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**The Effects of Tax Exemption
on Investment by Industrial
Firms in Columbia**

by
RICHARD E. BILLSBORROW

and

RICHARD C. PORTER

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J. C. B. Mohr (Paul Siebeck)

The Effects of Tax Exemption on Investment by Industrial Firms in Colombia

By

Richard E. Bilsborrow and Richard C. Porter

Contents: I. Background. — II. Administration of Exemptions. — III. Economic Assessment of Exemptions. — IV. Profitability of Exempt Firms. — V. Liquidity Effects on Investment. — VI. Lessons from Colombian Experience. — VII. Appendix: Sources of Data and Definitions of Variables.

Tax incentives are one of the most widely used policies for the stimulation of industrial expansion in developing countries: "Today virtually all developing countries . . . offer inducements to approved enterprises in the form of reductions in or exemptions from . . . income taxes for given periods of time"¹. Despite much accumulated experience, disagreement still exists about their effectiveness. Fiscal

Remark: The research for this paper was begun by Mr. Bilsborrow while in Colombia on a Fulbright - Hays Grant in 1965—66. He wishes to thank the Centro de Estudios Sobre Desarrollo Económico, Universidad de los Andes, Bogotá, for its assistance. We have both benefited greatly from the cooperation of many Colombian businessmen and government officials, from comments on earlier drafts by colleagues in the Colombian Department of Planning and the University of Michigan, and from criticism by participants in the 1968 Harvard Development Advisory Service Conference at Sorrento, Italy. This paper in no way represents an official position, and errors that remain are ours.

¹ George E. Lent, "Tax Incentives for Investment in Developing Countries", International Monetary Fund, *Staff Papers*, Vol. XIV, Washington, D. C., 1967, p. 249. Lent summarizes the characteristics of tax incentive legislation in thirteen developing countries but does not carry out any empirical analysis. — A careful earlier survey of theoretical and administrative aspects of tax incentives in developing countries, also non-empirical, is found in Jack Heller and Kenneth M. Kauffman, *Tax Incentives for Industry in Less Developed Countries*, Harvard Law School, International Program in Taxation, Cambridge, 1963. — Tax incentives for industry, inspired by the economic philosophy of Raúl Prebisch, have been especially attractive inducements to Latin American governments. See Raúl Prebisch, "Commercial Policy in the Underdeveloped Countries", *The American Economic Review*, Vol. XLIX, Menasha, Wis., 1959, Papers and Proceedings, pp. 251 sqq. — Pedro Mendive, "Tax Incentives in Latin America", United Nations, *Economic Bulletin for Latin America*, Vol. IX, New York, 1964, pp. 103 sqq.



experts generally denigrate tax exemption. Economists' opinions vary from quite negative, i. e., "... tax considerations are probably only infrequently of any significant consequence in a business decision"¹; to quite positive, i. e., "I have taken pleasure in attempting to 'debunk' ... those who seek to discredit such proved industrial incentives as tax exemption"². Unfortunately, empirical studies of tax incentives in developing countries are few and more aggregative than desirable³. In this paper the effects of tax exemptions in Colombia during the period 1960—66 will be examined in an effort to add more explicit empirical evidence to the debate. The basic question here is: To what extent have Colombia's tax exemptions encouraged firms to enter (or to expand in) areas of industry they otherwise would not have chosen?

In the fundamental reform of tax laws in 1960, Colombia offered exemption from major income taxes (for up to ten years, 1960—69) to firms which entered certain "basic" sectors of industry (such firms are hereafter called "basic") or which produced goods "complementary" to the production of iron and steel (i. e., firms which used as intermediate goods the products of the government-sponsored steel firm; such firms are hereafter called "complementary"). During the seven years, 1960—66, 100 different firms achieved this exemption in at least one year, for a total of 288 firm-years of exemptions. Since there are approximately 12,000 manufacturing establishments in Colombia⁴, the number of tax-exempt firms seems few. Nevertheless, the shareholder equity of these at-some-time-exempt firms is around 700 million pesos⁵, which represents nearly 10 percent of the total equity of all manufacturing industry. The total revenue loss during the seven years was about 160 million pesos. The annual loss in both 1965 and 1966 was around 50 million pesos, which was over 6 percent of total corporate income and excess profits tax receipts in each year.

¹ Stanford G. Ross and John B. Christensen, *Tax Incentives for Industry in Mexico*, Harvard Law School, International Program in Taxation, Cambridge, 1959, p. ix.

² Murray D. Bryce, *Policies and Methods for Industrial Development*, McGraw-Hill Series in International Development, New York, 1965, pp. V sq.

³ Two such examples are Milton C. Taylor, *Industrial Tax-Exemption in Puerto Rico, A Case Study in the Use of Tax Subsidies for Industrializing Underdeveloped Areas*, Madison, 1957. — Paul L. Chen-Young, "A Study of Tax Incentives in Jamaica", *National Tax Journal*, Vol. XX, Cambridge, Mass., 1967, pp. 292 sqq. — A more careful analysis, for the United States, is Robert M. Coen, "Effects of Tax Policy on Investment in Manufacturing", *The American Economic Review*, Vol. LVIII, 1968, Papers and Proceedings, pp. 200 sqq.

⁴ In 1965, according to Departamento Administrativo Nacional de Estadística, *Boletín Mensual de Estadística*, Año XVI, Bogotá, agosto, 1967, p. 27.

⁵ One peso was worth about (= .11) U. S. dollars in 1965.

The organization of the paper is as follows: Section I offers some historical background to the 1960 tax-exemption statute. Section II briefly reviews certain administrative procedures and problems. Sections III to V contain the economic evidence. And finally, Section VI summarizes the evidence and presents policy implications.

I. Background

There is a long history of the use of tax exemptions in Colombia as a stimulus to the growth of certain industries¹. Soon after independence was achieved, exemptions from import duties and various internal taxes were granted for the purpose of developing domestic manufactures. The number and magnitude of exemptions continued to grow throughout the nineteenth century, and accelerated in the twentieth once the government became generally empowered to concede exemptions whenever these promised to lead to the initiation of new industries. Before 1940, however, all such exemptions tended to be granted on an ad hoc basis. Exemption legislation for specific firms continues to exist today (for tourist hotels, auto assembly, etc.), but has been much surpassed in importance by the more general laws with which this paper is concerned.

The "modern" era of exemptions had its beginnings in the 1930's, when the Constitution was amended and Congress gave the administration extensive powers in the field of economic policy. With these new powers, the government established the Industrial Development Institute and called for the adoption of a development plan. The industrial part of this plan was supposed to identify areas of basic importance in which national raw materials were utilized. Although no explicit general definition of "areas of basic importance" was at that time offered, the list of 22 industrial fields which qualified implicitly suggests that industries were considered basic when they produced something which had not been produced in Colombia previously. Unfortunately, World War II made the necessary capital goods imports unavailable, and even after the war, the small magnitude and duration of the tax exemption (and the prerequisites) resulted in only two firms availing themselves of it².

Thus, while one of the 22 fields exempted in 1940 was iron and steel production, it soon became clear that a much greater government effort was needed if an iron and steel industry was to be established. With the

¹ Luis Ospina Vásquez, *Industria y protección en Colombia, 1810—1930*, Medellín, Colombia, 1955, p. 214.

² Alberto Silva and Tito Luis Caldas, *Régimen legal de la industria en Colombia*, Bogotá, 1956, p. 34 note. The relevant laws and decrees for points made in the two paragraphs above are, chronologically, Law 22 and Decree 1,143 of 1908, Article 32 of the Constitution and Law 54 of 1939, and Decrees 1,157 and 1,439 of 1940.

aid of the International Bank for Reconstruction and Development, plans were made for the "Empresa Siderúrgica Nacional de Paz del Río"¹ which was to receive such privileges as 20-year exemption from all taxes (including tariffs on imports), preferential treatment of import license applications, and compulsory financial contributions from private industry in the form of purchases of Paz del Río bonds².

In 1960 the income tax of Colombia was overhauled³ and a new system of general tax exemptions promulgated. Corporations and other forms of business organization formed prior to December 31, 1965, whose "sole purpose" is the exploitation of an economic activity classified by the Department of Planning as "basic" or "complementary" and whose raw materials used in their production processes are at least 60 percent of domestic origin (or 50 percent from Paz del Río, for "complementary" firms), are entitled to exemption (usually 100 percent) from income taxes through 1969⁴. The entire "complementary" exemption is best viewed as a disguised subsidy to Paz del Río since it induces Paz del Río customers to buy a larger quantity and/or pay a higher price than otherwise⁵.

While the "complementary" firms were clearly defined, the "basic" firms were not except in the form of a series of Department of Planning resolutions listing the specific industrial areas which qualified. The 21 areas consisted of extraction and processing of various ores, fishing, wool processing, and the production of various chemicals, petro-chemicals, paper products, fertilizers, artificial fibres, iron and steel, machines and machine tools, and tanning extracts. As most of these products were principally imported by Colombia at this time, the concept of "basic" appears to have become, by 1960, synonymous with import-substituting manufacture (see Section VI, point (c) below).

