and food processing. This leads to contraction of formal jobs and increased informalization of economic activities (see Yeldan (2006), Pamukçu and Yeldan (2005) and Bağımsız Sosyal Bilimciler (2005)).

On a more general scale, the joblessness phenomenon is taken as a global issue and is explained as a reflection of the rise of finance capital over industry in the last quarter of the last century. Ghosh (2003) for instance claims that what we see in the global commodity markets is not a simple job-flight problem, but is a problem of *job-disappearance*, that is, industrial jobs are disappearing everywhere. Studies by UNCTAD (2002, 2003), Patnaik (2003) and Singh (2003) also reflect support to this argument, noting that following the demise of the corporate capitalism of the post-Bretton Woods system characterized by the regulated trade and finance flows, the global economies are suffering from deflationary pressures everywhere; and that in the dismal outlook for possibilities for *global Keynesianism*, unemployment rates tend to rise all around the globe.

It is the purpose of this paper to search for viable policy alternatives to the jobless growth problem in Turkey in the short to medium-run. To this end, we implement a computable

general equilibrium (CGE) model and study the analytics of various policy instruments[2] that affect the labor markets within the realm of the current IMF program in Turkey.

Our premise in this paper is that a proper modeling of the structure of the labor market and a proper account of the general equilibrium linkages between the production-income generation-and aggregate demand components across individual sectors as well as macro aggregates are essential steps to understand the impact of the current austerity program on the evolution of output, fiscal and external balances, and employment. Accordingly, we develop a dynamic computable general equilibrium (CGE) model with a relatively aggregated productive sector, a segmented labor market and a full-blown public sector with a detailed treatment of fiscal balances. By itself, this endeavor is not new; over the years, a number of CGE models have been developed for Turkey. These include Dervis, *et. al.* (1982), Celasun (1986), Lewis (1992), Yeldan (1997, 1998), Diao, Roe and Yeldan (1998), Karadağ and Westaway (1999), De Santis (2000), Voyvoda and Yeldan (2005), and Agénor *et. al.* (2006). Those of Lewis (1992), Yeldan (1998), and Agénor *et. al.* (2006) include a financial sector, whereas the others are "real" models focusing on tax and trade policy issues.

The current model captures relevant linkages between the fiscal policy decisions, private sector choices and external balances that we believe are essential to analyze the impact of disinflation and fiscal reforms on labor market adjustment and public debt sustainability. First among these is the proper analysis of linkages between the fiscal austerity targets and the real sectoral activity; second, pertains to the structure of the labor market; and third focuses on the channels through which external disequilibria interact with the domestic economy. We pay particular attention to fiscal issues such as a high degree of debt overhang and fiscal dominance; the link between public investments in education, health and other aspects of social infrastructure and productivity gains across sectors; and interactions between external (current account) deficits, private saving-investment deficits, and the public (primary balance) surpluses.

We organize the rest of the paper under four sections. First, we provide a broad overview of the recent macroeconomic developments in Turkey. Here we study the evolution of the key macroeconomic prices such as the exchange rate, the interest rate and price inflation, and report on the post-1998 macroeconomic path of the Turkish economy. In section two we describe the analytical model. In section three, we implement the computable general equilibrium modeling analysis of various possible internal and external macroeconomic shocks that might hit Turkey. First we implement a labor market reform and study the implications of reducing/eliminating payroll taxes (paid by the employers). In this policy simulation we exclusively focus on fiscal adjustments and study the possible dilemmas of gains in efficiency in the labor markets *versus* the loss of fiscal revenues to the state. Next we widen the scope of the tax reform by reducing the share of *indirect taxes* (the value added tax) on consumers. Both types of taxes have been the focus of criticism in Turkey, due to their distortionary implications. Nevertheless this type of taxation is widely used both in Turkey and also in most parts of the developing world as it is "practical" and "do-able". However, as expected, the fall in the tax revenues places a heavy burden on the fiscal accounts, especially on public investments. If the fiscal targets of the IMF were to be maintained (*i.e.* the 6.5% primary surplus to the GDP rule) in the face of declining tax revenues, the burden of

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[2] See Agénor (2005) for the analytics of labor markets under austerity programs. See Gunter, Taylor and Yeldan (2005) for the analysis of labor market adjustments under external liberalization within CGE modeling framework.

adjustment falls on non-interest expenditures of the public sector, mainly public consumption and investments.

Thus, we further study the effects of alternative *primary surplus targets* along with a public investment program on education and social infrastructure. Here we try to assess the trade-offs between growth, employment generation and debt management. These simulations are important because the sustainability of Turkey's public debt remains a key policy issue. Our simulations allow us to quantify the impact of fiscal adjustment not only on the budget and commodity markets, but also on the labor market (real wages and unemployment) and standards of living.

Finally in the last section, we summarize the main results of the paper and offer some concluding remarks.

I.1. Post-1998 Macroeconomic Developments

The growth path of the Turkish economy over the post-1998 period had been erratic and volatile, mostly subject to the flows of hot money. Following the *contagion* effects of the Asian, Russian and the Brazilian turmoil, the economy first stagnated in 1998 with growth rate of 3.1 percent, and then contracted in 1999 at the rate of -5.0 percent. The boom of 2000 was followed by the 2001 crisis. In 2003 and 2004 the economy has grown by 5.8% and 9.9%, respectively, in real terms. Price movements were also brought under control through the year and the 12-month average inflation rate in consumer prices has receded from 45% in 2002 to 10.6% in 2004, and from 30.8% to 13.8% in producer prices. The post-2003 period has also meant a period of acceleration of exports, and export revenues have reached $64 billions over 2004. Nevertheless, with the rapid rise of the import bill over the same period, the deficit in the current account reached $15.6 billion (or about 5.3% of GDP in 2004). The current account deficit continued to widen in 2005 and reached 6.6% of GNP by the third quarter. Table 1 documents the main macro indicators of the post-1998 Turkish economy under close IMF supervision.

Table 1. Basic Characteristics of the Turkish Economy, 1998-2004

	1998	1999	2000	2001	2002	2003	2004
Real Rate of Growth							
GDP	3.1	-5.0	7.4	-7.4	7.6	5.8	8.9
Consumption Expenditures							
Private	0.6	-2.6	6.2	-9.2	2.0	6.6	10.1
Public	7.8	6.5	7.1	-8.6	5.4	-2.4	0.5
Investment Expenditures	-3.9	-15.7	16.9	-31.5	-0.8	10.0	32.4
Private	-8.3	-17.8	16.0	-34.9	-7.2	20.3	45.5
Public	13.9	-8.7	19.6	-22.0	14.5	-11.5	-4.7
Exports	12.0	-7.1	19.2	7.4	11.0	16.0	12.5
Imports	2.3	-3.7	25.4	-24.8	15.7	27.1	24.7
As Ratio to the GNP (%)							
Current Account Balance	1.0	-0.7	-4.8	2.4	-0.8	-3.4	-5.2
Stock of Foreign Debt[a]	55.4	69.5	64.4	93.9	76.2	58.5	53.7
Budget Balance	-7.0	-11.6	-10.9	-16.2	-14.3	-11.2	-7.1
PSBR	9.2	15.1	12.5	16.4	12.6	9.4	5.9
Macroeconomic Prices							
Rate of Change of the Nominal Exchange Rate (TL/$)	71.7	60.6	28.6	114.2	23.0	-0.6	-4.9
Inflation (WPI)	71.8	62.9	32.7	88.1	30.8	13.9	13.8
Inflation (CPI)	84.6	68.8	54.9	54.4	45.0	25.3	10.6
Real Interest Rate on GDIs	29.5	36.8	4.5	31.8	9.1	15.4	13.1
Real Wage Growth Rates[b]							
Private Sector	0.8	4.9	2.1	-20.1	1.1	5.1	3.9
Public Sector	4.6	22.5	17.2	-21.0	6.9	-1.1	2.9

Sources: SPO *Main Economic Indicators* ; Undersecreteriat of Treasury, *Main Economic Indicators;*
Central Bank Annual Reports

a. Debt stocks are denominated in TL by using the end-of-year CB sale prices of exchange rates.

b. Real wages per hour, as reported by the TR Central Bank from the SIS sources.

