Foreign Producer Price Indices corresponding to Brazilian Manufacturing Sectors, 1986-2003

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This report describes the construction of foreign price indices that correspond to Brazilian manufacturing sectors. The price index series are available as files

- `oecd-ppi.csv`,

- `us-ppi.csv`,

- `world-wpi-cpi-ppi.csv`,

- `foreign-ppi.csv`, `foreign-mix.csv`,

- `input-defl-forppi2.csv`,

- `capform-defl-forppi2.csv`,

at URL `http://econ.ucsd.edu/muendler/brazil`.

The focus lies on producer price indices. However, for important Brazilian trading partners who do not publish producer price indices wholesale and consumer price indices are used instead.

The present description of price index series for the period 1986-2002 is divided in five parts, discussing five groups of price indices in turn: (1) Sector-specific Producer Price Indices for OECD countries, (2) Aggregate Producer, Wholesale and Consumer Price Indices for non-OECD countries, (3) Import-weighted Foreign Price series, (4) Sector-specific Foreign Price Series for Intermediate Inputs, (5) Price Series for Capital Goods.

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1 Producer Price Indices for OECD countries

SourceOECD offers sector-specific Producer Price Index (PPI) series for most of its member countries over the period 1986-1998.

The US is Brazil's single most important trading partner. Its more detailed PPI series by the *Bureau of Labor Statistics* can be used to substitute for the aggregate OECD data. The US PPI data span the period 1986-2003.

1.1 Use

Foreign PPI series measure changes to producer costs at Brazil's foreign competitors. Foreign PPI series can be used to calculate sector-specific real exchange rates. Among other applications, sector-specific real exchange rates can serve as instrumental variables in econometric analysis. The foreign PPI series are also used to construct deflators for foreign intermediate inputs and foreign capital good acquisitions by Brazilian firms (see sections 4 and 5).

1.2 Period Covered

The PPI series for OECD countires covers the period 1986-1998. The US PPI series cover the period 1986-2003.

1.3 Data Sources

For the OECD-wide series, sector-specific Producer Price indices were extracted from the OECD's *Indicators of Industry and Services*.[1] The following member countries are covered: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Luxembourg, Netherlands, New Zealand, Norway, Spain, Sweden, Switzerland, Turkey, United Kingdom, United States.

PPI series for the US are available from the *Bureau of Labor Statistics* (`ftp://ftp.bls.gov`).

Appendix E lists Brazil's major trading partners for imports in 1995.

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[1] The *Indicators of Industry and Services* database from SourceOECD (ISSN 1608-1196) was last updated in December 2001 (`http://www.sourceoecd.org/content/html`).

1.4 A Note on Brazilian Sector Classifications and Their Concordance with OECD and US sectors

Sector definitions at the OECD and the US *Bureau of Labor Statistics* only partly coincide with the two most common industry classifications in Brazil: *nível 100* (*nível 80*) and *CNAE*.

A possible conversion from OECD sectors to *Nível 100* is documented in appendix A (not applied to the present file `oecd-ppi.csv`). Possible conversions from *SIC* (US) to *Nível 100* are discussed in Muendler (2002) in detail (`http://econ.ucsd.edu/muendler/brazil`). The concordance applied to the file `us-ppi.csv` is based on a 'loose' converter that permits some incompatibilities in select sectors to achieve sector matches at finer levels.

Nível 100 and *nível 80* were implemented by the census bureau *Fundação Instituto Brasileiro de Geografia e Estatística* (*IBGE*), Rio de Janeiro. While *nível 80* is applied to the national accounting system, *nível 100* was used for firm or plant level data during most of the eighties and the early nineties (*Pesquisa Industrial Mensal* and *Pesquisa Industrial Anual*, for instance). Over the course of the nineties, the new Brazilian classification system *CNAE* (*Classificação Nacional de Atividades Empresariais*) has been adopted more widely. It is internationally more comparable (now also used in *Pesquisa Industrial Mensal* and *Pesquisa Industrial Anual*, for instance).

1.5 Construction

The sector-specific price index series in the file `us-ppi.csv` are based on **nível 100** following the classifications in appendix C. There are mainly three reasons for this choice. *Nível 100* comes close to sector definitions used for the domestic Brazilian price indices *IPA* and *IPA-DI*. *Nível 100* is applied to many Brazilian firm and plant level data between 1986 and 2000. Finally, the finer definitions of *CNAE* are easily adapted to *nível 100* (see appendix B), and the first two digits of *nível 100* and *nível 80* coincide (at *nível 50*, see appendix D), permitting their conversion.

1.6 File Contents

The file `oecd-ppi.csv` contains annual sector-specific foreign PPI (producer price indices) of OECD member countries for the period 1986 through 1998. The original series was re-based to a value of 1 in 1990. The file `us-ppi.csv`

contains the monthly sector-specific US PPI (producer price indices) for January 1986 through July 2003 (from *BLS*). Sector definitions in the latter file are adapted to a sector classification at *nível 100*. The original *BLS* series are not re-based.

oecd-ppi.csv (9,152 obs.)

	Variable	Description
1.	country	Country[a]
2.	oecdsec	Sector definition OECD (PPI)[b]
3.	year	Calendar Year
4.	ppi	PPI: OECD Indic. of Industry & Services

[a]Observations are: 22 OECD member countries.
[b]Observations are: 32 sectors from SourceOECD *Indic. of Industry & Services*.

us-ppi.csv (14,592 obs.)