¹ Later "Acerías Paz del Río;" hereafter referred to simply as "Paz del Río." For a history of the financing and operation of Paz del Río, see John A. King, Jr., *Economic Development Projects and Their Appraisal, Cases and Principles from the Experience of the World Bank*, Baltimore, 1967, Case 30.

² In addition, it was necessary to insure that there would be buyers for the products of Paz del Río. Therefore, firms which purchased 80 percent of their raw materials from Paz del Río were exempted for a period of up to ten years (during 1954—63) from income, wealth, and excess profits taxes and from duties on imported capital equipment. It is difficult to discover how many firms received such tax exemption between 1954 and 1960 (when the decree was superseded), but there were surely several.

³ The details are described in Harvard Law School, International Program in Taxation, *Taxation in Colombia*, By George Jackson Eder, John C. Chommie and Hector Julio Becerra, World Tax Series, Chicago, 1964, pp. 325 sqq.

⁴ Resolution 197 of 1961, as modified by Resolutions 78 and 127 of 1962, 74 of 1964, and 225 of 1966.

⁵ See p. 420, footnote 2.

II. Administration of Exemptions

The effectiveness of a tax incentive program is to an important degree determined by its administration. We will see that it is necessary to keep in mind the administrative shortcomings in an economic evaluation of the Colombian tax exemptions. This review of Colombian procedures is also valuable because the Colombian experience provides such clear lessons to others.

Firms which wish to enjoy exemption privileges must deal with three different agencies: the Ministry of Development, the Superintendency of Corporations, and the Ministry of Finance¹. The extent of the paperwork alone partly or completely offset the value of the exemption for many small firms. More important, the lack of clear definition of responsibilities and communication between the three agencies led to further inefficiency and confusion. To some extent the problems followed from the *troika* structure; to some extent they were the result of carelessly or vaguely worded laws and decrees.

The Ministry of Development first approves, initially and each year thereafter, a firm's status as "basic" by means of an annual resolution. The Ministry of Finance, in turn, grants exemptions for "complementary" firms without regard to a Ministry of Development resolution and without any real ability to verify the 50 percent Paz del Río purchase requirement².

Finally, all "basic" and "complementary" firms must submit to the "vigilance" of the Superintendency of Corporations, but the Superintendency often does not know who the exempt firms are³. While each of the three organizations is empowered to make on-site inspections to ensure compliance with the "sole purpose" and import content requirements, in the only year for which evidence was available we found only three out of seven exempt firms were actually visited⁴. All this is not to say that the *troika* is intrinsically unworkable (in Colombia, some such

¹ All such translations of government organizations are our own.

² For "basic" firms, the legal department of the Ministry of Finance has publicly declared that the annual resolution is not necessary. Its tax examiners have rejected this legal opinion but still occasionally grant exemption in the absence of a Ministry of Development resolution.

³ In fact, none of the Government organizations knows exactly who the "complementary" firms are, nor can this be known without searching past corporate tax declarations. The Ministry of Development knows the "basic" firms (except those accepted by the Ministry of Finance without a Ministry of Development resolution), but does not even report this list to the Superintendency of Corporations. As a result, the Superintendency of Corporations does not have complete financial records for either group of exempt firms (see the Appendix).

⁴ Actually, the Superintendency of Corporations is empowered to make visits to all corporations every year to verify financial records, but because of insufficient staff only about 10 percent of the corporations are visited in any year.

division of labor and power is perhaps inevitable) but that a clear division of responsibility is necessary, and regular channels of interagency communication must be maintained.

Furthermore, a great deal of uncertainty has been caused by the Ministry of Development's interpretation of the law. Its decision to re-appraise each year the status of each "basic" firm has had unfortunate economic results. In place of a prior, secure tax exemption, potential exempt firms had to act in the face of uncertain exemption and possible long delays before receiving a decision. The extent of uncertainty is illustrated by the fact that "basic" status, once achieved by a firm, was renewed in only 66 percent of the subsequent years¹.

The critical lesson of this is the need for consistency over time. A firm should be able to get a decision as to its status before it undertakes or expands operations, and that status should be essentially irrevocable for a fixed period of time, provided the firm continues to fulfill certain clearly specified conditions. That the Colombian system extensively failed in this respect is witnessed by the fact that, of the more than thirty at-some-time-exempt firms with which we conversed or corresponded, about half voluntarily complained of administrative uncertainties².

A further shortcoming in the handling of the exemptions is the timing of the law and its implementation. The exemptions were to last up to ten years (1960--60, inclusive), but the law itself was not passed until December 22, 1960, and the various implementing decrees and resolutions were still being issued well into 1962. As a result, all the eventual exemptions for the early years assumed a windfall nature. Furthermore, few firms received exemptions for the first years³. Thus, if all the 71 firms that were exempt as "basic" at some time during 1960--66 receive exemptions in each of 1967, 1968, and 1969, they will have enjoyed less than six years' exemption on the average. The combination of the fact that firms

¹ Even "complementary" firms have been subject to this kind of uncertainty despite their more precise definition and freedom from Ministry of Development resolution. There have been cases where Paz del Río was unable (or refused) to continue supplying the steel needs of a particular "complementary" firm, with the result that the firm lost its tax-exempt status.

² This is particularly significant because the questions in both the interviews and correspondence were open-ended, with the result that the responses could not have been influenced by suggested answers.

³ Two of the reasons for this are that two-thirds of the at-some-time-exempt firms had not yet been established by the start of the exemption statute, and that the newly-established firms frequently did not earn sufficient profits to merit seeking exempt status in their first few years. For the at-some-time-exempt firms for which there are data, 44 percent earned zero or negative profits in the year of their establishment, 36 percent in the next year, and 22 percent two years later. For unprofitable firms exemption has no value.

are exempt through 1969 but that they must exist by December 31, 1965, to be eligible, means that firms which may be equally worthy receive income tax exemption for anywhere from four (1966-69) to ten years. Indeed, the firms which establish themselves in 1965, which may be more needy since they are just beginning production, receive exemption for a much shorter period than a firm which may have existed for many years.

Thus the implementation and administration of the Colombian tax-exemption system has been to varying degrees uncertain, arbitrary, dilatory, and uncoordinated. While we cannot quantify the impact of these administrative failings upon its effectiveness, there can be little doubt that this impact has been significantly negative, in the sense that the investment stimulated has surely been less than it could have been under more efficient administration.

III. Economic Assessment of Exemptions

An economic assessment of the effectiveness of tax exemptions is difficult. Ideally, we should like to know how differently the at-some-time-exempt firms would have acted if they had known (throughout the period, 1960-69) that they would not receive any exemptions. One obvious approach is to ask the firms how the possibility (or hope) of exemption had affected their decisions. There are, however, two difficulties. First, what businessmen say and what they do may differ greatly¹; second, the sample of respondents to the question is almost certainly biased². On the second difficulty, for example, we sought to converse or correspond with executives of all the 100 at-some-time-exempt firms, but the 30-odd with which we succeeded were clearly not a random sample. Though this group was similar to the entire 100 in its visible attributes³, it consisted, in almost equal parts, of extreme allies and extreme enemies of exemption. While this is not a surprising result⁴, it does induce skepticism about generalizing from the information offered.

¹ The methodological problems are likely to be even more severe than those discussed by Robert Eisner in his *Determinants of Capital Expenditures: An Interview Study*, Studies in Business Expectations and Planning, No. 2, Urbana, 1956.

² In fact, the "population" to which such a question can be addressed is incorrectly defined since it would have been a Herculean task to discover in the archives of the Ministry of Development the names of firms which solicited but never received exemption. The "population" being considered in this paper, therefore, consists of firms whose exemption hopes were, by 1966, at least once realized.

³ I. e., its composition with respect to number of years exempt, size, type of exemption, age, etc.

⁴ Since those who have been most favored or most disillusioned by the exemption system would seem the most likely to respond.

Nevertheless, these conversations and letters did suggest that there were two ways in which firms' decisions may have been favorably affected by the exemption law. First, many firms said they had initiated operations in response to the hope of exemptions; and second, some firms were able to expand more rapidly through reinvestment of profits once they began receiving exemption. To attempt to quantify these effects on the basis of possibly self-serving declarations¹ would have been dangerous, unless a large sample of long and careful interviews had been obtained. And even then the serious methodological problems would remain.

Another approach to the question, how did the hope of exemption affect investment decisions, lies in the analysis of the investment decision making process. If we knew what factors "caused" investment, then knowledge of how exemption affects these factors would show how exemption affects investment. One method of determining what factors were at least *associated* with investment is multiple regression. We might have tried to determine by multiple regression the relation between investment and other variables (such as internal funds, accelerator, etc.) for the exempt firms *before* they became exempt — i. e., their investment function. Then one could substitute exempt-period data (a) for the firms *including* their exemptions, and (b) for the firms *excluding* exemptions, in the estimated equation, and calculate the difference — i. e., the amount of additional investment occurring under exemption from what would have occurred otherwise.

