

# Sovereign Wealth Funds:

## Firm Level Impact and Natural Resource Endowments

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# Introduction

## Background

### Do commodity and non-commodity SWFs invest differently ?

- SWF: government investment vehicle with high foreign asset exposure, nonstandard liabilities and long (intergenerational) time horizon.
  - Public institutions with capacity to invest in private/public sector.
  - Long-term investment horizon
  - Less constrained by liquidity, risk, asset classes.
- Why are they important?
  - Unprecedented growth since 2001 → Global imbalances / high commodity prices.
  - Active role in allocation of public investment, specially in developing countries.

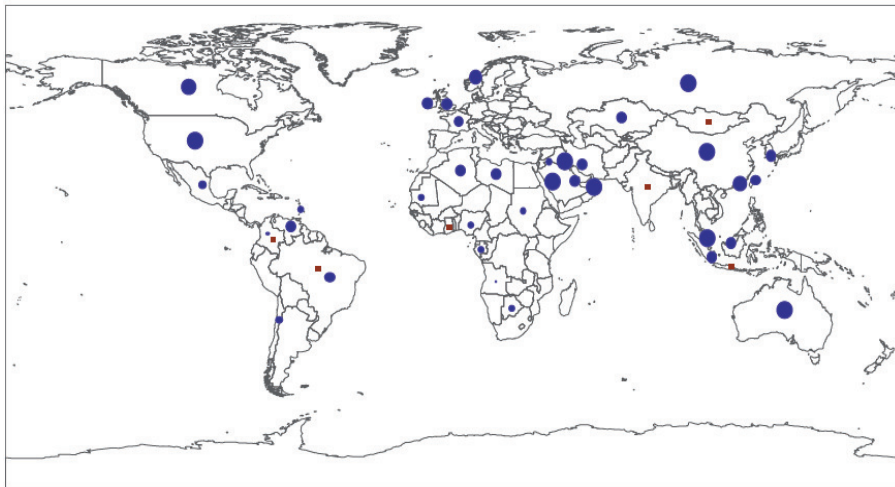
# Introduction

## Motivation and Background

- Interest motivated by policy implications
  - Impact on capital markets and asset prices.
  - Endorsement of *Santiago Principles*:
    - Transparency/predictability
    - Accountability
  - Different regulatory framework for SWFs from other investors
  - National strategy vs. commercial return
- Fiscal rules → New countries setting up sovereign wealth institutions: Brazil, Colombia, India, Indonesia, Ghana, Mongolia.
- Scarce evidence on SWF investments at disaggregated level.

# Where do SWF invest?

Major location of SWF investments

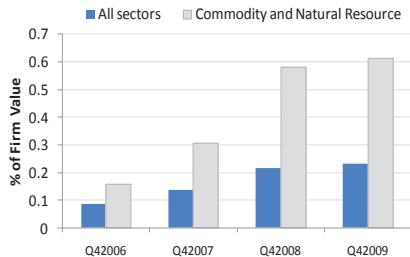


Source: UNCTAD (2009), OECD (2010) .

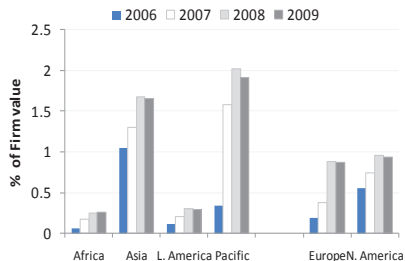
# Re-orientation of Investment

## Strategic Sectors and Geographic segmentation

Average SWF Investment 2006-2009



Regional SWF investments in N. Resources



Source: Author's calculation, based on Factset/Lionshares, 2010.

# Related Literature

## Reserves Management and Portfolio theory

- Management of Reserves
  - Jeanne and Rancière (2008) → Optimal level of reserves for EM.
  - Portes et al. (2006) → Optimal currency Shares in reserves
- Contingent Claims and Debt management
  - Contingent reserves management → Alfaro et al. (2006), Caballero and Panageas. (2004)
  - Optimal debt management → Van der Ploeg and Venables (2011)
- Portfolio Choice
  - Portfolio choice for long-term investors → Campbell 2003, Scherer 2008, 2009.

# Related literature

## Institutional Investment

- Institutional Investment at the firm-level
  - Gompers and Metrick (QJE, 2001) → Individual vs Institutional investors.
  - Ferreira and Matos (JFE, 2008) → Mutual funds, bank trusts, insurance companies.
  - Hau and Rey (AER, 2008) → Home bias at the fund level.
- SWF deals and firm impact
  - Chhaochharia and Laeven (2008). Informational bias in SWF investments.
  - Bernstein, Lerner and Schoar (2009). SWF investments and organizational structure
  - Fernandes (2009). SWF ownership effect on cost of capital.

# This paper

## Main contribution

- To study differences *between* commodity and non-commodity SWFs in ownership and firm value of publicly traded firms.
- To analyze non mean-variance factors (e.g. liquidity, transaction costs, natural endowments) in explaining the allocation of sovereign wealth investors.
- To introduce a comprehensive fund-firm level data to analyze SWF investment behaviour.



# Limitations

- Data/measurement
  - No full disclosure for all SWFs (e.g. China Inv. Corp - CIC)
  - Data exploits SWF participation in publicly traded firms. No private equity or venture capital deals.
  
- Problems of studying SWF investment
  - Censoring bias
  - “Price-effect” from rises in stock market cap.
  - Endogeneity between SWF ownership and firm value.

# SWF asset allocation: Commodity vs Non-Commodity

Based on Scherer (2009)

- Risk from non-financial assets can be hedged, at least partially, through financial assets.
- CAPM: only financial assets are considered.
- Correlation between financial and non-financial assets to reduce overall SWF risk.
- Apply to a multi-asset context: alternatives, other commodities.

# The Sovereign investor problem - Commodity Fund

## Investing in one risky asset (Scherer 2009)

- The decision making problem The SWF can invest its financial wealth into a single asset (i.e. global market portfolio) or cash. Returns for this performance are normally distributed and given by equation:

$$\tilde{r}_a \sim N(\mu_a, \sigma_a^2)$$

$\mu_a$ : Expected risk premium (over cash returns)  $\sigma_a$ : Asset volatility.

- Commodity price changes are also normally distributed:

$$\tilde{r}_o \sim N(\mu_o, \sigma_o^2)$$

and correlate positively with asset returns, i.e.

$$\text{Cov}(r_a, \tilde{r}_o) = \rho_{a,o} > 0$$

Assumption: Hotelling-Solow rule (indifferent to depletion or keeping commodity)  $\rightarrow \mu_o = 0$ .

- Let  $\theta$  be the fraction of importance of the SWF plays in the economy's government budget. Government budget evolves according to:

$$\tilde{r} = \theta w \tilde{r}_a + (1 - \theta) \tilde{r}_o$$

where  $w$  is the demand for risky assets, and  $1 - w$  represents cash holding carrying a zero risk premium.

