Shadow Prices for Project Appraisal in Turkey

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Europe, Middle East and North Africa Region

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This paper is a study of the shadow prices to be used for project appraisal in Turkey. It arrives at estimates of various efficiency pricing and social pricing parameters taking into account the Turkish import and export regime and the objectives of the Government.

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This paper is a study of the Shadow Prices for Project Appraisal in Turkey. I am grateful to Arshad Zaman who initiated and encouraged this study. I would like to thank Shakil Faruqi for very valuable comments on the subject matter of the paper and the methodological content and Adrian Wood for helpful discussions on estimation procedures.

I. INTRODUCTION

1. This paper describes the analytic and empirical basis for the estimation of shadow prices which may be used for the evaluation of projects in Turkey in the next five years. The fundamental ideas behind the methodology adopted in this study were developed by Little and Mirrlees 1/ and extended by Squire and van der Tak 2/. Economic analysis of projects in order to assess their likely impact on the relevant development objectives is carried out through a comparison of the various ways in which scarce resources required by the project might be used instead. The basic idea of project appraisal can be set out briefly. The project is first analyzed into detailed commodity and labor flows with numerical quantities assigned to them and each quantity converted into a value through multiplication by a price. The total value of outputs less the total value of inputs (discounting future values) is the present value of the project. The application of the traditional efficiency approach (TEP) essentially involves the steps mentioned above and translation of all projects costs and benefits into domestic prices.

2. The new methodology generally referred to in the literature as the extended efficiency approach (EEP) uses conversion factors in order to translate all costs and benefits into border prices. Thus it has the added advantage of allowing for distortions in prices between the domestic market and border prices. In the present context given that project analysis is supposed to assess costs and benefits in the same unit a common 'numeraire' is used. The 'numeraire' adopted by Little-Mirrlees and Squire-van der Tak is freely disposable, i.e., uncommitted, foreign exchange in the hands of the government. It is basically a foreign exchange numeraire but expressed in terms of units of the local currency (Turkish Liras) converted at the official rate of exchange.

3. In the idealized world of perfect competition the simple rule that prices of goods and services should be set equal to marginal costs leads to an efficient allocation of resources. This situation ensures optimality for a given income distribution, when no one can be made better off without reducing someone else's welfare. Moreover, given the compensation principle, as long as aggregate benefits exceed aggregate costs, the efficiency criteria is met and the beneficiaries of the project can (at least in theory) compensate the losers 3/. However, in the real world, distortions occur in prices and income distribution which are found objectionable in terms of efficiency and equity considerations. Given the usual convexity assumptions, increasing shadow prices exist although there are disagreements over the possibility of finding

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1/ I.M.D. Little and J.A. Mirrlees, Project Appraisal and Planning for Developing Countries, Basic Books, New York, 1974.

2/ L. Squire and H.G. van der Tak, Economic Analysis of Projects, World Bank, John Hopkins Press, Baltimore, 1975.

3/ For a discussion of the welfare optimum in the context of shadow pricing see: E.J. Mishan, Cost-Benefit Analysis, Praeger, New York, 1976.

them mainly due to data problems. The technical literature on shadow prices derives shadow pricing rules from the first order conditions from an optimization model and this results in rules that link production to international trade. While informational problems as regards tradable goods are surmountable given the small country assumption the case of non-tradable goods poses serious practical problems 1/.

4. Shadow prices are defined as the increase in welfare resulting from any marginal change in the availability of commodities or factors of production. According to the Little-Mirrlees rule the shadow price of a factor is precisely the value of output forgone when this factor is marginally, that is infinitesimally, withdrawn at the distorted market prices with the valuation carried out at international prices. The shadow pricing methodology is based on the premise that relative border prices correctly reflect relative shadow prices--a result which is true for a wide class of general equilibrium models.

5. Until recently, traditional methods of appraisal have emphasized the growth objective and been mainly concerned with the national income parameter. Many economists would agree that project analysis is intended to ensure that the available resources yield the maximum increment in total national income and other tools such as fiscal policy are to be used to bring about the optimum income distribution. The problem, however, is first the well known impossibility of optimal lump-sum taxation and more specifically in the case of most developing countries the inefficiency and weakness of the tax system. More recently, it has been argued that the operational assumption that all units of income make the same contribution to growth may be untenable. The World Bank and others advocate a more consistent and systematic estimation method that takes explicit account of the impact of the project on the distribution of income both between investment and consumption and among different groups in the society. The validity of this new approach is to some extent dependable on the extent to which the government is free to determine the desired level of investment and affect income distribution by means of fiscal and monetary policy. As already mentioned, the social economic and political constraints in developing countries limit the use of these policies and social pricing becomes a more useful concept. Mirrlees has argued that distribution and efficiency can be operated in the social management of the economy 2/. However, even in this framework he allows for some aspects of benefit-cost analysis which can allow for distributional objectives by systematic application of welfare weighting; both weighting private consumption relative to public expenditure and the incomes of people in different income quintiles. A point that needs to be emphasized is that the dichotomy between equity and growth issues has been exaggerated. There is indeed evidence that extreme

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1/ For an interesting exposition of the information problem refer to: Peter Warr, "Shadow Pricing: information and stability in a simple open economy", Quarterly Journal of Economics, Vol. XCII, 1978, pp. 95-116.

2/ J.A. Mirrlees, "Social Benefit-Cost Analysis and the Distribution of Income", World Development, Vol. 6, No. 2, 1978.

poverty and inequality may affect the growth objectives. The nutrition studies carried out do show the positive link between nutrition (income) and productivity of the labor force. However, the point made by Mirrlees is well-taken; obviously wasteful projects should not be undertaken merely on distribution grounds.

6. Social pricing has the advantage of bringing all available information from sector and other studies to bear on policy analysis. The shadow pricing system used in this study constitutes an informal attempt to capture general equilibrium effects and embody them in the particular national parameters. In the context of a general equilibrium model, the shadow price of a given input represents the change in the value of the national objective function due to a marginal change in the availability of that input, subject to a set of distorting constraints 1/. The lack of any estimates of these numbers in earlier work has limited the significance and usefulness of the parameters 2/. The estimation of shadow prices has also been shown to be useful in reflecting areas where additional information or more refined estimates are required 3/. Inclusion of estimates such as the social value of public income which is an explicit attempt to capture some of the general equilibrium effects of changes in public sector expenditure has made this approach more useful.

7. One further advantage of the more explicit approach now adopted by the Bank is that by using efficiency prices parameters are derived that are restricted to correcting for price distortions introduced by market imperfections. Social prices on the other hand provide a separate analytical framework to incorporate social objectives such as the trade-off between growth and equity. The efficiency pricing approach implicitly assumes certain drastic value judgments (discussed in the main text) particularly regarding the optimality of growth and income distribution. Social pricing, however,

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1/ See P. Dasgupta and J. Stiglitz, "Benefit-Cost Analysis and Trade Problems", Journal of Political Economy, Vol. 82, 1974, pp. 1-33.

2/ The partial equilibrium method used in project analysis has been criticized on the basis on non-marginality, for its lack of simultaneity and because of the judgment involved in choosing which linkages are to be analyzed and which are neglected when the impact of some disturbance is to be evaluated. While in principle these objectives can be met by an iterative process of successive approximation, in practice this has proved difficult to accomplish.

3/ This issue together with general equilibrium effects have been discussed in an interesting fashion by L. Squire, I. Little and Durdag "Applications of Shadow Pricing - Country Economic Analysis with an illustration from Pakistan". They have incorporated shadow prices into a more general study of country dates and insisted upon adoption of cost-benefit methodology to the particular country in such a way to call attention to general equilibrium issues.

allows systematic consideration of alternative sets of value judgments. Within very wide limits, differences in value judgments make little difference to many aspects of social benefit-cost analysis. Of course, some assumptions are required, but only limited government rationality need be assumed. The arguments concerning one method being objective and the other being 'subjective' are discussed below. It is enough to mention at this point that given that few countries have shown optimal growth and income distribution performances, the assumptions underlying efficiency prices would be overly restrictive. 1/ In terms of Squire-van der Tak, these judgments imply setting all the marginal distribution parameters, as well as β_v equal to unity, in which case net social benefit equals net efficiency benefit. 2/ Moreover, the efficiency approach assumes the economy does not face a foreign exchange constraint. In the case of present day Turkey, this is obviously unrealistic, and makes the approach more unsuitable than it would be otherwise. 3/

1/ This approach which is seemingly an objective one makes the implicit judgment that at the margin savings and consumption are equally valuable the existing income distribution is optimal, and there is no foreign exchange constraint.

2/ β is equivalent to the standard conversion factor and to the value of public income.

3/ It is often asserted that efficiency prices are 'objective' measures whereas social prices require the use of 'subjective' methods of analysis. This does miss the fact that simple opportunity cost measure may misrepresent the resource costs that result from changes in the patterns of household expenditure. The absence of a social premium on savings relative to consumption seems quite inconsistent with the interest of people involved in choice of technique and project appraisal in the magnitude of the savings premium. The claim that this is really a distributional effect is mistaken since it implies that the social discount rate should always be equal to the marginal rate of return on new investment evaluated at efficiency prices which is at variance with the results of the theory of planning and optimal growth. These points imply that traditional efficiency prices do not represent a consistent or appropriate basis for evaluating projects, even if one wishes to abstract from distributional effects.

II. SUMMARY OF ESTIMATION RESULTS AND POLICY IMPLICATIONS

8. In this section, some methodological issues as well as the estimation results are summarized 1/. Moreover, there is a brief discussion of their interpretation and use which is of particular interest to the project analyst though the generalist may also find it instructive. Some familiarity with the work of Little-Mirrlees 2/ and Squire-van der Tak 3/ as well as the country report, Turkey: Policies and Prospects for Growth 4/ is assumed. The recent work done in the preparation of the report as well as the general equilibrium model developed for Turkey have provided useful information for estimation purposes 5/. In particular various market distortions which have always been a major shortcoming in calculation of conversion factors have been quantified in Turkey. Therefore, it can be claimed that the estimates derived for Turkey are reliable due to the availability of information. Other sources used for information on the balance of payments are the "Monthly Bulletin", published by the State Institute of Statistics, and the 'Monthly Economic Indicators', the Ministry of Finance. The recent IMF and World Bank mission reports have also provided useful information. Moreover, the Turkish Fourth Plan (1979-1983) has been valuable in particular as regards providing information on government plans and objectives which are important factors used in social benefit-cost analysis. In many instances the existence of additional data and use of different approaches have provided different values for the national parameters, however, in many instances these are similar to previous estimates.

9. It remains to be said that the policy recommendations derived from the shadow prices prescribed in this paper should be regarded with some reserve. There still remain major informational gaps and the existence of additional data would allow many conceptual problems to be resolved and also allow estimation of additional parameters such as conversion factors for non-tradable goods, separate measures for the marginal productivity of capital

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1/ A more thorough examination of the methodology and the estimation procedures occupies us extensively in Sections III, IV and V.

2/ I.M.D. Little and J.A. Mirrlees, (1974).

3/ L. Squire and H.G. van der Tak, (1975).

4/ Turkey: Policies and Prospects for Growth, The World Bank, 1980 (Forthcoming).

5/ K. Dervis and S. Robinson, "The Foreign Exchange Gap, Growth and Industrial Strategy in Turkey: 1973-1983", World Bank Staff Working Paper No. 302, 1978.

in the public and private sectors and disaggregated shadow prices for major inputs. However, it is necessary to point out that the parameters already estimated do provide the basic structure and information required for the purposes of project analysis. It also is the case that the methodology used in this study makes it relatively simple to extend or even disaggregate the set of shadow prices to meet the need of specific project appraisals. Finally, it is important to stress that the shadow price estimates presented ought to be updated at regular intervals particularly if there are major changes in economic policy. The work of updating is also relatively simple and need only focus on changes in areas of policy which have a direct impact on accounting ratios.

Table 1: SUMMARY OF NATIONAL PARAMETERS

Parameters	Value
Standard Conversion Factor (SCF)	0.59
Conversion Factor for Consumption Goods (CF_C)	0.79
Conversion Factor for Intermediate Goods (CF_I)	0.55
Coversion Factor for Capital Goods (CF_K)	0.52
Marginal Product of Capital, q	12%
Elasticity of Marginal Utility, n	1
Rate of Pure Time Preference,	2
Consumption Rate of Interest (CRI)	4.5%
Value of Public Income, v	3.4
Critical Consumption Level:	
Rural, 1973 TL	1,208
Urban, 1973 TL	4,524
Critical consumption level as a ratio of national per capita average income	37%
Accounting Rate of Interest (ARI)	5%
The Summary Distribution Measure, D	1
Shadow Wage Rates (SP1): /1	
Rural Sector	0.56
Urban Informal Sector	0.55
Urban Formal Sector	0.57

/1 SP1 - see Section V for details.

