

A General Equilibrium Analysis of Income Distribution and Development Policy

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This paper presents an empirical analysis of the interaction between growth and income distribution for the Turkish economy over the period 1973-1979. The analysis is based on a multi-period, multi-sector computable general equilibrium model constructed for the Turkish economy, that permits the evaluation of distributional as well as growth consequences of alternative policies. Along with empirical testing of the model, three sets of experiments are conducted with the model. Counterfactual trade policy experiments, alternative wage policy experiments and simulations investigating the distributional and growth consequences of alternative potential redistributive policies indicate that the size distribution of income is stable and very difficult to change with the policy interventions considered. Agricultural terms of trade is one of the most important determinants of reducing overall poverty, and policy instruments conducive to higher growth is not necessarily in conflict with the policies aiming at more even distribution of income.

1. Introduction

The necessity of modeling distributional issues as an integral part of policy evaluation and development planning within the framework of multi-sector CGE models have been emphasized in recent country specific empirical research. (Adelman et al 1978; Taylor et al 1980; Bourguignon et al 1983) The major thrust of the emphasis is that fixed price input output models and linear programming models do not permit unified, endogenous treatment of the determinants of both growth and income distribution. Moreover, policy focus of development planning in the 60's, where the initiation and achievement of high rates of growth in a consistent framework that would lead to a better distribution of income, proved inadequate in the light of empirical findings that followed. (Adelman et al 1973; Chenery et al 1975; Ahluwalia 1976) Controversial theoretical viewpoints and empirical findings on the relationship between growth and income distribution in the short and medium runs (Cline 1972, 1975) further aggravated the need for endogenous treatment of the circular flow in the economy in the context of country specific CGE models.

With the same purpose this paper presents an empirical analysis of the interaction between growth and income distribution for the Turkish economy over the period 1973-1979. The analysis is based on a dynamic multi-sector CGE model constructed for the Turkish economy. Basic features of the model is described in section 2. The model is calibrated to 1973 base year data and empirically tested over the period 1973-1979. Section 3 presents validation results and a brief historical background on Turkey clarifying the purpose of the experiments conducted. Distributional implications of actual policies pursued are outlined in Section 4. Alternative trade, wage and redistributive policies simulated by the model are reported in Section 5.

2. Basic Features of the Model

The current model is an extended and modified version of CGE models developed by Dervis and Robinson (1978) and Urata and Lewis (1983) in conjunction with the World Bank to assess Turkish economic performance. The modifications are on the treatment of national, public and institutional accounts in a manner compatible with the flow of funds in Turkey's official planning process. Extensions concern mapping functional incomes into household incomes that permit the analysis of distribution of income to households. A thorough presentation of the model is contained in (Güven 1986, Celasun et al 1981).

The model is a simulation model that simulates the price-responsive optimizing behaviour of decentralized decision making units such as households, firms and the government, and the operation of product, factor and foreign exchange markets so as to determine outputs and product prices, employment and factor prices, and the exchange rate that clears each market. Market clearing or equilibrium is attained with prices varying in response to supply and demand conditions in each market so as to reduce all excess demands to zero. Accounting consistency is maintained between the production and expenditure accounts both at the micro and macro levels. Foreign trade is explicitly modeled where equilibrium is sought between receipts and expenditures.

The model is structured on the basis of input-output description of the economy, and consists of eleven sectors, three labor categories (Agricultural labor, organized urban labor, unorganized urban labor), five economically active groups (the three labor categories, agricultural and non-agricultural capitalists), and five household categories (farmer 1, farmer 2, urban poor, urban middle and urban rich). Within this main framework product market clearing constitutes the thrust of the formulation and factor and foreign exchange market clearing are attained in the order of causality of the circular flow in the economy described below.

2.1. Product Supplies and Factor Market Clearing

Production in each sector is assumed to be carried out by several firms with the objective of maximizing profits under perfect competition subject to multi-level production functions. Demand for intermediate inputs are given by fixed input output coefficients. Within a period the supply of each labor type is fixed and agricultural labor is assumed to be employed only in agriculture and urban labor categories in non-agricultural activities. Capital is a fixed coefficient aggregation of capital goods and assumed to be immobile across sectors in a period. For agriculture, composite primary input is a CES (constant elasticity of substitution) aggregate of agricultural labor and aggregate capital. In non-agricultural sectors, two urban labor categories are combined with a CES function to form aggregate labor and then combined with aggregate capital to form a CES aggregate of composite primary input. For an arbitrary non-negative commodity price vector, the solution to the optimization problem yields product supplies, employment by sector and labor type, and factor incomes including residual value added accruing to capital.