# Decomposing Demand

- The SWF manager is charged to maximize the utility of total government wealth. Utility defined as a (quadratic) function of uncertain wealth:

$$Utility \simeq \mu_p - \frac{\lambda}{2} \sigma_p^2$$

Then, the government seeks to maximize the function:

$$\text{Max}_w \left[ \mu_p - \frac{\lambda}{2} \sigma_p^2 \right] = \text{Max}_w \left( \theta w \mu_a - \frac{\lambda}{2} \left[ \theta^2 w^2 \sigma_a^2 + (1 - \theta)^2 \sigma_o^2 + 2w\theta(1 - \theta)\rho\sigma_a\sigma_o \right] \right)$$

Taking first order conditions and solving for  $w$ , the optimal asset allocation for a resource based SWF:

$$\begin{aligned} \frac{\partial f(w)}{\partial w} &= 0 \\ w^* &= w_s^* + w_h^* = \frac{1}{\theta} \frac{\mu_a}{\lambda \sigma_a^2} - \frac{1 - \theta}{\theta} \frac{\rho \sigma_o}{\sigma_a} \\ \underbrace{w^*}_{\text{Dem. risky asset}} &= \underbrace{w_s^*}_{\text{Speculative demand}} + \underbrace{w_h^*}_{\text{Hedging demand}} \end{aligned}$$

## Observation:

Total demand for risky assets can be decomposed into speculative demand  $w_s^*$  and hedging demand  $w_h^*$ . The desirability of the asset does not only depend on Sharpe-ratio but also on its ability to hedge out unanticipated shocks to commodity wealth. Specific sectors provide hedging against commodity prices.

# Hypotheses

## Heterogeneity of SWF investments

- $H_1$ : SWFs' portfolio preferences are affected by:
  - Source of fund proceeds (commodity/non-commodity)
  - Investment guidelines (OECD/non-OECD)
  - Foreign/domestic investments
  
- $H_2$ : Recent portfolio rebalancing of some SWFs reflect two additional investment motives: increase diversification/hedging and secure natural resource endowments.

# Data

## Factset/Lionshares and Worldscope databases

- SWF equity holdings:
  - Factset/Lionshares. Mandatory quarterly filings with the SEC and regulatory agencies.
  - 22 SWFs between Q1 2006 and Q4 2009. About 11.500 holdings in 8.000 firms. Between 30-50% of SWF total assets.
  
- Firms: All Worldscope universe in Thomson ONE

# Example of Institutional filings - SEC 13F form

UNITED STATES  
SECURITIES AND EXCHANGE COMMISSION  
WASHINGTON, D.C. 20549

FORM 13F

FORM 13F COVER PAGE

Report for the Calendar Year or Quarter Ended: September 30, 2010

Institutional Investment Manager Filing this Report:

Name: **Temasek Holdings (Singapore) Limited**

Address: 60B Orchard Road #06-18 Tower 2  
The Atrium@Orchard  
Singapore 238891

Form 13F File Number: 28-13088

FORM 13F INFORMATION TABLE

COLUMN 1	COLUMN 2	COLUMN 3	COLUMN 4	COLUMN 5	COLUMN 6
NAME OF ISSUER	TITLE OF CLASS	CUSIP	VALUE (X\$1000)	SHRS OR PRN AMT	SH/ PUT/ PRN CALL INVESTMENT DISCRETION
3M CO	COM	88579Y101	286	3,300	SH DEFINED
ABBOTT LABS	COM	002824100	387	7,400	SH DEFINED
AEROPOSTALE INC	COM	007865108	342	14,700	SH DEFINED
AIR PRODS & CHEMICALS					
AMAZON COM INC	COM	023135106	393	2,500	SH DEFINED
AMERICA MOVIL SAB DE					
APPLE INC	COM	037833100	1,135	4,000	SH DEFINED
ASML HOLDING N V	NY REG SHS	N07059186	351	11,800	SH DEFINED
AUTOMATIC DATA					

# Data

## Sovereign Wealth Funds Studied

SWF Institute	Country	Total SWF Assets 2009 USD Billion	Total Amount Equity Holdings	Commodity fund	OECD fund
Bahrain - Mumtalakat Holding Company	Bahrain	9.1	\$528,002,782	Yes	No
Botswana - Pula Fund	Botswana	6.9	\$25,537,462	Yes	No
Brunei Investment Agency	Brunei	30	\$35,666,127	Yes	No
Canada - Alberta's Heritage Fund	Canada	14.4	\$39,574,656	Yes	Yes
China Investment Corporation	China	332.4	\$252,434,800,235	No	No
Hong Kong - Monetary Authority IP	Hong Kong	259.3	\$145,586,201	No	No
Korea Investment Corporation	Korea	37	\$196,528,114	No	Yes
Kuwait Investment Authority	Kuwait	202.8	\$4,717,257,579	Yes	No
Libyan Investment Authority	Libya	70	\$149,449,016	Yes	No
Malaysia - Khazanah Nasional	Malaysia	25	\$20,900,194,992	No	No
New Zealand Superannuation Fund	New Zealand	12.1	\$957,101,795	No	Yes
Norway - Government Pension Fund	Norway	512	\$50,363,450,087	Yes	Yes
Oman Investment Fund	Oman	-	\$2,005,432	Yes	No
Qatar Investment Authority	Qatar	85	\$2,125,587,426	Yes	No
Saudi Arabia - SAMA Foreign Holdings	Saudi Arabia	439.1	\$559,428,332	Yes	No
Singapore - Temasek Holdings	Singapore	133	\$53,783,848,387	No	No
Singapore - GICS	Singapore	247.5	\$7,877,838,835	No	No
Thailand - SWF presumed	Thailand	-	\$8,060,871	No	No
UAE - Emirates Investment Authority	United Arab Emirates	-	\$1,580,000,000	Yes	No
UAE - Dubai World	United Arab Emirates	19.6	\$13,594,859,800	Yes	No
UAE - Abu Dhabi Investment Authority	United Arab Emirates	627	\$4,513,015,736	Yes	No
USA - Alabama Trust Fund	United States	-	\$19,391,263	No	Yes

Source: Factset/Lionshares Database on Institutional Investors.





# Institutional Investment

What explains differences in demand for stocks for institutional investors?

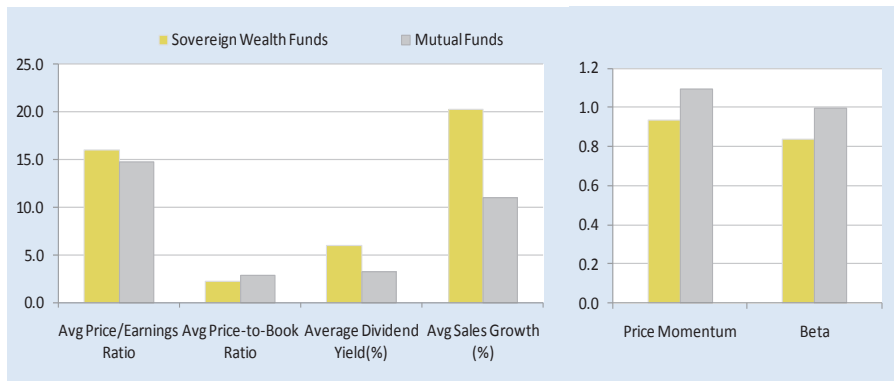
Legal environment. *Prudent man* theory :  $\left\{ \begin{array}{l} \text{Dividend yield}(\uparrow) \\ \text{Stock volatility}(\downarrow) \\ \text{Leverage}(\downarrow) \end{array} \right.$

