

# Factors that impact on pension fund investments in infrastructure under the current global financial regulation

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# Outline

- 1. Motivation**
- 2. Relevant Facts**
- 3. Data and Methodology**
- 4. Conclusions**

# Current trends

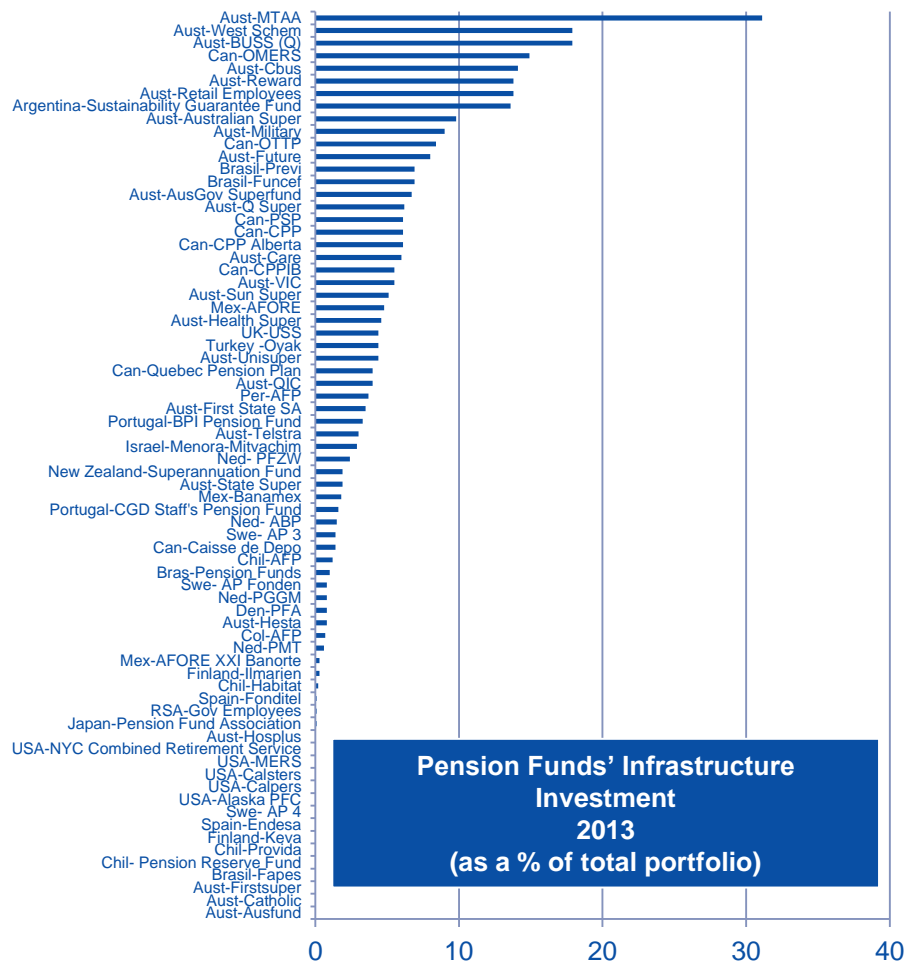
- A context of global pension reform: From DB to DC. PAYG pension reforms have been reducing their generosity. More space for private schemes
- Some pension challenges: lower long term returns + increasing life expectancy
- Growing interest to open more spaces for pensions funds to invest in physical infrastructure. Some reasons:
  - Returns adjusted to risk / Counterbalance effect on portfolios/ Hedge-inflation
  - Long- maturity matching between pension fund portfolio and infrastructure projects
  - Government`s interest : fiscal budget / economic growth
  - Some countries have a more flexible pension financial regime to invest on infrastructure, others not

**A change in PF`s financial regimes is necessary?**

# Goals

- **Shed light on how important is the financial regime to increase PF`s investment in infrastructure.**
  - There is too much debate in the regulatory fields about the importance of this topic to spur PFs investment in infrastructure projects.
  - There is a lack of quantitative analysis on this topic in the literature.
- Other goals:
  - A review of the experiences of pension funds investing in infrastructure around the world.
  - A survey/ balance of global financial regulatory changes related to PF investing in infrastructure.