2.2. Enterprise and Household Accounts

Disposable income of economically active labor categories and agricultural capitalists are derived from factor incomes by making the necessary adjustments for direct taxes, social security contributions to, and other budget revenue and transfer payments of the government. Non-agricultural capital income is first transformed into institutional income by deducting social security and foreign interest payments, from which institutional taxes are payed, and a fixed proportion saved. Residual enterprise income accrue to non agricultural capitalists and determine their disposable incomes after the adjustments for taxes and transfers. Income share of the economically active groups in the disposable income of the identified household categories are exogenous to the model. They are estimated by aggregating and rescaling the data provided in Derviş and Robinson (1980), compiled from 1973 SPO-Hacettepe Survey of Household Incomes for Turkey. Disposable income of each household category is then arrived at by applying these exogenous shares to the disposable incomes of the economically active, summing over the economically active groups, and adding workers' remittances in fixed proportions. Thus household incomes are endogenously determined as an algebraic sum of the factor incomes solved for by the model.

Following (Derviş et al 1978; Celasun 1975) an "additional financing" mechanism is modeled that is assumed to transfer proximate forced savings from households to public sector capital accounts through monetary mechanism described below.

2.3. Public Sector Accounts and Additional Financing Requirement

Public sector collects direct tax, social fund contributions, factor income and other budget revenue from the five economically active groups and enterprises and makes current transfers to them in fixed proportions. When indirect taxes on domestic output and foreign trade (net of subsidies) are added and government share of foreign interest payments are deducted from this flow, public disposable income is obtained. Since institutional, direct and indirect taxes are functions of endogenously determined factor incomes and outputs, public disposable income is also endogenous. In the official Five Year Plans and Annual Programs prepared for Turkey, both public investment and public consumption are treated as target variables to be attained, and therefore specified as exogenous variables of the model. Public savings, determined as the residual public disposable income after public consumption, and exogenously specified levels of domestic and foreign borrowing of the public sector need not equal public sector capital expenditures defined as the sum of public investment and direct capital transfers. The difference gives the additional financing requirement of the public sector and is assumed to be mobilized from externally specified reserve decumulation and from households in the form of forced savings.

2.4. Treatment of Foreign Trade and Balance of Payments

In the model the commodities produced and consumed are assumed to be tradeable goods. In determining export volumes from domestic production two specifications are used. For agriculture and mining sectors the small country assumption is made where domestic price of exports are determined from world prices. In these sectors the share of exports in domestic production is a function of the ratio of domestic prices to exports. In other sectors it is assumed that the world price of exports is an aggregate price and is different then the world price of Turkish exports determined endogenously from domestic prices, exchange rate and export subsidy rates. In these sectors the demand for Turkish exports is defined to be a function of the ratio of dollar prices of Turkish exports to world prices, and the price elasticity of demand for exports.

On the import side, the small country assumption is made. Furthermore, domestically produced commodities and imports of the same sector classification are treated as imperfect substitutes. First order conditions of the CES trade aggregation function of imported and domestically produced goods (composite good) determine the demand for imports as a function of their relative prices and elasticity of substitution between them.

Import demands determined as such are desired imports. Actual amounts imported depend on the availability of foreign exchange. Total foreign exchange available to be spent on imports is the sum of foreign exchange receipts from exports, short and long-term borrowing and reserve decumulation less the interest and project credit service payments of the private and public sectors. Depending on the specification of the nominal exchange rate different adjustment mechanisms are modeled that would clear the foreign exchange market. Under the flexible exchange rate specification nominal exchange rate is allowed to vary to equate the demand for foreign exchange to the supply of it. Under a non-liberal trade regime, where the exchange rate is externally specified, the adjustment mechanism is quantity rationing. Following Derviş et al (1978) a rationing factor is determined as the ratio of available foreign exchange to total desired imports and all sectoral imports are rationed by this ratio. This is the specification used in the historical simulation since it resembles what has actually taken place in Turkey during the period under consideration.

2.5. Final Demand and Equilibrium in Product Markets

Intermediate demand in product markets are determined by fixed coefficients. Domestic final demand is comprised of private consumption, public consumption, fixed investment and stock changes.

