

**EVALUATING THE NET ECONOMIC BENEFITS OF FREE TRADE ZONES IN THEORY  
AND PRACTICE: APPLIED TO THE KINGSTON EXPORT FREE ZONE IN JAMAICA.**

by

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~~Evaluating the Net Economic Benefit of Free Trade Zones in~~  
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## ABSTRACT

In recent years there has been a rapid growth in the number of Free Trade Zones (FTZs) around the World. The main purpose of this dissertation is to lay out a theoretical and empirical framework for evaluating such zones. The Kingston Export Free Zone (KFZ) is the main subject of the dissertation. Available theoretical works do not provide conclusive and unified results concerning the sign of net benefits conferred upon host countries by FTZs. The prevailing view is that empirical case studies represent the most suitable approach to determining whether a particular FTZ is beneficial to the host country. Case studies on several FTZs around the World have provided mixed results regarding their merits. The main contribution of this dissertation is an economic evaluation of the KFZ.

The first part of the dissertation outlines the relevant literature on FTZs and cost-benefit analysis. This provides the foundation for the economic evaluation in the second part which focuses on the KFZ's development, incentives, costs and benefits. The techniques and problems of estimating net benefits are outlined. In addition, problems associated with separating locationally diverted and incremental investment are addressed. The nature of these problems dictates that sensitivity analysis must be used in the economic evaluation. This weakens the study to the extent that definitive results cannot be reached. However, the realistic scenario considered in the evaluation shows that the KFZ confers substantial positive net benefits on Jamaica. In fact, only in very pessimistic scenarios are net benefits found to be negative.

## DEDICATION

To mom, dad, Phyl, Dawn, Bev, Deborah, Miranda, Lucinda, Nadia, James, Gareth and Tegan who are my family and closest friends.

## QUOTATION

" A woman when she is in travail hath sorrow, because her hour is come: but as soon as she is delivered of the child, she remembereth no more the anguish, for joy that a man is born into the world."

.... St. John 16 v 21

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## TABLE OF CONTENTS

Approval .....	ii
Abstract .....	iii
Dedication .....	iv
Quotation .....	v
Acknowledgement .....	vi
List of Tables .....	ix
List of Figures .....	xi
Introduction .....	xiii
A. A Review of the Literature on Free Trade Zones and on Cost-benefit Analysis .....	1
I. A Review of the Relevant Literature on Free Trade Zones .....	2
II. Some Important Methods for Cost-Benefit Analysis .....	10
Introduction .....	10
The Origins and Philosophical Foundations of Cost-Benefit Analysis .....	11
The Net Present Value of a Project .....	14
Estimating the Social Discount Rate for Cost-Benefit Studies. ....	16
Costs and Benefits Relevant in a Cost-Benefit Analysis of an EPZ .....	23
Risk and Uncertainty .....	42
Summary and Conclusions .....	45
B. The Development, Incentives, and Cost-benefit Analysis of the Kingston Export Free Zone .....	47
I. The Origins and Development of the KFZ .....	48
Facts on the KFZ Today .....	53
II. The Incentives and Promotion of the KFZ and the Response of Investors .....	58
Introduction .....	58
The Relative Importance of KFZ-Related Advantages .....	59



A Simple Model Showing the Impact of KFZ-Related Incentives on Investment in Jamaica. ....	65
Estimating the Quantity of Investment Attracted by the KFZ .....	70
Determining Which KFZ Investors Are in Jamaica Because of the KFZ-Related Incentives and the Proportion of Net Benefits These Investors Account For. ....	74
III. Estimating the Costs and Benefits Associated with the Kingston Free Zone .....	80
Introduction .....	80
Costs and Benefits .....	85
Development Costs .....	88
Operating Costs .....	92
Rental Revenues .....	94
Net Benefits from Employment in the KFZ .....	97
Benefits and Costs of Providing Utilities to the KFZ .....	104
Net Benefit to Jamaica from Purchases of Local Goods by KFZ Firms .....	107
Payroll Taxes .....	110
Profits to Jamaican Owned KFZ Firms .....	111
Net Foreign Exchange Gain .....	111
Other Benefits .....	112
Secondary Effects .....	113
Income Distributional Effects .....	117
Estimating the Net Present Value, Internal Rate of Return, and the Benefit-Cost Ratio for the KFZ .....	117
Summary and Conclusion .....	132
Appendix .....	137
Bibliography .....	163

## LIST OF TABLES

Table	Page	
BI.1	The Number of Employees, the Number of Firms, the Square Footage Rented in the KFZ, and the Value of KFZ Exports and Imports 1980 to June 1987 ....	51
BI.2	Data on Population, Employment, Exports, Imports, GDP, CPI, and the Exchange Rate for Jamaica from 1980 to 1987 .....	52
BI.3	Number of KFZ Firms from Each Country and the Percentage of KFZ Employment Attributable to Firms of Different Origins (1987) .....	54
BI.4	Production Activity of KFZ Firms .....	55
BI.5	Destination of Exports from the KFZ .....	56
BI.6	Reasons for the Predominance of Female Workers in the KFZ Based on Surveys .....	56
BII.1	U.S. Business Leaders' Perceived Obstacles to Investment in Jamaica .....	64
BII.2	The Results of a Survey of KFZ Managers to Determine the Relative Importance of Each of the Available Incentives .....	69
BII.3	Responses of Managers of KFZ Firms to the Question "Would Your Firm Have Located in Jamaica in the Absence of the KFZ?" .....	77
BIII.1	Conversion Factors for the Cost-Benefit Analysis .....	84
BIII.2	Repayment Schedule for World Bank Loan ..	97
BIII.3	Conversion Factors for Utilities .....	106
BIII.4	NPV Calculations with M=1.5 and Different Values of CFL, CFLP, CFO, KRCF, and SDR ..	123
BIII.5	NPV Calculations with M=1 and Different Values of CFL, CFLP, CFO, KRCF, and SDR ..	124

Table	Page
BIII.6	IRR and B/C Calculations for Different Values of M, CFL, CFLP, CFO, and SDR .... 125
1	The Sources and Uses of Funds for Financing the Development of the KFZ (J\$000s) ..... 137
2	Square Footage Rented, Rental Rate, and Rental Revenue for the KFZ (1980-1987) .. 138
3	Actual and Forecast Values of Benefits Associated With the KFZ from 1982 to 1989 (KRCF=1, M=1, CFL=.55, CFLP=.6, CFO=.6 .. 139
4	Actual and Forecast Values of Costs Associated With the KFZ from 1982 to 1989 (KRCF=1, M=1, CFL=.55, CFLP=.6, CFO=.6 .. 140
5	Actual and Forecast Net Benefits of the KFZ from 1982 to 1989 ..... 141
6	Ranking of Undiscounted Total Value of Costs and Benefits (1978 to 2007) ..... 142

## LIST OF FIGURES

Figure		Page
BII.1	A Simple Model Showing the Impact of KFZ-Related Incentives on Investment in Jamaica. ....	65
1	Realistic Case .....	122
2	Most Optimistic Case .....	127
3	Most Pessimistic Case .....	128
4	Pessimistic Case 1 .....	129
5	Slightly Pessimistic Case 1 .....	130
6	Very Pessimistic Case 1 .....	143
7	Pessimistic Case 2 .....	144
8	Optimistic Case 1 .....	145
9	Very Optimistic Case .....	146
10	Very Pessimistic Case 2 .....	147
11	Pessimistic Case 3 .....	148
12	Slightly Optimistic Case 1 .....	149
13	Optimistic Case 2 .....	150
14	Extremely Optimistic Case .....	151
15	Very Pessimistic Case 3 .....	152
16	Pessimistic Case 4 .....	153
17	Pessimistic Case 5 .....	154
18	Slightly Optimistic Case 2 .....	155
19	Optimistic Case 3 .....	156
20	Extremely Pessimistic Case .....	157
21	Very Pessimistic Case 4 .....	158
22	Very Pessimistic Case 5 .....	159

Figure		Page
23	Pessimistic Case 6 .....	160
24	Slightly Pessimistic Case 2 .....	161
25	Slightly Optimistic Case 3 .....	162

## INTRODUCTION

### *Historical Perspective on Free Trade Zones*

The concept of Free Trade Zones (FTZs) is not new, it originated over 2,000 years ago in the days of the Roman Empire. At that time activities such as transshipment, storage, and re-exporting of goods were facilitated by FTZs. During the Middle Ages, Mediterranean cities with economies dependent upon trade relied upon FTZs. In the 18th and 19th centuries FTZs were established by colonial powers in places like Gibraltar, Singapore, and Hong Kong. These ports were also used mainly for storage and re-exporting. The next period for rapid expansion of the free zone/port idea was at the end of the 19th century and the early 20th century in Europe. The post World War Two growth in trade resulted in FTZs being set up at key points on international trading routes. Colon, in Panama, was amongst the most successful in this era.

The modern FTZ or export processing zone (EPZ), like the Kingston Export Free Zone in Jamaica, emerged during the last three decades. Its aims are not focussed on warehousing and re-exporting but on employment generation and the production of manufactured exports. The prototype was established in Shannon, Ireland in 1959. Its purpose was to maintain employment at the airport whose position as a refuelling centre was threatened by the development of long range jets. Industrial development around Shannon increased subsequent to the inauguration of the FTZ. This is to some extent reflected by noting that in 1960 there were 440 employees in the FTZ and 1250 at the airport, whereas by 1970 there were 4,750 in the FTZ and 1,870 at the airport.<sup>1</sup> The FTZ proved to be an ideal vehicle for promoting industry based on imported raw materials and exported finished products.

The success of Shannon paved the way for similar FTZs to be set up in other countries. By the early 1970s there were seven FTZs in seven countries. In 1975 there were

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<sup>1</sup> See Kelleher (1976)

31 in 18 countries, and in 1986 there were close to 500 in over 70 countries.<sup>2</sup> The number of FTZs has increased dramatically over the last 30 years as they have gained international recognition as a successful medium for generating employment and stimulating industrial development. Papadopoulos (1985) suggests that "the catalyst for the phenomenal growth of FTZs was a 1967 United Nations resolution that marked the switch from import substitution to export development as the preferred method of industrialization".

### *Definition of Free Trade Zone*

The terms free trade zone, export free zone, duty-free zone, and export processing zone will be used interchangeably in this study. A FTZ is a geographically defined usually fenced area of land within a country. Imported goods can be brought into the zone free of customs duties and quotas. Once in the zone, goods can be packed, unpacked, mixed, blended, stored, assembled, manufactured or otherwise handled. They are then exported. Should the goods be consumed within the host country, they are subject to customs duties. Apart from customs laws, in most cases all laws of the host country apply within the zone. A major purpose of FTZs is to induce new capital to flow into the FTZ. Such an influx of capital should then yield benefits in the form of employment, foreign exchange earnings, technological transfers, and linkages of the FTZ with the rest of the economy. However, there are costs associated with establishing and operating a FTZ successfully. These costs should not be overlooked.

It would be reasonable to assert that many FTZs are set up to circumvent a country's own regulations, such as import tariffs and other customs restrictions.<sup>3</sup> These regulations tend to impede free trade and discourage investment in certain activities. Traditionally, international trade theory argues that complete free trade is optimal. However, in reality there are interest groups which benefit from such regulations and devote economic resources in lobbying for

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<sup>2</sup>See UNIDO (1980) and WEPZA Newsletter (1986)

<sup>3</sup> This is sometimes referred to as offensive FTZ creation as opposed to defensive FTZ creation where the zone is set up in an attempt to compete with other countries' zones.

their continued existence. FTZs can be considered as a compromise in the sense that those desiring regulations can have them while others can enjoy the benefits from free trade via facilities offered by the zone.

### *The Focus of the Dissertation*

The analysis of this dissertation centres on the Kingston Export Free Zone (KFZ). The economic, political, and social circumstances that resulted in its inauguration are analysed, and a cost-benefit analysis conducted to determine whether the KFZ has conferred net benefits on the rest of the Jamaican economy. It is hoped that the dissertation makes a contribution, if modest, to the controversy over the merits of such zones.

The dissertation is divided into two parts. Part A contains two chapters which are concerned with the literature on FTZ and cost-benefit analysis respectively. In Part A chapter I, there is a brief review of the major theoretical and empirical work done on FTZs. The theoretical work is couched in the framework of the Heckscher-Ohlin model of international trade. The theoretical literature on FTZs is not extensive, probably due to the relatively short history of modern FTZs playing a prominent role in international trade, and the narrowness of the field (being a small component of international trade theory). It is of interest to note that two of the main theoretical pieces conclude that FTZs may be welfare-deteriorating for a host country. These conclusions seem curious when one observes the number of FTZs that have been established throughout the world in the past few years. Empirical studies have found the success of FTZs to be mixed. Given the limiting assumptions and the indeterminacy of the sign of net benefits derived by the theoretical works, there is a strong case for arguing that the most meaningful way of assessing the performance of a particular FTZ is to carry out a cost-benefit analysis. The results of any such analysis should not be generalized since FTZs differ in many important ways, so do host countries.



Since much of this dissertation is devoted to actually carrying out a cost-benefit analysis, a large proportion of the literature reviewed is on this subject. Hence, Part A Chapter II presents the theoretical and empirical methods required to conduct cost-benefit analyses of FTZs. Direct costs and benefits typically encountered in analysing FTZs are outlined in the chapter and a general framework for evaluating FTZs provided. The problems associated with measuring costs and benefits and choosing a discount rate are also discussed.

Three chapters are contained in Part B which turns from general considerations to a specific case study of the KFZ. Part B Chapter I outlines the factors that culminated in the development of the KFZ in 1976. Details on the types of operation, origin, size, and other general information on firms in the KFZ are provided.

Part B Chapter II examines the incentives provided to KFZ investors which are not available to others in Jamaica. These are referred to as KFZ-related advantages. Should they not raise the rate of return to investors, it is difficult to make the case that the KFZ has made a positive difference to the welfare of Jamaicans. Even if they raise the rate of return significantly it may result in locational diversion of investment which reduces the net benefits to Jamaica. A model is presented to show the impact of the KFZ on investment flows into Jamaica. The problems of measuring such flows are discussed. The impossibility of separating diverted from new incremental investment means a definite conclusion cannot be reached on which investors are in Jamaica only because of KFZ-related advantages. This results in a weakness of the cost-benefit analysis of Part B Chapter III in which only the proportion of net benefits resulting from incremental investment is to be counted. Given this weakness, a sensitivity analysis examining realistic, optimistic, and pessimistic values of this proportion is recommended. Information from questionnaires answered by manager's of KFZ firms is used as the basis for the realistic scenario.

The methodology used in the cost-benefit analysis of the KFZ is outlined in Part B Chapter III. The chapter provides a step by step outline of the estimation of costs, benefits, discount rate, and other measures used in the economic evaluation. The results of the evaluation are also presented. In the realistic case the KFZ is found to confer positive net benefits on Jamaica. Only in very pessimistic scenarios is the present value of the net benefit stream found to be negative.

In the conclusion there is a discussion of the policy implications of this study. Recommendations are made, and there is a summary highlighting the significance of some of the findings developed in earlier chapters.

**PART A**

**A REVIEW OF THE LITERATURE ON FREE TRADE ZONES AND ON COST-BENEFIT  
ANALYSIS**

## CHAPTER I

### A REVIEW OF THE RELEVANT LITERATURE ON FREE TRADE ZONES

Studies relating to FTZs fall into three main categories:

- 1) theoretical approaches based on the Heckscher–Ohlin model;<sup>1</sup>
- 2) empirical approaches which use various techniques to evaluate the performance of certain FTZs currently in operation;<sup>2</sup> and
- 3) descriptive studies which provide general information on various aspects of FTZs around the world.<sup>3</sup> The theoretical approaches provide insights into the likely impact of FTZs on the host country. However, depending on the assumptions made, the conclusions reached are sometimes in favour of FTZs but other times not. The empirical studies also provide mixed results, some FTZs are found to have costs less than benefits, while the converse is true for others. The empirical results complement the theoretical conclusions by showing that each FTZ has certain different characteristics affecting its performance. The important aspects of the theoretical and empirical works are discussed below. The descriptive studies are valuable for providing general information and are called upon intermittently throughout the dissertation. However, for the purpose of the dissertation they are not reviewed.

Two of the leading theoretical papers on FTZs are written by Hamada (1974) and Hamilton and Svensson (1983). Hamada uses a standard two commodity and two factor model as a theoretical framework for the analysis of FTZs in developing countries. It is assumed that: i) the production of good 2 uses a more capital-intensive technique than good 1; ii) the country is relatively scarce in capital, so good 1 is exported and good 2 imported; iii) international prices are constant and given to the country; and iv) good 2 is protected.

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<sup>1</sup> Hamada (1974), Rodriguez (1976), Hamilton and Svensson (1983), Van Wijnbergen (1983), Grubel (1982a and 1983), and Donaldson (1985).

<sup>2</sup> Choe (1975), Andic and Cao (1980), Warr (1983 and 1985), and ESCAP/UNCTC (1985).

<sup>3</sup> See Currie (1979), Diamond (1979), Kelleher (1976), Wall (1976), Spinanger (1985) and Papadopoulos (1985).

In order to evaluate the welfare implications of introducing the FTZ, national income measured in international prices is the chosen criterion. An improvement of this measure suggests an improvement of potential consumption possibilities. The area of the country outside the FTZ is referred to as the domestic zone (DZ) and all consumption by workers takes place therein.

Hamada initially analyses the effects of a FTZ when there is no foreign investment and an import tariff is used to protect good 2. In this situation the production of good 2 occurs entirely within the DZ where the relative price is greater. Good 1 is not taxed in either zone so it does not matter where its production takes place.

If protection is carried out by an export tax on good 1, good 1 would be produced only inside the FTZ (due to the higher international price ratio). In this case it would not matter in which location good 2 was produced since the international price level prevails.

In the next section Hamada assumes foreign investment is permitted in the presence of an import tariff on good 2. Without a FTZ, such an influx of capital into industry 2 (without transfer of technology) attracts labour and results in a shortage thereof. In accordance with the Rybczynski Theorem, the output of industry 2 rises while that of industry 1 declines. This effect is called the factor proportions effect because it is brought about by the different factor proportions in each industry. Furthermore, national income at international prices declines because foreigners are able to sell good 2 within the tariff wall and receive the higher domestic price. Such an outcome is called the subsidization effect. The country also loses tariff revenue to foreigners.

Assuming that all new foreign capital is committed to producing good 2 within the FTZ, the introduction of a FTZ eliminates the subsidization effect since the output of the FTZ has to be exported or is subject to the tariff if it enters the DZ. As long as the production of both goods is continued in the DZ, the factor proportions effect and the

Rybczynski Theorem hold because labour is still attracted to industry 2. Consequently, national income at international prices falls by the product of the difference between the domestic price and the international price and the increase in the production of good 2 in the DZ. This is equivalent to the loss in tariff revenue due to the import substitution.

Hamada also analyses the case where foreign investment in the FTZ takes the form of new technology and there is incomplete specialization in the DZ. The result is uncertain in this case. If the new technology of the FTZ is more capital-intensive than either one of the two DZ industries, national income at international prices rises. However, it declines if the new technology is less capital-intensive than both.

Hamada mentions that his conclusions concerning the impact of foreign investment are weakened if one considers: a) the goal of industrialization; and b) externalities, or learning effects for DZ firms.

Rodriguez (1976) extends some of Hamada's results on the economic effects of a FTZ. He shows that if there is perfect factor mobility between the FTZ and the rest of the country, the final equilibrium will result in the same pattern of trade that would have prevailed under free trade, furthermore, all of the trade will be carried out by the FTZ.

Hamilton and Svensson's work is couched in the same analytical framework as Hamada's, they extend Hamada's results. The first part of their paper analyses the way in which the location of production is influenced by opening a FTZ. They consider a wider variety of trade barriers than Hamada. In the absence of capital inflows, they analyse the implications for production, consumption, and welfare in several different cases. The second part of the paper examines the case considered by Hamada. They support his result on the negative welfare effects of foreign capital inflows into either the FTZ or the rest of the economy, however they show that welfare declines relatively more when foreign capital enters the FTZ. The paper explicitly incorporates repatriated income and its composition.

Hamilton and Svensson note that their study is limited since no consideration is given to the opportunity cost of foreign investment. The implication is that foreign investment is not endogenous.

Given that numerous FTZs have been established and others are in the planning stages, it is peculiar that both theoretical studies conclude that the movement of foreign capital into a FTZ is welfare diminishing. Sweder Van Wijnbergen (1983) identifies this oddity and provides a theoretical explanation of why a country may still obtain positive welfare effects by establishing a FTZ and permitting the entry of foreign capital.

Van Wijnbergen extends the analysis of the other two studies by introducing a profits tax and making the supply of foreign capital endogenous. He assumes that the supply of foreign capital is an increasing function of the positive difference between its after tax rate of return and the world rate of return on capital. Van Wijnbergen's work, like the other two studies, shows that the inflow of foreign capital results in a fall in welfare due to the Rybczynski effect—where the labour intensive sector declines at the expense of the capital intensive sector—the loss is in terms of relinquished tariff revenue. However, his analysis shows that it is possible to set an optimal tax on capital so that the tax revenue outweighs the loss of tariff revenue. Such a possibility means that a FTZ is not necessarily welfare reducing. Hamada and Hamilton and Svensson fail to observe this result because they assume that all profits are repatriated and spent abroad. Van Wijnbergen's contribution should not be taken lightly because this may partly explain the continued popularity of FTZs.

There is a further problem with the three studies above, that is, they are all couched in the restrictive Heckscher–Ohlin (H–O) framework of analysis. The neat results of the H–O model follow from the assumptions that are made, such as full–employment of all factors of production. Many developing countries, like Jamaica, are plagued with unemployment rates in excess of 25%. One of the main attractions of a FTZ to a developing country is that it

provides employment for some of the unemployed in an attempt to solve a problem that the H-O model assumes away. The assumption of full-employment is quite unrealistic in such a case. In the presence of mass unemployment, it is unlikely that the pattern of labour movement predicted by the H-O model will occur. The Rybczynski effect is not likely to be observed because the unemployed will be amongst those going to work with the foreign capital in the FTZ. As a result, it does not necessarily follow that the factor proportions effect will obtain and that the labour intensive sector will decline when there is already an excess supply of labour. Hamada alludes to this criticism in his conclusion.

Other relevant theoretical studies on FTZs include work done by H. Grubel (1982a and 1983) and D. Donaldson (1985). Grubel (1983) focuses on the deregulation of Canadian enterprise. The book outlines the reasons why regulations have come about and the associated costs and benefits. He questions the validity of some of the arguments made in favour of regulation (such as the need to reduce economic instability—Grubel argues that private speculators will act so as to reduce fluctuations). He also outlines some of the non-market failures that arise as a result of regulation (such as the moral hazard problem with unemployment insurance). Grubel then proposes that free economic zones would be a good method of obtaining partial deregulation. He provides a theoretical analysis of the likely effects of such zones.<sup>4</sup> ~~The welfare improving~~ effects of such zones are in terms of employment, technology, entrepreneurship, and the lower costs of protection and transactions. The welfare reducing effects are in the form of locational diversion of trade and investment as well as the generation of negative externalities. Grubel mentions that theoretically the net welfare effects of free economic zones are indeterminate, and only empirical studies can lead to estimates of the net benefits. The cost-benefit analysis of Part B Chapter III is one such attempt to determine whether the net benefits of a FTZ are positive.

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<sup>4</sup>See Grubel (1982a) also. Grubel's approach is also open to the criticism that the assumptions of the Heckscher-Ohlin model are too restrictive.



Donaldson's work is on the need for Special Enterprise Zones in British Columbia. The conclusion is that such zones are inappropriate for the Province of British Columbia. After outlining the supposed costs and benefits, he argues that the implementation of such zones would be a mistake for British Columbia because the employment creation would be minimal; costs in terms of subsidies, foregone taxes, increased inequality are likely to be too great; the economy would be pushed away from its comparative advantage in the production of natural resources; foreign owned business has disadvantages for British Columbia; ~~technology can be obtained without zones~~; and zones will have serious problems concerning relocation of other firms. Donaldson suggests that zones "bring with them serious administrative problems concerning relocation of firms to the zones, direct competition with existing firms, selection of firms that would have located in the province anyway, and wasteful duplication of plants". Donaldson does not argue that zones may not be beneficial at the right place and time but he feels that they are not in the best interest of British Columbia.

The works of Grubel and Donaldson, along with those discussed earlier isolate theoretical arguments for and against FTZs. They provide a foundation and expose the need for empirical investigation. Furthermore, empirical tests seem most appropriate for assessing the success of FTZs since the more restrictive theoretical assumptions can be relaxed. Choe (1975), Andic and Cao (1980) Warr (1983 and 1985) and ESCAP/UNCTC (1985) have carried out such empirical studies on EPZs.

Choe performs a study on the Masan EPZ in Korea. He outlines the construction and operation of the zone, incentives given to (foreign) investors in the zone, and economic costs and benefits of the zone. The costs that Choe examines are;

a) zone construction and development; b) management and maintenance; c) private sector capital investment; d) subsidies through loans to exporters; and e) the cost of environmental pollution. The benefits include a) labour employment; b) foreign exchange; c) rental revenue; and d) tax revenue and returns to domestic capital invested.

Choe finds the benefit-cost ratios to be greater than unity (i.e. positive net benefits) for alternative estimates of the discount rate, the shadow wage rate, and the shadow price of foreign exchange. He also estimates the benefit-cost ratio under the assumption that the domestic sector does not subsidize the Masan EPZ firms through export loans. Substantial increases in the ratio indicate that the subsidy cost could be significant enough to alter the desirability of the zone.

Andic and Cao conduct a cost-benefit analysis of the Cartagena Free Zone (CFZ) in Colombia. The CFZ was set up to induce private investment with the aim of generating employment, encouraging export growth, and implementing other economic goals considered important for social development of the region. They estimate the same costs and benefits as Choe, except they include a multiplier effect for domestic investment spending.

The present value of net benefits are calculated by Andic and Cao under four different probabilities that the investment in the region would have in fact occurred in the absence of the CFZ. When the probability is highest, the most pessimistic case, the NPV was still found to be positive. The CFZ, based on the procedure used in this study, confers positive net benefits to Colombia.

In his studies of the Jakarta (Indonesia) and Bataan (Philippines) export processing zones, Warr sets up a theoretical model and then carries out a cost-benefit analysis. Warr finds that benefits exceed costs in the case of the Jakarta zone. He derives opposite results in the Bataan case where the EPZ was set up in a remote mountainous coastal area resulting in high infrastructural costs. Another major reason for negative net benefits for the Bataan zone is that foreign firms were excessively subsidized with loans below the going market rate.

The benefits that Warr estimates are: a) the gains from employment creation; b) foreign exchange earnings; c) technological transfer; d) property tax and other taxes; and e)

unofficial levies. Costs consist of: a) schemes to encourage investment in the EPZ or the use of domestic raw materials; b) losses in terms of rental; c) administration costs; and d) infrastructure costs. Warr does not employ technical formulae for estimating shadow prices as Choe does. However, they have a similar general approach. A common weakness in their works is their failure to account for the fact that some proportion of the investment in the EPZs might have entered the countries even if the EPZs were not established. Should this be the case then the net benefits are overestimated.

The ESCAP/UNCTC study evaluates export processing zones (EPZs) in China, Malaysia, Korea, India, The Philippines, Sri Lanka and Indonesia. The study outlines the relative success of various zones in these countries, the results of cost-benefit analyses on several zones are reported. There is also an attempt to identify the ideal conditions for an EPZ to have a good chance of being a success. Based on the examination of several EPZs, the study concludes that success is a function of timing (choosing the best time to set up the EPZ), location, local infrastructure, incentives, administration (the amount of red tape), and the general investment climate of the host country. The study is very useful because it is based on the actual experience of countries with EPZs. Other countries with EPZs or planning to establish them can learn from this piece of work.

The review has outlined the main theoretical and empirical approaches to evaluating the impact of EPZs on host countries. Inconclusive results are provided by theoretical approaches, which is understandable given the various assumptions made. Therefore, there is a need to conduct empirical analyses to support the theoretical approaches and provide more conclusive case by case results. The empirical studies discussed above show varying degrees of success between EPZs which supports the argument for a case study approach. The major contribution of this dissertation is to provide a case study on another zone, namely the KFZ, addressing some of the loopholes in other case studies. The study should provide further information for those involved in debates, especially in Jamaica, over the merits of EPZs.

## CHAPTER II

### SOME IMPORTANT METHODS FOR COST-BENEFIT ANALYSIS

#### Introduction

The objective of this chapter is to highlight the theory behind some of the methods used in cost-benefit analysis. The literature is extensive, so the techniques emphasised are those that provide the foundation for conducting a cost-benefit analysis of FTZs like the Kingston Export Free Zone (KFZ) in Jamaica. As mentioned in the previous chapter, the theoretical literature is inconclusive concerning the sign of the net welfare effects conferred upon the host nation as a result of establishing an EPZ. Empirical studies on various EPZs also provide varying conclusions.<sup>1</sup> Given the rapid global growth in the number of EPZs, there is a case for the argument that some countries or individuals in those countries are benefitting from them. The purpose of Part B Chapter III is to investigate whether the benefits received by Jamaica from the KFZ actually exceed the associated costs. This chapter does not focus directly on the KFZ, instead it examines the approaches that others have employed and suggested for carrying out evaluations on projects similar to the KFZ.

The core of the analysis focuses on the methods employed in the works by Hirshleifer (1970), Pearce (1971), Dasgupta, Sen, and Marglin (1972), Little and Mirrlees (1974), Squire and Van der Tak (1975), Harberger (1976), Sugden (1978), Jenkins (1979), Pearce and Nash (1981), and Mishan (1982).

In the following analysis, before delving into the actual methods used in cost-benefit analysis, there is a concise discussion of the underlying assumptions and the critiques of this type of analysis. The discussion is intentionally laconic since an entire volume could be written on the philosophical underpinnings of cost-benefit analysis.

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<sup>1</sup>See Warr (1983) and Warr (1985) for examples.

The next part of the chapter presents the Net Present Value (NPV) equation which describes the relationship between the NPV, the (social) discount rate (SDR), the costs, and the benefits. The second part is devoted to analysing the alternative methods advanced for estimating the social discount rate to be used in project evaluation. In the third part there is a discussion of the typical costs and benefits that should be included in a cost-benefit analysis of an EPZ. The likely problems associated with their estimation are also mentioned. Crucial concepts discussed in this third part are the shadow price of labour and the shadow exchange rate. There is then a discussion of risk and uncertainty and the use of sensitivity analysis in cost-benefit studies. The final section contains a summary and some conclusions.

When a cost-benefit study of a project is conducted, the evaluator engages in a hypothetical experiment. The starting position of any project evaluation should be to ask the question: If the project was not selected, what difference would it make to the consumption opportunities (measured in monetary terms) of the host country? The results of a cost-benefit analysis should provide insights into the answer since it is aimed at determining whether the net benefits of the project, in monetary terms, are positive or not.

### The Origins and Philosophical Foundations of Cost-Benefit Analysis

The concept of cost-benefit analysis was initiated in 1936 subsumed in the United States Flood Control Act. the Act advanced the principle that flood-control projects should be viewed as worthwhile if "the benefits to whom they may accrue, are in excess of the estimated costs".<sup>2</sup> In the late 1950s cost-benefit analysis was used in attempts to formalize public investment criteria in relation to the established criteria of welfare economics. Since then it gained popularity and has been applied to other U.S. Water projects. It has also been used in British transportation projects, and in the appraisal of hydro-electricity, irrigation, transportation, and water projects in developing countries.

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<sup>2</sup> See Pearce (1971) and Pearce and Nash (1981) for a more detailed discussion.

Cost-benefit analysis is aimed at outlining and quantifying the social costs and benefits of a policy/project in terms of a common unit of currency. It provides the decision-maker with a way of looking at the likely or actual impacts of a policy, and the results can be used as a basis for policy making. It is interesting to note that the results of a cost-benefit analysis could lead to recommendations that conflict with the results that a simple majority voting system would generate. For example, a cost-benefit study, using well defined value judgements, may show that the benefits of a project far exceed the costs. The resulting recommendation might then be in favour of the project. The analysis will reflect that the project probably causes some individuals to lose while others gain. If those who gain can be made to compensate the losers a potential Pareto improvement can be achieved. In reality these transfers may not occur but it is possible to effect them through the tax system. The potential Pareto improvement criterion is at the core of cost-benefit analysis. However, a political vote on the project by potential gainers and losers may reject it if the number of gainers are in the minority, despite the potential Pareto improvement.

Cost-benefit analysis is based upon value judgements which, unlike empirical statements, are not verifiable or falsifiable. Value judgements may vary from one approach to the next, so different conclusions may emerge between analysts examining the same project. For example, some analysts may place major emphasis on the income distributional or national defense aspects of a project while others choose to ignore such aspects and emphasize others. There is no way of determining the "correct" approach since each may be logical in its own context. However, it is incumbent upon analysts to express their value judgements and assumptions categorically so those interested in the conclusions can decide whether they are consistent with their philosophies and objectives.

In the cost-benefit analysis of the KFZ, value judgements are made, for example, all the benefits listed are thought to be "good" for Jamaica. No value judgements are made concerning income distribution impacts of the project, this implies that an equal weight is

given to each dollar without regard to who gains or loses it. Those who perceive the KFZ's activities to be a form of exploitation may disagree entirely with this approach. The results in this dissertation are mainly based on the author's neoclassical economics perspective. Behind this perspective lie Harberger's three basic postulates for applied welfare economics.<sup>3</sup> The postulates are:

- a) the competitive demand price for a given unit measures the value of that unit to the demander;
- b) the competitive supply price for a given unit measures the value of that unit to the supplier; <sup>4</sup>
- c) when evaluating the net benefits of a given project, the costs and benefits accruing to each member of the relevant group should normally be added without regards to the individuals to whom they accrue.

Harberger outlined these postulates in an attempt to provide a set of standards for applied welfare economists to follow.

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<sup>3</sup>Harberger (1971)

<sup>4</sup>A demand (supply) price measures the alternative benefits that demanders (suppliers) forgo when they pay for (get paid for) a marginal unit.

## The Net Present Value of a Project

Whatever the form of the costs and benefits arising from a project, the aim of the evaluation is to identify, measure, and weight them over the life of the project.<sup>5</sup> The ease of this process differs from one benefit (cost) to another. Some benefits, such as employment and foreign exchange earnings are easily identifiable whereas indirect benefits like positive externalities to industries located close to the project may be less conspicuous. Similarly for costs, infrastructural and operating costs are easy to identify but pollution and other negative externalities may be less obvious. With respect to the measurement of benefits and costs, there are some benefits which are difficult (impossible) to measure despite being readily identifiable. Such is often the case for technological benefits. Costs like the social opportunity cost of labour often present tricky measurement problems even though identification is no problem.

In project evaluations the intertemporal weights assigned to the various costs and benefits are usually determined by the social rate of discount. A given benefit (cost) is given a higher weight if it accrues today rather than in the future. Benefits (costs) arising in the future are discounted, using the social discount rate, to determine their present value. The procedure of estimating the social discount rate will be discussed later.

Once the evaluator has estimated the costs, benefits, and the social discount rate, the net present value of the project can be calculated as follows:

Let  $b_a, b_b, \dots, b_x$  represent each type of benefit generated in any given year.

$$\sum_a^x b = B = \text{total benefits for a given year.}$$

Let  $B_0, B_1, B_2, \dots, B_n$  represent project benefits in years 0,1,2,.....n.

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<sup>5</sup> See Hirshleifer (1970), Sugden (1978), Pearce and Nash (1981), and Mishan (1982).



Similarly, let  $c_a, c_b, \dots, c_x$  represent each type of cost generated in any given year.

$$\sum_a^x c = C = \text{total costs for a given year.}$$

Let  $C_0, C_1, C_2, \dots, C_n$  represent the project costs in years 0,1,2,.....n.

Let  $i$  = social discount rate (later the social discount rate is referred to as the SDR).

The present value of benefits and costs of a project in any given year is derived by multiplying each prospective benefit or cost by a discount factor  $1/(1+i)^t$  where  $t$  is the index of the year concerned. The discounted values of benefits and costs in all years are then aggregated to yield total present values as follows:

Present value of benefits ( $PV_B$ ):

$$PV_B = \sum_{t=0}^n B_t / (1+i)^t = B_0 / (1+i)^0 + B_1 / (1+i)^1 + \dots + B_n / (1+i)^n$$

Present value of costs ( $PV_C$ ):

$$PV_C = \sum_{t=0}^n C_t / (1+i)^t = C_0 / (1+i)^0 + C_1 / (1+i)^1 + \dots + C_n / (1+i)^n$$

The net present value of a project ( $NPV_p$ ):

$$NPV_p = \sum_{t=0}^n B_t / (1+i)^t - \sum_{t=0}^n C_t / (1+i)^t = \sum_{t=0}^n (B_t - C_t) / (1+i)^t = (B_0 - C_0) / (1+i)^0 + \dots + (B_n - C_n) / (1+i)^n$$

The present value criterion of investment states that a project is undertaken only if the NPV is positive.

A corresponding investment criterion for project evaluation is the benefit-cost ratio ( $B/C$ ).

$$B/C = \frac{\sum_{t=0}^n B_t / (1+i)^t}{\sum_{t=0}^n C_t / (1+i)^t}$$

If this criterion is applied, any project with a benefit-cost ratio greater than unity will be undertaken.

A third possible investment criterion is the internal rate of return (IRR). The IRR is that

rate of interest which equates the present value of benefits and the present value of costs. In other words, the IRR is the rate of interest for which

$$\sum_{t=0}^n B_t/(1+IRR)^t - \sum_{t=0}^n C_t/(1+IRR)^t = 0$$

For social discount rates below the IRR ( $i < IRR$ ), the present value of a project's benefits exceeds the present value of its costs (the  $NPV > 0$ ). At social discount rates above the IRR, the  $NPV < 0$ . Using the IRR as an investment criterion, a project will be selected only if the  $IRR > i$ .<sup>6</sup> More will be said about the investment criteria later. At this stage however, before going on to discuss the specific costs and benefits associated with EPZs, some time will be devoted to discussing the choice of the social discount rate (SDR) in project evaluation.

#### Estimating the Social Discount Rate for Cost-Benefit Studies.

There is much controversy in the literature concerning what measure an evaluator should use as a proxy for the social discount rate in cost-benefit analyses, especially where the project is financed with funds raised in the domestic capital market.<sup>7 8</sup> The choosing of the social discount rate is critical since it determines the weights assigned to costs and benefits in different periods of the project's life, thus playing a crucial role in determining the NPV.

Two basic schools of thought exist on the appropriate measure of the social discount rate. The first recommends the social time preference rate (STPR), and the second argues in

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<sup>6</sup> See Hirshleifer (1970) for a concise analysis of the IRR and the potential problems associated with using it as an investment criterion. A major problem arises when there is more than one alternation in the sign of the net benefit stream. This does not represent a major issue or concern in this dissertation.

<sup>7</sup>See Hirshleifer, et al (1960), Harberger (1972), Dasgupta, Marglin, and Sen (1972), and Little and Mirrlees (1974).

