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### Fiscal Incentives and Regional Development Projects: Mercedes-Benz in Juiz de Fora (MG)-Brazil 1996/1999

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# Fiscal Incentives and Regional Development Projects: Mercedes-Benz in Juiz de Fora (MG)– Brazil 1996/1999

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**SUMMARY.** The principal aim of this paper is to analyze the Mercedes-Benz project in the municipality of Juiz de Fora (Minas Gerais state). This will be accomplished in two ways. First we will analyze the use of fiscal incentives, at both the state and municipal level, which were used in the negotiation with Mercedes-Benz Corporation. Second, through an input-output exercise we will measure the impact of the Mercedes-Benz unit upon the other productive sectors located in Juiz de Fora, the rest of Minas Gerais state and the rest of Brazil. It is important to emphasize that we will measure these impacts in two steps: (a) the construction of the production unit: we will use the fiscal incentives (e.g.,

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budget benefits) offered to Mercedes-Benz (1996), and (b) the forecast production for the first year of operation: we will use the forecast of Class A production—40,000 units for 1999—to implement the shock.

**RESUMEN.** El principal propósito de este estudio consiste en analizar el proyecto de Mercedes-Benz en la municipalidad de Juiz de Fora (Estado de Minas Gerais), que se ejecutará desde dos enfoques. Primero, analizaremos el uso de los incentivos fiscales, tanto al nivel del estado como de la municipalidad, que se utilizaron durante la negociación con la corporación Mercedes-Benz. Segundo, a través de un ejercicio de entrada-salida, mediremos el impacto que la unidad de Mercedes-Benz tendrá sobre otros sectores productivos que operan en Juiz de Fora, y el resto del Estado de Minas Gerais y Brasil como un todo. Consideramos importante hacer hincapié que realizaremos dichas mediciones en dos etapas: (a) la construcción de la unidad de producción: cuando utilizaremos los incentivos fiscales (Ej.: beneficios presupuestarios) ofrecidos a Mercedes-Benz (1996), (b) producción estimada para el primer año de funcionamiento: cuando utilizaremos las proyecciones elaboradas para una producción Clase A—40.000 unidades para 1999 para calcular el impacto del cambio.

**RESUMO.** Este estudo tem por objetivo principal analisar o projeto da Mercedes-Benz no município de Juiz de Fora (Minas Gerais). Isto será implementado de duas maneiras. Primeiro analisaremos os incentivos fiscais, nos níveis estadual e municipal, que foram usados na negociação com a Mercedes-Benz Corporation. Segundo, através de um exercício de entrada-saída, mediremos o impacto da unidade da Mercedes-Benz sobre os demais setores produtivos localizados em Juiz de Fora, o resto do estado de Minas Gerais e o resto do Brasil. É importante enfatizar que mediremos esses impactos em duas etapas: (a) a construção da unidade de produção: usaremos os incentivos fiscais (por exemplo, benefícios orçamentários) oferecidos à Mercedes-Benz (1996); (b) produção prevista para o primeiro ano de operação: usaremos a previsão de produção de Classe A—40.000 unidades para 1999—para implementar a mudança. doi:10.1300/J140v07n03\_03 [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.** Input-output, Mercedes-Benz case and fiscal incentives

## 1. INTRODUCTION

The principal aim of this paper is to analyze the Mercedes-Benz project in the municipality of Juiz de Fora (MG). This will be accomplished in two ways. First we will analyze the use of fiscal incentives, both at the state and municipality level, which were used in the negotiation with Mercedes-Benz Corporation. Second, through an input-output exercise we will measure the impact of the Mercedes-Benz unit upon the other productive sectors located in Juiz de Fora, the rest of Minas Gerais state and the rest of Brazil. It is important to emphasize that we will measure these impacts in two steps: (a) the construction of the production unit: we will use the fiscal incentives (e.g., budget benefits) offered to Mercedes-Benz (1996); (b) a forecast of production for the first year of operation: we will use the forecast of Class A production—40,000 units for 1999 to implement the shock.

The paper is presented as follows: after the introduction, the second part presents a brief history of the fiscal incentives used by the state of Minas Gerais to promote regional development; the third part presents an analysis of the recent period of Minas Gerais's fiscal incentives and of the Juiz de Fora fiscal incentives; the fourth part contains an analysis of the Mercedes-Benz project, and the fifth part presents some conclusions.

## 2. FISCAL INCENTIVES IN THE STATE OF MINAS GERAIS

### 2.1. First Period (1969-1985)

The use of fiscal instruments to attract investments at the state level is not a recent phenomenon. In Minas Gerais, the policy of fiscal and financial incentives began in 1969. Law 5261 made the state sales tax "ICM" the principal instrument for promoting the industrialization process. The main objective of this law was to use 40% of the sales tax (ICM) generated in the following manner: (a) 25.6% was to be used as compensation for the investments made in the state for firms that had their process approved; (b) 4% was to go to the Minas Gerais state development bank; and (c) 2.4% was to go to the João Pinheiro Foundation in order to finance institutional research. The firms that were able to benefit from the law were those that had opened a new industrial plant in the state and those that upgraded their output without decreasing the existing levels of production (Oliveira and Duarte Filho, 1997).

It is important to emphasize that in 1973 Law 6196 was implemented in order to maximize the impact of the state's fiscal incentives policy. The projects that took advantage of this law were those that were given high priority. Such priority was evaluated according to the following criteria: the value of the projected investment, the importance of the investment to the de-concentration of economic activities in the state, the integration of the productive structure, the use of raw materials and regional inputs and, finally, the employment created in specific areas.<sup>1</sup>

The restrictions imposed by the federal government for using the state sales tax "*ICM*" as an incentive instrument to promote industrialization (Law 24/75) induced the Minas Gerais state government to adopt new fiscal incentives programs. Among these programs we can highlight the Fund for Industrialization (FAI), which was established by Law 6875/76. The FAI was a fund that had the state's budget as its principal source of financial support. New plants and improvement in existing industrial plants are supported by the fund.

In 1983 the state created the Social and Economic Development Fund (FUNDES), whose purpose was to integrate all of the state's financial programs. The sources of financial support for this fund were: (a) a budget endowment; (b) resources from credit operations, both internal and external; (c) a fixed share from taxes levied by the Union that were to be transferred to the state; (d) yields from temporary investments and from state financial resources; and (e) interest and other resources from funding and from investment income bonds.

In August 1985 the state government created the "GT-Incentives" for companies that settled in the state, enabling them to possibly increase the time period they needed to pay the state sales tax (*ICM*), and it also offered some tax alleviation to companies that bought raw materials within the state.

