

Latin American Business Review

ISSN: 1097-8526 (Print) 1528-6932 (Online) Journal homepage: http://www.tandfonline.com/loi/wlab20

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To cite this article: Marcos Costa Holanda & Francis Carlo Petterini (2007) Industrial Development from Tax Incentives: With Special Application to Ceará, Latin American Business Review, 7:3-4, 181-194, DOI: 10.1300/J140v07n03_08

To link to this article: http://dx.doi.org/10.1300/J140v07n03_08

Published online: 12 Oct 2008.

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Industrial Development from Tax Incentives: With Special Application to Ceará

Marcos Costa Holanda
Francis Carlo Petterini

SUMMARY. This work seeks to show that a fiscal incentives policy should be based on an analysis of both costs and benefits. When such an analysis is well-prepared, fiscal incentives can be a strong policy for industrial development. In order to illustrate the logic of this reasoning, the case of recent industrial development in the Brazilian state of Ceará is analyzed.

RESUMEN. Este estudio busca demostrar que una política de incentivos fiscales debe basarse en el análisis de costos y beneficios. Cuando el análisis se traza correctamente, los incentivos fiscales pueden convertirse en una poderosa política de desarrollo industrial. Para ilustrar la lógica de este razonamiento, se analiza el caso del reciente desarrollo industrial ocurrido en el estado brasileño de Ceará.

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[Haworth co-indexing entry note]: "Industrial Development from Tax Incentives: With Special Application to Ceará." Holanda, Marcos Costa, and Francis Carlo Petterini. Co-published simultaneously in *Latin American Business Review* (International Business Press, an imprint of The Haworth Press, Inc.) Vol. 7, No. 3/4, 2006, pp. 181-194; and: *Latin American Business: Equity Distortion in Regional Resource Allocation in Brazil* (ed: Werner Baer, and Geoffrey Hewings) International Business Press, an imprint of The Haworth Press, Inc., 2006, pp. 181-194. Single or multiple copies of this article are available for a fee from The Haworth Document Delivery Service [1-800-HAWORTH, 9:00 a.m. - 5:00 p.m. (EST). E-mail address: docdelivery@haworthpress.com].

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doi:10.1300/J140v07n03_08

RESUMO. Este trabalho procura mostrar que uma política de incentivos fiscais deve ser baseada na análise de custos e benefícios. Quando bem desenhada esta análise, os incentivos fiscais podem ser uma forte política de desenvolvimento industrial. Para ilustrar a lógica deste raciocínio é analisado o caso do recente desenvolvimento industrial no estado brasileiro do Ceará. *[Article copies available for a fee from The Haworth Document Delivery Service: 1-800-HAWORTH. E-mail address: <docdelivery@haworthpress.com> Website: <http://www.HaworthPress. com> © 2006 by The Haworth Press, Inc. All rights reserved.]*

KEYWORDS. Industrial development, tax incentives, market failures

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1. INTRODUCTION

The present federal government tax reform proposal has revived an old debate about tax incentives in Brazil. Unfortunately, this debate has concentrated on "allow" or "do not allow" tax incentives in the country's states, while important points like the efficacy, efficiency and fiscal sustainability of these incentives have been regarded as being of secondary importance.

Contrary to what some may think, tax incentives are not "free money" from the government to firms, nor are they "corporate welfare" (Hartzheim, 1997). Actually, when they are well designed and well implemented, tax incentives play an important role in correcting market failures (Barro and Sala-I-Martin, 1992; Laffont and Tirole, 1993; Nogueira, 2002).

We can point out at least two types of market failures that may be corrected. The first one is related to the absence of a well-defined national policy for compensating for the unequal distribution of production factors and income among the country's states.

The second one is related to the inability of the market to price the positive externalities created by private investments. For many investments, there are other benefits besides those priced by the investor. These additional benefits are transmitted to the region, but they are not considered in the private investment decision. In this case, the tax incentive is simply the state's pricing of the social benefits created by the investment.

The validity of tax incentives for attracting investments is defined the same way as the validity of the investments themselves, which are based on costs-benefits analysis.