Conversion Factors

10. Table 1 illustrates the estimates of the main national parameters required for social benefit-cost analysis. The standard conversion factor and the conversion factors for consumption, intermediate and capital goods were derived using the c.i.f. border prices for imports, the f.o.b. border price of exports after adjustment for import taxes, export rebates as well as 'domestic user costs' 1/. The various methods used did give similar results but the results quoted use the main Squire/van der Tak equation for conversion factors 2/. Following an extensive analysis of the Turkish economy, the premium rate used in adjusting for the divergence of the c.i.f. and tariff price and the domestic price of goods prior to the June 1979 devaluation was 90 percent. The devaluation is expected to have a net positive effect but cannot be depended upon to solve the structural problems of the economy on its own. The stabilization and trade policies will be very important policy variables which will also take time to become fully effective. The ambitious investment plans, national income growth rate, and industrialization program outlined in the Fourth Plan require continued large imports of intermediate and capital goods. The present state of affairs which is expected to change slowly and evidence on the recent past, however, imply that the above plans will lead to some rationing and shortages although at a smaller scale. The previous rate applicable to the results in (Table 1) is 60 percent and is consistent with the projections of the general equilibrium model 3/. Sensitivity analysis is carried out in Tables 5, 7, 9 and 11 to show the results of no distortions as well as a situation of extreme shortage similar to 1978.

11. The standard conversion factor is 0.59. If we allow for a premium rate of 90 percent the shadow exchange rate of TL 47.2 to the U.S. dollars is derived which is equal to the post (June 1979) devaluation rate and there-therefore increases confidence in our results. The conversion factor for consumption goods (CF_c) is higher than that for intermediate and capital goods (CF_I, CF_K). It does reflect the serious import rationing due to the supply-

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1/ See the main text for a discussion on the domestic user cost which is substantial in Turkey.

2/ $\frac{(M + X)}{M(1 + tm + TM) + X(1 - tx)}$, see Section III for details.

where M - imports
X - exports
tm - import taxes
tx - export taxes
TM - premium rate

3/ K. Dervis and S. Robinson, "The Foreign Exchange Gap, Growth and Industrial Strategy in Turkey: 1973-1983", World Bank Staff Working Paper No. 306, 1978, (See T-1 run of the model).

demand gap in the latter two markets. The conversion factor for consumption goods is dominated by the export side which seemingly does not have the same problems and therefore the border value and market value are not as widely divergent as is the case in the intermediate and capital goods market.

Marginal Productivity of Capital

12. Various methods were used to derive the marginal product of capital. Turkey is one of the few developing countries with reliable data on capital stock. It was, therefore, possible to use the production function approach and run regression equations to derive the marginal product of capital directly. 1/ There is a wide divergence of results depending on the methodology used. The micro approach does give a rough range, however, given the segmentation and imperfection of the capital market we based results on the macro approach. In the case of Turkey, the macro data allowed estimation of a value for the marginal product of capital equal to 12 percent. It is necessary to point out that the provision of additional data to enable the estimation of separate values of q for the public sector and the private sector would be very useful given the particular structure of the Turkish economy.

Social Pricing Parameters

13. The consumption rate of interest (CRI) was derived to be equal to 4.5 on the basis of the growth of consumption per capita, elasticity of marginal utility and the rate of time preference. The latter two parameters were based on the decisions and plans of the Turkish government as embodied in the Fourth Plan. The accounting rate of interest (ARI) is an important concept in social pricing since it provides the discount rate for public investments. The value of 6 implies that public sector projects with a social rate of return above 6 are justifiable given the growth objectives. The figure does allow Turkey to be committed to its growth objective but also allows weeding out inferior projects.

14. The value of public income (v) was estimated to be 3.4 which is quite high. It does, nonetheless, reinforce the 'etatist' position taken by authorities in Turkey. It is also a reflection of the status quo position which favors the state intervention in economic life 2/. The estimates for the critical consumption level and the consumption distribution weights are all indicative of inequality and large scale poverty in Turkey. Poverty is

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1/ The results do illustrate a high estimate of the marginal product of capital, however, they were derived too late to be included in this version.

2/ It is also consistent with the recent plans for increasing the share of public investment in total investment which reinforces faith in the above results and makes the social parameters more reliable from the project analyst's point of view.

more concentrated in rural areas. The consumption distribution measure for the lowest quintile is equal to 8 and the weight attached to the lowest population quintile is 3 which is indicative of the importance of undertaking more measures as regards the distribution of income. The information on the spread of basic needs programs indicates progress in fields such as education and health. The value of consumption distribution measures for the second quintile also reinforces the critical consumption level estimates 1/.

Shadow Wage Rates

15. The shadow wages estimates in the table are based on social shadow pricing procedures (SP1) that attaches a value of 1 to the marginal distribution measure, and disregards the disutility of effort and loss of leisure arising from extra employment. Marginal productivity of labor is measured by output forgone in alternative employment. The shadow wage for the urban informal sector is based on the assumption that the urban rate of unemployment remains constant because of its role as an equilibrating mechanism. We have, therefore, estimated separate shadow wage rates for rural and urban sectors, the latter being further disaggregated according to whether or not the labor is employed in sectors where there is an element of wage control. 2/ The traditional efficiency approach has provided the lowest estimates, and the extended efficiency approach by adding the consumption costs arising out of employment has provided the highest estimates. Once the social benefits of consumption are allowed for (through the use of social pricing), a reasonable set of shadow wage rate estimates are derived. There is also very little difference between the three sectors and the accounting ratios are in the range 0.55-0.57. These results lend support to choice of labor intensive projects and techniques of production.

1/ At the critical consumption level, $d = v.CF_c$ and therefore, $v.CF_c/d = 1$; namely at the second quintile.

2/ The rationale for this categorization is outlined in Section V.

Policy Implications

16. It is interesting to note the correspondence of the pattern of national parameters estimated for Turkey and the classic import substitution model developed by Little, Scitovsky and Scott 1/ and Balassa et al. 2/ The Turkish Government's policy of adopting higher import duties, an overvalued exchange rate, and substantial investment incentives which have been heavily subsidizing capital costs relative to labor costs (consequently higher $\frac{k}{o}$ ratios) has been responsible for creating a distorted market. The 'signaling' mechanism provided by the price system is no longer functional. Rationing in goods and capital markets also implies that market prices no longer reflect relative scarcities.

17. The industrial sector has grown in response to market incentives which bear little relation to the social value of producing different goods. There has also been negative discrimination against export-oriented activities. The Government incentive schemes e.g. tax rebates, are intended to encourage development of manufacturing for exports. However, first the scale is relatively small, secondly, the administration is based on a complex system. The goods affected also change continually and there is some uncertainty regarding rebate payments which has not been conducive to export oriented activities.

1/ Scott, et al., Industry and Trade in Some Developing Countries, 1970.

2/ Balassa et al., The Structure of Protection in Developing Countries, 1971.

III. EFFICIENCY PRICING PARAMETERS IN TURKEY

18. In this section we estimate the standard conversion factor (SCF), and the conversion factors (CF's) for tradables as grouped into the categories of consumption, intermediate and capital goods. 1/ These estimates provide the multiplier used for conversion from the market values to values at shadow prices which following the Little-Mirrlees methodology is measured by border prices. Various distortions contribute to the divergence of domestic prices from border prices. The import and export taxes account for some of the market imperfections that affect the above estimates. Rapid growth and the economic policies followed in Turkey have brought about non-tariff distortions that by far outweigh the import taxes. During the years 1978 and 1979, the "domestic cost elements" such as rent seeking activities and the cost of rationing, have been more than three times the average import tax rate.

19. The experience of rapidly growing developing economies indicates that the unbalanced nature of growth and its speed create serious shortages in the goods market. The formal import regime is not always a good indicator of all the distortions that affect market prices. In the case of Turkey considerable work that has been done in the preparation of the country report 2/ and the general equilibrium growth and trade model, hereafter referred to as the TGT model, 3/ have provided more information on various market distortions. The conversion factors that have been estimated have drawn upon the relevant data on import/export taxes as well as other domestic cost elements and, therefore, claim to be reasonable measures reflecting the divergence of domestic prices from border prices in Turkey. In this section a brief review of the import and export regimes will be followed by a study of other market imperfections and their implications as regards the estimation of conversion factors. Finally, the effect of devaluation on the conversion factors will be studied. In the TGT model, total imports are set equal to total foreign exchange earnings. Capital flows are given exogenously and total imports are determined by total exports and are, therefore, not equal to desired imports. 4/ The model outlines a quantity adjustment mechanism that closely resembles what took place in Turkey during the last few years and also takes into account general equilibrium affects. The scarcity value of the imported goods

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1/ The input-output information for Turkey does not provide a detailed breakdown of inputs that go into the production of non-tradable goods. Specific conversion factors for major non-tradables, e.g., construction and transportation cannot be calculated on the basis of available information and the SCF can be used as a rough approximation.

2/ Turkey: Policies and Prospects for Growth, The World Bank, 1980 (Forthcoming).

3/ K. Dervis and S. Robinson, (1978).

4/ S. Robinson and K. Dervis; "The Foreign Exchange Gap Growth and Industrial Strategy in Turkey: 1973-1983", World Bank Staff Working Paper No. 306 (1978).

is generally much higher than the c.i.f. and tariff price. Import users are off their demand curves at prevailing user prices and desired imports are higher than actual realized imports. The import prices appear implicitly in the profits made by producers and other license holders. A simple allocation rule that is a reasonable approximation to the real situation rations foreign exchange in proportion to desired imports. The model also assumes that illegal or semi-legal means of resale exist and for certain intermediate goods, very high premiums are being realized. The T-1 run of the model which outlines the more pessimistic view namely that future performance will be similar to the Third Plan period uses a premium of 90 percent for 1978 and 98.8 percent for 1979. Its projections for the rest of the plan period up to 1983 are within the range 55-60 percent. The country report 1/ also takes a premium rate of 90 percent to be a reasonable adjustment. In the estimation of conversion factors that follow, when allowance is made for the premium, the shadow exchange rate derived is equal to the new official rate (post June 1979 devaluation rate) namely TL 47.2 to the US dollar.

20. However, our choice of the premium rate depends on the trade and stabilization policies followed by the Government. The rate to be used in future project appraisal should allow for a consideration of the prospects of the Turkish economy over the next five years. It is important to notice that all projections of the premium are conditional upon the success of the specific policy package followed by the Government. The recent devaluation through its effects on resource reallocation, capacity utilization and capital accumulation is expected to have a net positive effect. The high exchange rate policy if successful will bring about a real change in the economy and reduce structural disequilibrium as well as the foreign exchange gap. The Fourth Plan also calls for higher investment and savings rates. The above together with a switch from import substitution to production for the export market can go a long way in reducing the distortions in the foreign exchange market.

21. The wisdom of the above discussion is, therefore, that the premium will not be expected to remain as high as 90 percent. It is also not realistic to expect deep-rooted structural disequilibrium in the Turkish economy to disappear overnight. The key issue is whether the exchange rate which has been adjusted recently will be changed again and often enough to keep up with the domestic inflation rate. However, the lack of such an adjustment will require the emergence of the premium rate to take into account the effect of trade restrictions. A reasonable estimate that is consistent with the projections of the general equilibrium model in Turkey is a premium of 60 percent which will be used in all the following conversion factors. However, sensitivity analysis is conducted to study the effects of differential premia on the estimates of conversion factors. One more point that needs to be made is that while present trends in the Turkish economy point to 60 percent as a reasonable estimate, any major economic change that affects the premium rate should be considered by the project analyst using the conversion factors. The methodology used is fairly flexible and the analyst should carefully take into account major changes at future points in time.

1/ Turkey: Policies and Prospects for Growth, The World Bank, 1980 (Forthcoming)

22. In the case of Turkey, a devaluation to be effective will have to bring about real price and income changes. Only in that case will the use of different post-devaluation accounting ratios be relevant. Given that the effects of the recent devaluation (June 1979) have not yet become fully manifested, this issue will need to be resolved in the future.