## **2.2. Second Period (1989-1993)<sup>2</sup>**

The second period of fiscal incentives policy in Minas Gerais was initiated in 1989 with the implementation of the Pro-Industry program. This period was characterized by a lack of concern about the spatial and sectoral problems incurred during the process of development. In other words, the sole aim was to promote the state's industrial growth. The principal instrument that the Pro-Industry program used for promoting development was to increase the term of payment of the state sales tax (*ICMS*) by companies that opened a unit or increased their productive capacity in the state.

In 1993, with the introduction of law 34.504, the PROIM (Program of Industrial Modernization) was created. Its objectives were: (a) the development and modernization of priority sectors and (b) the funding of high-tech companies and key sectors.

### **3. RECENT REGIONAL DEVELOPMENT STRATEGIES**

#### **3.1. State Strategies**

The strategies for promoting industrial development, and which were implemented after 1994 by the state of Minas Gerais, had the Integrated Development Plan for Minas Gerais (PMDI) as their principal instrument. The objective of this plan was the transformation of the Minas Gerais economy through: (a) structural programs, (b) public policies and (c) priority sectoral programs. The plan was based on the adoption of public policies both in the social area (health, education, etc.) and in the development of infrastructure (for industry and trade, science and technology, and urban and regional development). Thus, the plan's aim was to enhance the region's endogenous capacity and also to promote investments in a specific sub-region (e.g., Mercedes-Benz) (PMDI, 1994).

In other words, the PMDI was a plan that brought together all social agents (e.g., government, non-governmental organizations) in order to maintain the growth process of the most developed regions and also to improve the development process of the poorest ones. (Perobelli et al., 1997).

The expected result was an increase in the state GDP and, as a consequence, an improvement in the state per-capita income. In spatial terms, the plan had as an objective the promotion of industrial development towards the periphery, in other words, the promotion of a de-concentration in the Belo Horizonte metropolitan area (PMDI, 1994).

##### **3.1.1. Fiscal Instruments**

To guarantee that the new state development strategy was implemented, the fiscal instruments underwent some changes. Among these changes, the most important was Law 11.393 (Industry Incentive Fund—FIND). This fund entailed all the legislation of the Pro-Industry program and the PROIM (Induction of Industrial Modernization Program). The main modifications in those programs were:

- *Pro-Industry–Industry Diversification and Integration Program*

- a. funding working capital from 50% to 70% of state sales tax “ICMS” paid monthly, with an exemption of 12 to 36 months and a term of 5 to 10 years;
- b. implementing an inflation adjustment: IGP-M (Brazilian inflation index) with a reduction of 50% to 82%, depending on the region:
  - \*50%-Metropolitan area of Belo Horizonte, southern region and the Mineiran Triangle;
  - \*60%-Zona da Mata, central region, Alto Parnaíba and the Midwest;
  - \*70%-Northwest, North and Vale do Rio Doce;
  - \*82%-bacias dos rios Jequitinhonha, São Mateus and Mucuri;

- *PROIM–Industrial Modernization Program*

- a. Funding of fixed investments of up to 50% of the total investment forecast for the project, with a grace period of 36 months and an amortization of 60 months after the end of the grace period.

In 1996, with the increase in competition among Brazilian states for new investments, Minas Gerais introduced modifications to FIND. Among these modifications we can highlight the creation of the Strategic Industries Development Fund. (FUNDIEST).

- *The Strategic Industries Development Fund (FUNDIEST)*

This fund was created by Law 12.228/1996. Its objective was to give financial support for the development of specific sectors in the state. Among the programs that formed the fund we can highlight: (1) a program for funding support for the opening of strategic industries (Pro-Industry). This program can be characterized by: (a) the inclusion of sectors that would receive benefits: automobile and electronics, and (b) the funding of working capital up to 70% of the state sales tax “ICMS” debt, with an exemption of 36 to 120 months, and with a 10 year payment term (in 120 payments). These funds were to be made available to enterprises that made fixed investments of a minimum of R\$150 million and created 500 direct jobs; (2) a program for agricultural industries (Pro-Agriculture); and (3) a program to improve the commercialization of strategic industries.<sup>3</sup>



### 3.2. Municipality Strategies

In recent years, the city of Juiz de Fora has had the General Plan of the Municipality as a principal instrument for its development. This plan was intended to stimulate the economic development of Juiz de Fora by increasing the city's income and employment. The plan contained three steps: (a) the diagnosis phase (potential development sectors and bottleneck areas that could have a negative impact on the development process), (b) the placing of the development of the municipality into a broader perspective and (c) the construction of development scenarios (Bastos, 2000).

#### 3.2.1. Fiscal Instruments

The set of policy instruments used to stimulate the development of the municipality can be divided as follows:

- *Municipal Fund for the Development of Strategic Industries (FMDI)*. This fund was set up by Municipal Law 8.914/1996. It provides working capital for the development of economic activities that improve income and employment in the municipality, and it also aims to improve inter-sectoral interactions.
- *Law 7.771*. This law entails an exemption from municipal taxes: Municipal Property Taxes (IPTU), Municipal Service Taxes (ISS) and Municipal Transfer of Property Taxes (ITBI) spread over 10 years for firms that establish a plant in an industrial district. For those firms that open units outside the districts, the municipality will decide on tax exemptions on a case-by-case basis.
- *Law 8.717*. This law created the Municipal Development Fund. The principal source of this fund is the FAT (Transfer from Federal Government). This fund is for the improvement of micro and small companies in the municipality, and the resources will be used to buy equipment and provide working capital. The benefits will be for the industry, trade, service, technology-intensive sectors and agriculture. The limit for funding is R\$ 50,000 and it must be repaid in 36 months at an interest rate of 8%.

## 4. THE MERCEDES-BENZ CASE

### 4.1. Contractual Aspects

The contract for the opening of the plant (Mercedes-Benz, 1996, pp. 2, 37-38) affirms that: "*Mercedes has the following obligations: (1) to*



*make a fixed investment of a minimum of R\$ 400 million; (b) to create direct employment, giving preference to local workers (. . . ) reaching 1,500 direct jobs.” The contract also obligates Mercedes-Benz:*

*(. . . ) to make all efforts to buy inputs and business services, including the use of architectural firms and contractors, located in Minas Gerais. Sellers of inputs and business services will be chosen by Mercedes after an evaluation of the following factors: product and service quality and technology; the economic and financing situation of the input seller, product or service price. However, quality and technology will always have a greater weight over other factors; (. . . ) to find input sellers that have incentives for a unit in Minas Gerais, preferably in Juiz de Fora, or in the surrounding area. (Mercedes-Benz, 1996, pp. 3-37—trans. ours)*

Figure 1 presents the principal aspects of the contract signed by Mercedes-Benz, the Minas Gerais government and the local government.