The most successful aspect of the post-2001 crisis adjustment efforts clearly lied on the dis-inflation front. Inflation rate, both in consumer and producer prices, has been brought under control by 2004. As of end-2005, the rate of inflation stands at 10.5% for producer prices, and 5.7% for consumer prices. Over the year 2005 as a whole the central bank's inflation target was set at 8% for consumer prices.

Despite the positive achievements on the dis-inflation front, rates of interest remained slow to adjust. The real rate of interest remained above 10% over 2004 and generated heavy pressures against the fiscal authority in meeting its debt obligations. The persistence of the real interest rates, on the other hand, had also been responsible in attracting heavy flows of short term speculative finance capital over 2003 and 2005. This pattern continued into 2006 at an even stronger rate.

Inertia of the real rate of interest is enigmatic from the successful macro economic performance achieved thus far on the fiscal front. Even though one traces a decline in the general plateau of the real interest rates, the Turkish interest charges are observed to remain significantly higher than those prevailing in most emerging market economies. The credit

interest rate, in particular, is stagnant at the rate 18% despite the deceleration of price inflation. Consequent to the fall in the rate of inflation, the inertia of credit interest rates translates into increasing real costs of credit.

High rates of interest were conducive in generating a high inflow of hot money finance to the Turkish financial markets. The most direct effect of the surge in foreign finance capital over this period was felt in the foreign exchange market. The over-abundance of foreign exchange supplied by the foreign financial arbiters seeking positive yields led significant pressures for the Turkish Lira to appreciate. As the Turkish central bank has restricted its monetary policies only to the control of price inflation, and left the value of the Lira to be determined by the speculative decisions of the market forces, the Lira appreciated by as much as 40% in real terms against the US$ and by 25% against Euro (in producer price parity conditions).

The structural overvaluation of the TL, not surprisingly, manifests itself in an ever-expanding deficits on the commodity trade and current account balances. As traditional Turkish exports lose their competitiveness, new export lines emerge. These are mostly import-dependent, assembled-part industries, such as automotive parts and consumer durables. They use the advantage of cheap import materials, get assembled in Turkey at low value added and then are re-directed for export. Thus, being mostly import-dependent, they have a low capacity to generate value added and employment. As traditional exports dwindle, the newly emerging export industries are not vigorous enough to close the trade gap.[3]

Consequently, starting in 2003 Turkey has witnessed expanding current account deficits, with the figure in 2004 reaching a record-breaking magnitude of $15.4 billion, or 5.3% of aggregate GDP. The latest data indicate that by the end of 2005, the cumulative current account deficit has already reached $22.8 billion. Thus, the strong pressures towards deterioration of the current account balance seem to persist at the time of writing of these pages.

Thus, two important characteristics of the post-crisis adjustment path stand out: first is that the current expansion is observed to be concomitant with a deteriorating external disequilibrium, which in turn is the end result of excessive inflows of speculative finance capital. Secondly, the output growth contrasts with persistent unemployment, warranting the term "*jobless growth*".

I. 2. Persistent Unemployment and Jobless Growth

A key characteristic of the post-2001 Turkish growth path is its "jobless" nature. The rate of open unemployment was 6.5% in 2000 and it increased to 10.3% in 2002. The unemployment rate remained at that plateau despite the rapid surges in GDP and exports. Open unemployment is a severe problem, in particular, among the young urban labor force reaching 26%.

Table 2 tabulates pertinent data on the Turkish labor market.

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[3] According to Foreign Trade Statistics of the Undersecretariat of the Prime Ministry for Foreign Trade, as of October 2005, "motor vehicles", "electrical machinery and equipment" and "iron and steel" are among top five chapters in both imports and exports, http://www.dtm.gov.tr/.

Table 2. Developments in the Turkish Labor Market (1,000 persons)

|	2000	2001	2002	2003	2004	2005. Sep
15+ Age Population	46211	47158	48,041	48,912	49,906	50,991
Labor force participation rate (%)	49.9	49.8	49.6	48.3	48.7	49.0
Civilian Labor Force	23,078	23,491	23,818	23,640	24,289	24,989
Civilian Employment	21,581	21,524	21,354	21,147	21,791	22,566
Unemployed	1497	1967	2,464	2,493	2,498	2,423
Unemployment Ratio (%)	6.5	8.4	10.3	10.5	10.3	9.7
Underemployed	1,592.4	1,409.5	1,297	1,143	997	813
Underemployment Ratio (%)	6.9	6.0	5.4	4.8	4.1	3.3
Civilian Employment by Sectors						
Agriculture	7,103	8,089	7,458	7,385	7,400	6,661
Industry	3,738	3,774	3,954	3,821	3,988	4,360
Services	9,738	9,661	9,942	10,080	10,403	11,545

Source: Turkish Statistical Institute (TURKSTAT), Household Labor Force Surveys.

The civilian labor force (ages 15+) is observed to reach 50.1 millions people as of September 2005. On the other hand, the participation rate fluctuates around 46% to 50%, due mostly to the seasonal effects. It is known, in general that, the participation rate is less than the EU averages. This low rate is principally due to the size of the discouraged workers who had lost their hopes for finding jobs. If we add the TURKSTAT data on the *underemployed* people, the excess labor supply (unemployed + underemployed) is observed to reach 13.1% of the labor force.

Yet the most striking observation on the Turkish labor markets over the post-2001 crisis era is the sluggishly slow performance of employment generation capacity of the economy. Despite the very rapid growth performance across industry and services, employment growth was minimal. This observation, which actually is attributed to many developing economies as well,[4] is characterized by the phrase *jobless-growth* in the literature. In Turkey this problem manifests itself in meager employment generation despite the very rapid growth conjuncture especially after 2002.

In Figure 1, we plot the quarterly growth rates in real gross domestic product and contrast the y-o-y annualized rates of change in labor employment. In order to make comparisons meaningful, the changes in labor employment is calculated relative to the same quarter of the previous year.

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[4] See, e.g., UNCTAD (2002, 2003).

Figure 1.
Annual Rate of Change in GDP and Employment (%)
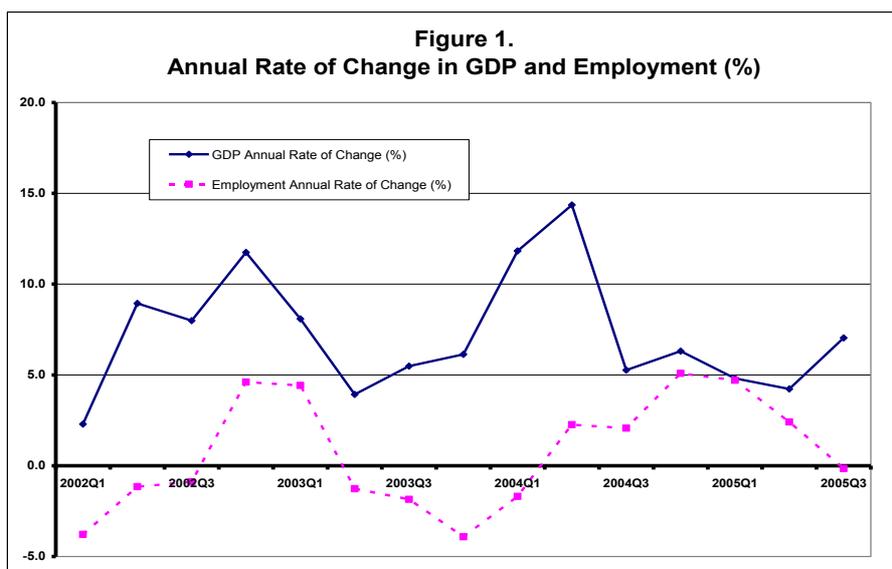
The figure discloses that between 2002.I and 2005.III the average rate of growth in real GDP was 7.5%. In contrast the rate of change of employment averaged *minus 0.1%* over the same period. Over the fifteen quarters portrayed in the figure, GDP growth was positive in all periods. Yet, labor employment growth was negative in 8 of those 15 quarters.