Liquidity constraints and transaction costs :  $\left\{ \begin{array}{l} \text{Firm size}(\uparrow) \\ \text{Share turnover}(\uparrow) \end{array} \right.$

Historical stock returns :  $\left\{ \begin{array}{l} \text{Book-to-market ratio}(\uparrow) \\ \text{Share momentum}(\uparrow) \end{array} \right.$

# Comparing Institutional Investors

## Sovereign Wealth vs Mutual Funds

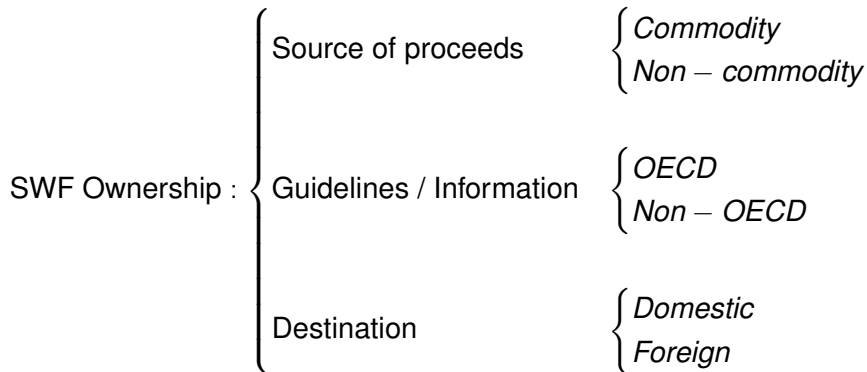


Source: Author's calculation, based on Factset/Lionshares, 2010.

# A definition of SWF ownership

The “colours” of SWF investment

- SWF ownership in the firm :  $Own_{i,t} = \sum_{j=1}^N \frac{Pos_j}{MkCap}$
- $Own_{i,t} = 1$  if  $\sum_{j=1}^N \frac{Pos_j}{MkCap} \geq 1\%$



# SWF Ownership

Total share owned by SWFs

$$SWFown_{it} = \theta_0 + \theta'_1 \text{Inst.} + \theta'_2 \text{Cost.} + \theta'_3 \text{Hist.} + \theta'_4 \mathbf{Z} + \nu + \epsilon_{it} \quad (1)$$

Variable	Definition
Size	Log (total assets)
Leverage	Ratio total debt / total assets
Invest. Opport.	3-year geom. average of sales growth
Stock volatility	Idiosyncratic variance of returns
ROE	Return over equity
DY	Dividend yield
R &D	R &D expend. / total assets
Turnover	Share volume/ adj. shares outst.
Cash	Cash and short term inv. / total assets
Antiself	Antiself index
<b>Other controls (Z)</b>	
BM	Log book-to-equity ratio
Ret	Annual stock rate of return
Capex	Total Capital expend. / total assets
ADR	Cross-listed in U.S. exchange.
FX Sales	Internat sales / total sales

## Results: Ownership

# Core Model

## Dataset total SWF holdings per firm: Probit estimation

	Baseline						Country effects			
	SWF dummy (ii)	M/E	SWF dummy (iii)	M/E	SWF dummy (iv)	M/E	SWF dummy (vi)	M/E	SWF dummy (vii)	M/E
Size	0.3144*** [0.018]	0.0204	0.3141*** [0.019]	0.0201	0.3345*** [0.021]	0.0184	0.3617*** [0.025]	0.3617	0.3588*** [0.026]	0.3588
Inv. Op.	0.1140** [0.052]	0.0074	0.1182** [0.052]	0.0076	0.1191** [0.060]	0.0066	0.1362** [0.064]	0.1362	0.1379** [0.064]	0.1379
ROE	0.0091*** [0.003]	0.0006	0.0094*** [0.003]	0.0006	0.0082*** [0.003]	0.0005	0.0069** [0.003]	0.0069	0.0071** [0.003]	0.0071
R&D	0.5125*** [0.115]	0.0332	0.5101*** [0.117]	0.0326	0.5756*** [0.124]	0.0317	0.4891*** [0.120]	0.4891	0.4828*** [0.122]	0.4828
Capital Expend.	-1.7216*** [0.559]	-0.1116	-1.6519*** [0.564]	-0.1055	-2.2422*** [0.635]	-0.1234	-1.4033** [0.666]	-1.4033	-1.4566** [0.670]	-1.4566
Cash	-0.0116*** [0.003]	-0.0008	-0.0111*** [0.003]	-0.0007	-0.0121*** [0.003]	-0.0007	-0.0149*** [0.003]	-0.0149	-0.0146*** [0.004]	-0.0146
Foreign Sales	0.0077*** [0.001]	0.0005	0.0075*** [0.001]	0.0005	0.0062*** [0.001]	0.0003	0.0030*** [0.001]	0.0030	0.0029** [0.001]	0.0029
GDP (firm)					-0.0063*** [0.001]	-0.0003				
Observations	5732		5523		5523		5732		5523	
Pseudo R-squared	0.183		0.1834		0.2107					
Controls	Yes		Yes		Yes		Yes		Yes	
Country fixed effects	No		No		No		Yes		Yes	

\*\*\* Significant at 1%, \*\* Significant at 5%, \* Significant at 10%

Note: Probit estimation. Dependent variable is a dummy for stakes larger than 1% of firm value. Robust standard errors (in brackets) clustered at the country level. Baseline control variables include: firm size, leverage, investment opportunities, return on equity, dividend yield, R&D investment, capital expenditure, cash holdings, dummy for American Depository Receipts, foreign sales, share turnover, GDP on firm's country, market capitalisation of firm country, time dummies and country effects (where specified).

# Core model: SWF Ownership

## Dataset total SWF Holdings per firm: Outstanding shares

	Baseline				Country Fixed Effects		
	O/S all (i)	O/S all (ii)	O/S all (iii)	O/S all (iv)	O/S all (v)	O/S all (vi)	O/S all (vii)
Size	0.1217*** [0.012]	0.1166*** [0.014]	0.1121*** [0.014]	0.1150*** [0.015]	0.1336*** [0.012]	0.1407*** [0.017]	0.1375*** [0.017]
Leverage	0.0142** [0.006]	0.0213** [0.009]	0.0189*** [0.007]	0.0193** [0.008]	0.0123 [0.028]	0.0162 [0.031]	0.0142 [0.031]
R&D	0.0624*** [0.020]	0.0598** [0.029]	0.0608** [0.029]	0.0689** [0.031]	0.0435 [0.074]	0.0773 [0.098]	0.0708 [0.097]
Capital Expend.	-0.085 [0.158]	-0.3765* [0.221]	-0.4609*** [0.163]	-0.5780*** [0.198]	0.0356 [0.287]	-0.1492 [0.410]	-0.2266 [0.413]
Foreign Sales		0.0014 [0.001]	0.0015** [0.001]	0.0008 [0.001]		-0.001 [0.001]	-0.0007 [0.001]
GDP (firm)				-0.0013** [0.001]			
Mkap/GDP (firm)				0.0006 [0.001]			
Observations	9459	5732	5523	5523	9459	5732	5523
R-squared	0.017	0.016	0.086	0.087	0.017	0.014	0.084
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed effects	No	No	No	No	Yes	Yes	Yes

\*\*\* Significant at 1%, \*\* Significant at 5%, \* Significant at 10%

Note: OLS Estimates. Dependent variable is the share of SWF ownership in the firm as percentage of market capitalisation. Robust standard errors (in brackets) clustered at the country level. Baseline control variables include: firm size, leverage, investment opportunities, return on equity, dividend yield, R&D investment, capital expenditure, cash holdings, dummy for American Depository Receipts, foreign sales, share turnover, GDP on firm's country, market capitalisation of firm country, time dummies and country effects (where specified).