	Variable	Description
1.	niv100	Sector at *Nível 100*[a]
2.	year	Calendar Year
3.	month	Month
4.	ppi	PPI: US *Bureau of Labor Statistics*
5.	sic2d	*SIC* 2-digit concordance[b]

[a]Observations are: 62 sectors at *nível 100*. See appendix C.
[b]Observations are: 23 sectors at the *SIC* 2-digit level. See Muendler (2002) for concordance details.

2 Price Indices for Brazil's Main Trading Partners

Global Financial Data (`http://www.globalfindata.com/`) offers annual aggregate producer price, wholesale price and consumer price series for many countries. According price indices were obtained for all non-OECD (and OECD) countries among Brazil's major 25 trading partners (as measured by imports in 1995).

2.1 Use

Foreign PPI, WPI and CPI series approximate price changes in markets of Brazil's foreign competitors. These series can be used to calculate annual aggregate real exchange rates for a basket of several currencies. These foreign price series also enter in the construction of deflators for foreign intermediate inputs and foreign capital good acquisitions by Brazilian firms (see sections 4 and 5).

2.2 Period Covered

The PPI, WPI and CPI series cover the period 1986-1998 for all of Brazil's 25 major source countries of imports (and cover the years 1984-2000 in most cases).

2.3 Data Sources

From Global Financial Data (`http://www.globalfindata.com/`), annual PPI series were extracted for: Belgium, Canada, France, Germany, Korea, Netherlands, Spain, Sweden, Switzerland, the United Kingdom, and the US. Annual WPI series were extracted for: Argentina, Chile, Italy, Japan, Mexico, Singapore, Taiwan, Uruguay, and Venezuela. Annual CPI series were extracted for: China, Hong Kong, Panama, Paraguay, Saudi Arabia.

Appendix E lists Brazil's major trading partners for imports in 1995.

2.4 File Contents

The file `world-wpi-cpi-ppi.csv` contains annual foreign PPI (producer price indices), WPI (wholesale price indices), or CPI (consumer price indices) of

Brazil's 25 major trading partners in 1995. The series consistently cover the years 1986-2000 (and 1984 through 2000 when available). The original series were re-based to a value of 1 in 1995.

world-wpi-cpi-ppi.csv (17 obs.)

	Variable	Description
1.	year	Calendar Year
2.	argentina	Argentina: WPI
3.	belgium	Belgium: PPI
...		
26.	venezuela	Venezuela: WPI

3 Average Foreign Price Series

Average foreign price series for groups of Brazil's main trading partners can be constructed using Brazil's import shares from those source countries in 1995 as weights. Sector-specific annual series are obtained on the basis of the producer price indices for the OECD countries (section 1) among Brazil's trading partners. Annual aggregate price series are obtained on the basis of price indices for Brazil's main 25 trading partners (section 2), for which sector-specific PPI indices are not available in general.

3.1 Use

Foreign PPI, WPI and CPI series approximate price changes in markets of Brazil's foreign competitors. These series can be used to calculate annual aggregate real exchange rates for a basket of several currencies. Among other applications, sector-specific real exchange rates can serve as instrumental variables in econometric analysis. These foreign price series also enter in the construction of deflators for foreign intermediate inputs and foreign capital good acquisitions by Brazilian firms (see sections 4 and 5).

3.2 Period Covered

The PPI series for OECD countires covers the period 1986-1998. The US PPI data cover the period 1986-2003.

3.3 Data Sources

For the sector-specific OECD-wide PPI series, see section 1. For the annual aggregate PPI-WPI-CPI series, see section 2. Appendix E lists Brazil's major trading partners for imports in 1995.

3.4 Construction

The import shares of Brazil's major trading partners in 1995 (appendix E) are used to weight the available foreign price series for groups of Brazil's 25 major source countries for imports.

3.4.1 Sector-specific monthly foreign prices based on PPI only

Sector-specific monthly foreign prices are calculated for the group of EU countries, for the USA and Canada, and for the group of 22 OECD countries with sector-specific PPI indices (see section 1 for the construction of underlying indices). These foreign price series are bundled in the file `foreign-ppi.csv`.

- Monthly sector-specific PPI series are available for the US only (from `us-ppi.csv`, section 1). The US is Brazil's single largest trading partner and accounts for around a quarter of all Brazilian imports.

- Annual sector-specific PPI series are available for the remaining 21 OECD countries (from `oecd-ppi.csv`, section 1). The annual series are turned into monthly series through linear interpolation.

  The price index P_i^m for any month $m = 1, \ldots, 12$ between July of one year t and June of the following year $t + 1$, is calculated as

  $$P_i^{m,t/t+1} = P_i^{\text{July},t} + (m-1) \cdot \frac{P_i^{June,t+1} - P_i^{July,t}}{12}.$$

  In the beginning year of the series posterior-year interpolation is extended to January through June. In the ending year of the series prior-year interpolation is extended to July through December.

3.4.2 Mixed monthly world prices based on sector-specific and aggregate PPI, WPI and CPI

One world price series for Brazil's main 25 trading partners is constructed from a mixture of sector-specific *and* aggregate price indices. This world price series is available in the separate file `foreign-mix.csv`.

- Monthly sector-specific PPI series are available for the US only (from `us-ppi.csv`, section 1). The US is Brazil's single largest trading partner and accounts for around a quarter of all Brazilian imports.