We now turn to the model where we focus on the issues of labor markets, unemployment, and fiscal adjustment.

II. Computable General Modeling Analysis

II-1. The Algebraic Structure of the Model and Adjustment Mechanisms

Given the overview of the recent macroeconomic developments, the conduct of fiscal policy and debt management, and labor market dis-equilibrium, we now develop a computable general equilibrium model for Turkey. The CGE model presented in this study is a real CGE model disaggregated into nine production sectors, a labor market that is divided into formal and informal components, and a fairly detailed account of the public sector. The model is built around a multi-sectoral social accounting matrix (SAM) of the Turkish economy based on a nine sector –agriculture, mining, consumer manufacturing, intermediates manufacturing, capital goods, energy, construction, private services, public services- input-output core of 2003. (See Appendix for the SAM and its supporting I-O data).

We define sectoral capital and labor aggregates as primary factors of production. Gross output in each sector in turn, is produced by a representative firm employing intermediates and composites of primary inputs. The capital input is further disaggregated into its private and public components, which enter into the production process at different stages so as to reflect their relatively differentiated positions in the production of value added. Public capital is assumed to be fixed and sector specific (which is later updated by the sectoral allocation of aggregate public investments). Private capital is mobile across sectors and the movement is directed by the difference in the differentiated private profit rates among the production

sectors. Labor input is also disaggregated into organized wage-labor and informal/marginalized labor categories. Nominal wage rate of the formal labor is assumed to be fixed and the organized labor market clears through quantity adjustments on employment. Thus, unemployment variable in the model is defined to be the "unemployed" wage-labor which is mobile between the formal and informal categories.

The multi-level treatment of the production technology defines, at the very top level, a Leontieff specification over the value added and intermediate inputs to produce the gross output in each production sector:

$$X_i^S = \min\left[\frac{V_i}{b_{0i}}, \frac{a_{1i}X_i^S}{b_{1i}}, \frac{a_{2i}X_i^S}{b_{2i}}, \frac{a_{3i}X_i^S}{b_{3i}}, \dots\right] \tag{1}$$

where V_i is the value-added and a_{ij}'s are the input-output coefficients measuring sales from sector i to sector j. We have $i=j=Agriculture, Mining, Construction, Consumer Manufacturing, Intermediates, Producer Manufacturing, Energy, Private Services, and Public Services$.

The value-added in each sector is generated by combining both formal and informal labor, as well as public and private physical capital.[5] At the last stage of this multi-level production lies:

$$V_i = A_{Vi} J_i^{\alpha_i} KG_i^{1-\alpha_i} \tag{2}$$

where sector specific public capital KG_i combines with the composite input J_i, under a Cobb-Douglas specification.

The composite primary input J_i, is defined to be a combination of private capital KP_i and composite labor aggregate C_i through a constant elasticity of substitution (CES) type of production function, with a relatively low level of substitution:

$$J_i = \overline{A}_{Ji}[\beta_{Ji}C_i^{-\rho_{Ji}} + (1-\beta_{Ji})KP_i^{-\rho_{Ji}}]^{-1/\rho_{ji}} \tag{3}$$

Finally, at the bottom of this multi-level specification lies the formation of the composite labor input with a relatively higher degree of substation in a CES type function:

$$C_i = \overline{A}_{Ci}[\beta_{Ci}LF_i^{-\rho_{Ci}} + (1-\beta_{Ci})LI_i^{-\rho_{Ci}}]^{-1/\rho_{Ci}} \tag{4}$$

Under such specification of the production technology, the first order conditions of profit maximization derive the input demand functions for primary inputs of production. The quantity adjustment in the labor market defines the formal unemployment level:

$$UNEMP_F = \overline{L}_F^S - \sum_i L_{F,i}^D \tag{5}$$

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[5] The public services sector is the exception since it employs only formal labor and public capital in the production of value added.

which is defined to be the "mobile" labor force between formal and informal labor groups. Thus,

$$\sum_i L_{I,i}^D = \overline{L}_I^S + UNEMP_F \tag{6}$$

The primary sources of income for the private household then compose of returns to both types of labor inputs, the wages, and returns to capital, the distributed profits. Private household's total income, on the other hand, consists of both primary income and secondary income categories:

$$totYHH = (1 - sstax).\overline{\overline{W}}_F.\sum_i LF_i^D + W_I \sum_i LI_i^D + EtrHH + GtrHH + SSItrHH + \varepsilon \cdot ROWtrHH \tag{7}$$

In the above equation, ε represents the exchange rate variable and $ROWtrHH$ represents the remittances. $sstax$ is the rate of social security contributions out of the wage income of formal labor. $GtrHH$ and $SSItrHH$ are government transfers to households and transfers from social security institutions, respectively. Here, $\overline{\overline{W}}_F$ and W_I denote the nominal wage rate of formal and informal labor types, respectively. So, the first two terms in the equation correspond to aggregate labor income of the private household. Here, $EtrHH$ is the net profit transfer of the enterprise income to private household and is defined by:

$$EtrHH = (1 - t_K)\sum_i RP_i - rttrrow\sum_i (1 - t_K)RP_i + GtrEE + r^D DomDebt^G - r_E^F \varepsilon ForDebt^E + \varepsilon ForBOR^E \tag{8}$$

Here, the first term is the enterprise profits left over after paying for both types of labor and taxes on profit income to government. A constant portion, $rttrrow$, of the total profit income is distributed to rest of the world to represent net factor income of the foreigners in Turkey. $GtrEE$ is the net transfers of the government to private enterprises, $r^D DomDebt^G$ is the interest payments of the enterprise sector out of government domestic debt and $r_E^F ForDebt^E$ is the interest payments of the private enterprises for their already accumulated foreign debt.

Private households save a constant fraction, s^p of their income. The residual aggregate private consumption then is distributed into sectoral components through exogenous (and calibrated) shares:

$$CD_i = cles_i.\frac{PRIVCON}{PC_i} \tag{9}$$

where PC_i is the composite price of product i which consists of the unit prices of domestic and foreign commodities, united under the imperfect substitution assumption through an Armingtonian specification.

Likewise, aggregate public consumption is distributed into sectoral production commodities in fixed proportions:

$$GD_i = gles_i.\frac{GOVCON}{PC_i} \tag{10}$$

Nonetheless, as the emphasis of the public fiscal policy is the budget surplus net of interest payments, the aggregate public consumption is specified to be a constant fraction of aggregate public income, net of interest payments on both the domestic and foreign public debt stocks:

$$GOVCON = gcr \cdot (\text{GREV} - r^F \varepsilon ForDebt^G - r^D \varepsilon DomDebt^G) \tag{11}$$

where *GREV* represents public revenues. *GREV* consists of direct taxes on wage and profit incomes and net profit income from state economic enterprises. The income flow of the public sector is further augmented by indirect taxes on domestic output and foreign trade (net of subsidies) and sales taxes:

$$GREV = \sum_i tn_i.PX_i.XS_i + \sum_i tm_i \varepsilon P_i^w M_i + \sum_i te_i \varepsilon P_i^W E_i + \sum_i tva_i.PQ_iCC_i + ty \cdot totYHH + t_K \sum_i RP_i + \sum_i RG_i \tag{12}$$

In equation (12), tn_i is the production tax rate, tm_i and te_i are tariff rate and subsidy rate on exports, tva_i is the sector-specific sales tax rate and ty is the direct income tax rate.