For the state, the benefits are the positive externalities created by these investments (jobs, technology absorption, attraction of productive

factors to the region, taxes, new markets, etc.). On the other hand, costs would be the amount of taxes forgiven and direct costs such as land donation, personnel training, etc.

Therefore, the main point is not "allow" or "do not allow" tax incentives, but to establish rules for "grant" or "do not grant" incentives for a specific investment. Furthermore, once this decision is made, it is necessary to define how they will be given and how much.

The decision on how to grant incentives should be based on some variables that are correlated with the capacity of the investment to generate positive externalities. The decision on how much to grant should be based on an analysis of the social benefits and the costs of the incentive. The costs are reflected mainly in the government's renouncement of its taxes. The private investments, job creation and technological innovation reflect the benefits.

From the above explanation, the reasoning for not allowing tax incentives in order to avoid a "fiscal war" between states is very simplistic. Other factors should be taken into consideration before condemning the tax incentives given by states.[1]

In the next section, we present the economic logic for tax incentives, and also an analytic model that enables evaluating a tax incentive program. This model is utilized in an empirical evaluation of the state of Ceará's tax incentive program in Brazil.

2. THE LOGIC OF TAX INCENTIVES

The decision to grant tax incentives always involves a trade-off between fiscal costs and economic benefits.[2] For the sake of analysis, let us consider the state's value-added tax. In Brazil this tax is called the ICMS (Value-Added Tax on Sales and Services), which may be regarded as being comprised of three parts. The first part could be called the *Pure ICMS* (ICMSP), which is the tax paid by companies that are not participants in the tax incentive program. The second one could be called the *Foreign ICMS* (ICMSF), which is the tax paid by foreign company participants in the program, and the third and last one could be called the *Local ICMS* (ICMSL), which is the tax paid by local company participants in the tax incentives program.

Only companies that do not receive tax incentives pay the entire ICMS. The other companies, which do receive tax incentives, pay less ICMS.

As showed in Diagram 1, "C" is the group of companies located in the state. These companies are classified into two groups. Sub group

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"C*" represents the companies which are local but which receive tax incentives. They generate ICMSL, while the others generate ICMSP. The group classified as "A" includes companies from other states and other countries that are attracted by the tax incentive program–they will generate ICMSF. Finally, Group "B" entails companies within the state that migrate because they are attracted by other state programs. These companies used to generate ICMSP.

We can observe that the companies included in Group "A" should not have a negative impact on the state's net collection of taxes. The ICMSF paid by them is less than the ICMSP but they did not come into existence until the creation of the tax incentives program and the attraction of the foreign firm. On the other hand, companies in Group "C*" have a negative impact on the state's collection of taxes, since they pay tax on incentives, the ICMSL, but not the ICMSP.

The basic logic for renouncing fiscal revenues is that attracting new investments will improve the economy's dynamics, which will in turn allow for high growth and high consumption in the future. This leads us to the following two questions: How much of the ICMS can be renounced? Which companies will receive incentives and in what amount?

Taking into consideration that the ICMS is the state's main source of tax revenue, the incentives are restrained by the net revenue needed to finance the state's budget. In the state of Ceará, the renouncement of the ICMS has a limit of 10% of the total collected during a fiscal year. Regarding the second question, the state has created a scoring system to define the tax incentives (See Dias, Holanda and Amaral Filho, 2003). This system defines the amount of tax credit based on variables such as the value of the investment, job creation, location, and inputs purchased from local firms.