Import Regime

23. In March 1978 Turkey formally devalued its currency by 38 percent to TL 25 to the dollar. The critical state of the Turkish economy and its huge balance of payments deficit brought about a further devaluation, setting the exchange rate at TL 47.5 to the dollar in May 1979. 1/ During the late 1960's and early 1970's, successive Plans were mainly concerned with rapid industrialization via capital-intensive technology, together with a policy of import substitution financed largely by traditional agricultural exports and processed raw materials. The import regime was therefore dominated by a concern for protection of "infant industries" through imposition of import duties and quotas and a licensing scheme. In the mid and late 1970's the external trade balances of Turkey deteriorated rapidly as a result of stagnation in export earnings (resulting from an overvalued currency, accelerating domestic inflation, increasing production costs and ad-hoc protective policies), a fall in worker's remittances, together with a rising import bill. Turkey's debt service ratio rose to 25.2 percent in 1978, leading to serious consequences as regards the country's credit-worthiness. 2/ The import regime in 1978 and 1979 has become more geared towards achieving a balance of payments equilibrium and demand management aims. Thus, across-the-board economy-wide import rationing has become an important tool in the present import regime. We will first look at the formal import regime to be used in the estimation of conversion factors. Next, it will be instructive to allow for effects of import rationing and the "premium" rate, to get a better view of the real import regime.

24. In Turkey all commercial imports require import licenses. These are issued to registered importers, industrialists, State Economic Enterprises, and government departments and permit the necessary foreign exchange payments to be made. Turkey's import regime relies on a positive listing system. The basic essentials of the import program are fixed by the State Planning Organization (SPO). It determines both the amount of projected imports and their classification according to the necessity of demand for imports in the implementation of development plans. All commodity imports are classified, in the first instance into two major categories in terms of

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1/ For most agricultural exports and for imports of petroleum and fertilizer the exchange rate that is applicable is TL 35 to the US dollar.

2/ Turkey: Policies and Prospects for Growth, The World Bank, 1980 (Forthcoming).

financing involved; programed imports financed by the country's own foreign exchange resources and all self-financing imports financed with project credits, private foreign capital and "imports with waivers". The programed imports financed in convertible currencies are divided into Liberalized Lists I, II, the EEC list, and global quota lists. The Liberalized List I comprises mainly raw materials for industrial products not produced domestically and allows free imports of such goods without quantitative restrictions. List II, composed mainly of raw materials produced in Turkey and semi-finished goods for industrial production, requires prior approval of the Ministry concerned when domestic production does not provide the required types of goods in terms of quality or quantity. The quota list comprising investment and consumer goods requires a more complex licensing procedure. The licensing system consistent with the general import-substitution policy provides domestic industry with a substantial degree of protection. A study by IBRD and the Turkish Industrial Development Bank in 1972 found the median of effective rate of protection to be 42 percent.

25. Imported commodities are subject to the following different types of taxation: 1/

(i) Customs duty (30-60 percent of the value of imports).

(ii) Stamp duty - previously at 9-9.5 percent of import value, now raised to 25 percent applies to all imports following waiver of GATT, article II.

(iii) Customs surcharge - 15 percent of applicable customs duty.

(iv) Quay duty - 5 percent of import value.

(v) Production tax - ranging from 10-75 percent when domestically produced goods are subject to the same tax.

26. Most of the imports consist of capital goods and intermediate goods, and import of petroleum is almost one-third of total imports. Consumer goods and food imports constitute less than 15 percent of total imports. The analysis of structure of imports shows that the proportion of essential imports has been rising partly in response to the long term changes in the productive structure of the economy and reflecting the growth policy which has favored sustained capital intensive investment requiring significant capital imports. Thus a cut in imports has long term growth consequences. The average tariff rate on imports is approximately 30 percent, varying widely over sectors. Generally higher than average rates apply to capital goods and some intermediate goods such as chemicals, and lower than average rates apply to food and some consumption goods.

1/ When customs duties are equal to zero, other taxes on imports are not payable. Also public sector imports are largely exempted from tariffs and duties.

27. As already mentioned, however, pure import rationing has become a prominent feature of the state policy. This has brought about a parallel foreign exchange market due to rising demand for imported goods. The widening gap between supply of and demand for imported items, and the rationing mechanism have added to the complexity of an already imperfect market. Thus effective import costs (domestic prices) in a short market are much higher than the c.i.f. price plus tariffs. For the period 1978-79 the TGT model has estimated a premium rate of 90 percent to be added to import prices (c.i.f. prices plus tariffs plus premium). 1/ The consequence of higher import costs has been a bias towards more import substitution at the expense of other types of policies. As the following tables and conversion factors show, given the large magnitude of the premium rate (nearly three times the average tariff rate in 1978) the conversion factors differ to a great extent depending on the premium rate.

Export Regime

28. Tax rebates are an important element of export policy established in 1963 to encourage exports of non-traditional manufactured goods. These were intended to offset the excise taxes paid by the manufacturers and import duties and similar charges on the import content of exports. While their impact has varied, textiles and the clothing industries have been major beneficiaries. The average rate of export rebate, i.e., premiums of the Turkish Lira per unit of foreign currency in transactions subject to rebates is expressed as a percentage of the c.i.f. price of exports. While there is no clear and direct relationship between export rebates and manufactured exports, rebates can be justified as an additional short-term assistance to industries that have an export potential but need time to develop export markets. In principle the amount of rebate payment is limited to the actual amount of taxes paid as well as export profitability considerations. Their administration also has always been inefficient and on a piece-meal basis. The share of exports subject to rebates increased from 30.6 percent in 1974 to 50 percent in 1977 and declined to 45 percent in 1978. The average rate of export rebates fell to around 10 percent in early 1978 and rose to approximately 15 percent in the same year.

1/ It is interesting to observe the price of gold ingots in Turkey as compared to that in the London market. The difference between the parallel exchange market rate and the official rate in March 1979 was 190 percent.

Estimation of Conversion Factors

29. In estimating conversion factors we will be mainly using the Squire and van der Tak methodology as outlined in Economic Analysis of Projects. 1/ Given the following assumptions:

(a) export demand and import supply are infinitely elastic; 2/

(b) marginal changes in expenditure on non-tradeables can be neglected; 3/

(c) all income elasticities of spending are unity or the relative size of the average propensities to spend on importables and on exportables are approximately reflected by the relative size of imports and exports. 4/

1/ The general formula for conversion factors is specified as

$$B = \sum_j a_j \lambda_j / p_j \qquad \Sigma a_j = 1 \qquad (1)$$

a_j - proportion of marginal expenditure devoted to the j^{th} commodity

λ_j - is the shadow price of the j^{th} commodity

p_j - is the market price of the j^{th} commodity

This requires information on the consumption patterns of different income groups and expenditure elasticities which is not available.

2/ With respect to the elasticity of demand and supply, the assumption of infinite elasticity seems advisable though it can be argued that the elasticity of export demand is less than infinite for some major products.

3/ This assumption is justified if either a_j for non-tradables is small or if λ_j/p_j for non-tradables is approximately equal to the conversion factor.

4/ In the case of Turkey the proportionality assumption (c) is to some degree justifed in view of the fact that its economic structure and trade composition are relatively diversified, i.e., import substitution is reasonably advanced and export structure contains a significant proportion of items which are domestically consumed.

(d) the existing extent and degree of protection is not likely to change significantly. 1/

we can use $$\frac{M + X}{M(1+tm+TM) + X(1-tx)} \quad (2)$$

M = c.i.f. value of imports
X = f.o.b. value of exports
tm = average tariff duty on imports
tx = average tax rebate (subsidy) on exports
TM = premium rate.

Standard Conversion Factor

30. In project appraisal, there will usually be a number of inputs whose weight in total costs is too small to justify the work which would be involved in estimating specific accounting ratios for them. For this reason, it is conventional to estimate a standard conversion factor (SCF) which is used to convert expenditures on such items into values at shadow prices. Tables 2 and 3 give the yearly values of the necessary export/import data to calculate the SCF for the years 1974-78. The SCF using the three year averages of trade and tax dates using equation (2) was estimated at 0.80. The substantial non-tariff import restrictions, rationing and exchange controls in Turkey constitutes an imperfect tax system. Addition of a "premium rate" makes up the difference between c.i.f. plus tariff rate and the domestic price of goods. After adjustment for the premium rate, (60 percent), the standard conversion factor estimated for 1977-78 was reduced to 0.59.

1/ When these assumptions are abandoned, the marginal propensities to consume exportables and importables have to be estimated and equation (1) may be written as

$$B = \frac{\frac{Em.APCM}{1 + tm} + \frac{Ex.APCx}{1-tx}}{Em.ApCm \qquad Ex.APCx} \quad (3)$$

where m and x refere to importables and exportables

Table 2: COMMODITY COMPOSITION OF IMPORTS 1974-78

(In millions of US dollars)

	1974		1975		1976		1977		1978		Average	
	Value	%	Value	%	Value	%	Value	%	Value	%	Value	%
Consumption goods	510	13.6	501	10.6	28	5.6	225	3.9	154	3.4	335	6.9
Intermediate goods		54.6	2411	50.9	2692	52.5	3395	58.6	2873	62.4	2607	55.0
Capital goods	1204	31.8	1826	38.5	2150	41.9	2176	37.5	1572	34.2	1785	38.1
Total imports (goods)	3778	100.0	4739	100.0	5129	100.0	5796	100.0	4599	100.0	4808	100.0

Source: Turkey: Policies and Prospects for Growth, The World Bank, 1980 (Forthcoming); Statistical Annex; Tables 3.1 - 3.4

Table 3: COMMODITY COMPOSITION OF EXPORTS 1974-78

(In millions of US dollars)

	1974		1975		1976		1977		1978		Average	
	Value	%	Value	%	Value	%	Value	%	Value	%	Value	%
Consumption goods	1225	79.9	1119	79.9	1679	85.7	1490	85.1	2003	87.5	1503	84.1
Intermediate goods	276	18.	254	18.	249	12.7	233	15.2	253	11.1	253	14.2
Capital goods	31	2.0	28	2.0	31	1.6	30	1.7	31	1.4	31	1.7
Total exports (goods)	1532	100.0	1401	100.0	1960	100.0	1753	100.0	2288	100.0	1787	100.0

Source: Turkey: Policies and Prospects for Growth, The World Bank, 1980 (Forthcoming); Statistical Annex; 3.1 - 3.4

Table 4: ESTIMATION OF STANDARD CONVERSION FACTORS (SCF) 1974-78

	1974	1975	1976	1977	1978	Average
Imports, c.i.f. (M)	3778	4739	5129	5796	4599	4808
Exports, f.o.b. (X)	1532	1401	1960	1753	2288	1787
Total (M + X)	5310	6140	7089	7549	6887	6595
Taxes on imports	1056	1392	1664	1760	1547	1484
Percentage (%)	28.0	29.0	32.0	30.0	33.0	31.0
Tax rebate on exports	67	96	196	192	138	138
Rebate/export ratio	4.3	6.9	10.0	10.9	6.0	7.6
Standard conversion factor (SCF) /a	0.83	0.80	0.79	0.79	0.80	0.80
Premium rate (60%)	2267	2843	3077	3478	2759	2885
Standard conversion factor (SCF*) /b	0.61	0.58	0.59	0.58	0.60	0.59

/a $SCF = \frac{M + X}{M(1 + tm) + X(1 - tx)}$

where: tm - import taxes
tx - export taxes
TR2 - premium rate (60%)

/b $SCF^* = \frac{M + X}{M(1 + tm) + X(1 - tx + TM)}$

Table 5: STANDARD CONVERSION FACTORS

Sensitivity Analysis

	1976	1977	1978	Average
Standard conversion factor (SCF*) /a				
SCF_1 /b	0.79	0.80	0.80	0.80
SCF_2	0.59	0.58	0.60	0.59
SCF_3	0.52	0.51	0.54	0.52

/a $SCF^* = \frac{M + X}{M(1 + tm + TM + X(1 - tx)}$

/b TM - premium rate (%)

SCF1: TM = 0

SCF2: TM = 60

SCF3: TM = 90

Source: Table 3, S. Robinson and K. Dervis "The Foreign Exchange Gap, Growth and Industrial Strategy in Turkey : 1973 - 1983", World Bank Staff Working Paper No. 306, 1978.

31. The SCF bears a close relation to the more familiar concept of shadow exchange rate (SER). 1/ The precise relation is

$$SCF/OER = 1/SER \quad (4)$$

OER = Official exchange rate
SER = Shadow exchange rate

Thus the SCF translates domestic prices into border prices expressed in units of the domestic currency, and division by OER expresses the result in units of foreign exchange. In the case of Turkey, using official tariff rates, the SER is TL 30 to the dollar. Alternatively, the second approach allowing for a rationing market leads to a shadow exchange rate which values the dollar at TL 47.2. This is very close to the effective market rate during the past two years and is a good measure of the overvaluation of the Turkish currency.