In order to characterize and represent the current fiscal policy of primary surplus targeting, the government's fiscal balances are centered around the pre-determined level of the primary surplus variable, *PRIMBAL*:

$$PRIMBAL = GREV – GOVCON – GINV - GtrHH – GtrEE – GtrSSI \tag{13}$$

where primary balance is defined to be the difference between government revenues and non-interest expenditures, namely government consumption (*GOVCON*), government investment (*GINV*) and all types of government transfers (*GtrHH + GtrEE + GtrSSI*).

The model sets the government transfer items to the households and to the enterprises as fixed proportions to the GDP. Transfers to the social security institutions, *GtrSSI*, on the other hand is an endogenous outcome of the SSI accounting balances. The revenues of the social security institutions originate from aggregate payroll taxes (levied on producers) and social security taxes (collected from labor incomes):

$$revSSI = (pyrltax + sstax_l).\overline{w}_F.\sum_i L_{F,i}^D \tag{14}$$

Expenditures of the SSI system are composed mainly of transfers to the households, variable *SSItrHH* in the private income equation above. We model this sum as a policy variable determined as a fixed ratio to the aggregate GNP:

$$SSItrHH = \chi\, GDP \tag{15}$$

where χ is the relevant expenditure/transfer ratio. Given the path for SSI expenditures, the deficit of the social security system prevails as:

$$SSIDeficit = revSSI – SSItrHH \tag{16}$$

By construction, all SSI deficit is met from the public sector revenues, thus *SSIDeficit = GtrSSI.*

Finally, since the primary (non-interest) budget surplus is pre-determined at the 6.5% of GDP, aggregate public investment expenditures is settled as a residual variable to maintain the public fiscal accounts.[6]

The public sector borrowing requirement (PSBR) can be read as follows:

$$PSBR = GREV - GCON - GINV - r^F \varepsilon\, ForDebt^G - r^D DomDebt^G - GtrHH - GtrEE - GtrSSI \tag{17}$$

The PSBR is either financed by domestic borrowing, $\Delta DomDebt^G$ or by foreign borrowing $\Delta\varepsilon\, ForDebt^G$.

In the last stage of the model definition, we state the market equilibrium conditions for each commodity i:

$$XS_i = CD_i + GD_i + IDP_i + IDG_i + INT_i \tag{18}$$

that is, each commodity is demanded either for private or public consumption purposes, private or public investment purposes or as an intermediate good.

The model's closure rule for the savings-investment balance *(Walras' Law)* is defined by:

$$PSAV + GSAV + \varepsilon\, CAdef = PINV + GINV \tag{19}$$

The numéraire of the system is the nominal conversion rate, ε. This choice precludes us from monetary issues of exchange rate determination and relative demand for domestic versus foreign currencies, —issues that the model is poorly equipped to address.

The real interest rate on the other hand, is hypothesized to be set at the external markets. The *CADef* in the equation above determines the current account balance in foreign exchange terms and equals to the export revenues, the remittances and private and public foreign borrowing on the revenue side, and the import bill, profit transfers abroad and interest payments on the accumulated private and public foreign debt stocks on the expenditures side:

$$CAdef = \sum P_i^W E_i + ROWtrHH + ForBor^E + ForBor^G$$
$$- \left[\sum P_i^W M_i + trrow \sum (1 - tk)RP_i + r_E^F ForDebt^E + r^F ForDebt^G \right] \tag{20}$$

The private and public components of the external capital inflows are fixed in foreign exchange terms. The additional endogenous variable to close the system is private investment expenditures, *PINV.* In other words, the model operates as in the neo-classical closure with

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[6] Aggregate fixed public investments, as % of GDP has been decreasing steadily under the constraints of the current program. The ratio was 5.6% in 2001, which has gradually dropped down to 5.3% in 2002, to 4.2% in 2003 and finally to 3.6% in 2004.

savings-driven investments. This specification is especially appealing in our context since it provides maximum sensitivity to the links between income generation, private savings, the fiscal burden, and accumulation and growth

Dynamics

The model updates the annual values of the exogenously specified variables and also the policy ratios in an attempt to characterize the 2003 – 2010 growth trajectory of the Turkish economy. Here we first update capital stocks with new investment expenditures net of depreciation; and also increase the available labor supplies by the population growth rates. Similarly, technical factor productivity rates are specified exogenously in a Hicks-neutral manner.

Nominal wage rates of the formal labor category is updated by the price level index which is endogenous to the system. Note that since the conversion factor, ε, is set as the numéraire, a rise in the aggregate price level indicates the extent of re-valuation of the domestic goods against the foreign goods, *i.e.* appreciation of the domestic currency in real terms.

Finally in this stage we account for the evolution of debt stocks. First note that government's foreign borrowing is taken as a ratio of aggregate PSBR:

$$\varepsilon\,ForBor^G = (gfborrat)PSBR \tag{21}$$

thus,

$$DomBor = (1 - gfborrat)PSBR \tag{22}$$

Consequently, Government Domestic Debt accumulates via:

$$DomDebt_{t+1} = DomDebt_t + DomBor_t \tag{23}$$

Government Foreign Debt, on the other hand, becomes:

$$ForDebt^G{}_{t+1} = ForDebt^G{}_t + ForBor^G{}_t \tag{24}$$

Similarly Private foreign debt is found as:

$$ForDebt^P{}_{t+1} = ForDebt^P{}_t + ForBor^E{}_t \tag{25}$$

This completes the algebraic specification of the general equilibrium model. We now turn to its use as an economic laboratory device to analyze various policy environments over the 2003-2010 macro economic path.

III. General Equilibrium Analysis of Alternative Policy Environments

III-1. The "Base Path, 2003-2010"

Our first task is to characterize the realized growth path of the Turkish economy over 2003 through 2010. Since data for 2003-2005 is now history, we will also be able to make direct comparisons of the model's tracking ability of the broad macro aggregates over this time span. To this end we make the following stylized assumptions:

- Assume that the real interest rate is given via the external markets
- The flow of external flows are assumed constant over the entire modeling horizon.
- The real exchange rate is determined endogenously under flexible trade conditions
- Wages of the formal/organized labor are fixed in nominal terms
- The rate of total productivity growth is set at 0.02 for 2004 and 0.05 for 2005. No further TFP growth is assumed over 2006 and 2008
- The non-interest, primary, budget balance is constrained to 6.5% of GDP (IMF program assumption)
- Labor supplies grow at 2.5% per annum
- Government capital investments across sectors are allocated at their historical paths, private capital flows are endogenously determined according to sectoral profit rate signals

Under these assumptions, we report over the following macro aggregates (see Table 3 for the model results on the base-path and historical validation):

GDP Growth and Macroeconomic Aggregates

The model results suggest a growth path of 8.3% and 5.5% for 2004 and 2005, respectively. Both rates closely follow the historical realized rates. For the rest of the modeling period, the base-path growth rate stabilizes at 4.6%. This rate is slightly below the program estimates for the Turkish economy (of 5% per annum), yet is within realistic expectations for the post-2006 growth trajectory.