# How much are PFs investing in infrastructure?



- Investing in infrastructure: from 0% to 31% of total PF's portfolio:
  - Average of those investing: **5.4% of portfolio**
- Australian and Canadian pension funds are those investing more in infrastructure:
  - **Australian pension funds currently investing: 8.6% of portfolio**
  - **Canadian PF currently investing: 6.6%**

# How Flexible are PF's financial regimes to invest in infrastructure?

A principal components synthetic Index of regulatory openness for the investment of pension funds in infrastructure

Index of regulatory liberalization for the investment of pension funds in infrastructure

| Country        | Index | Country             | Index | Country               | Index | Country            | Index |
|----------------|-------|---------------------|-------|-----------------------|-------|--------------------|-------|
| Belgium        | 10,58 | Sweden              | 7,93  | Iceland               | 6,01  | Zambia             | 4,91  |
| Canada         | 10,58 | Germany             | 7,93  | Jordan                | 6,01  | Nigeria            | 4,57  |
| Ireland        | 10,58 | Korea               | 7,78  | Switzerland           | 5,68  | Nigeria            | 4,57  |
| Netherlands    | 10,58 | Portugal            | 7,61  | Brazil                | 5,68  | Romania            | 4,57  |
| Gibraltar      | 10,58 | United States       | 7,59  | Malta                 | 5,66  | Czech Republic     | 4,33  |
| Malta          | 10,58 | Hungary             | 7,22  | Poland                | 5,50  | Albania            | 4,18  |
| Malawi         | 10,22 | Greece              | 6,80  | Bulgaria              | 5,50  | Colombia           | 4,18  |
| Australia      | 9,86  | Mauritius           | 6,79  | Slovak Republic       | 5,32  | China              | 4,18  |
| United Kingdom | 9,86  | Austria             | 6,74  | Armenia               | 5,31  | Pakistan           | 4,18  |
| Israel         | 9,85  | Italy               | 6,47  | Armenia               | 5,31  | Russian Federation | 3,98  |
| New Zealand    | 9,83  | Turkey              | 6,47  | Costa Rica            | 5,29  | Maldives           | 3,79  |
| Norway         | 8,71  | France              | 6,43  | Slovenia              | 5,29  | Egypt              | 3,74  |
| Japan          | 8,41  | Thailand            | 6,10  | Tanzania              | 5,29  | Dominican Republic | 3,38  |
| Estonia        | 8,36  | Trinidad and Tobago | 6,07  | Peru                  | 5,29  | Chile              | 3,07  |
| Jamaica        | 8,31  | South Africa        | 6,07  | Kenya                 | 4,93  | Uganda             | 3,02  |
| Luxembourg     | 7,95  | Spain               | 6,06  | Republic of Macedonia | 4,93  | India              | 2,30  |
| Finland        | 7,94  | Mexico              | 6,04  | Namibia               | 4,91  | Ukraine            | 2,25  |

## Factors to explore

According to the literature on infrastructure investment, economic agents, such as Pension Funds, could take into account the following aspects to invest in infrastructure:

- Project finance scheme of the country
- Domestic Financial conditions
- Regulatory and institutional issues beyond pensions
- Supply and demand aspects: relative attractiveness of the potential investment
- Structural economic characteristics of the country

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- Pension funds characteristics
- Pension fund financial regime related with infrastructure projects

# Data

The information of the database comes from several sources:

| Group of variables  | Database                        |
|---|---------------------------------|
| Group 1: flexibility of pension funds' investment in infrastructure according to several asset categories       | OECD (2014a)                    |
| Group 2: general characteristics of pension funds   | OECD (2014c)                    |
| Group 3: variables associated with financial market characteristics, legislation and other relevant regulations | World Economic Forum USA (2012) |
| <b>Dependent variable:</b> the investment of pension funds in infrastructure (as a % of total investments)      | OECD (2014b)                    |



# Data and methodology

- Definition of the dependent variable: “direct” investment on infrastructure projects.
- Censoring problem: The dependent variable is observed only over some interval of its support. The investment of pension funds in infrastructure (as a % of total investments) belongs to the interval  $[0\%, 100\%]$ : The sample is a mixture of observations with zero and positive values
- PFs from different countries and country variables. In some cases, each one with specific regulation (depending on the fund).
- Many regulatory variables to observe for an small sample. Financial regimes depend at least on: the type of asset, the degree of flexibility and geographical stance (local or foreign investment).
- PCA method to construct synthetic regulatory indexes.
- The Tobit model to control censoring problem
- The estimation process is controlled by the country: the clustered sandwich estimator is applied, using the country as cluster variable