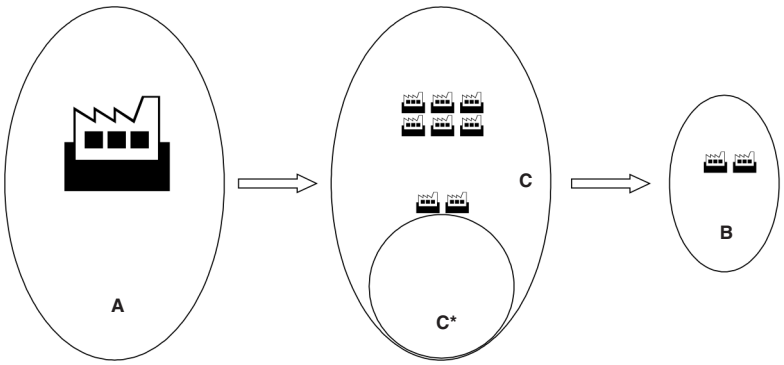
There is furthermore a third question, and we can use the example of Ceará to answer it empirically. In the analysis of Diagram (1), the dynamics of the *Pure ICMS* after the movement of firms in and out of the state is not clear. Is the ICMSP positively or negatively affected by the fiscal renouncement? After the incentives are granted, is there an increase in the ICMSP that can compensate for the fiscal renouncement? That is, is the program fiscally sustainable?

To answer this question, monthly series of ICMSP, ICMSL and ICMSF were analyzed for the period from January 1995 through May 2003 (see Graph 1). The series are in Brazilian Reals and are stationary in level.[3]

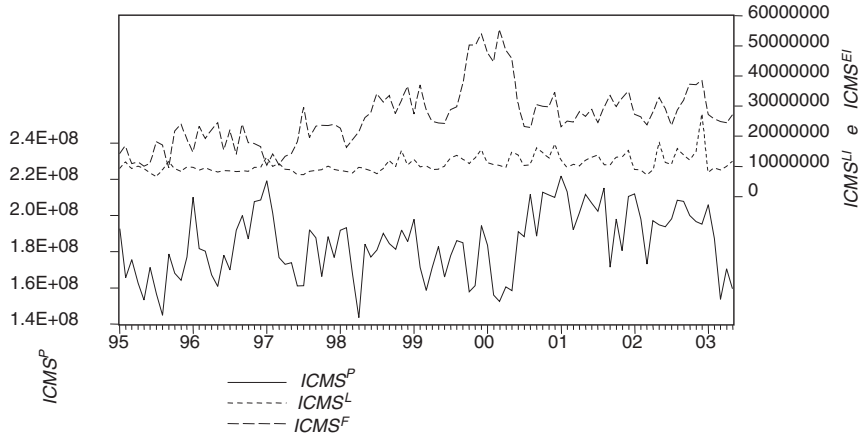
From these series, a VAR can be estimated and the following impulse–response analysis can be established: (1) Does a positive shock in

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DIAGRAM 1



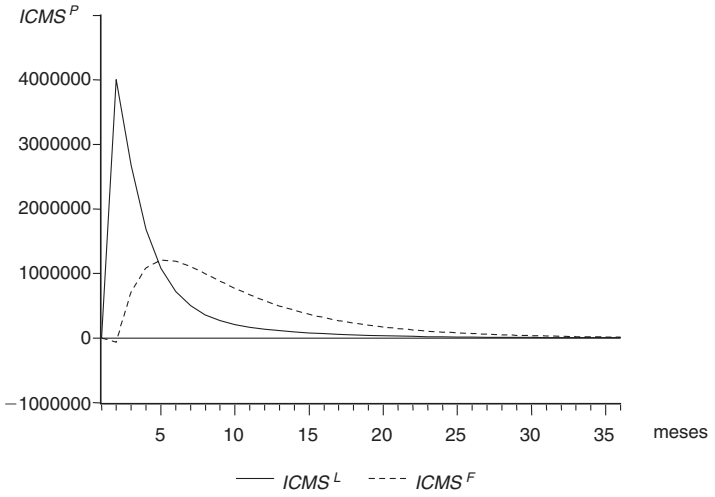
GRAPH 1



the ICMSL make the ICMSP respond positively? (2) Does a positive shock in the ICMSF make the ICMSP respond positively? The answer to both questions is yes, as illustrated in Graph 2.

The impulse–response analysis shows that the *ICMSP* is positively affected by the fiscal renouncement. It also shows that the answer of the

GRAPH 2. *ICMS*^{P} Reaction to a Standard Deviation in *ICMS*^{L} and *ICMS*^{F}



ICMSP to a shock in the *ICMSF* has a higher level of persistency than that to a shock in the *ICMSL*. This fact may be linked to the higher capability of foreign companies to create positive externalities.