- Annual sector-specific PPI series for 11 OECD countries among Brazil's major 25 trading partners are available (from `oecd-ppi.csv`, section 1). The annual series are turned into monthly series through linear interpolation.

- Annual aggregate PPI, WPI or CPI series are available for the remaining 13 countries not in the OECD sample but among Brazil's main 25 trading partners in 1995 (from `world-wpi-cpi-ppi.csv`, section 2). The annual series are turned into monthly series through linear interpolation.

  The price index P_i^m for any month $m = 1, \ldots, 12$ between July of one year t and June of the following year $t + 1$, is calculated as

  $$P_i^{m,t/t+1} = P_i^{\text{July},t} + (m-1) \cdot \frac{P_i^{June,t+1} - P_i^{July,t}}{12}.$$

  In the beginning year of the series posterior-year interpolation is extended to January through June. In the ending year of the series prior-year interpolation is extended to July through December.

3.4.3 Sector specification

Foreign price series in the files `foreign-ppi.csv` and `world-wpi-cpi-ppi.csv` are based on **nível 100** following the classifications in appendix C. There are mainly three reasons for this choice. *Nível 100* comes close to sector definitions used for the domestic Brazilian price indices *IPA* and *IPA-DI*. *Nível 100* is applied to many Brazilian firm and plant level data between 1986 and 2000. Finally, the finer definitions of *CNAE* are easily adapted to *nível 100* (see appendix B), and the first two digits of *nível 100* and *nível 80* coincide (at *nível 50*, see appendix D), permitting their conversion.

3.5 File Contents

The file `foreign-ppi.csv` contains sector-specific monthly PPI (producer price indices) from 22 OECD member countries grouped to EU countries, to the USA and Canada, and to the total of 22 OECD countries with sector-specific PPI indices.[2]

The file `foreign-mix.csv` contains a sector-specific monthly world price series for Brazil's main 25 trading partners on the basis of a mixture of sector-

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[2]The following OECD member countries are covered: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Luxembourg, Netherlands, New Zealand, Norway, Spain, Sweden, Switzerland, Turkey, United Kingdom, United States.

specific (12 OECD countries) PPI and aggregate (13 non-OECD countries) PPI, WPI, or CPI series.[3]

The original series were re-based to a value of 100 in January 1990. Sector definitions in the both files are adapted to a sector classification at *nível 100*.

foreign-ppi.csv (384 obs.)

	Variable	Description
1.	niv100	Sector at *Nível 100*[a]
2.	series	Index series[b]
3.	jan86	PPI Jan-1986
4.	feb86	PPI Feb-1986
...		
158.	dec98	PPI Dec-1998

[a]Observations are: 64 sectors at *nível 100*. See appendix C.

[b]Observations are: 6 series. `eu` (PPI EU), `eu*usdex` (PPI EU · nominal USD exchange rate), `oecd` (PPI OECD), `oecd*usdex` (PPI OECD · nominal USD exchange rate), `usacan` (PPI USA&Canada), `usacan*usdex` (PPI USA&Canada · nominal USD exchange rate).

foreign-mix.csv (384 obs.)

	Variable	Description
1.	niv100	Sector at *Nível 100*[a]
2.	series	Index series[b]
3.	jan86	PPI-WPI-CPI Jan-1986
4.	feb86	PPI-WPI-CPI Feb-1986
...		
158.	dec98	PPI-WPI-CPI Dec-1998

[a]Observations are: 64 sectors at *nível 100*. See appendix C.

[b]Observations are: 2 series. `world` (PPI-WPI-CPI World), `world*usdex` (PPI-WPI-CPI World · nominal USD exchange rate).

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[3]The sector-specific PPI of the following 12 OECD countries are covered: Belgium, Canada, France, Germany, Italy, Japan, Netherlands, Spain, Sweden, Switzerland, United Kingdom, United States. The aggregate PPI, WPI or CPI of the following 13 non-OECD member countries are covered: Argentina, Chile, China, Hong Kong, Korea, Mexico, Panama, Paraguay, Saudi Arabia, Singapore, Taiwan, Uruguay, Venezuela.

4 Foreign Price Indices for Intermediate Inputs

Foreign price levels and changes of intermediate inputs in industry may deviate from respective domestic prices in general and especially in periods of high or volatile inflation. This section suggests a construction method for foreign input price indices (which can be transformed to domestic prices with an appropriate exchange rate).

4.1 Use

Prices of foreign intermediate inputs may deviate from prices of domestic intermediates and are therefore needed to deflate foreign inputs separately. Such foreign input price series cannot be inferred from existing Brazilian price indices since the underlying quantity grids are not published. However, sector-specific foreign input price indices can be constructed from baskets of foreign producer (or wholesale) price index series for Brazil's trading partners. These price index series can be translated into domestic prices using the nominal exchange rates of major currencies. The resulting index series are adequate deflators for foreign intermediate inputs.

There are no sector-specific producer price (or wholesale) index series for some of Brazil's main trading partners. In these cases, annual aggregate indices are used. Moreover, monthly producer price index series at the sector-level are only available for the US (Brazil's main trading partner, accounting for around a quarter of all imports). This suggests that the present foreign input price indices are more adequate for annual than for monthly variables.

4.2 Period Covered

The series cover the period 1986-1998.