The principal difficulties encountered in this approach are (1) that it is not firmly established (even in the literature about the developed countries² what factors enter the investment-decision function and how they enter, and (2) that some of the important factors are nonobservable, chiefly because they refer to the *ex ante* expectations of the firm. Finally, the lack of the necessary data — partly caused by two-thirds of the exempt firms not existing before the tax-exempt period — made the approach above unfeasible³.

¹ Self-serving in that a continuation of the exemptions into the 1970's was then being considered.

² A substantial effort was made in attempting to examine the applicability of investment theory to less developed countries by Richard E. Bilsborrow, *The Determinants of Fixed Investment by Manufacturing Corporations in Colombia* (unpubl. Ph. D. thesis, University of Michigan, 1968), Ch. 3. Unfortunately, the econometric results are, in his words, "not terribly convincing" (p. 136).

³ One small piece of econometric evidence from the source above is of interest in the present context. Data were obtained for 68 firms (of which 8 were exempt from income taxes). A cross-section regression of investment on net internal funds and sales growth should have resulted in *positive* residuals for the exempt firms if the incentive/profitability effects on

Therefore, the empirical approach taken here will be noneconometric. In the next section the ex post profitability of the tax-exempt firms is examined on the assumptions that the ex ante profitability of an investment is an important factor in the investment decision and that the realized rate of profitability can give us some insight into the rate of profitability that had earlier been expected. In Section V the potential influence of tax exemption on investment through the availability of internal funds is investigated. Section VI will summarize the results of Sections IV and V and suggest policy implications.

IV. Profitability of Exempt Firms

We were able to calculate the average before- and after-tax¹ profit rates (on book value of shareholder equity) for 78 of the 100 at-some-time-exempt firms². The weighted (by 1966 equity of each firm) average before-tax and after-tax profit rates of all firms in the sample were 21.1 percent and 11.7 percent, respectively. As Table 1 indicates the variance in these averages was large. Thus, if all the at-some-time-exempt firms were exempt in all years, the exemption would have nearly doubled their average profit rate. Unfortunately, this says little about the effectiveness of exemption. In the first place, these profit rates mean little unless compared in some way with those of nonexempt firms. This is our first job. Later a theoretical framework will be developed to analyze the effectiveness of exemption on stimulating investment.

Table 1 — *Distribution of Firms by Profit Rates*

Before-tax profit rate (percent)	Number of firms
Negative	6
0 to 9.99	13
10 to 19.99	13
20 to 29.99	14
30 to 39.99	7
40 to 49.99	11
50 to 99.99	7
Greater than 100	7

investment were important (liquidity effects already having been included in the funds variable). However, this was not the case: residuals for the at-some-time-exempt firms summed to about zero.

¹ I. e., the after-tax profit rate that the firms would have had if they had not been exempt at all during the period.

² All the empirical work is based upon this group of 78 firms, hereafter called "the sample." See the Appendix for a description of sources, data and procedures.

For nonexempt firms the only comparable (before-tax) profit data which exist are for manufacturing corporations¹. For *all* manufacturing corporations (including the tax-exempt), the before-tax profit data varied during 1960—66, from 17.7 percent (in 1965) to 25.1 percent (in 1963), and averaged 20.1 percent over these seven years. This is almost exactly the same as the average before-tax profit rate (weighted by 1966 equity), 20.4 percent, of the 47 at-some-time-exempt corporations in the sample. (The other 31 firms in the sample were limited liability companies — see the Appendix.)

This near equality of ex post profit rates casts doubt on the usual belief that profit expectations in the exempt areas were too meager for entry to have occurred without special inducement². This may be true for those exempt areas in which few or no firms appeared, but for those exempt areas in which firms exist, the evidence is against it. Indeed, the exempt "basic" firms have tended to enter largely in a few already established fields of production: While there are 21 different industries that qualified for "basic" exemption, 51 of the 71 at-some-time-exempt "basic" firms produced in only four of these (coal, iron and steel, machines and machine tools, and fishing)³, and these four areas were the ones in which significant national production already existed in 1960. This strongly suggests at the outset that tax exemption may have been redundant in the established areas and an insufficient inducement in the not-yet-established ones.

Further evidence about the effectiveness of exemption is offered by the division of the sample into corporations and limited liability companies⁴. The differential impact of tax exemption on the two groups is

¹ This data is collected by the Superintendency of Corporations (Superintendencia de Sociedades Anónimas), Bogotá, and is published annually in its *Revista*. In Colombia there are two types of "corporations", the *sociedades anónimas* and the *sociedades limitadas*. The former are like the U. S. corporation, but the latter, "limited liability companies," are more uniquely Colombian and combine various features of the corporation and the multiple partnership. For the purposes of this paper, the critical difference lies in the tax rates. The corporation pays a progressive corporate income tax ranging from 12 to 36 percent, and is liable to an excess-profits tax; the limited liability company pays a progressive income tax ranging from 4 to 12 percent and is not liable to any excess-profits tax. In this study "corporations" will be used to refer only to the first group, while "limited liability companies" will be used for the second group.

² At the least, it would be necessary to explain why realized profits typically exceeded expectations in these areas (and not elsewhere).

³ In seven other designated areas not a single firm entered (or existed before).

⁴ The limited liability companies comprise 40 percent of the number of firms in the sample, but only 4 percent of the total (1966) equity. Only three of them received over 100,000 pesos worth of total exemption, and none over 1,000,000 pesos, whereas three-fourths of the corporations received over 100,000, and nearly half over 1,000,000 pesos of exemption, over the 1960—66 period.

shown by the figures for before-tax and after-tax profit rates; taxes would have reduced the weighted average profit rate of corporations from 20.4 percent to 10.7 percent and that of limited liability companies from 39.0 percent to 35.8 percent. Thus, exemption in all years would have nearly doubled the average profit rate of corporations but increased that of limited liability companies by less than one-tenth. While the fact that the limited liability companies were going to turn out profitably may not have been fully recognized beforehand by their owners, they knew well that exemption from corporate income taxes could never benefit them much¹.

In sum, ex post profit rate averages suggest that the tax-exemption system had least effect in inducing investment (1) in untried areas of production and (2) by limited liability companies.

But aggregates of several firms may hide interesting intragroup differences. In the remainder of this section, we will look at the 78 firms in the sample individually in an effort to say something about their division into two groups: (1) those that would still have been established (or expanded substantially as much) in the absence of exemptions, and (2) those that would not. Here we assume that the vital factor in the investment decision function is the expected profitability of an investment (or, what ordinarily gives the same results, the anticipated present value of the investment). Theoretically, then, the critical distinction lies in the division between investments whose anticipated present value is (1) negative in the absence of tax exemption but positive with exemption, and (2) positive even in the absence of tax exemption (though of course greater with exemption), or negative even with exemption².

To develop this distinction, let us consider a firm (or investment) in which one peso is invested in the year zero. Each year thereafter (at least up to the horizon of the investor) the depreciated part of this capital is replaced so that the real capital investment of one peso is maintained³. The anticipated real net cash inflow (hereafter called profit) per peso of investment is p pesos each year (again, at least up to the horizon of the investor).

This profit is to be tax-free for the first " a " years of the investment and thereafter will be taxed at a rate i . The investor calculates his present

¹ This is because the marginal income tax of limited liability companies could not exceed 12 percent.

² In their survey of tax incentives in developing countries, Heller and Kauffman (*op. cit.*) have parts of two chapters on this subject, Chapter 5, "Procedure for Evaluating the Effect of Incentives on Profitability", and Chapter 4, Section C, "Exemption as Incentives." But their theoretical approach is concerned with the effects of exemption on present value rather than whether it makes a *critical* difference in ex ante profitability, and hence in the investment decision.

³ "Real" means in year zero prices.

(real) value using a discount rate r , and his horizon is assumed to be b years¹. The present value of a peso of such investment (with "a" years of initial tax exemption), written V_a , is:

$$(1) \quad V_a = -1 + p \int_0^a e^{-rt} dt + p(1-i) \int_a^b e^{-rt} dt$$

where t is time². After integration, V_a can be written:

$$(2) \quad V_a = \frac{1}{r} (p-r) - pie^{-ra} - p(1-i)e^{-rb}$$

For some tax-exemption period of "a" years ($0 \leq a \leq b$) to be effective — in the sense of inducing an investment that would not otherwise be made — it is necessary (but not sufficient — see below) that the anticipated present value be negative if no exemption were offered (i. e., if $a = 0$) and be positive if exemption were offered throughout the anticipated life of the investment (i. e., if $a = b$)³. If V_0 (i. e., the present value without any tax exemption) is positive, the investor would undertake the investment in the absence of exemption. If V_b (i. e., the present value with "lifelong" exemption of "b" years) is negative, the investor would not undertake the project even if he were granted complete tax exemption over the entire expected economic life of the investment.