#### **4.2. Fiscal Benefits**

The fiscal benefits of the Mercedes-Benz project can be divided into budget benefits (credit offered to the company before operations) and tax benefits (based on the state sales tax—ICMS). Figure 2 shows the incentives offered to the company.

#### **4.3. Aspects of the Mercedes Unit**

##### **4.3.1. Suppliers Localization**

In this section we will make an analysis of the spatial distribution of the suppliers of the Mercedes unit in Juiz de Fora (MG). The aim of this section is to verify, in a simple way, what the impact of opening the Mercedes-Benz in Juiz de Fora was in the short-run. The spatial distribution of the sellers will be analyzed between 1996 (construction of the production unit) and 1999<sup>4</sup> (the first year of production of Class A models).

The relation among the initial sellers and the unit located in Juiz de Fora can be classified in three ways: (a) *Follow Sourcing*;<sup>5</sup> (b) *Joint-Venture*;<sup>6</sup> and (c) *New*. The sellers are located mainly in the states of Minas Gerais and São Paulo, as shown in Table 1. The *just-in-time* method of production of the Mercedes unit makes use of three regional points in Brazil.<sup>7</sup>

FIGURE 1. Contract Signed by Mercedes-Benz, Minas Gerais Government and Municipality of Juiz de Fora

<b>Donation</b>	<ul style="list-style-type: none"> <li>• <b>Land</b></li> <li>• Area with 2.8 million m<sup>2</sup>, with estimated value of R\$ 50.51 million</li> </ul>
<b>Infrastructure</b>	Urbanization of <i>Paraibuna</i> River Sanitary systems and drainage Road Access Parking Test track Electricity connections, water, natural gas and other facilities
<b>Capital participation by state/municipal government</b>	No information
<b>Credit granted</b>	<b>FIND/PROIM</b> —R\$ 112.16 million for fixed and working capital <ul style="list-style-type: none"> <li>• Adjusted for inflation</li> <li>• Interest rate 3.5% per year.</li> <li>• R\$ 25 million with exemption of 12 months</li> <li>• R\$ 80 million with exemption of 36 months</li> </ul> <b>FUNDIEST/PRO-Industry</b> —R\$ 16 million for fixed capital <ul style="list-style-type: none"> <li>• Two payments: 03/1999 (60%) and 03/2000 (40%)</li> <li>• Without interest or adjustment for inflation</li> <li>• Exemption of 120 months</li> </ul> <ul style="list-style-type: none"> <li>• <b>FUNDIEST/Pro-structure</b> Value: number of vehicles imported and tradable by the company               <ul style="list-style-type: none"> <li>• Term: 10 years</li> <li>• Exemption: 10 years</li> </ul> </li> <li>• Without interest or adjustment for inflation</li> </ul>
<b>Deferment of state sales tax (ICMS) payments</b>	<b>FUNDIEST/PROE-Industry and FMDI</b> <ul style="list-style-type: none"> <li>• Funding for working capital</li> <li>• State—7.75% on monthly revenues over 10 years</li> <li>• Municipality: 1.35% on monthly revenues up to the fourth year and 0.67% from the fifth through the tenth year.</li> <li>• Without interest or adjustment for inflation</li> <li>• Exemption of 120 months</li> </ul>
<b>Taxes exemptions granted</b>	<b>Taxes (IPTU, ISS, e ITBI) municipal taxes.</b> <ul style="list-style-type: none"> <li>• Term: 10 years</li> </ul>
<b>State government guarantees for credit facilities provided</b>	<b>State:</b> R\$ 101.9 mil. in CEMIG (a power utility) shares <ul style="list-style-type: none"> <li>• Adjusted for inflation</li> </ul> <b>Municipality:</b> R\$ 3.1 mil. bond <ul style="list-style-type: none"> <li>• Adjusted for inflation</li> </ul>

Source: Bastos (2000)

Obs: Monetary values refer to 1996

These points work as a linkage between the sellers and the unit located in Juiz de Fora. The Brazilian cities where the consolidation centers are located are: São Bernardo do Campo (SP), which includes the sellers from the city of São Bernardo do Campo and those from the states of Paraná and Rio Grande do Sul; Betim (MG), which includes the sellers from Minas Gerais and the city of Campinas (SP); and Juiz de Fora (MG), which entails the sellers located at the Mercedes unit itself (Neves, Oliveira e Brandão, 2002).

FIGURE 2. Value of Incentives Offered to Mercedes-Benz (R\$ 1000)

<i>Budget Benefits</i>	
Property	50,500.00
Infrastructure <sup>1</sup>	0.00
Credit for fixed and working capital	60,636.71
Credit for fixed capital	7,117.81
Credit for trade	16,757.79
Sub-Total	135,012.31
<i>Tax Benefits</i>	
Credit for fixed and working capital (discount)	555,535.44
Sub-Total	555,535.44
Overall Total	690,547.74

<sup>1</sup>The infrastructure indicated in Figure 1 was not included, because it was not a credit for the company, but was rather a cost that the state and local government was responsible for.  
Source: Alves (2000)

TABLE 1. Class A—Distribution of Sellers

Locale	Items		Auto-parts		Sellers	
	Absolute Value	(%)	Absolute Value	(%)	Absolute Value	(%)
MG (except JF)	325	15.52	72	6.32	28	9.09
Juiz de Fora	172	8.21			10	3.25
São Paulo	610	29.13			70	22.73
Paraná	17	0.81			2	0.65
Rio Grande do Sul	9	0.43			3	0.97
Nacional (except JF)	961	45.89	737	64.71	103	33.44
Imported			330	28.97	92	29.87
Total	2094	100.00	1139	100.00	308	100.00

Source: Prepared by authors based in Mercedes-Benz publications.

At the beginning of its operations Mercedes had 94 Brazilian sellers. Among them, 10 were installed on a property alongside the Mercedes unit in Juiz de Fora. Table 2 presents the distribution of sellers by city. The cities with the highest concentration of sellers are: Juiz de Fora (10), the place where the Mercedes unit is located; São Paulo (12); São Bernardo do Campo (11), where one of the consolidation centers is located and a region with intense activity for the automobile sector; Lavras (05); Betim (04); and Campinas (04).

