# Aggregate Dynamics in Lumpy Economies

*Data Appendix: Not For Publication*

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# A Data description

The objective of the empirical work is to construct the capital stock series at the firm level in order to identify the lumpiness associated to its dynamics. This section describe the sources, the construction of variables, and the filters we apply to clean the data.

**Chile.** The data comes from the *Encuesta Nacional Industrial Anual* (ENIA). The sample period covers 17 years, from 1995 to 2011, with an average of 744 manufacturing plants per year. From an overall number of plant-year observations of 87,191, we first drop the 3,373 permanently small firms (i.e. with less than 10 workers throughout the sample period, about 4% of sample). This filter is motivated by the lack of good quality data with respect to these firms since ENIA is directed to plant with more than 10 workers. Second, we drop 3,101 observations with non-positive total value of book capital, wage bill or sales (about 3.5% of the sample). Third, we drop 7,070 observations that had a frequency of non-zero investment lower than 10% of the sample period (about 8% of the sample). Finally, we drop plants with less than 3 years of coverage (about 6% of the sample). Note that we consider as new plants (and give a new ID) those that disappear from the sample more than three years and reappear in the sample after that. In total, we drop about 22% of the year-plant observations and keep 68,441 observations. Within this remaining sample, a balanced panel would maintain 23% of observations or 15,691 plant-years.

The following table summarizes the data cleaning process, providing the number of plant-year observations dropped in each step.

**Table I** – Data cleaning

| **Description** | **Chile** | **Colombia** |
|---|---|---|
| Start year | 1979 | — |
| End year | 2011 | — |
| Avg. number of plants per year | 543 | — |
| Plant-year observations | 154591 | — |
| Cleaning | Number of removed obs. | |
| Less than 10 employees | 3984 | — |
| Non-positive wage bill, capital, or sales | 5659 | — |
| Frequency of non-zero investment less than 10 | 12781 | — |
| Less than 3 years of coverage | 6222 | — |
| Remaining observations | 125945 | — |
| % of total | 81 | — |
| With more than 10 years of data | 98327 | — |
| % of remaining observations | 78 | — |

Sources: Authors calculations using establishment-level survey data from Chile and Colombia. Less than 10 employees refers to plants with less than 10 employees for all the years in the sample.

## A.1 Perpetual Inventory Method

In order to deal with reporting and measurement errors in the surveys, we construct capital series using the standard perpetual inventory method (PIM).

**Capital stocks** Let firm's $i$ stock of capital of type $j$ on year $t$ be given by:

$$K_{i,j,t} = (1 - \delta_j)K_{i,j,t-1} + \frac{I_{i,j,t}}{D_{j,t}} \quad \text{for } K_{i,j,t_0} \text{ given.} \tag{A.1}$$

We consider the following elements to construct the capital series:

- Capital types considered are $j \in \{\text{structures}, \text{machinery and equipment}, \text{vehicles}\}$.
- Gross investment: $I_{i,j,t}$ is gross nominal investment into capital of type $j$ at time $t$, and it is based on the information on purchases, reforms and improvements, and sales of fixed assets reported by each plant in the ENIA and EAM data sets.

$$I_{i,j,t} = puchases_{i,j,t} + reforms_{i,j,t} + improvements_{i,j,t} - sales_{i,j,t} \tag{A.2}$$

  See Section A.2 for details and one alternative way to construct investment using reported data.

- Depreciation rate: $\delta_j \in (0,1)$ is a type-specific time-invariant depreciation rate described in Table II. See Section A.3 for details.

**Table II** – Depreciation rates

| | Structures | Machinery & Equipment | Vehicles |
|---|---|---|---|
| Chile | 3 % | 11 % | 15 % |
| Colombia | 5 % | 10 % | 20 % |

- Price deflators: $D_{j,t}$ are gross fixed capital formation deflators by capital type from Penn World Tables (PWT). See Section A.4 for details.
- Initial capital: $K_{i,j,t_0}$ is given by:

$$K_{i,j,t_0} = \frac{\tilde{K}_{i,j,t_0}}{D_{t_0}} \quad \text{if } \tilde{K}_{i,j,t_0} \geq 0, \tag{A.3}$$

  where $\tilde{K}_{i,j,t_0}$ is firm $i$'s self-reported nominal stock of capital of type $j$ at current prices on the starting year $t_0 = t_{0,i,j}$, which is the first year in which firm $i$ reports a non-negative capital stock of type $j$.

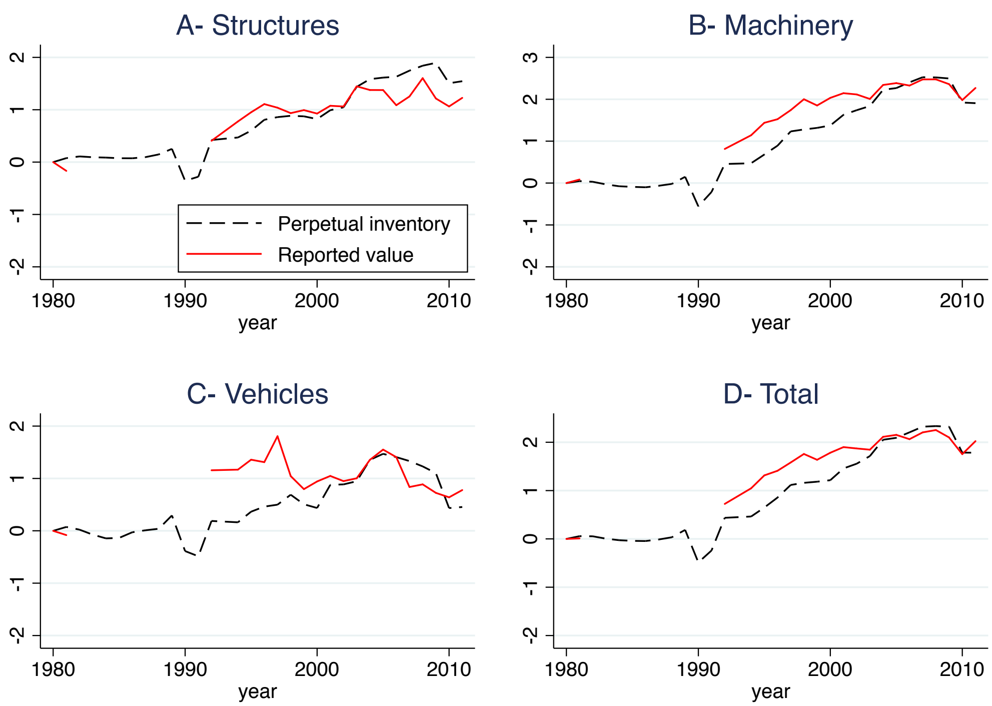
**Investment rates** Once we construct the investment and capital stock series, we generate the investment rate $i_{i,j,t}$ by dividing investment by initial capital:

$$i_{i,j,t} = \frac{I_{i,j,t}}{K_{i,j,t}}, \tag{A.4}$$

**Outliers.** In both countries, once we generate the series of investment rates, we eliminate 2% of observations considered outliers, with investment rates below the 1st percentile and above the 99th percentile of the investment rate distribution.

Figure I plots the aggregate capital stock computed with the perpetual inventory method and compares it to the reported book value. We observe that, in the aggregate, the reported book value is consistent with the PIM series, for each capital-type and for the total stock. This shows the good quality of the micro-data. Moreover, given the similarity in the series, we validate our choice of using the initial book value reported by the a plant as the initial condition for the PIM construction.

**Figure I** – Reported Book Value vs Perpetual Inventory in Chile




Notes: Aggregate capital stock in manufacturing sector reported by plants and computed through the PIM. All the variables are in logs and real terms, normalized to zero in 1980.