3. AN ANALYTICAL MODEL

In general, tax incentive programs follow the same logic. A company pays an amount of taxes, herein defined as ICMS *f*. From this amount paid to the state, the company has a restitution of "$\alpha_f \times \text{ICMS}_f$" ($\alpha_f \in [0,1]$) as a non-refundable loan.

Defining the balance of the program (S) as the difference between benefits and costs, and dividing the foreign companies by their national or international origin we have:

$$S = \sum_{i=1}^{3} S_i \qquad i = \text{State, Brazil, World} \tag{1}$$

The firms that originate from the state are local companies; from Brazil, they are companies from other states; and from the World, companies from other countries. The balances are defined by the difference

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between the benefits and costs created by each firm that receives the tax incentives.

Assuming that the state would renounce part of the ICMS as a non-refundable loan, two benefits are defined by the program. The first one is denominated Cash *(Ci)* and represents the net amount of ICMS paid to the state by the firm. The second benefit is denominated Amplified Benefit (*Bi*). It represents the benefits created by the investment such as jobs, technology, new ICMS (for example, taxes resulting from the electricity the new companies will consume), etc.

On the other hand, two costs are defined. The first one is denominated Loan *(Li)* and represents the ICMS amount that the firm does not pay to the state. The second cost is called Expenditures *(Gi)* and represents other costs the state incurs with the program (personnel training, land donation, etc).

Each balance may be represented with the following equation:

$$S_i = C_i + B_i - L_i - G_i \tag{2}$$

Now, we will define the structure of each component of (3). The *Cash* variable may be defined as the following equation:

$$C_i = \left(1 - \alpha_i\right) \times ICMS_i \tag{3}$$

Observe that $(1 - \alpha_i)$ is the marginal tax paid by the firm attracted to the program and it is limited to between zero and one.

The *Amplified Benefit* is a function of a vector Γ of benefits brought to the state by the program and the ICMS, as expressed in (4):

$$B_i = f_B\left(\Gamma, ICMS_i\right) \tag{4}$$

The variable *Loan* comes directly from (4) and is expressed in (5):

$$L_i = \alpha_i \times ICMS_i \tag{5}$$

The *Expenditure (Gi)* is defined as a function of a vector Ω of various costs related to the program and the ICMS, as expressed in (6):

$$G_i = f_G\left(\Omega, ICMS_i\right) \tag{6}$$

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Placing definitions from (3) to (6) into equation (2) and assuming that the tax incentives program is only valid if all partial balances of (2) are positive, we get to the following condition:

$$S_i > 0 \quad e \quad \frac{\partial S_i}{\partial ICMS_1} > 0 \quad \Leftrightarrow$$

$$\frac{\partial f_B}{\partial ICMS_i} - \frac{\partial f_G}{\partial ICMS_i} > \alpha_i - (1 - \alpha_i) \qquad \forall\, i \qquad (7)$$

$$BLMg > CLMg$$

Equation (7) means that the program is only valid if its Net Marginal Benefit (*BLMg*) is larger than its Net Marginal Cost (CLMg). The validity of the tax incentive program is defined by the relationship between cost and benefit, like any other public or private investment.

In (7), the left side defines the Net Marginal Benefit of the program (*BLMg*) and the right side the Net Marginal Cost (*CLMg*). The sign of *BLMg* may not be observed in the short run, but as the program progresses into maturity it would be revealed. The *CLMg* represents how much income the state renounces with an infinitesimal increase of ICMS generated by the firm. It is observed in the short run.

A key point here is that while the costs of the tax incentive program can be observed in the short run, the benefits cannot. Therefore, there is an implicit risk in any tax incentive program.