Table 2 enables us to affirm that there is a concentration of sellers in the metropolitan area of São Paulo, but there are some units in the interior (Campinas, Americana, Piracicaba, etc.), and there are also some in Minas Gerais (mainly in the metropolitan area of Belo Horizonte and the southern part of the state: Lavras, Santa Rita do Sapucaí, Varginha and Três Corações).

#### 4.3.2. Production and Employment During the First Years of Operation

This section presents data about production and employment in order to characterize the first years of the Mercedes-Benz unit's operations in Juiz de Fora (MG).

Table 3 shows that production of the Juiz de Fora unit was below what had been forecast. The project forecast a production of 40,000 units for 1999 and 70,000 units for 2000.<sup>8</sup> However, effective production did not even reach 16,000 units during both years considered. In order to make up for excess capacity, the Juiz de Fora unit began to produce the Class C model (a model for export) in 2001. The forecast was 10,000 units per year. In 2003 the lack of production capacity was around 80%. This worsened at the beginning of 2004 with the end of

TABLE 2. Distribution of Mercedes-Benz Sellers by Municipality (1999)

<i>City</i>	<i>No. of sellers</i>
Juiz de Fora	10
São Paulo	12
São Bernardo do Campo	11
Lavras	05
Betim	04
Campinas	04
Caçapava	03
Porto Alegre	02
Buenos Aires	02
Jundiaí	02
Americana	02
Valinhos	02
Ibirité, Monte-Mor, Arujá, Guarulhos, Juatuba, São José dos Campos, Guararema, Araraquara, Hortolândia, Três Corações, Santa Rita do Sapucaí, Mauá, Rio Grande da Serra, Varginha, Barueri, Ribeirão Pires, Piracicaba, Itapeverica da Serra, Monte Alto, Cotia, Sete Lagoas, Osasco, Limeira and São Caetano do Sul	01

Source: Martins et al. (1998)

the production of the Class C model. The model Smart Formore (DaimlerChrysler), announced for 2006, was the principal project for the Juiz de Fora unit. However, in March 2005 the Smart Project was cancelled and the company awaited communication from Germany (Mercedes-Benz . . . , 2005).

Table 4 enables us to verify that the majority of employees were from Juiz de Fora, as was required by the contract signed by Mercedes-Benz and the state and local governments. However, Mercedes did not respect the minimum amount of 1,500 jobs stated in the contract as a counterpart to the budget and fiscal benefits offered by the state of Minas Gerais and by the local government. The decline in employment was due to the decrease in production.

#### ***4.4. An Analysis of the Impact of the Mercedes-Benz Unit in Juiz de Fora (MG)***

##### ***4.4.1. Methodology and Database***

The input-output framework is frequently used to analyze the impact of growth of one region or country upon the sectors of the economy. Impacts can be calculated through economic multipliers. These multipliers enable us to verify, as an example, the direct and indirect impacts of a change in the final demand of a specific sector upon sales, income and employment (Miller and Blair, 1984).

In the present paper the inter-regional input-output matrix for Minas Gerais and the rest of Brazil (BDMG e FIPE, 2002) is used. The impacts on Juiz de Fora could be calculated because the technical coefficients

TABLE 3. Effective Production and Sales (Class A Model)

<i>Year</i>	<i>Production (Class A)</i>	<i>Sales (Internal Market)</i>	<i>Exports</i>
1999	14307	9831	3521
2000	15682	12006	3622
2001	9041	8661	852
2002	8168	8088	496
2003	6989	-	-
2004	5560	-	-

Obs: 1999—production began in April  
 The Class A Model was exported to Mexico, Venezuela and Argentina  
 Source: Mercedes-Benz Brazil—1999 and 2000  
 DaimlerChrysler Brazil—2001, 2002 and 2003.

TABLE 4. Jobs (1999/2001)

Year	Total Employment	Employment origin	
		Juiz de Fora	Other
1999	1558	1058 (68%)	500
2000	1350	900 (72%)	350
2001	1529	nd	nd
2002	1114	nd	nd
2003	1098	nd	nd
2004	1060	nd	nd

Source: Bastos (2004)  
OBS: nd—data not available

matrix and the Leontief Inverse were regionalized through the locational coefficients.<sup>9</sup>

#### 4.4.1.1. Basic Input-Output Model

Normally, the input-output model describes the monetary flow of goods and services through the economy. All sectors purchase goods from other sectors and use these goods to produce final goods. Mathematically, these interactions can be represented as follows (e.g., Miller and Blair, 1984; Dorfman et al., 1986; Perobelli, 2004):

$$\begin{aligned}
 x_{11} + x_{12} + \cdots x_{1n} + y_1 &= X_1 \\
 x_{21} + x_{22} + \cdots x_{2n} + y_2 &= X_2 \\
 &\vdots \\
 x_{n1} + x_{n2} + \cdots x_{nn} + y_n &= X_n
 \end{aligned} \tag{1}$$

where,

$x_{ij}$ —Sales from sector  $i$  to sector  $j$ , ( $i, j = 1, 2, \dots, n$ )

$y_i$ —final demand for goods from sector  $i$ , ( $i = 1, 2, \dots, n$ )

$X_i$ —total production of sector  $i$ , ( $i = 1, 2, \dots, n$ )

The input-output framework shows that the intersectoral flows from  $i$  to  $j$  for a specific period depend completely and exclusively on the total production of sector  $j$  for the same period. Thus:

$$a_{ij} = \frac{x_{ij}}{X_j} \tag{2}$$

Therefore, the equation system (1) that shows the interdependencies among the sectors can be rewritten as follows:

$$\begin{aligned} a_{11}X_1 + a_{12}X_2 + \cdots + a_{1n}X_n + y_1 &= X_1 \\ a_{21}X_1 + a_{22}X_2 + \cdots + a_{2n}X_n + y_2 &= X_2 \\ \vdots & \\ a_{n1}X_1 + a_{n2}X_2 + \cdots + a_{nn}X_n + y_n &= X_n \end{aligned} \quad (3)$$