We find the present value without exemption is:

$$(3) \quad V_0 = \frac{1}{r} [-r + p(1-i)(1 - e^{-rb})].$$

And the present value with "lifelong" exemption is:

$$(4) \quad V_b = \frac{1}{r} [-r + p(1 - e^{-rb})].$$

It is necessary to find the conditions in which:

$$(5) \quad V_0 < 0 < V_b.$$

These conditions are:

$$(6) \quad p(1-i) < \frac{r}{1 - e^{-rb}} < p.$$

¹ The use of a short horizon is, while not the best, a common way to handle the uncertainty of distant flows. What it means in the present context is that a piece of equipment is assumed to generate no revenue b years after its installation.

² d represents the differential, and e is the Napierian 2.718.

³ Increasing "a" beyond b would have no effect on the investor's decision, by the definition of b .

In words, these two conditions require that the after-tax profit rate be less than a certain quantity and that the before-tax profit rate be greater than that same quantity. That critical quantity, hereafter called CQ, is plotted in the figure for various values of r and for b equal to 3, 5 and 10 years.

It is clear from the figure that the CQ is very sensitive to the investor's rate of discount, r , and, to a lesser extent, sensitive to his horizon, b . We would like to know both for particular firms, but this is impossible. Since nominal interest rates in Colombia vary from .15 to .35, real interest rates must lie in the range, .05 to .25 (with the roughly 10 percent per year inflation of the early 1960's). Moreover, it seems reasonable to place investor horizons in the range of 3 to 10 years, with 5 years perhaps most likely. Under these suppositions, the CQ may lie anywhere from about .10 (with r low and b high) to .40 (with r high and b low). Thus, for exemptions to be effective, the after-tax profit rate must be less than some CQ in the range, .10 to .40, and the before-tax profit rate must be above that CQ.

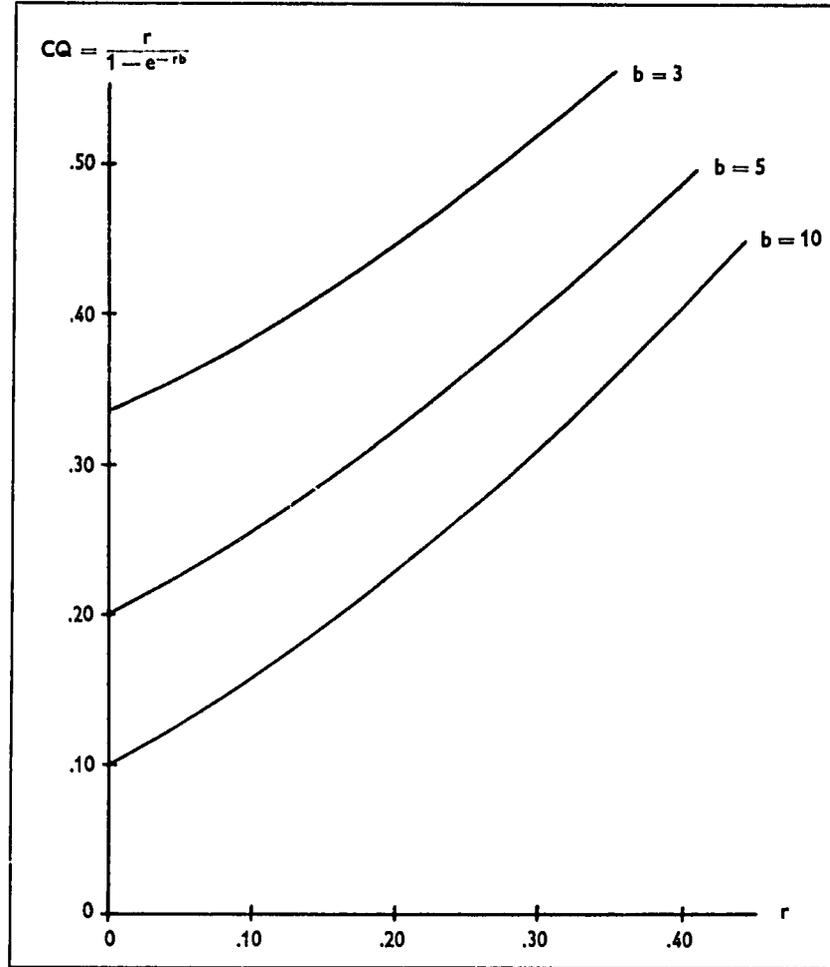
While the theory developed in the preceding paragraphs is simple, its application to the present problem is made tenuous by several considerations. First, the theoretical framework is at best a naive approximation of the complex process by which firms decide to enter (or expand their commitment in) a particular line of production. While no one would deny that expected profitability is an important ingredient in that decision, it is certainly not the only ingredient nor necessarily the most important. Second, any actually calculated profit rates must be based upon the firm's own accounts, which may not be accurate reflections of economic reality. Nevertheless, attempts to adjust the accounts to correct distortions quickly enter the realm of the arbitrary. Third, the calculated profit rates are ex post, whereas the firms' decisions must have been motivated by their possibly very different ex ante profit expectations¹.

The conclusion of the theoretical framework above is that, in the absence of precise information about firms' horizons and discount rates, we must accept the possibility that tax exemption was effective if there

¹ In fact, the correlation between ex ante and ex post profit rates was only .13 for a group of British firms. See C. F. Carter and B. R. Williams, *Investment in Innovation*, London, New York, Toronto, 1958, p. 90.

In addition, the time shape of the profitability of an investment is not usually uniform over its life, as the above model assumes. While the theory could be readily extended to consider varying time shapes, such a course would not meet the real problem that it cannot be known from what part of a profit flow varying over the firm's life cycle the data for particular years derive. These considerations imply that the utmost caution must be used in drawing conclusions about the effectiveness of exemptions from ex post profit data.

Figure



is any CQ value between .10 and .40 that is both greater than the after-tax profit rate and less than the before-tax profit rate. For nearly half the firms in the sample there is no such CQ: both the before-tax and after-tax profit rates are above .40 for 16 firms, and both the before-tax and after-tax profit rates are below .10 for 19 firms¹. It is illuminating to examine these two groups more carefully.

¹ We could carry the analysis above further and compare actual firm before- and after-tax profit rates with *different* CQ's. If we assume all firms are equal in the sense of having the same CQ, the *maximum* number of firms that might have been stimulated to invest by profitability

The 16 firms whose profit rates in the 1960's would have been above .40 even if they had paid taxes consisted almost entirely of small¹ limited liability companies that were established in the 1960's. It is tempting to conclude that these high ex post profitability rates must have been to some extent anticipated and hence tax-exempt status to a corresponding extent unnecessary to stimulate the firms' investments. However, this may not follow because small limited liability companies are more likely to have high CQ's, relative to either big firms, which would presumably have longer horizons, or corporations for whom the appropriate discount rate (or external cost of funds) is surely lower.

At the other end of the profit rate distribution, there were 19 at-some-time-exempt firms whose before-tax profit rates were less than .10. In composition, this group is quite similar to the entirety of at-some-time-exempt firms, their sole differentiating characteristic being that they have clearly not (yet) benefited much, if at all, from tax exemption. To the extent that these firms entered (or expanded) with full recognition that their operations would probably not become profitable until the late 1960's, the promise of tax exemption cannot have provided much stimulus. On the other hand, to the extent that these firms represent the low end of a high-variance distribution around ex ante profit expectations, the hope of tax exemption may still have been important in their decision.

The analysis above has assumed that all exempt firms have the same CQ. But firms in different activities are likely to have not only different investment horizons (h) and access to external funds (and hence r), but also different levels of risk, tariff protection, degrees of competition from non-exempt firms that fail to meet one of the legal requirements, etc., all of which will affect the CQ's. While it is impossible to adjust for these factors, we can compare individual firm profit rates with those of their *own* activities (sub-industry, type of mining, or whatever). The differences in activity profit rates will partially reflect the differences across firms in the factors above.

Then, using the same analysis as above, it follows that (1) if a firm's realized profit rate is greater *without* exemption than the industry average, it could not have been stimulated to invest by the exemption, since it would have invested anyway; and (2) if a firm's realized profit rate is less than the industry average even *with* exemption, it also could not

would have been at a CQ of .255. But at this CQ only 18 out of 78 firms, or 23 percent would have been stimulated. We will argue below that it is probably not plausible to assume the same CQ for all firms.

¹ I. e., firms whose equity was below 1 million pesos in 1966.

have been stimulated to invest by the exemption. Thus we consider a firm's fixed investment to have been stimulated by the exemption if and only if its profit rate *without* exemption would have been less than the activity average, *and* its profit rate *with* exemption greater than its activity average¹.