The model also captures the paths for public investment and private disposable income quite closely. One observes a severe divergence, however, on the side of private investments. The discrepancy between realized and modeled paths of private investments is quite large. This outcome is the direct end-result of the ever-widening current account deficits. With delayed adjustments on current deficits, the gap between domestic savings and investment is sustained by the inflows of foreign capital. This assumption is the direct consequence of the official program targets. As long as the current account deficit is *financed*, the gap in savings and investment reveals itself clearly. Yet in the meantime, as public expenditures are curtailed with the implemented fiscal policy, this gap is necessarily is borne only out of the surge in private investments.[7]

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[7] It is of course not clear how long the foreign inflows will continue to finance the current account deficits and we did not want to make any conjectural ad hoc hypotheses on its durability. But the analytical outcome is that, as long as the current deficit continues to be financed and as long as the public investments are cut by way of assumed primary surplus targets, the macro economic balances will necessarily warrant expanding private investments. In other words, in a period of low public deficits, the foreign gap will be associated with a widening

Table 3. Model Results: the Historical Path and Policy Scenarios

Real GDP Growth Rate

	Realization	Base-Path	Scenario 1	Scenario 2	Scenario 3
2003	**0.059**				
2004	**0.090**	**0.083**	0.083	0.083	0.083
2005	**0.055**	**0.060**	0.060	0.060	0.059
2006		0.045	0.049	0.046	0.081
2007		0.045	0.045	0.046	0.049
2008		0.046	0.046	0.046	0.049
2009		0.046	0.045	0.046	0.049
2010		0.047	0.046	0.046	0.048

Private Disposable Income / GDP

	Realization	Base-Path	Scenario 1	Scenario 2	Scenario 3
2003	**0.925**	**0.925**	0.925	0.925	0.925
2004	**0.910**	**0.900**	0.900	0.900	0.925
2005	**0.880**	**0.847**	0.847	0.847	0.870
2006		0.837	0.844	0.855	0.803
2007		0.832	0.839	0.849	0.801
2008		0.826	0.833	0.844	0.799
2009		0.821	0.828	0.838	0.796
2010		0.816	0.823	0.833	0.794

Private Investment / GDP

	Realization	Base-Path	Scenario 1	Scenario 2	Scenario 3
2003	**0.113**	**0.179**	0.179	0.179	0.179
2004	**0.142**	**0.212**	0.212	0.212	0.218
2005	**0.140**	**0.285**	0.285	0.285	0.291
2006		0.287	0.289	0.292	0.249
2007		0.286	0.288	0.291	0.246
2008		0.285	0.287	0.290	0.244
2009		0.284	0.286	0.289	0.242
2010		0.284	0.286	0.288	0.240

Public Investment / GDP

	Realization	Base-Path	Scenario 1	Scenario 2	Scenario 3
2003	**0.044**	**0.044**	0.044	0.044	0.044
2004	**0.038**	**0.036**	0.036	0.036	0.023
2005	**0.029**	**0.023**	0.023	0.023	0.010
2006		0.024	0.016	0.010	0.070
2007		0.025	0.017	0.011	0.070
2008		0.025	0.017	0.012	0.070
2009		0.026	0.018	0.013	0.070
2010		0.027	0.019	0.013	0.070

Private Consumption / GDP

	Realization	Base-Path	Scenario 1	Scenario 2	Scenario 3
2003	**0.668**	**0.690**	0.690	0.690	0.690
2004	**0.666**	**0.671**	0.671	0.671	0.690
2005	**0.650**	**0.632**	0.632	0.632	0.649
2006		0.625	0.630	0.638	0.600
2007		0.620	0.626	0.634	0.598
2008		0.616	0.622	0.629	0.596
2009		0.612	0.618	0.625	0.594
2010		0.608	0.614	0.621	0.593

PSBR / GDP

	Realization	Base-Path	Scenario 1	Scenario 2	Scenario 3
2003	**0.095**	**0.096**	0.096	0.096	0.096
2004	**0.059**	**0.065**	0.065	0.065	0.066
2005	**0.020**	**-0.002**	-0.002	-0.002	-0.001
2006		-0.009	-0.010	-0.009	0.020
2007		-0.012	-0.012	-0.012	0.019
2008		-0.015	-0.015	-0.015	0.018
2009		-0.018	-0.019	-0.018	0.017
2010		-0.022	-0.022	-0.021	0.016

Current Account Deficit / GDP

	Realization	Base-Path	Scenario 1	Scenario 2	Scenario 3
2003	**0.035**	**0.040**	0.040	0.040	0.040
2004	**0.052**	**0.048**	0.048	0.048	0.049
2005	**0.066**	**0.068**	0.068	0.068	0.069
2006		0.066	0.065	0.066	0.064
2007		0.063	0.063	0.063	0.062
2008		0.060	0.060	0.060	0.059
2009		0.058	0.058	0.058	0.057
2010		0.055	0.055	0.055	0.055

Private Foreign Debt / GDP

	Realization	Base-Path	Scenario 1	Scenario 2	Scenario 3
2003	**0.309**	**0.305**	0.305	0.305	0.305
2004	**0.308**	**0.329**	0.329	0.329	0.332
2005	**0.322**	**0.378**	0.378	0.378	0.382
2006		0.429	0.426	0.430	0.421
2007		0.474	0.472	0.475	0.467
2008		0.515	0.512	0.516	0.508
2009		0.551	0.549	0.552	0.544
2010		0.583	0.581	0.584	0.577

Public External Debt / GDP

	Realization	Base-Path	Scenario 1	Scenario 2	Scenario 3
2003	**0.276**	**0.284**	0.284	0.284	0.284
2004	**0.229**	**0.262**	0.262	0.262	0.264
2005	**0.178**	**0.246**	0.246	0.246	0.249
2006		0.237	0.235	0.237	0.232
2007		0.227	0.226	0.227	0.223
2008		0.217	0.216	0.218	0.214
2009		0.208	0.207	0.209	0.206
2010		0.200	0.199	0.200	0.197

Public Domestic Debt / GDP

	Realization	Base-Path	Scenario 1	Scenario 2	Scenario 3
2003	**0.564**	**0.562**	0.562	0.562	0.562
2004	**0.545**	**0.573**	0.573	0.573	0.578
2005	**0.548**	**0.600**	0.600	0.600	0.607
2006		0.575	0.571	0.576	0.565
2007		0.542	0.539	0.544	0.562
2008		0.508	0.505	0.509	0.558
2009		0.472	0.469	0.474	0.554
2010		0.435	0.432	0.436	0.548

Unemployment Rate

	Realization	Base-Path	Scenario 1	Scenario 2	Scenario 3
2003	**0.105**	**0.105**	0.105	0.105	0.105
2004	**0.103**	**0.096**	0.096	0.096	0.107
2005	**0.100**	**0.095**	0.095	0.095	0.106
2006		0.094	0.071	0.070	0.043
2007		0.091	0.068	0.063	0.043
2008		0.089	0.067	0.057	0.043
2009		0.086	0.065	0.052	0.042
2010		0.081	0.061	0.045	0.038

Domestic Interest Payments / GDP

	Realization	Base-Path	Scenario 1	Scenario 2	Scenario 3
2003	**0.148**	**0.148**	0.148	0.148	0.148
2004	**0.117**	**0.113**	0.113	0.113	0.114
2005	**0.075**	**0.047**	0.047	0.047	0.048
2006		0.041	0.041	0.041	0.040
2007		0.039	0.038	0.039	0.040
2008		0.036	0.036	0.036	0.040
2009		0.034	0.033	0.034	0.039
2010		0.031	0.031	0.031	0.039

saving investment gap. Hence the source of private investments is ultimately the current account deficit position to which we turn momentarily.

Current Account Deficit

The model tracks the current account deficit as a ratio to the GDP quite closely. The current deficit is assumed to reach 6.3% of GDP in 2005 (slightly lower than the 2005 end-of-year estimate) and is modeled to gradually recede to 5.5% by 2010 under the base-path. Clearly another side of the current deficits is the accumulation of foreign debt. The modeled base-path captures the divergent trends in private versus public foreign debt patterns quite closely. Given the austerity measures in the public sector, public borrowing as a ratio to
the GDP falls, yet the private sector accumulates external debt rapidly. This, of course, is due to the persistent current account deficit problem.