4.3 Data Sources

For the sector-specific OECD-wide PPI series underlying the present foreign input price series, see section 1. For the annual aggregate PPI-WPI-CPI series, see section 2. The basic foreign final-goods price series used to construct the present foreign input price series is an import-weighted series of those two original series (`foreign-mix.csv`, see section 3 for the import weighting).

Appendix E lists Brazil's major trading partners for imports in 1995. The initial final-goods price series for Brazil's 25 major trading partners are transformed using the input-output matrices for 1985, and 1990 through 1998 (as offered by *Fundação Instituto Brasileiro de Geografia e Estatística*), to arrive at the present foreign input price series.

4.4 Construction

Construction of the input price indices is based on annual input-output matrices and output price indices.

4.4.1 Input-Output Matrices

The national accounting division at *IBGE* provides annual input-output matrices. Due to the change in the national accounts in 1990, time-consistent matrices are only available for the years 1990 to 1998, and for 1985 as an earlier reference year. In order to obtain input-output matrices for the entire period 1986-1998, the matrices for 1986 through 1989 can be constructed from the matrices 1985 and 1990 by linear interpolation.

Brazilian input-output matrices since 1990 are 80×43. The 80 rows represent the sectors at *nível 80* from where inputs came, and the 43 columns represent the sectors according to *nível 50* to which the inputs went.[4] For the purpose of deflating variables in *PIA*, not quite as many rows and columns (sectors) are needed. Among the 80 rows at *nível 80*, only 52 correspond to industrial sectors. Similarly, among the 43 columns at *nível 50*, only 30 correspond to industrial sectors. The reduced 52 by 30 matrix is used for the following calculations.[5]

For the construction of sector-specific foreign input price indices, only relative weights for the input-absorbing sectors are needed. The columns of the input-output matrices provide these weights. Consider the input-output matrix $\mathbf{X}$ and call the entry in row i and column j x_{ij}. Then the matrix of weights $\mathbf{A}$ results by placing the entry $a_{ij} = x_{ij}/(\sum_i x_{ij})$ in cell (ij). The missing input-output matrices between 1986 and 1989 can now be constructed linearly. Calling every entry in the weights matrix in 1985 a_{ij}^{85} and every entry in the

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[4] *Nível 50* coincides with the first two digits of both *nível 80* and *nível 100*. See appendices C and D.

[5] This reduction disregards non-industrial inputs which are a very small fraction of total inputs in manufacturing.

1990 weights matrix a_{ij}^{90}, the intermediate weights for the years $t = 86, 87, 88, 89$ result as

$$a_{ij}^t = a_{ij}^{85} + (t - 85) \cdot \frac{a_{ij}^{90} - a_{ij}^{85}}{5}.$$

This procedure yields proper weights matrices for 1986 through 1989. Their columns sum to 1 (since $\sum_i (a_{ij}^{90} - a_{ij}^{85}) = 0$ and $\sum_i a_{ij}^{90} = 1$) and their values reflect linear changes in the input-output structure over the five-year period.[6]

4.4.2 Input Price Indices

Calling the vector of foreign final-goods price indices for month m in year t $\pi_{output}^{m,t}$, the vector of sector-specific input price indices results as

$$\pi_{input}^{m,t} = (\mathbf{A}^t)' \pi_{output}^{m,t}.$$

When departing from the sector-specific foreign input price series as constructed in section 3 (`foreign-mix.csv`), the vectors $\pi_{output}^{m,t}$ represent the 62 industrial sectors at *nível 100*. To make these 62 sectors conform to the 52 industrial sectors at *nível 80*, the price indices were averaged at *nível 50*, and $\pi_{output}^{m,t}$ was accordingly reduced to 52 rows. The weights matrix $\mathbf{A}^t$ has dimensions 52×30. So, the resulting input price vector $\pi_{input}^{m,t}$ has 30 rows—representing the 30 industrial sectors at *nível 50*.

4.5 File Contents

The file `input-defl-forppi2.csv` contains the foreign intermediate goods price series for an import-weighted and subsequently input-weighted mix of sector-specific and aggregate PPI, WPI and CPI foreign price series of Brazil's major 25 trading partners. (The construction of the underlying foreign price series is described in sections 1 through 3). Brazil's major 25 import source countries in 1995 account for 89.8 of all imports.

The file `input-defl-forppi2.csv` covers the years 1986 through 1998 and provides sector-specific foreign input price series at *nível 50*. The series are re-based to a value of 100 in January 1990.

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[6]The construction of a geometrically evolving series of input-output matrices proves infeasible with common micro-computer capacity. The RAM of a typical personal computer does not suffice to take the fifth root of the (30×30) square matrix $(\mathbf{A}^{85\prime}\mathbf{A}^{85})^{-1}\mathbf{A}^{85\prime}\mathbf{A}^{90}$.

input-defl-forppi2.csv (64 obs.)

	Variable	Description
1.	`ativ80`	Activity 80 (*Nível 50*)[a]
2.	`niv100`	Sector at *Nível 100*[b]
3.	`jan86`	Jan-86
4.	`feb86`	Feb-86
. . .		
158.	`dec98`	Dec-98

[a]Observations are: 30 activities at *nível 50*. See appendix D

[b]Observations are: 64 sectors at *nível 100*. See appendix C. Price index series are duplicated for respective sectors at *nível 100*

5 Foreign Price Indices for Capital Goods

Acquisitions of foreign capital goods may be best deflated using a selection of sector-specific foreign price indices (which can be transformed to domestic prices with an appropriate exchange rate).