The following matrix can represent this equation system:

$$AX + Y = X \quad (4)$$

Where,

$X = nx1$  sectoral production vector

$Y = nx1$  final demand vector

$A = nxn$  technical coefficients matrix

In order to verify the effects of a change in the final demand of the economy of a specific region, equation (4) can be rewritten as follows:

$$X = (I - A)^{-1}Y \quad (5)$$

Where,

$I =$  identity matrix  $n \times n$

In order to verify which are the impacts from the project of opening a Mercedes-Benz unit in Juiz de Fora (MG) upon the sectoral production of Juiz de Fora, the rest of Minas Gerais and the rest of Brazil, we must implement a decomposition at final demand ( $Y$  component) in equation 5. In other words, we must make the investment component explicit in order to implement the exercise and thus calculate the impact upon the economy. This exercise will be implemented for: STEP I—the construction of the unit in Juiz de Fora (through a shock in the investment) and STEP II—the first year of operation, considering the production values forecast in the contract for the year 1999 (through a shock in the



transportation sector—forecast of an increase in the supply of this sector). Thus, equation (5) can be re-written as follows:

$$X = (I - A)^{-1} \left[ \underbrace{C+I+G}_{\text{internal absorption}} + \underbrace{E}_{\text{exports}} \right] \quad (6)$$

Based on equation (6), we will implement the following simulation exercise:<sup>10</sup>

STEP I—Construction of the unit in Juiz de Fora (MG)

$$\begin{aligned} \Delta X &= (I - A)^{-1} * \Delta Y \\ \Delta Y &= \underbrace{C}_{\text{constant}} + \underbrace{\Delta I}_{\text{variation}} + \underbrace{G}_{\text{constant}} + \underbrace{E}_{\text{constant}} \end{aligned} \quad (7)$$

The construction of vector  $\Delta I$  will be explained in section 4.4.1.3

STEP II—Forecast for the first year of production

$$\begin{aligned} \Delta X &= (I - A)^{-1} * \Delta Y \\ \Delta Y &= \underbrace{\Delta C}_{\text{variation}} + \underbrace{I}_{\text{constant}} + \underbrace{G}_{\text{constant}} + \underbrace{\Delta E}_{\text{variation}} \end{aligned} \quad (7A)$$

where:

$\Delta C$  and  $\Delta E$  are the direction of the production

#### 4.4.1.2. Inter-Regional Input-Output Model

A region is not self-sufficient. Thus, it is necessary to exchange production and production factors with other regions. In order to describe such transactions, Isard applied the Isard Model for the first time in 1951. This model is known as the inter-regional input-output model (Miller and Blair, 1984).

The inter-regional input-output model describes the monetary flow of goods and services through the economy, but for more than one region. The model can be represented mathematically as follows:

$$\begin{aligned}
x_{11}^{LL} + x_{12}^{LL} + \dots + x_{1n}^{LL} + x_{11}^{LM} + x_{12}^{LM} + \dots + x_{1n}^{LM} + y_1 &= X_1 \\
x_{21}^{LL} + x_{22}^{LL} + \dots + x_{2n}^{LL} + x_{21}^{LM} + x_{22}^{LM} + \dots + x_{2n}^{LM} + y_1 &= X_2 \\
&\vdots \\
x_{n1}^{LL} + x_{n2}^{LL} + \dots + x_{nn}^{LL} + x_{n1}^{LM} + x_{n2}^{LM} + \dots + x_{nn}^{LM} + y_n &= X_n \\
x_{11}^{ML} + x_{12}^{ML} + \dots + x_{1n}^{ML} + x_{11}^{MM} + x_{12}^{MM} + \dots + x_{1n}^{MM} + y_1 &= X_1 \\
x_{21}^{ML} + x_{22}^{ML} + \dots + x_{2n}^{ML} + x_{21}^{MM} + x_{22}^{MM} + \dots + x_{2n}^{MM} + y_1 &= X_2 \\
&\vdots \\
x_{n1}^{ML} + x_{n2}^{ML} + \dots + x_{nn}^{ML} + x_{n1}^{MM} + x_{n2}^{MM} + \dots + x_{nn}^{MM} + y_n &= X_n
\end{aligned} \tag{8}$$

Where:

$L$  = region  $L$  (e.g., Minas Gerais)

$M$  = region  $M$  (e.g., the other Brazilian states)

$x_{ij}^{LL}$  = Purchases of sector  $i$  from sector  $j$  in the same region ( $i, j = 1, 2, \dots, n$ )

$x_{ij}^{LM}$  = Purchases of sector  $i$ , located in  $L$ , from sector  $j$ , located in  $M$  ( $i, j = 1, 2, \dots, n$ )

$x_{ij}^{ML}$  = Purchases of sector  $i$ , located in  $M$ , from sector  $j$ , located in  $L$  ( $i, j = 1, 2, \dots, n$ )

$x_{ij}^{MM}$  = Purchases of sector  $i$  from sector  $j$  within the region ( $i, j = 1, 2, \dots, n$ )

$y_i$  = Final demand for products of sector  $i$  ( $i = 1, 2, \dots, n$ )

$X_i$  = Total production of sector  $i$  ( $i = 1, 2, \dots, n$ )

To summarize, matrix  $X$  is the union of four matrices and is represented by:

$$X = \begin{bmatrix} X^{LL} & X^{LM} \\ X^{ML} & X^{MM} \end{bmatrix} \tag{9}$$

To arrive at the equation system that shows the interdependence among different sectors in the economy in both regions, we have the inter-sectoral technical coefficients:

Region  $L$ :

$$a_{ij}^{LL} = \frac{x_{ij}^{LL}}{X_j^L}$$

$$a_{ij}^{LM} = \frac{x_{ij}^{LM}}{X_j^L}$$

Region  $M$ : (10)

$$a_{ij}^{ML} = \frac{x_{ij}^{ML}}{X_j^M}$$

$$a_{ij}^{MM} = \frac{x_{ij}^{MM}}{X_j^M}$$

Thus, the equation system that shows the interdependence among the different sectors of the two regions is known as the technical coefficient matrix and can be represented by:

$$\begin{aligned} a_{11}^{LL}X_1 + a_{12}^{LL}X_2 + \dots + a_{1n}^{LL}X_n + a_{11}^{LM}X_1 + a_{12}^{LM}X_2 + \dots + a_{1n}^{LM}X_n &= y_1 = X_1 \\ a_{21}^{LL}X_1 + a_{22}^{LL}X_2 + \dots + a_{2n}^{LL}X_n + a_{21}^{LM}X_1 + a_{22}^{LM}X_2 + \dots + a_{2n}^{LM}X_n &= y_2 = X_2 \\ \vdots \\ a_{n1}^{LL}X_1 + a_{n2}^{LL}X_2 + \dots + a_{nn}^{LL}X_n + a_{n1}^{LM}X_1 + a_{n2}^{LM}X_2 + \dots + a_{nn}^{LM}X_n &= y_n = X_n \\ a_{11}^{ML}X_1 + a_{12}^{ML}X_2 + \dots + a_{1n}^{ML}X_n + a_{11}^{MM}X_1 + a_{12}^{MM}X_2 + \dots + a_{1n}^{MM}X_n &= y_1 = X_1 \\ a_{21}^{ML}X_1 + a_{22}^{ML}X_2 + \dots + a_{2n}^{ML}X_n + a_{21}^{MM}X_1 + a_{22}^{MM}X_2 + \dots + a_{2n}^{MM}X_n &= y_2 = X_2 \\ \vdots \\ a_{n1}^{ML}X_1 + a_{n2}^{ML}X_2 + \dots + a_{nn}^{ML}X_n + a_{n1}^{MM}X_1 + a_{n2}^{MM}X_2 + \dots + a_{nn}^{MM}X_n &= y_n = X_n \end{aligned} \quad (11)$$