Unemployment Rate

The rate of unemployment is one of the persistent problems of the Turkish growth path since 2003. The enigma of this "jobless growth" is one of the hardest aspects to model. The Turkish economy was characterized with both a fall in real wage costs, as well as a rise in the productivity growth. Under these conditions the persistence of unemployment is a real puzzle, suggesting either an inconsistency in the official statistics, or a conjectural bottleneck that we cannot foresee at the time being.

Nevertheless, given the models' flexibility in allowing adjustments of the exogenous flows, we could have generated the historical conditions to the extent possible. The unemployment path reveals a persistent tendency with a gradually falling unemployment rate of 8.1% until 2010. Clearly the rapid rise in imports together with the rise in current deficits generates significant contractionary pressures to the domestic industries that are labor intensive. With persistent appreciation of the domestic prices, the exporting industries lose their competitiveness and deceleration in domestic activity leads to contraction in employment demand as well.

Public Sector Borrowing Requirement and Domestic Debt

Given the strict application of the primary budget balance targets, the public sector borrowing requirement (PSBR) is observed to fall sharply and turn negative by 2006. Therefore under this contractionary environment the debt to GDP ratio falls secularly to reach 43% by 2010. The fall in the domestic debt burden is realized at a slightly lower rate than the realized observations. This discrepancy is mostly due to the fact that a significant portion of the domestic debt is indexed to foreign exchange which has appreciated quite strongly in the "real life". The model, being unable to capture the financial pressures towards exchange rate appreciation, fails in providing the necessary fall in the "domestic" value of the public debt. Nevertheless, as witnessed from the public sector borrowing requirement (PSBR), the modeled base-path captures the falling fiscal burden quite closely.

The next task is to ask "to what cost?" What are the adjustment mechanisms that enable such a fall in public expenditures? To what extend is such a fall desirable? And more importantly, "what could be the set of *pareto superior* moves in the Turkish policy context? These are the *socially relevant* questions that we want to address in the following pages of the paper.

III-2. Scenario 1: Reduce Payroll Taxes

Turkey has one of the highest tax burden on the labor markets. Employer-paid social security contributions averaged about 36% of total labor costs during 1996-2000; it has been argued that these high social security taxes create strong disincentives to job creation. More generally, many observers have called for a thorough overhaul of Turkey's social insurance system. Ercan and Tansel (2006) too, state that both the red tape and non-wage labor costs are higher in Turkey relative to, for instance, OECD averages. The authors consider the high tax burden on employment and high social security contributions among the institutional factors that contribute to the high level of unemployment and high level of undeclared work. Tunalı (2003) indicates that employee contribution to social security system can be as high as 15% while employer in typical risk occupation contributes as much as 22.5%.[8]

Figure 2 below portrays the relative tax burden on the employees and the employers. Turkish tax burden on he employers (the payroll tax) is relatively high and stands above the EU averages and above most of the comparable countries in terms of its size and development.

Figure 2. Income tax plus employees' and employers' social security contributions (SSC) as percent of labor costs (2003)*
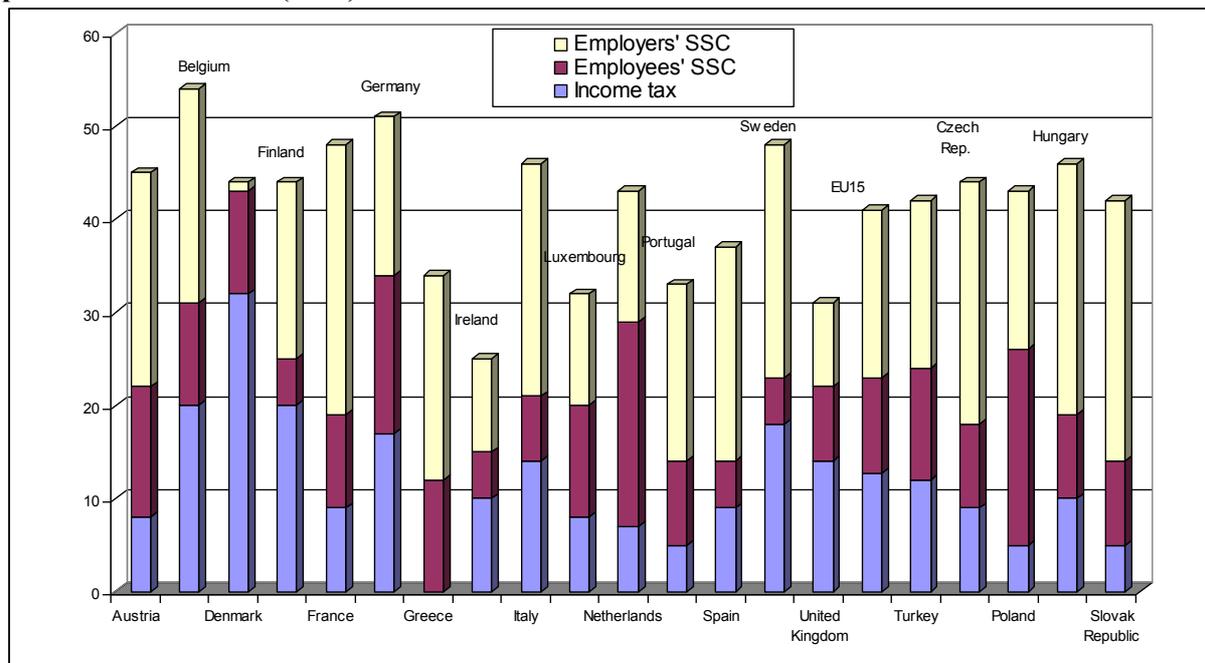
* Single individual without children at the income level of the average production worker.
Source: Pamukçu and Yeldan (2005).

Thus in this experiment we study the implications of lowering the payroll tax paid by the employers on employment, production and fiscal balances. We reduce the payroll tax by 5% starting in 2006, from its base rate of 19%. The lower tax revenues are not compensated by any other taxes. Thus, the fiscal adjustment necessarily calls for lower funds for public investments. The results of the experiment are depicted under column "Scenario 1" in Table 3.

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[8] The state does not contribute for individuals, but pays the deficits lump sum from the budget. This situation is represented in equations 14-16 in the model.

Clearly, the most important variable of this experiment is its effects on unemployment rate and the fiscal balances. Unemployment rate falls by almost 2 percentage points upon impact in 2006 and, based on the economy's natural path of expansion, continues to fall to 6.1% by 2010. This signals a full two percentage point of gain in employment.

We find that the overall growth of GDP is not significantly affected. The rate of growth is maintained, and its broad composition is perturbed very marginally. The main adjustment, however, falls on public investments. This outcome is the direct result of the fiscal administration under the program. The logic of the fiscal balances is that, given the tax revenues and interest costs, the public sector is to maintain a primary surplus (of 6.5%) of GDP. Once this constraint is met the rest of the public expenditures are calculated. We make the working assumption that, once the interest costs are met, the fiscal authority is not flexible on much of its non-interest expenditures either. Thereby we assume that public personnel expenditures and other transfers to households and enterprises are set at a constant ratio to the GDP. Transfers to the social security institutions on the other hand, is endogenous outcome of the SSI system accounts, and is financed by the aggregate public account. All this leaves public investment level to adjust to maintain the fiscal closure. Thus, within the context of our experiment, as tax revenues are curtailed, the government finds it necessary to adjust public investments downwards. As % of GDP, public investments are observed to fall to 1.9% in 2010, contrasted with 2.7% of the base-path (quite a low ratio itself!).

Since the primary surplus target is maintained for the experiment and the interest rate and other exogenous foreign flows are not assumed to be affected under this experiment, we find that the rate of debt management follows a similar path as in the base-run.