# Measuring regulatory flexibility on PF infrastructure investment through a synthetic index

- High number of financial products under specific regulation, compared to the small number of observations. Use of a standard PCA approach recommended.
- 7 financial products
- 4 codes for each variable:
  - Not Allowed to Invest
  - Allowed with restrictions
  - Allowed with restrictions but important exemptions
  - Allowed with no limit
- 2 categories: investing domestically or abroad.
- Two synthetic indexes constructed to be used for our estimations

$$\text{Portfolio flexibility\_IN} = 0.3850 \times X1\_in + 0.3640 \times X2\_in + 0.3863 \times X3\_in + 0.3896 \times X4\_in + 0.3832 \times X5\_in + 0.3603 \times X6\_in + 0.3763 \times X7\_in$$

$$\text{Portfolio flexibility\_OUT} = 0.3992 \times X1\_in + 0.3439 \times X2\_in + 0.4142 \times X3\_in + 0.4113 \times X4\_in + 0.3615 \times X5\_in + 0.3111 \times X6\_in + 0.3927 \times X7\_in$$

# Econometric strategy: the Tobit model

## Description

There is a database of  $N$  observations (pension funds).

There is a dependent variable  $y_i$  ( $i = 1, \dots, N$ ) and  $K$  exogenous variables (regressors)  $x_{ki}$  ( $i = 1, \dots, N; k = 1, \dots, K$ ).

The dependent variable is censored: We observe  $y_i$  but the true variable is  $y^*_i$  (latent variable)

$$\begin{aligned} y_i &= y^*_i & \text{if } y^*_i > 0 \\ y_i &= 0 & \text{if } y^*_i \leq 0 \end{aligned}$$

$$y^*_i = b_0 + b_1 x_{1i} + \dots + b_K x_{Ki} + u_i, \text{ where } u_i \sim N(0, s^2), \quad i = 1, \dots, N$$

The estimation process is controlled by the country: the clustered sandwich estimator is applied, using the country as cluster variable

**Results of the model**

|   | Dependent variable: Total Infrastructure investment (as a % of total investments) |          |             |            |
|---|---|----------|-------------|------------|
|   | Model 1   | Model 2  | Model 3     | Model 4    |
| Portfolio limit in domestic asset categories                                | 2.577 **  | -1,731   | -2,791      | -4,846     |
| Portfolio limit in foreign asset categories                                 | -0,399  | -2.342 * | -4.660 **   | -4,928     |
| Capital account liberalization  |   | 6.395 ** | 12.872 ***  | 49.606 **  |
| Quality of overall infrastructure   |   | -5,955   | -19.497 **  | -65.177 ** |
| Strength of legal rights index  |   | 4.241 *  | 4.841 **    | 15.035 **  |
| Strength of investor protection index                                       |   | -5.960 * | -11.725 *** | -38.669 ** |
| Number of procedures to enforce a contract                                  |   | -0,227   | -1,615      | -5.546 **  |
| Importance of pension funds relative to the size of the economy in the OECD |   | 0.193 *  | 0,09        | -0,073     |
| DB pension plans' assets as a % of total assets                             |   | 0,04     | 0,01        | 0.386 **   |
| Financial strengths indicator   |   |          | 9.000 **    | 32.405 **  |
| Non-financial corporate bonds to total bonds and notes outstanding (%)      |   |          | 0.940 **    | 5.143 **   |
| Share of total number of securitization deals                               |   |          | 0.340 *     | 2.139 **   |
| Anglosphere countries (broad version)                                       |   |          |             | 47,65      |
| EU countries  |   |          |             | 140.591 ** |
| EFTA countries  |   |          |             | 90.244 *   |
| Latin-American and Caribbean countries                                      |   |          |             | 94.610 *** |
| Constant  | -33.142 ***   | 0,628    | 69,281      | 29,451     |
| Number of observations  | 57  | 57       | 57          | 57         |
| Pseudo R <sup>2</sup>   | 0,018   | 0,088    | 0,147       | 0,225      |
| Log pseudolikelihood  | -80,655   | -74,884  | -70,026     | -63,679    |

Notes: \*\*\* \*\* \* denote estimates significant to 1%, 5% and 10% respectively

# Conclusions

- The empirical evidence shows that regulation itself might be important, but it seems that other factors take more relevance: rule of law, financial characteristics of the countries and geographical issues.
- From a policy implications perspective, the paper could help to downplay the importance of the financial regime for investing in infrastructure and rather observe the whole picture.