5.1 Use

Just as is the case with foreign intermediate goods, prices of foreign capital goods may deviate from prices of domestic intermediates and are therefore needed to deflate foreign inputs separately. Such foreign capital-goods price series cannot be inferred from existing Brazilian price indices since the underlying quantity grids are not published. However, sector-specific foreign capital-goods price indices can be constructed from baskets of foreign producer (or wholesale) price index series for Brazil's trading partners. These price index series can be translated into domestic prices using the nominal exchange rates of major currencies. The resulting index series are adequate deflators for foreign capital goods.

There are five main types of investment flows:

1. machinery,

2. vehicles,

3. computers,

4. miscellaneous investment goods, and

5. total investment flows.

Foreign price indices for these types of gross investment flows are constructed, using the mean of adequate sector-specific foreign price indices.

5.2 Period Covered

The series cover the period 1986-1998.

Table 1: Price Indices for Types of Gross Investment Flows

Type	Name	Sectors (*nível 80*)[a]
1	machinery	801, 1001
2	vehicles	802, 1201, 1301
3	computers	1101
4	miscellaneous	1401, 3201
5	total	(capital formation weights)

[a]For a list of sectors at *nível 80*, see appendix D.

5.3 Data Sources

For the sector-specific OECD-wide PPI series underlying the present foreign input price series, see section 1. For the annual aggregate PPI-WPI-CPI series, see section 2. The basic foreign final-goods price series used to construct the present foreign input price series is an import-weighted series of those two original series (`foreign-mix.csv`, see section 3 for the import weighting).

Appendix E lists Brazil's major trading partners for imports in 1995. The initial final-goods price series for Brazil's 25 major trading partners are transformed using the input-output matrices for 1985, and 1990 through 1998 (as offered by *Fundação Instituto Brasileiro de Geografia e Estatística*), to arrive at the present foreign input price series.

5.4 Construction

Table 1 lists the sectors over which the according foreign price indices are averaged to obtain gross investment price indices. Appendix D shows the according sector definitions at *nível 80*.[7] The weights for the averages are obtained from the national capital formation vector for Brazil, as explained below.

5.4.1 Specific Investment Flows (Types 1 through 4)

Unweighted means of the according sector-specific indices (column 3 of table 1) are taken.

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[7]For that purpose, the finest possible mapping between *nível 80* and *nível 100* is derived through algorithms. Sectors 801 and 802, for instance, can be separated and correspond one-to-one to 810 and 820, respectively.

5.4.2 Total Investment Flows (Type 5)

Brazil does not dispose of sector-specific capital formation statistics. So, no sector-specific price indices can be constructed to deflate investment flows. However, the census bureau *IBGE* provides a "capital formation vector" for the economy as a whole. It is based on the industry classification at *nível 80* and lists the sector-specific output used in capital formation. The normalized entries in this capital formation vector serve as weights for a price index to deflate total gross investment. Capital formation vectors between 1986 and 1989 are missing. They can be constructed through linear interpolation. Calling an entry in the capital formation vector in 1985 a_{ij}^{85} and an entry in the 1990 vector a_{ij}^{90}, the intermediate entries for the years $t = 86, 87, 88, 89$ result as

$$a_{ij}^{t} = a_{ij}^{85} + (t - 85) \cdot \frac{a_{ij}^{90} - a_{ij}^{85}}{5}.$$

This procedure yields proper weights for 1986 through 1989, and their values reflect linear changes in the capital formation structure over the five-year period.

Calling the vector of output price indices for month m in year t $\pi_{output}^{m,t}$ and calling the vector of weights, derived from the capital formation vector, $\mathbf{a}^{t}$, the economy-wide gross investment flow price index results as

$$\pi_{investment}^{m,t} = (\mathbf{a}^{t})' \pi_{output}^{m,t},$$

a scalar.

When departing from the sector-specific foreign input price series as constructed in section 3 (`foreign-mix.csv`), the vectors $\pi_{output}^{m,t}$ represent the 62 industrial sectors at *nível 100*. To make these 62 sectors conform to the 52 industrial sectors at *nível 80*, the price indices were averaged at *nível 50*, and $\pi_{output}^{m,t}$ was accordingly reduced to 52 rows. The weights vector $\mathbf{a}^{t}$ has 52 rows.

5.5 File Contents

The file `capform-defl-forppi2.csv` contains the foreign price index series for the five groups of gross investment flows in table 1—on the basis of an import-weighted mix of sector-specific and aggregate PPI, WPI and CPI foreign price series of Brazil's major 25 trading partners. (The construction of the underlying foreign price series is described in sections 1 through 3; Brazil's major 25 import

source countries in 1995 account for 89.8 percent of all imports.) The file `capform-defl-forppi2.csv` covers the years 1986 through 1998. The indices are re-based to 100 in January 1990.

capform-defl-forppi2.csv (5 obs.)

	Variable	Description
1.	`captype`	Type of Capital[a]
2.	`jan86`	Jan-86
3.	`feb86`	Feb-86
...		
157.	`dec98`	Dec-98

[a]Observations are: *computers*, *machinery*, *vehicles*, *other*, and *total*.