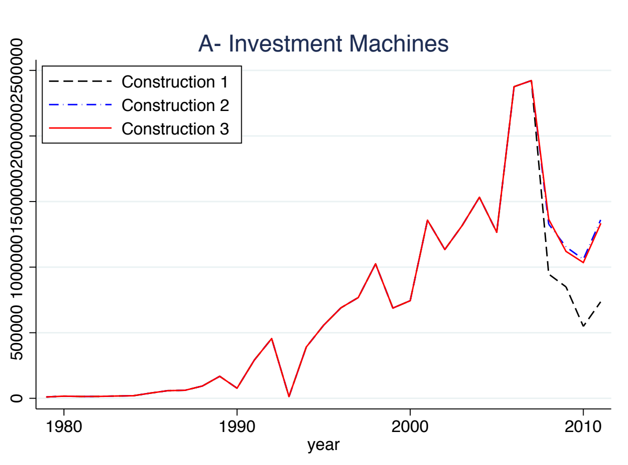
## A.2 Investment and Capital Stocks

**Chile.** Table A.I describes the variables from the *Encuesta Nacional Industrial Anual* used to construct the firms' gross investments on structures, vehicles and machinery. In the case of structures and vehicles (purchases of new and old buildings, sales of used buildings, and the value of works in progress) definitions and availability of variables are similar across years without substantial changes. The only exception is in 2008 and 2009, in which reforms and improvements are not disaggregated, but since we focus on totals, there is no substantial change in the definition. The value of works in progress is included for the available years—from 1996 to 2011.

When constructing machinery and equipment, we take into account a substantial change in the way the data is disaggregated. The period 1995-2007 disaggregates the data into 4 categories: i) land, ii) buildings, iii) vehicles, and iv) machinery, equipment and others; in contrast, for the period 2008-2011, there are two additional categories considered, namely (v) furniture and supplies and vi) software. We include furniture and supplies in machinery, and exclude software all together from the analysis. Figure II explains our choice. It plots investment and capital stock of machinery under three alternative ways to construct machinery. Construction 1 (C1) only considers machinery and equipment, Construction 2 (C2) adds furniture and supplies, and Construction 3 (C3) adds software. After 2008, we observe a permanent drop in C1 (this drop happens before the 2008-2009 Chilean recession, so cannot be fully attributed to it). The drop is mitigated under C2, which is almost identical to C3. Since we do not see a substantial change in the dynamics of machinery when adding software, we exclude this item for constructing the capital stock for machinery.

There is a new category of investment for different type of capitals after 2008: Retirement due to capital obsolescence, dismantling, abandonment or conversion to scrap. We do not use this variable for constructing investment for two reasons. First, this variables is only available after 2008, an small part of our sample. Second, this variable is included in the perpetual inventory method whenever we consider depreciation.

**Figure II** – Machinery: Investment, Alternative Specifications




Notes: The figure describes aggregate investment in millions of pesos under different specifications for *machinery*. Black dashed line (construction 1) describes the construction of investment and capital machines using only variables associated with machines and equipment. Blue dashed-dotted line (construction 2) describes the construction of investment and capital machines using variables associated with machines and equipment, furniture and supplies and others. Red solid line (construction 3) adds variables associated with software.

**Colombia.** Table A.II describes the variables from the *Encuesta Anual Manufacturera* used to construct the firms' capital stock. Again, we focus on three types of capital: structures, vehicles and machinery. For

**Table A.I** – Construction of Capital Stock: Chile

| Label | Short description | Years in data |
|---|---|---|
| Construction of Investment in Structures | | |
| + cbnedi | Purchase of new goods: buildings | 1979-2011 |
| + cbuedi | Purchase of used goods: buildings | 1979-2011 |
| − vbuedi | Sale of used goods: buildings | 1979-2011 |
| + refedi | Reforms and improvements made by third parties: buildings | 1979-2007/2010-2011 |
| + vbnedi | Reforms and improvements made by the establishment: buildings | 1979-2007/2010-2011 |
| + rmedi | Reforms and improvements: buildings | 2008-2009 |
| + vocedi | Value of works in progress: buildings | 1996-2011 |
| Construction of Investment in Vehicles | | |
| + cbnveh | Purchase of new goods: vehicles | 1979-2011 |
| + cbuveh | Purchase of used goods: vehicles | 1979-2011 |
| − vbuveh | Sale of used goods: vehicles | 1979-2011 |
| +refveh | Reforms and improvements made by third parties: vehicles | 1979-2007/2010-2011 |
| + vbnveh | Reforms and improvements made by the establishment: vehicles | 1979-2007/2010-2011 |
| + rmveh | Reforms and improvements: vehicles | 2008-2009 |
| + vocveh | Value of works in progress: vehicles | 1996-2011 |
| Construction of Investment in Machinery | | |
| + cbnmaq | Purchase of new goods: machines, equipment etc. | 1979-2011 |
| + cbumaq | Purchase of used goods: machines, equipment etc. | 1979-2011 |
| − vbumaq | Sale of used goods: machines, equipment etc. | 1979-2011 |
| + refmaq | Reforms and improvements made by third parties: machines, equipment etc. | 1979-2007/2010-2011 |
| + vbnmaq | Reforms and improvements made by the establishment: machines, equipment etc. | 1979-2007/2010-2011 |
| + rmmaq | Reforms and improvements: machines, equipment etc. | 2008-2009 |
| + vocmaq | Value of works in progress: machines, equipment etc. | 1996-2011 |
| + cbnmue (+cbnotr) | Purchase of new goods: furniture and supplies (etc.) | 2008-2011 |
| + cbumue (+cbuotr) | Purchase of used goods: furniture and supplies (etc.) | 2008-2011 |
| − vbumue (+cbuotr) | Sale of used goods: furniture and supplies (etc.) | 2008-2011 |
| + refmue | Reforms and improvements made by third parties: furniture and supplies | 2010-2011 |
| + rmmue (+rmotr) | Reforms and improvements: furniture and supplies (etc.) | 2008-2009 |
| + vocmue (+vocotr) | Value of works in progress: furniture and supplies (etc.) | 2008-2011 |
| + vbnmue | Reforms and improvements made by the establishment: furniture and supplies | 2010-2011 |

Notes: The table describes the variables used in the construction of the different types of capital. Machinery includes machinery, equipment and others, and for 2008-2011, it also includes furniture and supplies; we do not include software and intangibles.

all types of capital, we add up the purchase of new and old assets, costs and expenses of assets produced or built for own use, the value of upgrades and improvements of assets, and the acquisitions, transfers received and goods produced for own use; then we subtract the book value of sold assets and sales, withdrawals and adjusted transfers. The acquisitions, transfers received and goods produced for own use as well as withdrawals and adjusted transfers are only available for the earlier period of 1996-2003.

**Table A.II** – Construction of Capital Stock: Colombia

| Label | Short description | Years in data |
|---|---|---|
| Construction of Investment in Structures | | |
| + C7C2R2 | Purchase of assets – new – buildings and structures | 2004-2016 |
| + C7C2R3 | Purchase of assets – used – buildings and structures | 2004-2016 |
| + C7C2R4 | Costs and expenses of assets produced or built for own use – buildings and structures | 2004-2016 |
| + C7C2R7 | Value of upgrades and improvements of assets – buildings and structures | 2004-2016 |
| − C7C2R12 | Book value of sold assets – buildings and structures | 2004-2016 |
| + C7R1C2 | Acquisitions, transfers received and goods produced for own use – buildings and structures | 1996-2003 |
| − C7R1C5 | Sales, withdrawals and adjusted transfers – buildings and structures | 1996-2003 |
| Construction of Investment in Vehicles | | |
| + C7C6R2 | Purchase of assets – new – transportation equipment | 2004-2016 |
| + C7C6R3 | Purchase of assets – used – transportation equipment | 2004-2016 |
| + C7C6R4 | Costs and expenses of assets produced or built for own use – transportation equipment | 2004-2016 |
| + C7C6R7 | Value of upgrades and improvements of assets – transportation equipment | 2004-2016 |
| − C7C6R12 | Book value of sold assets – transportation equipment | 2004-2016 |
| + C7R8C2 | Acquisitions, transfers received and goods produced for own use – transportation equipment | 1996-2003 |
| − C7R8C5 | Sales, withdrawals and adjusted transfers – transportation equipment | 1996-2003 |
| Construction of Investment in Machines | | |
| + C7C6R2 | Purchase of assets – new – machinery and industrial equipment | 2004-2016 |
| + C7C6R3 | Purchase of assets – used – machinery and industrial equipment | 2004-2016 |
| + C7C6R4 | Costs and expenses of assets produced or built for own use – machinery and industrial equipment | 2004-2016 |
| + C7C6R5 | Value of machinery under assembly during the year – used – machinery and industrial equipment | 2004-2016 |
| + C7C6R6 | Value of machinery under assembly during the year – used – machinery and industrial equipment | 2004-2016 |
| + C7R6C2 | Acquisitions, transfers received and goods produced for own use – machinery and industrial equipment | 1996-2003 |
| − C7R6C5 | Sales, withdrawals and adjusted transfers – machinery and industrial equipment | 1996-2003 |

Notes: The table describes the variables used in the construction of the different types of capital. Machines incorporate machines, equipment and others, and takes into account the change in the survey in the time period 2008-2011. In these periods, we include other type of asset and we do not include software and intangible .