Total nominal investment (including stock changes) is savings driven and defined to be the sum of public, institutional, external, and household forced and voluntary savings. Total private investment is endogenously determined as the difference between total and public investments.

Forced savings are assumed to be mobilized from household incomes in fixed proportions before voluntary savings. Private consumption expenditure is residual disposable income after forced and voluntary savings. Sectoral private consumption demand by household type is based on the linear expenditure system (LES), and sectoral public consumption is determined in fixed proportions.

Following Urata and Lewis (1983) total investment funds are distributed among sectors by differentiating between public and private investment allocation patterns. Sectoral public investment shares are externally specified whereas private shares are endogenously determined in the intertemporal phase of the model as a function of sectoral deviation of rental rates from average rental rate in the economy. Investments by destination are transformed into investments by origin through the use of predetermined capital composition coefficients. Sectoral investment in stocks are determined using stock-output ratios.

Thus effective sectoral domestic demand is obtained as the sum of sectoral private and public consumption, intermediate demand from each sector, less import demand for each commodity. Domestic sectoral demand estimated as such is a function of the initial arbitrary nonnegative price vector that determined sectoral supplies explained in Section 2.1. Since equilibrium in product markets require sectoral supply to be equated to sectoral domestic demand, the problem reduces to one of solving for the market clearing prices that reduce all excess demands to zero. The solution

algorithm employed is due to (Powell 1970) and uses information about the derivatives of excess demand equations.

The model, being a Walrasian general equilibrium model, is homogenous of degree zero and solves for relative prices of commodities and factors, relative to the specified aggregate price level. This specification implicitly assumes that the determinants of the aggregate price level and relative prices are independent of each other, and interacting only through monetary mechanisms via additional financing requirement of the public sector and the transfer mechanism of forced savings.

The exogenous variables of the static CGE model outlined above are updated in the intertemporal linkage model using exogenous projections, growth rates, and linear interpolation between base and terminal year shares depending on the variable being updated.

3. Model Validation

The CGE model presented in the preceding section is validated through simulating the model over the period 1973-1979 in two year intervals and comparing models estimates of major economic variables with their actual values. The purpose of the historical validation is twofold; (i) testing and demonstrating the capability of the model in simulating the effects of a medium-term policy package on the sectoral and macro performance of the Turkish economy (ii) parameter estimation.

A CGE model has substantial data requirements and not only the available data is inconsistent and insufficient but most of the behavioral and structural parameters required by the model are not available. Thus the base year data was calibrated so that inconsistencies were removed, and the values of the parameters over time were estimated by solving the model over the period 1973-1979 several times, adjusting the values of the parameters at each iteration so that model's estimates of major economic variables were closer to their actual values.

Table 1. Comparison of Actual and Model Estimates of GDP and GNP

	1973		1975		1977		1979	
	Actual	Model	Actual	Model	Actual	Model	Actual	Model
Nominal Value Added (million TL current prices)	265661	265658	468382	467881	796123	796179	2015305	1981012
Sectoral Dist. of Nominal Value Added (%)								
Agriculture	27.54	27.84	29.06	28.74	27.61	26.63	23.11	22.43
Mining	1.38	0.96	1.27	0.88	1.80	0.86	1.54	0.92
Manufacturing	17.38	17.50	17.05	17.49	16.29	17.89	20.68	24.77
Construction	5.56	5.56	5.26	6.48	5.29	6.55	5.15	4.55
Infrastructure	14.98	14.98	14.71	13.92	15.12	14.95	15.76	13.57
Services	33.16	33.16	32.65	32.49	33.90	33.12	33.75	33.77
GDP (f.c)	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Index of real GDP (1973=100)	100.0	100.0	118.2	118.7	134.0	135.2	136.6	135.5
Nominal GNP (m.p. million TL)	309829	309405	535771	533165	872894	878390	2199520	2190777
Structure of Nominal GNP (m.p.)								
Private Consumption	67.94	68.03	70.32	70.13	68.89	68.72	66.65	68.93
Public Consumption	11.88	11.90	11.92	11.98	13.89	13.66	13.40	13.42
Total Private Investment	9.43	9.20	10.64	10.74	11.00	11.52	8.86	7.06
Total Public Investment	8.62	8.63	12.29	12.34	13.24	13.02	13.10	12.71
Total Resources	97.87	97.76	105.18	105.19	107.02	106.93	102.01	102.13
Current Deficit	-2.13	-2.24	5.18	5.19	7.02	6.93	2.01	2.13
GNP (m.p.)	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Public Disp. Income/GNP	20.67	20.76	20.88	20.95	20.23	19.83	16.02	15.85
Public Savings/GNP	8.79	8.86	8.95	8.96	6.34	6.17	2.62	2.43
Public Savings/Public I	101.95	102.64	72.88	72.61	47.88	47.39	19.96	19.10
Public Consumption/GNP	11.88	11.90	11.92	11.98	13.89	13.66	13.40	13.42