4. THE PROGRAM OF THE STATE OF CEARÁ

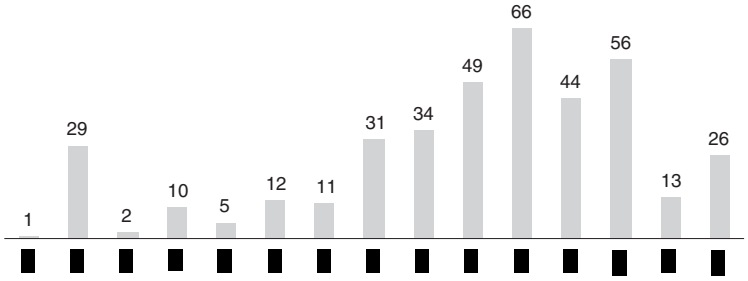
The Ceara tax incentive program is operated through a fund called the Industrial Development Fund (FDI), which was created in 1979 to promote the development of certain industrial activities in Ceará. Its basic role is to finance the program's subsidized loans.

Since then, the FDI has proven quite effective in attracting companies to the state (Graph 3).

Presently the FDI has three types of programs: PROVIN, directed to industrial firms; PROAPI, directed to exporting firms; PDCI, directed to retail firms.

Table 1 shows disbursements by program and by origin of firms contracted.

GRAPH 3. Number of FDI Contracts Signed Per Year



Source: Economic Development Secretariat of the State of Ceará

TABLE 1. Firms Contracted by the FDI

YEAR	ORIGIN OF FIRM CONTRACTED %							TOTAL
	Ceará		Rest of Brazil			Rest of world		
	PROVIN	PROAPI	PROVIN	PROAPI	PDCI	PROVIN	PROAPI	
1995	39.43	-	55.89	-	-	4.68	-	100
1996	29.98	-	66.11	0.32	-	3.60	-	100
1997	31.18	0.05	61.88	3.46	0.99	2.44	-	100
1998	26.65	0.44	64.07	5.98	0.37	2.48	-	100
1999	25.65	0.22	64.13	6.79	0.29	2.03	0.88	100
2000	25.29	0.01	62.12	6.63	0.17	2.42	3.36	100
2001	24.40	0.04	55.58	10.55	0.34	3.55	5.53	100
2002	24.75	0.01	56.72	9.31	0.09	3.48	5.63	100

Source: Economic Development Secretariat of the State of Ceará.

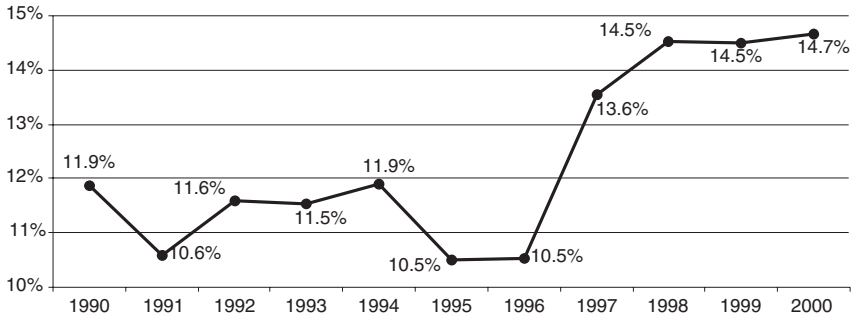
The main industrial sectors that have received incentives are as follows: Shoes and Leather–20.4% of total contracts; Clothes and Accessories–14.9%; Textiles–10.1%; Food and Beverages–9.7%; Chemical Products–8.5%.

As per geographic distribution, 70% of all the companies are located in the metropolitan area of Fortaleza (Ceará's capital).

Graph 4 presents the behavior of the gross private capital formation in Ceará in relation to its PIB for the 1990s. Notice that from 1990 through 1996 this variable oscillated between 10.5% and 12% of PIB, expanding to 14.7% in the year 2000.

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GRAPH 4. Gross Private Capital Formation in Relation to PIB–Ceará



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From the behavior presented in Graph 4, it is possible to conclude that FDI does not negatively affect gross private capital formation in Ceará. On the contrary, as the largest contracts were signed between 1995 and 1996, and since it takes around two years to convert such contracts into production, it seems the incentives have contributed to Ceará's capital accumulation.