<sup>8</sup>For a small country like Jamaica, where most of the funds for financing projects are raised on the foreign capital market or from the World Bank, the appropriate social discount rate in such a case should be a rate close to that at which the funds are borrowed.

favour of the gross rate of return on private sector investment ( $r$ ).<sup>9</sup> In the first best situation where there are no market distortions (such as taxation, inflation, and risk premium), an average of the capital market interest rates would satisfy both schools simultaneously since  $r = \text{STPR} = \text{market rate}$ . However, capital market interest rates are deemed inappropriate because in a world characterized by distortions a wedge is driven between  $r$  and STPR. In situations of underinvestment, which is often the case in developing countries,  $r$  tends to exceed STPR. Given that they differ, the question is which should be chosen? No single school of thought commands consensus among economists. Below there is a review of the major approaches to the social discount rate.

### *The Social Time Preference Rate*

The social time preference rate (STPR) is the rate at which individuals collectively trade off present consumption for future consumption. The STPR would be selected as the appropriate social discount rate if the analyst wishes to uphold the Paretian value judgement that consumers' wants should prevail.<sup>10</sup> However, measuring the STPR represents a serious problem for evaluators. Furthermore, this approach is criticized by those who think it is irrelevant to investment decisions. They claim that distortions often cause  $r$  to exceed STPR so using the STPR would result in public projects being favoured above private projects with higher rates of return. The STPR is not favoured by analysts because of these criticisms.

### *The Gross Rate of Return on Private Sector investment*

The logic behind this choice is that if the government's desire is to maximize the country's output, then projects with the highest rates of return should be selected. Hence, should superior returns be matched with projects emanating from the private sector, such projects should receive priority over those of public sector origin. If this approach is not followed, it

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<sup>9</sup> See Hirshleifer et al (1960)

<sup>10</sup> This is discussed briefly in Pearce and Nash (1981).

is argued that resource misallocation occurs. A major problem for evaluators favouring this approach is that of estimating  $r$ . Private firms have various approaches to measuring profits and rates of return so their reported figures may be misleading. This is complicated further by the fact that there are a multiplicity of such rates to observe when all firms of different sizes are taken into account. Another criticism stems from the fact that private rates of return make only financial considerations. Social values are ignored. A private project may generate negative externalities that reduce the social rate of return below the private rate. Hence, it is possible that a public project might be preferred to a private project even though the private rate of return is greater than the social rate. The approach is also criticised by those who think the STPR should be incorporated in some fashion. <sup>11</sup>

Dasgupta, Sen, and Marglin also criticize this first approach on the grounds that the marginal productivity of capital can be used as a surrogate for the social rate of discount only if it is assumed that the resources required for the project are drawn entirely from marginal investment in the private sector. The marginal productivity of capital is relevant, according to this view, but it is the present value of the consumption stream forgone when such investment is displaced that matters. This present value is relevant as a cost, not as a discount rate.

#### *The Dasgupta, Sen, and Marglin Approach*

Marglin (1967) and Dasgupta, Marglin, and Sen (1972) are responsible for this approach. It is a synthetic approach that combines the STPR and  $r$ . These writers criticize advocates of  $r$  since this assumes that resources required for the project are withdrawn only from marginal investment in the private sector. However, if resources are also displaced from consumption then  $r$  is an inappropriate measure of the social discount rate. The relevance of  $r$  is not denied but it is the present value of the consumption stream forgone when such investment is displaced that matters. The approach recommends that benefits and costs be discounted by

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<sup>11</sup>See Dasgupta, Sen, and Marglin (1972) and Harberger (1972).

the social rate of time preference for consumption, however, costs and benefits should be adjusted by the shadow price of investment to show that forgone private investment has a greater social return than present consumption. The shadow price of investment ( $P_{inv}$ ) measures the social value of current investment in terms of current consumption.

A major criticism of this approach is that it requires a different value of  $P_{inv}$  for each project with a different lifetime. This makes it difficult to use in practice, especially when one adds the problems of estimating  $r$  and the STPR.

### *The Accounting Rate of Interest*

This approach proposes that the accounting rate of interest (ARI) be employed as the social discount rate. Little and Mirrlees, and Squire and Van der Tak are the principal proponents. The ARI is the estimated marginal return from public sector projects given a fixed amount of investment funds available to the government. The ARI is essentially a rationing device. It is revised upwards if funds earmarked for investment are insufficient to finance all projects that look acceptable to policy makers. It is revised downwards if too few projects show themselves to be acceptable. The ARI simply ensures that the best public sector projects are recommended amongst those available in this sector. It does not necessarily lead to funds being optimally allocated between public and private sectors.

The ARI can be criticized because it fails to consider that in the absence of public sector projects, more resources would be freed for private investment and consumption. The ARI basically considers only the opportunity cost to the public sector rather than to the country as a whole.

### *The Harberger Approach*

In this approach it is suggested that the social discount rate be represented by a weighted average of the marginal productivity of capital in the private sector and the rate of time preference for consumption.<sup>12</sup> Harberger's synthetic discount rate can be expressed as follows:

$$i = \Theta r + (1-\Theta)q$$

where  $i$  = social discount rate.

$r$  = an average of separate marginal gross-of-tax-returns on capital in the private sector.

$q$  = an average of separate net-of-personal-tax yields on savings (representing the STPR).

$\Theta$  = the fraction of the public funds displacing private investments when the government borrows from the capital market.

$(1-\Theta)$  = fraction of public funds displacing private consumption.

Harberger's approach is based on assumptions that public investments are financed by borrowing from a perfect capital market and that there is full employment in the economy. In the special case where savings are completely interest inelastic,  $\Theta = 1$ ,  $i = r$ , and the discount rate can be estimated directly from private sector returns to investment.

Harberger's approach gives rise to the baffling problem of estimating  $r$ , the STPR, and the elasticities of savings and investment with respect to the interest rate.

### *Estimating the Social Discount Rate in Practice*

The previous section outlines the lack of consensus among economists concerning the choice of the social discount rate. It also mentions that actual measurement represents a formidable problem in most cases. The following discussion describes some approaches that are used in practice. Jenkins (1979) argues that the Harberger approach is more useful for practical purposes than the Dasgupta, Sen and Marglin option since the latter requires that a different

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<sup>12</sup>See Harberger (1972) ch.4 and ch.5 .

$P_{inv}$  be calculated for each project with a different lifetime. Secondly, the single discount rate provided by Harberger's method is easier to comprehend, especially for non-economist policymakers, than to use  $P_{inv}$  and then discount it.

Jenkins favours Harberger's approach and lays out the procedure for actually calculating the weighted social discount rate, however, he has to assume that the capital market is well functioning and that the government borrows its funds from there and not on international capital markets. He argues that the value of the social discount rate will be generally nearer to the gross return on private investment than the rate of time preference on consumption since the elasticity of private savings is much less than the value of the elasticity of demand for private sector investment. The Harberger-Jenkins approach shows that by raising funds on the capital market the government will cause interest rates to rise, thereby inducing people to postpone both consumption and investment decisions. This would not occur if the government raised its funds on foreign capital markets. In such a case, the appropriate social discount rate should be closer to the rate at which these funds are borrowed.

Dasgupta, Marglin, and Sen (1972) (ch.13) argue that a discount rate is required because future costs and benefits deserve lower weights than current costs and benefits. This is attributable to the fact that: a) per capita consumption tends to rise over time and, b) the marginal social significance (or marginal utility) of consumption diminishes with each increase in consumption. The latter of these two reasons involves a social value judgement. It is argued that the political process is incapable of "quantitative articulation of such value judgements as the elasticity of marginal utility embodies." As a result, it is recommended that the social discount rate be treated as an unknown of project formulation and evaluation. The use of sensitivity analysis is recommended for finding the "switching value" of the social discount rate. This is the numerical value of the discount rate for which the net present value of the project is zero which happens to be the IRR.

C.R. Blitzer (1973) (pp.16) argues that "we have no clear way of determining the social rate of discount and we are not able to substitute anything that we know for it." He recommends that the discount rate be treated as an unknown for the project and cost-benefit discounting performed either with a number of alternative rates, or with a single rate fixed exogenously by political authority. He concludes that (pp.17):

The choice of a discount rate, therefore, is the responsibility of those with political responsibility, rather than the economist.

The foregoing discussion has outlined difficulties involved in selecting the most appropriate value of the social discount rate.<sup>13</sup> It is evident that the rate chosen is critical for the evaluation of any proposed government project. Even when the project's prospective benefits and costs can be accurately computed, the choice of the discount rate figure may make the difference between acceptance and rejection. At stake in this choice may be the allocation of resources between private and public sectors of the economy. In general, evaluators resort to sensitivity analysis rather than commit themselves to a single value of the discount rate.<sup>14</sup> The same procedure is adopted in this dissertation.

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<sup>13</sup>The evaluator's task may be complicated due to changes in the social discount rate over time. Such changes may be the result of changes in the supply of capital funds. However, most studies use a single discount rate but may use sensitivity analysis to account for changes.

<sup>14</sup>Both Warr (1983 and 1985) and Choe (1975) use a range of values for the social discount rate.



## Costs and Benefits Relevant in a Cost-Benefit Analysis of an EPZ

### *Introduction*

In this section there is a discussion of costs that are likely to be relevant to a project evaluation of an EPZ. The way in which these costs are measured and likely problems are described.

Costs of a project, such as establishing and operating an EPZ, are the maximum alternative benefits sacrificed by carrying out this particular project. A project's costs consist of goods and services withdrawn from other parts of the economy for use in the project which, in the absence of the project, would not have been withdrawn.

Should the use of inputs for a project cause a reduction in total availability of those inputs (elsewhere in the country) corresponding exactly to their use by the project, then cost consists of actual physical inputs measured in value terms by the willingness to pay of other purchasers. In a situation where there is a corresponding increase in supply of inputs in response to demand created by the project, there may be no change in total availability of inputs to other users. In this case the project's cost is measured by the value of those goods and services whose availability to the rest of the economy declines because they are used up in producing inputs for the project. Apart from producer goods, foreign exchange, labour, and land are other inputs to be considered in the cost calculation. It is quite apparent that the nature and composition of costs will differ from project to project depending on the objective(s) and production process used. For example, a project aimed at generating employment is likely to use a labour-intensive production process, therefore, a large proportion of social opportunity costs may be related to the labour input.

Benefits of a project consist of goods, services, and/or foreign exchange that would not have been available in its absence. These benefits may be estimated by the value to consumers or producers of goods which add to the existing supply in the economy. If a

project's output merely substitutes for an alternative source of supply, leaving total supply unaltered, then benefits of the project are reflected by the value of resources set free from the alternative source of supply. For example, the benefit of an import-substitution project is net foreign exchange saved. Similarly, if a project produces output solely for the purpose of exports then benefits are the value of foreign exchange earned. An EPZ is a good example of this type of project. Measurement of foreign exchange benefits from an EPZ will be addressed later.

Just as in the case of costs, the nature of benefits will differ from project to project. Since this study focuses on EPZs, the cost-benefit analysis is not concerned with analysing net benefits derived by the host country's consumers and producers from purchasing the output of the EPZ. This follows from the observation that in most cases, and certainly in the case of Jamaica, output from EPZs is exported. In the case of an EPZ, the main benefits are in the form of employment, rental income, and probably foreign exchange. However, a good discussion of the measurement of benefits, when a project's output is consumed domestically, can be found in Dasgupta, Sen, and Marglin (1972).

### The Costs Associated with an EPZ

Major costs related to EPZs are the following: a) the social opportunity cost of labour (SOCL) used in the EPZ; b) development costs or in some cases the opportunity cost of land used by the EPZ; c) the opportunity cost of inputs employed in maintaining and operating the EPZ; d) the cost of subsidies, concessions and incentives; and f) externalities such as pollution, congestion and any other negative effects on local producers or consumers. Costs associated with locational trade diversion are also relevant.<sup>15</sup> Estimation of some costs is far more difficult than it is for others. The most elusive ones with respect to estimation are externalities. Sometimes it is a relatively simple matter to discern their presence and nature

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<sup>15</sup>See Grubel (1983 and 1985).

but an objective method of measurement is not likely to be available. Measuring the social opportunity cost of labour (SOCL) is invariably an involved procedure. An extensive literature exists on the topic. Measurement of other costs is usually a more tractable proposition subject mainly to data availability. There is a discussion below of how cost estimations might be approached, with a rather elaborate analysis of the SOCL.

### *The Social Opportunity Cost of Labour*

The terms social opportunity cost of labour, shadow wage rate, shadow price of labour, and economic opportunity cost of labour are used interchangeably in the literature, this paper also does so. The SOCL is the cost that a society incurs when a unit of labour leaves its current activities to work on a project. The value ascribed to the SOCL can influence the results of a cost-benefit analysis significantly. Therefore it should be chosen with care, especially in projects which generate many jobs.

Several alternative methods have been advanced for estimating the shadow wage rate (SWR) for labour in cost-benefit studies. They are presented below. In the most basic case, the SWR merely measures private opportunity cost of labour, that is, the marginal product of labour forgone in other activities as a result of its employment in a particular project. In conditions of high unemployment the SWR would be zero and not the market wage that is being paid, however, if there are seasonal fluctuations in labour one should be wary of such conclusions. Furthermore, no account is taken of the value of leisure to the unemployed nor that they might have a reservation wage.

Dasgupta, Sen, and Marglin (hence abbreviated as DSM) (1972) argue that three considerations determine the SWR: i) the direct opportunity cost; ii) the indirect cost; and iii) the redistribution of income. From a conceptual point of view direct opportunity cost is the simplest to handle but from an empirical perspective it is most difficult. The direct opportunity cost of a worker involved in a project is the social value of the forgone

marginal product. This might be as low as zero in situations of unemployment, but is represented usually by the wage in the traditional sector.

With regards to indirect costs, DSM argue that public projects are often financed by a transfer of income from capitalists to workers. For example, owners of capital may be taxed to finance a project that provides additional jobs for the poor. Indirect costs of labour are measured in terms of the decrease in investment resulting from transferring income from capitalists (who invest) to workers (who merely increase current consumption). If the present value of consumption that would be generated by investment is greater than the value of consumption by workers, the difference is an indirect cost that should be added to the direct opportunity cost.

Concerning redistribution of income, the transfer causes current consumption (by additional workers) to increase, but future consumption is reduced as a result of lower investment. If a higher weight is given to current consumption of additional workers than to reduced future consumption of capitalists, this represents a net gain to society. The effect reduces the SWR.

Apart from the problem of measuring the direct opportunity cost, measuring the shadow price of investment (the present value of consumption generated by a unit of investment) and assigning appropriate redistributive weights represent major obstacles for an analyst using the DSM approach. Also, abiding by Harberger's postulates conflicts with the idea of redistributive weights.

Another limitation of the DSM approach is the assumption that financing of public sector projects comes at the expense of private capital formation. It is quite possible that the project is financed from some other source such as international capital markets. Finally, this method fails to account for the value of leisure to the unemployed.

Little and Mirrlees (1974) represent the SWR by the formula below:

$$SWR = m + (c'-c) + (1 - 1/s)(c-m)$$

where  $m$  = the marginal product of labour.

$c'$  = additional resources (over and above the consumption of the wage earner) devoted to consumption such as transport costs and provision of urban overheads.

$c$  = consumption of the wage earner.

$c-m$  = excess of consumption over marginal product.

$s$  = value of uncommitted government income measured in terms of consumption committed through employment i.e. if  $s=3$ , this means that uncommitted government income is three times as valuable as consumption committed through employment. This might be due to the fact that uncommitted government income could be used in other ways to generate a greater PV of consumption.

$1/s$  = the social value of a unit of consumption committed through project employment, therefore, this type of consumption has a value of  $1/s$  of a unit of uncommitted government income.

$1 - 1/s$  = the loss in social value of committing a unit of income to consumption through project employment rather than having uncommitted income.

As can be seen, the Little-Mirrlees formulation of the SWR comprises forgone marginal product of labour, costs of transporting the worker and goods to the project, plus costs of having an extra amount  $c-m$  committed to consumption. It should be noticed that the last term in the formula vanishes if  $s=1$ , this occurs if resources committed to consumption through employment are of equal value to uncommitted income.<sup>16</sup> Little and Mirrlees also fail to include a value for leisure of the unemployed.

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<sup>16</sup>This would correspond to Harberger's third postulate.

Squire and Van der Tak (1975) propose the following formula for the SWR:

$$\text{SWR} = \text{Labour's forgone marginal product at accounting prices} + \text{Net social cost of increased consumption} + \text{Social cost of reduced leisure}$$

With respect to the forgone marginal product, if the labour market is quite efficient the market wage provides a fairly good estimate of the marginal product of labour at market prices, as well as forgone output. Applying this method may be unreliable if in response to every one job created by the project more than one individual leaves their current jobs (probably rural jobs) in an attempt to secure project jobs.

Squire and Van der Tak include the social cost of increased consumption in their SWR calculation in a similar way to Little-Mirrlees. There are two possible effects which may affect the SWR in offsetting ways. On the one hand, they argue that if the country has a growth objective this may be influenced by a project which pays increased wages to workers. Higher incomes may cause higher consumption and perhaps some increase in savings. Should consumption be considered less valuable than savings, this should be incorporated into the SWR calculation. The effect will be an increase in the SWR and a reduction in employment benefits from the project.

On the other hand, income distribution may be considered as an objective. In this case the degree to which the project provides income for poorer income groups should be shown to decrease the SWR thus increasing employment benefits associated with the project. Income distributional weights would be required as in the DSM method, however, applying Harberger's third postulate conflicts with this practice.

Squire and Van der Tak further argue that even if the consumption effect were ignored, using the marginal productivity of labour in alternative uses as an estimate of the

SWR may also be an oversimplification because in many cases people have a "reservation wage" and may actually choose to be unemployed. This reflects the value of leisure or the disutility of effort. If this consideration is acknowledged then the SWR of the unemployed is not zero. Squire and Van Der Tak point out that the World Bank traditionally concentrated on forgone output of labour in other uses when estimating the SWR. The implicit assumption is that growth, income distribution, and work-leisure preferences cancel out or may be ignored.

Jenkins (1979) analyses the economic opportunity cost of labour (EOCL) in a similar manner to Squire and Van der Tak. Jenkins derives the following formula for the economic opportunity cost of labour:

$$EOCL = p_a W + (1-p_a)V - (1-p_p)V$$

where  $p_a W$  is the product lost in alternative market activities now that the person works for the project.

$p_a$  is the proportion of time spent working in non-project related activities, if  $p_a=1$  then this represents a full-time non-project job.

$p_p$  is the proportion of time spent working on the project itself. If  $p_p=1$  this is a full-time project job.

$V$  is the value of time spent in non-market activities, that is, neither working in the project nor in non-project jobs.

The above formula reduces to:

$$EOCL = p_a W + (p_p - p_a)V$$

where  $(p_p - p_a)V$  represents the loss in non-market activities if the person works more hours on the project than when (s)he worked in a non-project job. If the person is working exactly the same amount of time in the project as (s)he was outside then  $p_a=p_p$  and OECL

is simply  $p_a W$ . If the individual was not working at all before the project but is now a project worker then  $p_a = 0$  and  $EOCL = p_a V$ .

Jenkins' method is elegant, but it does not account for net increases in consumption which may occur and may run counter to the country's growth objective. Jenkin's is thereby faithful to Harberger's third postulate. Apart from this, there is no great distinction between what Jenkins calls the EOCL and what Squire and Van Der Tak refer to as the SWR.

Harberger (1972) analyses what he refers to as the social opportunity cost of labour (SOCL) both with and without unemployment. In Harberger's opinion the ideal way to measure the SOCL would be to find each worker's supply price, that is, the minimum payment that would be accepted for a day's work. Even the involuntarily unemployed have a positive supply price since workers have a reservation wage below which they refuse to work. However, Harberger alludes to the infeasibility of discovering each supply price. Hence he concludes that other methods are required to approximate the SOCL.

Harberger notes that the SOCL relevant for a rural area project should be the going rural wage. While, for an urban project the prevailing competitive urban wage should be used. Traditionally it was argued that the SOCL on urban projects should also be equated with the going rural wage. The justification was on the grounds that creating urban jobs induces rural-urban migration and ultimately it is a rural job that is lost. Harberger argues that the differential between rural and urban wages, the latter being higher, is actually an equalizing one which accounts for higher cost of food, housing, and transportation in the cities.

The situation in which minimum wages apply for all urban jobs is also examined by Harberger. Such cases are often typified by persistently high rates of urban unemployment. Since the market determined equilibrium wage is not permitted to prevail, there is an "equilibrium" rate of unemployment instead which acts to regulate the flow of migration into



urban zones.

In response to a creation of urban jobs there is an initial reduction in the urban unemployment rate. Ultimately, however, the equilibrium rate will be restored as rural-urban migration is induced.<sup>17</sup> According to Harberger, migrants are on the margin of indifference between urban and rural life when the equilibrium rate of unemployment prevails. So, in this case the appropriate SOCL is the urban minimum wage (i.e. it is the supply price of workers) because this is the wage migrants use in their calculation when making the decision to move to the city.

For a city like Kingston, Jamaica, where a minimum wage and chronic unemployment co-exist, the urban minimum wage, as suggested by Harberger, might serve as an adequate proxy for the SOCL for the KFZ. This issue is raised again in Part B Chapter III.

Unlike some of the other approaches, Harberger does not consider the effect of increases in current consumption on a country's growth objective, neither does he consider the income redistribution objective. This is not surprising since such considerations would contradict his third postulate. Harberger's approach is open to criticism from those advocating the inclusion of these other effects. However, such critics would encounter the daunting task of justifying their choice of redistributive weights.

As is the case with the social discount rate, it can be seen that several methods exist for estimating the shadow wage rate. The one selected is likely to depend upon the nature of the project and the economy. The SWR will obviously differ according to: skill level; where the project's workers are drawn from; and the value the country places on income devoted to consumption relative to that devoted to investment.

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<sup>17</sup>This idea was developed by Harris, J.R. and M. Todaro (1970)

In his study of the Masan FTZ in Korea, Choe (1975) uses three different values for the SWR. He used one value calculated from the Little and Mirrlees method; one based on a generalized form of the Little and Mirrlees method which Warr advances;<sup>18</sup> and one equivalent to the going wage in the manufacturing sector. Warr's method provides the lowest SWR and the manufacturing wage the highest.

Warr, in his studies of the Jakarta (Indonesia) and Bataan (Philippines) EPZs, does not use any of the sophisticated methods discussed (not even his generalised version of Little and Mirrlees' method). In both cases he looks at various estimates of the opportunity cost of labour in the respective countries. He then defines a range for the SWR and uses sensitivity analysis to see how much difference each value makes to the NPV. With respect to skilled workers in the EPZ, he argues that their opportunity cost is equal to the wage paid to skilled workers outside the EPZ.

It therefore appears that unless evaluators have empirical or other reasons for choosing a particular SWR, prudence dictates that they try a few different values and examine how significant the differences are.

### *Development Costs*

The ease with which these direct costs can be measured is a function of availability and quality of data. These costs include the financial outlay required to finance the buildings and the infrastructure that supports the EPZ.

### *Opportunity Cost of EPZ Factory Space*

These costs are readily approximated by market rental rates of factory space in the vicinity of the EPZ. The assumption being that if the factory space were not used for the EPZ it could be rented out to other users at the market rate. However, if factory space (including land) was developed specifically for the project and was unusable before, the opportunity cost

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<sup>18</sup>See P. Warr (1973)

of factory space is reflected in development costs.

### *Maintenance and Operating Costs*

These direct costs are also relatively simple to evaluate if data are available. Included are wages paid to those maintaining and operating the EPZ, as well as any other input costs associated with these activities.

### *Subsidies, Concessions, and Incentives*

These costs arise because EPZ authorities wish to persuade firms to stay in or enter the EPZ. If financial outlays are made these can be measured subject to data availability and reliability. A subtle cost that should be mentioned in this category is the cost associated with providing loans to EPZ firms at preferential interest rates below the market rate. This cost can be estimated by multiplying the total quantity of loans by the interest rate differential.

Concessions in the form of rent reductions and tax holidays are taken care of in the section on benefits because they directly reduce benefits.

### *Externalities*

These costs are sometimes impossible to measure objectively despite being detectable. For example, pollution and congestion can be easily observed and their source identified but measuring the impact not so easy. In the final net benefit estimations these costs should certainly be mentioned. If their effects appear large, the evaluator might state that the NPV calculation should be reduced to account for this. The problem is finding an objective measure.

Similarly, production by EPZ firms might impact negatively on performance of local firms especially in circumstances where EPZ firms produce similar goods and compete for the same foreign or domestic markets. Once again these effects might be difficult to estimate. However, evaluators should conduct surveys on local firms that produce similar products as

EPZ firms. From these surveys they might obtain a range of estimates of how much these firms' profits have been affected by EPZ activities. Obviously profits may have decreased for other reasons, but if a systematic pattern is detected in profits of similar firms, before and after the EPZ came into operation, then they may have a case for attributing these costs to the EPZ.

Locational trade diversion is another cost that is virtually impossible to quantify. It arises as a result of firms inefficiently locating in the EPZ to gain entitlement to concessions offered therein. In a cost-benefit analysis of an EPZ, this cost is only relevant for domestic firms that locate within the EPZ since foreign firms bear this cost themselves and not local residents.<sup>19</sup> In a survey of EPZ firms, the evaluator can probably disclose the presence of this cost. Local managers should be asked whether in the absence of the EPZ they would still have chosen to locate around the same area. If their responses suggest that for other economic reasons they would have preferred alternative locations, then there could be scope to argue that the cost is significant and would influence the NPV calculation. This cost is usually most substantial when EPZs are used for regional development objectives, as was the case for the Bataan EPZ.

Although most of the costs in this section do not lend themselves to easy measurement, qualitative (if not quantitative) impressions of their significance can be deduced through surveys and questionnaires. Available studies on EPZs have not attempted to evaluate the impact of these externalities explicitly.

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<sup>19</sup> Locational diversion of investment may occur where the foreign firm actually gains, not only from EPZ concessions, but also because the EPZ is located in a superior area than would otherwise have been available. In such a situation the host country might fail to gain full benefits from the EPZ since it is (partially) occupied by investment that would have entered the country anyway. However, losses through inefficient location from the point of view of trading - locational trade diversion - may not occur. In fact, the EPZ may induce more trade from firms that have been diverted than if they had located in an alternative area.

## Benefits Resulting From an EPZ

The major benefits that result from an EPZ are: a) wages paid to local employees; b) foreign exchange earnings; c) technological transfers d) tax revenue; e) profit of local firms in the EPZ; f) rental and utility revenues; g) shipping revenues; h) the use of domestic raw materials; i) unofficial levies; j) spillovers (i.e. externalities). The estimation of each of these benefits is discussed briefly below.

### *Wages to Local Employees*

These are often the most significant benefits induced by establishing an EPZ. A major motivating force behind establishing an EPZ is the reaping of this type of benefit. As long as average wage rate data are available for each type of worker in the EPZ, estimating the total wage bill is a mere formality if one knows the total number of employees. Evaluators merely have to check EPZ employment statistics to obtain the numbers, however, if possible it is recommended that they should tour the zone and make a count to check the veracity of the official data. For one reason or another, firms might overstate (or understate in some circumstances) the level of their employment in order to obtain tax breaks or favours from government officials. To estimate future employment in the zone, the evaluator may have to use some type of trend, or ask firms about their growth intentions. The wages of foreign workers should not be included since these benefits do not accrue to the host country. However, their local expenditures should be included as a benefit.

To derive the net benefit from EPZ employment, the social opportunity cost of labour (summed for all workers) must be subtracted from the total wage bill.

### *Foreign Exchange Earnings*

The foreign exchange benefits from an EPZ can be measured as the product of net foreign exchange earnings (attributed to the EPZ) and the shadow exchange rate (SER). Choe (1975) explains that foreign exchange may be earned from the following sources:

1. Wage payments to domestic workers.
2. Sale of raw materials and intermediate inputs.<sup>20</sup>
3. Supply of utilities.
4. Taxes and rentals.
5. Foreign capital investments in cash.

Most of these benefits (already done for wages) will be outlined separately, so there will be double counting if they are counted again as foreign exchange earnings. For example we have already accounted for wage payment in the above section, it would be double counting to also include the foreign exchange value of wages as another benefit. However, to the extent that the domestic currency is overvalued there may be gains. This will be discussed below.

Sources of foreign exchange outflow are:

1. Dividend payments on equity held by foreigners.
2. Wage payment to foreign employees.
3. Liquidation of foreign equity holdings.

Warr (1983 and 1985) argues that foreign exchange is earned from exports of finished goods and expended on imports of raw material and capital goods. In the case of foreign-owned firms, however, transactions between firms in the EPZ and those abroad are essentially irrelevant to the calculation of the host country's net gain from the EPZ. Warr postulates that foreign exchange transactions will have balance of payments implications if

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<sup>20</sup> It is necessary to subtract the direct and indirect import content from the sale of goods and services to derive the net earnings in foreign exchange.

foreign currency earned is retained in the host nation's banking system, but from the perspective of economic welfare, these accounting effects are essentially irrelevant. The foreign exchange as well as interest generated is still the possession of foreigners, consequently, it does not augment consumption of domestic residents. Nevertheless, to the extent that domestic interest rates are below the return on investment, there could be a social gain from the retention of EPZ firms' foreign exchange in the domestic banking system. If foreigners are not constrained concerning where to keep their funds, this effect is likely to be negligible. However, should foreigners be forced (by the domestic authority) to maintain their earnings locally, they are effectively being taxed. In such cases, the evaluator should estimate the difference between domestic interest actually earned and what could be earned in the best alternative. The difference represents a net gain to the host country.

A further gain to the host occurs in circumstances where exchange controls and domestic protection cause the social value of foreign exchange in terms of the domestic currency to exceed the official exchange rate. Here, foreigners are still being effectively taxed whenever they exchange their foreign currency to carry out local transactions.

To the extent that the domestic currency is overvalued, the social value of additional traded goods which the host can purchase with the foreign exchange received exceeds the social value of the goods and services foreigners receive from the host in return for the foreign exchange relinquished. Such net gains to the host can be estimated by multiplying the quantity of foreign exchange received from EPZ activities by the difference between the shadow exchange rate (SER) and the official exchange rate (OER)<sup>21</sup>.

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<sup>21</sup>This can also be accomplished by multiplying the domestic value of the foreign exchange (using the OER) by  $(SER/OER - 1)$

## Estimating the SER

An estimate of the SER can be obtained using the following formula: <sup>22</sup>

$$\text{SER} = (P_T/P_D)\text{OER}$$

Where  $P_D$  is the market clearing price of imports in the domestic country.

$P_T$  is the protection inclusive price of imports in the host country. Since  $P_D < P_T$ , the domestic demand price exceeds the market clearing price so domestic residents are paying more than the market clearing price for imports.

For example, assume that the OER between Canada (C) and Jamaica (J) is J\$4 = C\$1. If Jamaica imports only one good from Canada with a market clearing price of C\$10, then Jamaicans should be able to purchase it for J\$40. However, if import restrictions result in the Jamaican price rising to J\$50 (with no other type of restrictions), it means that C\$10 of Canadian exports have to be purchased for J\$50. As a result the exchange rate (ceteris paribus) is effectively J\$5 = C\$1 instead of the official exchange rate (J\$4 = C\$1). In a cost benefit analysis where imports are valued in J\$, the appropriate SER is J\$5 = C\$1.

A general approach to estimating the SER can be represented by the following formula:

$$\text{SER} = \sum_{i=1}^n f_i P_i^T / P_i^{\text{cif}}$$

where imported goods are classified from 1 to n.  $f_i$  is the fraction of foreign exchange allocated to import  $i$  at the margin.  $P_i^T$  is the domestic market clearing price of import  $i$ .  $P_i^{\text{cif}}$  is the c.i.f. price of import  $i$  calculated at the OER.

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<sup>22</sup>It should be noted that this formula does not represent purchasing power parity (PPP) which focuses on the ratio of price levels in two countries evaluated at the OER. The PPP approach is appropriate when factors that cause price differentials are completely monetary, as in the case of differential rates of inflation in the two countries under consideration. Cost-benefit analysis attempts to evaluate alternative projects in "real" terms. (See Harberger (1972) for a more detailed discussion.)



This approach involves using the weighted average of the ratios of domestic market clearing prices of imports to c.i.f. prices evaluated at the OER. The weights are the fractions of foreign exchange allocated at the margin to the various imports. <sup>23</sup>

Choe (1975) uses a similar method for estimating the SER, Choe's version of the formula is:

$$\text{SER} = \text{OER}(1 + \text{IT}/\text{I})$$

I = the value in domestic currency of total commodity imports (cif).

IT = import tariff revenue in domestic currency.

Choe's approach yields the same results as the above approach. The approaches described above are based on the assumption that domestic demand price (marginal willingness to pay) equals the tariff inclusive import price. The ease with which these formulae can be used in a study depends upon the complexities of the tariff structure. It should also be borne in mind that import tariffs can be offset by subsidies to domestic consumption of traded goods.

### *Technological Transfers*

Technology transfer is commonly cited as a source of benefit conferred upon the host by an EPZ. In most cases this benefit is trivial due to the fact that technology is either heavily protected or is very basic and readily available in the host country.

The training of workers and supervisory personnel is a more likely source of benefit. If workers receive training in the EPZ and subsequently shift to non-EPZ employment, there is a benefit from the EPZ which is not reflected in the wages actually paid there.

Even in the presence of sizable technology transfers, the evaluator faces the formidable task of attempting to measure benefit in terms of domestic currency. In such a case the evaluator should emphasize that net benefits could be noticeably raised if technology were

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<sup>23</sup>See Dasgupta, Sen, and Marglin (1972), and Harberger (1972).

included.

Both Warr and Choe opt to disregard technological transfers in their analyses. They share the view that EPZ technology is in no way superior to that available in the host country. The same approach is taken in this dissertation when the KFZ is evaluated.

### *Tax Revenue*

Taxes collected from EPZ firms represent a clear source of benefit. In practice, however, most zones offer generous tax holidays which offset the potential gain. Moreover, in cases where taxes are levied one tends to find a high incidence of loss-making EPZ firms due to manipulation of cost and revenue data.<sup>24</sup>

Warr (1983) incorporates "informal levies" into his calculations. Unofficial levies are "under the table" payments made to customs officers and other officials to ensure smooth customs clearance. Warr finds the influence of these to be so strong in Jakarta that when he omits them from his calculations the NPV changes from being positive to negative. He does not make the same discovery in Bataan. Choe makes no mention of unofficial levies in his work nor do Andic and Cao.

Whenever evaluators detect the presence of unofficial levies they may be able to approximate the annual value by asking EPZ managers and/or officials. Luck permitting, an estimate might be made of unofficial levies per dollar of imports and exports. This can be used to approximate gains on annual customs clearances.

It should be noted that in this situation the "fruits" of illegal deeds are being counted as benefits. Some may find this objectionable, arguing that there is a concomitant social cost.

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<sup>24</sup>See Warr (1983 and 1985).

### *Profits of Domestic Firms*

Profits (losses) accruing to any domestically owned EPZ firms are a benefit (cost) accruing to the host country. If domestically owned firms are identified these net benefits are estimable using financial statements and/or questionnaires given to firms.

### *Rental and Utility Revenues*

If rental and utility rates paid by EPZ firms exceed market rates faced by non-EPZ users (in the same district), the difference represents a clear gain to the host because EPZ rates exceed the opportunity cost. On the other hand, if EPZ firms pay lower than market rates they are being effectively subsidized resulting in a negative net benefit to the host. With respect to EPZs, like the KFZ, where the land was not available for use prior to construction, development costs serve as a measure of opportunity costs. To avoid double counting the market rental rate should not be also included as an opportunity cost.

### *The Use of Domestic Raw Materials*

The use of domestic raw materials by EPZ firms may result in a benefit if the domestic price exceeds the social opportunity cost of raw materials. The cif import price is a good proxy of the social opportunity cost. Therefore the following calculation can be made:

$$\text{Benefit} = (\text{domestic price} - \text{import (cif) price})\text{VDM}$$

where VDM = value of domestic raw materials purchased by EPZ firms.

It should not be overlooked that whenever domestic inputs are sold to EPZ firms at subsidized rates, which is not unusual, this represents a cost.

### *Spillovers*

The arguments here follow the same line of reasoning as those given in the externalities section in the earlier discussion of costs. The principal spillovers being considered are: a) increases in employment and profits of non-EPZ firms which supply inputs to the EPZ or have any other dealings with the KFZ; b) multiplier effects of increased domestic expenditure

made by EPZ employees and firms.<sup>25</sup> The size of these gains can probably be estimated by surveys of the relevant non-EPZ firms to discover the degree to which their profits and employment have risen due to the EPZ. Employment benefits can be measured as mentioned earlier. If there are reliable estimates of the domestic expenditure multiplier(s), the evaluator might be able to approximate expenditure effects.

### Risk and Uncertainty

#### *Likelihood of the EPZ not being Responsible for Inducing Investment.*

In cost-benefit analyses of EPZs, a major uncertainty to contend with is that of determining whether (foreign) capital in the EPZ would have been attracted to the host country in the absence of the EPZ. The *raison d'être* of an EPZ is to attract investment that would not have been forthcoming otherwise. However, it is quite possible that other domestic or international factors are in operation that might have attracted the investment with or without the EPZ. If this is the case, investment in the EPZ is merely diverted from where it would otherwise have gone so the net benefits (such as employment benefits) should not be attributed to the EPZ *per se*. The host country undeniably receives the net benefits but the EPZ cannot be given the credit. If, on the other hand, it can be demonstrated that in the absence of the EPZ some (or all) of the investment would not have occurred, some portion of net benefits is attributable to the EPZ. This amounts to saying that the EPZ increases the rate of return above that prevailing elsewhere in the economy and induces incremental investment (that would otherwise not have been attracted) into the country as a result. The lower the degree of locational diversion of investment, the greater are net benefits.<sup>26</sup>

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<sup>25</sup> The multiplier is not used on opportunity costs because they do not represent net withdrawals of expenditure from the local economy. For example, if the opportunity cost of labour is foregone leisure, if this worker obtains employment in the EPZ there would not be a decline in local expenditure. The value of foregone leisure should be included as a cost but not as a multiplied contraction in expenditure.

<sup>26</sup>This issue is discussed at much greater length in Part B Chapter II.

### *Dealing With Other Risks and Uncertainties*

It is inevitable that real world projects are undertaken in risky and uncertain environments. For example, when an EPZ is established, the host country cannot be sure of: how many investors will be attracted; the origins of such investors; how many workers will be employed; what economic and political changes may occur domestically or internationally; etc. The net benefits of the project are likely to differ significantly depending on which states of nature prevail.

Approaches to dealing with such risks may involve either

- a) using conservative estimates of costs and benefits, that is, attempting not to overstate benefits and understate costs;
- b) adding a risk premium to the social discount rate thereby attaching lower weights to future net benefits and reducing the NPV. The main problem here is to decide on the appropriate risk premium.

In practice, if analysts are uncertain about values of some costs and benefits, or about the social discount rate, a standard procedure is to estimate the NPV under different scenarios. Such a practice is termed sensitivity analysis and is the topic of the following section.

### *Sensitivity Analysis*

Sensitivity analysis can be employed to demonstrate how NPV and IRR vary with changes in the value of any variable in the net benefit calculation. Its representation may either be as an absolute change in NPV or IRR, divided by a given percentage or a given absolute change in the variable, depending on which seems more appropriate. The degree of sensitivity can be expressed as follows:

$$\text{Degree of sensitivity} = X \cdot dNPV/dX$$

where  $X$  is the chosen value of the variable.