Appendix: Sectors of Industry

The definition of sectors of industry according to *nível 100* would roughly correspond to a three-digit *SIC* level in the US. Before gradually being substituted by *CNAE* (*Classificação Nacional de Atividades Empresariais*) during the nineties, *nível 100* was used to classify Brazilian economic activity at the micro-level. However, the national accounting system uses a classification system called *nível 80* which aggregates several manufacturing sectors in a slightly different way. Both *nível 100* and *nível 80* use a number system with four digits. The first two digits are identical in both systems (usually called *atividade 80*, *atividade 100*, or *nível 50*) and provide the simplest manner to move from *nível 100* to *nível 80*, and vice versa.

A   Compatibility between *Nível 100* and *OECD* sector definitions

The OECD-wide *Indicators of Industry and Services* are based on a small number of high-level sector definitions. The following list shows how these OECD definitions were transformed into *nível 100*. Several OECD sectors were mapped to more than one *nível 100* sector.

Nív.100	OECD	OECD sector description
2	210	Mining and quarrying
2	220	Mining and quarrying
2	310	Mining and quarrying
2	320	Mining and quarrying
3	3210	Manufacturing
31	2510	Food, beverages and tobacco
31	3010	Food, beverages and tobacco
31	3020	Food, beverages and tobacco
311.2	2610	Food
311.2	2620	Food
311.2	2630	Food
311.2	2640	Food
311.2	2710	Food
311.2	2720	Food
311.2	2810	Food

Nív.100	OECD	OECD sector description
311.2	2910	Food
311.2	3110	Food
311.2	3120	Food
313	3130	Beverages
314	2650	Tobacco
321	2210	Textile
321	2220	Textile
321	2230	Textile
322	2310	Wearing apparel (except footwear)
323	2410	Leather
324	2420	Footwear
33	1410	Wood and wood products
33	1420	Wood and wood products
3411	1510	Pulp, paper and paperboard
3411	1520	Pulp, paper and paperboard
342	1530	Printing, publishing and allied industry
35	1610	Chemicals industries
35	2010	Chemicals industries
35	2020	Chemicals industries
35	2110	Chemicals industries
35	2120	Chemicals industries
351.2	1710	Chemicals and chemicals products
351.2	1720	Chemicals and chemicals products
351.2	1910	Chemicals and chemicals products
351.2	1920	Chemicals and chemicals products
353	1810	Petroleum refineries
353	1820	Petroleum refineries
353	1830	Petroleum refineries
36	410	Non-metallic mineral products
36	420	Non-metallic mineral products
36	440	Non-metallic mineral products
362	430	Glass and glass products
371	510	Iron and steel
372	610	Non-ferrous metals
381	710	Metal products
381	720	Metal products
382	810	Machinery (except electrical)

Nív.100	OECD	OECD sector description
382	820	Machinery (except electrical)
382	910	Machinery (except electrical)
383	1010	Electrical machinery
383	1020	Electrical machinery
383	1030	Electrical machinery
383	1110	Electrical machinery
383	1120	Electrical machinery
384	1330	Transport equipment
384	1340	Transport equipment
3841	1320	Shipbuilding and repairing
3843	1210	Motor vehicles
3843	1310	Motor vehicles

B   Compatibility between *Nível 100* and *CNAE*

In recent years, Brazilian production has mostly been classified according to *CNAE* (*Classificação Nacional de Atividades Empresariais*) which comes closer to the international U.N. classification. The following list shows how *CNAE* can be transformed into *nível 100* according to an internal recommendation at *IBGE*.

Nív.100	CNAE
210	1310, 1321, 1322, 1323, 1324, 1325, 1329
220	1410, 1421, 1429
310	1110, 1120
320	1000
410	2620
420	2630
430	2611, 2612, 2619
440	2641, 2642, 2649, 2691, 2692, 2699
510	2711, 2712, 2721, 2722, 2729
610	2741, 2742, 2749, 2752, 2832
710	2751, 2831
720	2731, 2739, 2811, 2812, 2833, 2834, 2839, 2841, 2842, 2843, 2891, 2892, 2893, 2899

Nív.100	_CNAE_
810	2813, 2821, 2822, 2911, 2912, 2913, 2914, 2915, 2921, 2922, 2923, 2924, 2925, 2929, 2931, 2940, 2951, 2952, 2961, 2962, 2963, 2964, 2965, 2969, 2971, 2972
820	2932, 2953, 2954
1010	3111, 3112, 3113, 3121, 3122
1020	3130, 3141, 3151, 3152, 3191
1030	2981, 2989, 3011, 3199
1110	3012, 3021, 3022, 3192, 3210, 3221, 3222, 3330
1120	3230
1210	3410, 3420, 3431, 3432, 3439
1310	3142, 3160, 3441, 3442, 3443, 3444, 3449, 3450
1320	3511, 3512
1330	3521, 3522, 3523
1340	3531, 3532, 3591, 3592, 3599
1410	2010, 2021, 2022, 2023, 2029
1420	3611, 3612, 3613, 3614
1510	2110
1520	2121, 2122, 2131, 2132, 2141, 2142, 2149
1530	2211, 2212, 2213, 2214, 2219, 2221, 2222, 2229, 2231, 2232 2233, 2234
1610	2511, 2512, 2519
1710	2411, 2414, 2419, 2429
1720	2340
1810	2320
1820	2421, 2422
1830	2431, 2432, 2433, 2441, 2442
1910	2412, 2413
1920	2461, 2462, 2463, 2469, 2472, 2481, 2482, 2483, 2491, 2492, 2493, 2494, 2496, 2499, 2310, 2330
2010	2451, 2452, 2453, 2454
2020	2471, 2473
2110	2521
2120	2522, 2529
2210	1711, 1719, 1721, 1722, 1731, 1732
2220	1723, 1733
2230	1724, 1741, 1749, 1750, 1761, 1762, 1763, 1764, 1769, 1771 1772, 1779