**Thank you**

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**Descriptive Statistics**

|   | <b>Mean</b> | <b>Standard<br/>Deviation</b> | <b>Min</b> | <b>Max</b> |
|---|-------------|-------------------------------|------------|------------|
| Total Infrastructure investment (as a % of total investments)               | 3,104       | 8,843                         | 0          | 51,3       |
| Portfolio limit in domestic asset categories                                | 5,847       | 2,8                           | 0          | 10,579     |
| Portfolio limit in foreign asset categories                                 | 1,891       | 2,515                         | 0          | 9,848      |
| Capital account liberalization  | 5,199       | 2,026                         | 1          | 7          |
| Quality of overall infrastructure   | 5,033       | 1,042                         | 2,83       | 6,64       |
| Strength of legal rights index  | 6,456       | 2,105                         | 3          | 10         |
| Strength of investor protection index                                       | 5,825       | 1,368                         | 3          | 9          |
| Number of procedures to enforce a contract                                  | 32,93       | 5,454                         | 21         | 46         |
| Importance of pension funds relative to the size of the economy in the OECD | 24,105      | 35,449                        | 0          | 166,3      |
| DB pension plans' assets as a % of total assets                             | 20,329      | 35,506                        | 0          | 100        |
| Financial strengths indicator   | 4,561       | 2,044                         | 0          | 9          |
| Non-financial corporate bonds to total bonds and notes outstanding (%)      | 6,722       | 11,297                        | 0          | 36,21      |
| Share of total number of securitization deals                               | 2,13        | 7,27                          | 0,02       | 53,63      |
| Anglosphere countries (broad version)                                       | 0,123       | 0,331                         | 0          | 1          |
| EU countries  | 0,474       | 0,504                         | 0          | 1          |
| EFTA countries  | 0,018       | 0,132                         | 0          | 1          |
| Latin-American and Caribbean countries                                      | 0,105       | 0,31                          | 0          | 1          |

# Some ideas from the literature about why some pension funds invest more in infrastructure projects

- Flexible PF's financial regimes.
- Pensions funds' knowledge and understanding of infrastructure projects
- Tradition of investment in infrastructure
- DB matters
- DC matters
- The availability of good infrastructure projects
- Rule of law
- Project finance model



# Pension funds and their investments in infrastructure; regulation issues

Until now, regulation of PF infrastructure investment has national coverage

## Geographies with extremely flexible financial regulation

- They assume that the **best entities to assess the risks of the project are the investors** themselves, and as such, they only establish that the investments should be “prudent” and well planned (OECD, 2014)
- This group typically comprises the Anglo-Saxon countries (the United Kingdom, the United States, Australia and Canada), plus Belgium and the Netherlands