As observed from Table 1 and 2 model estimates closely reproduce actual changes in major sectoral variables and macro economic balances demonstrating the suitability of the model in simulating the effects of medium term economic policies on the performance of the economy despite the exogenous shocks of the seventies and the resulting imbalances experienced.

When the growth performance of the Turkish economy since the postwar era is analyzed it is seen that growth (more than 6% per annum) has not been smooth and self-sustaining, but disrupted almost every ten years due to the balance of payments problems. The inward oriented trade strategy, emphasizing import substitution and heavy protection is seen to have played an important part in the resulting structure of domestic production that is oriented to the large domestic market, requiring high imports, but not externally competitive. Though this strategy has been effective in the structural change of the economy, it has been extremely vulnerable to the external shocks of the 1970's. With the rise in the world price of oil in 1974, recession in developed countries, Turkey tried to maintain the growth momentum gained in the previous periods by trying to insulate the economy from external shocks by subsidizing the domestic price of oil, promoting investments and increasing public consumption. The widening savings gap and foreign exchange gaps were financed through reserve decumulation and massive external borrowing. These measures were successful in postponing the slowdown in the growth process until 1977. However with the drying up of reserves and the unforthcoming foreign borrowing in the magnitudes desired, the economy came to a halt in 1979.

Table 2. Actual and Model Estimates of Balance of Payments Accounts (Current prices, Million \$)

	1973		1975		1977		1979	
	Actual	Model	Actual	Model	Actual	Model	Actual	Model
Exports of Merchandise	1317	1310	1401	1431	1753	1742	2261	2259
Imports of Merchandise	2086	2088	4739	4618	5796	5813	5069	5002
Petroleum and products	222	276	812	894	1470	1213	1712	1518
Current Deficit	-484	-494	1880	1877	3425	3434	1239	1244
Workers' Remittances	1183	1183	1312	1312	982	982	1694	1694
Net Capital Inflow	233	233	1463	1463	2874	2874	1164	1164
Reserve Accumulation(-)	-728	-729	417	414	551	560	75	80

As seen from Table 1 and 2, the swing in the growth rates achieved, the increasing share of total and public investment and public consumption in GNP, the declining share of public savings in public investment and the increase in current account deficit are captured by the model both in magnitude and direction, indicating the success of the model in simulating the stance of the economic policy followed during 1973-1979.

4. Income Distribution Analysis of the Historical Base Run

Turkey with a GNP per capita of \$1110 (1977 US dollars) in 1977 compares well to other middle income countries with an average GNP per capita of \$1223 in 1977 (Urate et al 1983,13). However three country wide size distribution of income studies conducted in years 1963, 1968 and 1973 indicate that the rise in income levels have not been accompanied by a better distribution of income and that Turkey with gini coefficients of 0.55, 0.56 and 0.51 in the respective years suffer a substantial amount of income inequality. The study exploring the sources and structure of income inequality over the period 1950 to 1973 (Derviş et al 1980) point out that the major determinants of overall inequality in Turkey are; (i) the gap between agricultural and nonagricultural productivities, (ii) high inequality within the agricultural sector, and (iii) regional income differences.

There are no other country wide income distribution surveys after 1973 with which we can compare our estimates. However it is believed that the relative income distribution estimates obtained for 1973, and the CGE model estimates that closely reproduce actual values provide sufficient justification for the analysis of the size distribution presented below.

The CGE model generates the distribution of income to aggregate factors of production, to economically active groups and to the five household categories. Using the mean household incomes generated by the CGE model, the household size distribution can be obtained as the numerical aggregation of a number of different within group income distributions whose functional form and parameters are known (Robinson 1976). Aggregating and rescaling the data provided in (Derviş et al 1980,103) the parameters of each within group distribution for the five household categories distinguished in the model are estimated assuming that the within group distribution functions are log-normal. Log-variances of each household category is assumed to remain the same for the following years.