Thus, in a nutshell, we find that in returns to a 5% reduction in the payroll tax, the unemployment rate is reduced by 2 percentage points; the growth rate of the GDP is not much affected; private disposable income is increased (due to higher employment growth at higher formal wage rates); and yet government sector has to counteract these gains by further downward adjustments in its investment expenditures.


III-3. Scenario 2: Reduce Sales Taxes as well

The logic of the above scenario where we reduce payroll taxes is the theoretical expectation of increased efficiency gains by removing distortions on producer decisions. This logic can be extended over to the consumer side as well and one can envisage a reduction on the value added (sales) taxes. The Turkish tax system is known with its very skewed character to the indirect taxes. The share of indirect taxes in the aggregate is close to 70% and this adds a significant efficiency loss by distorting consumer's optimal expenditure decisions.

In this second policy experiment, we maintain the reduction in the payroll taxes introduced in scenario 1 above, and complement this tax reform by a further reduction of the value added tax rate by 1% starting in 2006.

As expected, the reduction of the sales tax (value added tax) leads to a 0.7% gain of private consumption as % of GDP over the Scenario 1 environment, and attains a 1.3% increase over the base path. Private disposable income continues to expand. The growth rates are again very little affected.

The gains on the unemployment side continue. The unemployment rate dips for a further 1.6% over its value in 2010 under the Scenario 1. This brings the unemployment rate to 4.5%. Yet the most notable achievement of these tow experiments is realized on the *increased formalization* of the labor markets. The share of *formal labor* in aggregate labor employment increases to 49%, an increase by 3 percentage points over the 2010 value of he base-path. As more formal labor is employed at the higher real wage rate, private incomes expand as well, bringing private disposable income, hence saving and investments. Figure 3 portrays the extend of the gains on formalization.

Figure 3. Share of Formal Labor Employment in Total
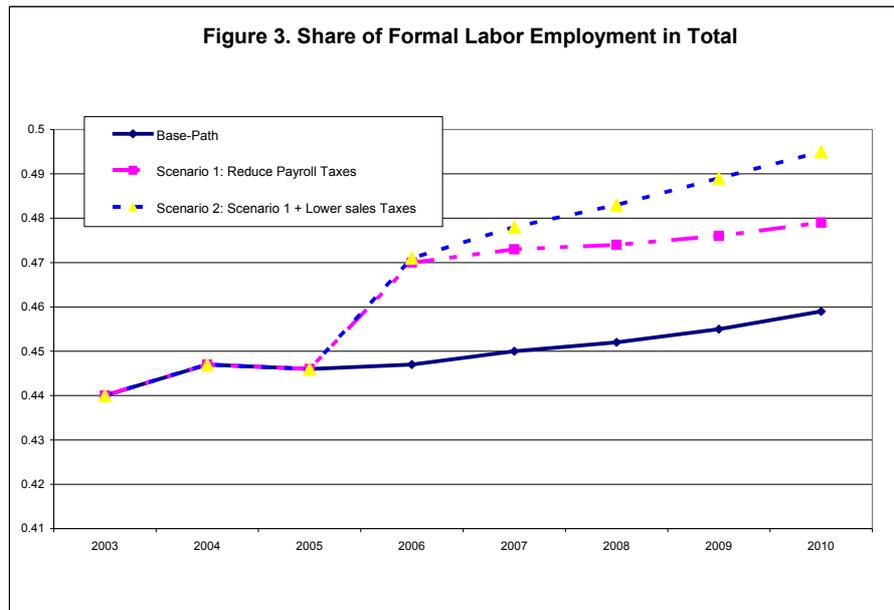
The increase in formal labor employment is definitely one of the strongest achievements of the tax reform policies implemented. In addition to lower unemployment, increased formal labor being paid higher wages lead to significant gains n private income generation in a relatively short time span.

Yet, as before, the costs of adjustment of these positive developments fall on the public accounts, the contraction in public investments in particular. The public investment-GDP ratio is observed to fall to 1.3% by 2010. It is dubious whether such a fall in government investments on social infrastructure could be accommodated by the economy. This brings us to an entirely new approach to fiscal reform.

III-3. Scenario 3: Comprehensive Fiscal Reform

The undesirable outcome of reduced public investments to historically unacceptable levels in the tax reform scenarios above is the outcome of two fiscal rules: First is the fact that the base-path 2006-2010 is prepared under the assumption that the current fiscal targets of the IMF program are to be maintained, *viz.* a 6.5% primary surplus will continue to be generated as % of GDP. Secondly, the fall in indirect tax revenues are compensated, eventually, by

declines in public investment funds, since all other forms of non-interest expenditures are pre-determined.

To counter these negative effects and also to maintain the efficiency gains of the tax reform on the labor and the commodity markets as implemented above, we now organize the following fiscal program: reduce both the payroll tax burden and the sales taxes as in scenarios 1 and 2 above; ***increase*** the public investments' share in the GDP to 7%; and ***adjust*** the direct income tax rate so as to bring equilibrium in the public accounts. Finally, in order to eliminate the excessive pressures on direct income taxes on private incomes, ***reduce*** the primary surplus to GDP ratio to 3.5% of GDP. All the policy changes are understood to be implemented in 2006 as a once-for-all policy shift.

The warranted rate of pubic investments to the 7% of GDP brings the share of public investments only to the lower end of the 1980's averages, and is still significantly lower than the 1970's values. Nevertheless, given the very low historical value of the public investments, even such a shift sounds very expansionary.

Clearly one can expect further gains to productivity and real wages in return to a policy of increased investments in the economy.[9] However, understanding productivity changes is one of the least understood areas of economics, and we tried to abstain as much as possible from making *ad hoc* and non-credible assumptions regarding the exogenous variables in the model. Thus, in that regard the growth effects of the scenario does not capture the likely gains in productivity and should at best be regarded as a "lower" estimate of the possible expansions in economic activity.

The need for endogenizing the income tax rate, on the other hand, is a technical necessity. Once we control the path for public investments, some other variable has to bear the burden of adjustment to close the fiscal accounts, and the current choice is the least distortionary one, given the motivation of the overall exercise.

Lastly, the logic of reducing the primary surplus target is also meaningful from the point of view of eliminating undue burden on the private sector. Especially at a time when the public sector's borrowing requirement was reduced, it is hard to justify the continued contraction of non-interest expenditures of the public sector.

We start first looking at the effects of the policy experiment on private disposable income. There is a gain of almost two percentage points in disposable income over the expanded tax reform scenario 2. This gain is the end result of increased formal labor employment and decline in unemployment rate in the economy. In fact, the increased public investment path – even though is not thought to be followed by likely increase in labor productivity-nevertheless generates sufficiently strong pulls for labor employment. The unemployment rate is observed to fall 3.8% by 2010 under the current scenario.

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[9] Provision of public funds, especially to social/productive spheres of the economy to maintain the social capital investments (on education, health, protection of environment…etc.) are among the mechanisms to achieve an endogenously-driven growth pattern. Among many studies on the productivity of public spending/investments, see Glomm and Ravikumar (1992), Barro (1991) and Jung and Thorbecke (2003). Utilizing an endogenous growth model where public funds to education contribute to the formation of human capital of the future generations, Voyvoda and Yeldan (2005) study the trade-off between the short-term debt dynamics and the long-term growth.

The burden of this scenario on fiscal accounts is not excessive given the hike in the income tax rate. We portray the model solutions for the income tax burden as a ratio to the GDP in Figure 4.