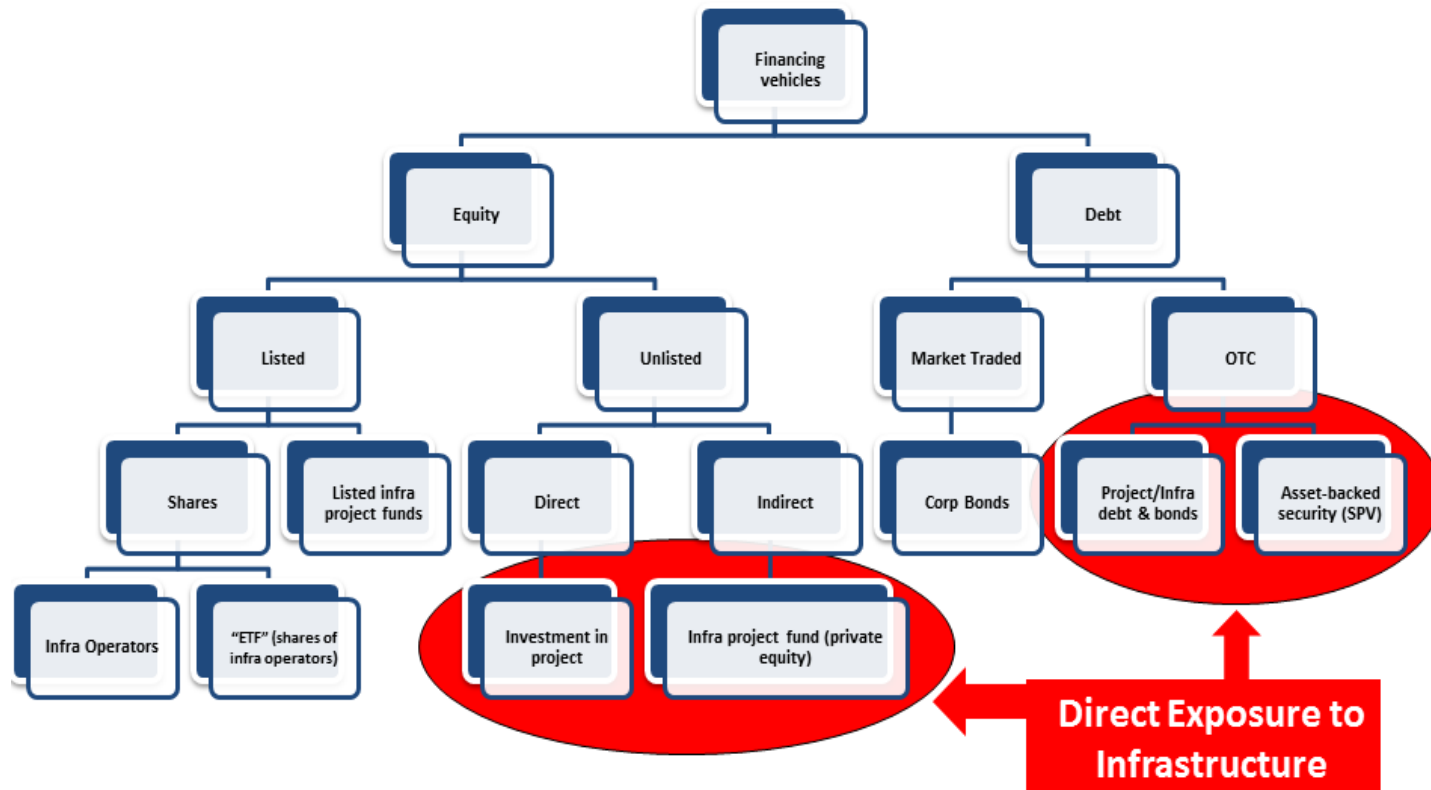
## Regulation of infrastructure investment by means of limits or conditionality

- Regulation in countries that set limits on pension fund investment in infrastructure is tremendously varied
- **A third** of the countries analysed in OECD (2014) **do not allow** investment in **private investment funds or in direct loans**
- In terms of investment in **shares**, the **majority** of countries **do not allow investment in unlisted instruments** and have limits for **quoted assets**

# Pension funds and their investments in infrastructure; regulation issues

Big complexity in the different possibilities of infrastructure financing and its regulation

Each infrastructure needs its specific project finance



# Pension funds and their investments in infrastructure

More to take into account: risks and coverage



# Global financial regulation and infrastructure investment

- The **financial crisis in 2007-08** revealed the weaknesses of the financial system due to the **high leverage** of the lending institutions, their **liquidity problems** and the low level and **quality of their capital**
- **Basel II and Basel III** obliges the lending institutions to **improve the quality and quantity of their capital**, improve their **risk management** systems, reduce **leverage**, **increase liquidity** and take **counter-cyclical measures**
- Longer is the time horizon of a loan, higher is the consumption of capital. As a result, **traditional financiers (banks) lose their appetite to continue funding such projects**
- In this context, **governments seek a more intensive participation of other financial players** (such as insurance companies and pension funds) **and wonder what are the barriers that have prevented a more intense participation**