Notice that the way tax incentives contribute to economic welfare is by increasing future consumption. This is achieved when the net total investment of the economy increases.

Table 2 presents the ICMS subsidized loans, private investments and jobs created by the FDI in the period 1995-2002.

Table 2 shows that Ceara's tax incentive program generated over three billion Brazilian Reals in investments and created more than 57 thousand jobs in the period of 1995-2002.[4]

The amounts expressed in Table 2 also allow us to deduct the cost of creating jobs through the FDI. Observe that the state renounced taxes of R$ 2,371 million to generate 57,335 jobs over the eight-year period. This is equivalent to R$ 5,170 or US$ 1,720 per year per employee (around 2 Brazilian minimum wages per month). On the other hand, the private sector invested R$ 3,148 million to generate these same jobs. This is equivalent to R $6,900 or US$ 2,300 per year per employee (around 2.4 Brazilian minimum wages per month).[5]

A direct benefit of the tax incentives can be estimated from the income these jobs generate. Table 3 reveals the expenditure profile of Ceara's families by type of expense. Knowing this profile and knowing that an

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TABLE 2. *ICMS Subsidized Loans*, Private Investments and Jobs Created–R$ 1,000.00

		1995	1996	1997	1998	1999	2000	2001	2002	1995-2002 (Total)
Ceará	ICMS	111.4	106.1	111.2	115.1	137.5	151.8	143.9	157.7	1,034.7
	Sub. Loans	69.2	66.6	71.5	79.0	99.9	108.4	102.7	110.1	707.4
	Investment	33.4	19.4	109.2	119.0	1,039.4	11.7	11.9	394.6	1,738.6
	Jobs	1,214	843	5,650	3,709	3,686	3,571	1,351	1,060	21,084
Brazil	ICMS	180.5	227.9	215.6	308.9	385.4	397.6	270.7	292.7	2,279.3
	Sub. Loans	97.4	146.6	143.8	190.9	249.9	268.1	235.0	254.6	1,586.3
	Investment	94.6	61.5	113.8	475.5	67.4	230.6	0.3	302.1	1,345.8
	Jobs	343	5,746	6,320	15,957	2,734	2,219	126	1,339	34,784
World	ICMS	11.4	10.8	7.4	9.7	10.3	13.6	18.7	19.4	101.3
	Sub. Loans	8.2	7.9	5.6	7.3	7.9	10.3	14.9	15.5	77.6
	Investment	3.1	24.7	0	3.8	11.9	19.9	0.8	0	64.2
	Jobs	108	560	0	269	157	343	30	0	1,467
Total	ICMS	303.3	344.8	334.2	433.7	533.2	563.0	433.3	469.8	3,415.3
	Sub. Loans	174.8	221.1	220.9	277.2	357.7	386.8	352.6	380.2	2,371.3
	Investment	131.1	105.6	223.0	598.3	1,118.7	262.2	13.0	696.7	3,148.6
	Jobs	1,665	7,149	11,970	19,935	6,577	6,133	1,507	2,399	57,335

Source: Economic Development Secretariat of the State of Ceará.

TABLE 3. Type of Expenditure in the Total Budget and Its Respective ICMS Rate

Type of Family Expense	Percentage of each expense in the Family Budget %	ICMS rate charged over each expense %
Food	38.04	7.00
Housing	14.63	17.00
Household goods	6.27	17.00
Clothing	6.21	17.00
Transportation	14.39	8.13
Health and personal grooming	8.54	17.00
Personal expenses	6.79	2.93
Education	3.01	1.55
Communication	2.12	17.00
Average ICMS Rate %		10.5%

Source: IPECE, IBGE

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ICMS rate is charged on each expenditure, we can estimate the amount of ICMS that is generated when this income goes to consumption.