The variable might be the price of an input. Sensitivity analysis might record that a 10% change in the input price leads to a 1% change in the IRR or a \$100 dollar change in NPV. Perhaps the most useful way to give the results of a sensitivity analysis is to record what absolute or percentage change in the variable(s) is required to make  $NPV = 0$ . The assumed absolute value of a variable that makes the  $NPV = 0$  is called the switching value. For example, the IRR is the switching value for the social discount rate.

This type of analysis can be used to illustrate the degree to which a project is marginal. Should a small variation in the price of an input or output eliminate a positive NPV, the project is clearly marginal. Sensitivity analysis can also be used as an indicator of a project's riskiness. For example, if the evaluator's estimate of a variable is a mere guess (such as the future value of the social discount rate), where the true value could fall within a wide range, it is important to check the sensitivity of NPV to different values of the variable falling in the relevant range. If NPV is sensitive the project is risky. The more important is the variable (in terms of value), and the nearer it is to the present, the more sensitive is the NPV to any percentage change.

The technique of sensitivity analysis is commonly used with regards to variables like the shadow wage rate and the social discount rate which evaluators are normally uncertain about. It is also used extensively in Part B Chapter III because of the intractability of separating locationally diverted investment from incremental investment. It is also used to see how sensitive the results are to various values of key parameters.

## Summary and Conclusions

The purpose of this chapter is to provide a basis which facilitates the performing of cost-benefit analyses of EPZs and other projects. The philosophical foundations of cost-benefit analysis are discussed. Most of the methods and value judgements presented are those advanced in the leading works on this subject. The analysis makes it clear that numerous types of costs and benefits are relevant, some more obvious and direct than others, and others easier to measure than some. The evaluator is presented with quite a challenge when such a study is undertaken. A high degree of technical economic knowledge in conjunction with common sense are prerequisites for successfully carrying out a study of this nature.

Having detected the range of costs and benefits associated with an EPZ, the evaluator must estimate them for each year (using the techniques discussed), and express them in real terms. It is also incumbent upon the evaluator to select the most reasonable estimates of future costs and benefits, which are crucial to the calculation. Projects are typically characterized by having large costs in early periods but benefits which accrue mainly in the future. Forecasting techniques can be employed to determine future values, otherwise, as is often done, it can be assumed that future values will be approximately equal in real terms to those of the present.

Once the hurdle of determining net benefits has been cleared, it is then necessary for the evaluator to select the most appropriate social discount rate(s) – perhaps with the aid of sensitivity analysis. The evaluator may also have to make other adjustments to account for risk and uncertainty. The path is then clear to generate a value, or range of values, for the NPV or IRR of the project.

Cost-benefit analyses can prove to be important because when projects are being considered many of the costs and benefits are inconspicuous, estimation might require the use of sophisticated techniques. For example, project promoters may only consider private costs

and benefits in their planning, however, a wise and prudent evaluator will account for the full social costs and benefits. It is quite possible that net social benefits may differ significantly from net private benefits.

Current international trade theory does not enable economists to be conclusive on the issue of whether EPZs confer net welfare augmenting effects on the host country. Hence, empirical investigation is required to help resolve the issue in each particular case. Important insights have been received by the author from researching the major contributions to the literature on cost-benefit analysis. The procedures analysed in this chapter provide invaluable assistance in the evaluation of the Kingston Export Free Zone in Jamaica that takes place in Part B.



**PART B**

**THE DEVELOPMENT, INCENTIVES, AND COST-BENEFIT ANALYSIS OF THE  
KINGSTON EXPORT FREE ZONE**

## CHAPTER I

### THE ORIGINS AND DEVELOPMENT OF THE KFZ

The concept of a Free Zone in Jamaica originated in 1973 when the Port Authority of Jamaica (PAJ) embarked upon its development programme for the Port of Kingston. The PAJ is a statutory body whose principal aim is to provide, regulate and operate the port facilities in Jamaica. Back in 1973 the objective of the PAJ was to set up a modern containerized trans-shipment terminal with a Free Zone where warehousing and "break bulk" activities could be carried out.

In 1976, during the years of the Michael Manley led People's National Party (PNP) Government, the PAJ created the KFZ on land bordering the trans-shipment terminal. However, it was not until February 1980 that the law defining its legal status was passed. The KFZ is situated on land that has been reclaimed from the sea which puts it right on the water's edge. The PAJ also saw the KFZ as part of a plan to stimulate commercial and industrial activity which would eventually result in increased shipping traffic. The project was based on recommendations of a UNIDO-supported feasibility study conducted in 1975.

The laws governing the KFZ were initially laid out in the Kingston Export Free Zone Act of 1980. This Act has now been replaced by the Jamaica Export Free Zones Act of 1982 which outlines: a) responsibilities and functions of the PAJ; b) operations permitted within the Free Zone; c) licences required; and d) banking and foreign currency activities. Apart from the specific exemptions provided to KFZ firms, all other Jamaican laws prevail within the Zone.

The PAJ had built 28 Standard Factory Buildings (SFBs) by the end of the 1981 Fiscal Year, using its own financial resources in addition to funds borrowed from the Jamaica National Investment Corporation (JNIC). This amounted to 176,000 sq. ft. of factory space for 18 tenants, most of whom were warehousing or light manufacturing firms. The PAJ looked

upon the KFZ as a profit-making venture, therefore a conscious attempt was made to minimize staff overhead.

There is no evidence to suggest that the KFZ was established to satisfy the demands of lobby groups as may sometimes be the case. It appears that it originated as a quiet commercial venture by the PAJ, on land it developed adjacent to the trans-shipment terminal. Originally, the KFZ's prime attribute was its ideal location at the port adjacent to the best trans-shipment terminal in the region. Even if the KFZ had not developed into the major industrial centre that it is at the moment, its facilities could still have been used for warehousing. As a result the Port of Kingston may still have been an attractive shipping zone increasing revenues of the PAJ.

At the end of 1980 the Jamaican Labour Party (JLP), led by Edward Seaga, gained control of the political apparatus in Jamaica. Soon after, Jamaica embarked on a World Bank assisted Structural Adjustment Programme aimed at diversifying the country's export base and relieving dependence on the declining bauxite/alumina sector. The expansion of the KFZ was envisioned as a means by which manufacturing exports could be stimulated. The Government of Jamaica and the World Bank then became involved in the development of the KFZ. A World Bank loan package valued at US\$13.5 millions was negotiated and arranged.

In February, 1982, the PAJ established a limited liability company, Kingston Free Zone Company Limited (KFZC), to operate the Zone as its subsidiary and agent in carrying out its responsibilities under the law. It was expected that the PAJ's ownership would decline from 100% to 60% by the end of the project implementation period reflecting the Government's equity contributions to the project.

The principal objectives of the KFZ project, from the point of view of the Government, were to promote exports, generate foreign exchange earnings, and create new employment opportunities in the vicinity of one of the highest unemployment areas in

Kingston, namely the South Kingston area.

As an export promotion strategy the KFZ was designed to:

- a) attract foreign investors;
- b) provide a demonstration of the country's potential to domestic industries;
- c) create backward linkages to domestic supply of materials and components;
- d) provide training in technical skills, management, international marketing and quality control for domestic employees; and
- e) stimulate technical/financial contacts with foreign firms.<sup>1</sup>

To gain some insight into the pace at which development occurred, an interview with a senior security officer, Mr. Gladstone Smith, was carried out. Mr. Smith is one of the most senior employees of the KFZ in terms of years of employment. He started working in September 1976 when the KFZ was officially given Free Zone status. He explained that:

At that time there were only a few buildings and the sea. There were six warehouses (SFBs) in 1976. Construction continued in 1977-78 and other investors entered. Apart from the first firm to enter the Zone, which was Lawrence Manufacturing, the new entrants like the old were mainly involved in warehousing. The facilities also changed hands regularly as investors came and went. In the 1979-80 period things became stuck as uncertainty amongst investors set in due to the political climate. In 1981-83 there were signs of development again. However, the major thrust in development came between 1984 and 1986.

The major thrust between 1984 and 1986 is conspicuous if one observes growth of employment, square footage rented, the number of KFZ firms, and the US\$ value of KFZ exports and imports. These data are presented in Table BI.1 below. Table BI.2 presents data on certain Jamaican variables so that the size of the KFZ relative to the economy as a whole can be observed. By comparing the two tables, it can clearly be seen that the KFZ is very small relative to the economy as a whole. An analysis of the KFZ is a marginal analysis so changes in KFZ variables are unlikely to have significant repercussions on the

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<sup>1</sup>See World Bank (1982a).

rest of the economy.

TABLE BI.1

The Number of Employees, the Number of Firms, the Square Footage Rented in the KFZ, and the US\$ Value of KFZ Exports and Imports (in US\$millions) 1980 to June 1987.

Year	1980	1981	1982	1983	1984	1985	1986	1987
Employees	496	240	875	960	3134	5084	8300	10500
Firms	11	15	14	9	13	17	19	19
Sq.ft(000s)	119	186	186	216	371	518	650	750
Exports	n/a	n/a	14	14	19	43	70	n/a
Imports	n/a	n/a	16	12	23	40	55	n/a

Source: KFZ Statistics.

TABLE BI.2

Data on Population, Employment, Exports, Imports, GDP, CPI, and the Exchange Rate for Jamaica from 1980-87.

Year	1980	1981	1982	1983	1984	1985	1986	1987
Population (in millions)	2.17	2.2	2.23	2.27	2.30	2.34	2.37	n/a
Employment (000's)	737	761	756	734	778	782	796	n/a
Unemployment (000's)	260	254	287	256	266	253	266	n/a
Exports (US\$m)	963	974	726	424	564	555	596	647
Imports (US\$m)	1171	1473	1372	859	903	1135	964	1204
GDP in (1980 J\$)	4750	4869	4916	5015	4996	4764	4873	n/a
CPI	100	112.7	120.1	134	171.3	215.3	247.8	264.3
Exchange rate	1.78	1.78	1.78	3.28	4.93	5.48	5.48	5.50

Source: International Financial Statistics and ILO Labor  
Statistics.

In an interview with Mr. Byron Lewis, the first KFZ General Manager, he said:

In the early days the KFZ could not pick and choose between investors because the degree and method of promotion was inadequate. Demand for KFZ facilities was mainly for purposes of warehousing which did not create much employment. Later, in response to new methods of promotion, the KFZ was able to be more selective as more and more investors expressed interest. Light manufacturing labour-intensive industries were given highest priority.

Table BI.1 above reflects that over time more labour-intensive operations were given preference by KFZ management. This can be detected by comparing the pattern of increase in employment with that of the number of firms. In 1982 there was a large jump in KFZ employment but a decline by one in the number of firms. In 1983 employment continued to rise while the number of firms declined by five. This 1982-83 period saw the entrance of other garment manufacturers, a food processing company and an animal feeds manufacturing company. These companies were more labour-intensive and their manufacturing activities occupied more SFBs than the warehousing companies they were replacing. This provides an explanation of why square footage rented increased while the number of firms decreased. Table BI.1 reveals that after 1983 the number of firms increased but employment increased at a quicker rate reflecting the movement towards labour-intensive garment manufacturing. It may be no surprise to note that there are currently no warehousing firms operating within the KFZ, while 12 of the 19 firms are garment manufacturers employing over 90% of the workers.

#### Facts on the KFZ Today

The KFZ currently has 19 firms. The following table summarizes: a) the country of origin of firms; and b) the percentage of total employment created by firms from different countries.

TABLE BI.3

Number of KFZ Firms from Each Country and the Percentage of KFZ Employment Attributable to Firms of Different Origins (1987)

Country of origin	#Firms	%employment
USA	8	17
Hong Kong	7	74
Jamaica	2	3
India	1	5
Hungary	1	1
TOTAL	19	100

As far as the number of firms is concerned, the USA and Hong Kong dominate with eight and seven respectively. However, Hong Kong firms are the principal employers. East Ocean Textiles of Hong Kong employs over 50% of the KFZ work force in its three KFZ companies. East Ocean has two garment factories. It has also set up a box making factory to protect it against unreliability of local box manufacturers, now it supplies other KFZ firms with boxes.

As mentioned earlier, 12 of the 19 firms are engaged in production of garments and employ about 89% of KFZ workers.<sup>2</sup> Table BI.4 below shows production activities of all KFZ firms. Apart from garment production, activities of KFZ firms are quite diversified. A zone is more likely to succeed in the long run if production activities are diversified since its fate will not be determined by the fortunes of one product/market.

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<sup>2</sup>Source: Kreye, O. etal (1987).



TABLE BI.4

Production Activity of KFZ Firms

Type of Production	#Firms
Garments	12
Electrical Equipment	1
Animal Feed	1
Ethanol	1
Candies	1
Food Processing	1
Pharmaceuticals	1
Boxes	1
TOTAL	19

All KFZ output is exported, except for some of the output of the Jamaican owned firms. Table BI.5 shows the destination of exports. The table shows that all companies, except the box company, export to the USA. One company exports to Europe as well and another to the Caribbean (excluding Jamaica).

It is estimated that approximately 95% of KFZ workers are female. A survey of 14 KFZ firm managers was carried out in an effort to explain the predominance of females. The following table contains the explanations given (it was possible to give more than a single explanation).

Table BI.6 suggests that on the whole the skills, attitude, and aptitude of women are more suitable to the type of light manufacturing activities of the KFZ.

TABLE BI.5

Destination of Exports from the KFZ

Country	#Firms
USA	18
Europe	1
Jamaica	1
Caribbean	1
KFZ	1

TABLE BI.6

Reasons for the Predominance of Female Workers in the KFZ Based on Survey Results

Reason given	#Firms
Women are more dextrous/patient/attentive	5
Women are the majority of applicants	3
Traditional to employ women	2
Women are better at repetitive tasks	2
Women adapt more quickly	1
Jamaican man is too 'macho'	1

The size of the labour force and the types of activities carried out in the KFZ have certainly undergone changes in its short 11 years of existence. The popularity of the KFZ has risen, thereby raising the bargaining power of the authorities relative to investors. The authorities are in a better position to be able to determine the type and mix of operations

that are carried out within the Zone. The promotion of the Zone and the attractive incentives available are in large part responsible for the greater control now enjoyed by KFZ authorities. These incentives are discussed later.

The KFZ has expanded at a faster rate than was anticipated. As a result, increased pressure is placed on the infrastructure which was not set up to handle such growth. The performance of the KFZ has caught the eye of many who initially viewed it as a struggling project and a possible "white elephant". It is taken seriously by different interest groups. Investors now find the KFZ attractive and are seemingly less "foot-loose", this is to some extent reflected by the number of light manufacturers which have made fixed investments and would not be able to withdraw as readily as warehousemen. Therefore, the KFZ is a more stable arena of activity. The unemployed see the KFZ as a source of employment and training and flock its gates in a quest for jobs. The politicians from both parties argue and engage in disputations concerning who deserves credit for the apparent success of the KFZ. The People's National Party claims that the ground was broken under its administration while the Jamaica Labour Party maintain that progress was made only since it came to power. Some activists see the KFZ as a den of exploitation which is likely to perpetuate the position of women on the lower echelons of Jamaican society.<sup>3</sup> Foreign leaders who are contemplating establishing zones in their own countries have sponsored visits to the KFZ and studied the apparent reasons for its success. Whatever the nature of one's interest, the KFZ has developed into a large area of industrial activity and every day it impacts upon the lives of more Jamaicans. In fact the "Free Zone" has become a household term in Jamaica.

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<sup>3</sup>See Dunn (1987).

## CHAPTER II

# THE INCENTIVES AND PROMOTION OF THE KFZ AND THE RESPONSE OF INVESTORS

### Introduction

This chapter examines the incentives given to KFZ firms relative to what they would receive elsewhere in Jamaica. Such incentives cause a difference between the rate of return in the KFZ and that elsewhere in Jamaica. In the process the rate of return in the KFZ also rises above that in some locations outside Jamaica. Supposedly this attracts incremental investment to Jamaica, resulting in a variety of net benefits that would not have been forthcoming otherwise. Net benefits are described in the cost-benefit analysis in Part B Chapter III, which is the main contribution of this dissertation. If some of this investment would have occurred in Jamaica in the absence of the KFZ, the KFZ should not be given credit for net benefits from such diverted investment.

A simple economic model is used to show how higher returns of the KFZ increase the rate of investment in Jamaica. Due to problems associated with measuring the elasticity of supply of investment, the level of investment, and degree to which the KFZ increases the rate of return, it is not possible to empirically estimate the incremental investment caused by the KFZ. However, results of questionnaires and interviews are used to cast light on the importance of KFZ incentives and which investors would not have chosen Jamaica in its absence.

## The Relative Importance of KFZ-Related Advantages

It was stated in Part A Chapter I that FTZs are often the result of lobbying from exporters and other domestic producers who are forced to pay duties on imported inputs. However, there is no evidence that this was the case in Jamaica. In fact, due to the Industrial Incentives Law of 1956 (inaugurated to encourage the establishment and protection of domestic industry), manufacturers in Jamaica receive several concessions anyway. These include importing capital goods, raw materials and intermediate goods without duty, and generous tax write-offs after a ten year income tax holiday. In the presence of such concessions one may wonder why a FTZ was required to encourage further exports. If it cannot be shown that the KFZ offers additional benefits over other Jamaican locations, then any benefits accruing from (foreign) investment within the KFZ should not be attributed to the KFZ. The following discussion describes the additional benefits provided by the KFZ.

For a foreign investor deciding between EPZs in different countries, three types of incentives are of importance, namely, a) zone-related incentives, b) zone-specific incentives, and c) country-related incentives.<sup>1</sup> Only zone-related incentives should be considered "true" incentives offered by a particular EPZ in a given country since these are the only ones unavailable outside. However, for obvious reasons, EPZ promoters often attempt to present all incentives as EPZ-related. McDaniel and Kossack have constructed a model in order to evaluate the financial benefits to users of EPZs. Their analysis identifies the zone-related benefits to be measured. The final decision to locate within an EPZ or not is reduced to a capital budgeting problem in which investors compare costs of (re)locating within the EPZ with the value of zone-related benefits.

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<sup>1</sup> See McDaniel and Kossack (1985) for a detailed discussion of these incentives. To avoid confusion, McDaniel and Kossack's definitions of types of incentives are used in this dissertation.

Zone-related incentives/benefits are defined by McDaniel and Kossack as "those advantages which are directly consequent to specific operations within an FTZ which would not be available if those same operations were conducted without access to an FTZ". These advantages are unavailable in non-FTZ activities. Such incentives might arise due to legislation - for example, lower tariff rates or the option to defer tax payments - and due to savings relating to security, faster customs clearance and less red tape of all sorts.

Zone-specific incentives are advantages associated with a particular EPZ within a country, such as proximity to ports, airports, etc.; ease of access; community cultural activities; and availability of public utilities. These factors certainly have a bearing on the location selected by an investor, however, they are not zone-related because they are available to firms whether or not they choose to operate within the EPZ. They are merely the advantage of one location in a country as opposed to another, so they cannot be considered as true benefits of the EPZ.

Country-related incentives account for favourable aspects of a country (excluding the EPZ) that make investors prefer it to other countries. They include climatic conditions; proximity to a large international market such as the USA or the EEC; english-speaking population; and favourable international trade agreements. These do not qualify as zone-related advantages since a firm need only locate in that country to gain access to them.

In the case of the KFZ, the zone-related benefits include: i) freedom to repatriate 100% of profits; ii) 100% tax holidays in perpetuity; iii) reduced amount of red tape and faster clearance of imports and exports; iv) the greater degree of physical security; v) being in the limelight so that politicians are more responsive to requests; and vi) a way for foreign investors to become acquainted with Jamaica with fewer perceived risks.

The freedom to repatriate 100% of profits is clearly important. If the Jamaican Government were to restrict firms' privileges to move their profits and foreign exchange at

will, this would be effectively a tax on firms. In a country where foreign investors feel the political situation could easily destabilize, they place great value on being free to repatriate profits. Furthermore, this incentive is crucial to the extent that foreign firms exporting from the KFZ are not required to hand over their foreign exchange earnings from exports to the Central Bank. They can retain these funds abroad and use them to finance their raw material imports into the KFZ. Therefore, the shortage of foreign exchange in Jamaica does not act as a constraint on foreign investors in the KFZ who escape the chore of competing for available foreign exchange in the weekly auction. Non-KFZ firms are not as fortunate. They have to encounter uncertainty, paperwork, and delays associated with the auction and cannot be sure that their bids for foreign exchange will be met. There is little doubt that this KFZ-related incentive is important in luring investors.

The 100% tax holiday in perpetuity is an incentive available only to KFZ companies. Export manufacturers outside the KFZ have a 100% tax holiday for ten years only. However, after ten years they still have access to generous write-offs. Furthermore, transfer pricing, renaming the company and setting up again after ten years, and other methods can be used to circumvent any taxes that might be levied. These facts reduce the importance of this incentive as a KFZ related one, nevertheless, companies in the KFZ still have a net advantage since they never have to devote resources to paying or avoiding taxes.

With respect to customs clearance, KFZ companies are guaranteed faster clearance with reduced red-tape. Customs officials check their shipments soon after they arrive ensuring that they are available to firms with little delay. Similar treatment is given to KFZ shipments leaving Jamaica. Such preferential customs treatment saves time and reduces delay-induced costs. It facilitates planning ahead and reduces inventory costs. Non-KFZ companies are forced to go through the normal customs procedures which are subject to lengthy, unpredictable and variable delays.

There is scope for arguing that by giving preferential treatment to KFZ companies greater queuing costs are imposed upon non-KFZ firms and individuals. However, the KFZ's use of customs services is very small as a percentage of total usage in Jamaica. Moreover, non-KFZ users already face costs due to delays of varying length so it is unlikely that the KFZ's activities make any noticeable difference. Therefore, these costs are assigned a value of zero in the cost-benefit analysis.

The KFZ is completely fenced in and is patrolled by numerous security guards. Entry and exit from the KFZ are monitored very closely to ensure that employees, managers, and visitors declare all items brought in or taken out. In addition, KFZ companies have their own security systems to reduce break-ins, employee thefts, and insurance payments. The manager of one garment producing company explained that his company formerly operated outside the KFZ but entered solely for security reasons. Non-KFZ companies may provide their own security but they have to settle for less or incur greater costs to attain the same level of security as KFZ companies. KFZ companies enjoy not only their own security but also that provided by the zone authorities plus the positive externalities derived from security provided by neighbouring companies in the zone. Security is definitely an important KFZ-related benefit. Since the rental payments by firms cover the cost of security, the main benefits of being in the KFZ are due to economies of scale.

The fact that KFZ companies are in the limelight is a definite advantage to them. Politicians are extremely keen to obviate any disruptions and problems associated with the KFZ because the KFZ represents a conspicuous example of their endeavours to alleviate chronic unemployment. KFZ managers communicate directly with key politicians and have their requests dealt with promptly. Such an option is not open to the typical non-KFZ exporter. The benefit is greater stability and predictability of the legal and economic environment.



Costs of dealing with red-tape, security problems, foreign exchange regulations, and other restrictions represent a trade barrier just as tariffs and quotas do. They increase the price of imports used as inputs and production costs generally. They thus reduce competitiveness. The KFZ is therefore typified by lower trade barriers than the rest of Jamaica, despite receiving no preferential treatment than other manufacturers with respect to tariffs and quotas. Consequently, the KFZ encourages foreign investors to enter Jamaica who otherwise would not do so.

KFZ-related advantages reduce costs, raise rates of return and attract investment (which yields net benefits) that would not have taken place. Unfortunately, it is impossible to measure the value of these zone related benefits. There is little doubt that they exist as anyone knows who has to deal with the bureaucracy in developing countries in efforts to obtain foreign exchange, import permits, any kind of licence, export clearance and security arrangements. One can gain some insight into the importance of KFZ-related benefits by observing how they reduce several of the obstacles to investment in Jamaica. These obstacles were identified in a 1983 survey conducted by the U.S. Business Committee on Jamaica. The results are presented in the following table.

These survey results clearly indicate that the principal obstacles to investment in Jamaica are bureaucratic and regulatory in nature. Investors are easily deterred by such obstacles. The aim of the KFZ is to minimize the impact of these obstacles thereby attracting investment that otherwise would have gone elsewhere. Concerning the problems with electricity and water, the Jamaica Public Service Company (JPS) and the National Water Commission (NWC) address the needs of the KFZ with priority. For example, if a power outage is planned, the JPS has promised to forewarn KFZ firms so they can avoid losses associated with sudden outages.

Table BII.1

U.S. Business Leaders' Perceived Obstacles to Investment in Jamaica (Rated as Important or Very Important).

Obstacle	% of Responses
Slowness of Government decision making	82%
Lack of Electricity	74%
Shortage of foreign exchange	72%
Customs procedures	72%
Excessive Government regulations	69%
Restrictions on profit remittance	65%
Poor attitude of officials toward private business	63%
Customs and other duties	63%
Lack of relevant or sufficient investment incentives	61%
Lack of water	58%

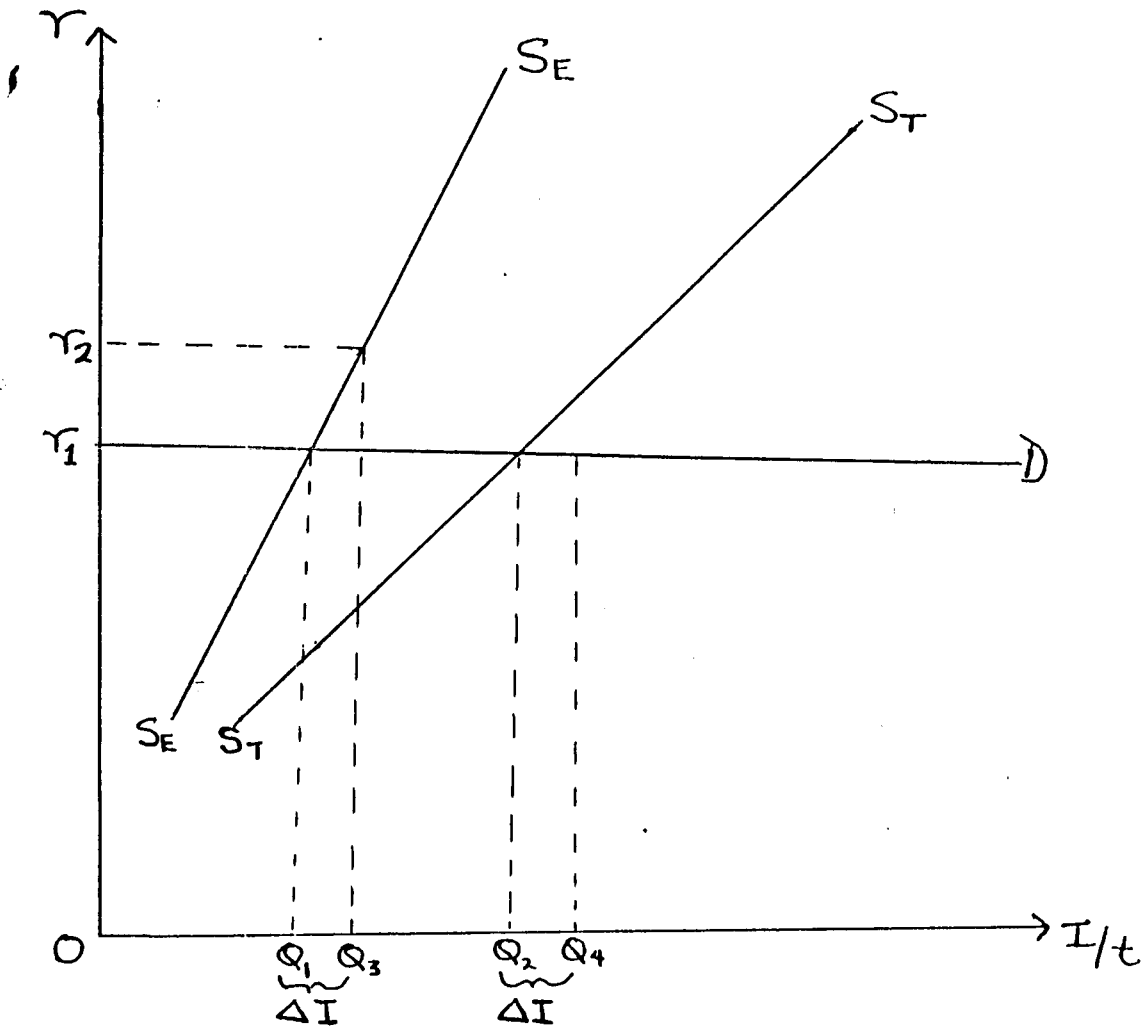
Sample Size: 460 Firms

Source: U.S. Business Committee on Jamaica, 1983.

If the factors listed in the Table BII.1 are the major obstacles to investment in Jamaica, there is a good case for arguing that the KFZ (by eliminating or minimizing them) raises the rate of return and attracts investors that would have stayed in the USA or gone to other countries. The following analysis uses a simple model to illustrate the impact of KFZ-related incentives on investment in Jamaica. The problems associated with measuring the impact empirically are also discussed.

A Simple Model Showing the Impact of KFZ-Related Incentives on Investment in Jamaica.

FIG. BII.1



In Fig. BII.1, the horizontal axis measures the quantity of investment in Jamaica per time period. The vertical axis measures the rate of return. It is assumed that the country has two equal-sized sectors. The first comprises producers of exports, the second producers for the domestic market. It is assumed that the elasticity of supply with respect to investment is the same in each sector. The first supply curve,  $S_E S_E$ , is for the export sector, the other,  $S_T S_T$ , is for overall investment in Jamaica. Since the focus of the analysis is on the export sector (and it is assumed that the two sectors are the same size), the supply curve for investment in the sector producing for the domestic market is not shown explicitly in Fig. BII.1.  $S_E S_E$  therefore has a slope twice that of  $S_T S_T$ . The supply curves are drawn upward sloping to reflect that at higher rates of return more investment is supplied.  $r1D$  measures the demand curve for investment in Jamaica. It is drawn horizontal to reflect that the quantity of investment is supply determined. However, a downward sloping demand curve would not change the thrust of the analysis.

Before the establishment of the KFZ the equilibrium rate of return is  $Or_1$ . The equilibrium quantity of investment is  $0Q_1$  and  $0Q_2 (=20Q_1)$  in the export sector and the overall economy, respectively. The introduction of the KFZ, with the related advantages, affects only the export sector since KFZ firms are required by law to export all their products.<sup>2</sup> The KFZ-related advantages raise the rate of return to  $Or_2$  for those investors in the export sector who are involved in activities deemed desirable by the KFZ authorities.<sup>3</sup> As a result there is an increase in investment of  $Q_3-Q_1$ .<sup>4</sup> Grubel, in a discussion of motives for

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<sup>2</sup>In one special case where the investor is Jamaican and produces animal feed which Jamaica requires, the firm has been given the right to supply the domestic market as well as export.

<sup>3</sup> According to two former managers of the KFZ, a major requirement is that KFZ firms create employment, hence warehouse type operations are no longer encouraged. Garment producers are given preference because the labour-intensive production methods used tend to generate more employment (see Table BI.3). In addition, firms must be involved in activities that can be accommodated within SFBs of 6,000 sq.ft. Light manufacturing activities, like garment production, are ideally suited to the KFZ facilities. In some EPZs in other countries, firms are allowed to construct their own buildings to suit their operations.

<sup>4</sup>It is assumed that no noticeable reduction of investment in the domestic sector occurs as

international capital movements, describes how government subsidies, "such as free provision of a factory building or the granting of a tax holiday" may cause direct investment which otherwise would not have been undertaken.<sup>5</sup> The modern portfolio theory of investment can also be used to explain why an increase in the rate of return from  $r_1$  to  $r_2$  leads to an increase in investment. The higher return and lower risk associated with the KFZ may fit well in the portfolios of more investors, providing them with just the combination of risk and return appropriate for their preferences and needs.

The precise size of  $Q_3-Q_1$  depends on both the elasticity of supply of investment in the export sector and the increased returns ( $r_2-r_1$ ).

#### *The elasticity of the supply curve for investment in the export sector*

The elasticity of  $S_E S_E$  is determined by the marginal cost of additional investment in Jamaica. Costs include forgone investment opportunities, increased portfolio risk, wage and other input costs, the inconvenience of foreign production, and the fear of expropriation of capital assets by the government.<sup>6</sup> In the extreme, if  $S_E S_E$  is perfectly inelastic,  $Q_3-Q_1$  is zero so no new investment is attracted to Jamaica. In such a case the marginal cost of increased investment is very high. The more elastic is  $S_E S_E$ , the larger is  $Q_3-Q_1$ .

#### *The size of $r_2-r_1$*

If the increase in the rate of return,  $r_2-r_1$ , is very small to all potential investors in the export sector, then  $Q_3-Q_1$  is likely to be minimal, unless  $S_E S_E$  is very elastic. However, the discussion earlier in this chapter suggests that KFZ-related incentives are important. Further evidence of their importance is provided by the following statement by a former KFZ

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<sup>4</sup>(cont'd) the export sector becomes more attractive. This is discussed later.

<sup>5</sup>See Grubel (1980) pp.578-579.

<sup>6</sup>See Kim 1985.

manager:<sup>7</sup>

Investors told us that the Free Zone provided them with a 40% cost reduction due to the fact that they would not have to deal with the bureaucracy. Cost reductions are in terms of fewer time delays and inefficiencies due to manpower wasted walking around with papers requiring signatures.

Additional evidence is provided by interviews with managers of 14 of the 19 current KFZ firms.<sup>8</sup> They were asked to state how important each incentive was in their companies' decision to locate within the KFZ. The survey required them to rate each incentive as either "very important", "important", or "unimportant". The incentives considered and the responses are contained in Table BII.2.

It should be remembered that the importance of incentives is through their cost-reducing effect. The incentives are ranked according to the number of managers saying "very important".<sup>9</sup> Three of the top five are KFZ-related incentives which indicates their importance to investors in a position to take advantage of them. KFZ legislation, requirements, and facilities render it unattractive to some investors in the export sector despite the associated advantages. Such investors may be deterred by a) not having the option to sell in the local market, b) not being able to operate within the confines of 6,000 sq.ft. SFBs, c) the preference given to labour-intensive production processes, or d) being far from the source of important local inputs. In effect, the KFZ may not increase the rate of return to some investors in the export sector.

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<sup>7</sup> The statement was made by Mr. Byron Lewis, the first manager of the KFZ, in a tape-recorded interview.

<sup>8</sup> Three managers were unwilling to be interviewed, however, they were from small garment-producing firms so one would not expect any dramatic differences in their responses. East Ocean consists of three firms so only one interview was required. This accounts for the remaining five firms not included in the survey.

<sup>9</sup> When asked to list other incentives, seven managers mentioned the importance of Jamaica being an English-speaking country. Three mentioned the favourable climate both of which are Jamaica-related benefits.

TABLE BII.2

The Results of a Survey of KFZ Managers to Determine the Relative Importance of Each of the Available Incentives (the numbers represent how many of the 14 chose each option)

Incentive	Type	Relative Importance		
		very	important	unimportant
1) Proximity to USA	JR	13	1	0
2) Duty Free Trade	JR	11	2	1
3) Profit Repatriation	KR	10	1	3
4) Minimal Customs	KR	9	5	0
5) 100% Tax Holiday	KR	9	3	2
6) Location in Kingston/ Proximity to Port	KS	8	5	1
7) Low Labour Costs and Large Labour Pool	JR	7	2	5
8) Jamaican Quota to USA	JR	7	1	6
9) Security of KFZ	KR	4	7	3
10) CBI	JR	3	1	10
11) 806, 807 Tarriff	JR	2	2	10
12) LOME	JR	1	1	12

JR = Jamaica-related, KR = KFZ-related, KS = KFZ-specific

At the same time other export sector investors are well suited to the KFZ which explains the predominance of garment producers in the KFZ. The KFZ legislation and facilities are "tailor-made" for their kind of operations. Garment producers have traditionally faced very low profit margins so KFZ-related advantages can be crucial to them.<sup>10</sup> Apart from the requirement of low average labour costs and a large pool of such labour, their profitability depends upon minimal delays to their imports of fabric and other inputs, and to exports of final products. Delays caused by regulations, bureaucrats, and other forms of red-tape can be very costly since the final products are usually required in USA stores by certain dates. Unreliability may lead to a loss of clientele. To avoid this a firm may incur higher costs, (such as transporting final products by air rather than sea) which reduce their narrow profit margins even further. Garment manufacturers usually have to be reassured that such costs will be minimal before they risk investing in a particular country, especially when there are an increasing number of countries giving such reassurances.

The discussion above suggests that  $r_2-r_1$  is very significant to many investors in the export sector and is likely to be responsible for attracting investment to the KFZ. In other words,  $Q_3-Q_1$  is positive. In practice, however, measuring  $Q_3-Q_1$  with accuracy may be intractable. This is discussed below.

#### Estimating the Quantity of Investment Attracted by the KFZ

If the quantity of investment that would have come to Jamaica's export sector in the absence of the KFZ ( $0Q_1$  in Fig. BII.1) or to Jamaica as a whole ( $0Q_2$ ) could be measured, one could use the difference between either of these quantities and the KFZ-inclusive quantities as a measure of new investment attracted by the KFZ. There are factors that render measuring  $0Q_1$  and  $0Q_2$  virtually impossible for a country like Jamaica. The problem is great

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<sup>10</sup> A problem with some of these investors is they are "foot-loose", ready to leave (at low cost) if their narrow profit margins are squeezed too much. For many the cost reductions brought about by KFZ-related advantages are of paramount importance to their profitability.



enough for developed countries with stable economic and political climates, much more Jamaica which has a tendency to experience political and economic fluctuations. Branson (1968) and Branson and Hill (1971) attempt to estimate capital flows into the USA and other OECD countries by making capital flows a function of changes in the rate of return in the USA and abroad, changes in the growth of USA and foreign GNP, and expected changes in the exchange rate. In these studies the estimated regression equations show statistical significance and coefficients have the expected signs. However, several weaknesses which reduce the accuracy of the estimates are mentioned. These include problems associated with dealing with risk, transactions costs, tax laws, and time lags. All these factors affect capital flows but their impact cannot be estimated or estimated accurately. In the actual estimation, problems with data and simultaneity are also encountered.

If an attempt were made to estimate a supply function for the flow of investment into Jamaica, the above problems would not only be encountered but magnified. This would be due mainly to political and economic instabilities and data inadequacies. Even if a very accurate estimate of the relationship could be derived, to determine  $Q_3-Q_1$  would still be a problem because the factors that cause the rate of return in the KFZ to be greater than elsewhere in Jamaica are non-pecuniary. It would be difficult to accurately assess the extent to which firms' profits have risen. If  $r_2-r_1$  is indeterminate so is  $Q_3-Q_1$ .

#### *Locating the change in investment brought about by the KFZ*

If legislation were to increase the rate of return to all investors across the country, it would be very difficult to determine where the incremental investment is located since it would be spread all over the country. Separating normal flows from incremental flows may not be possible. However, if the legislation is specific to a particular location, like an EPZ, one can at least identify where the investment is (assuming that the EPZ attracts very little investment to non-EPZ locations). Nevertheless, there would still be a problem of separating normal flows from incremental flows because of locational diversion of investment.

### *Locational Diversion of Investment*

Locational diversion of investment occurs when investment that was located elsewhere in the host country or was already destined for another location within the country finds its way into the EPZ instead because of EPZ-related advantages. In such cases EPZ-related advantages are not necessary and the country gains nothing directly from the EPZ. In fact, it loses to the extent that it bears the cost of providing these advantages.