Conversion Factor for Consumption Goods (CF_c)

32. The value of CF_c is determined by estimating the increase in the value of consumption at domestic prices if one more unit of foreign exchange is committed to consumption. The CF_c is required to transform a marginal increase in consumer expenditure into its equivalent value at shadow prices. 2/ This will be the ratio of the value of this consumption at border prices to its value at domestic prices. From import and export data averaged over the years 1973-79 (Tables 6, 7) the conversion factor for consumption goods is derived. Since disaggregated urban and rural consumer expenditure data do not exist it is not possible to derive any separate estimates although given the inequal income distribution one could safely assume that there would be a difference.

33. Only a small proportion of consumer expenditures is spent on the purchase of consumer goods that are imported and subject to restrictions. The majority of consumer imports consist of essential items free of constraints although subject to customs duty at a rate of 30 to 40 percent. The consumption conversion factor was estimated at 0.79.

1/ The relationship between SER and conversion factors is discussed in detail in A. Ray "Shadow Exchange Rates and Conversion Factors" (CPN, forthcoming).

2/ This means that the basket of commodities making up the consumer's marginal consumption must be valued at shadow prices and the resulting sum expressed as a proportion of the value of the same basket at market prices.

Table 6: ESTIMATION OF CONVERSION FACTOR FOR CONSUMPTION GOODS (CF_c) 1974-78
(In millions of US dollars)

	1974	1975	1976	1977	1978	Average
Imports of consumption goods, c.i.f. (M)	509.7	501.3	286.8	225.2	154.2	335.4
Exports of consumption goods, f.o.b. X)	1225.3	1118.8	1679.2	1489.7	2002.8	1503.1
Total trade ($X_c + M_c$)	1735.0	1620.1	1966.0	1714.9	2157.0	1838.5
Taxes on M_c	193.7	190.5	108.9	85.5	58.6	127.4
Tax rebate on X_c	122.5	111.9	167.9	148.9	201.0	150.0
Premium rate (60%)	305.8	300.6	172.1	135.0	92.4	201.0
Conversion factor (CF_c)	0.74	0.73	0.81	0.82	0.86	0.79

Table 7: ESTIMATION OF CONVERSION FACTOR FOR CONSUMPTION GOODS
Sensitivity Analysis

	1974	1975	1976	1977	1978	Average
Conversion factor for consumption goods						
CF_{c1}/a	0.84	0.84	0.87	0.87	0.89	0.86
CF_{c2}/2	0.74	0.73	0.81	0.82	0.86	0.79
CF_{c3}/3	0.69	0.68	0.79	0.82	0.84	0.76

/a CF_{c1} - premium rate = 0.

/b CF_{c2} - premium rate = 60%.

/c CF_{c3} - premium rate = 90%.

Conversion Factor for Intermediate Goods (CF_I)

34. The conversion factor for intermediate goods for Turkey using 1974 to 1978 import and export data was estimated at 0.55 (Tables 8, 9). Turkey's main intermediate imports are petroleum products, chemicals, iron and steel which are major inputs into industrial production. Intermediate imports have been subject to varying degrees of tariff and non-tariff policies. The premium rate on such imports in recent years has been very high and given the rate of industrial growth together with recent foreign exchange shortage, the official price plus tariff rate would not be a good guide of the user cost of such imports to the private sector. The State Economic Enterprises and public sector are major consumers of the import of intermediate goods and the premium rate applying to the public and private sector also differ due to many complex arrangements. 1/ Moreover, there is a special arrangement for resale of foreign exchange earned by exporters which effectively allows them to make black market profit on exchange rate transaction. An average tariff rate of 26 percent is used in the estimation of (CF_I). Recent changes in tax rebates in May 1979 have reduced the maximum rebate rate and narrowed down its application to manufactured goods. The average rebate used in the estimates is 18 percent. A more serious problem given the extent of the rationing in this group and in particular given the differential treatment of public and private sector and their relative shares in the economy of such imports is what would be a reasonable value for the premium. The 90 percent premium rate would reduce the CF_I to 0.48 (Table 5). 2/

1/ Imports of petroleum and petroleum products and chemicals amounted to about 35 percent of total merchandise imports in 1978. (IMF Report, July 1979).

2/ The important point to note is that the conversion factors derived reflect the existing foreign trade policy, the values attached to various policies, (e.g., existing import taxes) and the export and import regimes. Some studies (Adrian Wood: Manufacturing Industry and Foreign Trade, The World Bank, March 1979) show that in many manufacturing industries the domestic resource costs are very high and production adversely affected the foreign trade balance in the sense that earning or saving a dollar of foreign exchange required another one dollar's worth of imported inputs. Inefficient producers have benefitted from tax rebates and protection by heavy tariff and non-tariff protective devices. Lack of competition, and import substitution policies, and high trade barriers creating serious shortages have led to a situation where foreign reserves are misallocated.

Table 8: CONVERSION FACTOR FOR INTERMEDIATE GOODS (CF_I) 1974-78
(In millions of Turkish liras)

	1974	1975	1976	1977	1978	Average
Imports of intermediate goods, c.i.f. (M_I)	2063	2411	2692	3395	2873	2607
Exports of intermediate goods, f.o.b. (X_I)	276	255	249	233	253	259
Total trade ($X_I + M_I$)	2338	2665	2941	3658	3125	2866
Taxes on M_I (26%)	563	627	700	823	642	678
Tax rebate on (X_I)	39	46	57	58	38	47
Premium rate (60%)	1238	1447	1615	2037	1483	1564
Conversion factor (CF_I)	0.56	0.55	0.55	0.55	0.56	0.55

Source: Turkey: From Crisis to Growth, 1979; S. Robinson and K. Dervis (1978). IMF Reports on Turkey, 1979.

Table 9: CONVERSION FACTORS FOR INTERMEDIATE GOODS (CF_I)
Sensitivity Analysis

	1974	1975	1976	1977	1978	Average
Conversion factors for intermediate goods CF_I						
CF_{I1}/a	0.80	0.79	0.79	0.79	0.80	0.80
CF_{I2}/b	0.56	0.55	0.55	0.55	0.55	0.55
CF_{I3}/c	0.49	0.48	0.48	0.47	0.48	0.48

/a CF_{I1} - premium rate = 0.

/b CF_{I2} - premium rate = 60%.

/c CF_{I3} - premium rate = 90%.

Conversion Factor for Capital Goods (CF_K)

35. The conversion factor for capital goods transforms a marginal increase in expenditure on capital goods into its equivalent value at shadow prices. Turkey's exports of capital goods are still relatively small. The import of such items, however, has been increasing rapidly in the past few years. Average tariff rate applicable is 33 percent but the rationing in this market given the importance of capital intensive technology and priority of industrial projects has been quite fierce, particularly in the private sector. The public sector, however, has fared better, at least up to 1978 when the real credit crunch started. The CF_K estimated is 0.52 but when adjusted for 90 percent premium it is reduced to 0.45 (Tables 10, 11).

Table 10: ESTIMATION OF CONVERSION FACTORS FOR CAPITAL GOODS 1974-1978

	1974	1975	1976	1977	1978	Average
Imports of capital goods, c.i.f. (M_K)	1204	1826	2150	2176	1572	1786
Exports of capital goods, f.o.b. f. (X_K)	31	28	32	30	33	31
Total (X_K + M_K)	1235	1854	2182	2206	1605	1817
Taxes on M_K	397	603	710	718	519	589
Tax rebates on X_K	3.1	3.2	6.7	6.6	5.0	5.3
Premium rate (60%)	722	1096	1290	1306	943	1072
Conversion factor for capital goods (CF_K)	0.52	0.52	0.52	0.52	0.52	0.52

Table 11: CONVERSION FACTORS FOR CAPITAL GOODS
Sensitivity Analysis

	1976	1977	1978	Average
Conversion factors for capital goods				
CF_{K1}/a	0.75	0.75	0.75	0.75
CF_{K2}/b	0.52	0.52	0.52	0.52
CF_{K3}/c	0.45	0.45	0.45	0.45

/a CF_{K1} - premium rate = 0.

/b CF_{K2} - premium rate = 60%.

/c CF_{K3} - premium rate = 90%.

36. The simple formula $\frac{1}{1+tm}$ (6) can be used when we assume that all exportables are exported 1/ and that income elasticities for import commodities are all unity. In this case the results will differ to a large extent for SCF and CF_c but by a lesser amount for CF_I and CF_k.

Table 12

	$CF = \frac{1}{1+tm}$	$CF = \frac{1}{1+tm+TM}$	Original Estimates
SCF	0.77	0.53	0.59
CF_c	0.72	0.50	0.79
CF_I	0.79	0.53	0.55
CF_K	0.77	0.52	0.52

TM - premium rate.

37. An interesting exercise using the T-1 run of the TGT model and using the simple formula (6) for conversion factors and allowing for the premia produces not very different results. The general equilibrium TGT model projections for imports and exports as well as imports and exports as well as import duty and export rebates that are expected to be relevant in the medium

1/ The use of the simple formula may not be justified given the fact that the very serious import rationing and the fall in imports implies that exportables were to a large extent directed to a booming domestic market.

run (1979-1983). 1/ There is a 19 sector division of the economy and an aggregated study of the consumer goods. (Table 13). On the basis of the values provided by this model the estimates of conversion factors were slightly lower than the original estimates. While using the simple formula is partly responsible for this, some of the difference is due to the data based used.

Table 13: SECTORAL CONVERSION FACTORS 1978
(Domestic Price = CIF + Tariffs + 90 percent)

	tm (%)	tm + TM	X = 1 + tm + TM	$\frac{1}{X}$
Agriculture	23.1	103.1	2.03	0.49
Mining	6.8	96.8	1.97	0.50
Food	24.0	114.0	2.14	0.57
Textiles	65.9	155.9	2.56	0.39
Clothing	7.2	97.2	1.97	0.51
Wood	14.9	104.9	2.05	0.48
Paper	47.1	137.1	2.37	0.42
Chemical	41.4	131.4	2.31	0.43
Rubber & plastic	44.6	134.6	2.34	0.43
Petroleum products	12.1	102.1	2.02	0.50
Non-mineral products	47.1	137.1	2.37	0.42
Basic metal	14.3	104.3	2.04	0.49
Metal products	21.5	111.5	2.11	0.47
Non-electrical machinery	35.2	125.2	2.25	0.44
Electrical machinery	20.2	110.2	2.10	0.47
Transportation equipment	36.0	126.0	2.26	0.44
Construction	00			
Infrastructure	00			
Services	00			
SUM				
Agriculture	23.1	113.1	2.13	0.47
Consumer goods	37.9	127.9	2.28	0.43
Intermediate goods	25.8	115.8	2.16	0.46
Capital goods	32.7	120.7	2.21	0.45
Construction	00			
Infrastructure	00			
SUM	27.9	117.9	2.18	0.46

tm = Tariffs on imports.
TM = Premium.
$\frac{1}{1 + tm + TM}$

Source: Kemal Dervis and Sherman Robinson; T-1 Run of TGT Model.

1/ There is an implicit assumption that all values of the general equilibrium

The Marginal Productivity of Capital,q

38. The marginal product of capital is the net return earned by a marginal unit of investment at border prices when all inputs and outputs are measured at efficiency prices. It indicates the marginal rate of transformation between present and future foreign exchange and is an objective parameter that in principle can be observed. 1/ Estimation of q can be based on both macro and micro data. For Turkey both sources are explored. Initially two different macro economic estimation procedures will be used and a further study of micro data will help to establish a reliable estimate of q. Moreover, the availability of data allowed us to attempt regression analysis using labor or capital stock and employment figures, dissaggregated in the agricultural and non-agricultural sectors. 2/

39. In the first procedure, the incremental employment/capital ratio is multiplied by the marginal product of labor and the result subtracted from the incremental output-capital ratio, to give an estimate of the marginal productivity of capital in domestic prices. This is then multiplied by the standard conversion factor over the conversion factor for capital goods (CF_K) to express it in foreign currency terms.