Now let us examine the data using the approach above under two different meanings of the phrase "industry average" in (2) above. We

Table 2 — *A Comparison of the Profit Rates of Tax-Exempt Firms with the Average^a for their Activity, 1963 and 1964*

	1963	1964
Firms with $P^b \geq$ average for activity, without exemption	20	41
Firms with $P^b \leq$ average for activity, even with exemption	16	17
Firms in between (those "stimulated")	4	3
Firms with $P^b \geq$ average for all manufacturing, without exemption	22	42
Firms with $P^b \leq$ average for all manufacturing, even with exemption	13	15
Firms in between (those "stimulated")	5	4
Corporations with $P^b \geq$ average for activity, without exemption	8	21
Corporations with $P^b \leq$ average for activity, even with exemption	16	11
Corporations in between (those "stimulated")	4	3
Corporations with $P^b \geq$ average for manufacturing, without exemption	9	17
Corporations with $P^b \leq$ average for manufacturing, even with exemption	12	14
Corporations in between (those "stimulated")	5	4

^a For corporations only. — ^b P^b indicates realized profit rate (on equity).

Source: Firm profit rate data: balance sheets and income statements supplied to Superintendency of Corporations (see the Appendix). -- Industry profit rate data: Superintendency of Corporations, *Revista*, 1964 and 1965.

¹ It is important to realize that it is not entirely correct to utilize the profitability criterion in complete isolation from liquidity considerations. If tax exemption raises a firm's profit rate from below to above its CQ but the firm failed to invest during the exempt period, it would seem excessively charitable to say that it was stimulated by profitability to invest. Therefore we imposed a condition that the f_2 liquidity ratio (see Section V below) for the firm must be at least .25.

see from Table 2 above that comparing exempt firms to their own (Standard Industrial Trade Classification) two- or three-digit industry average, only 4 out of 40 firms in 1963 and 3 out of 61 in 1964 could have been stimulated to invest¹. Thus less than 10 percent of the firms might have been stimulated to invest, according to this approach.

However, one might question comparing firm profit rates to the average for that kind of activity if one believes the entrepreneurial talents in the firms are *general*, i. e., equally usable in other manufacturing activities. If we compare individual firm profit rates to the average net profit rates for all manufacturing corporations in 1963 (13.7 percent) and 1964 (12.7 percent) respectively, the results are approximately the same (see Table 2). Note that this is identical to using the overall CQ approach developed above except that one specific CQ is used for all firms and only the two years are used.

Furthermore, one might question the appropriateness of using profit rate data of corporations as a basis for comparison when in fact about 40 percent (31 out of 78) of the firms are limited liability companies. Unfortunately, no data on average profit rates of limited liability companies were available. But we can carry out the analysis above for corporations only. The results are then slightly more auspicious for the tax exemption, but still only about 11 percent of the firm-years could have been stimulated when the basis for comparison is the industry average, and only 14 percent when the basis is the average for all manufacturing corporations. (Notice that not one limited liability company was stimulated.)

None of the calculations above changes appreciably if the "stimulated" and "non-stimulated" firms are weighted by value of exemption, investment, or equity. We thus conclude that it is unlikely that tax exemption could have had profitability effects resulting in additional investment on more than a small minority of the exempt firms².

¹ These were the latest years for which sufficiently disaggregated data on industry/activity profit rates were available at this writing. The source is given in Table 2.

² One reader suggested that tax-exempt firms would generally seem to be more risky undertakings than the average (even for their own activity). Therefore we explored what would happen if we added an allowance for risk differential. Since there seemed no obvious way to quantify an appropriate average risk differential for exempt firms, we arbitrarily settled upon a figure equal to about five percent of invested capital. The desirability of adding such a differential was also indicated by the fact that many exempt firms realized low ex post profits (5 percent on invested capital or even less) which they surely could not have expected ex ante. The risk differential would then go part way towards compensating for our (necessary) assumption that ex ante and ex post profits are equal in those (low ex post profit) firms for which that assumption would seem implausible. The difference this makes is considerable: 31 to 36 percent of the corporation firm-years might have been stimulated (and 20 to 25 percent of the total). Nevertheless, the inclusion of such a large risk-differential (about

V. Liquidity Effects on Investment

Unfortunately, to the extent businessmen do not make explicit profitability calculations in determining their fixed investments, we must be wary of accepting the conclusions of the previous section. And in fact available evidence seems to indicate that most businessmen, even in developed countries, either do not make explicit profitability estimates to compare alternative projects, and/or are motivated more by considerations other than profit maximization in undertaking their investments¹. Businessmen have always manifested a strong preference for financing investment by internal funds. Where financial capital is scarce and capital markets are as imperfect as they are in Colombia, one would expect this preference to be even stronger. Interviews in Colombia supported this hypothesis².

Thus the survey evidence against profitability and in favor of liquidity suggests that an important, if not the most important, impact of tax exemption is to augment a firm's internal funds so that it can expand more rapidly. If one sees availability of internal funds simply as one of the variables in the investment decision function, then tax exemption will always "stimulate" investment somewhat since it always increases a firm's liquidity position somewhat³. Initially, a stricter view will be taken here, that internal funds affect the investment decision only as a constraint. Under this view, if a firm's investment is less than the volume of internal funds it would have had if it had paid taxes, then the additional liquidity bestowed upon it by tax exemption is deemed redundant.

25 percent of actual average realized profit rates) is not supported by the empirical evidence which reveals that exempt corporations were slightly *more* profitable than the average for all manufacturing (see p. 305).

¹ The literature on this is too vast for more than a few references here. See George Katona and James N. Morgan, "The Quantitative Study of Factors Determining Business Decisions", *The Quarterly Journal of Economics*, Vol. LXVI, Cambridge, Mass., 1952, pp. 678sq. — Joel Dean, *Capital Budgeting, Top-Management Policy on Plant, Equipment, and Product Development*, 3rd Print, New York, 1956, pp. 288sq. — Gordon Donaldson, *Corporate Debt Capacity, A Study of Corporate Debt Policy and the Determination of Corporate Debt Capacity*, Boston, 1961. — Donald F. Istvan, "The Economic Evaluation of Capital Expenditures", *The Journal of Business*, Vol. XXXIV, Chicago, Ill., 1961, pp. 458sq. — For Latin America in general see Albert Lauterbach, *Enterprise in Latin America, Business Attitudes in a Developing Economy*, Ithaca, New York, 1966. — For Colombia see Bilsborrow, *op. cit.*, Ch. 4 and 5.

² See Bilsborrow, *op. cit.*, Appendix A. Also, in response to a mail questionnaire to all corporations by the Department of Planning in 1965 the need for credit was the only "problem" marked by over half the tax-exempt corporations responding (nine out of seventeen).

³ Except, of course, if the firm's profits were negative and hence its tax liabilities zero.

To make this test it is convenient to define an "investment-internal funds coefficient" (f) as follows:

$$(7) \quad f = \frac{\text{Gross Investment}}{\text{After-Tax Internal Funds}}$$

where, for firms which were in fact tax exempt, "after-tax internal funds" incorporates our estimate of the taxes the firm would have paid if not exempt. When this f coefficient is less than one, it means that investment has been less than after-tax internal funds, and we presume that the additional liquidity due to the exemption has been redundant. When f is greater than one, investment exceeds after-tax internal funds, and we presume that the additional liquidity has, at least marginally, made that investment possible.

Two different measures of f will be analyzed. In f_1 the after-tax internal funds of each firm consist of its average¹ after-tax profits and additions to (depreciation and other) reserves; the investment of each firm is assumed to consist of the average change in its fixed capital. f_2 is the same as f_1 except that dividend payments are subtracted from after-tax internal funds. This presumes that a firm has an obligation to distribute a portion of profits to its shareholders before considering whether to invest the remainder (i.e., its retained earnings)².

The distribution of firms by f coefficient is shown in Table 3. The critical distinction is between f 's greater than one and less than one³. Notice that whether f_1 or f_2 is used makes little difference: in either case, more than six-sevenths of the firms failed to invest as much as the level of gross internal funds they would have had even if they were not tax exempt. In other words, average investment was less than average after-tax internal funds. This would seem to indicate that tax exemption

¹ For the years during 1960--66 for which data about the firm are available; the details are described in the Appendix.

² If the purpose of tax exemption is to stimulate investment through liquidity, one wonders why the benefits are permitted to be distributed to shareholders at all. In Pakistan dividends paid out of exempt profits were not exempt from the corporate income tax (Heller and Kauffman, *op. cit.*, p. 27).

³ Actually, this is a bit too generous for the liquidity criterion: A firm is more likely, *ceteris paribus*, to have a high f if its level of internal funds (and hence profit rate) is very low. In fact, if profits are negative and equal in absolute value to depreciation, the f ratio will be infinite. Yet we would not want to say that investment had been stimulated because of a high f . We will attempt to handle this problem by imposing the condition that the firm's average profit rate without exemption be at least .03. Therefore, just as it was unrealistic to consider the profitability criterion in complete isolation from liquidity, it is also unrealistic to consider liquidity in complete isolation from profitability.