In the extreme case where  $S_E S_E$  is vertical, all investment in the EPZ is diverted since the increased rate of return induces no (new) incremental investment. In the more realistic case where  $S_E S_E$  is not vertical (as in Fig.BII.1), Q3-Q1 would be located in the EPZ (assuming the EPZ is large enough) but so might some diverted investment. A major problem in a study such as this is to decompose EPZ investment into its diverted and incremental portions.

Locational diversion of investment could be minimized if EPZ authorities reserve space only for certain types of investors to which EPZ-related advantages are known to be important.<sup>11</sup> Furthermore, if the facilities are made unsuitable to many types of investors this should reduce the scope for diversion although this may run counter to the purpose of the EPZ which is to attract investment. The KFZ authorities may have reduced diversion to some extent by creating an environment conducive to garment production and giving preference to this type of labour-intensive activity. Moreover, low profit-margin garment producers are likely to find KFZ-related advantages very important. This by no means suggests that the KFZ has caused no locational diversion of investment. In fact, questionnaire results presented below attest to its presence.

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<sup>11</sup>EPZ authorities may be reluctant to do this in the early stages of the EPZ because they would like to have as many investors as possible. The presence of investors in an EPZ often acts as an attraction to potential investors.

It should be emphasized that the KFZ is located right at the port of Kingston and may be a better location for some investment (even without KFZ-related incentives) than alternative locations in Jamaica. In such cases Jamaica avoids losses due to locational trade diversion – where firms set up in an inefficient location to benefit from a particular legislation. In the presence of diverted investment, the KFZ's ideal location may permit diverted investors to get involved in more trade than they would have in an alternative location. There may be some gains to Jamaica as a result of this.

Finding ways to measure the distances  $0Q1$ ,  $0Q2$  and  $0Q3$  in Fig. BII.1 might not even be important in this dissertation if one could be sure that all investment in the KFZ was attracted by KFZ-related advantages, that is, no diversion of investment exists. In such a case  $Q3-Q1$  would be equal to the investment in the KFZ (assuming the KFZ does not attract a significant quantity of incremental investment into non-KFZ activities).<sup>12</sup> However, there might still be insufficient information available to estimate the value of this investment accurately. Nevertheless, one could at least identify which firms were attracted by the KFZ. This being the case, and, since the KFZ-research department maintains statistics on the expenditures of KFZ firms, one could estimate quite precisely the benefits Jamaica receives from these expenditures. It is these benefits (from expenditures) that are important in the cost-benefit analysis in Part B Chapter III.<sup>13</sup> The quantity of investment  $Q3-Q1$  is important because it is the source of benefits though not the benefits per se. Nearly all of the investment equipment in the KFZ is purchased abroad so the direct benefits to Jamaica are minimal. The benefits to Jamaica from such investment are indirect, accruing in the form of wages, foreign exchange earnings, and local purchases of goods and services made by firms. It is also worth noting that firms that make the largest investments may not generate the

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<sup>12</sup> Fig. BII.1 deals with changes in investment flows rather than changes in the stock of capital. Therefore,  $Q3-Q1$  should be seen as the flow of investment induced by the KFZ over the period since it was established.

<sup>13</sup> However, the presence of locational diversion of investment in the KFZ renders the analysis of Part B Chapter III more complicated.

largest benefits to Jamaica because they may import inputs and other supplies and employ relatively few workers. There is not a proportional relationship between size of investment in Jamaica and benefits to Jamaica.

The preceding analysis shows that the KFZ attracts a quantity of investment equal to Q3-Q1 which would be very difficult to measure. For the purpose of this dissertation, measuring Q3-Q1 is not as important as knowing where the investment is located. It is the net benefits conferred upon Jamaica that matter in the cost-benefit analysis. If one does not know where the investment is one cannot measure net benefits. Fortunately, one knows that since KFZ-related advantages are the attraction, Q3-Q1 must be within the KFZ! The most formidable task in this dissertation is addressing the locational diversion problem and deciding which of the 19 firms would not be in Jamaica in the absence of KFZ-related incentives. Their investment represents Q3-Q1.<sup>14</sup> If one knew the answer one could estimate their expenditures and calculate the net benefits to Jamaica.

Determining Which KFZ Investors Are in Jamaica Because of the KFZ-Related Incentives and the Proportion of Net Benefits These Investors Account For.

It was mentioned earlier that when cost-benefit analyses of projects are conducted, only benefits and costs specific to the project are to be considered. Net benefits that would have occurred in the absence of the project should be identified and excluded. Without omniscience it is impossible to know exactly what would have happened if there was no KFZ. The best one can do is provide evidence which suggests that certain investors acted the way they did because of the increased rate of return effected by the KFZ. Evidence has been presented above which suggests that low profit margin garment manufacturers have much to gain by

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<sup>14</sup>This again assumes that the KFZ's activities are not responsible for attracting further investment to non-KFZ locations. For example, investors may set up firms outside the KFZ in order to supply goods and services, and do subcontracting for KFZ firms. Some subcontracting does occur but only on a small scale. It is also assumed that the KFZ does not deter other investors in any way.

acting this way. However, it does not prove that all of them acted thus. It may be possible that some were coming to Jamaica anyway so KFZ-related benefits were merely a bonus which diverted them from some other location. In the following two subsections there is a brief discussion of approaches that others have used to handle the issue of the degree of diverted investment in EPZs. There is then a discussion of the approach used in this dissertation.

### *The Choe and Warr Approach*

Choe (1975) and Warr (1983) in their respective studies of the Masan and Jakarta EPZs, do not address this issue. Their implicit assumption is that all firms in these EPZs would not have been in the respective countries in the absence of the EPZs. The possibility of locational diversion is not considered. Warr (1985) in his study of the Bataan EPZ states this assumption explicitly as follows:

It was assumed that firms which entered the EPZ would not have been present in the Philippines in the absence of the zone. In fact, some (but not many) of these firms would presumably have invested elsewhere in the country anyway.

By not attempting to determine which firms would have invested in the Philippines anyway, Warr has probably overstated the values of all costs and benefits induced by EPZ investment. Furthermore, he does not offer any evidence to support that "not many" would have invested elsewhere in the country.

### *The Andic and Cao Approach*

Andic and Cao (1980) address the problem more directly with respect to the Cartagena EPZ (CFZ), they state:

Since it cannot be known whether the new private investments are totally attributable to the facilities provided by the CFZ or would have taken place in any case, even in the absence of the CFZ, the results of the analysis were weighted by the probabilities of such occurrences. Four alternate assumptions were made ranging from high optimism to high pessimism.

Andic and Cao do not describe the method used to select their probabilities. The values

chosen were 0.55, 0.40, 0.25, and 0.1 in the highly optimistic, fairly optimistic, pessimistic and highly pessimistic cases, respectively. This approach is an improvement on Choe and Warr's because it attempts to separate locationally diverted investment from incremental investment (without explicitly stating so). It is unsatisfactory since no definitive results can be generated. Nevertheless, it appears to be the best approach currently available to economists. Therefore, a similar approach is used in the cost-benefit analysis of Part B Chapter III.

#### *The KFZ-Related Conversion Factor*

In the cost-benefit analysis a sensitivity analysis is carried out using probabilities from 0 to 1 to weight net benefits brought about by the KFZ. These probabilities are estimates of what is referred to, in this dissertation, as the KFZ-related conversion factor (KRCF). Choe and Warr's approach leads to the  $KRCF = 1$  because it assumes no locational diversion of investment. This would mean that KFZ-related advantages are given credit for all net benefits to Jamaica which arise from investment in the KFZ. At the other extreme,  $KRCF = 0$  if  $S_E S_E$  in Fig. BII.1 is perfectly inelastic so that all KFZ investment is diverted. In such a case the cost-benefit analysis is reduced to the simple exercise of summing the costs (less salvage value of KFZ) to Jamaica of providing KFZ-related advantages.

In this dissertation there is an attempt to identify a "realistic" case and several optimistic and pessimistic cases. In the "realistic" case the KRCF is estimated from answers to a question posed to managers of 14 KFZ firms.<sup>15</sup> Each manager was asked "Would your firm have located in Jamaica in the absence of the KFZ"? The results are presented in Table BII.3 below under the heading "yes/no". The names of firms are not mentioned as requested by some managers. Therefore firms are labeled from F1 to F14. The table also presents the country of origin, the date of entry, the type of product, and the employment of firms as of July 1987.

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<sup>15</sup>The same 14 as in Table BII.2.

Table BII.3

The Responses of Managers of KFZ Firms to the Question "Would Your Firm Have Located in Jamaica in the Absence of the KFZ?"

Firm	Country	Entry	Product	Employment	"yes/no"
F1	USA	1977	garments	650	yes
F2	Jamaica	1981	Animal feed	13	yes
F3	Jamaica	1982	food process	280	yes
F4	USA	1982	garments	415	yes
F5	USA	1983	candies	16	no
F6	Hong Kong	1984	garments	5800	no
F7	Hong Kong	1984	garments	1250	no
F8	USA	1985	garments	219	no
F9	Hong Kong	1985	garments	330	uncertain
F10	USA	1986	ethanol	35	yes
F11	USA	1986	electrical	150	uncertain
F12	USA	1986	garments	231	yes
F13	India	1986	garments	525	yes
F14	Hong Kong	1987	garments	380	uncertain

Source: Questionnaire data June-July 1987

The results show that managers of F5, F6, F7, F8, which entered in 1983-85, said "no". Three were uncertain and the remaining seven said "yes". F1 was already in Jamaica, which explains the answer of "yes". It entered the KFZ for security reasons after experiencing several break-ins while outside the KFZ. The manager explained that terminating operations had been considered until KFZ facilities became available. In this case the KFZ cannot be given credit for attracting the investment that the firm had already made in Jamaica, however, it should receive credit for the firm's expansion and preventing a possible decline in investment.

Based on the earlier discussion of the importance of the KFZ to low margin garment producers, it is surprising that only four managers said "no". Mr. Pennycooke - KFZ manager from 1983 to 1987 - was asked (tape recorded interview) for his impression on these findings. He responded:

Companies that do not feel the KFZ is important probably do not appreciate the importance of not being exposed to foreign exchange controls or bureaucracy. In the Free Zone, when a company sells its product abroad, the sales revenue does not have to be brought back into Jamaica. It can be used to finance more imports. In the Customs Territory, this revenue would have to come back through the Central Bank then application has to be made for foreign exchange to purchase imports.

The "realistic" KRCF is calculated by expressing total expenditures of those firms whose managers said "no" as a proportion of total expenditures by all firms. Using total expenditures is appropriate since it is through such expenditures that benefits are conferred upon Jamaica. Unfortunately data were available only for 1985 and 1986 expenditures. For these years the proportion accounted for by the four firms whose managers said "no" was 0.37 and 0.29, respectively. An average of 0.33 is selected as a realistic estimate of the KRCF.<sup>16</sup> The accuracy of this estimate can be questioned on the following grounds:

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<sup>16</sup> This proportion is surprisingly low when one notes that these firms employed 61% and 65% of KFZ workers in 1985 and 1986, respectively. One would expect wages to workers to be the largest expenditure made by firms. In the absence of the ethanol firm such would be the case, however, this firm alone accounted for 41% and 33% of total local expenditures in 1985 and 1986, respectively. A major component of this firm's expenditure is fuel oil. Since the firm's manager said "yes", this explains why the estimate of KRCF is only 0.33.



a) It is based on only two years of data and does not incorporate changes that occur in other years. Moreover, most of the firms in the survey have only been in the KFZ since 1984, so this estimate is very unreliable for years prior to this. However, expenditures by KFZ firms were much less in magnitude in the pre-1984 period and would not have a major impact on the net benefit stream. For the years after 1986, it is assumed that the KRCF will remain at 0.33.

b) It relies on the results of questionnaire data and data collected by the KFZ from firms. The managers/owners of some firms may have reasons or ulterior motives for giving a particular response or for overstating or understating expenditures. For example, some of the managers who said "yes" (their firm would have located in Jamaica with or without the KFZ) may have done so because they wish to create the impression (to the authorities) that KFZ incentives are insignificant in hope that more incentives will be given, to attract more new investors, which they will receive also. Those who said "no" may have done so because they fear current incentives might be reduced, in which case their profits would decline. It is assumed that such factors cancel out if they manifest themselves. In the analysis of the next chapter  $KRCF = 0.33$  is used as the "realistic" case, however  $KRCF = 0$ ,  $KRCF = 0.1$  and  $KRCF = 0.25$  are used in the pessimistic scenarios while  $KRCF = 0.5$ ,  $KRCF = 0.75$  and  $KRCF = 1$  are used in optimistic scenarios.

Part B Chapter III provides a detailed theoretical explanation of how the KRCF is used in the cost-benefit analysis. The inability to determine an accurate value of the KRCF is a weakness of this study, it leads to the need for a sensitivity analysis which yields no definitive results. However, pulling together the empirical information and sorting out the issues of benefits and costs makes some, if modest, contribution to the controversy over the merits of EPZs.

## CHAPTER III

# ESTIMATING THE COSTS AND BENEFITS ASSOCIATED WITH THE KINGSTON FREE ZONE

### Introduction

The objective of this section is to explain how costs and benefits of the KFZ are estimated. These costs and benefits are tabulated and provide the results used for the cost-benefit analysis. No detailed KFZ study of this nature has been carried out before. However, the World Bank, prior to providing a US\$13.5 million loan to Jamaica for expanding the KFZ, carried out studies on the prospects of the KFZ.<sup>1</sup> In these studies the economic rate of return on the project was estimated.

### *The World Bank Studies*

Economic benefits considered by the World Bank were: i) rental income at US\$3.50 per sq.ft per year and increasing to US\$4.25 in 1986; and ii) wages paid to local labour by firms. Economic costs were capital costs of the project and marginal operating costs of the KFZ. The World Bank estimated that approximately 4,000 jobs would be created when KFZ companies reached full capacity in 1990. For the post-1990 to 2004 period it was assumed that the net benefit stream would remain constant in real terms. At the terminal date in 2004, a residual value of KFZ assets equal to J\$16.509 million (in real terms) was assumed. On the basis of these assumptions and forecasts, an economic rate of return on investment of 35.39% was estimated.

The passage of time has produced actual data that differ quite considerably from World Bank estimates. Though World Bank estimates of official rental rates have turned out to be correct, the following factors have not turned out as predicted:

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<sup>1</sup>See World Bank 1982a and 1982b.

a) the World Bank assumed an official exchange rate of US\$1 = J\$1.788 throughout the life of the project. The exchange rate has been US\$1 = J\$5.50 since 1985. Therefore the difference between estimated and actual is large. This difference worked to the advantage of Jamaica since development was financed by drawing down less than 33% of funds made available by the World Bank;

b) the World Bank estimated that 700,000 sq.ft of factory space would be available by 1990, however, in June 1987 there were already over 750,000 sq.ft available with another 150,000 sq.ft under construction.

c) the World Bank estimated that KFZ employment would be 4,000 by 1990. By 1987 KFZ employment was 10,500. The actual employment effect has turned out to be more than double the forecast value.

A further problem with the World Bank studies is that no account is taken of locational diversion of investment. The World Bank is renowned for high quality work, the fact that it did not deal with this issue is probably indicative of the difficulty of doing so. The cost-benefit analysis in this chapter attempts to deal with this problem. In addition it includes costs and benefits not considered by the World Bank and uses data that have become available since 1982. The present study is arguably a more realistic economic evaluation of the KFZ.<sup>2</sup>

#### *Sources of data used in this cost-benefit analysis*

The data were compiled during a three month field trip to Jamaica. The author is fortunate enough to be one of the first persons outside the KFZ to be granted access to the entire set of KFZ data. The KFZ has a research department to which firms are required to report each month, so a rich source of data is available. However, prior to 1982 no data are

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<sup>2</sup>The World Bank study does mention benefits accruing from goods purchased in Jamaica and from training of Jamaican workers but these were not included in calculations.

available on costs and benefits.<sup>3</sup> The department has improved its data collection methods over the years which means that by 1985 it had a large range of data on firms. The data set before 1985 is not as complete.

Other sources of data and information are a) the companies that supply electricity, water, telephone and telex services; and b) interviews with ex-managers of the KFZ, managers of KFZ firms, KFZ workers, a manager of a shipping company, and managers in several government organisations. Most of these sources are listed in more detail later in the chapter as they become relevant. Collecting data made the author appreciate some of the problems of obtaining information, especially from government organisations, in a developing country. It also made it more clear why KFZ firms try to minimize dealings with bureaucracies.

The data in this chapter are expressed in constant 1982 Jamaican dollars. The consumer price index is used as the deflator. The use of constant dollars in an economic evaluation makes it possible to make meaningful comparisons between values of costs (or benefits) from one year to the next because non-base year values are all expressed relative to those in the base year. In addition, constant dollars render forecasting a much simpler process since, in the absence of any alternative forecasts, one can assume that future values of a particular variable will remain constant in real terms – a procedure frequently adopted in this type of analysis.<sup>4</sup> Forecasting the CPI is thereby by-passed. There is still the possibility that relative prices among various good/service groups might change over the life of the project. However, neglecting such possible changes is understandable given the uncertainty concerning the future. Typically, the best estimate is that relative prices will be constant unless there are good

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<sup>3</sup>The cost-benefit analysis covers the period 1978 to 2007, however, for the 1978–81 period the only available data on costs and benefits are development costs and rental revenue. These are contained in World Bank (1982b). It is assumed that all other benefits and costs were equal and offsetting during the 1978–81 period.

<sup>4</sup>See Warr (1983 and 1985) and World Bank (1982a).

reasons to believe otherwise.<sup>5</sup> In the cost-benefit analysis to follow, allowance is made for higher wages resulting from productivity increases.

For the purpose of the cost-benefit analysis, all conversions of costs or benefits from U.S.\$ to J\$ or vice-versa are carried out using the shadow exchange rate (SER). Rental payments and repayments to the World Bank are candidates for this treatment. The procedure for calculating the SER is based on the analysis provided in Part A Chapter II. For the 1982-86 period, imports are divided into broad categories based on the SITC. For each year, the value of imports in each category is expressed as a proportion of the value of total imports. These proportions serve as weights. The average tariff rate for Jamaica is calculated by multiplying the tariff rate in each category by the respective weight then summing across all categories. The average tariff for the period is estimated to be 20%. Therefore, on average, tariff-inclusive prices exceed cif prices evaluated at the OER by 20%. The implication is that the SER exceeds the OER by 20%. Hence, the conversion factor used for the exchange rate is 1.2. The World Bank also estimates the SER to be 20% above the OER, its reports state the following:<sup>6</sup>

Because of the critical shortage of foreign exchange in Jamaica a shadow exchange rate with the US\$, which is 20% higher than the existing rate has been used on all foreign costs and benefits.

Another very important use of the SER is in calculating net foreign exchange gain to Jamaica from foreign exchange conversions made by KFZ firms. Firms are required to raise all funds used for transactions in Jamaica from foreign sources. These foreign funds are then converted into local currency at the OER. Given that the SER represents a more realistic value of the US\$, Jamaica is estimated to pay out about 20% less J\$ for each US\$ than the free market would dictate. This is due to the overvalued J\$.

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<sup>5</sup>See Harberger (1972)

<sup>6</sup>See pp.63 in World Bank (1982b) and pp.27 in World Bank (1982a).

The table below provides a summary of all the conversion factors used in the cost-benefit analysis.

Table BIII.1

Conversion Factors for the Cost-Benefit Analysis

Conversion Factor	Values
KRCF	0, 0.1, 0.25, 0.33, 0.50, 0.75, 1.0
CFL	0.55, 0.99
CFLP	0.60
CFO	0.60, 0.80
SER	1.2
M	1.0, 1.5

KRCF is the conversion factor reflecting the proportion of net benefits that should be attributed to the KFZ.  $KRCF=1$  means 100% of net benefits are attributed to the KFZ.

CFL is the conversion factor for KFZ labour, excluding administration employees whose CFL is assumed to be unity.  $CFL=0.55$  means that the shadow wage rate is 55% of the average market wage in the KFZ.

CFLP is the conversion factor for goods purchased in Jamaica by KFZ firms.  $CFLP=0.6$  means that the opportunity cost of goods sold to KFZ firms is 60% of the market price.

CFO is the conversion factor for other expenditures by KFZ firms.

SER is the shadow exchange rate.

M is the Keynesian multiplier.

It should be remembered that the results of this study, like any cost-benefit analysis, reflect value judgments and assumptions used. This does not invalidate the results, but it is an unattestable fact that other evaluators might conduct their own studies (using the same

data set) and generate conflicting results.

The KFZ is very small relative to the entire Jamaican economy, as shown in Tables BI.1 and BI.2 earlier. Therefore, changes brought about by its existence are marginal and should not impact significantly on other major economic variables. The analysis of this chapter attempts essentially to compare Jamaica without the KFZ to Jamaica with the KFZ. The induced benefits generated due to investment in the KFZ are estimated. However, as was discussed in the preceding chapter, not all of these benefits can be attributed to the KFZ. Deciding the value of the KRCF is contentious, since it is impossible to measure the exact proportion of net benefits that would have taken place in Jamaica if the KFZ had not been created. This explains the need for a sensitivity analysis.

### Costs and Benefits

The cost-benefit analysis aims at identifying and evaluating net benefits accruing to Jamaica as a result of establishing the KFZ. Before discussing the estimation of costs and benefits, the following equations are used to summarize and clarify the analysis of this chapter. The net benefits (NB) of the KFZ can be represented as follows:

$$\text{BIII.1) NB} = (\text{R} + \text{SV} + \text{W} + \text{LP} + \text{U} + \text{T} + \text{FE} + \text{TT} + \text{P} + \text{UL}) - (\text{D} + \text{OP} + \text{OCL} + \text{OCLP} + \text{OCU} + \text{OTT})$$

The terms in the first set of parentheses are benefits and those in the second are costs.

R = rental revenue.

SV = salvage value of KFZ in 2007.

W = wages to KFZ workers.

LP = purchases of goods and services locally by KFZ firms.

U = utility payments by KFZ firms.

T = HEART tax, and National Insurance and Housing payments by KFZ firms.

FE = net gain to Jamaica due to the overvalued exchange rate.

TT = technology and training.

P = profits (or losses) to Jamaican firms.

UL = unofficial levies.

D = development costs.

OP = operating costs of KFZ.

OCL = opportunity cost of KFZ labour (OCL=W.CFL).

OCLP = opportunity cost of providing local goods and services (OCLP=LP.CFLP)

OCU = opportunity cost utilities.

OTT = opportunity cost of training and technology.

Equation BIII.1 can be rewritten to show net benefits as follows:

$$\begin{aligned} \text{BIII.2) } \text{NB} = & (\text{R}+\text{SV}-\text{D}-\text{OP}) + (\text{W}-\text{OCL}) + (\text{LP}-\text{OCLP}) + (\text{U}-\text{OCU}) + \text{T} \\ & + \text{FE} + (\text{TT}-\text{OTT}) + \text{P} + \text{UL} \end{aligned}$$

If the Keynesian expenditure multiplier (M) is included, all expenditure injections by firms in the rest of the economy should be multiplied by M. KFZ firms raise their funds abroad so their expenditures in Jamaica represent autonomous spending increases. Each dollar spent by KFZ firms has a M\$1 effect on real GNP if the economy operates below full employment. Jamaica experiences unemployment rates of about 25% which leaves scope for a multiplier effect on GNP to take place. The Planning Institute of Jamaica estimates a Keynesian GNP multiplier of 1.5 (M=1.5) for Jamaica. This estimate of the multiplier is used in the NPV calculations, M=1 is also used. If M is incorporated in the analysis the following equation is obtained:<sup>7</sup>

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<sup>7</sup>Expenditures made within Jamaica by expatriates should be included in the multiplier effects. Since expatriates are relatively few and their expenditures unknown, they are omitted both from equation BIII.3 and the cost-benefit analysis.



$$\text{BIII.3) NB} = (\text{M.R+SV-D-OP}) + (\text{M.W-OCL}) + (\text{M.LP-OCLP}) + (\text{M.U-OCU}) \\ + \text{M(T+FE+P+UL)} + (\text{TT-OTT})$$

The final adjustment to be made is to account for the KRCF, this is done as follows:

$$\text{BIII.4) NB} = (\text{KRCF.M.R+SV-D-OP}) + \text{KRCF(M.W-OCL)} + \text{KRCF(M.LP-OCLP)} \\ + \text{KRCF(M.U-OCU)} + \text{KRCF.M(T+FE+P+UL)} + \text{KRCF(TT-OTT)}$$

Equation BIII.4 is a general form of the net benefit equation. If KRCF and M are both equal to unity then equation BIII.4 collapses into equation BIII.2 which is a special case.<sup>8</sup> Equation BIII.4 reveals that all costs and benefits do not have to be adjusted using KRCF and M. Development costs require no adjustment by KRCF which means the entire cost of developing the KFZ has to be attributed to the project because such costs are not investment-induced.<sup>9</sup> These costs are borne by Jamaica and were incurred prior to the arrival and not due to the arrival of the investment. In other words, development costs are incurred to induce investment to enter the KFZ, but are not investment-induced. Furthermore, the multiplier should not be applied to development costs since the authorities could have achieved a similar effect by spending the funds elsewhere in the economy. Analogously, the entire scrap value of the KFZ should be counted as a benefit and not adjusted by either KRCF or M. Operating costs have been treated similarly, this assumes that they are fixed and do not change with the number of firms in the KFZ. This is not unrealistic since

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<sup>8</sup> The problem with using the KRCF in this way is that it assumes that firms which are not in the KFZ because of locational diversion spend the same proportion on each component of total expenditure. That is, it assumes that they account for the same proportion of the total wage bill as they do of all other expenditures. If more disaggregated data were available an adjustment could be made so that each component of total expenditure has its own conversion factor. When the conversion factors used to calculate opportunity costs are the same (CFL=CFLP=CFO) this conversion would not be necessary. As long as they are not too far apart the difference is not likely to be significant.

<sup>9</sup>Investment-induced costs are those arising due to firms investing in the KFZ, such as the opportunity cost of labour.

salaries of administration workers would have to be paid unless the KFZ is closed.<sup>10</sup>

The following analysis explains how net benefits included in equation BIII.2 are estimated for Jamaica. Then the NPV, B/C, and IRR calculations are performed with the necessary adjustments for KRCF and M.

### Development Costs

Development costs for the KFZ include: a) costs of reclaiming the land from the sea, dumping it up and levelling it; b) costs of providing infrastructure such as roads, water, power, and telephone lines; and c) cost of constructing standard factory buildings (SFBs).

The land on which the KFZ is situated has been reclaimed from the sea. Therefore, supply of land to the rest of the economy was not reduced to other potential users as is often the case. In cases where supply is reduced to others, the appropriate measure of the opportunity cost of land is the ultimate willingness to pay for the land by others. In the case of the KFZ, the relevant opportunity cost is the value of resources used up in reclaiming the land from the sea. Jamaica certainly incurred costs in making the land available, however these costs are wholly or partially offset by benefits Jamaica derives from owning land that has a market value and can be rented or sold according to its market value. To determine whether the land development on its own confers positive net benefits on Jamaica, one should compare the discounted value of expected rental with the present value of development costs.

In a similar vein to the land development argument, Jamaica now has a site equipped with roads, power, and factory buildings. Though there were costs of providing infrastructure

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<sup>10</sup> If there are any costs or benefits resulting from the aesthetically (dis)pleasing appearance of the KFZ they should also be left unadjusted.

there are offsetting benefits in terms of the discounted value of actual and expected rental receipts.<sup>11</sup> For the purpose of this cost-benefit analysis the discounted value of aggregate development costs (land and infrastructure) are included as costs while actual and expected rental revenue from KFZ firms are benefits. This should provide some indication as to whether rental payments alone are sufficient to offset costs of developing the KFZ.

Warr (1983) in the study of the Jakarta EPZ has no data on costs of constructing factory buildings. Consequently, he assumes that construction costs can be approximated by the discounted value of commercial rents (outside the Jakarta EPZ) over the life of the buildings. In the study Warr estimates that commercial rents exceeded those paid in the EPZ by about 20% which implies a subsidy to EPZ firms.

In a subsequent work on the Bataan EPZ in Indonesia, Warr obtained data on infrastructural costs. To avoid double counting he omits the opportunity cost of EPZ factory space as measured by rental rates in the vicinity. Therefore, for the researcher furnished with data on costs of developing an EPZ it is more precise to incorporate these costs directly rather than to approximate them by the discounted value of rents on comparable factory space.

The KFZ was set up by the Port Authority of Jamaica (PAJ) in 1976 on land bordering the trans-shipment terminal. The law which defines the KFZ's legal status was not passed until February, 1980. By 1981 the PAJ had developed 14 acres of land and constructed 28 standard factory buildings (SFBs)<sup>12</sup>. Detailed accounts and statistics on the KFZ were not maintained until 1982. Therefore, to estimate development costs in the earlier years of the KFZ is not a straightforward matter. However, from the World Bank study (1982b)

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<sup>11</sup>In some zones only land is prepared and foreign firms are responsible for constructing their own factory buildings. In such cases the host country gains because of the multiplier effects from investments made by foreigners and saves on development costs. However, it is likely that rental revenue is lower. The net outcome is uncertain.

<sup>12</sup>An SFB is a standard sized factory building in the KFZ, each has an area of 6,000 sq.ft.

one can obtain the PAJ's balance sheets for 1977 to 1982, as well as the sources and uses of funds accounts from 1979.

Net fixed assets of the KFZ were J\$2,254,000 in 1977 which suggests that the PAJ invested this amount in land, buildings, and equipment during the 1976-77 period. Net fixed assets remained at the same level for 1978 implying that no net addition was made to fixed assets. For 1979 to 1982 the World Bank study contains PAJ sources and use of funds accounts which more clearly identify funds spent on KFZ development. In 1979 the PAJ contributed another J\$140,000 to the equity of the KFZ. In 1980 it provided a further J\$3,909,000 plus there was a loan of J\$800,000 from the Jamaican National Investment Corporation (JNIC). Therefore, total cost of KFZ development in 1980 was J\$4,709,000. In 1981 the total was J\$1,801,000, J\$290,000 was supplied by the PAJ and the other J\$1,511,000 by another JNIC loan. For 1982 the total was J\$2,558,000, J\$800,000 represented equity contribution by the PAJ and the other J\$1,758,000 was a bank loan to the PAJ.

From 1983 to 1987 KFZ accounts can be used to obtain development costs. In 1983 Jamaica received its initial installments of a World Bank loan. As part of the agreement the PAJ and the Government of Jamaica (GOJ) were required to make equity contributions of J\$1,290,000 and J\$2,235,000 respectively. J\$965,000 was obtained from the World Bank, so the total for 1983 was J\$4,490,000. For 1984, 1985, 1986, and 1987 totals were J\$9,993,000, J\$7,247,000, J\$12,584,000, and J\$5,206,000 respectively. Table 1 in the appendix of this chapter shows how these totals are divided amongst the PAJ, GOJ, and the World Bank.

Due to equity contributions of the GOJ, the PAJ's equity in the KFZC has declined from 100% to about 60% at the moment. The World Bank project consisted of a US\$13.5 million loan. The objective was to help expand the KFZ so that employment, foreign exchange earnings, and exports (among other objectives) could be increased. KFZ expansion entailed dumping up and levelling of a further 23 acres of land, provision of additional

utilities, and construction of more SFBs.

The terms of the loan required that the World Bank be consulted on all important decisions such as which Jamaican firms should receive construction contracts. In order to gain access to funds the Government of Jamaica (GOJ) was required to lend the entire amount to the KFZ for any development expenses. Subject to World Bank approval of the expenditure, the GOJ was subsequently reimbursed to the order of 59% of funds spent. Effectively the GOJ was responsible for financing 41% of costs. As noted above, however, the PAJ was also required to continue making equity contributions.

By June 30, 1987 Jamaica had only drawn US\$4.4 million of US\$13.5 million available. There are three principal reasons for this: a) the procedure required to gain access to funds; b) delays in construction of factory space and other infrastructural facilities; and c) devaluations of the J\$ from US\$1 = J\$1.78 in 1982 to US\$1 = J\$5.50 in 1985 (to the present). The devaluations resulted in the requirement of fewer US dollars to carry out development. When the US\$13.5 was originally granted it was equivalent to J\$24 million. Despite drawing only US\$4.4 million for KFZ development this is still equivalent to J\$22 million at the OER.

Repaying the World Bank loan represents a cost to Jamaica. However, no repayments were required until 1987 when US\$1.13 millions were repaid. The KFZ is required to make repayments of US\$0.5 millions per annum from 1988 onwards until repayment is completed in 1994. For the purpose of the cost-benefit analysis, World Bank contribution to development costs are not included in the category of total development costs since Jamaica was not required to make immediate repayments. Such future repayments have to be given lower weighting than costs incurred in the past or present. The discount rate used in the NPV calculation takes account of the weighting. The World Bank repayments are included as a cost in a category of their own.

It should be borne in mind that the KFZ is expected to be fully developed by the end of 1987 hence development costs are ascribed a value of zero from then on. The analysis is carried out using all available data from 1977, forecasts are made up to 2007 at which time KFZ assets will be given a salvage value of J\$12.25 (J\$1982). It is assumed that due to depreciation the salvage value of buildings will be zero in 2007. However, the land is expected to retain its value (measured in terms of costs of developing it). The World Bank study estimates that preparing the land, with associated infrastructure, accounts for about 50% of development costs.<sup>13</sup> Therefore, of the J\$24.5 millions (1982 J\$) in development costs, it is assumed that J\$12.25 millions were land related. This amount is used as an estimate of the salvage value.

### Operating Costs

In the following three subsections there is a brief discussion of administration costs, selling and promotional costs, and costs associated with finance and development. In years prior to 1982 there were no detailed KFZ statistics, however, the PAJ kept statistics which aggregated these three categories.<sup>14</sup> For those years these costs can be added to development costs to derive total cost of development. In the years between 1982 and 1986 detailed figures for these costs are presented in KFZ financial accounts. The analysis below examines each category in turn.

#### *Administration and General Costs*

These costs have to be included in the analysis because they occur as a consequence of the KFZ's existence. They represent basic costs of running the KFZ. Included are directors' fees, salaries, payroll taxes, redundancy payments, medical and other staff benefits, pension contributions, maintenance, security, utilities, insurance, subscriptions and donations, printing and

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<sup>13</sup> See World Bank 1982a and 1982b.

<sup>14</sup>Source: IBRD Report

stationery, management and other fees.

For 1982 to 1986 these costs were incorporated in the PAJ's equity contributions so they will not be included separately. However, these equity contributions ceased after 1986. The KFZ maintained its own data on these costs throughout the 1982-86 period which are used to forecast values for the cost-benefit analysis. For 1987 onwards it is assumed that these costs will increase in proportion to the KFZ's square footage. After 1988 they are assumed to remain at the 1988 value in real terms. Table 4 of the appendix presents data on these costs.

### *Selling and Promotion Costs*

Included in this category are costs of advertising, promotion, entertainment, travelling and subsistence. They are treated in a similar manner to administration costs, that is, between 1982-86 they would have been accounted for by PAJ equity. To the extent that they will occur in the future they will be financed from other sources and will represent a cost. However, all available KFZ facilities are now fully occupied so it is likely that these costs will decline significantly from 1987 onwards. For the purpose of this analysis it is assumed that these costs will be about 50% of the real 1986 value. Table 4 of the appendix shows these costs since 1982 as well as forecast values included in the net benefit calculations.

### *Finance and Policy*

Bank charges, leasehold amortization, depreciation and bad debts are the constituents of this category. Between 1982-86 these costs were included in equity contributions of the PAJ but forecasts are based on values obtained from the KFZ financial accounts. The same assumptions are made as with selling and promotion costs. Table 4 in the appendix presents values from 1982-86 and forecasts after 1986.

## Rental Revenues

The Free Zones Law of Jamaica requires that all rental payments made by KFZ firms be denominated in U.S. dollars, except for space used for canteens. Rental revenue is a direct function of the rental rate and the number of square feet of factory space rented. Table 2 of the appendix reveals that both rental rate and square footage have increased over the years explaining the increase in real rental revenues that have taken place. Rental revenues are converted to J\$ using the SER.

It should be noted that in years where data are available, square footage rented multiplied by the going rental rate and converted to J\$ at the OER, sums to less than total rental revenue. The cause of this is preferential treatment received by certain firms with respect to rental rates. A notable example is the largest firm in the KFZ which pays only U.S.\$2.50 per square foot per annum compared to the going rate of U.S.\$4.25. The firm has used its size and influence as bargaining power in negotiating such a deal and to generally wield power in KFZ affairs.

Forecasts of real rental revenues are based on expected increases in the rental rate and square footage rented. On land currently available, usable square footage is nearly at its maximum of 900,000 square feet, a target which should be reached by the end of 1987. Hence the KFZ should be fully occupied by the start of 1988. On the basis of this information it is forecast that real rental revenue will remain at the 1988 value for future years.

Rental revenue is an investment-induced benefit so it requires conversion using KRCF. If KRCF is assumed to be 0.33, the implication is that the KFZ can only take credit for 33% of rental receipts since Jamaica would have received the other 67% in its absence (assuming there is no shortage of this quality land in the rest of Jamaica).



### *Rental Revenues from KFZ Canteen Space*

In 1985 the first canteen was opened in the KFZ. It occupies 5,000 sq.ft and the rental rate is J\$35,000 per year, that is, about J\$7 per sq.ft per year. This compares with the KFZ's going rental rate of US\$4.25 per sq.ft which is equivalent to J\$23 at the OER. However, according to the manager of the KFZ, the canteen is looked at in a different light to a factory unit because most of the space in the former is utilized as a public dining area. It is argued that if the kitchen area alone were considered, the rental rate would be comparable with that paid for factory space.

In April 1987 another canteen was opened, it occupies 9,000 sq.ft with an annual rental of J\$90,000, that is, about J\$10 per sq.ft. Two additional canteens have been constructed and started operating towards the end of 1987, the rental rate is unknown to the author. The new canteens are 6,000 and 7,000 sq.ft respectively. Rental receipts represent a benefit to Jamaica. It is assumed that these canteens will also be rented at J\$10 per sq.ft.

For all canteens it is assumed that rental covers only kitchen areas since dining areas are public. The opportunity cost of building these canteens is captured in development costs of the KFZ. Table 3 in the appendix shows actual and expected rental receipts from canteens. As only one canteen was open in 1985 and 1986, receipts in each of these years were only J\$35,000. The second canteen opened in April 1987 so rental for eight months of 1987 should be approximately (67% of J\$90,000) J\$60,000. It is assumed that no rental payment for the two new canteens will be made until 1988. By 1988 total canteen rental receipts should be approximately J\$255,000 per annum. It is forecast that the real value of rental receipts will remain at the 1988 value over the life of the project.

### *Rental Forgone on the Administration Building*

The administration building occupies 6,000 sq.ft. If this space were not utilized for the purpose of administration, it could be rented to firms at the going rental rate, US\$4.25 per sq.ft per year. The forgone rental income is not a cost to Jamaica, it is a failure to receive additional rental revenue. In other words, benefits would be greater if it were rented out. The opportunity cost is already taken care of in development costs.