Therefore, 10.5% of the payroll generated by the jobs created by the tax incentive program returns to the state's treasury. This amount will reduce the fiscal loss generated by the program. As pointed out earlier, the CLMg differs from the BLMg, because it can be observed and estimated in the short run. Observe that the loans from FDI are the sum of the ICMS generated by each one of the *F firms* multiplied by the established incentive rate ($\alpha_{f,i}$). Suppose there is one representative rate (α_i). The loans for firm *i* in period *t* is equal to this rate multiplied by the total ICMS generated by the firm, added by a random term ($u_{i,t}$), as described in (8).

$$L_{i,t} = \sum_{f=1}^{F} \left\{ \alpha_{f,i} \times ICMS_{f,i,t} \right\} = \alpha_i \times ICMS_{i,t} + u_{i,t} \tag{8}$$

Based on the estimate of Equation (8), and taking into consideration the concepts discussed in the former section, Table 4 presents the CLMg, α-(1-α), and the tax incentive rate ($\hat{\alpha}$) for the FDI.

We can observe in Table 4 that in general the *CLMg* increases until 1999. From there the estimated *CLMg* stabilizes at R$0.30 per R$1.00 of ICMS in the case of local companies, at R$0.60 per R$1.00 of ICMS in the case of outside firms from the world, and at R$0.80 per R$1.00 of ICMS in the case of outside firms from Brazil. The latter says that the

TABLE 4. FDI: *RLMg* and α Estimated by Origin of Firm

YEAR	CEARÁ		BRAZIL		WORLD	
	CLMg	α	*CLMg*	α	*CLMg*	α
1995	0.07	0.54	−0.54	0.23	0.50	0.75
1996	0.07	0.54	−0.24	0.38	0.50	0.75
1997	0.12	0.56	−0.22	0.39	0.59	0.80
1998	0.21	0.61	−0.12	0.44	0.59	0.80
1999	0.31	0.66	−0.02	0.49	0.60	0.80
2000	0.30	0.65	0.80	0.90	0.62	0.81
2001	0.29	0.65	0.80	0.90	0.63	0.82
2002	0.27	0.64	0.80	0.90	0.64	0.82
2003	0.31	0.66	0.80	0.90	0.63	0.82

tax incentive to outside firms from Brazil is equivalent to 80% of the tax due.

These results show that, as expected, it takes fewer incentives to attract local firms than to attract outside firms.

Observe that it is cheaper to attract firms from other countries than from other states. This probably happens because in foreign firms' planning the tax incentive is the least important factor in their decision to invest.

5. CONCLUDING REMARKS

This paper has aimed to contribute to the tax incentive debate. In Brazil, this debate focuses on the dilemma "allow" or "do not allow" the incentives by the states to avoid the so-called "fiscal war."

The fiscal war argument tends to look only to the fiscal costs of the program. From a state's point of view, however, what matters is the balance of benefits and costs of the program.

An empirical analysis of the state of Ceara's tax incentive program was performed. The data showed that since its advent, private gross capital formation in the state has increased. It was observed that the program generated over three billion Brazilian Reals in private investments and around 57 thousand direct jobs.

Regarding costs, it was verified that the incentives could average up to 80% of the tax due.

It should be pointed out that tax incentive policies such as the one developed by the state of Ceará originated from the lack of a well-defined national policy for regional development.

As discussed, it seems extremely simplistic to condemn the incentives only to avoid the "fiscal war." Usually, private investments create significant positive social benefits that should be priced. Tax incentives are no more than the state recognizing and pricing these benefits.

In sum, instead of condemning tax incentives, the more reasonable approach is to find ways to validate these incentives as instruments of a national regional development policy. The issue should not be "condemn" or "do not condemn" the tax incentives, but how to structure regional development policies based on tax incentives.

NOTES

1. For empirical investigations on tax competition in Brazil see Holanda (2001) and Mendes (2000).

2. For an extensive survey on the literature of tax incentives see Buss (2001).

3. The stationariness was tested using the Dickey and Fuller technique (see Patterson, 2000), utilizing variables in level, intercept and level of significance of 5%.

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4. These figures were given by the State Secretariat. They were not audited.

5. Considering the Brazilian Real/US Dollar exchange rate of 3:1 as in November 2004.

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doi:10.1300/J140v07n03_08

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