**Correcting observations with payment dues.** We identify one challenge within the Chilean dataset. For some plants, there is a sequence of almost identical positive investments that share similar growth rates across firms. These payments are not associated with the rental of capital services, since there is a specific variable that captures rents and it is not correlated with these types of investments. We understand this information as payment dues: an increase in the capital stock that is registered in fractions spread through several years for book-keeping purposes (the small differences in value are part of monetary adjustments). For these reason, we substitute this investments by summing them up and assigning them to the first date in which we observe a substantial increase in the book value of this asset. The key assumption that capital is integrated into the firm's production at that first investment date. Table V describes two examples for different plants of investments in structures and machines. Table VI describes the percentage of observations with this problem, which is small.

**Table V** – Example of correction of payment dues: Chile

| Year | Inv. structures | Book value struc. | Redefined struc. | Inv. machines | Book value mach. | Redefined mach. |
|---|---|---|---|---|---|---|
| 1995 | 2274 | 3911 | 16077 | 393 | 30536 | 2381 |
| 1996 | 2279 | 3931 | 0 | 394 | 30689 | 0 |
| 1997 | 2290 | 3951 | 0 | 396 | 30842 | 0 |
| 1998 | 2299 | 3967 | 0 | 399 | 30965 | 0 |
| 1999 | 2304 | 3975 | 0 | 401 | 31027 | 0 |
| 2000 | 2313 | 3991 | 0 | -377 | 31151 | -377 |
| 2001 | 2318 | 3991 | 0 | 624 | 29035 | 624 |
| 2002 | 2378 | 6878 | 2378 | 0 | 21722 | 0 |
| 2003 | 2445 | 10068 | 2445 | – | – | – |
| 2004 | 2472 | 11356 | 2472 | – | – | – |

**Table VI** – Number of Observation with Payment Dues

| | Structures | Machinery | Vehicle |
|---|---|---|---|
| Percentage of obs. with constant inv. | 0.27% | 1.05% | 0.36% |

## A.3 Depreciation rates

In this section we explain the choices for type-specific depreciation rates used for each country. While it is standard in the literature to use 5% for structures, 10% for machinery and 20% for vehicles (see Oberfield (2013)), we decide to use country-specific information and different sources to set their values.

**Chile.** For the case of Chile, Henríquez (2008) uses tax records and other studies to obtain the average duration of different types of capital goods, as replicated here in Table VII, and derive implied geometric depreciation rates of 1.8%, 7.2% and 6%, respectively. These numbers are much smaller than the standard ones referred above. We also construct depreciation rates by capital type using information on capital stocks from the Penn World Tables (PWT) and from National Accounts, which yield higher rates than in Henríquez (2008). With this information, we decide to take middle values across sources, yielding 3% for structures, 11% for machinery and 15% for vehicles, respectively.

**Table VII** – Capital Depreciation in Chile

| **Sources** | **Structures** | **Machinery** | **Vehicles** |
|---|---|---|---|
| Standard values | | | |
| Geometric Depreciation | 0.05 | 0.1 | 0.2 |
| Henríquez (2008) | | | |
| Lifetime 1974-1984 | 60 | 16 | 18 |
| Lifetime 1985-1995 | 56 | 14 | 17 |
| Lifetime 1996-2002 | 52 | 12 | 15 |
| Lifetime 2003-2005 | 50 | 11 | 15 |
| Average Lifetime | 55.87 | 13.93 | 16.67 |
| Geometric Depreciation (1974-2005) | 0.018 | 0.072 | 0.06 |
| PWT | | | |
| Geometric Depreciation (1979-2014) | 0.025 | 0.155 | 0.224 |
| National Accounts | | | |
| Geometric Depreciation (1985-2011) | 0.029 | 0.12 | - |

Notes: Depreciation rates by capital type in Chile across different sources. Average life of machinery means average life of electric machinery.

**Colombia.** We obtain average depreciation rates in Colombia by type of capital from Pombo (1999). The table also shows the imputed depreciation rates in the PWT and National Accounts.

**Table VIII** – Capital Depreciation in Colombia

| | Buildings | Machinery | Vehicles |
|---|---|---|---|
| Pombo (1999) | | | |
| Cross-sectoral mean, observed (1974-1994) | 0.045 | 0.112 | 0.186 |
| PWT | | | |
| Geometric Depreciation (1980-2014) | 0.025 | 0.139 | 0.189 |
| National Accounts | | | |
| Geometric Depreciation (1985-2011) | | | |

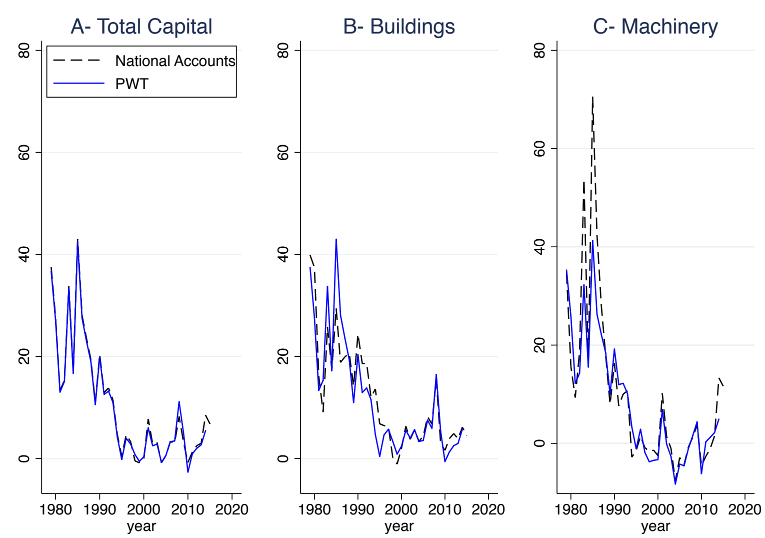
Notes: The table describes depreciation rates across different sources for Colombia.

## A.4 Deflators by capital types

We use the Penn World Table (PWT) investment deflators by capital type, see Feenstra, Inklaar and Timmer (2015).[1] There are two advantages of using PWT prices instead of National Accounts. First, they are consistent with the investment types in our micro-data, and second, their methodological construction is consistent across countries and time. We verify that the data is consistent between National Accounts and PWT for the period of analysis for total capital stock and for each capital type.

Figures III and IV describe investment inflation for different capital categories.[2] We compute total investment inflation from PWT using the prices indexes for structures, machinery, vehicles and other, together with their total nominal expenditure to construct their relative weights. In National Accounts, we use "formación bruta de capital". In the case of Chile, National Accounts does not provide separately the vehicles category.

**Figure III** – Capital Inflation in Chile

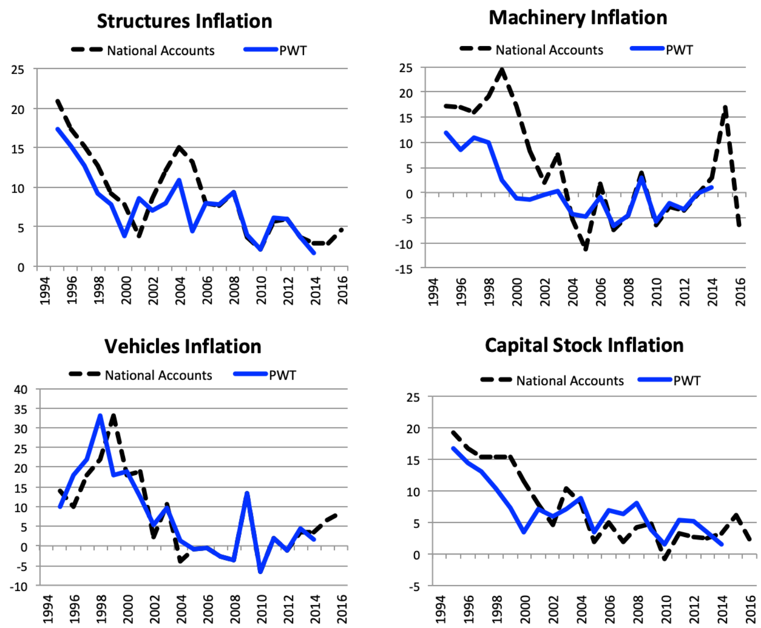



Notes: Panels A, B and C describe inflation of total capital stock, structures and machinery. Black dashed line describes inflations computed from National Accounts and blue solid line describes inflations computed from PWT.