### *Repayments to the World Bank*

There has already been a discussion of these costs in the previous section. Repayments of loans represent a cost to Jamaica, however, the magnitude of the cost is reduced by the fact that no repayments were required until 1987. The repayments are converted to \$J using the SER of US\$1 = J\$6.6 to reflect that Jamaica relinquishes US dollars worth 20% more than if they were valued at the OER. Assuming that the OER and SER remain constant, it can be assumed that the real value of repayments will remain constant over the repayment period. Since Jamaica borrowed only US\$4.4 million and has already repaid US\$1.13 million, repayments should be completed by 1994. Table BIII.2 below shows the expected repayment schedule of the World Bank loan in terms of both US\$ and 1982 J\$ converted using the SER. Equation BIII.1 does not include repayments to the World Bank explicitly because they are assumed to be included in development costs. However, in the analysis they require separate treatment to account for the fact that repayments did not commence until 1987.

TABLE BIII.2

Repayment Schedule for World Bank Loan (1987-1994)

Year	1987	1988	1989	1990	1991	1992	1993	1994
US\$000	1130	500	500	500	500	500	500	500
J\$000	3482	1754	1754	1754	1754	1754	1754	1754

Net Benefits from Employment in the KFZ

The main economic benefits from employment created by the KFZ are measured in terms of wages paid to Jamaican workers. There may also be benefits in terms of social and psychological improvements such as: reduced crime due to fewer idle people; reduced pregnancy rates since working women wish to maintain their independence; and people who were previously unemployed feeling better about themselves.<sup>15</sup> However, these latter benefits are not readily quantifiable so will not be considered explicitly in the economic evaluation. Nevertheless, if policymakers deem them to be significant they may ascribe a value to them which can be added to the net benefit stream. The principal costs associated with KFZ employment are the opportunity costs of labour. These will be examined below.

*Wages*

Data on wages paid by KFZ firms are extracted from statistics compiled by the KFZ research department. Firms are required to submit their wage bill for each month. Although employment figures are available for the KFZ from 1980, data on wages are not available until 1982. Rather than estimating wage bills in years prior to 1982, it is assumed that in these years the total wage bill was equal to the opportunity cost of labour. This should not

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<sup>15</sup>These deductions are based on impressions received when interviewing KFZ workers, administrators, and Jamaican politicians.

influence the results significantly as employment was low in this period. Such an assumption means that the wage bill and the opportunity cost cancel out in these years and do not need to be included in the tables. It should be noted that gain through employment is perhaps the greatest source of benefit from EPZs, consequently, in the absence of detailed statistics by the KFZ it would have been imperative to estimate total wage payments. Warr (1983 and 1985) was forced to estimate wage bills of the Jakarta and Bataan EPZs. Estimation was carried out by multiplying the estimated average EPZ wage rate by number of employees. Such a procedure lacks accuracy because: a) it is difficult to estimate an average which is continually changing due to increases in employment and productivity of workers; b) high rates of absenteeism would not be captured, so the wage bill would be overstated; c) with total number of employees fluctuating significantly during some years it would be difficult to select a representative total for each year; d) overtime payments would not be captured resulting in an underestimated wage bill.

For the five year period 1982–86 the data reported in Table 3 of the appendix show dramatic increases in the real wage bill of KFZ firms. Increases are attributable to the large increases in employment over the period (from 875 at the end of 1982 to 8300 in 1986) and increases in workers' productivity over the period.

Forecasting wage payments for 1987 onwards is not a straightforward affair. If the KFZ had been in existence longer and more years of data were available then it might be possible to forecast using a time series model. However, this option is not available. It is assumed that future wage payments depend upon a) expected annual increase in the level of employment and b) expected annual real wage rate. Despite having exhausted all available space for expansion, KFZ employment can be increased by operating more than a single shift per day (which is already being practiced by some companies) or by employing more workers in the available space. Charles Pennycooke, KFZ manager until September 1987, estimates that KFZ employment should level off at 15,000 in the next couple of years. However, he alludes to

the fact that employment gains may be realised outside of the KFZ through increased sub-contracting arrangements or through KFZ firms setting up in new zones.

By June 1987 KFZ employment was estimated to be 10,500 and expected to reach 11,000 by the end of 1987, representing a 33% increase over 1986. However, the wage bill for 1987 is not expected to rise by the same percentage because new workers (except those already trained - which are few) are paid less than their more experienced counterparts. Currently the typical new worker receives about J\$90 per week while the average KFZ wage is about J\$150 (estimated from surveys conducted by the author).<sup>16</sup> Hence new workers earn about 60% of the average wage. Consequently, the real wage bill of KFZ firms should rise by about  $(0.6 \times 33)\% = 20\%$  above the 1986 value due to employment changes alone.

Employment is expected to increase to about 14,000 in 1988 (according to the KFZ manager's prediction) which represents a 27% increase over 1987. Therefore, the wage bill for 1988 should be approximately  $(0.6 \times 27)\% = 16\%$  above the 1987 value due to increased employment.

In 1989 employment is expected to reach the plateau of 15,000. This represents a 7% increase over 1988, so the real wage bill should rise by about  $(0.6 \times 7)\% = 4\%$ . This accounts only for increases due solely to extra employment. There should also be concomitant increases in the real wage bill due to productivity increases which result in average real wages rising.

With respect to average real wage, this is expected to rise as relatively new unskilled workers acquire knowledge and experience thus becoming semi-skilled and skilled. Following an initial probation period, most workers are hired (or fired) and paid on the basis of their productivity. It is assumed that a typical worker's monthly average productivity curve initially increases at an increasing rate as (s)he develops familiarity with equipment and gets into a

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<sup>16</sup>The minimum wage for garment sector workers is J\$85 per week.

rhythm. Having developed the fundamental skill and technique it is likely that the worker's average monthly productivity increases at a decreasing rate until it levels off when the worker operates at maximum efficiency. It is not expected that average productivity will decline during the horizon of the study since the majority of workers are young (between 19–24 years old) and should be able to maintain maximum efficiency over the relevant years. However, if the KFZ were to operate indefinitely one would expect average productivity of older workers to decline eventually. It is estimated that a typical (garment) worker takes one month to acquire the basic skills and techniques and a further three months to attain maximum efficiency.<sup>17</sup>

If turnover of KFZ workers was very high it is unlikely that average productivity would rise significantly over time because there would be a perpetual large pool of new inexperienced workers. Most KFZ firms have developed incentive schemes to minimize worker turnover and maximize average productivity. Such is not the case in every country, for example, in Bataan (The Philippines) it is reported that after a six month period, during which workers are paid 75% of the minimum wage, employment of many workers is terminated and fresh "trainees" hired. In this case firms seem more concerned about minimizing their wage bills.<sup>18</sup>

In September 1985 the average weekly wage in KFZ garment firms was about J\$110, the wage for a typical new worker was about J\$90.<sup>19</sup> The fact that average wage was only about 22% above that of a new worker reflects that KFZ employment was undergoing rapid expansion with a large proportion of new workers. By August 1987, new workers' wage was

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<sup>17</sup> This information is obtained from learning curves estimated by Sinotex, a KFZ garment manufacturing firm.

<sup>18</sup>See Kreye, O. et al (1987).

<sup>19</sup>Source: Quarterly Survey of Jamaica, September 1985.

still J\$90 but average KFZ wage had risen to J\$150 (60% above the new worker wage).<sup>20</sup> Since it is real wage that is of concern, it is necessary to adjust nominal values by the CPI. Therefore, average real wage for September 1985 was about J\$70 (in 1982 J\$), while average real wage for August 1987 was about J\$86, which represents a 22% rise over the two years (no 1986 average figures could be found). On the basis of this it is assumed that average real wage increased by about 11% per year between 1985 to 1987 and will continue to do so for 1988. Despite the likelihood of further increases in real wages in 1989 since employment is predicted to be still rising, it is assumed that these increases will be small enough to ignore. The implication is that after 1988, KFZ workers will be close to maximum efficiency so significant productivity increases will not occur after this point.

Forecasts of wage payments are shown in Table 3 of the appendix, they are based on predictions made for both employment and real wage increases. It should be noted that the forecast value for 1989 is expected to prevail in all subsequent years.

### *Shadow Cost of KFZ Labour*

Determining the shadow wage rate (SWR) is difficult since the productivity of workers varies and people have different marginal valuations for leisure. A significant proportion of KFZ employees were previously unemployed (or unemployable as the KFZ manager emphasizes) so there is a temptation to conclude that the most appropriate SWR is (close to) zero. However, such a conclusion would be erroneous (as discussed in Part A Chapter II) since the value individuals place on leisure would be ignored.

An attempt was made to determine the typical worker's reservation wage by the use of a questionnaire. KFZ workers were asked what was the minimum wage they were prepared to work for if the KFZ ceased to exist and they were (once again) jobless. Most workers gave what appeared to be an inflated value of their reservation wage, probably because they had

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<sup>20</sup>This information is derived from questionnaires completed by managers of KFZ firms.

become accustomed to receiving KFZ wages in excess of their pre-employment reservation wage. Also, they felt that their qualifications had increased. Some individuals actually reported reservation wages in excess of their current wages because of their expectations of higher wages in the near future (or their failure to comprehend the question posed). It was concluded that an estimate of the reservation wage based on the questionnaire would be invalid because personal biases were too influential.

The author finally decided that it would be easier and more realistic to estimate the SWR in a manner similar to that used by Weiss in his study on Jamaican national parameters.<sup>21</sup> Weiss derives a conversion factor for unskilled labour of 0.6 (CFL=0.6), this indicates that the opportunity cost of labour is valued at 60% of the actual market wage rate. He assumes that newly employed workers are drawn from different labour-supplying sectors in direct proportion to their involvement in these sectors. Based on Jamaican labour force data, unskilled workers with no previous occupation are divided between agriculture and the rest of the economy in a 60:40 ratio. Weiss thereby applies a weight of 0.6 to workers originating from agriculture and 0.4 to those from elsewhere. He then proceeds to estimate output forgone in the supplying sectors.

Weiss uses the wage that an agricultural employee could earn per annum as a proxy for lost agricultural output. The assumption is that agricultural workers are paid the value of their marginal products. Based on Jamaican data he derives an average wage rate for agriculture of J\$3,000 per annum.

To estimate the SWR in the rest of the economy Weiss adopts the concept of the reservation wage. He mentions that the reservation wage can be interpreted in two ways: a) the compensation required for a loss of leisure, or for the extra effort involved with a new job; b) the sum needed to justify forgoing casual activities that the worker may otherwise be

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<sup>21</sup>See Weiss (1985).



engaged in. Weiss rejects the opinion that loss of leisure has a real cost as far as the underemployed are concerned. Instead the reservation wage is taken to represent that wage in new employment which adequately compensates the worker for forgoing informal or casual labour. Weiss estimated a reservation wage of J\$10 per day (in 1983) he also estimates that the typical urban informal sector worker works about 10 weeks per year in the formal sector at \$20 per day. Therefore he estimates annual earnings for such a person to be J\$3,000 per annum.<sup>22</sup>

In order to obtain the SWR for the economy as a whole Weiss takes a weighted average of the agricultural wage and the reservation wage elsewhere. Since Weiss, by coincidence, estimates both wages to be equal, the weights are irrelevant, therefore \$3000 is the estimate. Weiss then estimates the average market wage rate for unskilled Jamaican labour to be J\$5,000. Consequently, Weiss recommends a conversion factor of  $J\$3000/J\$5000 = 0.60$ .<sup>23</sup>

The approach used by Weiss is not entirely appropriate for analysing the SWR for the KFZ because such a high weighting is attributed to the agricultural sector. KFZ workers are predominantly female emanating from the high unemployment non-agricultural South Kingston and Portmore areas. A more appropriate weight for agriculture would be close to zero. In a similar vein to Weiss' treatment of the non-agricultural sector, the reservation wage is deemed as most appropriate in this analysis. A high percentage of workers are between the ages of 19 to 24 years and would most likely be involved in casual domestic occupations for themselves or for others.

The minimum wage for domestic workers in Kingston appears to be the most appropriate proxy for the SWR. This essentially corresponds to the approach of Harberger mentioned in Part A Chapter II. The argument is that this wage reflects the market value

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<sup>22</sup>40 weeks at J\$10 per day plus 10 weeks at J\$20.

<sup>23</sup>This conversion factor for unskilled labour is virtually the same as that estimated for Jamaica in IDB (1977).

of a day's work of a typical unemployed woman who either works at home or for someone else. Expressing this as a proportion of average KFZ wage should yield a reasonable estimate of the conversion factor. Data on the average KFZ wage are available only for 1985 and for the first half of 1987. The official minimum wage for domestic workers has not changed in nominal terms since 1985, nevertheless it is quite evident that domestic workers have received wage increases between 1985-87. 1985 will be taken as a representative year since the minimum wage was revised in that year.

In 1985 the minimum weekly wage for a domestic worker was J\$52 plus meals.<sup>24</sup> A more representative minimum wage for 1985 is that for workers who receive no meals - that is J\$60 weekly. The average KFZ wage for 1985 was J\$110 per week so the minimum wage represents about 55% of this. A conversion factor of 0.55 appears to be quite appropriate and corresponds closely to that suggested by Weiss. For the purpose of this study 0.55 is regarded as most the reasonable estimate of the conversion factor for labour (CFL), however, a sensitivity analysis will be carried out using  $CFL=0.9$  to observe how the NPV calculation fluctuates with a much greater value for the conversion factor.

Table 3 of the appendix shows real wages as well as different estimates of the opportunity cost of labour when  $CFL=0.55$  and  $CFL=0.90$ .

#### Benefits and Costs of Providing Utilities to the KFZ

KFZ firms are users of Jamaican utilities such as electricity, water, telephone, and telex. In return for the use of these utilities firms are required to pay market rates. Payment for utilities is a benefit to Jamaica, however, to derive net benefits the opportunity cost of supplying these utilities must be subtracted. If marginal revenue from supplying these utilities exceeds marginal cost then net benefits to Jamaica are positive. Similarly, if marginal revenue

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<sup>24</sup>Source: Quarterly Survey of Jamaica, December 1985.

is less than marginal cost net benefits are negative and Jamaica would be effectively subsidizing the KFZ firms.

Since the statistics maintained by the KFZ only record payments for utilities over the 1982 to 1986 period, it will be assumed that in the pre-1982 era benefits from utility payments were exactly offset by costs of utility provision. Table 3 of the appendix reports the data on utilities.

Making forecasts beyond 1986 for utility payments is based on expected expansion of factory space of the KFZ. The following assumptions are made:

a) utility payments will expand in proportion to square footage until 1988 when the KFZ has exhausted all available space; b) in years subsequent to 1988 payments will remain at 1988 values in real terms.<sup>25</sup>

Based on the KFZ construction schedule, available factory space is expected to expand from 650,000 sq.ft in 1986 to 900,000 sq.ft at the close of 1987 (a 38% increase). By June 1987, 750,000 sq.ft were completed. It would be inaccurate to forecast utility payment increases of 38% between 1986-87 because firms starting at the end (or in the middle) of 1987 will not be required to make most of the payments until 1988. It is assumed that payments will rise by 20% between 1986 to 1987, and by 18% from 1987 to 1988.

### *The Shadow Cost of Utilities*

The companies responsible for provision of utilities in Jamaica are: the Jamaica Public Service Company (JPS) which supplies electricity; the National Water Commission (NWC); the Jamaica Telephone Company (JTC); and the Jamaica International Telecommunications Company (JAMINTEL). None of these companies keeps separate accounts on how much it costs to supply the KFZ, moreover no significant change in investment was required to supply utilities. It is therefore necessary to estimate conversion factors based on operating

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<sup>25</sup>These assumptions will be used later in forecasting other variables.

costs and revenues of each utility company. The exact method used involves expressing the operating costs of each utility as a proportion of its operating revenues for each year. A ratio less than unity in any given year indicates an operating profit while a ratio above unity reflects an operating loss. Using this method implies that the marginal cost of supplying utilities to the KFZ is the same as the marginal cost elsewhere in Jamaica.

The cost to revenue ratios were derived from financial statements of each of these public companies. In years that the JPS and the NWC registered losses the implication is that KFZ firms were the recipients of subsidies. The estimated conversion factors are recorded in Table BIII.3 below.

TABLE BIII.3

Conversion Factors for Utilities

Year	JPS	NWC	JTC	JAMINTEL
1982	1.14	0.93	0.81	0.57
1983	0.92	1.07	0.85	0.48
1984	0.95	1.09	0.76	0.39
1985	0.94	1.07	0.71	0.39
1986	0.96	0.95	0.78	0.46

JPS=Jamaica Public Service, NWC=National Water Commission, JTC=Jamaica Telephone Company, JAMINTEL=Jamaica International Telecommunications Company.

The 1986 values are estimated from an average of the 1982-85 values.

Having estimated conversion factors by the procedure described above, the amount actually paid by KFZ firms to each utility company is multiplied by the conversion factor to derive the shadow cost in each year.

In order to forecast values for the post-1986 period it is assumed that for all utilities, with the exception of the NWC, the shadow cost will increase in real terms in direct proportion to expected increases of KFZ factory space. After 1988 real values are forecast to remain constant. The NWC has made profits and losses throughout the period so it is assumed that it will break even after 1986. However receipts from the NWC will rise at the same rate as the expansion of KFZ factory space.

#### Net Benefit to Jamaica from Purchases of Local Goods by KFZ Firms

KFZ firms report expenditure on local goods and services under three categories: a) goods; b) other expenditures; and c) shipping.

#### *Goods*

Data on purchases of domestic goods by KFZ firms are obtained from reports of firms sent to the KFZ research department. A principal aim of the KFZ is to encourage backward linkages with the local economy, this has not been achieved to the desired extent. KFZ firms actually purchase very few Jamaican products that are direct inputs into their production processes. For example, nearly all of the cloth, thread, buttons, and sewing machines used in manufacturing garments are imported. Supposedly this is caused by either the poorer quality of domestic products, higher prices for domestic products, or unreliability of local suppliers.<sup>26</sup> However, KFZ firms do purchase some items locally such as fuel, office supplies, and packaging and cleaning materials. The food processing firm also bought hot sauces and spices for its canned fish. The total expenditure on these items cannot simply be included as a net

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<sup>26</sup>These are the main reasons suggested by firm managers in interviews.

benefit to Jamaica, the costs of providing them has to be subtracted. These net benefits are included in the term (LP-OCLP) in equation BIII.2.

A conversion factor is required to provide an estimate of the shadow cost of supplying goods. The Private Sector Organisation of Jamaica (PSOJ) estimates that a standard mark-up on costs for Jamaican goods is in the range of 35–50%. For the purpose of this analysis a figure of 40% will be applied which implies that the conversion factor, referred to as CFLP, is 0.6. That is, 60% of the price paid for Jamaican goods is represented by the cost of supplying them.

The fact that Jamaican wholesalers are able to mark-up their prices above the social opportunity cost implies that a wedge is created by barriers to competition in the economy. High tariffs and prohibitive quotas protecting the domestic market from foreign competition are major determinants of this wedge. In addition, the difficulties associated with raising capital in Jamaica reduce the scope for local competition and enables existing suppliers to maintain their market power. Some commodities are imported only by the Government or special licensed importers, the resulting monopoly power makes it possible for such importers to maintain a wedge between private cost and social opportunity cost. Domestic regulations and constraints are the main reasons why such large mark-ups can be maintained.

The shadow cost of expenditures on goods can therefore be estimated as the product of the conversion factor (CFLP) and total expenditure on Jamaican goods by KFZ firms. Tables 3 to 5 in the appendix show total expenditures on Jamaican goods, and the respective shadow costs for the 1982–88 period.<sup>27</sup>

In order to forecast values of expenditures on Jamaican goods (and therefore the shadow cost since the conversion factor is assumed to remain at 0.60) the same assumptions are made as were made with the forecasts of utility payments. That is, they will increase in

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<sup>27</sup>The 1987 and 1988 values are forecasts.

direct proportion to expected growth in square footage of the KFZ until 1988 and remain constant in real terms in subsequent years.

### *Other Expenditures*

Included in the category of other expenditures (O) are payments made by KFZ firms for a) sub-contracting; b) local insurance premiums; c) legal and other services; d) maintenance and alterations; e) travel expenses; and e) miscellaneous expenditures. Payments to Jamaicans for these goods and services are certainly a benefit to the domestic economy, however, to determine the net benefits the shadow cost of these expenditures must be accounted for. The variety in types of expenditure in this category renders it very complicated to derive a representative conversion factor (CFO). The conversion factor of 0.6 used above for purchases of Jamaican goods presents itself as being reasonable. However, prudence dictates that a higher value be also used to see the sensitivity of results to the choice of conversion factor. A value of 0.8 is chosen.<sup>28</sup> These results are provided in Tables 3 to 5 in the appendix.

Forecasts are based on the expected rate of growth of KFZ square footage. Real values are forecast to remain constant after 1988.

### *Shipping Revenues and the Shadow Cost to Jamaican Shipping Agents of Providing Services*

Shipping is another expenditure included under LP in equation BIII.1. Data on shipping revenues are found in statistics compiled by the KFZ. Revenues are payments to local shipping agents who arrange the shipping of KFZ firms' goods with international shipping companies (like Evergreen Shipping Lines). A senior official at a large shipping agency stated that approximately 60% of the agency's receipts covered costs of providing services. It is therefore thought that a conversion factor of 0.6 is appropriate for determining the shadow cost of shipping. The results are contained in Tables 3 to 5 of the appendix. Forecasts are made by increasing revenues and costs by the expected growth in square footage of the

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<sup>28</sup>The conversion factor for other expenditures is referred to as CFO.

KFZ.

### Payroll Taxes

Payroll taxes paid by KFZ firms include the H.E.A.R.T. Tax, National Housing and National Insurance contributions.

#### *The H.E.A.R.T. Tax*

Jamaica has in place a Human Employment And Resource Training (H.E.A.R.T.) programme for providing a basic training to unskilled workers. All firms in the KFZ have to pay the H.E.A.R.T. tax, an amount equal to 3% of the value of their wage bill. It will be assumed that the cost of running the programme is offset by the fact that Jamaica now has a pool of higher skilled labour, that is, the human capital stock of the nation has increased. The tax revenue can therefore be counted as a net benefit to Jamaica. Tables 3 and 5 of the appendix present data on the H.E.A.R.T. tax, National Housing, and National Insurance Contributions. These payments are 3%, 3%, and 2% of the wage bill respectively.

#### *National Housing and National Insurance Contributions*

National Housing contributions are equivalent to 3% of KFZ firms' wage bill. KFZ employers have to pay this in addition to wages. Receipts are used by the Government to provide subsidized housing. National Insurance contributions are used to finance pension schemes and health programmes in Jamaica. These are equal to 2% of the wage bill.

Tables 3 and 5 in the appendix contain the data. It is assumed that these revenues will remain the same percentage of the wage bill throughout the forecast period.



### Profits to Jamaican Owned KFZ Firms

Wincorp and Antillean Foods are the only two KFZ firms with major Jamaican interests. The companies refused to reveal their exact profit and loss figures. However, Wincorp declared that it operated with significant profits while Antillean (now in receivership) operated at a loss. It is assumed that the profit positions of these two companies net out to zero. This is being rather conservative since it excludes future profits of Wincorp, however there is no more realistic assumption in the absence of actual profit and loss statements. Consequently, these data are not included in any of the tables found in this analysis.

### Net Foreign Exchange Gain

These gains originate as a direct consequence of the overvalued exchange rate. Foreign firms are legally obligated to raise all their funds abroad, consequently they receive less than the true market value of their foreign exchange when conversions are carried out at the official exchange rate (OER). The Bank of Jamaica (BOJ) effectively saves 20% on each US\$ dollar converted to J\$. Hence, foreign firms are essentially being taxed or are being required to convert 20% more dollars than the free market would dictate in order to be able to conduct local transactions. The SER is estimated at 20% above the OER, therefore the benefit to Jamaica can be approximated by taking 20% of the value of total domestic expenditures carried out in local currency by KFZ firms. Wincorp and Antillean's expenditures are included in the aggregate statistics reported by the KFZ, so 20% is probably an overestimate since these firms are in large part Jamaican and can raise local funds. A conservative percentage of 15% is therefore used. The results are reported in Table 3 and 5 of the appendix. For the purpose of forecasts it is assumed that the gain will remain at the 1986 value for future years.

## Other Benefits

In this section there is a brief discussion of other benefits that are sometimes reaped in an EPZ, namely technological benefits and unofficial levies.

### *Technological Gains*

Technology used by KFZ firms, with the exception of ethanol production, is very basic and is easily accessible in Jamaica. The typical garment factory is equipped with sewing machines and irons, this does not represent a major technological gain for a nation at Jamaica's stage of development. Even most non-garment producers of the KFZ use very standard production processes. The ethanol producing operation involves more advanced techniques but these are not diffused throughout the rest of the economy.

The only source of potential technical gains are those occurring via on the job training of workers who might then take their skills outside the KFZ. It is unlikely that such a benefit is of significant magnitude so it will be excluded from the cost-benefit calculation.

### *Unofficial Levies*

In the survey of KFZ managers, they were asked if any situations had arisen where it was required that they make undisclosed payments to customs officers or other government officials. There was a unanimous response that no such cases were encountered. It is unlikely that they would have revealed it if such cases had in fact occurred. However, there is no evidence to support a conclusion that Jamaica derives a benefit from unofficial levies (unlike Warr's findings for the Jakarta EPZ).

## Secondary Effects

These effects, apart from multiplier effects, are not explicitly incorporated in equation BIII.1 but could easily be added. It is often the case that activities of an industrial zone have repercussions of one sort or another for other sectors or areas of the economy. Such spillover effects could either be negative or positive. To the extent that such effects occur, it is correct to attribute them to the KFZ as long as they are the consequence of net new investment from abroad. If, for example, multiplier effects are the result of expenditures that would have taken place in Jamaica in the absence of the KFZ—and assuming they would accrue regardless of where the expenditures are made and what form they take—then the KFZ should not receive credit for them. Yet, even in cases where expenditures would have occurred anyway, if it is shown that multiplier effects would not accrue were the KFZ located elsewhere then they should still be attributed to the KFZ. Such might be the case if expenditures resulting from the KFZ are made in an area of less than full employment while those from alternative projects would be made in areas of full employment. It should be noted that in this study the KRCF is used to adjust expenditures so that only multiplier effects arising from net new foreign investment are included.

Apart from multiplier effects, other examples of secondary effects include: congestion and pollution; the impact of the KFZ on other local (garment) producers; and locational trade diversion. These are discussed below.

### *Congestion and Pollution*

To the extent that pollution and congestion occur their impact represents a cost to Jamaica. However, despite being on the fringe of the Kingston Metropolitan Area, the KFZ does not appear to create any undue congestion since it is sufficiently removed from the downtown and New Kingston areas. Furthermore, a high proportion of workers arrive and depart in public transportation rather than in their own vehicles. The most serious problem associated

with this is the greater exposure of female workers to assaults as they journey home from late shifts. No attempt is made to ascribe a social cost to such incidents in this study.

There is also a good case for arguing that pollution is minimal since activities of garment manufacturers are quite clean and relatively quiet. Furthermore, there is no evidence available which suggests that workers develop illnesses from the workplace. In fact, there is evidence to the contrary because the KFZ Medical Post claims to diagnose and treat many illnesses that workers develop outside the KFZ. This could actually be included as a benefit to Jamaica.

#### *Effects on Local Producers - Pecuniary Externalities*

The above discussion has explained that the KFZ's activities produce no unpleasant emissions to disturb local producers. However, it is possible that they could be adversely affected by pecuniary externalities that reduce their profits while those of foreign KFZ firms are augmented. It is possible to set up laws to protect property rights against pollution and other externalities of a similar nature, but no one has established a method for avoiding pecuniary externalities. These arise due to changes in market demand and supply conditions for goods, services, and factors of production.

A survey of ten local garment producers was carried out in an effort to determine whether they experience any negative or positive repercussions from activities of the KFZ. The responses stated overwhelmingly that the KFZ did not affect their output or workers in any way. Local firms producing for the export market argued that KFZ firms were not competing in their segment of the market. Local firms producing for the local market argued that since the KFZ produced for export only, its activities did not affect them. One small producer complained that the KFZ had taken away some contracts that it might have received. Furthermore, the KFZ had attracted away some of its best workers while those received from the KFZ were usually the poorest workers. On the whole it was decided that

the complaint of this small producer was not great enough to consider as a significant cost of the KFZ. If such pecuniary externalities which redistribute wealth from non-KFZ Jamaican firms to foreign KFZ firms, were significant they should be incorporated in the cost-benefit calculation.

If the KFZ were to create a shortage of labour and drive up wage rates for non-KFZ producers this would increase their costs. However, much of this pecuniary externality could not be counted as a cost to Jamaica since it is mainly a transfer from local capitalists to workers. This effect is likely to be minimal in Jamaica anyway since the KFZ follows similar pay guidelines to non-KFZ firms.

#### *Locational Trade Diversion*

Locational trade diversion occurs when investors choose to operate within a zone in order to take advantage of incentives offered despite the zone not being the optimal location for their business. Resources are therefore wasted because firms are not able to operate at maximum efficiency in a suboptimal location. Such a situation is more likely to occur if a zone is set up in a rural area far from ports in an effort to attain regional development. It could also arise if a firm sets up far away from the source of its raw materials in order to take advantage of concessions available in the zone. None of these cases appear to apply in the case of the KFZ because most of the producers import their inputs and/or export their output. Moreover, the zone is situated right at the port, close to areas of high labour unemployment. The ideal location of the KFZ renders locational trade diversion an unlikely cost. Moreover, this cost would be only of relevance to the extent that it affects Jamaican owned firms. There seems to be no reason to include it in the cost-benefit study.<sup>29</sup>

In the survey of KFZ managers they all agreed that the KFZ was ideally located for their requirements. In fact, when asked to do so, none of them identified a preferred

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<sup>29</sup>The problem of locational diversion of investment is taken care of by using the KRCF.

location, which supports the conclusion that locational trade is an insignificant cost.

### *Other Externalities*

Another externality that is identified by those associated with the KFZ is the reduction in the birth rate that is likely to result. The continual growth of the population in Jamaica is seen as a problem. The government has tried to make the public conscious of it. Therefore, any projects that assist in reducing it might be socially beneficial to the nation. Most KFZ workers are female, it is argued that these women will be less willing to relinquish the economic independence they are now enjoying as a result of their employment. Furthermore, women not yet employed but hoping to work in the KFZ will also be less prepared to entertain a pregnancy. Sociologists have argued that there has been a tendency for women to bear children as a means of attaining economic support from men. However, the KFZ is helping to alter this pattern.

Another positive externality that could be mentioned is the improved state of mind and self esteem that is felt by those now unemployed who were formerly thought of as unemployable. It is hoped that their more optimistic outlook will be transferred to their families and friends thus improving the well being and hope of many Jamaicans.

One other negative externality worth mentioning is the possible "demoralisation" cost imposed upon non-KFZ firms which have to face delays and extra paperwork while their KFZ counterparts (mainly foreigners) receive preferential treatment. It is quite likely that some degree of frustration and dissatisfaction may result.

It is not possible to objectively measure the impact of these externalities due to their nature. As a result they are excluded from the net benefit calculations, however, it is possible that their impact might not be trivial. If the decision maker or evaluator considers a positive externality to be important and significant then it is not inconceivable that a project may still be implemented even when the NPV (excluding the externality in question) is

negative. In such a case the decision maker feels that including these externalities renders the NPV positive. The converse may take place with a significant negative externality.

### Income Distributional Effects

In this analysis no judgement is made with respect to income distributional effects. This is consistent with Harberger's third postulate (see p.13). However, it is worth noting that nearly all KFZ employees were formerly unemployed and amongst the poorest Jamaicans. Since their incomes have increased, Jamaica's income distribution should be more equal. If a more equal income distribution is considered a welfare improvement for Jamaica, it could be argued that the KFZ has contributed positively to this end.

### Estimating the Net Present Value, Internal Rate of Return, and the Benefit-Cost Ratio for the KFZ

Having identified and estimated the relevant costs and benefits, the next step is to estimate the Net Present Value (NPV), internal rate of return (IRR), and the Benefit-Cost (B/C) ratio for the KFZ. The procedure for carrying out this operation was outlined in Part A Chapter II. Choosing the appropriate social discount rate was also discussed in that chapter. There are several alternative approaches to estimating the social discount rate (SDR). However, analysts usually resort to sensitivity analysis since no consensus exists on the most appropriate measure of the SDR. Weiss (1985) suggests a minimum rate of 10% for Jamaica, his methodology is outlined below.

Weiss (1985) mentions the Little–Mirrlees approach as one alternative for estimating the SDR, that is, alter the SDR until the number of projects exactly matches available funds. Weiss argues that this approach is unreasonable in cases where there are not several projects being considered simultaneously. He then mentions the alternative approach suggested by Warr (1985), that is, use the marginal cost of access to foreign borrowing as a minimum level for the SDR. Weiss points out that the implication of using this rate is that additional local expenditure is financed through foreign borrowing. This is certainly representative of the Jamaican situation.

The relevant loans from foreigners are the marginal lines of credit which are generally the least attractive ones since they are usually only considered when lower interest rates become unavailable. Weiss studied Jamaica's creditors and observed that foreign commercial banks' loans had the highest rates of interest. In 1982, these loans represented 28% of Jamaica's total debt. He mentions that during mid-1983 Jamaica's status as a borrower meant that its interest payments were 2.25% above the London Inter-Bank Offer Rate (LIBOR) for commercial bank loans. At this time Jamaica's interest charge amounted to 12.25% plus approximately 0.5% for other fees. Weiss alludes to the fact that these nominal rates should be deflated and expressed in real terms. The change in the international prices of Jamaica's principal exports and imports was selected as an appropriate deflator. Any increases in these prices indicates that the foreign debt would require a smaller physical quantity of export items or of forgone imports to finance the debt servicing.

After analysing trends in Jamaican export and import prices and commercial bank rates on borrowing, Weiss estimates a real cost of borrowing of 8–9% in 1983 and 10–11% in 1984. Weiss points out, however, that international prices and interest rates are prone to major fluctuations so the discount rate should be adjusted accordingly.



Warr (1985) uses a similar approach in the study of the Bataan EPZ. He estimates the SDR by averaging the U.S. Prime Rate from 1973 to 1982 (instead of the LIBOR), adding a 1% risk premium and deflating by the average rate of increase of the export unit value index. A similar approach is followed for Jamaica in this study using available data from 1983 to 1986. Since most of Jamaica's loans for the KFZ project are from the World Bank at a rate of interest of 11%, this rate is chosen. It is deflated by 0.41%, the average increase of the U.S. export unit value index over the period. This index is selected because the U.S. is Jamaica's major trading partner. If a 1% risk premium is added, the SDR can be estimated as 11.59% which is close to the range suggested by Weiss.

The following calculations are carried out using a spectrum of values for the SDR to observe the sensitivity of NPV and B/C ratio to different values. However, a value of 11% is considered most "realistic" since this coincides with the rate paid on the World Bank loan in a period when the prices of U.S. exports rose very little. Choosing 11% assumes that the risk premium and the increase in the U.S. export unit value index cancel. 11% is also justifiable since it is close to Weiss' recommendation of a minimum of 10%.

### *The Calculations*

The calculations in this section are carried out with the use of VP-Planner, a spreadsheet software package. Carrying out calculations would have been a much lengthier and more tedious affair without this software.

The discounted present value of net benefits was calculated for 1978 to 2007 using values of the SDR ranging from 1% to 50% in some cases. This range of values is selected because it is large enough to provide plenty of information with regards to how the NPV and the SDR covary. The calculations are based on a projected life of 25 years for the KFZ after 1982 (which is the base year ( $t=0$ ) when discounting as well as for the price index used to deflate the actual data on costs and benefits). Choosing a longer life would

make little difference since net benefits accruing farther into the future are weighted very low. The following subsection contains the results of the NPV, IRR, and B/C calculations for 1978 to 2007 in the "realistic" case scenario. Tables BIII.4 to BIII.6 below present the results using different values of the SDR, KRCF, shadow cost of labour, and shadow cost of other Jamaican goods purchased (as shown in Table BIII.1) Table 6 in the appendix provides a ranking of costs and benefits.

### *The "Realistic" Case*

In the realistic case  $KRCF=0.33$ ,<sup>30</sup>  $CFL=0.55$  (conversion factor for labour),  $CFLP=0.6$  (conversion factor for local purchases of goods),  $CFO=0.6$  (conversion factor for other expenditures),  $SDR=11\%$  (social discount rate), and  $M=1.5$  (multiplier) since it is realistic to assume that in the presence of unemployment, expenditure by foreign firms has a multiplied effect on GNP. These estimates can be substituted into the net benefit equation as follows:<sup>31</sup>

$$NB = (KRCF.M.R+SV-D-OP) + KRCF(M.W-CFL.W) + KRCF(M.LP-CFLP.LP) \\ + KRCF(M.U-OCU) + KRCF.M(T+FE+P+UL) + KRCF(TT-OTT)$$

$$\text{So, } NB = (.33[1.5]R+SV-D-OP) + .33(1.5W-.55W) + .33(1.5LP-.6LP) \\ + .33(1.5U-OCU) + .33[1.5](T+FE+P+UL) + .33(TT-OTT)$$

The NPV, B/C, and IRR are then calculated as follows:

$$NPV = \sum_{t=0}^{29} NB_t / (1.11)^t = \$119,799,090 \text{ (1982 \$J)}$$

$$B/C = \frac{\sum_{t=0}^{29} B_t / (1.11)^t}{\sum_{t=0}^{29} C_t / (1.11)^t} = 143,304,640 / 72,209,720 = 1.98$$

<sup>30</sup>As estimated in Part B Chapter II.

<sup>31</sup>Check pp.85-86 again for the meaning of the abbreviations in the equation. In the equation it is assumed that LP includes expenditures on goods as well as other expenditures, therefore  $CFLP=CFO=0.6$ .

IRR = 41%

Based on the assumptions and framework of analysis used, the calculations above show clearly that benefits of the KFZ exceed costs by a wide margin. From the point of view of economic returns, KFZ development appears to have been a successful project for Jamaica. Fig. 1 below graphs the NPV calculations for SDR values from 0% to 45%. The graph clearly depicts the inverse relationship between NPV and SDR. Furthermore, it shows that an SDR value of 41% is required to make the NPV negative. This value of the SDR is the IRR.

### *Other Scenarios*

A total of 28 scenarios have been analysed which vary from most optimistic to most pessimistic.<sup>32</sup> The results of these scenarios are presented in Tables BIII.4, BIII.5, BIII.6 and the figures below (and in the figures in the appendix). The purpose of all these scenarios is to illustrate the sensitivity of the NPV, IRR, and B/C ratio to changes in the various conversion factors and parameters. Most scenarios lack realism because they are based on extreme parameter values. However, they can all be compared to the "realistic" case to see the difference in results. Some of the most interesting scenarios are described below.

The most optimistic scenario uses SDR=11%, M=1.5, KRCF=1, CFL=0.55 and CFLP=CFO=0.6. In this case NPV=J\$270,191,590, B/C ratio=2.66, and IRR=82%. The only difference between this scenario and the "realistic" case is the value of KRCF. However, it can be seen from Tables BIII.4 to BIII.6 that an increase in the KRCF from 0.33 to 1 increases NPV, IRR and B/C by 125%, 100% and 34%, respectively. This scenario corresponds to the case where all net benefits are attributed to the KFZ.<sup>33</sup> There is a graph of these

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<sup>32</sup>Each graph (presented below and in the appendix) indicates whether the scenario is optimistic or pessimistic depending on whether the IRR is above or below that of the "realistic" case.

<sup>33</sup>This is the implicit assumption made by Choe (1975) and Warr (1983 and 1985).