Figure 4. Total Income Tax as a Ratio to the GDP
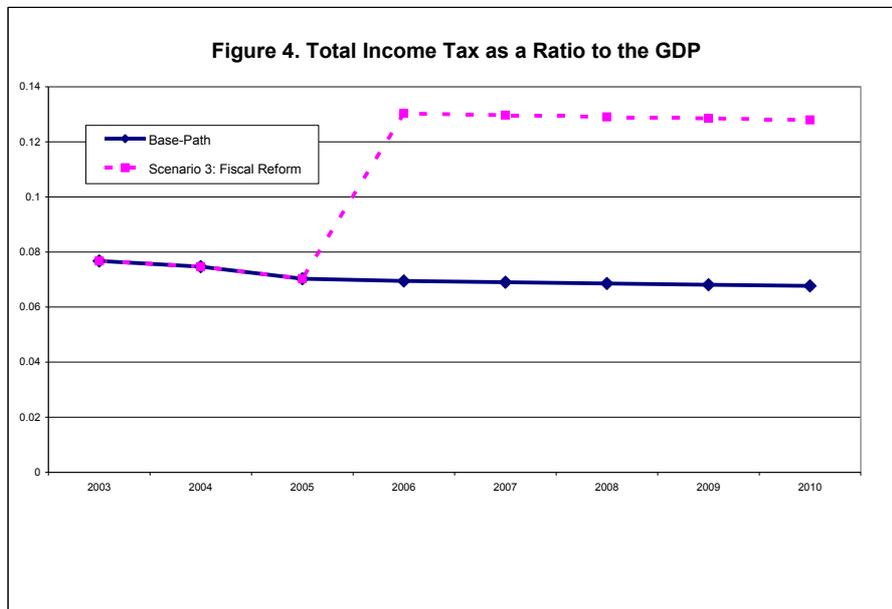
Starting 2006, a doubling of the direct tax ratio is envisaged by the model solution. The replacement of indirect taxes with direct income taxes generate clear efficiency gains for the economy which then translate into higher employment and higher private incomes.

Of course one of the key elements in this exercise is that the tax adjustment does not become too excessive in light of the warranted increases in the public investments. To achieve this we have reduced the primary balance ratio to the GDP by 3 percentage points. The model results suggest that there is a slight increase in the public sector borrowing requirement under this scenario to 1.6% of the GDP in 2010, in comparison to the -2.2% value found for the base path. The increased PSBR does not put undue strain on the debt burden, however, given the increased employment and income generation. The ratio of domestic debt to the GDP remains constant and does not show a tendency to increase, hence it remains "manageable".

VI. Conclusion

In this paper, we utilized a computable general equilibrium model to study policy alternatives to combat the jobless growth problem for Turkey. With the aid of the CGE apparatus we have portrayed the 2003-2010 growth trajectory of the Turkish economy and also reported on the current state of the macroeconomic policy environment in Turkey. The current IMF-led austerity program operates with a fiscal targeting regime (at 6.5% to the GDP), and reduced public non-interest expenditures.

Our policy experiments reveal that, in return to lowering employment tax burden, Turkey may achieve higher employment growth. However, as a result of lower tax revenues, the advocated policy suffers from the insufficiency of fiscal funds for public investments and the consequent fall in the quality of public services. Complemented with a heterodox program consisting of expanded direct income taxes that replace lowered employment taxes, and expanded public

investments together with a lower primary surplus target for the public sector may produce socially superior macroeconomic outcomes. Our results suggest that within the context of such a program, Turkey may experience a fall in its unemployment rates significantly and can also succeed in keeping its debt ratios at a modest level.

On a broader scale, as simulated over the time horizon as above, the model results forcefully disclose the tacit dilemma of the IMF-led "primary surplus program". The attainment of fiscal targets to maintain the warranted rates of primary surplus deprives the social/productive spheres of the economy from the most needed public funds to maintain the social capital investments on education and health. Any further reduction in the tax revenues is found to generate significant pressures on the non-interest expenditures of the public sector. Thus, it is found necessary to search for more heterodox alternatives to the current IMF program beyond the primary surplus targets.

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APPENDIX: Data Sources and Management

Social Accounting Matrix (SAM)

Our model utilizes a multisectoral SAM of the Turkish economy for year 2003 which methodologically depends an earlier work, Telli (2005a). In the context of national accounting and general equilibrium modeling, the referred study (re)produces an interlocking and integrated system to define, collect, classify and manipulate the necessary data, in order to build the *time series* of yearly aggregated SAMs beginning from 1996. While official figures of key macroeconomic and fiscal variables are kept unchanged, it steps forward to reconcile most prominent discrepancies and differences as concerns to the definition, coverage and standards of the national statistics.

This study introduces a number of improvements to the data generation process by i) incorporating the latest socio-economic dynamics when building the micro SAM for the Turkish economy, and ii) by enhancing the simulation and decomposition capabilities as well as potential accuracy and reliability of general equilibrium model(s) through the use of yearly updates of SAMs. Lastly, the achievement of comparability of macroeconomic and sectoral variables of the model with official policy figures (specifically those of SPO) is worth noting.

From Macro SAM to Micro SAM

The disaggregation method followed uses the schematic macro-SAM presented at Telli (2005a) to get the micro version SAM through: i) the use of relevant input-output coefficients, ii) highly detailed and electronically linked data surface through an assembly line system and iii) the other up-to-date information available like census, surveys conducted by TURKSTAT and foreign trade compositions. Tables A1 and A2 display definitions and figures of such schematic SAM of the Turkish economy for the year 2003.

The CGE model presented in this study is based on an aggregation of the 1996 input-output table of the Turkish economy published by the TURKSTAT, into nine production sectors; agriculture, mining, consumer goods manufacturing, intermediate goods manufacturing, capital goods manufacturing, construction, private services, public services and a consolidated sector for energy products and services in the economy.

Input Output Core

The latest official I-O Table belongs to the year 1998 but 1996 I-O is preferred for further use in the analysis for a number of reasons. First, the macro-SAM structure which we use as a basis in the disaggregation and aggregation procedure in constructing the database for our model, uses 1996 I-O data when constructing schematic recursive real SAMs for years 1996-2003. Secondly, authors observe that 1996 I-O structurally mirrors the fiscal parameters like some tax and subsidy figures much closer to the official public accounts than the fiscal definitions employed in 1998 I-O[10].

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[10]Specifically, the 1998 I-O and that of 1996 are not identical in their treatment and definition of certain fiscal items like production taxes.

1996 I-O is rearranged accordingly to give a structural portrayal of *intermediate inputs* at the intersection of commodities row and activities column in the 2003 aggregated SAM. The factor incomes of capitalists as it appears in the I-O table below wit the row *operating surplus*, is used for any necessary correction to avoid sectoral excess demand or supply conditions. Non-residents' final consumption home is treated to be from private services sector in its origin while residents final consumption abroad is added to the final imports of private services.

Intermediate demand and supply coefficients are then employed to divide the 278,878,198 billion TL flow in the I-O Table. Additionally the structural composition of most tax figures in micro SAM is obtained accordingly from this aggregated version of 1996 I-O. Alternatively, factor incomes and foreign trade compositions by sector of origin are based on the most recent data following Telli (2005b), rather than simple reproduction of the 1996 I-O ratios.

Factor Endowments and Factor Incomes

Capital is featured around two categories: public and private. Estimated sectoral allocation of capital stock comes from Telli (2005b)[11]. The study employs a method based on the estimated rate of returns on public and private capital to split the sectoral total capital.

Our model distinctly recognizes two types of labor: formal and informal. First, labor endowment in the economy is divided between public and private sector employers. Then, a fine aggregated level of sectoral decomposition is produced. Formal and informal labor employments are then estimated with the help of TURKSTAT surveys, census and public accounts like State Economic Enterprises and Social Security Institutions. At the fourth stage, average wage rates for each labor type across major sectors of the economy are attributed.

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[11]Saygılı et. al. (2002) also provide sectoral allocation of the capital stock for the Turkish economy. However, they do not make the distinction between public and private capital stocks.