[1]PWT data is downloaded from here.

[2]The Chilean National Account data can be downloaded from here and for some years, the data is found in the "Anuario de Cuentas Nacionales" here.

**Figure IV** – Capital Inflation in Colombia




Notes: Inflation of total capital stock, structures, machinery and vehicles. Black dashed lines describe inflation computed from National Accounts and blue solid lines describe inflation computed from PWT.

## A.5 Comparison with National Accounts

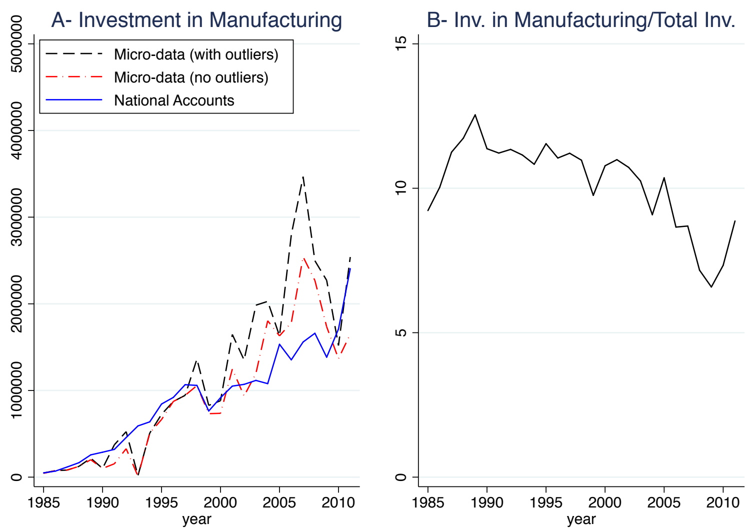
This section verifies that the information contained in the survey data is consistent with aggregated information from National Accounts.

**Chile.** The national account office in Chile uses the ENIA survey as a source to compute several indices, such as variations in inventories or value added by type of industry. Nevertheless, National Accounts does not use ENIA to compute total investment or investment in the manufacturing sector; for that purpose, it uses sources related to the supply of capital goods (i.e., balance of payments, national statistical institute, Corporacion de Desarrollo Tecnologico de Bienes de Capital). Therefore, National Accounts serve as an orthogonal source to verify that the micro-data from the survey is consistent with the total investment in the manufacturing sector.

Panel A of Figure V describes total nominal investment constructed from the ENIA (dashed black line) and the total nominal investment in the manufacturing sector constructed using National Accounts (solid blue line), in current millions of pesos. As we can see, the two series are very close to each other with a correlation of 0.62. Total investment from the micro-data for the period 2005-2009 seems to growth at a much faster rate than National Accounts, but we found that this is mainly explained by a few outliers. For example, if we drop observations with investment rates larger than 5% of aggregate investment (dashed-dotted red line), then the fit between the aggregate investment from the micro-data and the national account is much better, both in levels and cyclicality. Finally, Panel B of V describes the proportion of total investment that is done in the manufacturing sector, which represents on average 7% in the sample period, but has been declining.

For the year 2003-2009, the National Accounts calculates the distribution of investment by capital types at the sector level. Table IX describes the composition of capital across different types from the ENIA and from National Accounts. We find that the proportions invested in structures are similar between National Accounts and in ENIA, but the decomposition between machinery and vehicles is different across datasets.

**Figure V** – Investment in Chilean Manufacturing Sector: Micro-data vs. National Accounts




Notes: Panels A describes investments in the manufacturing sector. Blacked dashed line plots aggregate nominal investment constructed from ENIA, red dashed-dotted line plots the same variable but dropping outliers (i.e., investment larger than 5% of aggregate investment), and the blue solid line plots the total investment from National Accounts. Panels B describes investment in the manufacturing sector over total investment. Nominal investment from national account uses the concatenated investments from the base year 2015.

**Table IX** – Distribution of Investment Across types of Capital

| | Structures | Machinery | Vehicle |
|---|---|---|---|
| National Accounts | 35.4 | 51.4 | 13.1 |
| ENIA | 29.1 | 68.6 | 2.1 |

Notes: The table describes average percentage of investments across different types of capital in the ENIA and national accounts.

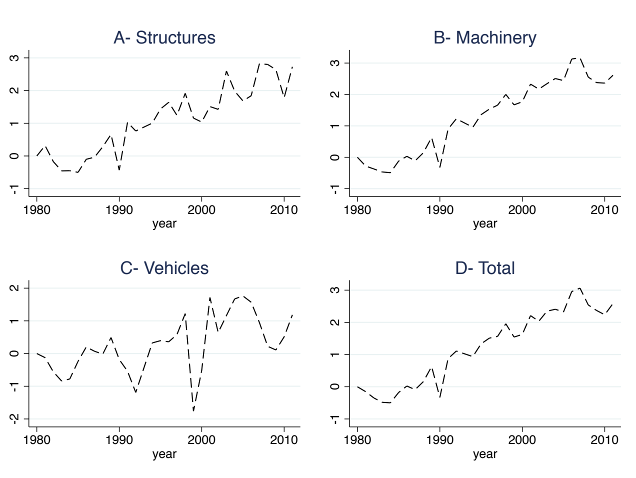
# B Investment Rates Statistics

## B.1 Aggregate Time Series

This section plots aggregate time series, constructed as the sum of the plant level variable $X_{j,t} = \sum_{i=1}^{N_t} x_{i,j,t}$.

**Investment.** Figures VI shows aggregate investment series by type of capital. All the variables are expressed in logs and in real terms, normalized in 1995.

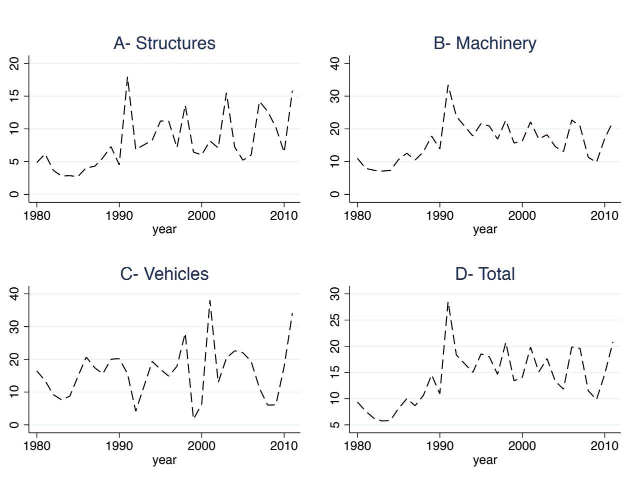
**Figure VI** – Investment in Chile




Notes: Panels A, B, C, and D describe aggregate manufacturing investments in buildings, machines, vehicles and total. All the variables are in log and in real values.

**Investment/Capital Ratios.** Figure VII shows the aggregate investment/capital ratio by type of capital. Capital stocks in both series are constructed using the PIM.

**Figure VII** – Investment to Capital Ratio in Chile




Notes: Panels A, B, C, and D investments over capital in buildings, machines, vehicles and total. All the variables are in log and in real values.

## B.2 Cross-sectional statistics

Now we focus on the distributions of investment rates across plants for all time periods. We present yearly average of cross-sectional statistics for a variety of samples:

1. By capital type: structures, machinery and equipment, and vehicles.
2. By plant size, measured as number of workers.
3. By sector: 2-digit manufacturing sectors from CIIU classification.

**Statistics by capital-type** Table X presents the yearly average of cross-sectional statistics by capital type for a balanced panel within the ENIA establishment-level survey data for Chile. Table XI repeats the information for an unbalanced panel. Inaction frequency is defined as the fraction of observations with investment below 1% in absolute value; positive spikes are investments above 20% and negative spikes below −20%. Note that the column total considers the statistics for the total capital stock, and it is not the average of the statistics by capital type. For comparison, we include information for the US in Cooper and Haltiwanger (2006) and Zwick and Mahon (2017).