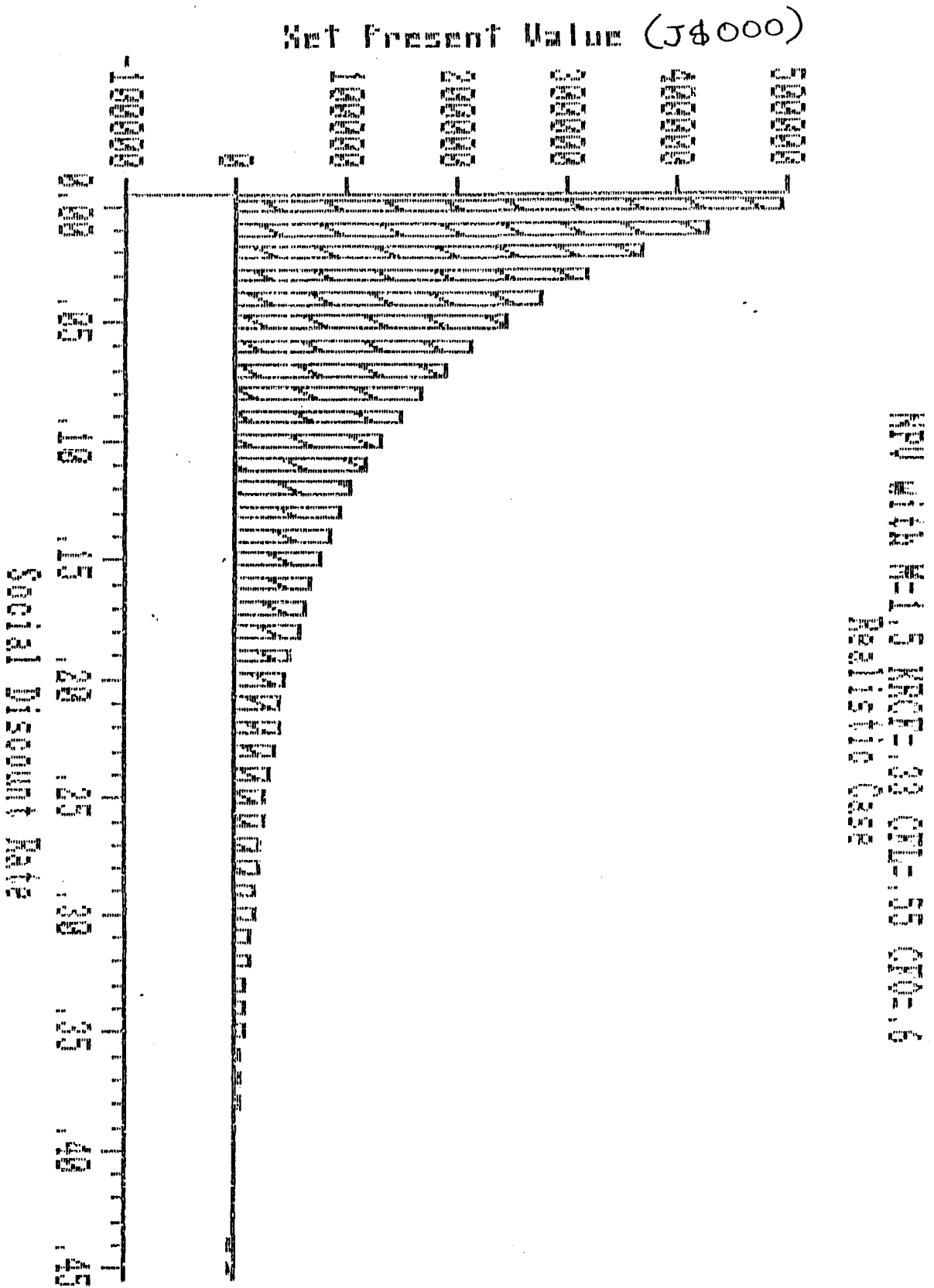


TABLE BIII.4

a) NPV Calculations with M=1.5, CFL=.55, CFLP=0.6, CFO=.6 and Different Values of KRCF and SDR (in 1982 J\$000)

	SDR					
	1%	5%	10%	11%	15%	30%
KRCF						
0	-92373	67570	-50542	-48241	-41334	-31473
.1	37907	9442	-2180	-3195	-5335	-5146
.25	282720	130658	54422	46076	24073	1220
.33	427298	245082	133911	119799	78521	16674
.50	653330	314258	140227	120781	68696	10917
.75	1023940	497858	226031	195486	113320	20614
1	1394549	681458	311836	270192	157943	30310

b) NPV Calculations with M=1.5, CFL=.9, CFLP=0.6, CFO=.8 and Different Values of KRCF and SDR (in 1982 J\$000)

	SDR					
	1%	5%	10%	11%	15%	30%
KRCF						
0	-92373	-67570	-50542	-48241	-41334	-31473
.1	29561	6839	-2825	-3687	-5505	-5151
.25	226603	103019	41623	34956	17489	-151
.33	327241	152927	64985	55303	29662	2513
.50	541096	258980	114629	98540	55529	8174
.75	855589	414942	187634	162125	93569	16499
1	1170082	570904	264640	225710	131608	24825

TABLE BIII.5

a) NPV Calculations with M=1, CFL=.55, CFLP=0.6, CFO=.6 and Different Values of KRCF and SDR (in 1982 J\$000)

KRCF	SDR					
	1%	5%	10%	11%	15%	30%
0	-92373	-67570	-50542	-48241	-41334	-31473
.1	-11895	-19137	-21957	-22196	-22745	-23854
.25	108823	53513	20921	16871	5138	-12704
.33	173206	92259	43790	37707	20009	-6698
.50	310019	174596	92385	81984	51610	6065
.75	511216	295678	163848	147097	98083	24834
1	712412	416761	235311	212209	144555	43603

b) NPV Calculations with M=1, CFL=.9, CFLP=0.6, CFO=.8, and Different Values of KRCF and SDR (in 1982 J\$000)

KRCF	SDR					
	1%	5%	10%	11%	15%	30%
0	-92373	-67570	-50542	-48241	-41334	-31473
.1	-35486	-33246	-30202	-29692	-28042	-26002
.25	49844	18238	308	-1867	-8104	-17796
.33	95353	45697	16580	12972	2530	-13419
.50	192061	104046	51159	44507	25126	-4119
.75	334278	189854	102009	90881	58357	9558
1	476495	275662	152860	137255	91587	23235

TABLE BIII.6

IRR and B/C (SDR=11%) Calculations with M=1.5, CFL=.55, CFLP=0.6, CFO=.6, and Different Values of KRCF

	KRCF=.1	KRCF=.25	KRCF=.33	KRCF=.5	KRCF=.75	KRCF=1
IRR	0.08	0.33	0.41	0.54	0.68	0.82
B/C	0.93	1.74	1.98	2.26	2.51	2.66

IRR and B/C (SDR=11%) Calculations with M=1.5, CFL=.9, CFLP=0.6, CFO=.8, and Different Values of KRCF

	KRCF=.1	KRCF=.25	KRCF=.33	KRCF=.5	KRCF=.75	KRCF=1
IRR	0.08	0.30	0.37	0.49	0.63	0.76
B/C	0.92	1.49	1.63	1.83	1.99	2.07

IRR and B/C (SDR=11%) Calculations with M=1, CFL=.55, CFLP=0.6, CFO=.6, and Different Values of KRCF

	KRCF=.1	KRCF=.25	KRCF=.33	KRCF=.5	KRCF=.75	KRCF=1
IRR	-0.2	0.18	0.24	0.35	0.46	0.56
B/C	0.69	1.16	1.31	1.51	1.67	1.77

IRR and B/C (SDR=11%) Calculations with M=1, CFL=.9, CFLP=0.6, CFO=.8, and Different Values of KRCF

	KRCF=.1	KRCF=.25	KRCF=.33	KRCF=.5	KRCF=.75	KRCF=1
IRR	-0.8	0.10	0.16	0.26	0.37	0.46
B/C	0.62	0.98	1.09	1.22	1.33	1.39

results in Fig. 2 below.

The most pessimistic scenario is where  $M=1$ ,  $KRCF=0$ ,  $CFL=0.9$ ,  $CFLP=0.6$  and  $CFO=0.8$ .<sup>34</sup> Here the net benefit equation collapses to:

$$NB = SV - D - OP.$$

For  $SDR=11\%$ , the  $NPV=J\$-48,241,490$  and the  $B/C$  ratio is 0.02. This is the case where all KFZ investors would have been in Jamaica (and operating at their current levels) even if there was no KFZ. Therefore, all KFZ investment would be locationally diverted. The salvage value is the sole benefit while development and operating costs are borne by Jamaica. In this case the NPV represents the cost Jamaica incurs in its unsuccessful attempt to attract incremental investment (that is, investment that would otherwise not have come to Jamaica). The NPV calculations are graphed in Fig. 3 below.

To determine the importance of the multiplier to the analysis, the scenario where  $M=1$ ,  $KRCF=0.33$ ,  $CFL=0.55$ , and  $CFLP=CFO=0.6$  can be compared with the "realistic" case. In this scenario  $NPV=J\$37,707,230$ ,  $IRR=24\%$  and  $B/C=1.31$ . The only difference between this scenario and the "realistic" case is that this one excludes the multiplier effect. Therefore, it is more pessimistic. The NPV, IRR, and  $B/C$  ratio are less than the "realistic" case by 69%, 41%, and 34%, respectively. Although the NPV is still positive and  $B/C$  greater than unity, the exclusion of the multiplier reduces them substantially. Fig. 4 below shows the responsiveness of the NPV to the SDR in this case.

Another scenario worth noting is where  $M=1.5$ ,  $KRCF=0.33$ ,  $CFL=0.9$ ,  $CFLP=0.6$ , and  $CFO=0.8$ . This scenario is also on the pessimistic side since the  $CFL$  and  $CFO$  are greater than in the "realistic" case. The NPV is  $J\$55,302,820$ ,  $IRR=37\%$ , and  $B/C=1.63$  which represent a decline of 53%, 10%, and 18%, respectively, from the "realistic" case. Fig. 5

---

<sup>34</sup> In fact, since  $KRCF=0$ , the values of  $M$ ,  $CFL$ ,  $CFLP$  and  $CFO$  are irrelevant.



FIG. 2

MOST OPTIMISTIC CASE

NPV with  $R=1.5$   $KOCF=1.0$   $OTI=.55$   $COI=.6$

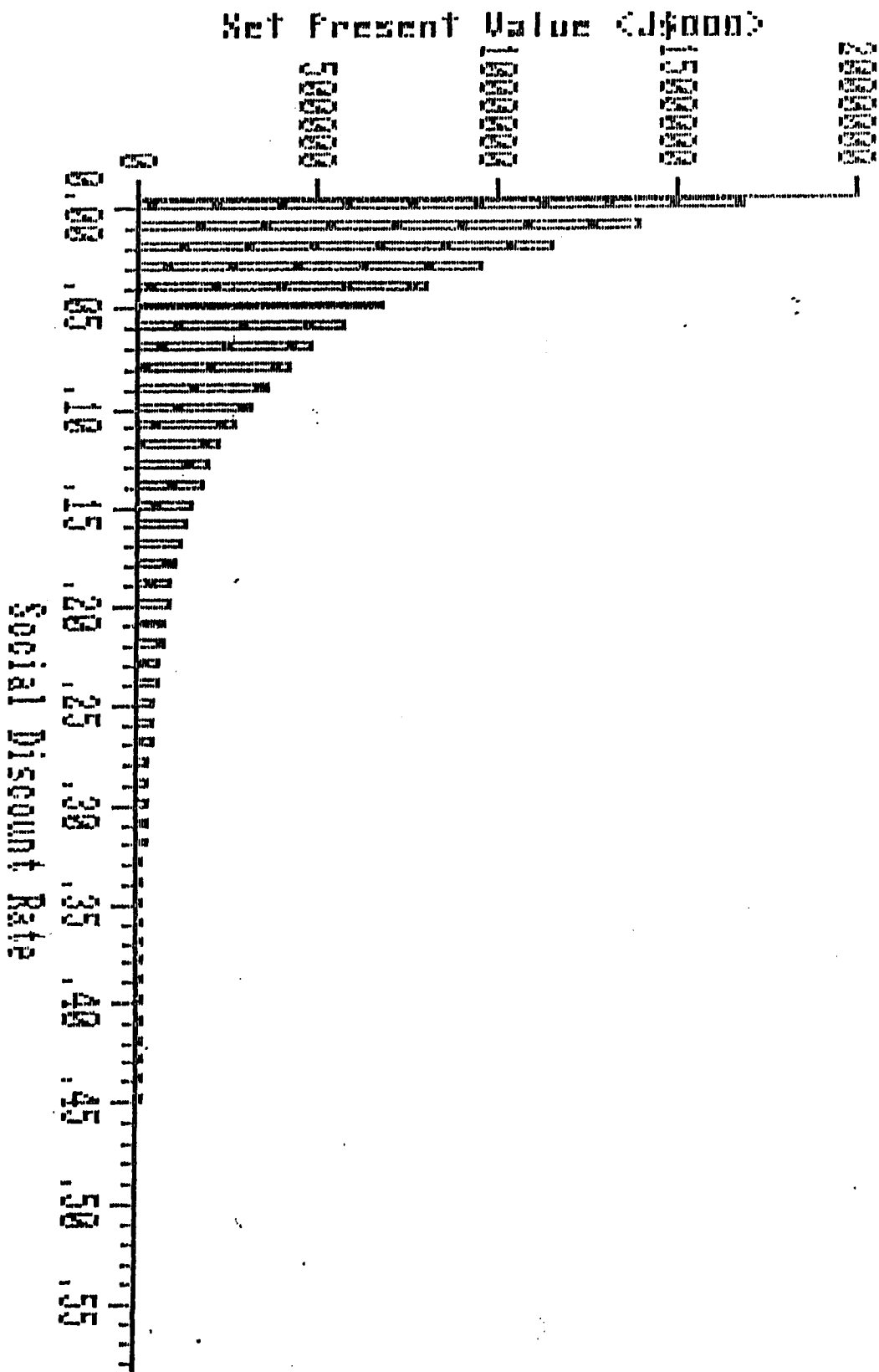


FIG. 3

MOST PESSIMISTIC CASE

NPV with M=1 KRCE=0 CFI=.9 CFO=.8

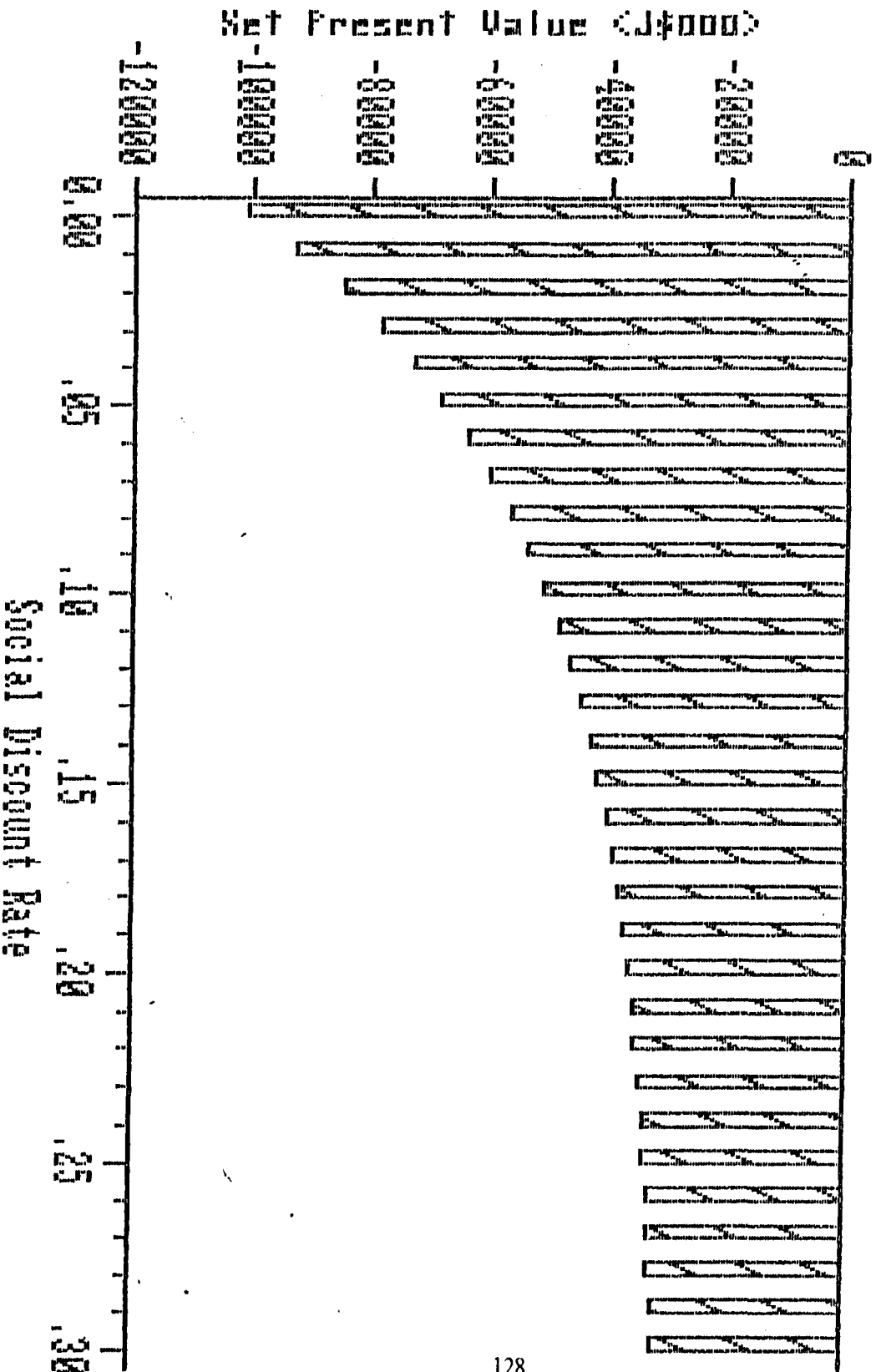
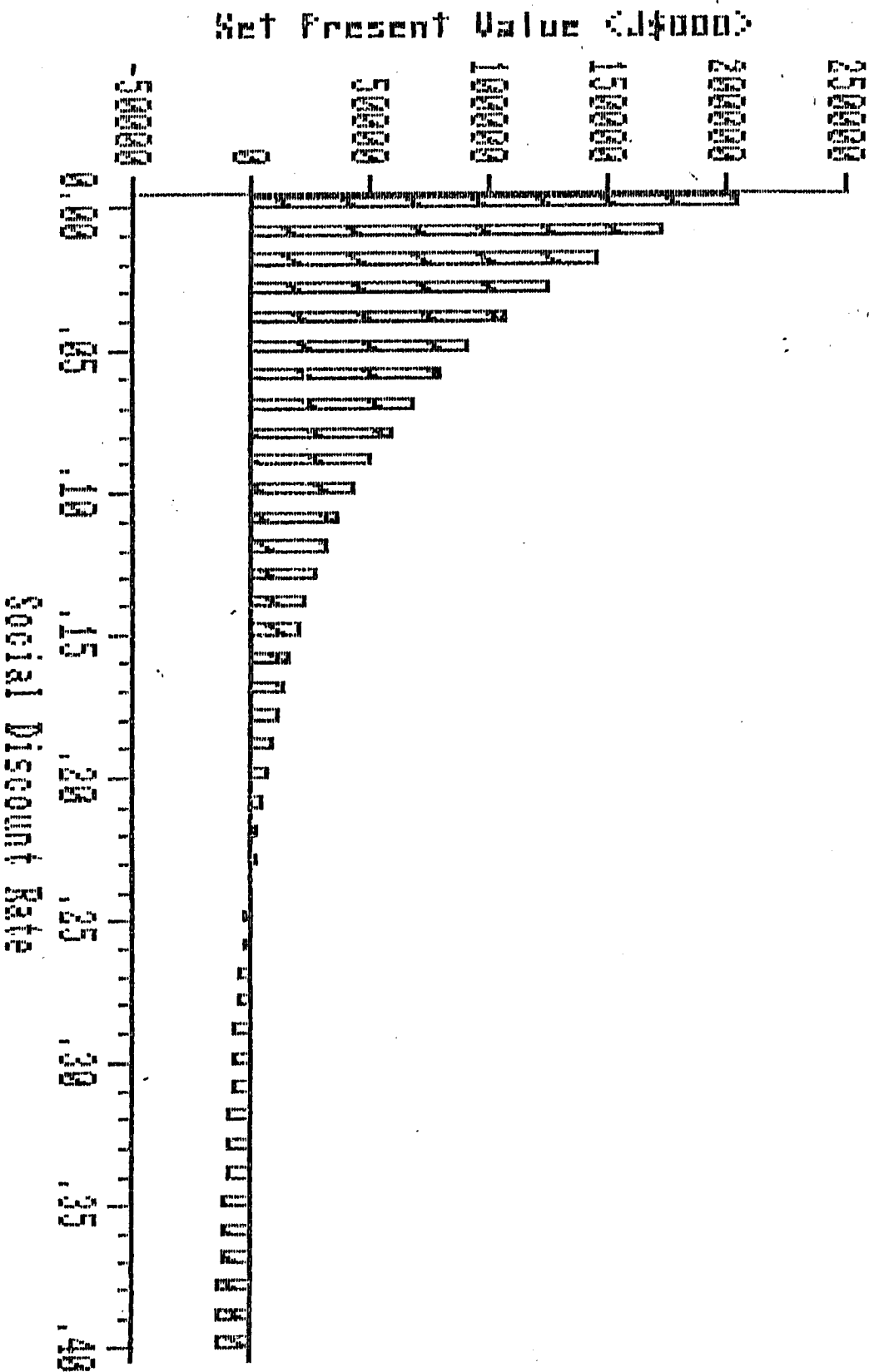


FIG. 4

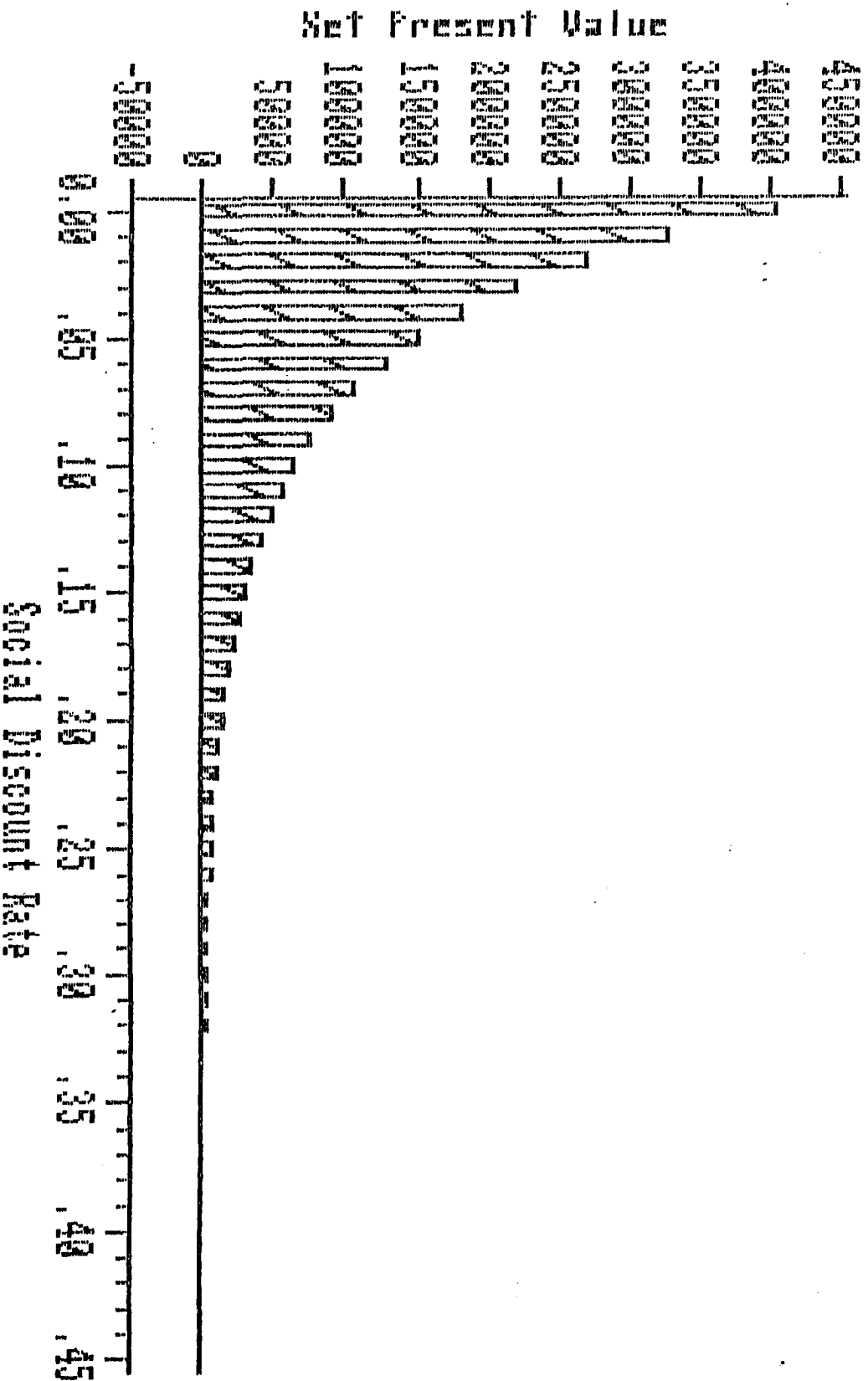
PESSIMISTIC CASE 1

NPV with  $M=1$   $KRCF=.33$   $CTL=.55$   $CFO=.6$



SLIGHTLY PESSIMISTIC CASE 1

NPV with  $N=1.5$   $MRCF=.33$   $CPI=.9$   $CFO=.8$



below shows the relationship between the NPV and SDR.

Graphical representation of all other scenarios can be found in Fig.6 to Fig.25 of the appendix.<sup>35</sup>

In the cost-benefit analysis, some benefits and costs have certainly dominated the results. Table 6 in the appendix provides a ranking of the undiscounted total value (SDR=0) of each benefit and cost for 1978 to 2007 so that their relative magnitude can be observed. The importance of wage benefits, local purchases of goods and services, and foreign exchange gain is shown on the benefit side. The opportunity costs of labour and local purchases dominate the cost side.

This chapter has outlined and estimated the relevant economic costs and benefits associated with the KFZ. The procedure and assumptions for estimating each cost and benefit has been discussed. If the "realistic" scenario is used as a benchmark, the NPV, IRR, and B/C ratio calculations strongly suggest that the KFZ confers positive net benefits on the Jamaican economy. Only in very pessimistic scenarios is the NPV negative (as Tables BIII.4 to BIII.6 and Fig. 1 to Fig. 25 show). Hence, there seems to be a good case for arguing that the welfare of Jamaicans has been augmented by the KFZ.

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<sup>35</sup>Although there are 28 scenarios, only 25 graphs are shown because the four cases where KRCF=0 yield the same results.

## SUMMARY AND CONCLUSION

### *Summary*

The purpose of this brief chapter is to summarize the principal findings of the dissertation and to make a few general points and recommendations.

The first two chapters examined literature on EPZs and cost-benefit analysis which provided the foundation for the economic evaluation of the KFZ. Theoretical models do not generate conclusive or unifying results concerning the merits of EPZs, therefore the approach used in this dissertation seems to be appropriate for assessing the KFZ. It should be noted that similar empirical case studies of other EPZs have provided mixed results with regards to net benefits of EPZs.

In the evaluation of the KFZ, the most formidable problem is that of dividing investment into its diverted and incremental components. Only net benefits due to incremental investment can be attributed to the KFZ. The intractability of this problem led to the need for results based on sensitivity analysis. Consequently, no definitive results can be generated, however, a realistic case based on questionnaire information is used. This is still an improvement over those studies that ignore the investment diversion issue completely thereby overstating the value of net benefits. The realistic case scenario finds large positive net benefits from the KFZ indicating that Jamaica has benefitted.

### *Recommendations concerning the expansion of EPZs in Jamaica*

The apparent success of the KFZ has encouraged the establishment of four other Jamaican EPZs and a privately operated one is also being planned. To ensure that these new zones and those planned have the maximum chance of benefitting Jamaica, the authorities should do the following:

a) not allow EPZ firms to compete with local firms. If EPZ firms are allowed to compete

- with producers in the Customs Territory they will have an unfair advantage and may force these firms out of business.
- b) not allow firms already in Jamaica to transfer into EPZs unless there is satisfactory proof that these firms would close down otherwise. This reduces the location diversion problem.
- c) research prospective investors thoroughly in an attempt to determine whether they would come to Jamaica with or without EPZ-related incentives. If there is enough evidence to prove that the same amount of investment would come to Jamaica anyway, entry into the EPZ should be denied and other locations recommended. The diversion problem is further reduced by doing this. This recommendation might be ignored if there is no pressure on the EPZ facilities, that is, demand for the facilities is low or supply is in abundance.
- d) set up facilities in each EPZ which increase the rate of return to investors likely to create substantial new employment and produce goods that penetrate easily into international markets. Wage payments tend to be the main source of benefits from EPZs so firms that create the most employment should be preferred (unless low employment firms are likely to make major purchases of other Jamaican goods). If the goods produced are restricted when entering overseas markets or are subject to large demand fluctuations there may be large risks to the Jamaican economy if workers are producing them.
- e) not make facilities of each EPZ the same, thereby attracting different types of investors to each zone. This should help to diversify the economy and render it less vulnerable to fluctuations of a particular market. For example, Jamaica should avoid being too dependent on sales of garments to the USA because changes in USA regulations and market conditions may have severe negative impacts on the Jamaican economy. Jamaica experienced negative impacts of this type when demand for its bauxite fell in the late 1970s. The result was a severe decline in standard of living because the economy depended heavily on exports of bauxite. However, it should be noted that Jamaica has taken steps towards diversifying EPZ production. The Montego Bay zone is aimed mainly at firms involved in data processing rather than garment production.

f) not set up EPZs to promote regional development in remote rural areas unless research is conducted which estimates that costs of setting up and providing infrastructure will be exceeded by benefits. The new EPZ in Hayes, Clarendon is an example of a zone set up to develop a region which has experienced high unemployment following the decline of the sugar industry in the 1960s and 1970s. An economic evaluation of the Hayes zone is required to determine whether its benefits exceed costs.

*Factors that may mitigate against the proliferation of EPZs in Jamaica*

It is possible that in the forthcoming decade there will be a proliferation of EPZs in Jamaica. Since the inception of the KFZ in 1976, four others have been established. Future increases in the number of EPZs will depend in large part on:

1. the success of EPZs currently in operation — if EPZs operating at present do not continue to succeed in attracting new investment, it is unlikely that more zones will be set up. On the other hand, their continued success is likely to encourage the establishment of others.
2. availability of (foreign) funds to finance construction and development — Jamaica's ability to finance such large projects from domestically raised funds is limited. This is reflected in the country's large debt to foreign banks and multilateral agencies. This high debt burden already acts as a major constraint in Jamaica's attempts to raise funds in international markets, it is likely to also hamper any major EPZ expansion plans.
3. political considerations — there are interest groups in Jamaica that do not support EPZs. Some purport that their operations constitute overt exploitation of Jamaican labour. Others are appalled at the preferential treatment received by foreigners. Such interest groups are likely to exert increased pressure as the number of EPZs grow. Furthermore, by allowing the number of EPZs to grow, the Government's control over domestic activities is somewhat diminished. This may not be consistent with the ideology of the incumbent Government. It is not improbable that after a certain level of growth in the number of EPZs, the Government



itself will resist further deregulation of the economy.

4. monitoring costs — monitoring the activities of a few EPZs may not represent a major problem for existing government departments. However, as the number rises, monitoring costs may increase at a faster rate due to more problems with smuggling and other illegal activities. Furthermore, unless there is a commensurate growth in size of the bureaucracy, EPZ firms will discover that savings due to reduced bureaucratic delays are gradually dissipated. There will be a consequent reduction in the rate of return to investment in Jamaica which could culminate in high vacancy rates in EPZs.

The above factors are likely to represent some of the principal obstacles to unrestricted growth of EPZs in Jamaica.

#### *EPZs versus traditional drawback and exemption schemes*

An issue raised frequently is why the Jamaican Government does not merely offer a duty free environment by way of traditional duty drawback and exemption schemes rather than incur the costs of establishing EPZs. However, these traditional schemes have typically fallen into disrepute due to being administered inefficiently and the need for major bureaucratic entanglements. Investors are often unimpressed by the long delays they face when awaiting rebates and the time wasted with bureaucrats. The circumvention of these problems is what makes EPZs so attractive to investors in Jamaica, despite sacrificing the privilege to operate in the location of their choice.

Another factor that renders EPZs preferable to drawback schemes is the following: When investors observe that the Government is prepared to absorb sunk costs of establishing an EPZ, this provides them with a signal that there will be a commitment to maintaining the duty free environment without the need for excessive bureaucratic involvement. In addition, the EPZ is more attractive because it affords greater security. Since the success of any project aimed at attracting investment is measured in terms of the amount of investment

actually attracted, if investors' rate of return is augmented more by EPZs than by drawback schemes it seems appropriate that EPZs should be preferred.

Finally, the issue of monitoring costs arises again. When a group of investors are congregated in a particular zone it is much easier to monitor them than if they are dispersed throughout the country. Therefore, savings in monitoring costs combined with possible extra benefits from attracting more investors are likely reasons why governments, like that of Jamaica, favour EPZs over drawback programmes.

#### *Future extensions of this research*

A few interesting avenues of further research have opened up to the author while writing this dissertation. These include: a) developing a model, based on costs and benefits, which shows how the optimal size of any given EPZ and the optimal size and mix of firms can be determined; b) providing a model for determining the optimal number of EPZs in Jamaica; and c) developing a model based on transactions costs to show that even in a world of free trade there might still be benefits from EPZs in Jamaica. These topics are beyond the scope of this dissertation but will be addressed in future work.

It is hoped that this dissertation has made some contribution, if modest, to the debate on the merits of EPZs. With the different results generated in the theoretical and empirical literature, and the rapid growth of EPZs, it is likely that the debate will continue for many years to come.

## APPENDIX

TABLE 1

The Sources of Funds for Financing the Development of the KFZ  
(J\$000s)

Year	PAJ	JNIC	GOJ	World Bank	Total
1977	2254				2245
1978					
1979	193				193
1980	3909	800			4709
1981	290	1511			1801
1982	2558				2258
1983	1290		2235	965	4490
1984	5371		2855	1767	9993
1985	1358		1875	4014	7247
1986	600		1395	10589	12584
1987			525	4681	5206
					50726

TABLE 2

Square Footage Rented, Rental Rate, and Rental Revenue for the  
KFZ (1980-1987)

Year	Square Footage	Rental Rate (US\$/sq.ft)	Revenue (J\$000)	Revenue (1982 J\$000)
1980	118,500		242	292
1981	186,000	2.90	548	586
1982	186,000	3.50	537	632
1983	215,870	3.50	986	1028
1984	371,000	3.50	1834	1427
1985	518,370	3.50	5935	3768
1986	650,000	4.25	6914	3977
1987 (June)	750,000	4.25	n/a	n/a

TABLE 3

Actual and Forecast Values of Benefits Associated with the KFZ  
from 1982 to 1989 in 1982 J\$000 (KRCF=1, M=1, CFL=.55, CFLP=0.6,  
CFO=.6)

Year	1982	1983	1984	1985	1986	1987	1988	1989
Rental	632	1028	1427	3768	3977	4772	5631	5631
Wage	423	2479	3301	10446	13086	17143	21771	23295
Dom Purch.	111	617	1360	9141	8001	9601	11329	11329
Other Expen.	118	201	1541	8969	14865	17837	21047	21047
Shipping	92	496	603	1029	955	1146	1352	1352
Electricity	57	442	298	1694	1755	2106	2485	2485
Water	2	74	59	691	461	527	622	622
Telephone	16	106	105	281	292	350	413	413
Telex	4	21	16	43	41	49	58	58
Nat. Hous.	13	74	99	313	393	514	653	699
Nat. Ins.	9	50	66	209	262	343	435	466
H.E.A.R.T.	13	74	99	313	393	514	653	699
Canteens	0	0	0	19	17	42	107	255
For. Exch.	129	695	1132	4969	6091	7504	9123	9370
Technology	0	0	0	0	0	0	0	0
Unofficial	0	0	0	0	0	0	0	0
Externalities	0	0	0	0	0	0	0	0
TOTAL	1619	6357	10106	41885	50589	62448	75679	78081

TABLE 4

Actual and Forecast Values of Costs Associated with the KFZ from 1982 to 1989 in 1982 J\$000 (KRCF=1, M=1, CFL=.55, CFLP=0.6, CFO=.6).

Year	1982	1983	1984	1985	1986	1987	1988	1989
Dev. Cost	2558	3084	5957	2059	1198	290	0	0
Repay. IBRD	0	0	0	0	0	3482	1754	1754
Opp. Cost Lab								
OCL=0.55	233	1363	1816	5745	7195	9428	11974	12812
OCL=0.75	317	1859	2476	7835	9815	12857	16328	17471
OCL=0.90	381	2231	2971	9401	11777	15429	19594	20967
Dom. Purch.	67	370	816	5484	4801	5761	6798	6798
Other Exp.								
CFO=0.60	71	121	925	5381	8919	10702	12628	12628
CFO=0.80	94	161	1233	7175	11892	14270	16838	16838
Shipping	52	298	362	617	573	688	811	811
Electricity	65	408	282	1600	1679	2015	2377	2377
Water	2	80	64	741	439	527	622	622
Telephone	13	90	80	200	228	274	323	323
Telex	2	10	6	17	19	23	27	27
Admin.&Gen.	0	0	0	0	0	2017	2380	2380
Sell.&Prom.	0	0	0	0	0	103	103	103
Fin.&Policy	0	0	0	0	0	829	978	978
Externalities	0	0	0	0	0	0	0	0
TOTAL	3063	5824	10308	21844	25051	36139	40775	41613

Table 5

Actual and Forecast Net Benefits of KFZ from 1982 to 1989 in 1982 J\$000 (KRCF=1, M=1, CFL=.55, CFLP=0.6, CFO=.6).

Year	1982	1983	1984	1985	1986	1987	1988	1989
Dev. Costs	-2558	-3084	-5957	-2059	-1198	-290	0	0
Rental	632	1028	1427	3768	3977	4772	5631	5631
Admin.&Gen.	0	0	0	0	0	-2017	-2380	-2380
Sell.&Prom.	0	0	0	0	0	-103	-103	-103
Fin.&Policy	0	0	0	0	0	-829	-978	-978
Wages	190	1116	1485	4701	5889	7715	9797	10483
Dom. Purch.	44	247	544	3656	3200	3840	4532	4532
Other Exp.	47	80	616	3588	5946	7135	8419	8419
Shipping	37	198	241	412	382	458	541	541
Electricity	-8	34	16	94	76	91	108	108
Water	0	-6	-5	-50	22	0	0	0
Telephone	3	16	25	81	64	80	90	90
Telex	2	11	10	26	22	26	31	31
Nat. Hous.	13	74	99	313	393	514	653	699
Nat. Ins.	9	50	66	209	262	343	435	466
H.E.A.R.T.	13	74	99	313	393	514	653	699
Canteens	0	0	0	19	17	42	107	255
For. Exch.	129	695	1132	4969	6091	7504	9123	9730
TOTAL	-1447	530	-202	20040	25536	29795	36659	37345

TABLE 6

Ranking of Undiscounted Total Value of Costs and Benefits (1978 to 2007 in 1982 J\$000s).