Table 3 — *Distribution of Firms by f Coefficients*

Value of f coefficient	Number of firms with							
	f ₁				f ₂			
	total	corporations	limited liability companies	large ^a	total	corporations	limited liability companies	large ^a
> 1.00	10	6	4	3	11	7	4	3
.75—.99	4	4	0	1	5	5	0	2
< .75 ^b	64	36	28	8	62	34	28	7
Total	78	46	32	12	78	46	32	12

^a "Large" refers to firms with equity of over 10 million pesos (about \$ 1 million) on December 31, 1966. All were corporations. — ^b Includes also eight firms with f's greater than .75 but profit rates without exemption of less than .03 (see p. 414, footnote 3).

Source: Financial data supplied by firms. See the Appendix.

could have stimulated investment by relaxing a liquidity constraint for only a small minority of the firms.

Further examination of the data indicates that the distribution of f coefficients is not very different between firms established before and after 1960, or between "basic" and "complementary" firms. Also there was no noticeable difference between corporations and limited liability companies, in contrast to what we observed before concerning profitability effects of exemption. Both these results are somewhat surprising since we would expect smaller firms, particularly limited liability companies, to be more dependent on internal sources of funds, and hence likely to "benefit" from exemptions, than larger firms. There appear to be three reasons why this was not true: (1) limited liability companies were much more profitable than corporations; (2) they increased their capital stock at a slower rate than corporations; and (3) precisely because of their less facile access to capital markets, they may have diverted internal funds to working capital or precautionary balances.

Several criticisms can be levied against the liquidity approach used here. One is that it is certainly oversimplified to presume that a firm with an f greater than one was thereby necessarily stimulated to invest. (This is similar to the regression fallacy of presuming that association implies causation.) And, if it was, what proportion of investment was stimulated — all, or only some part? Available data do not permit answers to this question. A further problem is that the relation between investment and internal funds goes both ways. It is also true that investment increases productive capacity, which may lead to higher

sales, profits, and internal funds. But since our time period is so short and the time it takes for a new fixed investment to be profitable is often two to three years (see p. 401, footnote 3), it seems likely that the simultaneity problem is not very important here.

A final point is that it surely is arbitrary to choose 1.00 as the determining f ratio if the average f ratio for all Colombian firms is less. A separate study of 22 Colombian manufacturing corporations with far more reliable data¹ than most (including this sample) found a median (also mean) f ratio of .75. If we take .75 as the critical f , then all of the percentages become slightly larger, but none is over 30 percent, except that about 35 to 40 percent of the larger corporations appear to have been stimulated. Nevertheless, we should note that this approach would vitiate the "pure liquidity" value of using the f 's with one as the critical value. All it says is that some combination of liquidity/profitability/etc. effects stimulated these firms (with f 's greater than .75) to invest more relative to internal funds than the "average" in Colombia.

Thus we must conclude that the overall pattern of the f coefficients is sufficiently consistent that it is difficult to avoid the conclusion that the large majority of firms — limited liability companies and corporations alike — did not expand their fixed investment in the 1960's as a result of the liquidity influence of any tax exemptions they received.

VI. Lessons from Colombian Experience

There remain two remediable shortcomings in the analysis of the effects of exemption on profitability and liquidity above. The first is that perhaps limited liability companies should be excluded since it is fairly clear a priori that, given their low rate of taxation, the effects of exemption on stimulating investment were unlikely to be significant². Suppose we now exclude them and work only with corporations. We will further stratify corporations by value of exemptions received over the period in order to discern whether firms that received larger exemptions were more likely to be stimulated. A second shortcoming of the previous analysis is that it considered the effects of exemption on profitability and liquidity separately. Let us now proceed under the assumption that if both the profitability and liquidity criteria are simultaneously satisfied for a firm, then investment *will* be considered to have been stimulated

¹ See Bilsborrow, *op. cit.*, Ch. 4C. These 22 were chosen out of about 120 on the basis of data completeness and compatibility.

² In fact, using the criteria developed in this paragraph, only four limited liability companies out of the sample of 32 were stimulated by either criterion. This is because the potential impact of exemption on the investment decision varies directly with the tax that the firm would otherwise have to pay.

Table 4 — *Effects of Exemption in Stimulating Investment of Corporations when Profitability and Liquidity Factors are Considered Simultaneously*

Total value of exemption received (1,000 pesos)	Total number corporations	Number stimulated by profit-ability only	Number stimulated by liquidity only	Number stimulated by both	Number stimulated by neither
10,000 plus	3	0	1	1	1
5,000—9,999	6	0	0	1	5
2,000—4,999	7	1	0	0	6
1,000—1,999	6	2	0	0	4
500— 999	6	0	1	0	5
100— 499	8	4	1	0	3
1— 99	7	0	1	1	5
Total ^a	43	7	4	3	29

^a Four corporations, which received no exemption because of negative profits, are excluded for obvious reasons.

by exemption; and if one of the criteria is fulfilled, but not both, then investment *may* be considered to have been stimulated. For this purpose the average firm profitability over the exempt period with and without exemption will be compared with the manufacturing average, as described above. The liquidity criterion will be based upon an f_2 of 1.00, also as discussed above. The results are summarized in Table 4. We therefore conclude our empirical work with the statement that less than one-third and possibly much less than one-third of the corporations were stimulated to invest. The distribution of the proportion of those stimulated by value of exemptions received (about the same as by size of firm) indicates that this percentage would be about the same if weighted. This conclusion, however, is based upon the economic analyses in the two previous sections and therefore subject to all the qualifications expressed therein.

All of the preceding analysis leads to one conclusion — the Colombian tax-exemption program has probably not been very effective. Even though its administration considerably reduced its effectiveness, the economic analysis above strongly suggests that, even well-administered, the program might not have been effective¹.

¹ One might inquire as to what the benefit-cost ratio (or difference) is for tax exemption. We found the ratio of investment stimulated to direct revenue loss to be less than one (around 2/3). However, this is really only a crude measure of the cost effectiveness of tax exemption, and is *not* a benefit-cost ratio. As often found in the economic literature, such ratios typically incorporate calculations of neither the "true" benefits nor the "true" costs, which should

Lessons can be drawn from the Colombian experience at two levels: first, where a government has decided upon some kind of tax-exemption program, and seeks to operate it as effectively as possible; and second, where a government is willing to consider alternative policies to exemption for achieving the same objectives. On the first level, the chances for success of a tax-exemption program (similar to the present Colombian program) can probably be increased with the following changes:

(1) The exemption system must be organized to provide prior and certain tax exemption to qualified firms. The law must be issued before the period of exemption begins, and it must spell out carefully who can qualify, and how. Firms must be able to obtain government commitments as to their tax status and the conditions which they must fulfill to maintain this status; and they must be able to get this before they begin (or expand) operations. Any subsequent annual examinations of the firm should be intended solely to check fulfillment of the conditions.

(2) The governmental organization that confers tax exemption should require from the exempt firms not only financial data of the sort we obtained to make our investigation (profits, estimated income tax liability, capital stock, depreciation, dividends, equity) but also data on output, sales, employment, and proportion of raw materials and capital goods of foreign vs. domestic origin. Only with such information is it possible to evaluate the economic effects of the exemption program (including those beyond the effects on fixed investment considered here). And without evaluation it takes on a mythical, prayerful quality.

(3) To stimulate investment the stimulus should be attached to investment and not profits. In Colombia a very profitable firm which invests little receives more exemption than a firm which makes low profits but large investment expenditures. As long as income-tax exemption is used to attempt to stimulate investment (in contrast to alternatives discussed below), the latter type of company receives little benefit. Thus it may be wise to place some kind of ceiling on the amount of exemption. In Colombia, for example, corporations should not have been exempted from the excess profits tax. In countries without an excess profits tax only income up to some fraction of shareholder equity might be exempt and the rest subject to taxation.

be measured by opportunity costs. For example, what is the cost to the economy of "investment stimulated?" To begin with, some investment that would otherwise have occurred will not now be undertaken. Determining this is not only virtually impossible, but would constitute only a first step: One would wish to calculate the benefits to society of that foregone investment (and the benefits to society of the investment stimulated), which would in turn require the determination of a large number of shadow prices. Similarly, the taxes foregone do not constitute an opportunity cost.

(4) The present exemption system has largely failed to encourage entry in thoroughly new and untried areas. Exemption alone will often be inadequate in such areas, and the government must seek other, more direct stimuli, either in addition to or in place of exemption.

(5) Since tax exemption is presumably a reward for doing something other than only making profits, the recipient firm should be subjected to conditions beyond type of product and national raw material content. For example, it might be required to prove that its production or employment had risen by a certain percentage over the previous year¹. More important, it might be required to invest an amount equal to some fraction of its tax savings². Also, income distributed as dividends might be excluded from exemption.