We find that vehicles has the largest investment rate of almost 20%. In terms of frequency of investment, the fraction of positive investments is largest in machinery, while the fraction of negative investments is largest in vehicles. The inaction rate (investment rates lower than 1% in absolute value) is largest for structures and vehicles, above 60%. Vehicles is the category with the largest spike rates (investment rates larger than 20%), both for positive and negative spikes. Across all categories, investment rates appear to be very asymmetric (the frequency of positive investments is larger than the frequency of negative investments) and serially uncorrelated.

**Table X** – Investment Rates Statistics: **Capital Type** (Balanced Panel)

| | | | **Chile** | | | |
|---|---|---|---|---|---|---|
| | **Structures** | **Machinery** | **Vehicles** | **Total** | **US I** | **US II** |
| Average Investment | 10.3 | 19.9 | 21.3 | 18.3 | 12.2 | 10.4 |
| Positive Fraction ($i > 1\%$) | 22.8 | 54.8 | 26.0 | 56.7 | 81.5 | — |
| Negative Fraction ($i < -1\%$) | 1.4 | 2.4 | 6.1 | 4.0 | 10.4 | — |
| Inaction rate ($\|i\| <= 1\%$) | 75.8 | 42.9 | 67.9 | 39.3 | 8.1 | 23.7 |
| Spike rate ($\|i\| > 20\%$) | 10.2 | 24.2 | 22.7 | 24.3 | 20.4 | 14.4 |
| Positive spikes ($i > 20\%$) | 9.7 | 23.7 | 19.3 | 23.2 | 18.6 | — |
| Negative spikes ($i < -20\%$) | 0.5 | 0.6 | 3.4 | 1.0 | 1.8 | — |
| Serial correlation | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.4 |

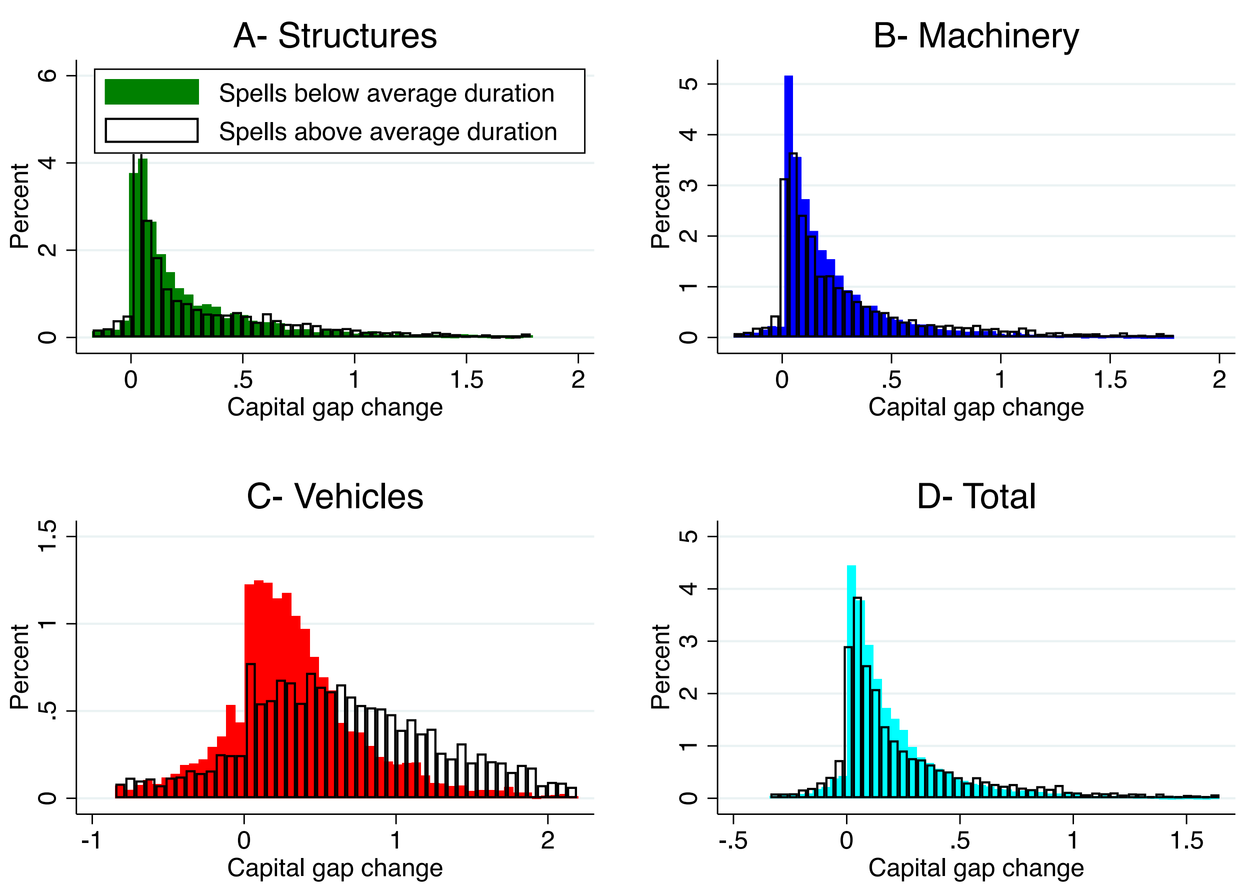
Sources: Authors calculations using establishment-level survey data for Chile. US I shows data from Cooper and Haltiwanger (2006) and US II shows data reported in Zwick and Mahon (2017) for the balanced panel. Following these papers, investment rates reported in this table are computed as Investment divided by Initial Capital. We use perpetual inventories to compute capital stock.

**Table XI** – Investment Rates Statistics: **Capital Type** (Unbalanced Panel)

| | **Chile** | | | |
|---|---|---|---|---|
| | **Structures** | **Machinery** | **Vehicles** | **Total** |
| Average Investment | 10.6 | 20.3 | 21.3 | 18.7 |
| Positive Freq ($i > 1\%$) | 22.9 | 53.6 | 25.7 | 55.6 |
| Negative Freq ($i < -1\%$) | 1.5 | 2.5 | 6.2 | 4.2 |
| Inaction Freq ($\|i\| <= 1\%$) | 75.6 | 43.9 | 68.0 | 40.2 |
| Spike rate ($\|i\| > 20\%$) | 10.5 | 24.3 | 22.8 | 24.6 |
| Positive spikes ($i > 20\%$) | 10.0 | 23.7 | 19.3 | 23.5 |
| Negative spikes ($i < -20\%$) | 0.5 | 0.6 | 3.6 | 1.1 |
| Serial correlation | 0.0 | 0.0 | 0.0 | 0.0 |

Sources: Own calculations using establishment-level survey data for Chile. Capital stocks computed with PIM.

**Figure VIII** – Distribution of capital gap changes by average duration




Notes: Panels A, B, C, and D describe aggregate manufacturing investments in buildings, machines, vehicles and total. All the variables are in log and in real values.

**Statistics by subsector** We consider 8 major subsectors within the manufacturing sector: (1) Food and beverages; (2) Textile, clothing and leather; (3) Wood and furniture; (4) Paper and printing; (5) Chemistry, petroleum, rubber and plastic; (6) Manufacture of non-metallic mineral products; (7) Basic metal; (8) Metal products, machinery and equipment. Each sector contains around X firms or X% of the sample. Table summarizes the investment rate statistics by subsector for the total capital stock and by capital type. We observe that, besides the textile sector, there are no significant differences in the size of investments, the relative frequencies of positive, negative and zero investments, or in the spike rates.

**Statistics by plant size** We define plant size in terms of the average number of workers during the sample period and then consider four quartiles: small plants (0-25%, S), medium plants (25-50%, M), large plants (50-75%, L), and very large plants (75-100%, XL). Table XIII shows statistics by plant size with detail by capital-type. In all capital categories, average investment, the frequency of non-zero investments, and the fraction of spikes increase with plant size. In contrast, the inaction rate decreases with size.