Nív.100	CNAE
2310	1811, 1812, 1813, 1821, 1822
2410	1910, 1921, 1929
2420	1931, 1932, 1933, 1939
2510	1571, 1572
2610	1551
2620	1552
2630	1521, 1522, 1523, 1585
2640	1553, 1554, 1555, 1559, 1583
2650	1600
2710	1511, 1513
2720	1512
2810	1541, 1542
2910	1561, 1562
3010	1531
3020	1532, 1533
3110	1556
3120	1422, 1514, 1543, 1581, 1582, 1584, 1586, 1589
3130	1591, 1592, 1593, 1594, 1595
3210	2495, 3310, 3320, 3340, 3350, 3691, 3692, 3693, 3694, 3695, 3696, 3697, 3699, 3710, 3720

C *Nível 100* definitions

Nível 100	English description
2	**Mineral Mining (except combustibles)**
210	Metal Ore Mining
220	Nonmetallic Minerals Mining
3	**Petroleum and Gas Extraction and Coal Mining**
310	Petroleum and Gas Extraction
320	Coal Mining
4	**Nonmetallic Mineral Goods Manufacturing**
410	Cement Manufacturing
420	Cement, Concrete and Gypsum Product Manufacturing
430	Glass and Glass Product Manufacturing
440	Nonmetallic Mineral Product Manufacturing
5	**Iron and Steel Production and Processing**
510	Iron and Steel Production and Processing
6	**Nonferrous Metals Production and Processing**
610	Nonferrous Metals Production and Processing
7	**Other Metal Products Manufacturing**
710	Iron and Steel Foundries and Forgings
720	Other Metal Products Manufacturing
8	**Machinery, Equipment and Commercial Installation Manufacturing (including parts and accessories)**
810	Machinery, Equipment and Commercial Installation Manufacturing (including parts and accessories)
820	Road Construction Machinery and Tractor Manufacturing
9	**Machinery Maintenance, Repairing and Installation**
910	Machinery Maintenance, Repairing and Installation
10	**Electrical Equipment and Components Manufacturing**
1010	Electrical Products Manufacturing for Power Generation and Distribution

Nível 100	English description
1020	Electric Conductor and Other Electrical Device Manufacturing (except for vehicles)
1030	Electric Appliance and Equipment Manufacturing (including household appliances, office machinery, parts and accessories)
11	**Electronic Equipment and Communication Apparatus Manufacturing**
1110	Electronic Components, Electronic Equipment and Communication Apparatus Manufacturing
1120	Audio and Video Equipment Manufacturing
12	**Automobile, Truck and Bus Manufacturing**
1210	Automobile, Truck and Bus Manufacturing
13	**Other Transportation Equipment and Vehicle Parts Manufacturing**
1310	Motor Vehicle Engine and Parts Manufacturing
1320	Ship and Boat Building (including repairing)
1330	Railroad Rolling Stock Manufacturing and Repairing
1340	Other Transportation Equipment Manufacturing
14	**Wood Sawing, Wood Products and Furniture Manufacturing**
1410	Wood Sawing and Wood Products Manufacturing
1420	Furniture Manufacturing
1430	Peat Production
15	**Paper Manufacturing, Publishing and Printing**
1510	Pulp and Paper Production
1520	Pulp, Paper and Paperboard Products Manufacturing
1530	Publishing and Printing
16	**Rubber Product Manufacturing**
1610	Rubber Product Manufacturing
17	**Non-petrochemical Chemical Manufacturing**
1710	Non-petrochemical Chemical Manufacturing

Nível 100	English description
1720	Alcohol Production
18	**Petroleum Refining and Petrochemical Manufacturing**
1810	Petroleum Refining
1820	Basic and Intermediate Petrochemical Manufacturing
1830	Resins, Artificial and Synthetic Fibers and Elastomers Manufacturing
19	**Miscellaneous Chemical Products Manufacturing**
1910	Fertilizer Manufacturing
1920	Miscellaneous Chemical Product Manufacturing
20	**Pharmaceutical Products, Perfumes and Detergents Manufacturing**
2010	Pharmaceutical Manufacturing
2020	Perfumes, Detergents and Candles Manufacturing
21	**Plastics Products Manufacturing**
2110	Laminated Plastics Plate and Pipe Manufacturing
2120	Plastics Products Manufacturing
22	**Textiles Manufacturing**
2210	Natural Fabric Processing, Weaving, Knitting and Finishing
2220	Artificial and Synthetic Fabric Weaving, Knitting and Coating
2230	Other Textiles Manufacturing
23	**Apparel and Apparel Accessories Manufacturing**
2310	Apparel and Apparel Accessories Manufacturing
24	**Footwear and Leather and Hide Products Manufacturing**
2410	Leather and Hide Products and Luggage Manufacturing
2420	Footwear Manufacturing
25	**Coffee Manufacturing**
2510	Coffee Manufacturing
26	**Plant Product Processing (including tobacco)**
2610	Rice Milling and Processing
2620	Wheat Milling