# Commodity vs Non-Commodity Funds

## Dataset total SWF Holdings per firm

	Commodity (v)	Non Commodity (vi)	Commodity (vii)	Non Commodity (viii)	Commodity (xi)	Non Commodity (xii)	Commodity (xiii)	Non Commodity (xiv)
Size	0.0897*** [0.005]	0.0224* [0.013]	0.0887*** [0.004]	0.0263* [0.015]	0.0980*** [0.004]	0.0405** [0.016]	0.0961*** [0.004]	0.0384** [0.016]
Leverage	0.0121** [0.005]	0.0067** [0.003]	0.0120** [0.005]	0.0073* [0.004]	0.0096 [0.008]	0.0063 [0.030]	0.0092 [0.008]	0.0047 [0.030]
Dividend Yield	0.0085 [0.009]	0.0066 [0.006]	0.0087 [0.010]	0.0028 [0.005]	0.0037 [0.002]	-0.0036 [0.009]	0.0049** [0.002]	0.0007 [0.009]
R&D	0.0666** [0.027]	-0.0059 [0.012]	0.0648** [0.027]	0.0041 [0.014]	0.0398* [0.024]	0.0242 [0.095]	0.0361 [0.024]	0.025 [0.094]
Capital Expend.	-0.2786*** [0.071]	-0.1824 [0.146]	-0.2696*** [0.076]	-0.3084* [0.183]	-0.1026 [0.101]	-0.103 [0.395]	-0.1279 [0.104]	-0.1567 [0.397]
ADR	-0.3716*** [0.056]	31.0126 [22.040]	-0.3628*** [0.067]	30.9181 [22.001]	-0.2682*** [0.042]	0.2558 [0.165]	-0.1234 [0.372]	30.5326*** [1.413]
Foreign Sales	0.0017*** [0.000]	-0.0001 [0.001]	0.0018*** [0.000]	-0.001 [0.001]	0.0007*** [0.000]	-0.0017* [0.001]	0.0008*** [0.000]	-0.0014 [0.001]
Turnover	1.5849* [0.839]	-3.5642** [1.396]	1.5280* [0.813]	-1.8996** [0.756]			2.2299*** [0.839]	-2.0125 [3.220]
GDP (firm)			0.0001 [0.000]	-0.0014** [0.001]				
Mkap/GDP (firm)			-0.0002 [0.000]	0.0007 [0.001]				
Observations	5523	5523	5523	5523	5732	5732	5523	5523
R-squared	0.085	0.082	0.085	0.083	0.0805	0.08	0.0821	0.0808
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed effects	No	No	No	No	Yes	Yes	Yes	Yes

\*\*\* Significant at 1%, \*\* Significant at 5%, \* Significant at 10%

Note: OLS Estimates. Dependent variable is the share of SWF ownership in the firm as percentage of market capitalisation. Robust standard errors (in brackets) clustered at the country level. Baseline control variables include: firm size, leverage, investment opportunities, return on equity, dividend yield, R&D investment, capital expenditure, cash holdings, dummy for American Depository Receipts, foreign sales, share turnover, GDP on firm's country, market capitalisation of firm country, time dummies and country effects (where specified).



# OECD vs Non-OECD funds

## Dataset total SWF Holdings per firm

	OECD (v)	Non-OECD (vi)	OECD (vii)	Non-OECD (viii)	OECD (xi)	Non- OECD (xii)	OECD (xiii)	Non- OECD (xiv)
Size	0.0924*** [0.004]	0.0197 [0.013]	0.0913*** [0.004]	0.0238 [0.015]	0.0998*** [0.004]	0.0408** [0.016]	0.0979*** [0.004]	0.0395** [0.017]
Leverage	0.0114** [0.005]	0.0075* [0.004]	0.0112** [0.005]	0.0081* [0.004]	0.0116* [0.007]	0.0045 [0.031]	0.0112* [0.007]	0.003 [0.030]
Dividend Yield	0.0069 [0.009]	0.0083 [0.006]	0.0075 [0.009]	0.004 [0.005]	0.0049** [0.002]	-0.0056 [0.009]	0.0063*** [0.002]	-0.0011 [0.009]
R&D	0.0530** [0.023]	0.0078 [0.018]	0.0504** [0.023]	0.0185 [0.020]	0.0419** [0.021]	0.0358 [0.096]	0.0377* [0.021]	0.0336 [0.094]
Capital Expend.	-0.2911*** [0.070]	-0.1698 [0.147]	-0.2667*** [0.074]	-0.3113* [0.183]	-0.1234 [0.089]	-0.0405 [0.401]	-0.1552* [0.091]	-0.0901 [0.403]
Cash	0.0009 [0.001]	0.0008 [0.001]	0.0008 [0.001]	0.0011 [0.001]	-0.0014* [0.001]	-0.0009 [0.004]	0 [0.001]	0.0008 [0.004]
Foreign Sales	0.0014*** [0.000]	0.0001 [0.001]	0.0016*** [0.000]	-0.0008 [0.001]	0.0009*** [0.000]	-0.0019* [0.001]	0.0010*** [0.000]	-0.0016* [0.001]
Turnover	2.3043*** [0.784]	-4.2836*** [1.457]	2.0159** [0.783]	-2.3875*** [0.810]			2.2953*** [0.735]	-2.0874 [3.268]
GDP (firm)			0.0002 [0.000]	-0.0016*** [0.001]				
Observations	5523	5523	5523	5523	5732	5732	5523	5523
R-squared	0.188	0.077	0.189	0.078	0.1767	0.093	0.186	0.0753
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed effects	No	No	No	No	Yes	Yes	Yes	Yes

\*\*\* Significant at 1%, \*\* Significant at 5%, \* Significant at 10%

Note: OLS Estimates. Dependent variable is the share of SWF ownership in the firm as percentage of market capitalisation. Robust standard errors (in brackets) clustered at the country level. Baseline control variables include: firm size, leverage, investment opportunities, return on equity, dividend yield, R&D investment, capital expenditure, cash holdings, dummy for American Depository Receipts, foreign sales, share turnover, GDP on firm's country, market capitalisation of firm country, time dummies and country effects (where specified).