**Table XII** – Investment Rate Statistics: **Major Sectors** (Unbalanced Panel)

**All types**

| | **Food** | **Textile** | **Wood** | **Paper** | **Chem** | **Mineral** | **Metal** | **Machine** | **All** |
|---|---|---|---|---|---|---|---|---|---|
| Average Investment | 18.1 | 15.6 | 20.1 | 21.1 | 21.4 | 20.9 | 19.1 | 18.7 | 18.7 |
| Positive Freq ($i > 1\%$) | 54.4 | 48.4 | 53.1 | 56.3 | 65.9 | 56.6 | 62.0 | 56.6 | 55.6 |
| Negative Freq ($i < -1\%$) | 3.3 | 4.9 | 5.8 | 4.7 | 4.1 | 3.8 | 4.4 | 4.2 | 4.2 |
| Inaction Freq ($\|i\| <= 1\%$) | 42.2 | 46.7 | 41.1 | 39.0 | 30.0 | 39.7 | 33.6 | 39.2 | 40.2 |
| Spike rate ($\|i\| > 20\%$) | 23.9 | 20.4 | 25.5 | 26.0 | 28.9 | 25.2 | 27.0 | 24.9 | 24.6 |
| Positive spikes ($i > 20\%$) | 23.0 | 19.2 | 24.1 | 25.1 | 27.7 | 24.2 | 25.6 | 24.0 | 23.5 |
| Negative spikes ($i < -20\%$) | 0.9 | 1.2 | 1.4 | 0.9 | 1.2 | 1.0 | 1.4 | 1.0 | 1.1 |
| Serial correlation | 0.0 | 0.0 | 0.1 | 0.0 | -0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

**Structures**

| | **Food** | **Textile** | **Wood** | **Paper** | **Chem** | **Mineral** | **Metal** | **Machine** | **All** |
|---|---|---|---|---|---|---|---|---|---|
| Average Investment | 10.6 | 7.7 | 12.0 | 10.7 | 13.1 | 11.6 | 11.6 | 10.0 | 18.7 |
| Positive Freq ($i > 1\%$) | 25.2 | 13.7 | 22.8 | 21.7 | 30.0 | 24.3 | 25.8 | 20.0 | 55.6 |
| Negative Freq ($i < -1\%$) | 1.4 | 1.4 | 1.6 | 1.6 | 1.9 | 1.5 | 1.8 | 1.2 | 4.2 |
| Inaction Freq ($\|i\| <= 1\%$) | 73.4 | 84.9 | 75.6 | 76.7 | 68.1 | 74.2 | 72.4 | 78.8 | 40.2 |
| Spike rate ($\|i\| > 20\%$) | 10.9 | 7.5 | 11.3 | 9.6 | 13.1 | 10.3 | 12.0 | 9.6 | 24.6 |
| Positive spikes ($i > 20\%$) | 10.5 | 6.8 | 10.6 | 9.2 | 12.4 | 9.9 | 11.3 | 9.1 | 23.5 |
| Negative spikes ($i < -20\%$) | 0.4 | 0.7 | 0.7 | 0.4 | 0.7 | 0.4 | 0.6 | 0.4 | 1.1 |
| Serial correlation | 0.0 | 0.1 | -0.0 | -0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

**Machinery**

| | **Food** | **Textile** | **Wood** | **Paper** | **Chem** | **Mineral** | **Metal** | **Machine** | **All** |
|---|---|---|---|---|---|---|---|---|---|
| Average Investment | 19.2 | 17.2 | 22.0 | 22.2 | 23.5 | 21.6 | 21.2 | 21.0 | 18.7 |
| Positive Freq ($i > 1\%$) | 51.3 | 47.4 | 50.7 | 54.6 | 64.5 | 53.5 | 59.9 | 55.2 | 55.6 |
| Negative Freq ($i < -1\%$) | 1.9 | 3.1 | 3.5 | 3.6 | 2.6 | 2.3 | 2.3 | 2.2 | 4.2 |
| Inaction Freq ($\|i\| <= 1\%$) | 46.7 | 49.4 | 45.8 | 41.8 | 32.9 | 44.2 | 37.7 | 42.6 | 40.2 |
| Spike rate ($\|i\| > 20\%$) | 23.0 | 20.7 | 24.2 | 25.4 | 30.4 | 24.6 | 27.0 | 24.5 | 24.6 |
| Positive spikes ($i > 20\%$) | 22.5 | 20.0 | 23.2 | 24.7 | 29.6 | 23.9 | 26.3 | 24.0 | 23.5 |
| Negative spikes ($i < -20\%$) | 0.5 | 0.7 | 1.0 | 0.7 | 0.8 | 0.7 | 0.7 | 0.5 | 1.1 |
| Serial correlation | 0.0 | 0.0 | 0.0 | -0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

**Vehicles**

| | **Food** | **Textile** | **Wood** | **Paper** | **Chem** | **Mineral** | **Metal** | **Machine** | **All** |
|---|---|---|---|---|---|---|---|---|---|
| Average Investment | 21.2 | 16.9 | 22.8 | 21.0 | 24.5 | 19.0 | 22.8 | 23.3 | 18.7 |
| Positive Freq ($i > 1\%$) | 27.3 | 17.4 | 27.1 | 21.8 | 30.6 | 25.6 | 27.6 | 27.8 | 55.6 |
| Negative Freq ($i < -1\%$) | 5.8 | 4.8 | 7.9 | 5.3 | 7.9 | 6.7 | 6.5 | 6.3 | 4.2 |
| Inaction Freq ($\|i\| <= 1\%$) | 66.8 | 77.7 | 65.0 | 72.9 | 61.4 | 67.7 | 65.9 | 65.8 | 40.2 |
| Spike rate ($\|i\| > 20\%$) | 23.3 | 17.6 | 23.7 | 19.8 | 27.2 | 21.1 | 24.2 | 24.8 | 24.6 |
| Positive spikes ($i > 20\%$) | 20.2 | 14.3 | 19.2 | 16.6 | 22.6 | 17.3 | 20.6 | 21.1 | 23.5 |
| Negative spikes ($i < -20\%$) | 3.1 | 3.3 | 4.5 | 3.1 | 4.6 | 3.8 | 3.6 | 3.6 | 1.1 |
| Serial correlation | 0.0 | -0.0 | -0.0 | 0.0 | 0.0 | 0.0 | -0.0 | -0.0 | 0.0 |

Sources: Own calculations using establishment-level survey data for Chile. Capital stocks computed with PIM.

**Table XIII** – Investment Rate Statistics: **Plant Size and Capital Type** (Unbalanced Panel)

| **All Types** | | | | | |
|---|---|---|---|---|---|
| | **S** | **M** | **L** | **XL** | **All** |
| Average Investment | 14.8 | 17.4 | 20.2 | 22.3 | 18.7 |
| Positive Freq ($i > 1\%$) | 39.1 | 48.4 | 59.5 | 75.0 | 55.6 |
| Negative Freq ($i < -1\%$) | 3.8 | 4.2 | 4.7 | 4.1 | 4.2 |
| Inaction Freq ($\|i\| <= 1\%$) | 57.1 | 47.4 | 35.8 | 21.0 | 40.2 |
| Spike rate ($\|i\| > 20\%$) | 18.7 | 22.2 | 26.3 | 31.0 | 24.6 |
| Positive spikes ($i > 20\%$) | 17.6 | 21.2 | 25.1 | 29.9 | 23.5 |
| Negative spikes ($i < -20\%$) | 1.1 | 1.0 | 1.1 | 1.1 | 1.1 |
| Serial correlation | -0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

| **Structures** | | | | | |
|---|---|---|---|---|---|
| | **S** | **M** | **L** | **XL** | **All** |
| Average Investment | 5.8 | 7.6 | 11.0 | 15.0 | 18.7 |
| Positive Freq ($i > 1\%$) | 9.0 | 12.4 | 21.1 | 39.1 | 55.6 |
| Negative Freq ($i < -1\%$) | 0.6 | 1.0 | 1.3 | 2.5 | 4.2 |
| Inaction Freq ($\|i\| <= 1\%$) | 90.5 | 86.6 | 77.5 | 58.4 | 40.2 |
| Spike rate ($\|i\| > 20\%$) | 5.2 | 6.9 | 10.5 | 15.8 | 24.6 |
| Positive spikes ($i > 20\%$) | 4.9 | 6.4 | 10.0 | 15.1 | 23.5 |
| Negative spikes ($i < -20\%$) | 0.3 | 0.5 | 0.5 | 0.7 | 1.1 |
| Serial correlation | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