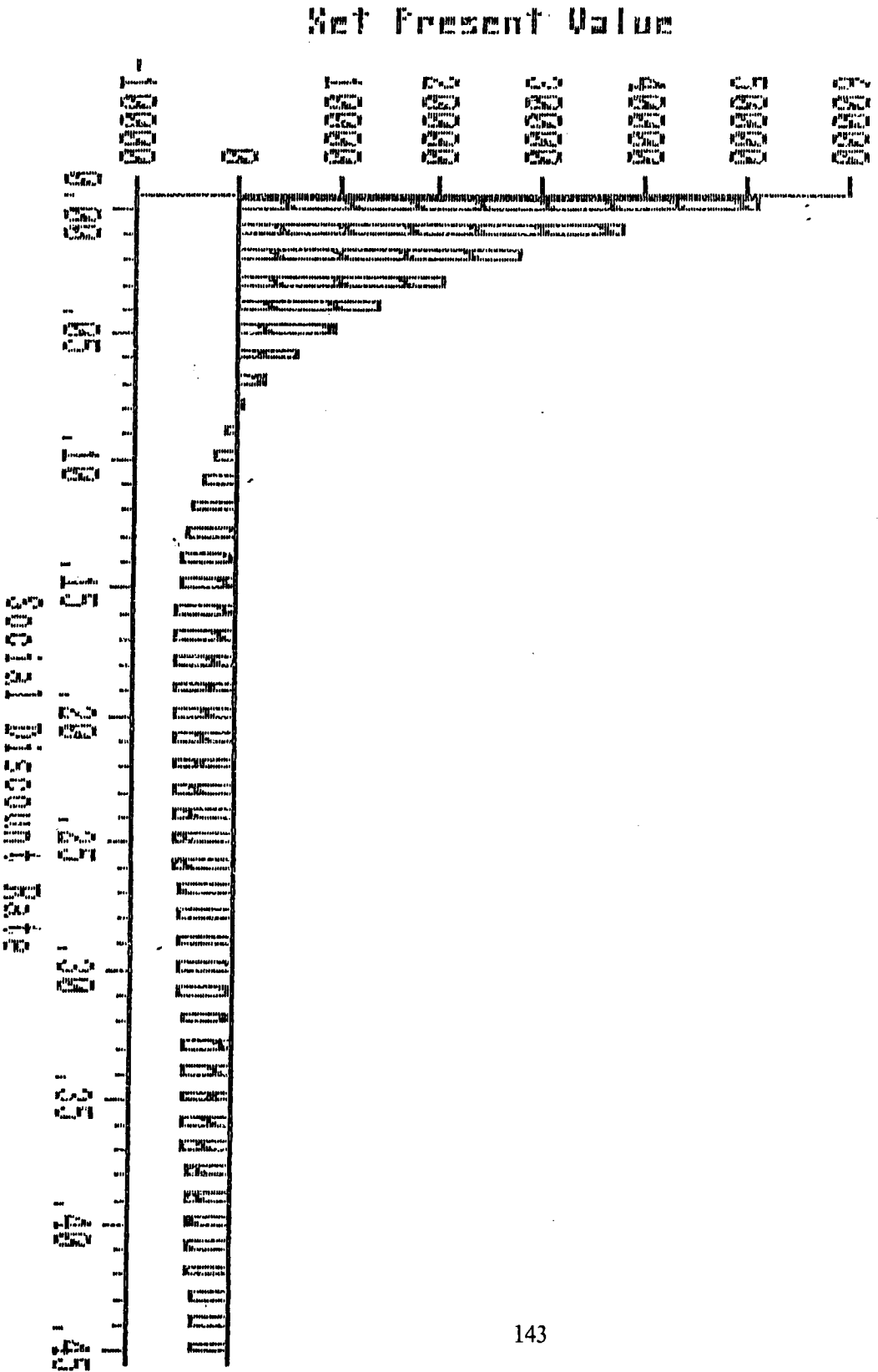
Cost	\$	Benefit	\$
OCL (CFL=0.90)	460129	Wages	511254
OCL (CFL=0.55)	281185	Other purchases	464471
Oth purch (CFO=.8)	371577	Jam. purchases	255411
Oth purch (CFO=.6)	278683	Foreign Exchange	214549
Jam. purchases	153259	Rental	129594
Electricity	53589	Electricity	56052
Administration	49617	Shipping	31361
Finance & policy	20389	Nat. Housing	15340
Shipping	18810	H.E.A.R.T.	15340
Loan Repayment	15760	Water	14254
Water	14292	Nat. Insurance	10228
Telephone	7345	Telephone	9410
Sell. & promotion	2163	Canteens	5285
Telex	617	Telex	1334



FIG. 6

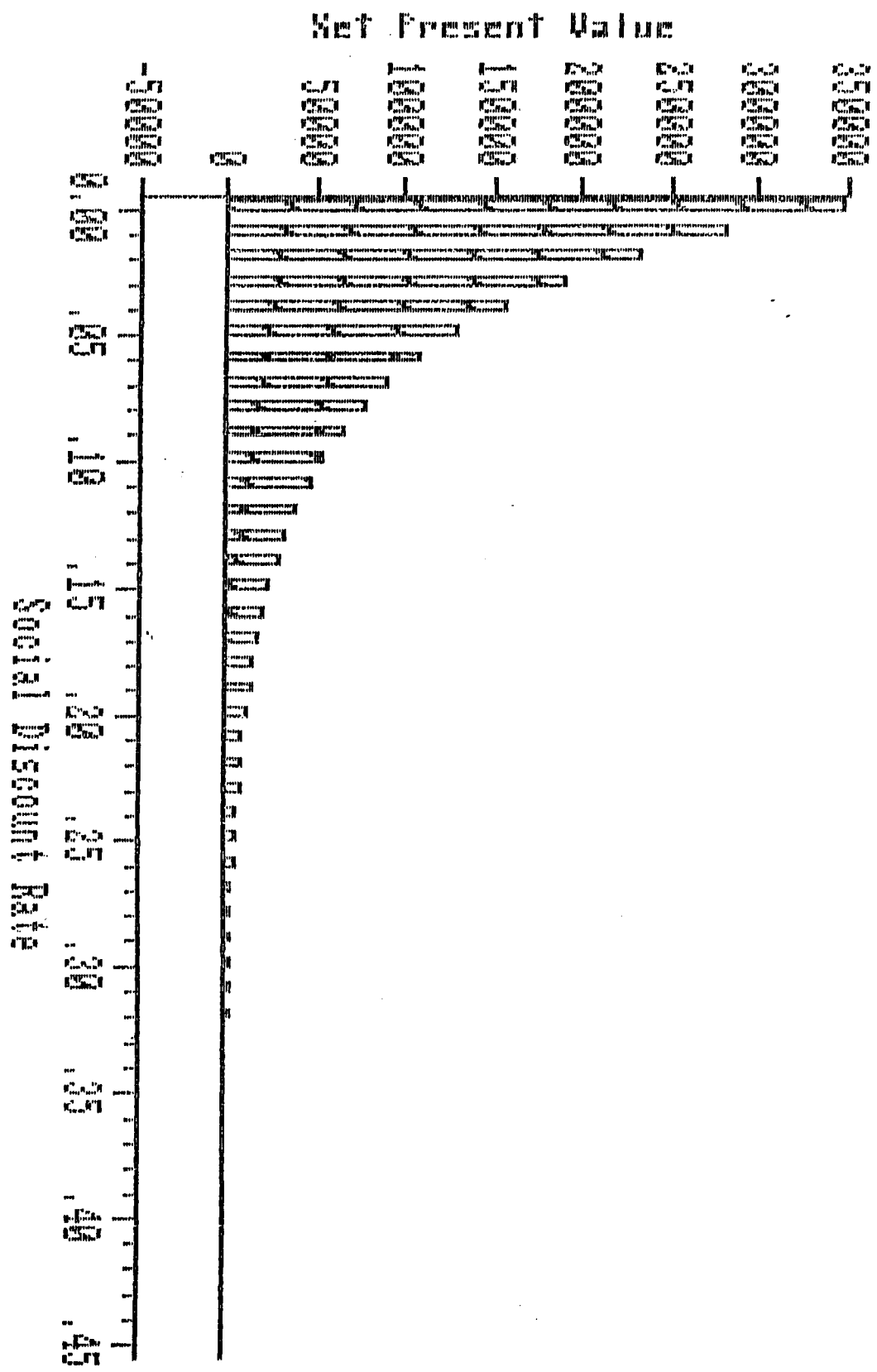
VERY PESSIMISTIC CASE 1

RPM with  $M=1.5$   $KOCF=1$   $OTI=.55$   $OTV=.6$

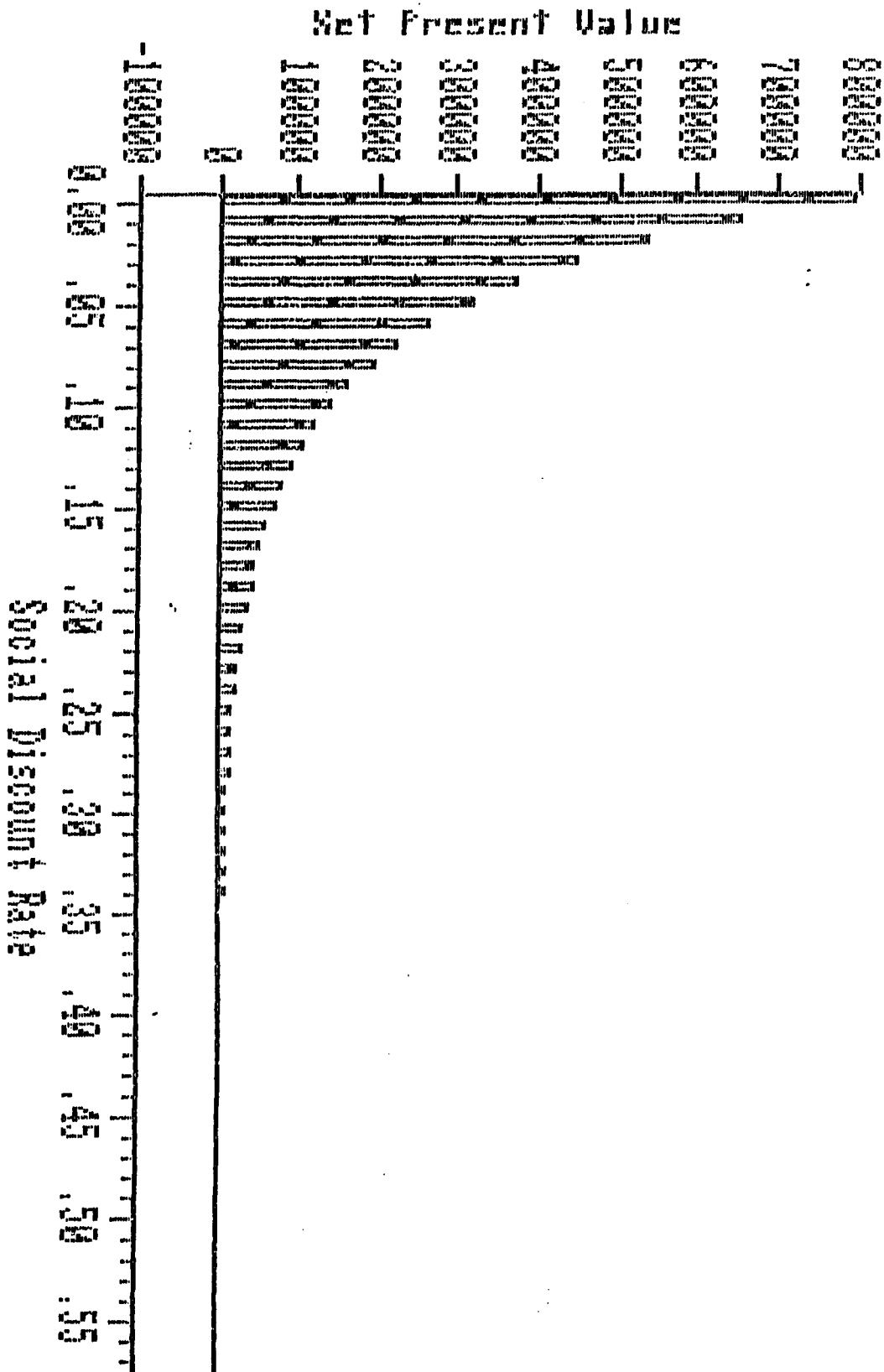


PESSIMISTIC CASE 2

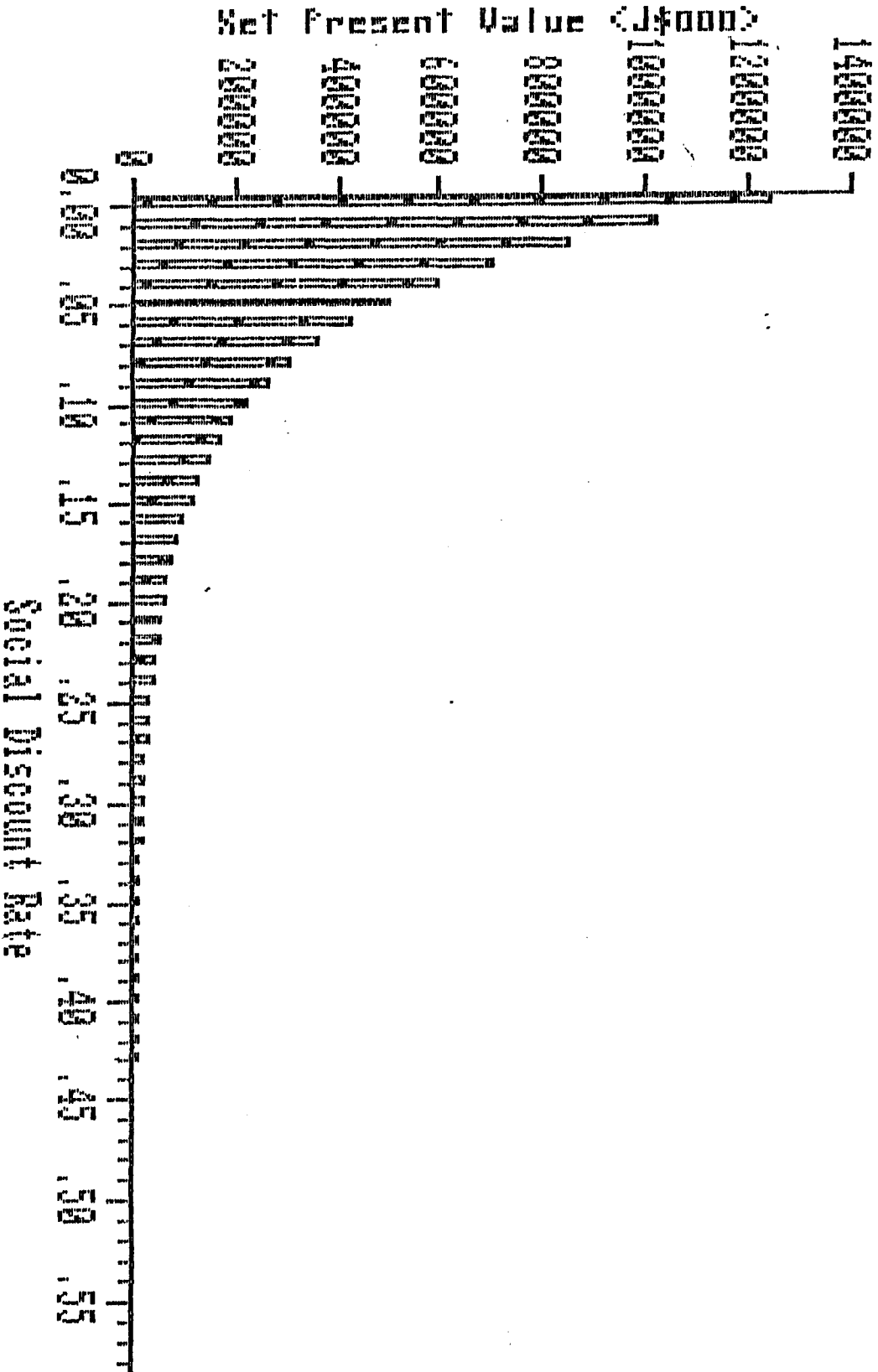
NPV with  $M=1.5$   $KOCF=.25$   $OTL=.55$   $CF0=.6$



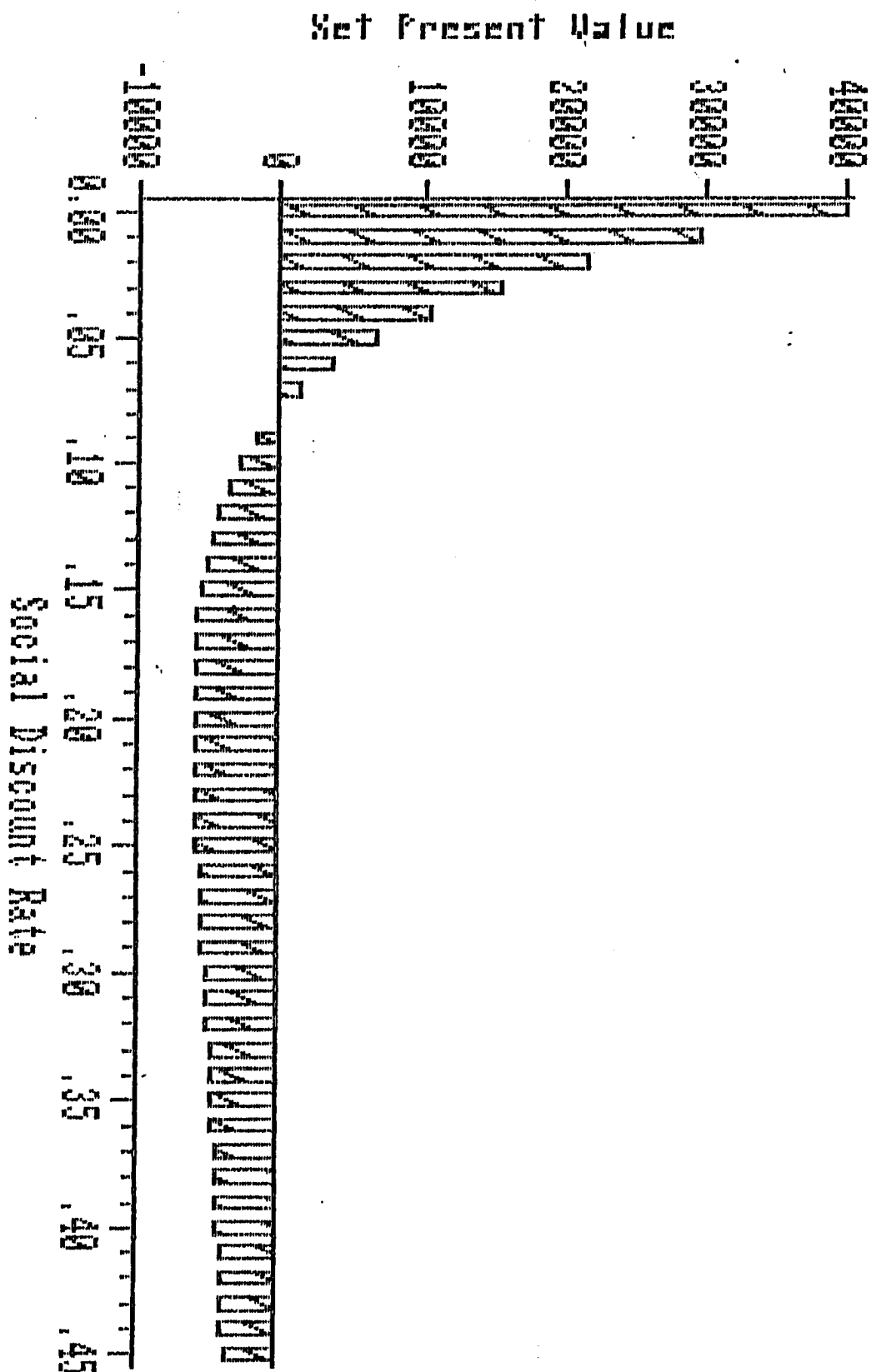
NPV with  $M=1.5$   $MROI=.5$   $OPI=.55$   $OIO=.6$



NPV with  $M=1.5$   $KRCF=.75$   $CFL=.55$   $CFO=.6$



NPV with  $M=1.5$   $KRPF=.1$   $CFI=.9$   $CF0=.8$



NPV with  $M=1.5$   $KRCF=.25$   $CFL=.9$   $CFO=.8$

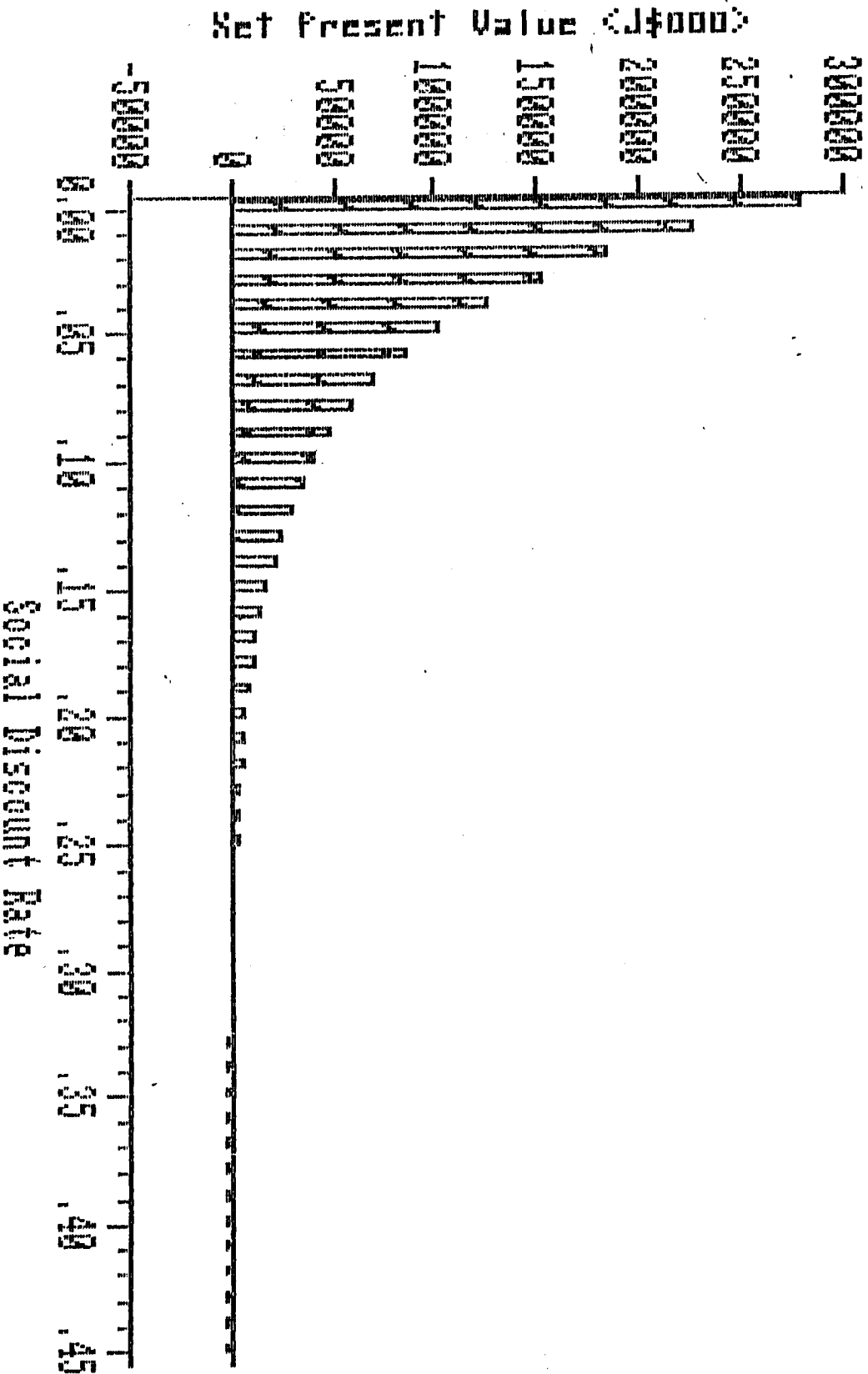
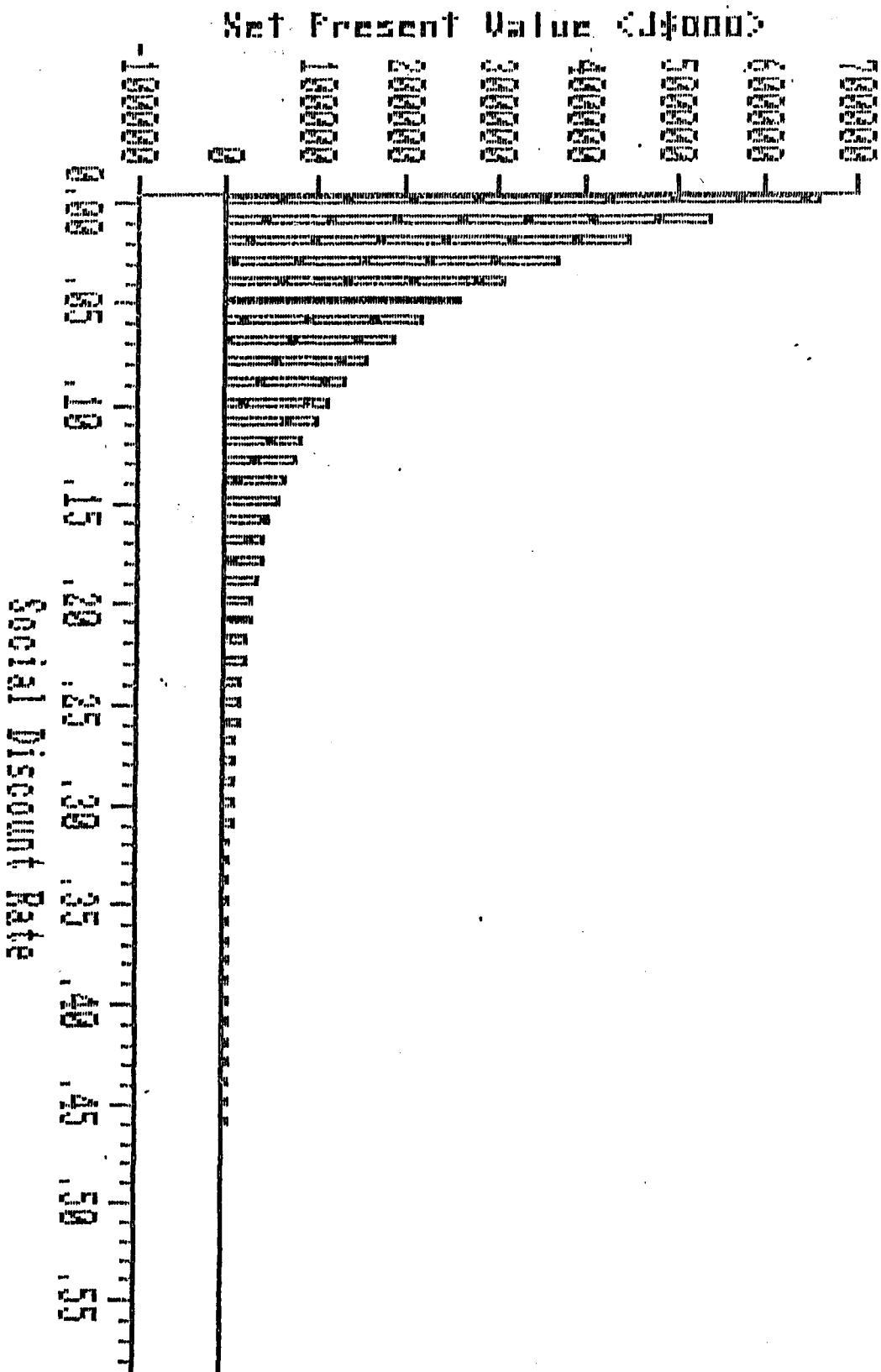


