Regulatory Environment and Pension Investment Performance

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Research question

What is the impact of funded pension funds’ regulation on risk-adjusted investment performance?
Motivation: An Observation

**Australia**
- No portfolio limits imposed
- Diversification focus
- No investment limit by issuer

**Chile**
- Max limit in equities ranging from 5-80% depending on fund, minimum limit from 0-40% depending on fund
- Various limits on bonds, retail investment fund and foreign assets.
- Investment in real estate, private investment fund prohibited.
- Multitude of investment limits in issuer

Source: OECD Global Pension Statistics, Survey of Investment Regulation of Pension Funds (OECD)
# Regulation as a Spectrum

<table>
<thead>
<tr>
<th>Aspect</th>
<th>Regulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Investment Restrictions</td>
<td>High ← Medium → Low</td>
</tr>
<tr>
<td>Minimum Guarantee</td>
<td>Protection funds ← Book reserves/in-house funds</td>
</tr>
<tr>
<td>Supervision</td>
<td>Integrated ← Specialized</td>
</tr>
<tr>
<td>Coverage</td>
<td>Mandatory Occupational ← Quasi-mandatory → Voluntary Personal</td>
</tr>
<tr>
<td>Benefits</td>
<td>DB ← Hybrid → DC</td>
</tr>
<tr>
<td>Governance</td>
<td>Collective ← Employer-led → Individual</td>
</tr>
<tr>
<td>Indexation</td>
<td>Legal requirements ← Self-regulation → No rules</td>
</tr>
<tr>
<td>Vesting</td>
<td>Immediately ← Longer period</td>
</tr>
</tbody>
</table>

Adapted from Ebbinghaus (2010), *Varieties of Pension Governance: The Privatization of Pensions In Europe*, Oxford University Press
Investment Restrictions

Minimum or maximum portfolio limits by asset class.

**Reason e.g.**

For

Ensure *adequate diversification*, protect beneficiaries against sponsor insolvency and financial risks.

Against

Impede optimal portfolio selection

**Example**

On equities in 2007:

- 30% limit on domestic equities in Switzerland,
- 35% limit in Norway,
- 0-30% limit in Mexico,
- 0-80% limit in Chile.

Australia, New Zealand, the Netherlands, Ireland, UK, US impose no direct limit any asset class.
Minimum Guarantee

Plans promise a minimum rate of return, benefit guarantee.

### For

- Provide a certain level of **financial security** to members.

### Against

- Investment managers induced to take high risk if the shortfall is **guaranteed** to some extent by a **central guarantee fund/the government**.

### Reason e.g.

- Chile: minimum return guarantee that is backed by the government.

### Example

- UK: “Pension Protection Fund”.

- DC funds with no minimum guarantee:
  - U.S 401(k)
  - Australia’s Superannuation
Specialized Supervisory Authority

Whether the supervisory authority supervises pension provision institutions only

For

Reason e.g.

Differences among financial institutions necessitate a **unique approach** to regulation on each.

Example

An Bord Pinsean (Pensions Board) in Ireland.

La Superintendencia de Pensiones in Chile.

Against

Avoid **heterogeneous and secondary objectives** to be fulfilled by numerous smaller regulators.

Example

De Nederlandsche Bank supervises banks, insurers and pensions in the Netherlands.

Komisja Nadzoru Finansowego (Polish Financial Supervision Authority) in Poland.
Summary of Findings

- **Investment restrictions**: Lower risk-adjusted investment returns in emerging market economies.

- **Minimum return or benefit guarantee**: No statistically significant influence.

- **Type of supervisory authority**: (Weak evidence) Specialized SA generates slightly higher Sharpe ratio in advanced economies.
Related Literature

Mutual funds context

- Almazan et al. (2004) find no relation between investment restrictions on the policy statements of mutual funds and their returns.

- Agarwal et al. (2013) reveal that mutual funds’ investment performance were harmed by an increase in the disclosure frequency.

Meanwhile, for pension funds

Descriptive:
Tapia (2008) reports asset allocation, fund size and other summary statistics for private pension funds in 23 countries

Theoretical:
Philip Davis (2002) assesses the justification, nature and consequences of prudent person rules and quantitative portfolio regulations. Hinz et al. (2010) evaluate investment performance measures for pension funds, taking into consideration particular characteristics and objectives of pension systems

Geographically localized:
Focusing only on Latin American countries, Srinivas and Yermo (2010) find that tight regulatory regimes common in that region have yielded lower risk-adjusted return compared to market benchmarks.
Data

27 countries, annual data from 2002-2010.

<table>
<thead>
<tr>
<th>Category</th>
<th>Countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advanced Economies (18)</td>
<td>Australia, Austria, Belgium, Canada, Denmark, Germany, Ireland, Israel, Italy, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom, United States.</td>
</tr>
<tr>
<td>Economies in Transition (4)</td>
<td>Croatia, Czech Republic, Hungary, Poland</td>
</tr>
<tr>
<td>Emerging Market Economies (5)</td>
<td>Chile, Colombia, Mexico, Peru, Turkey</td>
</tr>
</tbody>
</table>

Sources:
OECD Global Pension Statistics (OECD GPS), the Federación Internacional de Administradoras de Fondos de Pensiones (FIAP), the Association of Latin American Pension Supervisors (AIOS), Croatian financial services supervisory agency (HANFA), International Monetary Fund, World Bank World Development Index, Bloomberg, Datastream.
Methodology

Ordinary Least Squares Regression on cross-sectional data.

\[
\text{Dependent Variable} = \text{Independent Variable} + \text{Control Variables} + \text{Error Term} + \text{Constant}
\]

Sharpe Ratio of Pension Investment Return

I. Investment Restrictions,
II. Minimum Guarantee,
III. Supervisory Authority.

(II) and (III) are constructed as dummy variables.