For tax exemption to be effective, the critical determinants of the investment decision ought to be known better than they are at present. The details of the exemption system could then be tailored to this knowledge. It is also important for a country to know what its industrialization goals are, and how exemptions can help achieve those goals. Once the goals are made explicit, however, it is likely that tax exemption will no longer appear the best policy for achieving them. For example, in Colombia, the chief purposes of exemptions appear to be: (a) to encourage investment in general, and in certain activities in particular; (b) to induce an increase in output in specific fields; and (c) to reduce imports.

Various policies that directly strive for each of these objectives are available; some illustrations are given below:

(a) To encourage investment in general³, accelerated depreciation or investment tax credits can be applied, without extensive administrative problems and without discrimination between firms. A higher tax credit could be given for companies in "basic" industries, etc. The

¹ In view of large-scale unemployment in many less developed countries, A. R. Prest suggested subsidised bases on the number of workers employed rather than on fixed investment. See his *A Fiscal Survey of the British Caribbean*, Colonial Research Studies No. 23, London, 1957, esp. pp. 28, 102. — See also J. E. Meade, "Mauritius: A Case Study in Malthusian Economics", *The Economic Journal*, Vol. LXXI, London, 1961, pp. 521 sqq., esp. p. 529. To the extent capital and labor are used in fixed proportions, the two may be equivalent.

² Of course, this does not mean that fraction would be considered to have been stimulated by exemption since the firm would certainly have invested some amount anyway. But at least such a provision would insure some minimal coefficient.

³ It is not at all obvious that this is desirable in Colombia since there is widespread excess capacity already. In fact, this excess capacity may have resulted partly from another device which subsidizes investment in general in Colombia — the favorable exchange rate for imports of capital goods.

advantage of a tax credit is that it rewards companies in proportion to their investment, not their profitability¹.

(b) To induce an increase in output in specific sectors (whose growth would not otherwise occur), direct output subsidies can be offered. These have the benefit of rewarding, not profits but production; furthermore, they offer rewards to low profit firms where exemption does not, and offer ever smaller rewards (after taxes) as firms become more profitable. In particular, to stimulate steel production it can be argued that a direct subsidy to Paz del Río would be more effective than giving tax exemption to buyers of its products².

(c) If by "basic", the government means import saving, then such a definition should be put in the law, and firms should receive status on the basis of their ability to prove net import saving. The impact of the exemption on the balance of payments could be greater if all firms

¹ Numerous articles have been published in recent years comparing various tax devices for stimulating investment on an a priori basis. See E. Cary Brown, "Tax Incentives for Investment", *The American Economic Review*, Vol. LII, 1962, Papers and Proceedings, pp. 335sq. — Richard Goode, "Accelerated Depreciation Allowances as a Stimulus to Investment", *The Quarterly Journal of Economics*, Vol. LXIX, 1955, pp. 191sq. — Robert E. Hall and Dale W. Jorgenson, "Tax Policy and Investment Behavior", *The American Economic Review*, Vol. LVII, 1967, pp. 391sq. — In fact it can be shown mathematically that tax credits for investment are likely to stimulate more investment per unit of revenue loss than other similar devices. See J. Black, "Investment Allowances, Initial Allowances and Cheap Loans as Means of Encouraging Investment", *The Review of Economic Studies*, Vol. XXVII, Cambridge, 1959—1960, pp. 44sq. On behalf of tax exemption, however, one might add that, unlike tax credits and accelerated depreciation allowances, it does not discriminate in favor of capital-intensive methods of production.

² Since the tax exemption of "basic" firms can be easily compared to various alternatives (e. g., subsidized credit or straight subsidies based on output — see Section VI), no special theoretical analysis is necessary. However, this is not true of "complementary" exemption since it has the two-fold purpose of stimulating not only the growth of "complementary" firms but also of Paz del Río. It can be shown (see R. Porter, *The Effectiveness of Tax Exemption in Colombia*, Center for Research on Economic Development, Discussion Paper No. 8, July, 1969) that the "complementary" firm gains more from the exemption system if Paz del Río costs are variable and gains more from a tax-cum-subsidy if they are fixed. Furthermore, those steel-using firms which buy less than half their raw materials from Paz del Río do not qualify for tax exemption as "complementary" and hence they (and/or their customers) are better off under the tax-cum-subsidy system, in which Paz del Río prices are (at least somewhat) lower. Similarly, "complementary" firms (1) that are not very profitable and/or (2) whose costs are very largely composed of their Paz del Río purchases, will prefer the tax-cum-subsidy system since, in the first case, loss of tax exemption costs them little, and in the second, lower Paz del Río prices are more important. Thus, the only firms that would prefer the present tax-exemption program are those that (1) are very profitable and/or (2) buy just over half their raw materials after exemption from Paz del Río. The present exemption program offers incentives only to firms that can reach the magic 50 percent Paz-del-Río-purchase level, and then it offers no incentive to exceed that level. A tax-cum-subsidy system stimulates all firms to begin to use, and use more, Paz del Río products.

were required to decrease their percentage (or, better, the total amount) of imported materials used *each year*, or forsake a certain percentage of the exemption. A simple example of such a provision would require that either the percentage imported or the value of the exemption decline by, say, five percentage points each year. This would ensure that the exemption would disappear after a fixed number of years and also impose a limit on the extent to which such import-content protection could disrupt comparative advantage¹.

There are many advantages to indirect industrial policies, not the least of which is that they use, rather than obstruct, the workings of markets and that they usually require fewer scarce administrative resources. But in the realm of tax exemptions, indirectness is no virtue. The fewer the tenuous links such policy relies on, the less likely it is to fail². Where the links between tax exemption and industrial goals cannot be tightly forged, other policies should be sought that offer inducement nearer the point where reaction is desired.

VII. Appendix: Sources of Data and Definitions of Variables

All firms, both corporations and limited liability companies, which enjoy exemptions as "basic" or "complementary" firms are required to submit to the "vigilance" of the Superintendency of Corporations. In practice this has meant only the exempt firms must annually file balance sheets and income statements with the Superintendency.

In fact, not all exempt corporations file every year. For example, for the 53 corporations which were exempt at one time or another (according to resolutions of the Ministry of Development), there should be on file 288 corporation-years of balance sheets and income statements during the years, 1960--66. Seventy-five of these — more than one-fourth — were not locatable in the archives of the Superintendency; while some were presumably lost, a large number were probably never filed. This is surprising since all corporations are required by law to file these forms every year.

¹ See Bernard Munk, "The Welfare Cost of Content Protection: The Automotive Industry in Latin America", *The Journal of Political Economy*, Vol. LXXVII, Chicago, Ill., 1969, pp. 85sqq.

² And the easier it is to know when it has failed — and this latter is no trivial consideration. This conclusion is supported by the comprehensive work of Gunnar Myrdal on South Asia where discretionary controls over the private sector have proliferated in ever-increasing fashion, with concomitant reductions in their effectiveness and administrability. See his *Asian Drama, An Inquiry Into the Poverty of Nations*, A Twentieth Century Fund Study, London, 1968, Vol. II, Ch. 10, and Vol. III, Appendix 8.

Even more surprising is the fact that the 45 exempt limited liability companies were more responsible than the corporations in filing these forms; the former even filed 35 times when they were *not* exempt (according to resolutions of the Ministry of Development). In the case of "complementary" firms, this largely reflects the fact that many firms receive this exemption without a resolution from the Ministry of Development. In the case of "basic" firms, this reflects the delay and uncertainty involved in getting exempted. The limited liability companies which were at-some-time-exempt as "basic" firms applied for exemption 69 times but (eventually) received it only 49 times, or 71 percent of the time. This lends support to the .66 figure in the text as an estimate of the probability of re-exemption.

Although the information which is filed is amazingly detailed, it is recognized that it is not always accurate or even honest¹. But to correct it would have been difficult if not impossible. Accordingly, it was decided to make no changes in the information submitted by the firms (except that reclassifications of items by the Superintendency were usually accepted).

From each firm's submission for each year, five pieces of information were taken:

E = Shareholders' "equity" (at the end of the year, excluding retained earnings of that year). This is approximately net wealth, or total assets minus current and accrued liabilities.

K = Fixed, depreciable assets (at the end of the year, valued at cost of acquisition and undepreciated).

P = Profits (after depreciation, net of provisions for corporate income taxes).

T = Provisions for that year's corporate income taxes. The sum of P and T, labeled P', is therefore before-tax profits.

D = Depreciation and other additions to reserves (i. e., cash inflows not counted as profits).

The empirical work is based on a sample of 78 of the 100 at-some-time-exempt firms (as "basic" or "complementary", according to resolutions of the Ministry of Development). Twenty-two firms were excluded because the Superintendency did not have usable records for two or more years of actual production during the 1960-66 period. The number of observations (i. e., years) per firm in the sample ranges from two to seven

¹ The data are not used to check tax declarations, import license applications, etc., but the firms cannot be sure of that.

and averages about four. The distribution of these firms between corporations and limited liability companies, and between "basic" and "complementary" firms is shown in Table A.