| **Machinery** | | | | | |
|---|---|---|---|---|---|
| | **S** | **M** | **L** | **XL** | **All** |
| Average Investment | 14.6 | 18.6 | 22.2 | 25.4 | 18.7 |
| Positive Freq ($i > 1\%$) | 35.4 | 45.7 | 57.9 | 74.5 | 55.6 |
| Negative Freq ($i < -1\%$) | 1.8 | 2.0 | 3.0 | 3.1 | 4.2 |
| Inaction Freq ($\|i\| <= 1\%$) | 62.7 | 52.3 | 39.1 | 22.4 | 40.2 |
| Spike rate ($\|i\| > 20\%$) | 16.3 | 20.7 | 26.4 | 33.5 | 24.6 |
| Positive spikes ($i > 20\%$) | 15.8 | 20.1 | 25.6 | 32.8 | 23.5 |
| Negative spikes ($i < -20\%$) | 0.6 | 0.5 | 0.8 | 0.7 | 1.1 |
| Serial correlation | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

| **Vehicles** | | | | | |
|---|---|---|---|---|---|
| | **S** | **M** | **L** | **XL** | **All** |
| Average Investment | 16.4 | 19.9 | 23.1 | 24.8 | 18.7 |
| Positive Freq ($i > 1\%$) | 15.1 | 20.3 | 26.4 | 38.6 | 55.6 |
| Negative Freq ($i < -1\%$) | 3.6 | 4.4 | 6.3 | 9.9 | 4.2 |
| Inaction Freq ($\|i\| <= 1\%$) | 81.3 | 75.3 | 67.2 | 51.5 | 40.2 |
| Spike rate ($\|i\| > 20\%$) | 15.3 | 19.6 | 24.5 | 30.2 | 24.6 |
| Positive spikes ($i > 20\%$) | 12.8 | 16.7 | 20.7 | 25.5 | 23.5 |
| Negative spikes ($i < -20\%$) | 2.6 | 2.9 | 3.8 | 4.7 | 1.1 |
| Serial correlation | 0.0 | -0.0 | -0.0 | 0.0 | 0.0 |

Sources: Authors' calculations using establishment-level survey data for Chile. Capital stocks computed with PIM.

# C Inputs from data

In this section, we construct cross-sectional statistics using the panel data on $(\Delta x, \tau)$ and then use them as inputs into our observation formulas to recover parameters, steady state moments and the CIR. First, we explain how to use the data on investment rates to construct changes in capital gaps, and second, we explain how to construct the stopping time distribution and some challenges.

**Capital gaps.** Recall that the change in capital gaps is given by the log difference in the capital stock between an adjustment date $\tau_{i,j,t}$ and immediately before adjustment $\tau^-_{i,j,t}$:

$$\Delta x_{i,j,t} = \hat{x} - x_{\tau^-_{i,j,t}} = \log\left(K_{\tau_{i,j,t}}/K_{\tau^-_{i,j}}\right) = \log\left(1 + i_{i,j,t}\right) \tag{C.5}$$

Using the information on investment rates, we construct capital gaps as:

$$\Delta x_{i,j,t} = \begin{cases} \log\left(1 + i_{i,j,t}\right) & \text{if} \quad |i_{i,j,t}| > \underline{i} \\ 0 & \text{if} \quad |i_{i,j,t}| < \underline{i}, \end{cases} \tag{C.6}$$

where $\underline{i} > 0$ is a parameter that captures the idea that small maintenance investments do not incur the fixed cost of investment. Following Cooper and Haltiwanger (2006), we set $\underline{i} = 0.01$, such that all investments smaller than 1% in absolute value are excluded and considered as part of the inaction frequency.

**Stopping Times Distribution.** There are two challenges to estimate moments in the stopping time distribution: i) Right-censoring, and ii) Heterogeneity.

**(1) Right censoring** Right censoring comes for the fact that the panel is finite in the time dimension. Thus, instead of estimating unconditional moments, we estimate moments conditional of being in the sample. For example, if we work in a panel data with $T$ years, then using the simple mean across stopping times implies that we estimate $\mathbb{E}[\tau_{ij} | \sum_j \tau_{ij} < T]$, where $i$ stands for the plant and $j$ for the $j$-th adjustment. To deal with this challenge, we implement a series of random samplings of stopping times, one by firm, and then taking the average stopping time of each firm. As a way to corroborate the validity of this strategy, we compute average capital age directly from the data and then compare it to the value obtained by using the relationship between age and stopping times $\mathbb{E}[a] = \frac{1}{2}\mathbb{E}^{\hat{x}}[\tau]\left(1 + \mathbb{CV}^2[\tau]\right)$. With the random sampling, both numbers are very close to each other; we take this as a sign that the concerns regarding right-censoring are alleviated this way.

**(2) Heterogeneity** Statistics related to duration, in particular stopping times, are very sensitive to the degree of heterogeneity in the sample. To alleviate this concern, one ideally report statistics for very disaggregated data. The challenge here lies in that, in order to compute each stopping time, we require at least two investment observations to determine the beginning and the end of the inaction period. While this is not a concern when considering the dataset as a whole, it becomes a problem when computing statistics for smaller subsamples. Considering these issues, we deal with heterogeneity in the following way. When computing statistics by plant size, we pool small and medium plants together and large and extra large plants together. Regarding subsectors within manufacturing, our analysis in the previous section shows that investment behavior at the plant level across sectors is very homogenous, and for that reason, heterogeneity does not appear as a concern in that case.

## C.1 Results by capital type

Table XVII shows results by capital type and is divided in two parts. In the upper part, we show the cross-sectional statistics for frequency, capital gaps, and covariances between them, which serve as inputs into our observation formulas. The lower part of the table shows the estimated parameters $\nu, \sigma, \hat{x}$ and ergodic moments $\mathbb{E}[x^2], \mathbb{C}ov[x, a]$, and $\text{CIR}_1(\delta)$ implied by our formulas.

**Table XIV** – Inputs from Micro Data and Outputs from the Theory (Balanced Panel)

| | Chile | | | |
|---|---|---|---|---|
| **Inputs from Micro Data** | **Structures** | **Machinery** | **Vehicles** | **Total** |
| **Frequency** | | | | |
| $\mathbb{E}^{\hat{x}}[\tau]$ | 2.44 | 1.75 | 2.44 | 1.71 |
| $\mathbb{CV}^2[\tau]$ | 1.09 | 0.93 | 0.90 | 0.85 |
| **Capital Gaps** | | | | |
| $\mathbb{E}^{\hat{x}}[\Delta x]$ | 0.27 | 0.25 | 0.42 | 0.22 |
| $\mathbb{E}^{\hat{x}}[\Delta x^2]$ | 0.19 | 0.16 | 0.46 | 0.13 |
| $\mathbb{E}^{\hat{x}}[(\hat{x} - \Delta x)^3]$ | -0.19 | -0.13 | -0.33 | -0.10 |
| **Covariances** | | | | |
| $\mathbb{C}ov^{\hat{x}}[\tau, \Delta x]$ | 0.06 | 0.08 | 0.36 | 0.04 |
| $\mathbb{E}^{\hat{x}}[\tau(\hat{x} - \Delta x)^2]$ | 0.53 | 0.34 | 1.32 | 0.25 |
| **Outputs from Theory** | **Structures** | **Machinery** | **Vehicles** | **Total** |
| **Parameters** | | | | |
| $\nu$ | -0.11 | -0.14 | -0.17 | -0.13 |
| $\sigma^2$ | 0.08 | 0.08 | 0.13 | 0.07 |
| $\hat{x}$ | 0.01 | 0.05 | 0.17 | 0.04 |
| **Steady State Moments** | | | | |
| $\mathbb{V}ar[x]$ | 0.23 | 0.17 | 0.26 | 0.15 |
| $\mathbb{C}ov[x, a]$ | 0.91 | 0.38 | 0.08 | 0.42 |
| **Transitional Dynamics** | | | | |
| $\mathbb{V}[x]/\sigma^2$ | 3.01 | 2.25 | 2.03 | 2.24 |
| $-\nu\mathbb{C}ov[x, a]/\sigma^2$ | 1.34 | 0.71 | 0.10 | 0.80 |
| $\text{CIR}_1(\delta)$ in random fixed cost model | 4.35 | 2.96 | 2.13 | 3.04 |

Sources: Authors calculations using establishment-level survey data for Chile.