Table 3 presents the overall household distribution statistics for the four benchmark years obtained by using the real disposable household incomes excluding remittance income.

Table 3. Household Size Distribution Statistics for the Base Run

	1973	1975	1977	1977
Relative Distribution(%)				
Bottom 40%	9.86	10.25	10.49	10.57
Middle 40%	31.89	31.56	31.45	31.13
Top 20%	58.25	58.19	58.06	58.31
Gini Coefficient	0.535	0.532	0.529	0.531
Log-Variance	1.061	1.007	0.973	0.956
Mean Incomes (thousands of 1973 TL)				
Overall	31.85	34.80	38.29	37.80
Farmer 1	13.05	15.25	17.20	16.86
Farmer 2	79.34	89.62	96.21	92.75
Urban Poor	21.64	22.84	24.25	22.90
Urban Middle	32.89	33.77	36.05	34.92
Urban Rich	252.25	281.65	324.82	353.31
Ratio:Top Decile-Bottom Decile	40.04	37.33	35.83	35.75

Based on Table 3 the following conclusions can be drawn:

- (i) The distribution of household incomes excluding remittances is more uneven for the base year than suggested by 1973 income distribution survey results. Since the distribution statistics are obtained from the survey data, and the CGE model generates household incomes from GDP accounts, the discrepancy must be due to the underestimation of both agricultural and nonagricultural incomes in the survey.
- (ii) In accordance with the GDP growth rates achieved the relative size distribution slightly improves from 1973 to 1977 and shows a tendency to deteriorate after 1977. However, when the relative size distribution is obtained using nominal incomes, the deterioration from 1977 to 1979 is more profound. The main reason for this is the substantially lower consumer price index for farmer households, 5.22, as compared to the consumer price index for urban households, 5.61, in 1979 (1973=1).
- (iii) Despite the steady increase in the mean real incomes of all household categories, with the rate of increase of farmer 1 incomes highest, the improvement in the relative distribution from 1973 to 1977 is very slight (Gini coefficient declines by only 1.12%) indicating that unless measures aimed at reducing the within group log-variances are sought, it is very difficult to reduce the extent of overall inequality.
- (iv) The very uneven distribution of rural incomes seem to remain as one of the major sources of overall inequality. However the increasing inequality in the urban sector, characterized by the substantial mean income differentials among urban households, shows a tendency to be the other source of overall inequality.
- (v) When mean real household incomes including remittances are used to generate household size distribution, it is seen that the Gini coefficient for 1973 alone reduces by 4.3%. Given the insensitivity of the Gini coefficient to rising mean incomes the role of remittances in reducing relative inequality cannot be overlooked. However to avoid introducing bias with respect to different exchange rate parities and thus Turkish Lira equivalent of remittance

income, we refrained from reporting and using household income statistics including remittances as the base run statistics with which the results of the experiments are compared.

5. Results of Experiments

The experiments conducted are analyzed under three groups. Group A focus on alternative trade strategies with exchange rate the main policy instrument. Group B concern alternative wage policies. Group C contain alternative redistributive experiments with a new base, where the oil price rise and the balance of payments problems that occurred due to it is nonexistent, so that the relationship between growth and income distribution can be analyzed without distortions. The experiments are pure in the sense that all exogenous variables and parameter values of the base run are preserved, and only a few of them changed in each experiment.

Group A: Definition of Experiments

A1: Same as historical base run. Instead of fixed exchange rate specification with quantity rationing, the flexible exchange rate specification is used.

A2: Same as A1. Instead of actual borrowing and reserve decumulation, following (Derviş et al. 1978, 50) normal borrowing and reserve change has been assumed.

A3: Same as A2. Except that growth rates of labor categories, set at their actual political employment rates in obtaining the base run, are set at their natural growth rates.

A4: Same as A3. Except that remittances are assumed to remain constant in dollar terms, or increase at the average annual growth rate of world inflation (excluding oil prices).

A5: Same as A4. Except that tariffs are reduced by 10% per year.

The growth and distributional consequences of the experiments in Group A are summarized in Tables 4 and 5.