Nível 100	English description
2630	Fruit and Vegetable Processing and Canning (including juice and spices manufacturing)
2640	Other Grains and Seeds Milling and Plant Product Manufacturing
2650	Tobacco Product Manufacturing
27	**Slaughtering and Meat Processing**
2710	Animal (except poultry) Slaughtering and Meat Processing
2720	Poultry Slaughtering and Processing
28	**Fluid Milk and Dairy Product Manufacturing**
2810	Fluid Milk and Dairy Product Manufacturing
29	**Sugar Manufacturing**
2910	Sugar Manufacturing
30	**Seed Oil Refining and Food Fats and Oils Processing**
3010	Oilseed Milling
3020	Seed Oil Refining and Food Fats and Oils Processing
31	**Other Food and Beverage Manufacturing**
3110	Animal Feeds Manufacturing
3120	Other Food Manufacturing
3130	Beverage Manufacturing
32	**Miscellaneous Other Products Manufacturing**
3210	Miscellaneous Other Products Manufacturing

D *Nível 80* definitions

A list of *IBGE*'s English descriptions of sectors at *nível 80* follows below.

Nív.80	Nív.50	English Description of Sector
201	2	Iron ore mining
202	2	Mining of other metals
301	3	Oil and gas production
302	3	Coal and other mining
401	4	Non-metallic mineral products
501	5	Basic metallic products
502	5	Rolled steel
601	6	Non-ferrous metallic products
701	7	Other metallic products
801	8	Manufacturing and maintenance of machinery and equipment
802	8	Tractors and embankment machinery
1001	10	Electrical equipment
1101	11	Electronic equipment
1201	12	Automobiles, trucks, and buses
1301	13	Other vehicles and parts
1401	14	Wood and furniture
1501	15	Paper, pulp, and cardboard
1601	16	Rubber products
1701	17	Non-petrochemical chemical elements
1702	17	Alcohol
1801	18	Motor gasoline
1802	18	Fuel oil
1803	18	Other refinery products
1804	18	Basic petrochemical products
1805	18	Resins and fibers
1806	18	Alcoholic fuel
1901	19	Chemical fertilizers
1902	19	Paints, varnishes, and lacquers
1903	19	Other chemical products
2001	20	Pharmaceutical and perfumery products
2101	21	Plastics

Nív.80	Nív.50	English Description of Sector
2201	22	Natural textile fibers
2202	22	Natural textiles
2203	22	Artificial textile fibers
2204	22	Artificial textiles
2205	22	Other textile products
2301	23	Apparel
2401	24	Leather products and footwear
2501	25	Coffee products
2601	26	Processed rice
2602	26	Wheat flour
2603	26	Other processed edible products
2701	27	Meat
2702	27	Poultry
2801	28	Processed milk
2802	28	Other dairy products
2901	29	Sugar
3001	30	Raw vegetable oil
3002	30	Processed vegetable oil
3101	31	Animal food and other food products
3102	31	Beverages
3201	32	Miscellaneous

E Brazil's Major Trading Partners in 1995

Brazil's major source countries for imports in 1995 are listed in the following table.[8] The top 3 import sources make up for 45.1 percent of total Brazilian imports. The top 25 trading partners comprise 89.8 percent. These 25 countries were selected for the construction of the foreign price series. Brazil's top 50 import origins make up for 97.9 percent. These shares remain quite stable throughout the 1990s.

	Country (Aladi, Spanish)	Import share in 1995
1.	Estados Unidos	.23910
2.	Argentina	.10907
3.	Alemania	.10288
4.	Italia	.05995
5.	Japón	.05171
6.	Francia	.02678
7.	Corea Sur, Rep. de	.02450
8.	Arabia Saudita	.02403
9.	Canadá	.02315
10.	Chile	.02245
11.	Suiza	.02068
12.	Uruguay	.01896
13.	Reino Unido	.01874
14.	Hong Kong	.01721
15.	Venezuela	.01698
16.	México	.01595
17.	Paises Bajos	.01561
18.	España	.01552
19.	Bélgica	.01466
20.	Taiwán (Formosa)	.01277
21.	Suecia	.01139
22.	Singapur	.01128
23.	Paraguay	.01007

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[8]*Source*: Aladi, Associação Latino-Americana de Integração.
(http://www.aladi.org/nsfaladi/sitio.nsf/vsitioweb/comerciop).

	Country (Aladi, Spanish)	Import share in 1995
24.	China	.00793
25.	Panamá	.00670
26.	Kuwait	.00569
27.	Sudáfrica, Rep. de	.00553
28.	Australia	.00515
29.	Malasia	.00486
30.	Irán, R. Islamica del	.00484
31.	Argelia	.00481
32.	Finlandia	.00445
33.	Noruega	.00432
34.	Perú	.00412
35.	Portugal	.00358
36.	Dinamarca	.00353
37.	Rusia	.00350
38.	Polonia	.00302
39.	India	.00262
40.	Puerto Rico	.00261
41.	Yemen	.00258
42.	Israel	.00243
43.	Indonesia	.00241
44.	Irlanda (Eire)	.00227
45.	Tailandia	.00222
46.	Bermudas	.00151
47.	Pakistán	.00135
48.	Antillas Holandesas	.00134
49.	Marruecos	.00109
50.	Nigeria	.00108
51.	Rumania	.00108
52.	Guinea	.00107

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