# Domestic vs Foreign Investments

## Dataset total SWF Holdings per firm

	Domestic (v)	Foreign (vi)	Domestic (vii)	Foreign (viii)	Domestic (xi)	Foreign (xii)	Domestic (xiii)	Foreign (xiv)
Size	0.0196 [0.012]	0.0925*** [0.006]	0.0239* [0.013]	0.0912*** [0.007]	0.0382*** [0.015]	0.1030*** [0.008]	0.0366** [0.015]	0.1010*** [0.008]
ROE	0.0004 [0.000]	0.0006 [0.001]	0.0001 [0.000]	0.0006 [0.001]	-0.0003 [0.001]	-0.0003 [0.001]	-0.0001 [0.001]	-0.0002 [0.001]
Dividend Yield	0.0083 [0.006]	0.0068 [0.009]	0.0053 [0.005]	0.0061 [0.010]	-0.0029 [0.008]	0.0035 [0.004]	0.0016 [0.008]	0.0048 [0.005]
R&D	0.0028 [0.010]	0.0580** [0.028]	0.0127 [0.011]	0.0562** [0.029]	0.0346 [0.086]	0.0379 [0.047]	0.0331 [0.084]	0.0343 [0.048]
Capital Expend.	-0.1219 [0.146]	-0.3391*** [0.073]	-0.2279 [0.180]	-0.3501*** [0.082]	0.0129 [0.360]	-0.1784 [0.196]	-0.0405 [0.358]	-0.203 [0.204]
Foreign Sales	-0.0002 [0.001]	0.0018*** [0.000]	-0.001 [0.001]	0.0018*** [0.000]	-0.0018** [0.001]	0.0007 [0.000]	-0.0015* [0.001]	0.0007 [0.000]
Turnover	-2.9679** [1.285]	0.9885 [0.980]	-1.6542** [0.740]	1.2827 [0.828]			-1.5678 [2.906]	1.8434 [1.656]
GDP (firm)			-0.0011** [0.000]	-0.0002 [0.000]				
Observations	5523	5523	5523	5523	5732	5732	5523	5523
R-squared	0.098	0.041	0.1	0.042	0.04	0.0398	0.0975	0.0398
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed effects	No	No	No	No	Yes	Yes	Yes	Yes

\*\*\* Significant at 1%, \*\* Significant at 5%, \* Significant at 10%

Note: OLS Estimates. Dependent variable is the share of SWF ownership in the firm as percentage of market capitalisation. Robust standard errors (in brackets) clustered at the country level. Baseline control variables include: firm size, leverage, investment opportunities, return on equity, dividend yield, R&D investment, capital expenditure, cash holdings, dummy for American Depository Receipts, foreign sales, share turnover, GDP on firm's country, market capitalisation of firm country, time dummies and country effects (where specified).

## Results: Effect on firm value

# Impact On Firm Value

## Total SWF ownership and firm value: Tobin Q

	(i) Q Tobin (SWF)	(ii) Q Tobin (SWF)	(iii) Q Tobin O/S	(iv) Q Tobin O/S
SWF ownership	1.4413*** [0.240]	1.3043*** [0.231]	0.0456** [0.019]	0.0398 [0.026]
Size	-0.1200** [0.049]	-0.1118*** [0.032]	-0.0929* [0.048]	-0.0859*** [0.032]
Dividend Yield	-0.008 [0.009]	-0.0332* [0.018]	-0.0075 [0.009]	-0.0310* [0.018]
Cash Holdings	0.0205*** [0.006]	0.0228*** [0.008]	0.0226*** [0.006]	0.0245*** [0.008]
ADR	-0.664 [0.517]	-1.1057 [2.812]	-1.5197 [1.142]	-1.8117 [2.931]
Foreign Sales	0.0035 [0.002]	0.0001 [0.002]	0.0044** [0.002]	0.0011 [0.002]
Share Turnover	10.9007** [4.414]	22.0452*** [6.144]	10.9144** [4.358]	21.2909*** [6.159]
Observations	5418	5418	5418	5418
Controls	Yes	Yes	Yes	Yes
Country fixed effects	No	Yes	No	Yes

\*\*\* Significant at 1%, \*\* Significant at 5%, \* Significant at 10%

Note: Probit estimates for columns (i) and (ii) and OLS estimates for (iii) and (iv). Dependent variable is the Tobin Q of the firm, measured as the book value of total assets plus market value of equity minus the book value of equity divided by total assets. Robust standard errors (in brackets) clustered at the country level. Baseline control variables include: firm size, leverage, investment opportunities, return on equity, dividend yield, R&D investment, capital expenditure, cash holdings, dummy for American Depository Receipts, foreign sales, share turnover, GDP on firm's country, market capitalisation of firm country, time dummies and country effects (where specified).

# Impact On Firm Value

## Firm value by type of SWF Ownership

	Commodity	Non Commodity	OECD	Non-OECD	Domestic	Foreign
Commodity / OECD /Domestic	0.7458*** [0.117]		0.7913*** [0.120]		0.0004 [0.030]	
Non-Commodity / Non-OECD / Foreign		0.0026 [0.027]		0.0021 [0.027]		0.1623*** [0.053]
Size	-0.1495*** [0.034]	-0.0814** [0.032]	-0.1372*** [0.034]	-0.0627** [0.032]	-0.0814** [0.032]	-0.0967*** [0.032]
Dividend Yield	-0.0355** [0.018]	-0.0305* [0.018]	-0.0416** [0.018]	-0.0368** [0.018]	-0.0305* [0.018]	-0.0315* [0.018]
Cash Holdings	0.0238*** [0.008]	0.0246*** [0.008]	0.0225*** [0.008]	0.0231*** [0.008]	0.0246*** [0.008]	0.0244*** [0.008]
ADR	-0.3196 [2.808]	-0.6725 [2.939]	-0.4224 [2.810]	-0.795 [2.942]	-0.6048 [2.970]	-0.5259 [2.816]
Share Turnover	19.6603*** [6.142]	21.2395*** [6.161]			21.2312*** [6.161]	21.0149*** [6.155]
Observations	5418	5418	5422	5422	5418	5418
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes

\*\*\* Significant at 1%, \*\* Significant at 5%, \* Significant at 10%

Note: OLS Estimates. Dependent variable is the Tobin Q of the firm, measured as the book value of total assets plus market value of equity minus the book value of equity divided by total assets. Robust standard errors (in brackets) clustered at the country level. Baseline control variables include: firm size, leverage, investment opportunities, return on equity, dividend yield, R&D investment, capital expenditure, cash holdings, dummy for American Depository Receipts, foreign sales, share turnover, GDP on firm's country, market capitalisation of firm country, time dummies and country effects (where specified).

# Gravity model and Natural Resource Endowments

# Gravity Model

## Motivation

- Assets trade: studies on M&A (Di Giovanni, 2005), banks (Papaioannou, 2009), equity flows (Coeurdacier 2009)
- No previous study of SWFs in a gravity framework. Analysis at the sector and firm level
- Study hypothesis on the shift of investment towards natural resource industries.
- Contextualize in the literature of institutional ownership

# Gravity Model

## Natural Endowments as Allocation Determinants

$$\text{Log} \left( \frac{T_{ij}}{M_i M_j} \right) = \beta_0 + \beta'_1 \mathbf{G}_{\text{geo}} + \beta'_2 \mathbf{F}_{\text{firm}} + \beta'_3 \mathbf{X}_{\text{orig}} + \beta'_4 \mathbf{X}_{\text{dest}} + \mathbf{T} + \lambda_j + v_{ij}$$

### Determinants

- Natural endowments
- Diversification / hedging
  - Covariances monthly returns on the local's stock market indices (1990-2009).
  - Correlation between firm historical returns and underlying asset.
- Covariates
  - Geographic
  - Firm characteristics
  - Macro (GDP, trade, financial development, regional)
  - Institutional quality. Legal origin, country risk, anti-self dealing index