As a matrix, we have:

$$AX + Y = X \quad (12)$$

Where:

$A = nxn$  technical coefficients matrix

$X = nx1$  sectoral production vector

$Y = nx1$  final demand vector

We can define the coefficients matrix of an inter-regional model with two regions by:

$$A = \begin{bmatrix} A^{LL} & A^{LM} \\ A^{ML} & A^{MM} \end{bmatrix} \quad (13)$$

The sectoral production vector is represented by:

$$X = \begin{bmatrix} X^L \\ X^M \end{bmatrix} \quad (14)$$

The final demand vector is represented by:

$$Y = \begin{bmatrix} Y^L \\ Y^M \end{bmatrix} \quad (15)$$

Equation (12) can be described as follows:

$$X = (I-A)^{-1} Y$$

Or

$$\left\{ \begin{bmatrix} I & 0 \\ 0 & I \end{bmatrix} - \begin{bmatrix} A^{LL} & A^{LM} \\ A^{ML} & A^{MM} \end{bmatrix} \right\} \begin{bmatrix} X^L \\ X^M \end{bmatrix} = \begin{bmatrix} Y^L \\ Y^M \end{bmatrix} \quad (16)$$

#### 4.4.1.3. Impact Calculation

##### 4.4.1.3.1. Production Due to a Variation in the Investment—STEP I—Construction of the Mercedes Unit in Juiz de Fora

The calculation of the impact upon production due to a variation in the investment (i.e., the construction period of the Mercedes unit in Juiz de Fora) is based on the methodology used by Chahad et al. (2004). The calculation was arrived at based on the following steps:

- Regionalization of the direct technical coefficients matrix (A) and the Leontief inverse matrix (B). In this step, the values in the quadrant Minas Gerais x Minas Gerais of matrices A and B were regionalized through the locational quotient. This regionalization is necessary to construct matrices A and B for the Juiz de Fora municipality.
- Construction of a pattern unit of investment

$$UPI_{ij} = \frac{X_{ij}}{\sum_{i=1}^n \sum_{j=1}^k X_{ij}}$$

Where:  $UPI_{ij}$ —Brazilian investment pattern unit  
 $X_{ij}$ —investment of sector “i” in region “j.”

$$\sum_{i=1}^n \sum_{j=1}^k X_{ij} \text{—total investment in Brazil}$$

- a. Construction of a shock vector for calculating the impact of the investments. This vector will be constructed by the pre-multiplication of the invested value in the construction by the UPI vector.

$$Shock(\Delta I) = Investment\ value * UPI_{ij}$$

- b. Calculation of the impact of investments

This vector will be constructed through the pre-multiplication of the shock vector ( $\Delta I$ ) by the Leontief inverse matrix. Thus,  
Investment impact =  $B * \Delta I$

*4.4.1.3.2. Production Due to a Forecast of Production—STEP II—the First Year of Operation, Considering the Production Values Forecast in the Contract for the Year 1999.* The impact upon production will be measured as follows:

$$\Delta X = (I - A)^{-1} * \Delta Y \quad (17)$$

where:

$\Delta Y$ —final demand vector—(production values forecast for the transportation sector)

$\Delta X$ —impact upon sectoral production (R\$)

$(I - A)^{-1}$ —Leontief inverse.

#### 4.4.2. Results Analysis

In order to calculate the impact of the investments upon sectoral production in the Juiz de Fora municipality, the rest of Minas Gerais and the rest of Brazil from STEP I—construction of the Mercedes unit in Juiz de Fora (MG)—we used the value of budget benefits (see Figure 2) to construct the shock vector in the simulation exercise.

Table 5 presents the 10 sectors in Juiz de Fora, the rest of Minas Gerais (RMG) and the rest of Brazil (RBR) that had the greatest impact upon production due to the budget benefits offered to the Mercedes-Benz unit.

In Juiz de Fora, we can verify that the construction sector presents the highest impact. The sector with the second highest impact is transportation equipment. It is important to note that the absorption of the impact by the 10 sectors in Juiz de Fora is around 95%. In other words, the sectoral distribution of benefits for the sectors located in Juiz de Fora is concentrated.

For the rest of Minas Gerais, we can observe that: (a) the concentration of the sectoral distribution of benefits in the rest of Minas Gerais is smaller than in Juiz de Fora. The absorption of the first 10 sectors that had the highest impact was around 75% of the total impact, and (b) the results for nonmetallic minerals, other metals and the steel sector should be emphasized. The absorption of these sectors is around 34% of total impact.

For the rest of the Brazil, we can observe that sectoral distribution of benefits on the productive structure is less concentrated than in Juiz de Fora. The absorption of the 10 sectors with the highest impact is around 78%. Another interesting point is that the construction sector also presents the highest impact.

A very important result is the intra-sectoral one. It is important to note the impact within the transportation equipment sector. We can observe that this sector is one of the 10 most important sectors, in terms of impacts upon production in Juiz de Fora, and also in the rest of Brazil. However, the same does not occur for the rest of Minas Gerais. This can represent more linkage towards the other Brazilian states.

Another relevant point is the verification of the share of the 10 sectors with the highest absorption in the total sectoral impact. For example, it is interesting to check the contribution of transportation equipment in Juiz de Fora against the total sectoral impact (Juiz de Fora plus rest of Minas Gerais plus rest of Brazil). Table 6 presents those results.