## C.2 Results by firm size

**Table XV** – Inputs from Micro Data and Outputs from the Theory (Balanced Panel, Small Firms)

| | Chile | | | |
|---|---|---|---|---|
| **Inputs from Micro Data** | **Structures** | **Machinery** | **Vehicles** | **Total** |
| **Frequency** | | | | |
| $\mathbb{E}^{\hat{x}}[\tau]$ | 2.87 | 2.06 | 2.83 | 1.97 |
| $\mathbb{CV}^2[\tau]$ | 1.17 | 0.99 | 0.89 | 0.94 |
| **Capital Gaps** | | | | |
| $\mathbb{E}^{\hat{x}}[\Delta x]$ | 0.32 | 0.27 | 0.51 | 0.23 |
| $\mathbb{E}^{\hat{x}}[\Delta x^2]$ | 0.22 | 0.18 | 0.56 | 0.15 |
| $\mathbb{E}^{\hat{x}}[(\hat{x}-\Delta x)^3]$ | -0.21 | -0.15 | -0.41 | -0.12 |
| **Covariances** | | | | |
| $\mathbb{C}ov^{\hat{x}}[\tau, \Delta x]$ | 0.09 | 0.11 | 0.48 | 0.07 |
| $\mathbb{E}^{\hat{x}}[\tau(\hat{x}-\Delta x)^2]$ | 0.78 | 0.46 | 1.77 | 0.34 |
| **Outputs from Theory** | **Structures** | **Machinery** | **Vehicles** | **Total** |
| **Parameters** | | | | |
| $\nu$ | -0.11 | -0.13 | -0.18 | -0.12 |
| $\sigma$ | 0.08 | 0.07 | 0.13 | 0.07 |
| $\hat{x}$ | 0.01 | 0.05 | 0.20 | 0.04 |
| **Steady State Moments** | | | | |
| $\mathcal{M}_2[x]$ | 0.22 | 0.19 | 0.27 | 0.16 |
| $\mathcal{M}_{1,1}[x,a]$ | 0.83 | 0.47 | -0.03 | 0.48 |
| **Transitional Dynamics** | | | | |
| $\mathcal{M}_2[x]/\sigma^2$ | 2.87 | 2.61 | 2.14 | 2.53 |
| $-\nu\mathcal{M}_{1,1}[x,a]/\sigma^2$ | 1.20 | 0.82 | -0.05 | 0.88 |
| $\text{CIR}_1(\delta)$ | 4.07 | 3.43 | 2.09 | 3.40 |

Sources: Authors calculations using establishment-level survey data for Chile.

**Table XVI** – Inputs from Micro Data and Outputs from the Theory (Balanced Panel, Large Firms)

| | Chile | | | |
|---|---|---|---|---|
| **Inputs from Micro Data** | **Structures** | **Machinery** | **Vehicles** | **Total** |
| **Frequency** | | | | |
| $\mathbb{E}^{\hat{x}}[\tau]$ | 2.29 | 1.47 | 2.15 | 1.45 |
| $\mathbb{CV}^2[\tau]$ | 1.02 | 0.69 | 0.81 | 0.58 |
| **Capital Gaps** | | | | |
| $\mathbb{E}^{\hat{x}}[\Delta x]$ | 0.26 | 0.24 | 0.36 | 0.21 |
| $\mathbb{E}^{\hat{x}}[\Delta x^2]$ | 0.19 | 0.14 | 0.40 | 0.11 |
| $\mathbb{E}^{\hat{x}}[(\hat{x}-\Delta x)^3]$ | -0.19 | -0.10 | -0.29 | -0.08 |
| **Covariances** | | | | |
| $\mathbb{C}ov^{\hat{x}}[\tau, \Delta x]$ | 0.03 | 0.04 | 0.23 | 0.01 |
| $\mathbb{E}^{\hat{x}}[\tau(\hat{x}-\Delta x)^2]$ | 0.46 | 0.22 | 0.97 | 0.16 |
| **Outputs from Theory** | **Structures** | **Machinery** | **Vehicles** | **Total** |
| **Parameters** | | | | |
| $\nu$ | -0.11 | -0.16 | -0.17 | -0.14 |
| $\sigma$ | 0.08 | 0.08 | 0.14 | 0.06 |
| $\hat{x}$ | 0.01 | 0.06 | 0.14 | 0.05 |
| **Steady State Moments** | | | | |
| $\mathcal{M}_2[x]$ | 0.24 | 0.15 | 0.26 | 0.12 |
| $\mathcal{M}_{1,1}[x,a]$ | 1.01 | 0.28 | 0.23 | 0.30 |
| **Transitional Dynamics** | | | | |
| $\mathcal{M}_2[x]/\sigma^2$ | 3.13 | 1.89 | 1.93 | 1.90 |
| $-\nu\mathcal{M}_{1,1}[x,a]/\sigma^2$ | 1.45 | 0.59 | 0.29 | 0.66 |
| $\text{CIR}_1(\delta)$ | 4.58 | 2.48 | 2.22 | 2.56 |

Sources: Authors calculations using establishment-level survey data for Chile.

### C.3 Results with weights

**Table XVII** – Inputs from Micro Data and Outputs from the Theory (Balanced Panel, Weighted by Capital)

| | Chile | | | |
|---|---|---|---|---|
| **Inputs from Micro Data** | **Structures** | **Machinery** | **Vehicles** | **Total** |
| **Frequency** | | | | |
| $\mathbb{E}^{\hat{x}}[\tau]$ | 2.21 | 1.29 | 1.60 | 1.27 |
| $\mathbb{CV}^2[\tau]$ | 0.87 | 0.37 | 0.74 | 0.34 |
| **Capital Gaps** | | | | |
| $\mathbb{E}^{\hat{x}}[\Delta x]$ | 0.17 | 0.21 | 0.33 | 0.18 |
| $\mathbb{E}^{\hat{x}}[\Delta x^2]$ | 0.10 | 0.10 | 0.34 | 0.07 |
| $\mathbb{E}^{\hat{x}}[(\hat{x} - \Delta x)^3]$ | -0.09 | -0.06 | -0.41 | -0.04 |
| **Covariances** | | | | |
| $\mathbb{C}ov^{\hat{x}}[\tau, \Delta x]$ | -0.07 | -0.00 | 0.11 | 0.00 |
| $\mathbb{E}^{\hat{x}}[\tau(\hat{x} - \Delta x)^2]$ | 0.18 | 0.11 | 0.66 | 0.08 |
| **Outputs from Theory** | **Structures** | **Machinery** | **Vehicles** | **Total** |
| **Parameters** | | | | |
| $\nu$ | -0.08 | -0.16 | -0.21 | -0.14 |
| $\sigma$ | 0.05 | 0.06 | 0.16 | 0.04 |
| $\hat{x}$ | -0.02 | 0.06 | 0.11 | 0.06 |
| **Steady State Moments** | | | | |
| $\mathcal{M}_2[x]$ | 0.18 | 0.09 | 0.42 | 0.07 |
| $\mathcal{M}_{1,1}[x, a]$ | 1.24 | 0.20 | 0.56 | 0.15 |
| **Transitional Dynamics** | | | | |
| $\mathcal{M}_2[x]/\sigma^2$ | 3.87 | 1.64 | 2.51 | 1.65 |
| $-\nu\mathcal{M}_{1,1}[x, a]/\sigma^2$ | 2.06 | 0.53 | 0.67 | 0.50 |
| $\text{CIR}_1(\delta)$ | 5.93 | 2.17 | 3.18 | 2.15 |

Sources: Authors calculations using establishment-level survey data for Chile.

# References


Cooper, R. W. and Haltiwanger, J. C. (2006). On the nature of capital adjustment costs. *The Review of Economic Studies*, **73** (3), 611–633.

Feenstra, R. C., Inklaar, R. and Timmer, M. P. (2015). The next generation of the penn world table. *American Economic Review*, **105** (10), 3150–82.

Henríquez, C. G. (2008). *Stock de Capital en Chile (1985-2005): Metodologa y Resultados*. Economic Statistics Series 63, Central Bank of Chile.

Oberfield, E. (2013). Productivity and misallocation during a crisis: Evidence from the chilean crisis of 1982. *Review of Economic Dynamics*, **16** (1), 100–119.

Pombo, C. (1999). Productividad industrial en colombia: una aplicación de números índices. *Revista de economía del Rosario*, **2** (1), 107–139.

Zwick, E. and Mahon, J. (2017). Tax policy and heterogeneous investment behavior. *American Economic Review*, **107** (1), 217–48.