Formally,

$$q = \frac{\Delta O}{\Delta K} - \frac{\Delta E}{\Delta K} \times \frac{\Delta W}{\Delta E} \frac{SCF}{CF_k} \qquad (7)$$

where,

O = GDP at factor cost
K = Total fixed investment
E = Employment
W = Wages

The incremental output/capital ratio is the inverse of the conventional ICOR (3.8 during 1973-77) 3/ and may be estimated from output and investment data for Turkey adjusted by respective deflators. When we allow for lagged effects of investment $\frac{\dot{O}}{K}$ is equal to 0.30. The value of $\frac{\dot{O}}{K}$ that will be used in these will be 0.27 4/ which is consistent with both the TGT model and the country

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1/ Squire and van der Tak, Economic Analysis of Projects, 1975, p. 110.

2/ The results of the regression analysis using aggregate production functions (Cobb-Douglas and C.E.S.) were derived too late to be included in this version.

3/ K overestimates q because k is an average concept whereas q is a marginal concept and also k neglects the contribution of other factors of production and that of technical progress (See van der Tak, (1975), p.111).

4/ Source: Turkey: Policies and Prospects for Growth, The World Bank, 1980 (Forthcoming)

report estimates. The employment/capital ratio 1/ can be derived by using the investment figures and employment figures during the 1974-78 period (Table 14). The marginal productivity of labor is difficult to measure and there is a wide gap between productivity in urban and rural sectors. A weighted figure of marginal labor productivity is adopted as a rough approximation, w = 23,400. 2/

$$q = (0.27 - 23{,}400 \times (0.0023 \times 10^{-3})) \frac{0.59}{0.52} = 0.244$$

Given the above values, q is estimated to be 24 percent and allowing for lagged investment effects will give a result closer to 28 percent.

Table 14: SECTORAL INCREMENTAL CAPITAL-LABOR RATIO

Labor Productivity (TL)	1973-77
Agriculture	722
Industry	672
Services	572
Average	432

Sources: OECD; TURKEY; OECD Economic Surveys; November 1978.

40. The second method estimates the Opportunity Cost of Capital using a Cobb - Douglas type production function,

$$O = Ce^{rt}K^{a}L^{B}, \qquad (8)$$

O = Output
C = Constant
r = rate of technical progress
k = Capital
L = Labour

1/ The inverse ratio can be interpreted as the macro index of the costs of creating a job.

2/ The various sources that can be used are estimates of shadow wage rates (Section IV), minimum wage laws and productivity measures in Turkey. The minimum wage rates are not representative of the marginal product of labor in the various sectors and provide a means of enforcing some degree of social planning. Moreover, they cover only a small proportion of the total working population. The figures used are based on marginal productivity measures used in deriving shadow wage rates in Section V.

The marginal change in output with respect to a marginal change in capital gives the following:

$$\frac{dO}{dK} = a\, Ce^{rt} K^{a-1} L^{B} \qquad (9)$$

Multiplying through by k and dividing by k

$$\frac{dO}{dK} = a\, Ce^{rt} K^{a-1} L^{B} \frac{K}{r} \qquad (10)$$

$$= a \frac{O}{K}$$

where $\frac{O}{K}$ is the output-capital ratio (inverse of ICOR) and "a" is the share of of profits in National Income. 1/ The $\frac{O}{K}$ ratio has already been estimated to be 0.30 allowing for lagged effects of investment. Table 15 provides estimates for "a" for the period 1978-80 using projections of labor income and capital income taken from the T-1 run of the TGT model. The share of gross profit is roughly 50 percent of National Income. 2/ However, when the share of profit after rent and depreciation is taken into account it will bring "a" down to 35 percent of National Income. Compared to other middle income countries (MIC) at a similar level of development, this is a reasonable estimate. The resulting opportunity cost of capital is 10.5 percent which expressed in border prices amounts to a rounded value of q of 12 percent which does seem to be a more reasonable estimate.

Table 15

	Share of Capital
Agriculture	0.39
Industry	0.63
Manufacturing	0.61
Service	0.43
Total	0.50

Source: Projections of the TGT model, K. Dervis and S. Robinson (1978).

1/ The above can be derived directly since the marginal product of capital is equal to the rate of profit, given assumptions of perfect competition and constant returns to scale.

2/ 61 percent for manufacturing sector, and 40 percent for agriculture.

Table 16: OPPORTUNITY COST OF CAPITAL
(In millions of TL)

Year	Total Net National Income K + W	Total Income (W)	Total Capital (K)	$\frac{K}{K+W}$	a* /2	$\frac{O}{K}$	OCC /1	$q.\frac{SCF}{CF_k}$
1978	1,069,465	533,125	536,346	0.50	0.35	0.30	0.11	0.12
1979	1,642,241	814,285	827,956	0.50	0.35	0.30	0.11	0.12
1980	2,482,790	1,238,741	1,244.049	0.50	0.35	0.30	0.11	0.12

/1 $OCC = a \frac{O}{K}$.

/2 a* takes into account the estimate of rent and depreciation capital.

Source: Turkey: From Crisis to Growth, The World Bank, 1979; Statistical Annex; K. Dervis and S. Robinson; TGT Model; T-1 Run.

41. For the micro-economic estimation procedure two sources of information on the marginal productivity of capital are available; the interest rate structure in the economy and evidence on project-specific economic rates of return. Criticisms have been made regarding the imperfections in the capital market implying interest rates are not very meaningful measures of the marginal productivity of capital and profit rates would provide better guidance on q. Evidence on rate of profit in the private sectors, however, is a useful parameter but difficult to obtain.

42. Looking first at the interest rate structure, Table 17 presents various rates in force during 1973-74 and 1978-79. In February 1978, the government increased the legal ceiling on term loans to industry to 16 percent per annum and in May 1979 to 20 percent. In addition borrowers pay 25 percent transactions tax on interest. Moreover, commercial banks charge 2 percent per annum commission on collateral held. The effective cost to borrowers is now 26 to 28 percent. However, once we allow for the inflation rate measured by the index of wholesale prices the real cost to borrowers of short term local currency loans is negative 1/. The situation, however is different in the case of individual long-term local currency loans since the real cost

1/ The inflation rate increased from 16 percent to 24 percent in 1977 and to 51 percent in 1978 and is projected to go down to 40 percent during the present fiscal year and fall to 10 percent by 1982 if the Government stabilization policy is successful.

of loans should be measured over their maturity when the rate of inflation is expected to decline. 1/

Table 17: LENDING INTEREST RATES IN TURKEY

	1973	1974	1978	May 1979
General interest rate	10.5	11.5	1.6	20.0
Medium-term credits	12.0	14.0	16.0	20.0
Medium- and long-term credits	9.0	10.5	10.5	16.0

43. Further information may be obtained from Bank financed projects. The following list summarizes the estimated internal economic rate of return for some recent Bank projects;

Erdemir Steel Project, 1978	8-17%
Ports Rehabilitation Project, 1979	20-37%
Grain Storage Project, 1979	21%
Southern ANTALYA Tourism Project, 1976	17.2%

Moreover, the World Bank has used a rate of 8% to lend money for various projects.

44. The micro data provides a wide range (8-20) percent for q. The Eurocurrency rates can be taken as a reasonable estimate of the marginal productivity of capital. The other interest rate and economic rate of return figures, however, cannot be relied on. First, they provide a very wide range which is not helpful from the project analyst's point of view. Second, these rates loose their significance in a capital market which is as segmented and imperfect as the Turkish one. In a market where capital is rationed, interest rates may no longer be meaningful estimates of marginal productivity of capital. Third, there is reason to believe that the rates applicable to the

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1/ If the stabilization policy is successful, a typical 7 year loan at the end of 1979 with a 2 year grace period would have a zero cost in real terms over its entire life if the borrowers paid nominal financial charges of about 19 percent per annum. As a result, the prevailing interest rate implies a real cost to the borrower of 7 percent.

private and public sectors differ. The public sector and State Economic Enterprises have often had access to cheaper and more readily available sources of capital. The poor performance of the latter is a clear sign of misallocation of resources resulting in inefficient operations. Given the limited measure of capital available to the Turkish economy there has been a crowding out effect which has influenced the private sector.

45. Of the macro results the second approach is adopted and a net figure of q = 12 percent is a reasonable estimate to be used in project appraisal. However, several points need to be made. First, given the market imperfections it will be useful to estimate the marginal productivity of capital in the public sector and the private sector separately. Presently the data available does not allow such work to be undertaken, but it remains an important issue as long as the public sector is given certain preferences and advantages in the capital market which affects investment decisions. Second, as already mentioned the capital market segmentation should not be overlooked.

IV. SOCIAL PRICING PARAMETERS IN TURKEY

46. In this section we describe the methods and data sources underlying our estimates of consumption and accounting rates of interest, the value of public income, the consumption distribution weights, the summary distribution measures and finally the critical consumption level. First, we present a brief assessment of the Government's social objectives from which we deduce the likely range of values for the consumption rate of interest (CRI). A careful specification of the Government's preferences with regard to growth and income distribution objectives is important. What matters is to bring the objectives of the Government to bear on production decisions because their objectives are related to possibilities. The objectives that are incorporated in the analysis do play a role in the estimation of shadow prices. The important point to note when moving from efficiency to social pricing is that whether the benefits of a project will accrue primarily to those already rich, or to the poor, is highly relevant to decisions about it. But the way in which this view can and should influence project appraisal is the important fact in social benefit-cost analysis. 1/

47. Ideally, production decisions should be left to seek efficiency and the government ought to correct the maldistribution of income by using the tax system despite the fact that optimal lump-sum taxation is impossible. Moreover, naive applications of distributional ideas has to be avoided. It is necessary to observe, however, that a systematic application of welfare weighting can allow for distributional objectives. The objectives can be expressed by means of a social welfare function which assigns to all possible allocations of income to individuals a numerical value. Relating the weights to basic needs may be a practical solution to the weighting problem. We, therefore, describe recent trends in public income and expenditure and present estimates of the value of public income. Based on the preceding results we make an estimate of the accounting rate of interest (ARI).

Government Objectives

48. Turkey's Fourth Plan calls for improvement in income distribution patterns and states that amongst the basic assumptions concerning political and social choices, "the most important of these...are concerned with the mechanisms for the distribution of income and resources, and the allocation of the means of production". 2/ The planners have been concerned with a

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1/ See J.A. Mirrlees, "Social Benefit-Cost Analysis and the Distribution of Income", World Development, 1978, Vol. 6, No. 2 for a more detailed discussion. The argument is that the chief impact of distributional considerations is on the costing of labor, measurement of benefits from public goods, and pricing of non-tradables. The last is in principle important but in practice the correct way of adjusting prices is complicated and difficult to assess.

2/ Source: Fourth Plan, and Turkey: From Policies and Prospects for Growth, 1980 (Forthcoming).

more equitable and just income distribution to eliminate the past social and economic imbalances resulting from rapid growth. There is an emphasis on issues such as unemployment, and quality of urban and rural life. The elaborate treatment of social problems does indicate interest in social planning principles. Nonetheless, it is important to notice that the critical economic situation in Turkey resulting from a huge external deficit, high inflation rates and structural imbalances in the employment and capital markets and breakdown of the price mechanism - presents more pressing problems that might outweigh the social aspects of the Plan. This point will have to be taken into account by choosing subjective parameters that are close to the government objectives as pronounced in the Plan. Over the period 1973-77 the growth rate of Gross National Product has been 7.1 percent which given a 2.5 percent population growth rate implies a per capita income growth rate of 4.6 percent and a per capita income close to $1,100. 1/ Moreover, the priority given to import substitution and industrialization led to a growth rate of the industrial sector at the rate of 9.3 percent compared to 3.5 percent growth rate in agriculture. Despite industrial growth, Turkey's agricultural base accounts for about 62 percent of the labor force and 24 percent of GDP. Investment, on the other hand, has increased from 17.9 percent of GDP to 26.1 percent between the years 1972 and 1977. The inadequacy of saving mobilization efforts (savings ratio = 16 percent of GDP) in financing investment has led to heavy reliance on short and medium-term foreign sources which have subsequently caused a large external deficit. The present plans for heavy industrial investment and export-oriented growth and projected GDP growth rate of 8.2 percent (1979-83), increase in the share of industrial output to 32 percent in 1982 and a fall in the share of services from 52 to 49 percent, require investment to increase by 12.5 percent annualy in real terms rising from 20 percent to 24.4 percent of GNP in 1983. Given that the sectoral distribution of investment shows a significantly large share (27.4 percent) devoted to manufacturing of intermediate and capital goods, reducing the relative shares of housing and transport and a modest allocation to social sectors, it is obvious that the government objectives indicate a very low consumption rate of interest (CRI). The lower this rate the less one discounts future relative to current consumption, and hence the greater the premium attached to resources which promote growth.