Table 4. Comparison of Basic Economic Indicators - Group A

	Base Run	A1	Average Annual Real Growth Rate (%)			
			A2	A3	A4	A5
Total Consumption	2.54	5.97	4.09	4.53	5.08	5.00
Total Investment	4.82	5.09	3.25	3.66	4.23	4.40
Exports	-0.54	8.84	19.03	20.37	17.10	17.97
Imports	0.68	3.19	-1.36	-1.18	0.01	0.25
GDP (m.p.)	5.19	6.38	5.72	6.27	6.39	6.40
Organized labor wage	2.28	1.12	0.15	-1.49	-1.00	-0.99
Unorganized labor wage	2.34	1.83	0.57	-1.71	-1.02	-1.08

Table 5. Comparative Household Distribution Statistics (Group A 1979)

	Base Run	A1	Average Annual Real Growth Rate (%)			
			A2	A3	A4	A5
Relative Distribution(%)						
Bottom 40%	10.57	10.99	10.88	10.96	10.92	10.92
Middle 40%	31.13	30.90	31.05	30.43	30.38	30.37
Top 20%	58.31	58.11	58.07	58.61	58.70	58.71
Gini Coefficient	0.531	0.525	0.526	0.529	0.530	0.530
Log-Variance	0.956	0.909	0.923	0.903	0.908	0.908
Mean Incomes (thousands of 1973 prices)						
Overall	37.80	36.77	36.02	34.42	35.61	35.58
Farmer 1	16.86	19.14	17.98	18.43	18.81	18.83
Farmer 2	92.75	103.37	98.61	100.47	104.37	104.59
Urban Poor	22.90	21.98	21.97	19.33	20.15	20.09
Urban Middle	34.92	31.71	31.78	29.35	30.36	30.31
Urban Rich	353.31	298.57	295.22	297.35	308.61	307.46
Ratio:Top Decile-Bottom Decile	35.75	32.15	32.95	32.33	32.66	32.64

The results of the counterfactual trade policy experiments summarized in Tables 4 and 5 indicate that the growth performance would have been more favorable and self-sustaining with the exchange rate equilibrating balance of payments and avoiding the foreign exchange crisis. Moreover by comparing experiments A1, A2 and A4 with each other it can be inferred that both foreign borrowing and workers' remittances have been important determinants of the high rates of growth achieved, and that had it not been for the substantial foreign borrowing actually used, both growth and income distribution would have been adversely affected despite the exchange rate policy employed. Another point to note is that flexible exchange rate policy alone is not sufficient in channeling industrial production to foreign exchange earning activities since export expansion is seen to be the result of expenditure switching. The results further indicate that the initial improvement in the overall distribution is due to the narrowing rural urban gap brought about by the improvement in the agricultural terms of trade. But the unchanged within-group log variances, and enlarging income gap among urban households deem further improvement almost impossible with the policies considered.

Group B : In this group experiment A4 is selected as reference.

B4A: Same as A4. Instead of the endogenous determination of the wages of all labor categories, the growth rate of organized labor's real wage is set exogenously so that it remains constant at its base year value throughout the period 1973-1979.

B4B and B4C: Same as B4A except that the growth rate of organized labor's real wage is set at +3% per annum, and -3% per annum, respectively.

Table 6. Comparison of Group B Alternatives

	Average Annual Real Growth Rate (%)			
	A4	B4A	B4B	B4C
Total Consumption	5.08	4.16	4.41	5.41
Total Investment	4.23	4.00	3.42	4.55
Exports	17.10	16.61	15.27	18.04
Imports	0.01	-0.04	-0.24	0.13
GDP (m.p.)	6.39	6.16	5.55	6.79
Unorganized labor wage	-1.02	-1.14	-1.19	-1.09

As observed from Table 6 experiment B4C singles out as the most favorable wage policy from the growth point of view. This result is due to the favorable agricultural terms of trade in B4C with agriculture accounting for more than 30% of GNP.