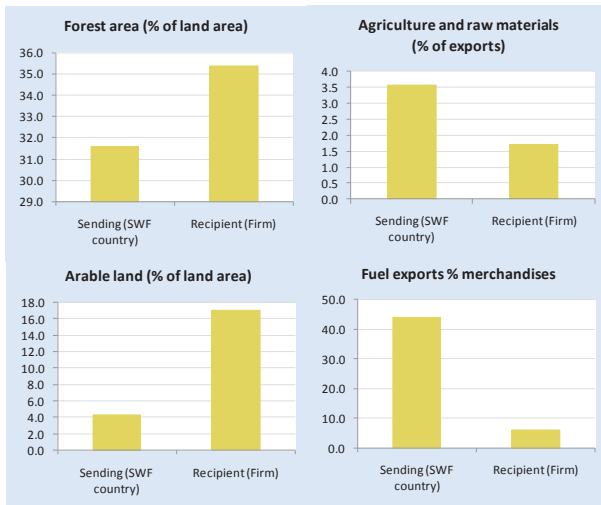
# Gravity Model

## Proxies for Natural Resource Endowments

Indicator	Definition
Agricultural irrigated land (% of total agricultural land)	Agricultural areas purposely provided with water, including land irrigated by controlled flooding.
Forest area (% of land area)	Forest area is land under natural or planted stands of trees of at least 5 meters in situ, whether productive or not.
Agricultural raw materials exports (% of merchandise exports)	Agricultural raw materials comprise SITC section 2 (crude materials except fuels) excluding divisions 22, 27 (crude fertilizers and minerals excluding coal, petroleum, and precious stones), and 28 (metalliferous ores and scrap).
Food exports (% of merchandise exports)	Food comprises the commodities in SITC sections 0 (food and live animals), 1 (beverages and tobacco), and 4 (animal and vegetable oils and fats) and SITC division 22 (oil seeds, oil nuts, and oil kernels).
Manufactures exports (% of merchandise exports)	Manufactures comprise commodities in SITC sections 5 (chemicals), 6 (basic manufactures), 7 (machinery and transport equipment), and 8 (miscellaneous manufactured goods), excluding division 68 (non-ferrous metals).
Ores and metals exports (% of merchandise exports)	Manufactures comprise commodities in SITC sections 5 (chemicals), 6 (basic manufactures), 7 (machinery and transport equipment), and 8 (miscellaneous manufactured goods), excluding division 68 (non-ferrous metals).
Fuel exports (% of merchandise exports)	SITC section 3 (mineral fuels).
Agricultural land (% of land area)	Agricultural land refers to the share of land area that is arable, under permanent crops, and under permanent pastures.
Arable land (% of land area)	Land under temporary crops (double-cropped areas are counted once), temporary meadows for mowing or for pasture, land under market or kitchen gardens, and land temporarily fallow.
Clean energy production (% of total energy use)	Clean energy is noncarbohydrate energy that does not produce carbon dioxide when generated. It includes hydropower and nuclear, geothermal.

# Gravity Model

## Descriptive Statistics Natural Resource Endowments



# Gravity Model and Natural Resource Endowments

## Commodity vs Non-commodity Funds

### All Sample

	Commodity Fuel Exports	Non-Commodity Fuel Exports	Commodity Agric. Land	Non-commodity Agric Land	Commodity Arable land	Non-commodity Arable Land	Commodity Raw Mat. Exports	Non-commodity Raw Mat. Exports	Commodity Metals Exports	Non-Commodity Metals Exports
Coefficient	0.3250***	-0.1012	-0.1456*	0.1540***	-0.2310	0.2352*	-0.6223	-0.8236	-0.0700	-0.4665**
Standard error	[0.092]	[0.145]	[0.085]	[0.050]	[0.144]	[0.136]	[1.026]	[0.640]	[0.184]	[0.196]
Observations	7206	4099	7237	4130	7237	4130	7206	4099	7206	4099
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

### Restricted Sample

	Commodity Fuel Exports	Non-Commodity Fuel Exports	Commodity Agric. Land	Non-commodity Agric Land	Commodity Arable land	Non-commodity Arable Land	Commodity Raw Mat. Exports	Non-commodity Raw Mat. Exports	Commodity Metals Exports	Non-Commodity Metals Exports
Coefficient	0.0081	-1.8234**	-0.0748	0.3989	0.1825	0.2361	-3.3565*	-4.8648**	0.7962	-2.2283*
Standard error	[0.144]	[0.835]	[0.137]	[0.249]	[0.268]	[0.645]	[2.021]	[2.353]	[0.666]	[1.184]
Observations	427	1004	428	1015	428	1015	427	1004	427	1004
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

### Commodity Firms

	Commodity Fuel Exports	Non-Commodity Fuel Exports	Commodity Agric. Land	Non-commodity Agric Land	Commodity Arable land	Non-commodity Arable Land	Commodity Raw Mat. Exports	Non-commodity Raw Mat. Exports	Commodity Metals Exports	Non-Commodity Metals Exports
Coefficient	-0.3229	-0.4082	0.2439	0.179	0.6048*	-0.2418	-0.7204	2.3326***	-0.3854	1.3859
Standard error	[0.214]	[0.406]	[0.228]	[0.115]	[0.366]	[0.297]	[4.755]	[0.513]	[0.890]	[1.138]
Observations	24	51	24	51	24	51	24	51	24	51
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

\*\*\* Significant at 1%, \*\* Significant at 5%, \* Significant at 10%

Note: OLS Estimates. Dependent variable is the bilateral value of SWF holding as % of outstanding shares. Robust standard errors (in brackets) clustered at the country level. Baseline control variables include distance, firm size, leverage and foreign sales. Other variables included in the original configuration were: country contiguity, common language, colonisation, common coloniser, trade as % of GDP, net FDI inflows. See appendix for a detailed description of controls.

# Gravity Model and Hedging - Commodity sensitivity

## Commodity vs Non-Commodity Funds

	All sample		Restricted sample	
	Commodity	Non-commodity	Commodity	Non-commodity
Distance	-0.0008*** [0.000]	-0.0012*** [0.000]	-0.0043*** [0.001]	-0.0054*** [0.001]
Size	2.0967*** [0.070]	2.8321*** [0.500]	6.0997*** [0.826]	12.4634*** [2.070]
Leverage	-2.2213*** [0.520]	-5.2587 [4.102]	-15.3759 [9.931]	-14.6848 [14.348]
Foreign Sales	0.0266*** [0.004]	-0.0065 [0.033]	0.0178 [0.051]	-0.0647 [0.135]
Commodity sensitivity $\beta_{o,a}$	-5.6978*** [2.168]	-1.6556*** [0.281]	-21.2976*** [8.037]	-4.7998 [2.985]
Observations	7237	4130	428	1015
Controls	Yes	Yes	Yes	Yes
Number of country_code	50	48	35	35

Standard errors in brackets

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Note: Panel Estimates. Dependent variable is the bilateral value of SWF holding as % of outstanding shares. Robust standard errors (in brackets) clustered at the country level. Baseline control variables include distance, firm size, leverage and foreign sales. Other variables included in the original configuration were: country contiguity, common language, colonisation, common coloniser, trade as % of GDP, net FDI inflows. See appendix for a detailed description of controls. Commodity sensitivity calculated as the regression of demeaned asset returns against demeaned oil returns.