I. Market Performance,
II. Pension Design.
Methodology – Investment Restriction (Global)

**Global Index, IR^G**

Consider **nine** asset (sub-) class:

- Equities (listed & non-listed), bonds, real estate, investment funds, loans, bank deposits, foreign assets (OECD & non-OECD issued).

Construct a **global index of investment restrictiveness**.

**Example**

In 2004,

<table>
<thead>
<tr>
<th></th>
<th>Equity</th>
<th>Real Estate</th>
<th>Bonds</th>
<th>Investment Funds</th>
<th>Loans</th>
<th>Bank Deposits</th>
<th>Foreign Assets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Austria</td>
<td>50%</td>
<td>20%</td>
<td>No limit</td>
<td>No limit</td>
<td>No limit</td>
<td>No limit</td>
<td>50% non-Euro</td>
</tr>
<tr>
<td>Index</td>
<td>+1</td>
<td>+1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>+1</td>
</tr>
</tbody>
</table>

Source: OECD Annual Survey of Investment Regulation of Pension Funds (2004)

Index for investment restrictiveness for Austria in 2004 is 3.
Methodology – Investment Restrictions (Refined)

Refined index, $\text{IR}^{e,b,f}$

Three major asset classes: equities (e), bonds (b), foreign assets (f).

$$\text{IR}^{e,b,f} = 100\% - \text{Maximum Investment Allowed (as a \% of portfolio) in e, b, or f.}$$

Example

In 2004,

<table>
<thead>
<tr>
<th></th>
<th>Equity</th>
<th>Real Estate</th>
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<td>No limit</td>
<td>No limit</td>
<td>50% non-Euro</td>
</tr>
</tbody>
</table>

Refined Indices

$\text{IR}^e = 100\% - 50\%$

$\text{IR}^b = 100\% - 0\%$

$\text{IR}^f = 100\% - 50\%$

Source: OECD Annual Survey of Investment Regulation of Pension Funds (2004)
Emerging Market Economy, EME

International Monetary Fund’s (IMF) yearly classification in the “World Economic Outlook”

<table>
<thead>
<tr>
<th>Level of development</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advanced Economies</td>
<td>0</td>
</tr>
<tr>
<td>Economies in Transition</td>
<td>0.5</td>
</tr>
<tr>
<td>Emerging Market Economies</td>
<td>1</td>
</tr>
</tbody>
</table>

Example:

<table>
<thead>
<tr>
<th>2002</th>
<th>...</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Austria</td>
<td>Advanced Economy</td>
<td>Score</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0</td>
</tr>
</tbody>
</table>

**EME = Average over 2002-10 score**
Methodology – Control Variables

Market Performance

- Sharpe ratio of the local equity and bond markets indices
- Two largest asset classes in which pensions invest
- Control for the investment performance that is attributable to market return

Design Features

Heterogeneity of the plans
- Defined Contribution or Defined Benefit
- Mandatory or Voluntary
- Occupational or Personal

\[ DC = \text{\% of DC funds within the aggregated data of the country} \]
\[ MV = \text{\% of mandatory funds within the aggregated data of the country} \]
\[ OP = \text{\% of occupational funds within the aggregated data of the country} \]
Methodology – Regression Specification

Dependent Variable =  

1. Independent Variable +  
2. Independent Variable × EME +  

Error Term + Constant

Sharpe Ratio of Pension Investment Return

I. Investment Restrictions,  
II. Minimum Guarantee,  
III. Supervisory Authority.

I. Market Performance,  
II. Pension Design.
### Regression Results

<table>
<thead>
<tr>
<th>Independent Variable and Estimated Coefficient (Standard Errors)</th>
<th>1</th>
<th>Non-interacted</th>
<th>2</th>
<th>Interacted with EME</th>
</tr>
</thead>
<tbody>
<tr>
<td>$IR^G$</td>
<td></td>
<td></td>
<td></td>
<td>-0.635**</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.120**</td>
<td></td>
<td>(0.053)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.053)</td>
<td></td>
<td>(0.248)</td>
</tr>
<tr>
<td>$IR^e$</td>
<td></td>
<td></td>
<td></td>
<td>-0.024*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.001</td>
<td></td>
<td>(0.006)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.007)</td>
<td></td>
<td>(0.013)</td>
</tr>
<tr>
<td>$IR^b$</td>
<td></td>
<td></td>
<td></td>
<td>-0.024</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.006</td>
<td></td>
<td>(0.007)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.007)</td>
<td></td>
<td>(0.015)</td>
</tr>
<tr>
<td>$IR^f$</td>
<td></td>
<td></td>
<td></td>
<td>-0.024**</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.005</td>
<td></td>
<td>(0.005)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.005)</td>
<td></td>
<td>(0.010)</td>
</tr>
<tr>
<td>$MG$</td>
<td></td>
<td></td>
<td></td>
<td>-1.146</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.027</td>
<td></td>
<td>(0.306)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.306)</td>
<td></td>
<td>(0.904)</td>
</tr>
<tr>
<td>$SA$</td>
<td></td>
<td></td>
<td></td>
<td>-0.548</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.758*</td>
<td></td>
<td>(0.390)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.390)</td>
<td></td>
<td>(0.675)</td>
</tr>
</tbody>
</table>

*p < 0.1; **p < 0.05; ***p < 0.01
Conclusion

Restrictions on equities and foreign assets are associated to lower risk-adjusted investment return.

With improved data quality and consistency if its collection across countries is standardized:
  • refined measure of performance, e.g. fees-adjusted return,
  • refined measure of strictness of regulation, e.g. fund-level data for restriction by fund.