Table 7. Comparative Household Distribution Statistics (Group B 1979)

	A4	B4A	B4B	B4C
Relative Distribution(%)				
Bottom 40%	10.92	10.81	10.43	11.06
Middle 40%	30.38	30.55	31.13	29.87
Top 20%	58.70	58.64	58.44	59.08
Gini Coefficient	0.530	0.530	0.532	0.531
Log-Variance	0.908	0.921	0.970	0.885
Mean Incomes (thousands of 1973 prices)				
Overall	35.61	36.36	38.07	34.42
Farmer 1	18.81	18.79	18.14	19.37
Farmer 2	104.37	104.12	99.85	108.02
Urban Poor	20.15	20.02	19.77	20.21
Urban Middle	30.36	31.90	36.87	27.44
Urban Rich	308.61	307.90	306.98	308.68
Ratio:Top Decile-Bottom Decile	32.66	33.16	35.06	31.92

Statistics provided in Table 7 demonstrate the difficulty of judging what a better distribution of income is. The relative income distribution measures and the mean real incomes of households, when used as ranking criteria, point out different wage policies as the most favorable from the distributional aspect. Based on the mean real incomes of all household categories, except urban middle households, B4C rates as the most favorable policy. However if the objective is to improve the mean real income of a target group, B4B seems to be the most promising wage policy, at the cost of lower growth, and more uneven overall distribution.

Group C

C1: Same as the Historical Base Run with the changes being; (i) the increase in the world price of petroleum set equal to the increase in the world price of other products.(ii) The values of exogenous variables set at their targeted values in the Fourth Five Year Plan that did not envisage the oil price rise. (iii) Smoothed out growth rates of parameters from period to period preserving cumulative growth rates. (iv) Price level deflated exchange rate held constant over the entire period.

C2: Same as C1 except that the direct tax rate of agricultural and nonagricultural capitalists increased by 10% per annum and the additional tax revenue transferred to farmer 1 and urban poor households in the proportions of 60% and 40% respectively.

C3: Same as C2 except that the additional tax revenue is not transferred but channeled to public investment.

C4: Same as C1 except that institutional taxes are lowered by 10% per year.

Table 8. Comparison of Group C Alternatives

	Average Annual Real Growth Rate (%)			
	C1	C2	C3	C4
Total Consumption	6.61	6.60	6.17	6.61
Total Investment	13.44	13.51	14.56	13.46
Exports	3.77	3.79	4.04	3.78
Imports	5.92	5.94	6.03	5.93
GDP (m.p.)	7.91	7.92	7.88	7.92
Organized labor wage	3.67	3.48	4.32	3.68
Unorganized labor wage	2.57	2.37	2.84	2.59

Table 9. Household Distribution Statistics (Group C)

	C1		C2	1979	
	1973	1979		C3	C4
Relative Distribution(%)					
Bottom 40%	9.86	11.34	12.04	11.62	11.31
Middle 40%	31.89	31.23	32.27	31.93	31.21
Top 20%	58.25	57.43	55.69	56.46	57.48
Gini Coefficient	0.535	0.517	0.498	0.508	0.517
Log-Variance	1.061	0.878	0.820	0.860	0.879
Mean Incomes (thousands of 1973 prices)					
Overall	31.85	36.03	35.28	33.77	36.23
Farmer 1	13.05	19.82	22.24	18.89	19.82
Farmer 2	79.34	105.64	104.17	98.38	105.63
Urban Poor	21.64	22.10	24.51	21.93	22.14
Urban Middle	32.89	30.88	29.13	29.36	31.10
Urban Rich	252.25	277.24	255.89	237.03	282.25
Ratio:Top Decile-Bottom Decile	40.04	30.09	26.20	28.55	30.24

The results of experiment C1 indicate that if the external shocks of the seventies had not been experienced the targeted growth rates would have been achieved, and the high rates of GDP growth would have translated into steady improvement of income distribution. Tax and transfer policy simulated in C2 demonstrate that redistributive policies do not have adverse growth implications while improving the distribution of income significantly. Experiment C3 indicate that increased public investment induces no change in the growth performance and only slightly improves overall distribution at the cost of reduced absolute income levels. Neither the distributional nor the growth consequences of encouraging institutionalization is promising as it results in lower disposable household incomes due to increased forced savings. So experiment C2 singles out as the most promising redistributive policy.

Overall it can be concluded that although the experimental results are specific to Turkey major policy conclusions regarding income distribution and growth are in close conformity with the empirical findings of research carried out in other country contexts using CGE models. (Adelman et al. 1978, Taylor et al. 1980) Mainly; (i) It is very difficult to improve the overall relative distribution of income, while functional distribution is quite sensitive to policy changes. (ii) Policy instruments conducive to higher growth are not necessarily in conflict with the policies aiming at more even distribution of income, and higher rates of growth result in more even distribution of income. (iii) The most important relative price change effecting size distribution is the change in agricultural terms of trade.

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