# Gravity Model and Diversification

## Commodity vs Non-Commodity Funds

	All Sample		Restricted Sample	
	Commodity	Non-Commod.	Commodity	Non-Comm.
Distance	-0.0007 [0.001]	-0.0017*** [0.000]	-0.0041*** [0.001]	-0.0082*** [0.003]
Size	2.2686*** [0.114]	6.8909*** [1.181]	5.4048*** [0.996]	29.1322*** [5.846]
Leverage	-3.4552*** [0.913]	-12.8235 [9.412]	-12.7031 [12.203]	-9.4256 [31.161]
FX Sales	0.0044 [0.003]	-0.0119 [0.072]	-0.0447 [0.062]	-0.3362 [0.417]
Stock Mkt. Correl.	-28.3585*** [2.643]	54.3039** [24.609]	-17.6272** [7.041]	81.2850 [88.038]
Observations	3561	1726	294	312
Controls	Yes	Yes	Yes	Yes

\*\*\* Significant at 1%, \*\* Significant at 5%, \* Significant at 10%

Note: OLS Estimates. Dependent variable is the bilateral value of SWF holding as % of outstanding shares. Robust standard errors (in brackets) clustered at the country level. Baseline control variables include distance, firm size, leverage and foreign sales. Other variables included in the original configuration were: country contiguity, common language, colonisation, common colonisator, trade as % of GDP, net FDI inflows. See appendix for a detailed description of controls.

# Robustness Checks

- Self-selection firm valuation and SWF ownership
- Fund by Fund Individual Regressions: O/S of firm, O/S of fund portfolio
- Over-represented funds: NBIM Norway and New Zealand Superannuation Fund
- Censoring bias

# Robustness checks

## Self-selection of firm valuation

Dependent variable:	Tobin Q (firm value)	
	Outcome	Selection
SWF ownership (% O/S)	1.2053*** [0.204]	
Firm size	0.0033 [0.024]	0.8342*** [0.160]
Leverage	-0.1081** [0.055]	-1.5621* [0.899]
Inv. Opport.	0.5837*** [0.086]	-0.674 [0.639]
ROE	0.0077*** [0.002]	-0.0067 [0.014]
Dividend Yield	-0.0372*** [0.013]	-0.1277* [0.074]
R&D	0.9078*** [0.150]	-0.2743 [0.662]
Capex	-0.9821* [0.580]	-4.2372 [2.633]
Cash holdings	0.0210*** [0.007]	-0.0405 [0.034]
<hr/>		
Instrument		
Landlocked	-0.3722*** [0.009]	
Analysts	0.2715*** [0.004]	
Mills ratio	27.4109** [44.106]	
Observations	8872	

Standard errors in brackets  
\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

# Robustness checks

## Individual Ownership as share of SWF Portfolio - Selected SWFs

	New Zealand	Korea	GIC	Temasek	Saudi Arabia	Malaysia
Size	-0.1951*** [0.059]	-0.0547** [0.027]	0.1940** [0.086]	0.0244 [0.042]	0.1372 [0.108]	0.098 [0.078]
Leverage	-0.2543 [0.318]	0.0072 [0.032]	-1.6569** [0.821]	-0.2654 [0.573]	-236.1424*** [86.141]	-1.5319** [0.764]
Inv. Op.	-0.2852** [0.134]	0.0138 [0.026]	-0.4919* [0.266]	0.1533* [0.087]	0.2197 [0.295]	-1.2685*** [0.601]
ROE	0.0061*** [0.002]	0.0023 [0.003]	0.0148*** [0.005]	0.0206*** [0.005]	0.1491*** [0.050]	0.0440*** [0.011]
Dividend Yield	-0.0319 [0.045]		0.0251*** [0.006]	-0.0116 [0.032]	-0.6094*** [0.218]	-0.1168 [0.075]
R&D	-8.2601*** [2.662]	-0.1835 [0.422]	-1.7529 [1.656]	-9.2298*** [2.850]	2.0159*** [0.682]	0.3974 [0.522]
Capital Expend.	3.2854*** [0.569]	-2.8977* [1.532]	-0.8948 [1.439]	-1.6813* [0.880]	-16.7134* [8.715]	2.1174* [1.254]
Cash	0.0585*** [0.013]	-0.0908* [0.050]	-0.5237*** [0.071]	0.0113* [0.006]	-1.4116*** [0.502]	-0.3049* [0.183]
Foreign Sales	-0.0251** [0.010]	0.0049 [0.006]	0.0007 [0.001]	-0.0052 [0.004]	0.0075 [0.007]	0.0039 [0.003]
GDP (firm)	0.0334*** [0.009]		0.0029 [0.004]	-0.0014 [0.004]	-0.9808*** [0.377]	-0.1927*** [0.037]
Observations	5520	1571	5520	5520	5520	5520
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes

\*\*\* Significant at 1%, \*\* Significant at 5%, \* Significant at 10%

Note: Probit estimation. Dependent variable is a dummy for stakes larger than 1% of firm value. Robust standard errors (in brackets) clustered at the country level. Baseline control variables include: firm size, leverage, investment opportunities, return on equity, dividend yield, R&D investment, capital expenditure, cash holdings, dummy for American Depository Receipts, foreign sales, share turnover, GDP on firm's country, market capitalisation of firm country, time dummies and country effects (where specified).



# Robustness checks

## Selection bias and Heckman correction - Gravity model

	Outcome (i)	Selection (ii)	Outcome (iii)	Selection (iv)	Outcome (v)	Selection (vi)
Distance	-0.0211* [0.013]	-0.0002*** [0.000]	0.0048 [0.014]	-0.0002*** [0.000]	-0.0064 [0.009]	-0.0002*** [0.000]
Invest. Opp.	0.1842 [0.148]	0.0014*** [0.000]	-0.0651 [0.150]	0.0014*** [0.000]	0.0892 [0.175]	0.0016*** [0.001]
ROE	0.0127 [0.351]	-0.0004 [0.002]	0.0119 [0.313]	-0.0002 [0.002]	-0.2397 [0.463]	-0.0005 [0.002]
Dividend yield	0.699 [1.098]	0.0031 [0.005]	-0.1295 [0.528]	0.0069 [0.004]	0.2219 [1.108]	0.0027 [0.006]
R&D	-0.0473 [0.283]	0.0002 [0.001]	-0.1134 [0.249]	0.0004 [0.001]	-0.872 [1.290]	-0.0044 [0.004]
Cap. Expendt.	0.0382 [0.660]	0.0039 [0.002]	-0.6446 [0.622]	0.0037 [0.002]	-0.3818 [0.708]	0.0015 [0.003]
Cash holdings	0.0104** [0.005]	0.0000** [0.000]	0.0037 [0.005]	0.0000** [0.000]	0.0076 [0.005]	0.0001*** [0.000]
ADR	25.1176 [29.824]	0.1611 [0.132]	3.2586 [26.660]	0.1548 [0.132]	8.0668 [29.905]	0.078 [0.140]
Foreign Sales	-0.1312 [0.158]	0.0011* [0.001]	-0.2446* [0.140]	0.001 [0.001]	-0.249 [0.186]	0.0009 [0.001]
Fund size	52.6827** [25.112]	0.2770*** [0.037]	11.3837 [25.467]	0.2868*** [0.039]	48.7052** [24.099]	0.3067*** [0.048]
SWF performance	-0.1128 [0.121]	-0.0012*** [0.000]	0.0922 [0.126]	-0.0013*** [0.000]	0.3339** [0.163]	-0.0002 [0.001]
<b>Instruments</b>						
ADR (cross-listed US exchange)		-0.0047 [0.012]				
Firm Turnover		-0.0043**				
Anti self-dealing index				0.1311* [0.070]		
Trade openness (% GDP)						0.0010*** [0.000]
Inverse Mills ratio		[0.002] 147.2683 [102.083]		-59.2586 [107.906]		40.7048 [74.918]
Observations	11175	11175	11159	11159	5084	5084