FIG. 12

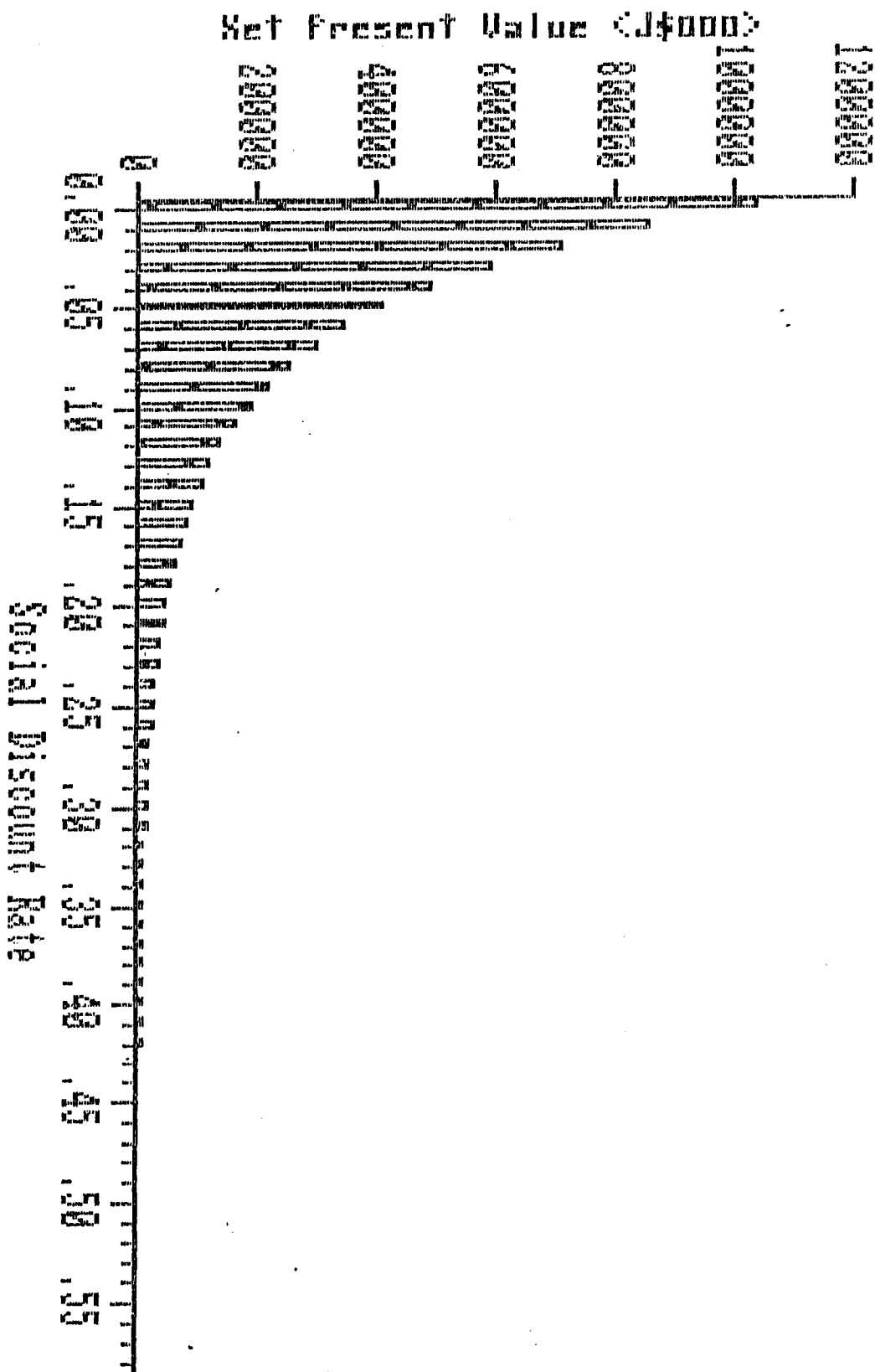
SLIGHTLY OPTIMISTIC CASE 1

NPV with  $M=1.5$   $KRCF=.5$   $CFI=.9$   $CFO=.8$



OPTIMISTIC CASE 2

NPV with  $M=1.5$   $R_{OCE}=0.75$   $CPI=0.9$   $CFO=0.8$

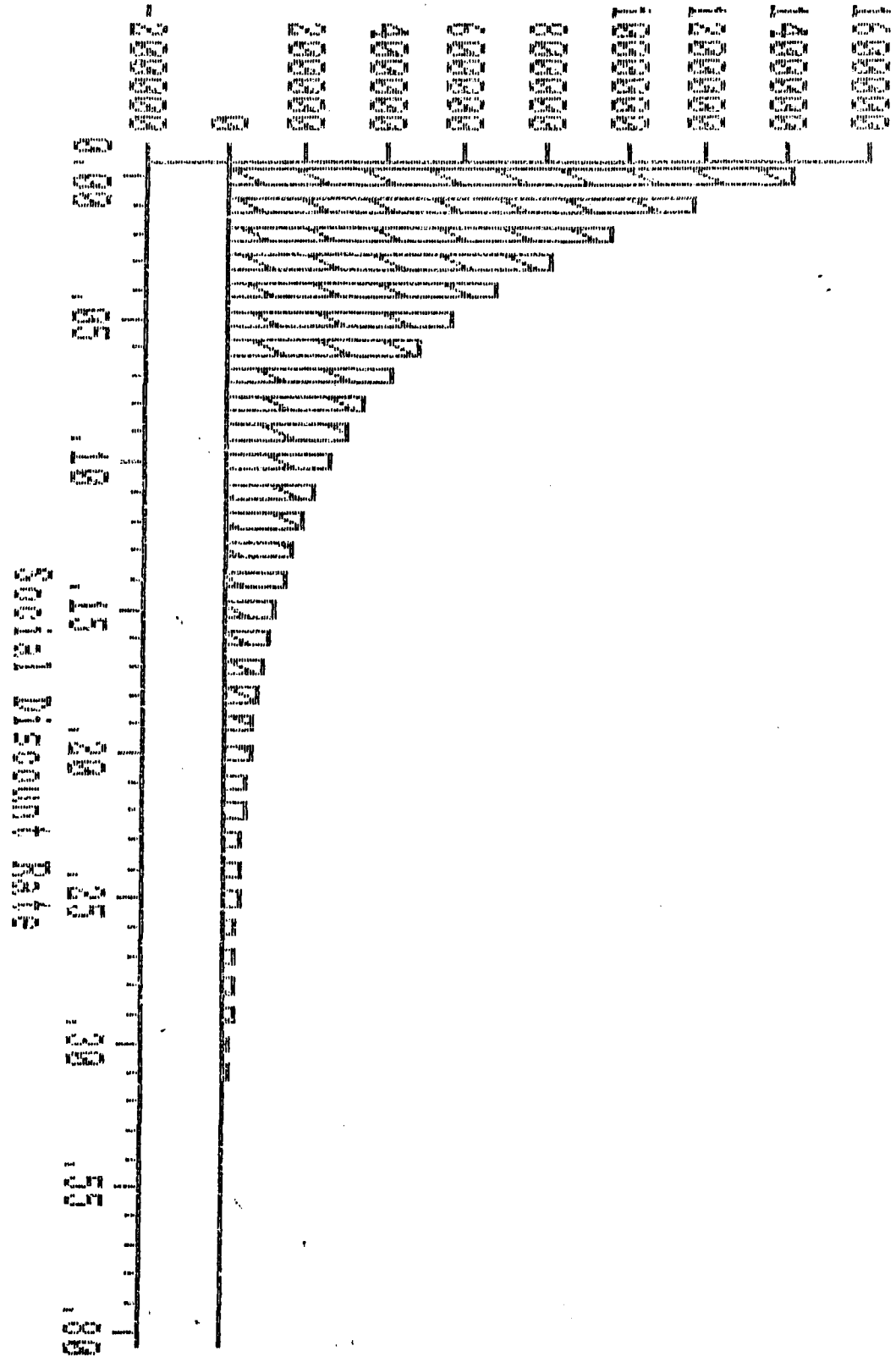




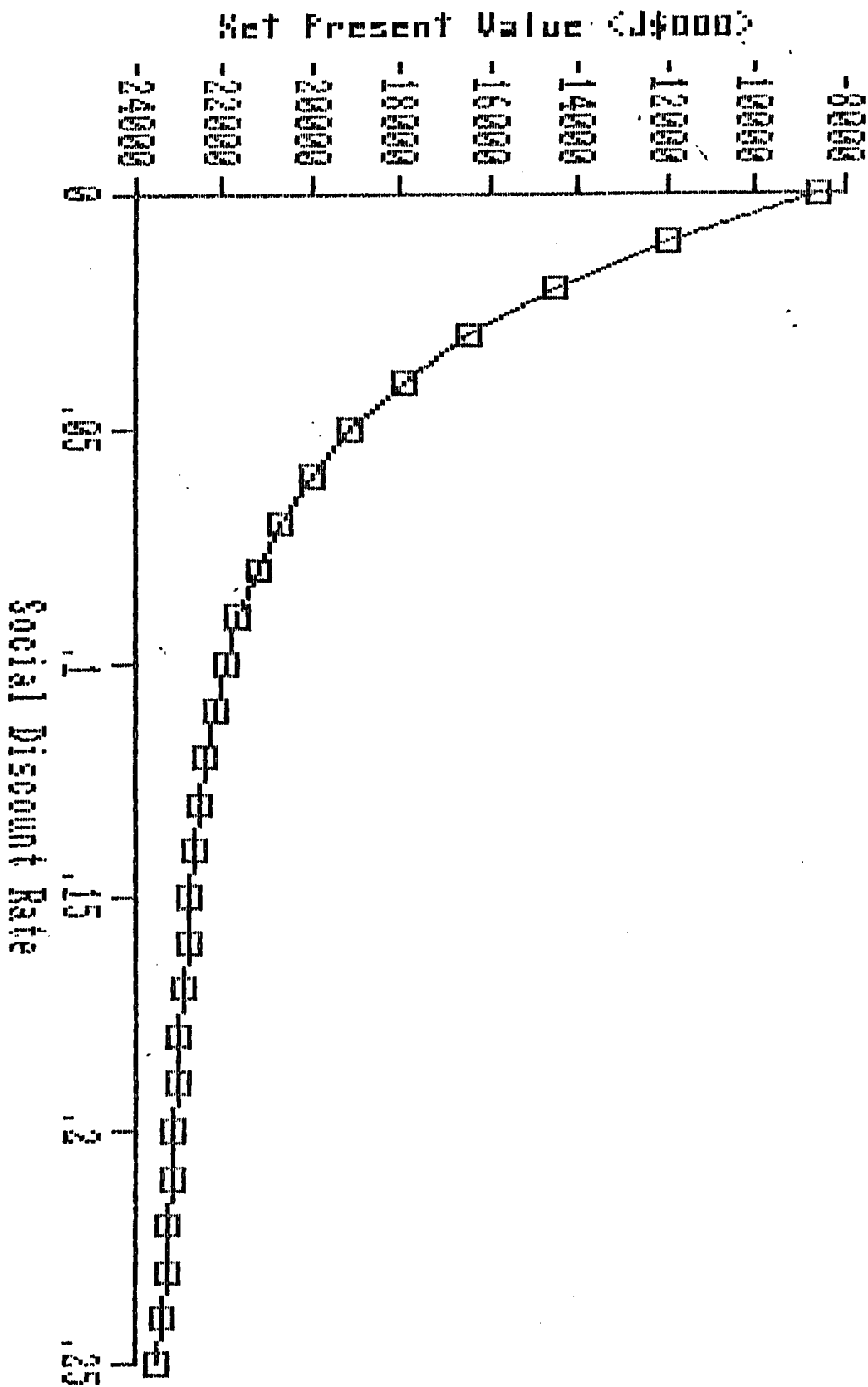
EXTREMELY OPTIMISTIC CASE

CF0 = 1.5 CF1 = 1 CF2 = 1.5 CF3 = 1.5

Net Present Value

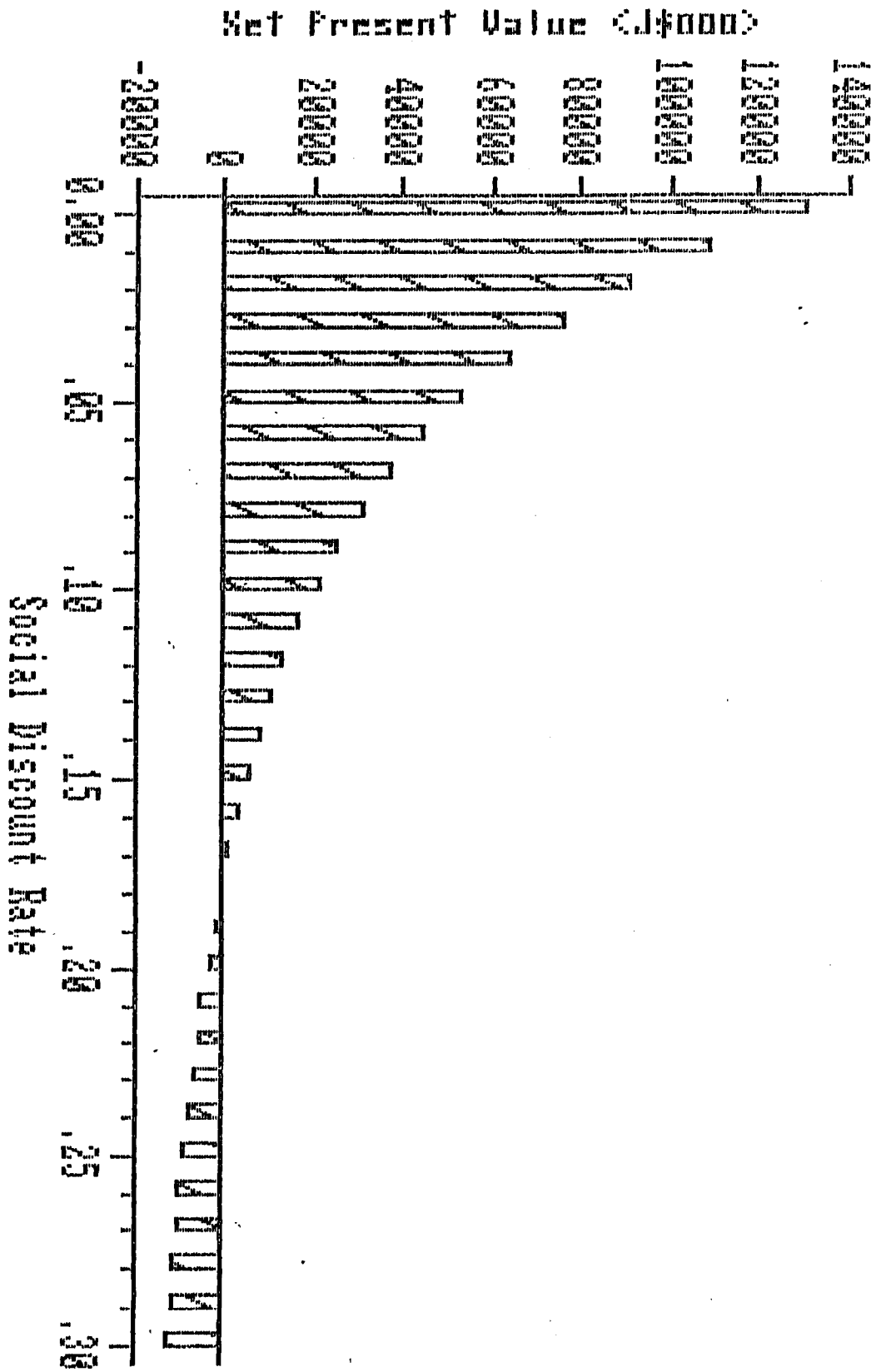


NPV with M=1 XACF=.1 CFI=.55 CFO=.6

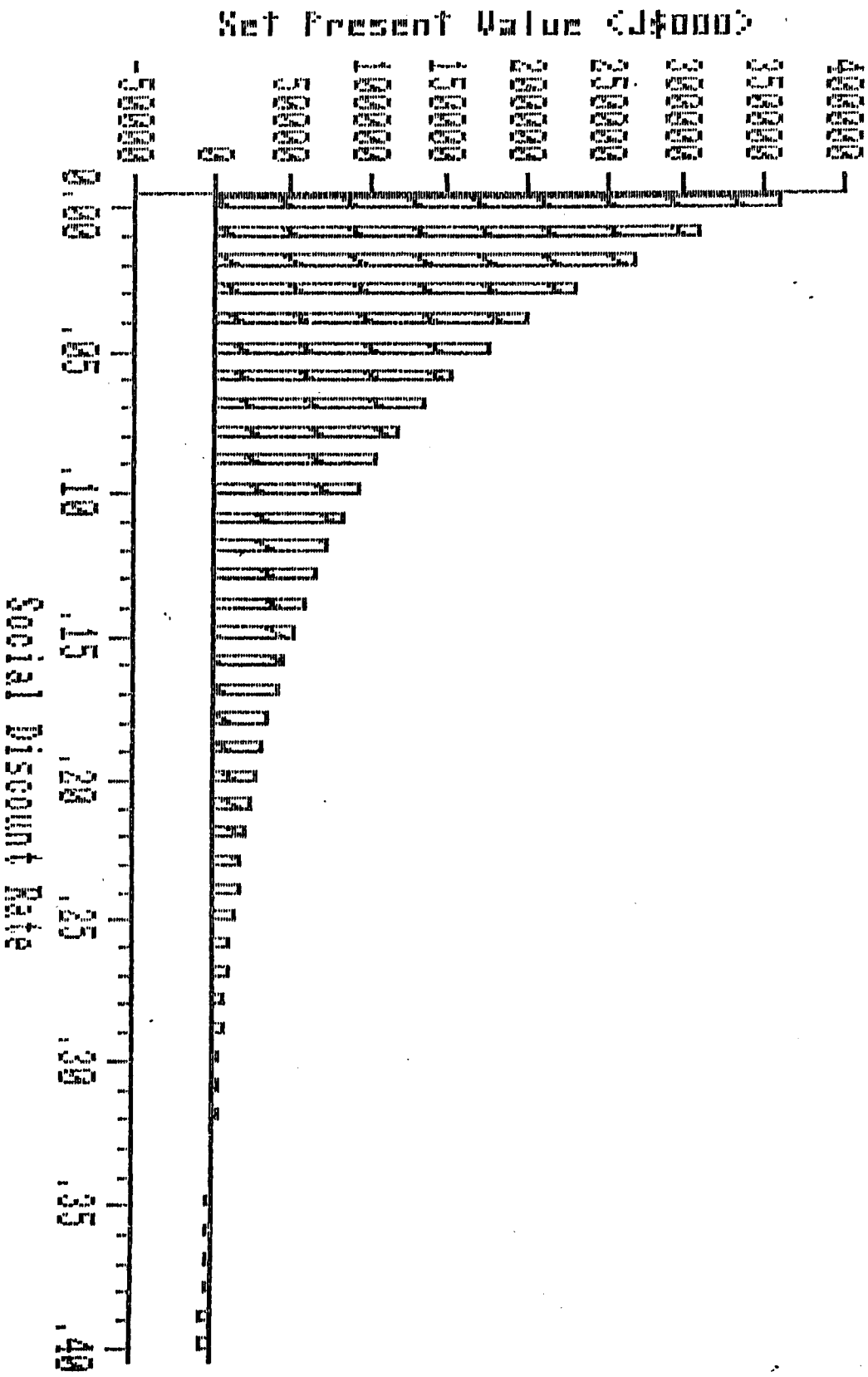


PESSIMISTIC CASE 4

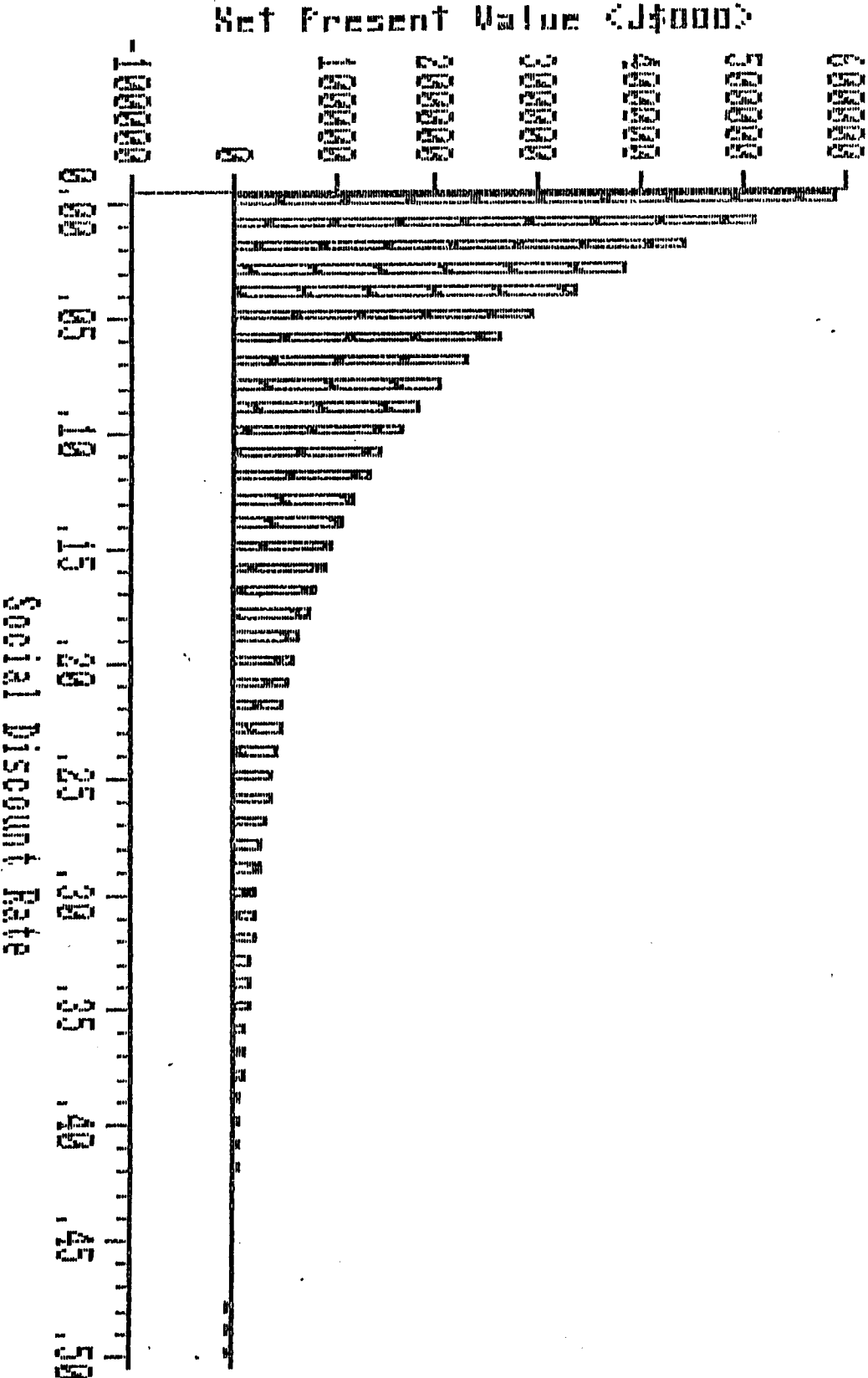
NPV with  $M=1$   $K=0.7$ ,  $\alpha=.25$   $\beta=.55$   $\gamma=0.6$



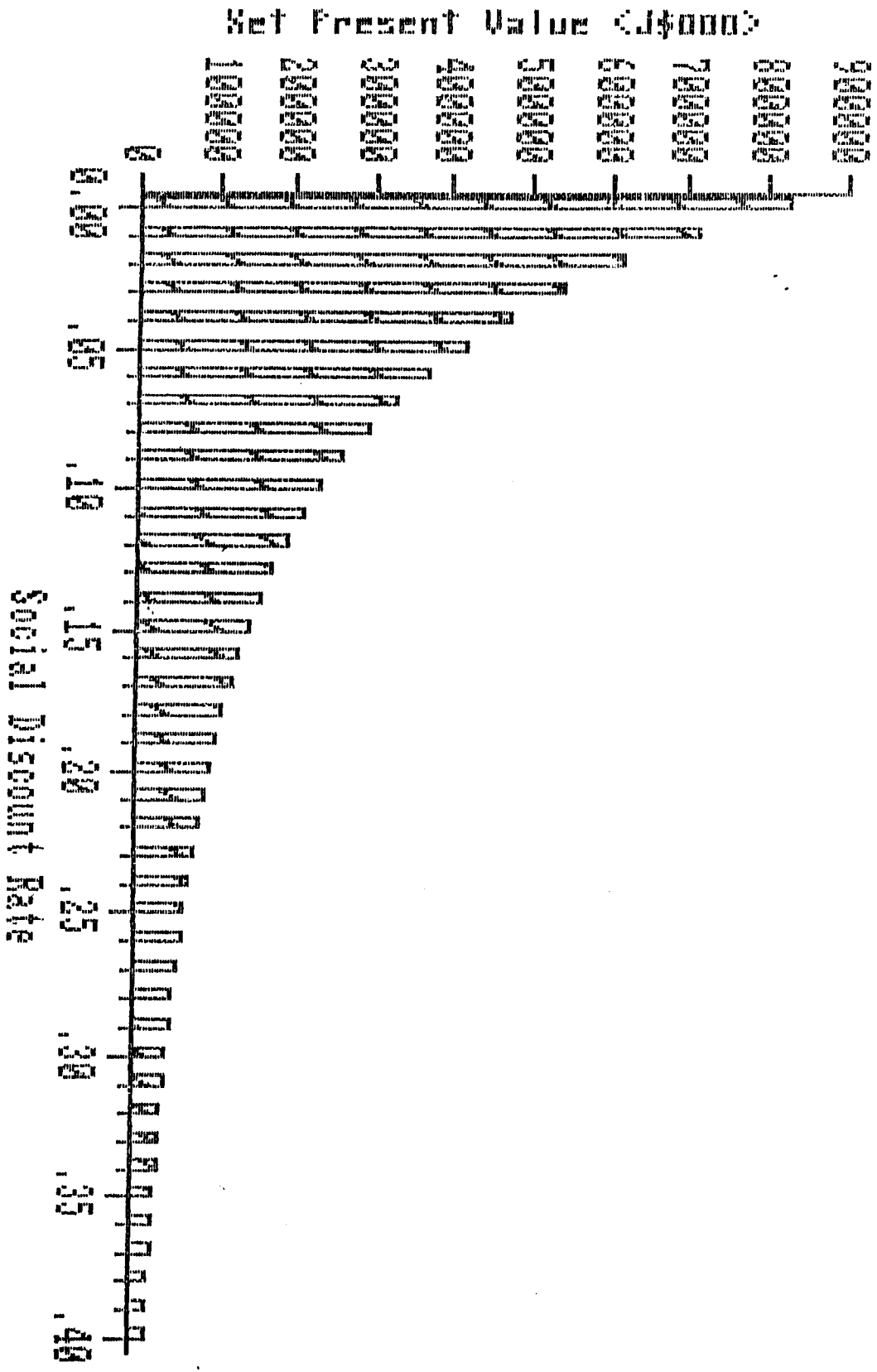
NPV with  $M=1$   $KRCE=.5$   $OTL=.55$   $OTO=.6$



NPV with  $M=1$   $KRCE=.75$   $CPI=.55$   $CFO=.6$

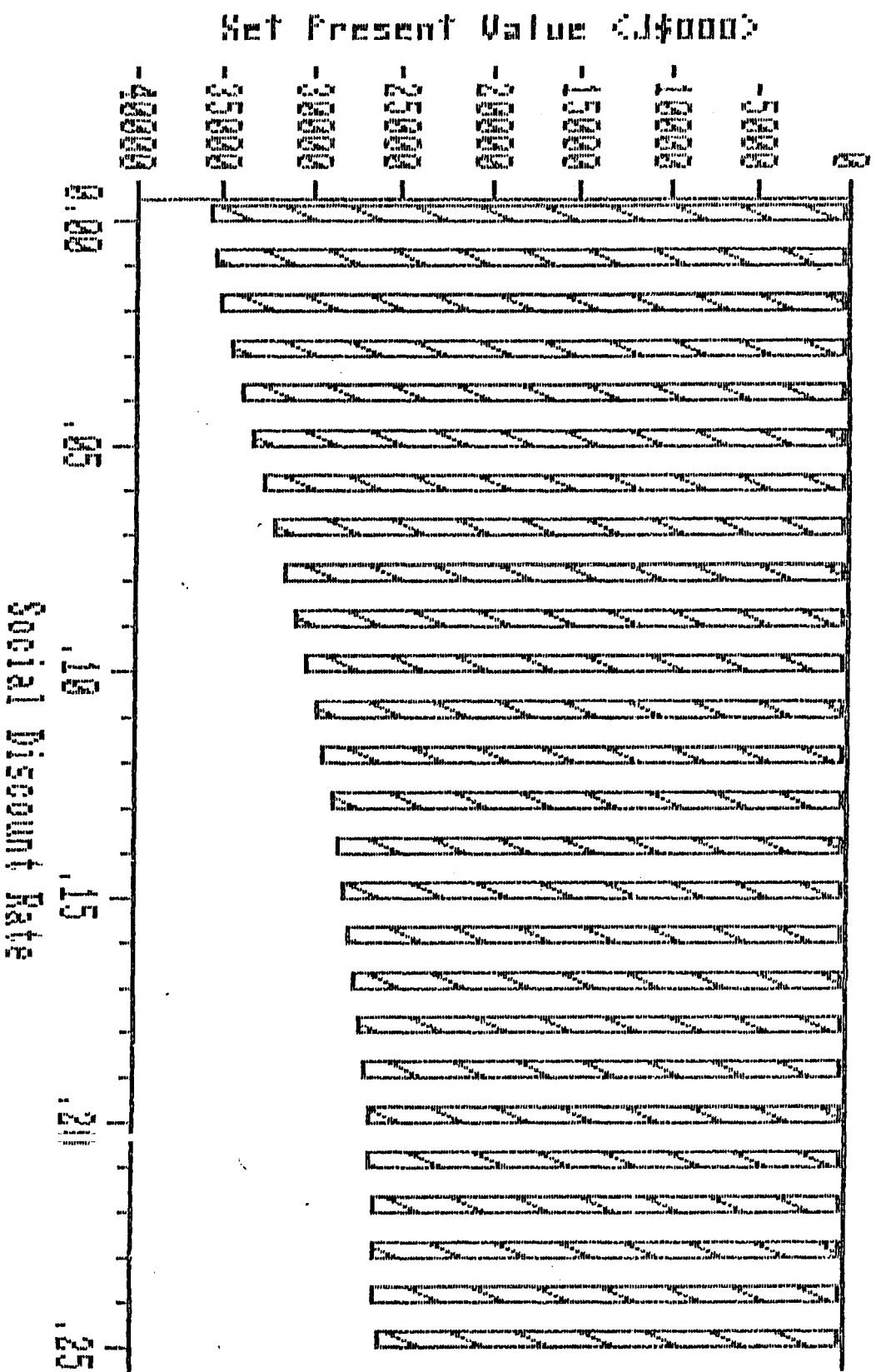


PROJ with R=1 PROF=1.0 CFI=.55 CFO=.6

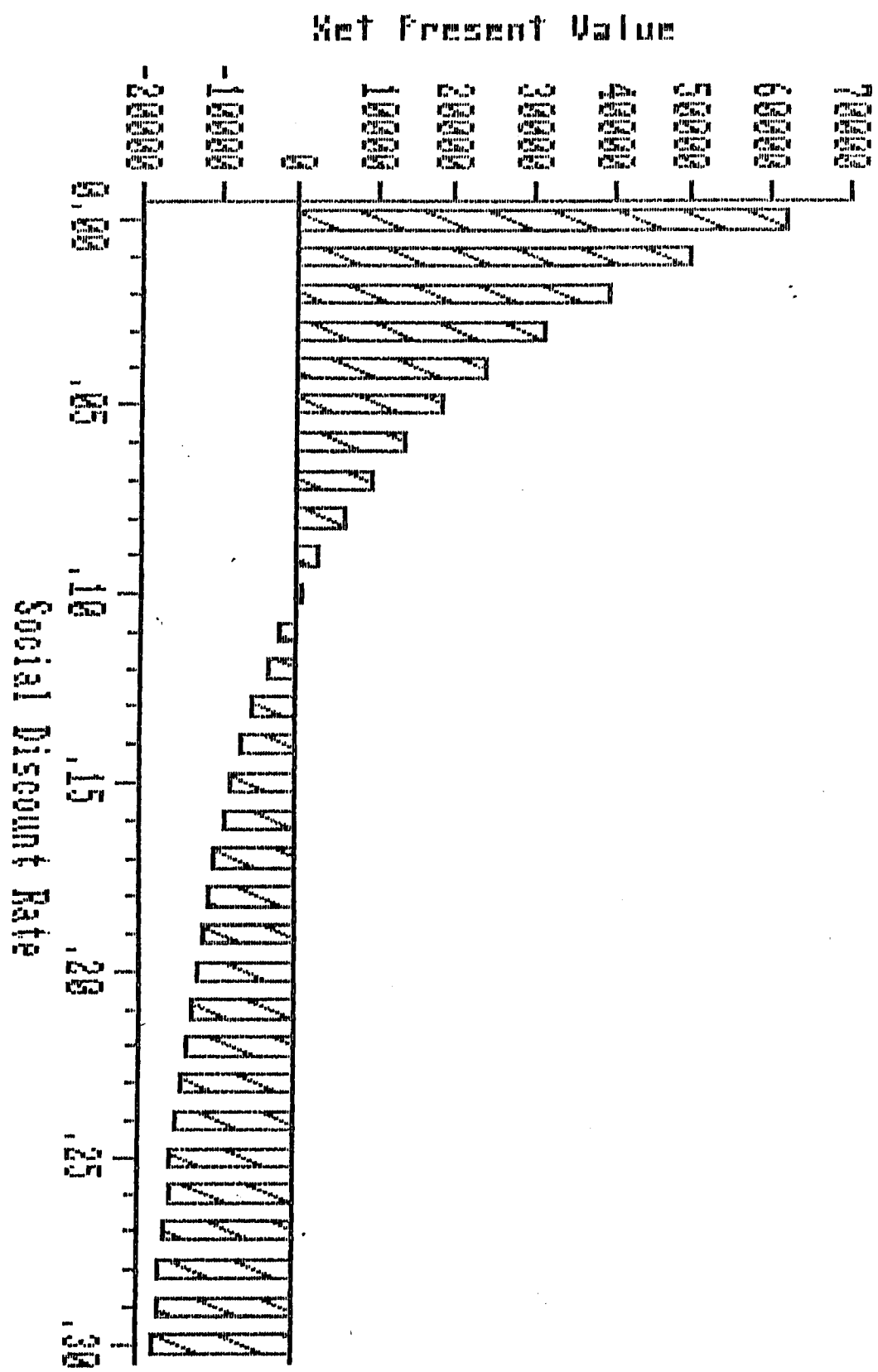


EXTREMELY PESSIMISTIC CASE 2

NPV with  $M=1$  KRCF=.1 CFI=.9 CFO=.8

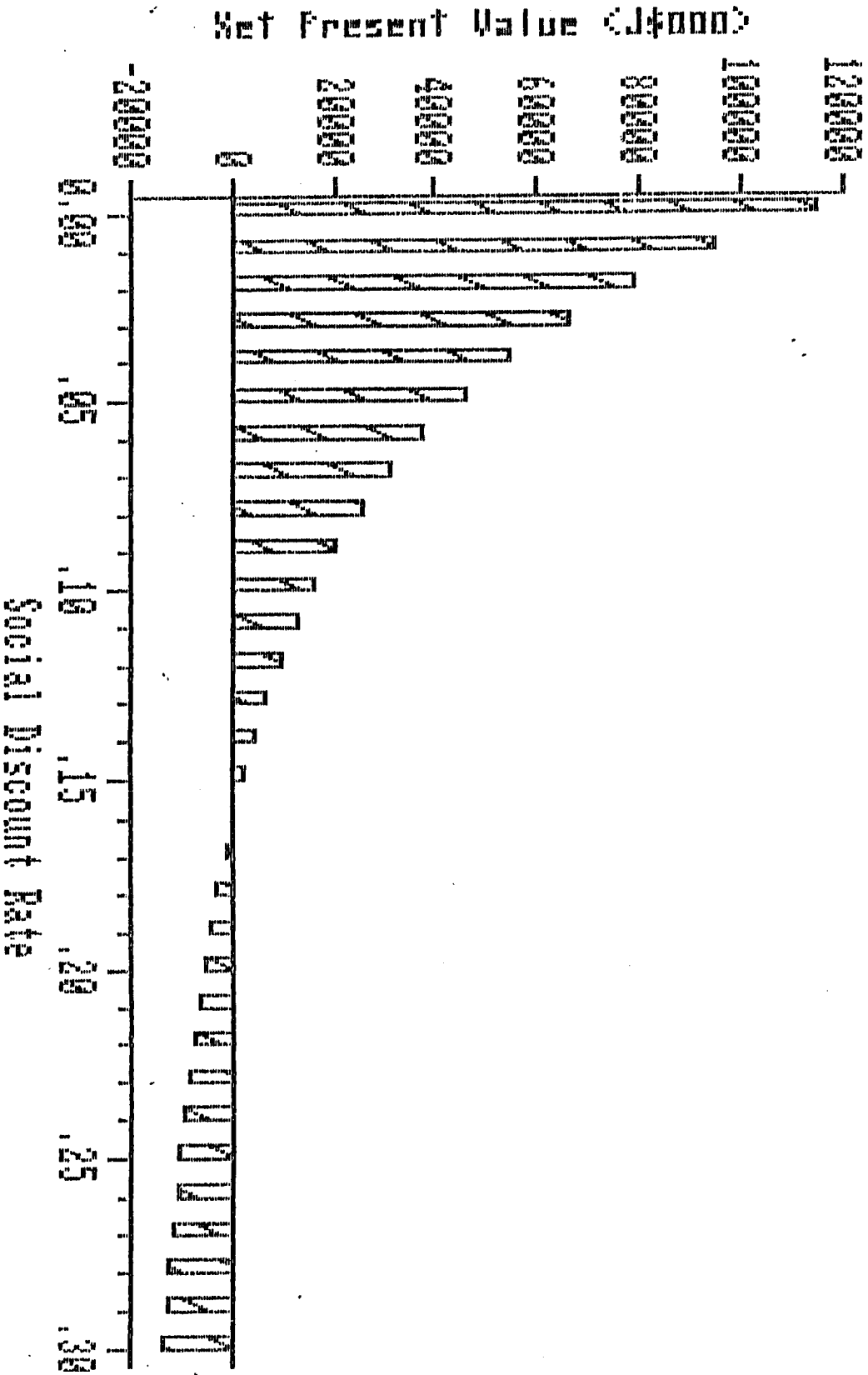


NPV with  $M=1$   $KICF=.25$   $CPI=.9$   $CFO=.8$

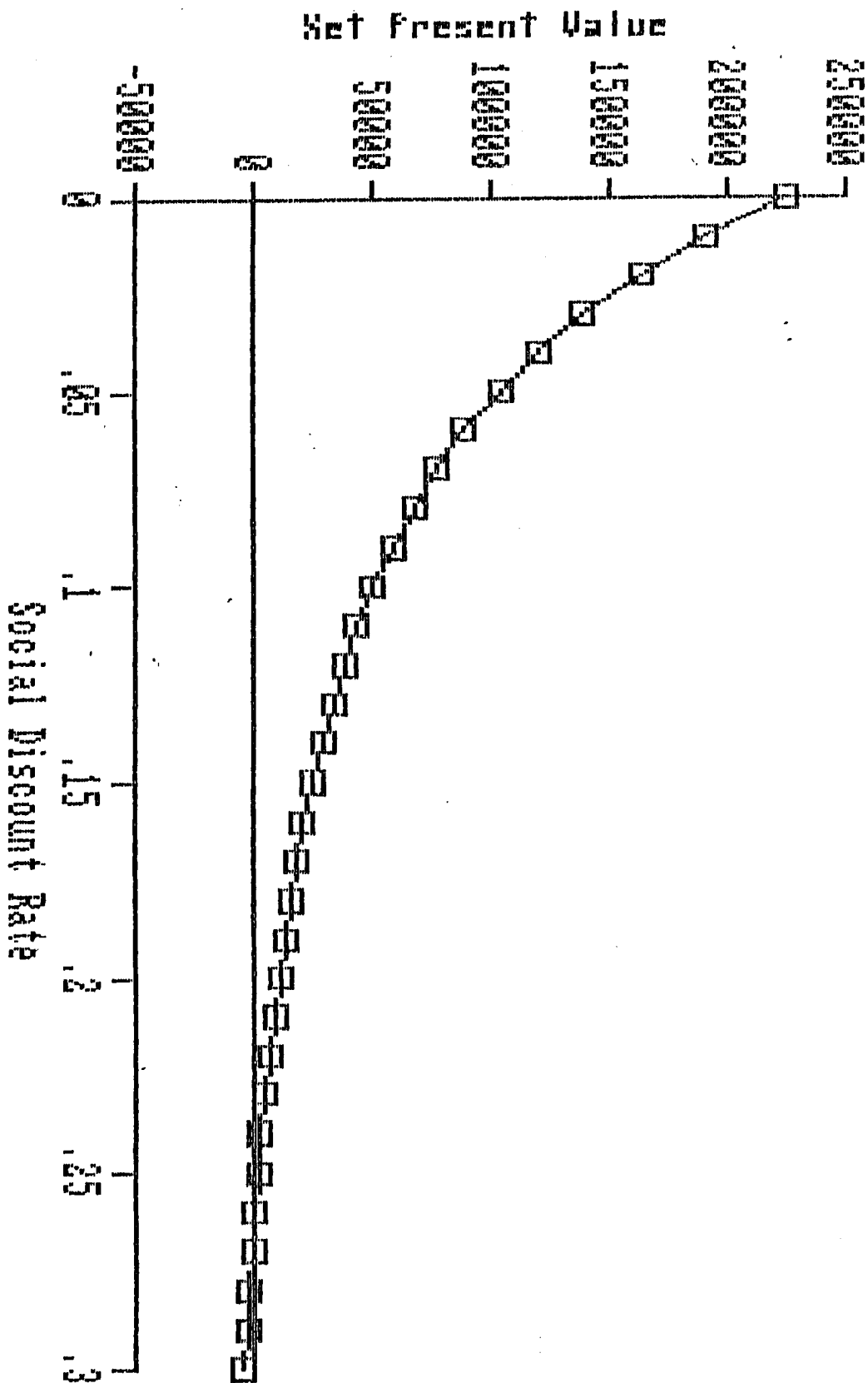




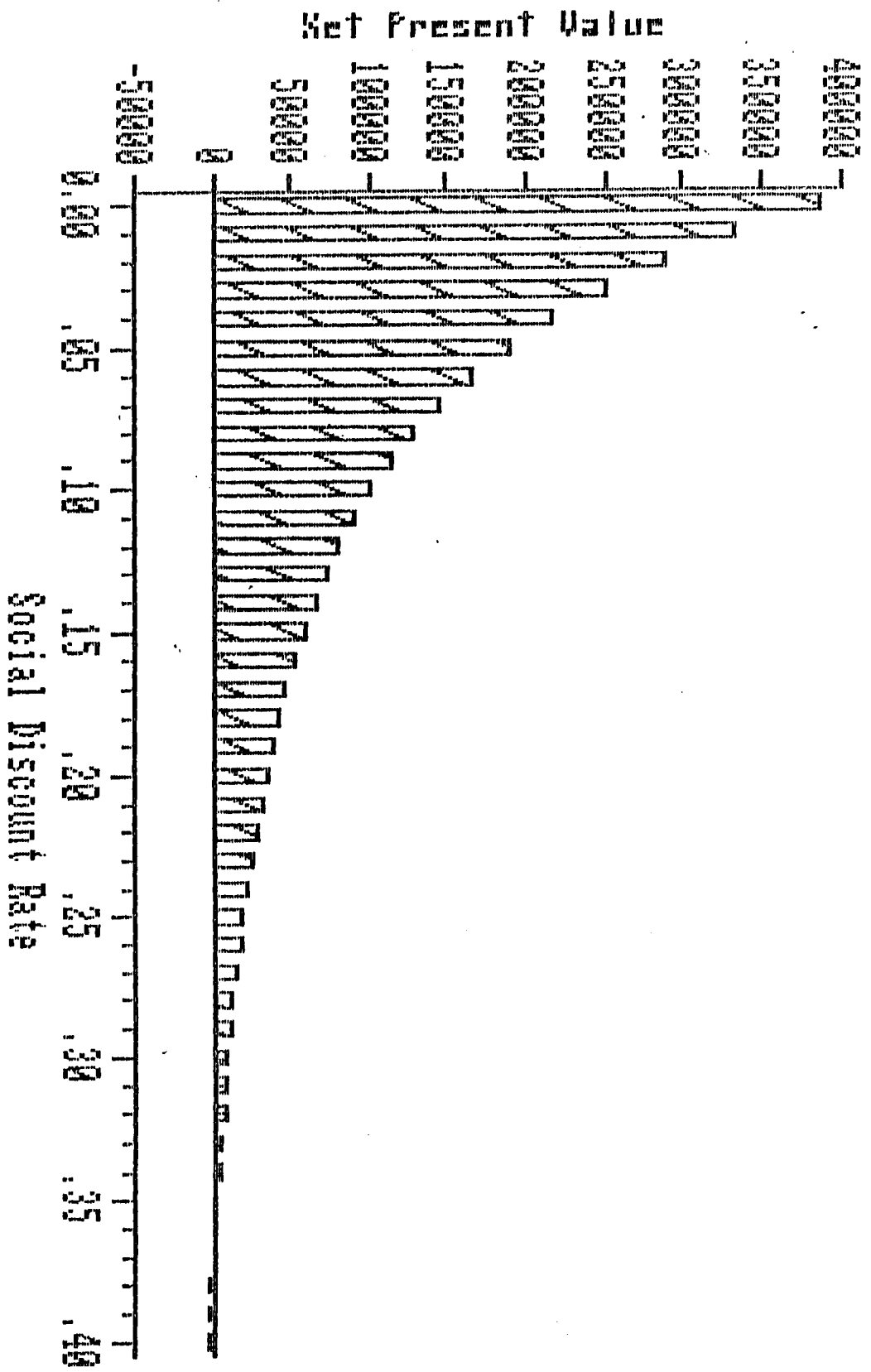
NPV with  $M=1$   $KRCE=.33$   $CFC=.9$   $CFO=.8$



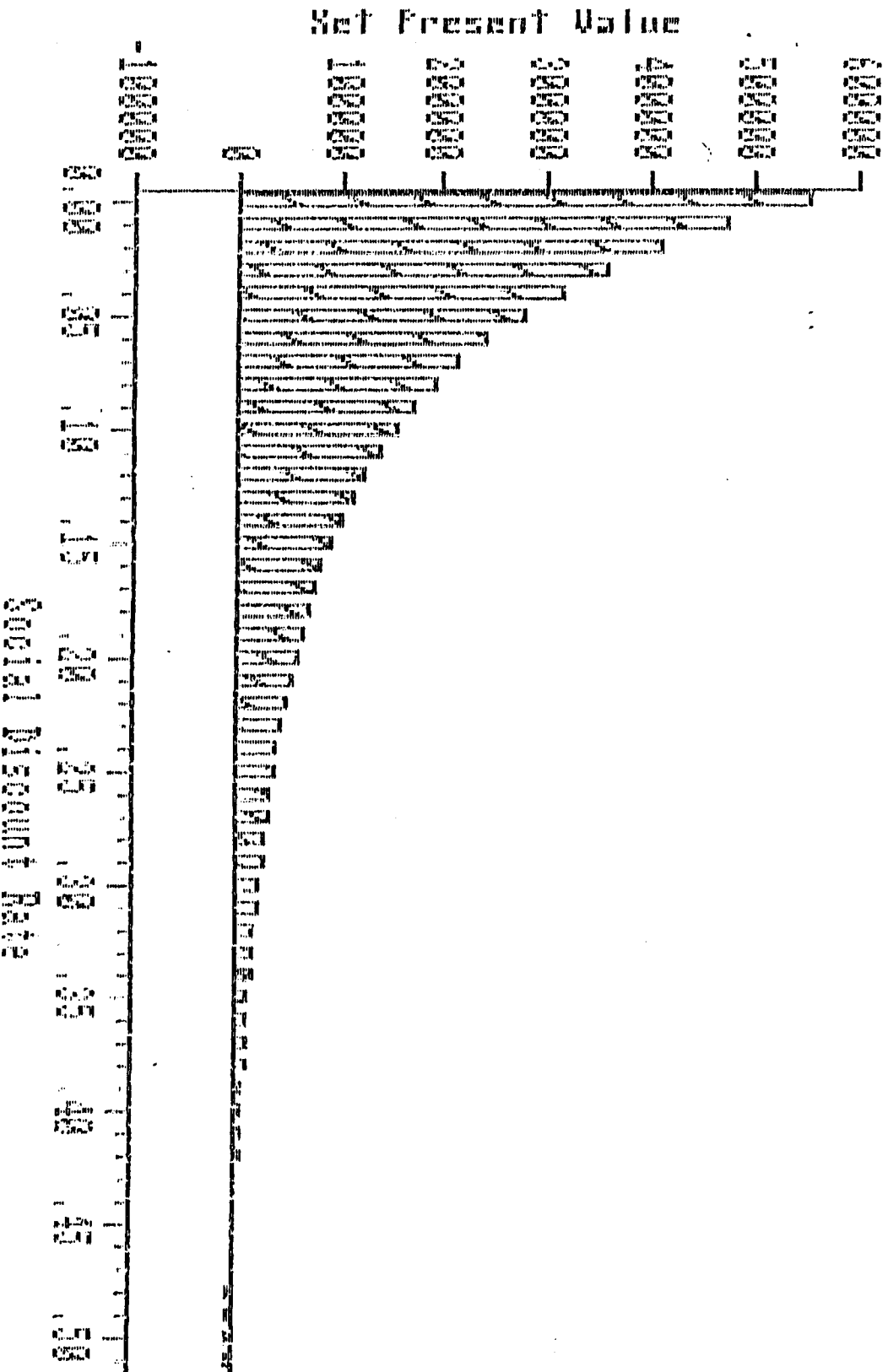
NPV with  $M=1$   $KRCF=.5$   $CFI=.9$   $CFO=.8$



NPV with  $M=1$   $KBCF=.75$   $CPI=.9$   $CFO=.8$



SLIGHTLY OPTIMISTIC CASE 3  
NPV with M=1 PROF=1 OIL=.9 OTO=.8



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