According to Table 5, 66% of the impact of the investment in the Mercedes unit (e.g., budget benefits) during the construction phase in Juiz de Fora is absorbed by the construction sector. It is important to emphasize that from the total variation in the production of this sector, 13.65% is due to the sector located in Juiz de Fora. Another important result is the contribution of the transportation equipment sector located in Juiz de Fora to the total impact of the transportation equipment sector. In Table 6 we can observe that this contribution is around 19%. As

TABLE 5. Sectoral Distribution of the Investment (Construction)

Sector	Juiz de Fora		Rest of MG		Rest of Brazil	
		(%)	Sector	(%)	Sector	(%)
Construction		66.655	Nonmetallic minerals	17.502	Construction	43.775
Transportation equipment		8.402	Agriculture	15.309	Trade	4.785
Trade		5.504	Other metal products	10.530	Machinery	4.553
Steel		4.353	Construction	8.444	Agriculture	4.546
Other metal products		2.607	Steel	6.572	Nonmetallic minerals	4.412
Business services		2.047	Machinery	4.824	Petroleum refining	3.780
Transportation		2.018	Trade	4.557	Transportation equipment	3.717
Nonmetallic minerals		1.863	Electrical equipment	4.122	Other metal products	3.656
Machinery		1.256	Petroleum refining	3.570	Electronic equipment	2.758
Financial institutions		1.087	Other chemicals	2.915	Electrical equipment	2.211

Source: Based on the simulation exercise.



TABLE 6. Spatial Distribution of the Investment During the Construction Phase for Relevant Sectors in Juiz de Fora

Sectors	Contribution		
	Juiz de Fora	Rest of MG	Rest of Brazil
Construction	13.65	0.66	85.68
Transportation equipment	19.11	0.11	80.79
Trade	10.39	3.29	86.31
Steel	19.49	11.27	69.25
Other metal products	6.27	9.70	84.03
Business services	9.07	1.56	89.37
Transportation	9.22	4.74	86.04
Nonmetallic minerals	3.67	13.21	83.12
Machinery	2.69	3.96	93.34
Financial institutions	10.59	3.93	85.47

Source: Based on the simulation exercise.

we expected, the highest contributions for all sectors are located in the rest of Brazil.

From the impact upon the productive sectors (Juiz de Fora, rest of Minas Gerais and rest of Brazil) due to a variation in the investment (construction phase), we can observe that 9.14% of this impact occurs in Juiz de Fora, 3.50% in the rest of Minas Gerais and 87.36% in the rest of Brazil.

Another point to be analyzed is the impact on production in Juiz de Fora, the rest of Minas Gerais and the rest of Brazil due to the production forecast for the first few years of the Mercedes unit's operations in Juiz de Fora. In order to implement this kind of analysis, we make use of the production forecast for the first year of operations as stated in the contract signed by the agents (Mercedes and the state and local governments). This forecast was for 40,000 units. It is important to emphasize that in order to find the revenue from the supply of these units, we took the medium price of the Class A model (R\$ 40,000.00), which was the first model produced by the Mercedes unit in Juiz de Fora (MG).

Observing Table 7, we verify that in Juiz de Fora the greatest impact due to the forecast of production in the transportation equipment sector (STEP II—first year of operation) is upon the sector itself—around \$72. Steel sector production in Juiz de Fora varies by 8.11% due to the positive variation in transportation sector production (value forecasted). We observe that the impacts are concentrated among the sectors. In other

TABLE 7. Sectoral Distribution of the Impact During the First Year of Operations (Forecast for Class A Production)

Juiz de Fora		Rest of MG		Rest of Brazil	
Sector	(%)	Sector	(%)	Sector	(%)
Transportation equipment	72.81	Other metal products	30.93	Steel	17.12
Steel	8.11	Machinery	17.97	Other metal products	9.13
Trade	3.65	Nonmetallic minerals	12.53	Trade	8.02
Transportation	3.19	Trade	5.48	Transportation	7.12
Other metal products	2.60	Steel	5.23	Petroleum refining	6.32
Financial institutions	2.54	Agriculture	4.96	Machinery	5.99
Machinery	1.97	Chemicals	4.26	Business services	4.93
Electric, gas and sanitary services	0.95	Transportation	4.13	Electric, gas and sanitary services	4.73
Communication	0.86	Electric, gas and sanitary services	3.75	Financial institutions	3.92
Public administration	0.83	Electrical equipment	3.52	Transportation equipment	3.81

Source: Based on the simulation exercise.

words, the 10 sectors presented in Table 7 are responsible for 97% of the variation in production in Juiz de Fora (MG).

In the state of Minas Gerais, the concentration in the variation in production due to the production forecast for the first year of operations of the Mercedes-Benz unit in Juiz de Fora is also high. The 10 sectors presented in Table 7 are responsible for 92% of the total variation in the state's production. It is important to note the variation in the production of other metal products, machinery and nonmetallic minerals.

The impact on the sectoral production in the rest of Brazil, given the production forecast for the Mercedes unit's first year of operations, is less concentrated than in Juiz de Fora and the rest of Minas Gerais. The impact is around 71%. The production of the other metals sector is the one that varies most—around 17%.

The spatial distribution of the impacts upon the sectoral production in Juiz de Fora, the rest of Minas Gerais and the rest of Brazil due to the production forecast for the first year of operations is distributed as follows: 74.20% of the impact on production is in Juiz de Fora, 20.25% in the rest of Brazil and 5.55% in the rest of Minas Gerais.

## 5. CONCLUSIONS

In this paper we have broadly analyzed the project of opening a Mercedes-Benz unit in Juiz de Fora, Minas Gerais state. Both Minas Gerais and Juiz de Fora had fiscal incentives (e.g., immunity from tax payments) as one of the main instruments for attracting industrial projects. In other words, the promotion of regional and local development is based mainly on fiscal benefits. It is also important to emphasize that this kind of policy is common in the majority of Brazilian states and was largely used in Brazil in the 1990s.

It was not the aim of this paper to validate or not to validate the use of fiscal instruments as a way of attracting new enterprises. The strategy adopted in this paper was to improve the reader's knowledge of the available instruments at both the state and local levels, and also to make an analysis of the impact of the Mercedes-Benz unit project in Juiz de Fora by analyzing the construction and the production forecast for the first year of operations. We can observe that the Mercedes-Benz unit in Juiz de Fora did not reach an effective capacity. Since the first year of operations, the unit at Juiz de Fora has been working below capacity. It had the Class A model as the first model produced, but due to the small level of production of the Class A, the Class C model (for export) began

to be produced. For 2005, there was a plan to build the Smart Formore model in Juiz de Fora. Mercedes-Benz was negotiating a new contract with the state government.