Consumption Rate of Interest

49. The consumption rate of interest (CRI) is a discount rate defined as the rate of fall over time in the value of the marginal utility of consumption, at the average level of consumption (consumption is the numeraire). Its purpose in project selection is to ensure that the government's preferences concerning future consumption and current consumption are adequately reflected in shadow prices. It is estimated as the sum of the rate of pure time preference (p) or the degree of "impatience" of a community, and the product of the growth rate of real per capita consumption (g) and the social elasticity of the marginal utility of consumption, (n).

$$CRI = ng + p \qquad (11)$$

1/ Turkey: Policies and Prospects for Growth; 1980 (Forthcoming), Statistical Annex Table 1.

Of the three elements of the CRI, only (g) can be estimated objectively. For the period 1974-1978 total private consumption at constant prices grew at an annual rate of 4.95 percent, implying an average growth rate of real per capita consumption of 2.5 percent.

50. As has been shown elsewhere, 1/ (n) can be linked to the Government's attitude toward the degree of inequality in the distribution of income. The larger the value of n, the faster the decline in income weights, as the household income increases and hence the greater the social benefit accorded to distributional changes in favor of the lowest income groups. Turkey's Fourth Plan makes it quite clear that growth is the major objective in the medium run though considerations of equity and social planning are not completely ignored. The Turkish government has already stated its desire to improve income distribution. However, given the present tax structure, although wages have been raised recently to match the inflation rate, nonetheless the tax system is such that it bites heavily into the new high nominal wages of lower income groups (although one may infer with some confidence that n>o since Turkey employs a progressive tax structure). For the main part of the analysis a value of n=1 will be used, meaning that increased household incomes by a certain percent will reduce the income weight by the same percentage. In sensitivity analysis, n=0.5 is used to show consequences of assuming that the government attaches less priority to distributional improvements relative to other objectives.

51. The objectives also imply a very low value for the rate of pure time preference (2 percent) because an increase in this parameter reduces, other things being equal, the extent to which the weighting system favors growth. The low reflects the government's preference for future compared to present consumption.

Table 18

		Range of CRI Rate of Pure Time Preference		
		0	1	2
Social elasticity of the marginal utility of consumption (n)	0.5	1.25	2.25	3.25
	1	2.5	3.50	4.50

Within the resulting range (1.25% $\leq$ CRI $\leq$ 4.50%) our best estimate for the CRI is 4.50. This measure, however, has to be seen within the limitations on consumption following the Ecevit Austerity Plan and demand management aims. Moreover, the higher CRI, the higher will be the accounting discount rate (ARI).

1/ M. Scott, Project Appraisal in Practice (1976), p. 30.

The Value of Public Income,v

52. The value of public income is estimated in terms of the consumption stream generated by a unit of public investment assuming optimal allocation of public funds. While public income is expended for many purposes, since public investment is probably a major component of marginal public expenditure, it would seem important to attempt some estimate of its value. The results can be checked later by relating them to estimates of the critical consumption level. If we neglect the reinvestment of the returns to the public sector, v can be estimated using the simple formula; 1/

$$v = q/CF_c \cdot CRI \qquad (12)$$

when; q = Marginal product of capital in the public sector
CRI = Consumption rate of interest
CF_c = Conversion factor for consumption goods.

If we let q = 8 percent and CRI = 3.5, v will be 2.89. For the central value of q = 12 percent, and CRI = 4.5 we estimated v to be 3.37 (3.4). This means that marginal social value of foreign exchange in the public sector is worth 3.4 times the marginal social value of private consumption at the average level of consumption. If we allow for the range of q to be 8 to 24 percent and CRI to be between 1.25 and 4.5, the range of v will be between 2.25 and 24.30 (Table 19). The results depend largely on q and public sector profitability. If n = 0.5, with q = 8 percent, the value of public income will be approximately equal to 4 illustrating the priority given to growth. 2/

Table 19: VALUE OF PUBLIC INCOME $v = q/CF_c \cdot CRI$

q	1.25	2.25	3.5	4.5
8	8.10	4.50	2.89	2.25
12	12.20	6.75	4.30	3.37
24	24.30	13.50	8.68	6.75

1/ Squire and van der Tak (1975), p. 106.

2/ The limitation of complex formula is due to the underlying assumptions:

(a) All variables q, CRI, S, SCF remain constant over time so that v also remains constant which generally implies that equation (13) overestimates v since it can be expected that the divergence between q and i will decrease over time, reducing v.

(b) All project benefits augment either average private sector consumption or public investment.

53. In the more complex case, where it is assumed that the government and private sector save and reinvest some of the returns for public investment, v may be estimated by using the following equation:

$$v = \frac{q - sq}{i - sq} \quad \frac{1}{CF_c} \qquad (13)$$

This method was applied despite the limitations cited below. The results were, however, suspect due to the very large inaccuracy in the marginal propensity to save where various sources have provided a range as wide as 0.08 - 0.33 and resulting unreliable values of v. The present Plan calls for a marginal propensity to save of 35 percent by the public sector. If the marginal propensity to save is taken to be 0.25 and q to be 12 percent the value of v is 6.5. Despite the overestimation problem, allowing for savings out of investment gives a much higher estimate of v.

Table 20: PRIVATE SECTOR MARGINAL PROPENSITY TO CONSUME, 1974-1979
(TL millions)

Year	GDP	ΔGDP	Private Consumption (C)	ΔC	$\frac{\Delta GDP}{\Delta C}$
1973	150429		105349		
1974	163238	12809	116387	11038	0.861
1975	177761	14523	123812	7425	0.511
1976	192783	15022	133701	9889	0.65
1977	201267	8484	138172	4471	0.52
1978	208235	6968	144061	5889	0.84
			Ave.		0.67
			Av.		0.67

Source: Turkey: Policies and Prospects for Growth, The World Bank, Statistical Annex; Ministry of Finance; Annual Statistics, 1979.

MPS = 1 - MPC MPS = Marginal Propensity to Save
MPS = 0.33 MPC = Marginal Propensity to Consume

The Critical Consumption Level (CCL)

54. The critical consumption level is defined as that level of per capita consumption at which the government regards private consumption just as valuable as public income. 1/

We can derive CCL(c*) implied by the value of v previously computed from the public investment approach:

$$\text{at } c^*,\ d = v.CF_c \qquad (14)$$

$$d = \left[\frac{\bar{c}}{c^*}\right] n \qquad (15)$$

Given n = 1, an existing level of consumption equal to 35 percent of the average level of consumption would result in the required value for d. Relatively small differences in n and v can lead to large differences in CCL. it follows that if we can obtain an independent estimate of CCL which matches the estimates from n, and v we have significantly increased the reliability and acceptability of the estimated set of distribution weight. The 1978 average consumption level $\bar{c}$ was TL 3,350. 2/ The estimate of c* is TL 1,247. Given a GDP per capita level of TL 4,886, the ratio of CCL to real per capita GNP is 26 percent, and $\frac{c^*}{\bar{c}}$ = 37 percent.

55. An independent estimate of the CCL can be derived from the government's fiscal policy by determining the point on the income scale at which the government stops taxing or starts subsidizing private consumption. In the 1978 tax reform bill of the Ecevit cabinet the minimum alllowance for wage earners is rearranged based on the minimum wage. The bill has increased the "special deductions" that apply only to State employees and workers by 19 fold. 3/ Thus, the current deduction of TL 5 will rise to TL 95 a day meaning that TL 2,850 of income will be tax free. The general deduction will apply to all income so that a family of four will enjoy a tax exemption on TL 360 of

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1/ The CCL may be calculated from the formula

$$\bar{c}(v.CF_c)^{\frac{1}{n}} \qquad (16)$$

where $\bar{c}$ is average per capita consumption and CF_c is the consumption conversion factor. The CCL is that point at which $d/v = CF_c$.

2/ The gross private consumption and population information are derived from Turkey: Policies and Prospects for Growth, 1980 (Forthcoming), Statistical Annex.

3/ Source: Weekly Special Survey, EBA, April 1978.

this income and for a worker or a state employee, this will be added to his special deduction, bringing the total to TL 3,210 (equivalent to an annual income of TL 38,500). This, however, bears little relation to the subsistence level and does not apply to the agricultural sector but is, nonetheless, indicative of the government's estimate of a minimum acceptable net income.

Using current 1978 prices, $\frac{c^*}{\text{GNP Per capita}} = 11.2\%$ and

$$\frac{c^*}{\bar{c}} = 16.2\%$$

56. In summary, one finds that although in the case of Turkey no reliable precise estimate of the CCL is possible, the evidence supports the previous conclusion that parameter values of n=1.0, CRI=4.5%, reflect approximately current government value judgements and $\frac{c^*}{\bar{c}}$ value of 37 percent is is a reasonable estimate. The CCL is 26 percent of the national per capita average which is consistent with other results in MIC's where the CCL is between one quarter and one half of the per capita average. 1/

The Accounting Rate of Interest (ARI)

57. The Accounting Rate of Interest (ARI) plays a critical role in the general application of social benefit-cost analysis because it is the principal parameter reflecting the opportunity cost of public income used both for projects and to finance other policies such as income used either for projects or to finance other policies such as income transfers, consumption subsidies. Ideally, the ARI should equal the real rate of return on marginal investment in the public sector when they are evaluated using accounting prices. Alternatively, if the government is borrowing heavily from abroad and we accept the assumption that the volume of such borrowing and the use of funds are 'rationally' determined, then ARI should equal the marginal real cost of such borrowing.

1/ The CCL can be used as a cross-check on the distribution weight d, derived later. But the use of the cross check is based on the assumption that at the margin, the social value of different types of public expenditure, e.g., investment, consumption subsidies, etc., is roughly the same. It follows that an independent estimate of the CCL may be seen as a test of the initial judgment concerning the subjective parameters, given the assumption of an optimal allocation of public resources, or as a test of the assumption of an optimum allocation of public resources given the initial judgment concerning the judgment parameters.

58. Very little work has been done in Turkey on the appraisal of public projects using a consistent set of shadow prices. Recent World Bank appraisals of Turkish projects have used border prices and only sometimes shadow wages have been used. But the implicit conversion factor has varied largely from project to project and does not seem to have been based upon systematic analysis of the social costs and benefits of employing labor. Subject to these qualifications the economic rate of return estimated for World Bank appraisal projects have varied between 8-30 percent. But given the low social rate of return on import-substituting projects, it is unlikely that the real marginal social rate of return on public investment will exceed 10% and will probably be near 8 percent.

59. If we look at the ARI as the rate of fall overtime in the social value of uncommitted public sector income measured at border prices, since v is the relative value of public income in terms of consumption, it follows that:

$$ARI = sq + (1-s)\, q/v\, CF_c \quad 1/ \qquad (17)$$

Table 23 shows the alternative values for ARI computed from equation (17).

Table 23: THE ACCOUNTING RATE OF INTEREST

	S=0.20	S=0.25	S=0.30
q = 8%	4.03	4.27	4.58
q = 12%	6.04	6.40	6.78
q = 24%	11.95	12.80	13.56

Taking the combined value of q = 12 percent and a marginal propensity to save of 0.30 (Table 23), the ARI will be equal to 6.8. On the other hand, the T-1 run of Dervis and Robinson model provides an S = 0.25 which would give a value of 6.4. Thus the range of $6.0 \leq ARI \leq 6.8$ seems a reasonable one. This, however, supports the existing evidence that discounting using social rates makes more projects acceptable than use of private rates of return. It also reflects the high priority on growth through public income expenditure.

1/ Alternatively we can examine the rate of fall of v;

$$ARI = CRI - \frac{dv}{dt} \quad \frac{1}{v}$$

if we assume that the marginal allocation of public income between current expenditures and investment remain constant which is questionable in the case of Turkey.

60. Finally, we can examine this problem in the light of the Turkish government's policies towards foreign borrowing. The government and the State Economic Enterprises which until recently preferred not to borrow abroad, during the latter part of 1970's borrowed heavily on international capital markets. It is possible that the Eurocurrency markets represent the marginal source of funds. The rate of interest on Eurocurrency loans varies with the general market interest rate and with the premium charged on the specific loan. It has been recently about 1 3/4 percent points above the LIBOR (9-10 percent). Given the rescheduling of Turkish debts and the fact that the debts will have to be rolled over on terms which cannot be predicted creates an extra source of uncertainty as regards the behavior of the LIBOR and exchange rates. Allowing for a risk premium the marginal cost of such borrowing is pushed up to 11 3/4 percent. If we deduct the expected rate of inflation for traded commodities we will get a value of 5 percent ($\pm$ 0.5) per annum for this parameter. 1/ This provides another estimate which we should use carefully, given the present standing of Turkey in capital markets. The ARI rate of 6.0 will be used in future estimates as a reasonable estimate.