Table A — *Distribution of Sample Firms by Type of Exemption and Business Form*

	Number of firms in sample that are	
	"basic" ^a	"complementary"
Corporations	34	13
Limited liability companies	17	14

^a Two firms were at various times both "basic" and "complementary." They are treated throughout as "basic."

For the profitability analysis of Section IV, two profit rates are calculated: (1) the before-tax profit rate on equity, P'/E , and (2) the after-tax profit rate on equity, $(P' - H)/E$, where H is the amount of corporate taxes the firm would have paid if not exempt (i. e., the value of the exemption to the firm).

To simplify the task of calculating H , we assumed that P' was the correct income on which to base the income tax and E the correct wealth on which to base the excess profits tax. These assumptions may lead to a slight overestimate of H ¹. Further, only the two principal corporate taxes (i. e., income tax and excess profit tax) were calculated; since there are several other minor corporate taxes, this leads to an underestimate of H . These biases are both small and fortunately partially offset each other.

To calculate the before-tax and after-tax profit rates referred to in the text, the (between two and seven) observations of P'/E and $(P' - H)/E$ are simply averaged for each firm². Two comments are necessary about our calculations of profit rates. First, to the extent that the profits of exempt firms were reduced because of the adjustments they had to make to meet the (usually 60 percent) national-content requirements for exemption, their before-tax profit rates would have been higher if they had not been exempt. And second, the profits of exempt firms may have been intentionally overstated, to the extent that such firms (1) are sure they will receive exemption, (2) have accounting leeway in their profit-and-loss

¹ Since certain parts of gross income (e. g., dividend income from other corporations) and equity are exempt from income and excess profits taxes, respectively.

² Only in rare cases did this require linear interpolation over more than one year for any firm.

statements, and (3) wish to declare large profits during their exempt years in order to build up a large equity base for their later non-exempt years in which they (if corporations) would be subject to excess profits taxes ("excess" being determined by the size of the equity base). Needless to say, it is almost impossible to guess to what extent such biases exist. But we can derive some comfort from the fact the effects of the national-content requirement and any intentional overstating of profits would have opposite and hence partly self-cancelling effects on the actual firm profit rate data used.

In the liquidity analysis of Section V, use is made of D as well as P' and H to form estimates of the internal funds available to the firm; it is important to include D in the measure of internal funds because it is a source of (investible) funds just as net profits is. For the years in which there are data, a simple average of the values of D , P' , and H is calculated. The firm's average change in K , written \dot{K} , is simply the difference between K in the last year (for which there are data) and K in the first year (for which there are data) divided by the number of years between the two observations. It is these averages of D , P' , and \dot{K} that are used to calculate the f values in the text. The formulas are:

$$(A-1) \quad f_1 = \frac{\dot{K}}{P' - H + D}$$

$$(A-2) \quad f_2 = \frac{\dot{K}}{(1 - v)(P' - H) + D}$$

where v is the proportion of after-tax income paid out in dividends, or the dividend payout rate. The rationalizations for f_1 and f_2 are given in Section V of the text. Since it was not always possible to obtain data on dividends, we resorted to the following procedure: (1) where actual data was available, it was used and therefore implicitly accepted as correct (13 corporations); otherwise, (2) where ownership of firms was widespread¹ a payout rate of .5 was used (10 corporations); (3) where ownership was concentrated, .2 was used (24 corporations and all 31 limited

¹ Firms were considered as having "widespread" ownership if they had at least twenty stockholders, with no three together owning over half the stock. (This definition is partly necessitated by availability of data on ownership characteristics in the *Revista* of the Superintendency of Corporations.) In such a situation there may be an obligation on the part of the managers to distribute sufficient dividends to keep the owners satisfied. Evidence on the thirteen firms in this sample for which there were data, plus that published on members of the Bogotá Stock Exchange (*Bolsa de Valores*), indicates that our procedure is sufficiently generous. It may overstate dividends, which would further strengthen our argument in the text.

liability companies). We believe this procedure is sufficiently generous to incorporate any "obligations" to shareholders — i. e., any prior claims on otherwise potentially investible funds. While our procedure is not as precise as one would wish, the results (the differences between f_1 and f_2) are very insensitive to it (see Section V).

There are three obvious objections to our procedure for calculating the f 's. First, any comparison of a firm's internal funds and its investment presupposes a consistent theory concerning the timing with which funds are used for investment. The above procedure is not consistent on this score, but is used on the grounds that any inconsistency would generally be of small quantitative importance, and that any loss of observations about P' , D , and H would be more serious¹.

Second, the simple averaging of P' , D , and H observations (or, in the case of K , differencing) takes no account of inflation during the period; but it is not clear what account one wishes to take or even if account should be taken. The f coefficients do tell us something about the destination (fixed investment or not) of the average peso (not the average real peso) of internal funds.

Finally, all calculations are constructed from the data of years in which the firm reported to the Superintendency. It is necessarily assumed that there are no biases introduced by the absence of data for other years (or by the absence of firms for which there were insufficient records).

* * *

Zusammenfassung: Die Wirkungen von Steuerbefreiungen für Investitionen durch Industrieunternehmen in Kolumbien. — In der vorliegenden Abhandlung werden die Auswirkungen von Steuerbefreiungen in Kolumbien während der Jahre 1960–1966 untersucht, um ein stichhaltiges empirisches Beweismaterial für die Diskussion zur Verfügung zu stellen. Die grundlegende Frage ist: In welchem Ausmaß haben die Steuerbefreiungen Kolumbiens Unternehmen ermutigt, ihre Tätigkeit in industriellen Bereichen aufzunehmen (oder auszudehnen), die sie sonst nicht gewählt hätten?

Die Untersuchung ist wie folgt gegliedert: Abschnitt I gibt einen historischen Hintergrund für das Steuerbefreiungsgesetz aus dem Jahr 1960. Abschnitt II bietet eine kurze Übersicht über gewisse Verwaltungsverfahren und -probleme. Die Abschnitte III bis V enthalten die ökonomische Beweisführung und Abschnitt VI faßt schließlich diese Beweise zusammen und zieht aus ihnen die wirtschaftspolitischen Schlußfolgerungen.

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¹ When gross fixed investment was regressed on internal funds and other variables in the study of 68 Colombian manufacturing corporations (see p. 403, footnotes 2 and 3), the optimal lag structure on the internal funds variable was found to be one year. But the difference between a one-year lag and no lag was small.

Résumé: L'influence des exemptions d'impôts sur l'investissement des entreprises industrielles en Colombie. — Afin d'apporter à la discussion des preuves empiriques plus explicites, on examine dans cet article les effets qu'ont eu les exemptions d'impôts en Colombie pendant les années de 1960 à 1966. La question de base est de savoir en quelle mesure les exemptions d'impôts en Colombie ont encouragé les entreprises à entrer (ou à s'étendre) dans des domaines industriels que, sans cela, elles n'auraient pas choisis.

L'étude s'organise de la manière suivante: La Section I donne un résumé des causes historiques de la loi des exemptions d'impôts de l'année 1960. La Section II examine brièvement certains procédés et problèmes administratifs. Les Sections III à V contiennent les faits économiques. La Section VI, enfin, résume les faits et en tire les conséquences de politique économique.

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Resumen: El impacto de la exoneración de impuestos sobre la inversión industrial en Colombia. — En el presente artículo se estudia el resultado de la exoneración de impuestos en Colombia durante los años 1960—1966 con el fin de ampliar la base empírica para la discusión de este tema. Concretamente se trata de averiguar hasta qué punto las exoneraciones impositivas han inducido en Colombia a empresarios a iniciar (o ampliar) actividades en el sector industrial que en otro caso no hubieran efectuado.

En el primer capítulo, los autores recuerdan los antecedentes históricos de la ley de exoneración de impuestos del año 1960. El segundo capítulo contiene un breve sumario de diversos procedimientos y problemas administrativos. Los capítulos 3—5 presentan el análisis económico, mientras que en el capítulo sexto se resumen los resultados y se trata de sacar algunas conclusiones político-económicas.

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Riassunto: Gli effetti di esenzioni fiscali per investimenti da parte di imprese industriali in Colombia. — Nel presente saggio sono esaminate le ripercussioni di esenzioni fiscali in Colombia durante gli anni 1960—1966 per mettere un consistente materiale di prova empirico a disposizione della discussione. La questione fondamentale è: In che misura le esenzioni fiscali della Colombia hanno incoraggiato imprese ad iniziare (o allargare) le loro attività in settori industriali che altrimenti non avrebbero scelto?

L'indagine è articolata come segue: Il capitolo primo offre uno sfondo storico alla legge di esenzione fiscale dell'anno 1960. Il secondo capitolo fa una breve sintesi di certi problemi e procedimenti amministrativi. I capitoli terzo fino al quinto contengono la deduzione delle prove economiche ed il capitolo sesto infine riassume queste prove e ricava da esse le conseguenze di politica economica.