In order to analyze the Mercedes-Benz unit within the context of regional and local development promotion, the results of the simulation exercises, using an input-output framework, enabled us to verify the structure of inter-sectoral and inter-regional relations. These interactions were presented during the construction period (budget benefits) and during the first year of the unit's operations (production forecast). In sectoral terms, we found that: (a) there is a concentration in the interactions for a small number of sectors in the productive structure in Juiz de Fora, and (b) there is an impact with a smaller degree of concentration upon the sectoral production in the rest of Minas Gerais and the rest of Brazil.

Another point to emphasize is that in the investment (construction) phase the structure of interactions is as follows: around 9% within Juiz de Fora, around 3% for the rest of the Minas Gerais and 88% for the rest of the Brazilian economy. The structure of linkages for the production forecast for the first year of production is: (a) total impact (taking into account the intra-sectoral impacts, which means the impact upon the transportation equipment sector of Juiz de Fora)—74.20% in Juiz de Fora, 5.55% in the rest of Minas Gerais and 10.25% in the rest of Brazil and (b) net impact (not taking into account the intra-sectoral impacts in Juiz de Fora)—43.80% in Juiz de Fora, 12.08% in the rest of Minas Gerais and 44.05% in the rest of Brazil.

## NOTES

1. It is important to point out that the criterion of spatial de-concentration and productive integration was not taken into account. In other words, a project was approved if it demonstrated its viability only from the economic and financial point of view.

2. Some authors include the Integrated Development Plan for Minas Gerais (PMDI) in the second period of fiscal incentives. In this paper, the PMDI will be considered as a third period of fiscal incentives adopted by the state. It is with the implementation of this plan that regional imbalances are systematically discussed. In the previous period, these questions were present, both in Pro-Industry and in the PROIM (Induction of Industrial Modernization Program), but they were not implemented.

3. This program is for working capital companies that import and sell on the internal market products similar to those that will be produced by the company itself. This resource will be used during the construction period and the first few years of activity (Bastos, 2000).

4. The 1999 data was collected from research developed by Martins et al. (1998).

5. A *Follow Sourcing* system consists of hiring the same seller in Germany (where the Class A model is also produced) and Brazil. The seller can be located wherever it wants (in Brazil or in Germany).

6. The company association that develops and executes a project.

7. The company also has a consolidation center in *Bremerhafen*, Germany.

8. Among the facts that can explain this difference between forecast production and actual production we can highlight: (a) the exchange rate devaluation, (b) the increase in the interest rate, (c) a decrease in internal consumption and d) a decrease in exports. As a consequence, the price of the Class A model changed. The forecast value for 1996 (US\$25 to US\$30 thousand) in April 1999 was between R\$43 thousand to R\$51 thousand. (exchange rate of 1.7). Thus, the final price of the product changed from R\$33 thousand to R\$36 thousand.

9. See *Procedimento de regionalização por Quociente Locacional* in Miller and Blair (1984).

10. It should be emphasized that the simulation exercise will be implemented in the inter-regional input-output model, whose structure is presented in the next section.

## REFERENCES

- Alves, M.A. de S. (2000). "Guerra Fiscal e Finanças Federativas no Brasil: O Caso do Setor Automotivo." *Master's Thesis*. Campinas: Universidade Estadual de Campinas/ Instituto de Economia.
- DaimlerChrysler (2001). Relatório de Atividades da DaimlerChrysler no Brasil.
- DaimlerChrysler (2002). Relatório de Atividades da DaimlerChrysler no Brasil.
- DaimlerChrysler (2003). Relatório de Atividades da DaimlerChrysler no Brasil.
- Dorfman, R., Samuelson, P. A., and Solow, R. M. (1986). "Linear Programming and Economic Analysis." New York, Dover.
- Bastos, S. Q. de A. (2000). "Estratégia Locacional da Indústria Automobilística: O Caso as Mercedes-Benz em Juiz de Fora." *Master's Thesis*. Rio de Janeiro: Universidade Federal do Rio de Janeiro / IPPUR.
- BDMG and FIPE (2002). "Matriz Inter-Regional de Insumo-Produto Minas Gerais x Resto do Brasil." BDMG and FIPE.
- Chahad, J. P. Z., Comune, E., and Haddad, E. A. (2004). "Interdependência Espacial das Exportações Brasileiras: repercussões sobre o Mercado de Trabalho." *Revista Pesquisa e Planejamento Econômico*, Vol. 34, No. 1, pp. 93-122.
- Martins, H. E. de P., Perobelli, F. S., Resende, P. T. D., and Paula, G. M. (1998). "Sistemas Regionais de Inovação na Indústria Automobilística: O Caso da Mercedes-Benz em Juiz de Fora (MG)." In: *Anais do II Congresso da Sociedade de Economia Política*. pp. 956-969.
- Mercedes-Benz do Brasil (1996). Contrato de Implantação da Indústria. Juiz de Fora.
- Mercedes-Benz do Brasil (1999). Relatório de Atividades da Mercedes-Benz do Brasil.
- Mercedes-Benz do Brasil (2000). Relatório de Atividades da Mercedes-Benz do Brasil.
- Mercedes-Benz produzirá importados em Minas Gerais (2005). *Revista Auto Esporte*. Edição 478, March.

- Miller, R. E., and Blair, P. D. (1984). "Input-Output Analysis: Foundations and Extensions." New Jersey: Prentice Hall.
- Neves, M. A., Oliveira, A. M., and Brandão, N. A. (2002). "A Complexa Montagem de um Veículo: A Mercedes-Benz em Juiz de Fora." In M. R. Nabuco, M. A. Neves and A. M. Carvalho Neto, *A Indústria Automotiva: A Nova Geografia do Setor Produtivo*. pp. 141- 172. DP&A editora.
- Oliveira, F. A., and Duarte Filho, F. C. (1997). "Aspectos da Guerra Fiscal no Brasil: A Política de Incentivos Fiscais em Minas Gerais." *Work prepared for IESP/FUNDAP for the project Aspectos da Guerra Fiscal no Brasil*. February. Mimeo.
- Perobelli, F. S. (2004). "Análise Espacial das Interações Econômicas entre os Estados Brasileiros." Tese de doutorado. São Paulo: Universidade de São Paulo / IPE.
- Perobelli, F. S., Oliveira, A.F., Novy, L.G.G., and Ferreira, M.V. (1997). "Avaliação do Potencial de Desenvolvimento dos Municípios de Minas Gerais na Região do entorno de Juiz de Fora (MG): Uma Aplicação de Análise Fatorial." *Research Report FEA/UFJF and FAPEMIG*.
- PMDI (1995). "Plano Mineiro de Desenvolvimento Integrado." Belo Horizonte: Government of Minas Gerais, 110pp.

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