The Consumption Distribution Weights, d

61. The consumption distribution weight, d, for a particular beneficiary group will usually have to be estimated in the specifc project context, where non-marginal changes are the rule. These weights refer both to the relative valuation of consumption changes accruing to different beneficiaries at a given time and to consumption over time. 2/ Only in those cases where it may be assumed that the project results in marginal changes for people with comparable levels of per capita income/consumption can the marginal consumption distribution weight be applied.

62. The d's for different household groups in the population have been calculated using;

$$w = d/v\ CF_c \qquad (19)$$

1/ In addition, it is useful to build up an estimate of the ARI through an examination of the internal social rate of return of accepted IBRD project.

2/ If there is not interdependence of utility functions;
Social Welfare (W) = $W\ (d_1U_1d_2U_2\ldots)$,.
where the d's are social weights on individual consumption and the U's are individual utility levels.

where d is the ratio of national average household consumption and the average household consumption in each group, the v value used is 3.4 and n = 1, CFc = 0.79.

63. The major point that emerges is that consumption accruing to the lowest 30 percent of the population is considered substantially more valuable than public income. This does reflect the very skewed income distribution in Turkey. While per capita GNP has increased, more than 40 percent of the total income accrues to the top 10 percent, leaving the bottom group much below the national average. There is very little difference with the 1963 study of income distribution.

64. Income distribution on a regional and urban/rural basis is also very skewed giving a much higher income to urban sector. The Robinson-Dervis study points to some interesting facts. 1/ They found that in their classification of the society into 11 socio-economic groups what was obvious was great inequality within sectors. The top ranking farmers in their study had high incomes comparable to the highest incomes in the urban sector. However, poverty was also more concentrated in the rural sector. Thus, average consumption level gives no indication of welfare levels within the rural sector. They also found evidence of large regional inequality and increasing poverty as they went towards South East Turkey. Given the degree of poverty in Turkey, the pragmatic use of a weighting system that is concerned with the issue of poverty rather than inequality may be called for.

1/ S. Robinson, K. Dervis, "The Sources and Structure of Inequality in Turkey (1950-1973)," Princeton - Turkey Project, 1977.

Table 24: INCOME DISTRIBUTION BY INCOME BRACKET

Income Bracket	% of Households	% of NI	Cumulative % NI
0 - 2,500	4.1	0.3	0.3
2,500 - 5,000	8.1	1.2	1.5
5,000 - 10,000	17.8	5.4	6.9
10,000 - 15,000	20.0	10.1	17.0
15,000 - 25,000	22.5	17.9	34.9
2,500 - 50,000	18.1	25.4	60.3
50,000 - 100,000	6.8	18.6	78.9
100,000 - 200,000	1.9	10.8	89.7
200,000 +	0.7	10.3	100.

Source: S. Robinson, K. Dervis, (1977).

Table 25: MARGINAL CONSUMPTION DISTRIBUTION WEIGHTS, d

Population Percentile (%)	Percentage of Total Income /1 (%)	Average Per Capita Income in Percentile Group /2 (TL 1968 Prices)	Marginal Distribution Weights /3 (n = 0.5)	(n = 1.0)	W = 1/CFV n=0.5	n=1
0-20	2.5	557	1.24	8.0	0.46	3.03
21-40	7.0	1,670	0.71	2.66	0.27	1.01
41-60	15.0	3,342	0.50	1.33	0.18	0.50
61-80	21.0	4,678	0.42	0.95	0.16	0.36
81-100	55.0	12,252	0.26	0.36	0.10	0.14
Total Population	100.0	4,455				

/1 This column was derived from K. Dervis and S. Robinson, "The Sources and Structure of Inequality in Turkey (1950-1973)", (Princeton-Turkey income distribution project, 1977).

/2 This column was derived by dividing income share of a particular income group in total income by the proportion in total population of that group.

/3 The distribution weights were estimated by using $d = (\bar{c}/c)^n$ where $\bar{c}$ is the national average per capita income level and c is the average per capita income level in the particular percentile group.

V. SHADOW WAGE RATE ESTIMATES

65. The estimation of shadow wage rates has been carried out in accordance with the principles adopted in previous studies and the Squire and van der Tak methodology has been applied throughout this study. However, given the variety of data sources available, it has been possible in this study of Turkish national parameters to derive some additional interesting results on the basis of the assumptions made. It, nevertheless, remains the case that additional information would be of considerable value in refining the estimates and reducing uncertainties.

66. For the present discussion, we will concentrate on the estimation of shadow wages for labor in the following three sectors; rural, urban informal, and urban formal. 1/ The rationale behind this categorization is that it does correspond to the segmentation of the labor market in Turkey and provides a meaningful division into categories for which parameter values relating to income weights, expenditure levels, etc., have been estimated. We have, therefore, estimated separate SWR's for labor in rural and urban areas, the latter being further disaggregated according to whether or not labor is employed in sectors where wages are controlled by the government. The categorization adopted here is also consistent with that used in the TGT model. 2/ Clearly a more disaggregated approach dividing labor by skill variation and allowing for inter-regional differences will be very enlightening and warrants the development of a more detailed data base.

Population, Labor Force and Employment

67. Estimates of Turkey's population cited by the Bank is 43.14 million in 1978 with a growth rate around 2.5 percent. The labor force participation rate (LFPR) in Turkey has been falling and now stands at 66.29. Although there are some doubts as regards the reliability of the figure there is no question that participation rate is unusually low. This is attributable partly to the structural changes that have been taking place as the country's industrial sector has grown relative to the agricultural sector. However, the

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1/ It is important to realize that strictly speaking the marginal product of labor is measured as output foregone in leaving alternative employment which in the case of formal urban sector labor is marginal product when employed in the rural or informal urban sector. However, indications of scarcity of certain kinds of skilled labor in the formal sector and the possibility of obtaining better paid jobs (there is a difference between public sector and private sector wages in the formal sector), through search activities within the formal sector justifies the estimation of a separate shadow wage rate for this sector.

2/ K. Dervis, S. Robinson, (1978).

phenomena of "discouraged workers" also seems to affect the labor force participation rate to some extent. This is not surprising given that surplus agricultural labor was 4.6 percent of labor supply in the peak season which is a lower bound to the actual surplus labor. 1/ The unemployment figure is put between 15-25 percent. Turkey despite its Plan does have an unusually high agricultural base for a middle income country, with 62 percent of its worker force in agriculture. Future increases of employment in this sector are considered small and the Plan forsees a fall in agricultural employment. The non-agricultural sector has to absorb the entire labor force of 300,000 jobs a year. External migration which was a major absorber of employment has been falling and does not absorb more than 10,000-15,000 workers per year. The high capital intensity resulting from subsidized capital and the drive for industrial growth does not help the employment problem either. Increasing labor costs to employers and labor unrest are other factors that influence the choice of a more capital intensive technology when it is possible.

Trends in Real Wage Rates

68. Minimum wage legislation and unionization are important aspects of the urban labor market in Turkey. Legislation pertaining to minimum wages has been present for more than forty years. They have reflected government statements concerning social justice. However, instead of being a guide for the rest of the economy, in practice minimum wages have followed actual market wages and have been the dependent variable. The minimum wage applies mainly to the 2 million public sector employees (12 percent of the labor force) 2/, but the State Economic Enterprise wages are above the minimum wages. Although most of the unionized workers get more than the minimum wage, the wage laws provide insight into the rate of change of market wages, and are also used in union negotiations. The nominal wages rose from TL 18 in 1970 to TL 180 in 1979, although after tax real wages show very little change. The extent of unionization in the urban formal sector has grown to 57 percent of the industrial labor force and the unions strength and activity has been increasing. The evidence of union activity does have certain implications as regards the imperfections in the labor market.

69. The labor market in Turkey has been very disturbed in recent years. Nominal wages as well as the wage cost to employers have been rising rapidly. For 1977 average daily wages were about 70 percent higher than official data due to employers' contribution to the social security system, yearly bonuses and other fringe benefits. The tax system also has favored the fringe benefits (taxed at 10 percent) against nominal wages (taxed at 30 percent). In fact according to the private sector surveys, the fringe benefits/nominal wage

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1/ Turkey: Policies and Prospects for Growth, The World Bank, 1980 (Forthcoming).

2/ Turkey: Policies and Prospects for Growth, The World Bank, 1980 (Forthcoming).

ratio has risen to 90 percent. 1/ This does make the nominal wage an unrealistic figure to use in the estimates and we will need to allow for this divergence. However, the inflation rate has been very high and it rose to about 50 percent in 1978. The wage rises have always been behind price rises and once adjustment is made for the inflation rate, the 1978 real wage represents only a 6 percent gain over the observed wage in 1970. 2/ Moreover, since the tax system is based on nominal wages the increases in nominal wages have been taxed away. 3/ The real after tax earnings during 1970-1977 rose by only 1 percent. Moreover, if we allow for the increase in average labor productivity in the non-agricultural sector, (productivity growth rate was 28 percent in 1970-76) it is obvious that workers have not reaped the benefits of higher productivity and have not achieved higher real wages despite the increase in wage costs to employers.

70. Wage levels for Government workers comprising 15 percent of the non-agricultural labor force (830,000 civil servants) shows that the real wages in 1977 are only 70% of their 1970 level, but the estimates are not clear as regards inclusion or exclusion of fringe benefits, bonuses, etc. Most public sector employers, however, receive wages in excess of the minimum wage. In 1978 the average nominal increases in wages and salaries of the State Economic Enterprises employees were around 48 percent which implies a reduction in real disposable income as increases in wages have been eroded by rapidly accelerating inflation and higher marginal tax rates on income.

71. Given the large agricultural base of the economy (62 percent) there is a great problem regards wage trends in this sector. The recent Plan does not mention employment effects in this sector and there is a projection of a fall in employment that further reflects the surplus labor problem. The minimum wage legislation has set TL 90 as the relevant figure in the agriculture sector. This, however, is not a very good guide to agricultural wages. The peak agricultural wage observed by Bhalla in 1978 was TL 125 which is consistent with the figures used in the Forestry Project in 1977. The report used a slack season wage rate of TL 40 and a peak season rate of TL 120. Given the large seasonal variations in different regions, disaggregated regional data would allow far greater insight into real agricultural wages in Turkey.

1/ "The Turkish Economy: Prospects for Growth Within Stability," TUSIAD, 1978. Their results are based on a survey conducted in 429 plants.

2/ Turkey: Policies and Prospects for Growth, The World Bank, 1980 (Fortncoming)

3/ In our analysis of shadow wages, this may not cause a problem if private and public incomes are considered equally valuable and in fact public income may be valued more highly in the case of Turkey. However, this depends on the value of v and income distribution objectives.

72. In view of the considerable degree of variation in wage rates within the informal urban sector it is worth emphasizing certain aspects of our treatment of urban labor markets. Additional employment in the urban sector generated by a project is filled directly by new migrants from rural areas as well as moving up the job scale. Therefore, increases, in the number of jobs available will be matched by a decline in the number of unemployed or underemployed urban dwellers plus a flow of rural migrants. The total flow of migrants induced by additional employment is likely to be substantially larger than the number of jobs occupied by migrants since there will also be a flow of dependents over a certain period of time.

Table 26: WAGE STRUCTURE /a
(TL per day)

	1970	1972	1976	1977	1979
Minimum wage	15.5-19.5	22-25	60.0 /b	110 /c	180
Real Minimum Wage /d	18.0	17.0	21.7	19.6	20.7 /e
Nominal Wages					
Public Sector	38.7	48.7	132.2	178.1	
Private Sector	33.0	41.3	105.9	128.7	
Real Wages					
Public Sector	38.7	35.5	47.9	51.3	
Private Sector	33.0	30.1	38.3	37.1	
Labor Costs /f		88.1 /g	119.4	306.0	

Source: Turkey: Policies and Prospects for Growth, The World Bank, 1980 (Forthcoming).

/a Based on data of Social Insurance Institute.
/b Prevailing on June 1976.
/c January 1978.
/d Deflated by Istanbul CPI, 1970 = 100.
/e Deflated by June CPI for Istanbul (870, 1970 = 100).
/f Costs of hiring a worker including wages, premia, and benefits.
/g 1973.

73. A class of migration models has been developed to explain the co-existence of high levels of urban unemployment and rural-urban migration. These models are characterized by an inflexible wage differential between the rural and urban sectors and by intersectoral labor transfers that continue until there is equality between the expected urban wage defined as the product of the probability of being employed and the prevailing urban wage and

the rural wage. 1/ At the core of these models is a migration function with urban employment probability as well as rural and urban wages as determining variables. One characteristic common to many of these models is that they imply a constant rate of urban unemployment, which in turn implies that the migration response M, namely, the number of migrants who will come to the city as one additional job is created, can be expressed as the ratio of total urban labor force, L, to total urban employment, N: $M = L/N$ 2/ (20) The precise formulation of the shadow wage rate depends upon the nature of the labor market and behavior of migrant workers. Since information on these issues in Turkey is scarce, one has to adopt a very simple model. This remains an area that merits deeper investigation, the results of which could be used to improve the estimates.

Social and Efficiency Wages

74. It is usual in project appraisal to distinguish between shadow prices calculated on an efficiency basis and social shadow prices. The distinction between them is due to the different approaches adopted in the treatment of the consumption and distributional effects of income payments. The traditional efficiency prices (TEP) measure simply the opportunity costs of various types of labor in their alternative forms of employment; in effect the marginal output of labor forgone elsewhere because of its use in the project. The extended efficiency prices (EEP) also incorporate allowances for the social cost and benefits of income payments or transfers. Commitment of additional resources to consumption as a result of wage payments will have a net social cost, when there is judged to be a premium on public savings relative to private consumption. The Social Prices (SP) incorporate distributional and other considerations (mainly of externalities) by introducing income weights which vary according to the real income of the recipient. The differences between (EEP) and (SP) is that the former treats all income recipient as if they were at the average consumption level $\bar{c}$, whereas the latter takes account of costs and benefits associated with the transfer of income to households with below average consumption levels. In this study, three sets of shadow prices have been calculated:

(i) Traditional Efficiency Prices.

(ii) Extended Efficiency Prices.

(iii) Social Prices.

1/ S. Harris and M. Todaro, "Migration, Unemployment and Development: A Two Sector Analysis"; American Economic Review, March 1970, Vol. 60; S.E. Stiglitz, 'Alternative Theories of Wage Determination and Unemployment in LDC's: The Labor Turnover Model' Quarterly Journal of Economics, May 1974.

2/ Mazumdar, D. "The Rural-Urban Wage Gap, Migration, and the Shadow Wage", World Bank Staff Working Papers No. 197, 1975.

In terms of the TEP system, if we assume the market for the type of labor concerned is reasonably efficient, then the marginal product of labor (m) in its alternative use is taken as a measure of forgone output. To obtain its value at border prices requires adjustment by means of an accounting ratio (SCF). 1/

$$\text{Shadow Wage} = SCF.m \qquad (21)$$

75. In terms of our categorization of labor we can measure the marginal productivity of labor in the different sectors with varying degrees of difficulty. It is necessary given the importance of (m) to examine the issue briefly. Generally, the market wage is taken as the measure of (m). This is a good approach when the relevant labor markets are active and market forces work so that the wage level is equal to the value of the marginal product of labor at the margin. Labor markets for unskilled labor may be sufficiently active even in rural areas to permit the use of this method. The market price for labor is determined by the interaction of demand and supply curves with the private demand curve being the marginal labor productivity curve and the private supply curve determined by the opportunities for alternative work and private disutility of effort. It is only within the framework of a neoclassical model that perfect labor markets exist with no rigidities, flexible wages, full employment, maximizing behaviour information.

76. In Turkey there is evidence of large surplus labor (4.5 million at peak season) and large unemployment (15-25 percent). Marginal product of labor particularly in the agriculture sector is likely to be low but not equal to zero as in the Lewis model. As Sen has pointed out, ".... even if the marginal product of labor could fall to zero for some total amount of labor, that would not be a point of work equilibrium unless the peasants had no disutility of effort, the work equilibrium would be a positive marginal product of labor". 2/

77. In the case of Turkey, given the imperfection in all labor markets in serious, careful studies are required to get reasonable measures for (m). In the rural sector the problem is the existence of surplus labor as well as open unemployment. The minimum wage legislation decreed TL 90 to be the relevant wage in the rural sector. The existence of open and disguised unemployment would indicate that marginal product of labor would be lower than what the wage level represents. The Northern Forestry Project Appraisal Report estimated the marginal product of labor in peak season to be equivalent to TL 120 and in the slack season to be TL 40. Marginal product of labor can be estimated using a weighted average of wages that uses seasonal employment as

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1/ This approach is not suitable when a project has an excess migration effect.

2/ Amartya Sen, Employment, Technology and Development, 1975, p. 37, Clarendon Press, Oxford.

weights. 1/ The marginal product of labor in the agricultural sector is estimated to be equivalent to TL 60.

78. The marginal product of labor in the informal urban sector poses some estimation and specification problems particularly given the variation in skill level in this group. The surplus labor and disguised unemployment measures are very difficult to measure in this sector and there is no way of deriving labor utilization ratios. However, it is reasonable to take the appropriate (m) in this sector to be very close to the marginal product of labor in the rural areas. The observation of the Dervis-Robinson estimates also gives very similar measures. Thus it is reasonable to assume that at the margin the (m) of labor in the informal urban sector is close to that in the rural sector. We will take (m) to be equal to 60 within this sector. Sensitivity analysis is carried out using M = 70 as well. The urban informal sector wage figure is difficult to estimate. Unfortunately, Turkish and other data do not provide any conclusive measure of the wage level in this sector. It is, nonetheless, true that the wage level would be at least marginally higher than rural wages to make up for migration costs. The wage level for this sector is estimated to be TL 110 which is lower than the present minimum wage legislation but higher than the average wage level in the rural sector.2/ This figure is also consistent with the estimate derived from TGT model.

79. To derive a reasonable value for the marginal product in the urban formal sector the minimum wage and average wages are useful statistics. The

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1/ Formally $M = \sum \frac{Dj}{Sj} Wj$ (22)

$\sum j=1$

M = value of forgone marginal product of labor
Wj = monthly observed wage rate
Dj = monthly utilization of labor
Sj = monthly availability of labor

where, j=1, ...12

Given the above method is costly and time-consuming a short-cut might be to assume that m = w during peak seasons and estimate labor utilization during slack periods. The weighted average of peak and slack seasons estimated for Turkey was TL 59.

2/ Sabot in his study of migration has concluded that the marginal urban resident, given the prospect of eventually finding a high wage job will accept an urban income equivalent to his marginal product in the rural areas during his search period. (Sabot, 1977).

minimum wage has been raised to TL 180. 1/ Average daily wage is higher due to fringe benefit and bonuses, etc. If the ratio of fringe benefits to nominal wages is taken to be 90 percent then taking into account the differential tax structure the average income in the formal sector will be TL 270 in 1978 prices. This is the figure we will use as the market wage rate. However, it is necessary to point out to large variations partly dependent on relative union strength. The weighted average of the market wages in the urban formal sector is a reasonable basis but it obviously overestimates the marginal product of labor. The market wage is upward bias and marginal product of labor in the formal urban sector is taken to be equivalent to TL 200 in 1978.

Estimation of Shadow Wages

80. The shadow wages for the three sectors are estimated according to the following equations. Applying the (TEP) approach, the shadow wage rate is equal to labor's forgone marginal product at accounting prices.

$$SWR = SCF.m$$

$$(SWR = SCF.m.M \text{ if we allow for migration effects}) \quad (23)$$

The (EEP) approach also takes account of the social cost of increased consumption:

$$SWR = SCF.m + (w-m)\, CF_c \quad 1/ \quad (24)$$

which is appropriate if the government's sole aim is to maximize growth. If $SCF = CF_c$ then $SWR = SCF.w$. The (SP) is used to allow for government

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1/ There is a conceptual problem as regards the relevant measure to be used for (m) in the formal sector. The rural-urban migration model assumed together with the existence of large surplus labor and unemployment in the other two sectors may be used as an agrument for using the output foregone in the rural or informal urban sectors as the relevant measure for (m) in the formal urban sector. However, there is evidence of relatively high marginal productivity of labor in non-agricultural activities and in particular in industry. Also despite unionization and government social planning objectives which increase the degree of imperfection in the urban formal labor market, the latter sector in Turkey does approach the neoclassicial model more closely than the other two sectors. Obviously, the average wage overestimates the marginal product of labor in this sector. It does indicate, however, that the marginal product of labor in the urban formal sector is much closer to the formal wage level than to the marginal product of labor in the rural sector.

2/ Squire and van der Tak (1975), p. 84.

objectives including growth and income redistribution. In the simple case where increased effort has zero social cost (O = 0).

$$SWR = SCF.m + (w-m)\ (Cf_c - \frac{d}{v}) \qquad (SP1)\ (25)$$

In this case the shadow wage rate will be higher the more important the growth objective as reflected in the value of v. A more complete method allows for O to vary and also takes into account the social cost of reduced leisure as well as differential consumption weights d:

$$SWR = SCF.m + (w-m)\ (CF_c - \frac{d}{v}) + (w-m)\ O\frac{ed}{v}) \qquad (SP2)\ (26)$$

where e = ratio of the private value of forgone leisure to the market value of increased consumption.

When O > 1, the government considers increased private effort less of a cost than output forgone on consumption (and conversely if O < 1). We also experiment with different values of d by setting d initially equal to 1. Then we allow for a difference in the weighing system applied to the rural and urban informal sector by using a d value equal to 3.03 derived from our income distribution anaylsis Table 25 and leave the d value for the urban formal sector to be equal to 1.

81. The results differ depending on which approach is used. However, given the discussion that went on before, and the critisms to the implicit value judgment underlying the efficiency approach and there is reason to consider the results of SP1 as reasonable. 1/ More interesting work can be done if the consumption weights for rural and urban sectors are estimated separately, but this will have to wait for a more disaggregated data base. The results derived in Tables 27 and 28 do confirm the expectation that (TEP) gives the lowest shadow wage rates while the (EEP) provides the highest estimates. Moreover, the accounting ratios for the three sectors are very close. The accounting ratios would lend support to projects which are of a more labor intensive nature both in the rural sector. The migration effects reinforce rural employment possibilities by raising the SWR in the formal and informal urban sectors (Table 29). The figures estimated, although based on the assumptions made about the Turkish labor market, do provide a useful basis for the project analyst to value labor in project appraisal.

1/ SP1 is chosen rather than SP2 on the grounds of practicality and not any other criteria. Estimations of O and e needed for SP2 may be very difficult and are more meaningful when disaggregated data is used to derive project specific shadow wages.

Table 27: SHADOW WAGES IN TURKEY
(In Turkish Liras)

		TEP/1	EEP/2	SP1/3	SP2/4
Rural Sector		35	59	50	55
Urban Informal Sector /5	(i)	35	75	60	68
	(ii)	41	73	61	67
Urban Formal Sector		118	173	153	163

/1 TEP - Traditional Efficiency Prices — SWR = SCF.m

/2 EEP - Extended Efficiency Prices — SWR = SCF.m + (w-m) CF_c

/3 SP1 - Social Prices — SWR = SCF.m + (w-m) $(CF_c - \frac{d}{v})$

/4 SP2 - Social Prices — SWR = SCF.m + (w-m) $(CF_c - \frac{d}{v})$ + (w-m) $\emptyset$ ed/v

/5 (i) - m = 60
(ii) - m = 70

Table 28: ACCOUNTING RATIOS FOR LABOR

		TEP	EEP	SP1	SP2
Rural Sector		0.39	0.65	0.56	0.60
Urban Informal Sector	(i)	0.32	0.66	0.55	0.61
	(ii)	0.37	0.68	0.55	0.61
Urban Formal Sector		0.43	0.64	0.57	0.60

Table 29: SHADOW WAGE RATES
(In Turkish Liras)

	TEP*	EEP*	SP1*	SP2*
Urban Informal Sector	44	84	69	76
Urban Formal Sector	148	203	183	192

*Include migration effects.

Table 30: SHADOW WAGE RATES
(In Turkish Liras)

		SP1	SP2
Rural Sector		32	145
Urban Informal Sector	(i)	31	53
	(ii)	37	55
Urban Formal Sector		112	143

Take d = 3.30 for the Rural and Urban Informal Sectors.
d = 1 for the Urban Formal Sector

Table 31: ACCOUNTING RATIOS FOR LABOR

		SP1	SP2
Rural Sector		0.36	0.50
Urban Informal Sector	(i)	0.28	0.48
	(ii)	0.34	0.50
Urban Formal Sector		0.41	0.53