Standard errors in brackets

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Note: Heckman correction model. In the outcome equation the dependent variable is the normalized equity investment on each firm. In the selection equation the dependent variable is the equal to one when firm has a positive SWF holding and zero otherwise. Firm size and turnover are used as instruments in column (ii), the anti-self dealing defined by Djankov et al (2008) in column (iv) and a measure of trade openness in column (v). Anti-self dealing index measures the ex-ante and ex-post effectiveness of regulation and enforcement against violators, with the year 2003 as the baseline. It focuses on private enforcement mechanisms, such as disclosure, approval, and litigation, governing a specific self-dealing transaction. Robust standard errors (in brackets) clustered at the firm level. See appendix for a detailed description of controls.

# Conclusion

## Conclusion 1

- Significant variation in the determinants of SWF ownership between commodity and non-commodity funds
- Most SWFs are attracted to large firms, with proven profitability and international activities
- Differences among groups remain:
  - Commodity funds favour R&D and foreign activity.
  - OECD-based funds are attracted to liquid stocks and foreign sales.
  - Domestic investments prefer small firms, with less traded firms, and less international activity.

# Conclusion

## Conclusion 2

- Overall a positive effect of SWF portfolio allocations on firm value.
- Differences on Firm value: investments from i) commodity, ii) OECD funds in iii) foreign markets have a larger impact on firm value.
- Natural endowments contribute to explain SWF equity holdings for specific SWF groups.
- Effect in commodity and non-commodity SWFs for some natural-resource proxies (agricultural land, metal exports) and hedging / diversification.

# ANNEX

# Expected effects

## SWF Ownership

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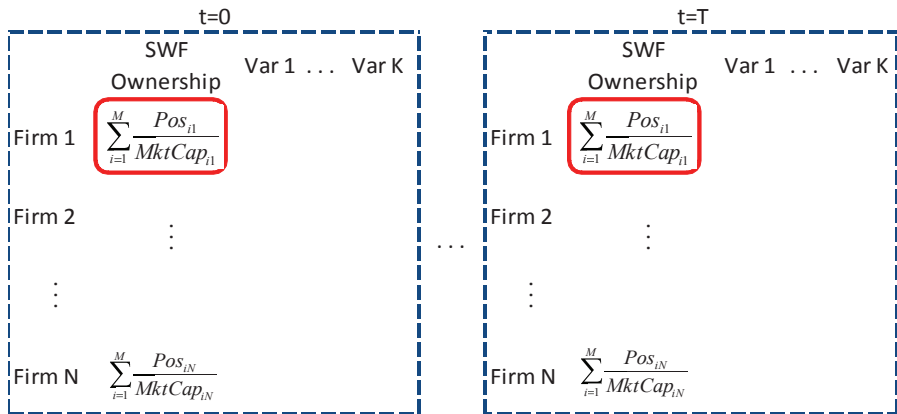
Size	+	ADR	+
Leverage	+/-	Foreign Sales	+
Inv. Opport.	+	Turnover	+/-
ROE	+	Book Value	+/-
R&D	+/-	Cash Holding (FM)	+
CAPEX	+/-	GDP firm country	+
Cash Holdings	+	Mkt Cap firm country	+

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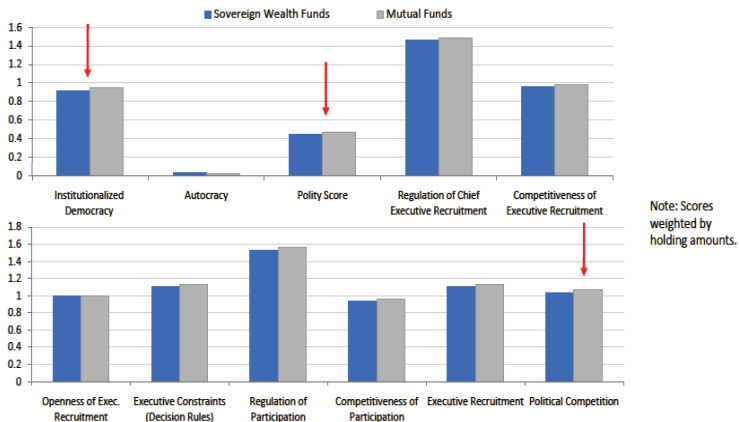
# Data structure

Total SWF ownership by firm



# SWFs and Political Bias

## Political Regimes in recipient countries - Polity IV

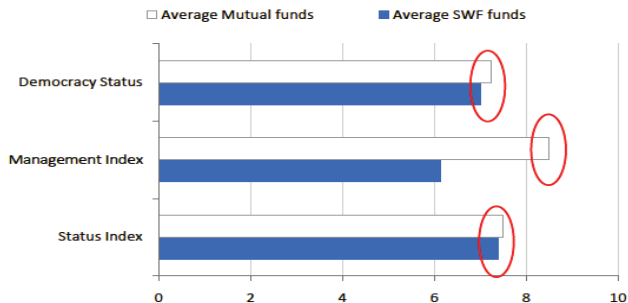


Source: Author's calculation, based on Factset/Lionshares and Polity IV, 2010.

Note: *Polity Score* refers to concomitant qualities of democratic and autocratic authority in governing institutions.

# SWFs and Political Bias

A democratic premium - Bertelsmann Index



Source: Author's calculation, based on Factset/Lionshares and Bertelsmann Foundation, 2010.

Status Index: State of development by countries on their way to democracy, as political and economic transformation.

Management Index: Dynamic score valuating the equality of governance and among decision makers (2005 to 2007).



# Robustness checks

## Invidual Ownership as share of Firm Value - Selected SWFs

	Norway	New Zealand	GIC Singapore	Temasek Singapore	Norway	New Zealand	GIC Singapore	Temasek Singapore
Size	0.0014 [0.003]	-0.0025*** [0.001]	-0.002 [0.002]	0.0016 [0.005]	-0.0003 [0.003]	-0.0022*** [0.001]	-0.0016 [0.002]	0.005 [0.013]
Inv. Opp.	0.0048 [0.007]	-0.0015** [0.001]	-0.0056 [0.005]	0.0001 [0.009]	0.0068 [0.011]	-0.0032 [0.002]	-0.0061 [0.006]	-0.0027 [0.041]
ROE	0.0005* [0.000]	0.0001** [0.000]	0.0001 [0.000]	0.001 [0.001]	0.0005* [0.000]	0.0001 [0.000]	0.0001 [0.000]	0.0009 [0.001]
R&D	0.024 [0.024]	0.0011 [0.002]	0.0313 [0.031]	0.0044 [0.010]	0.0245 [0.019]	-0.0002 [0.004]	0.0316*** [0.010]	0.0162 [0.071]
Capex	-0.0638 [0.058]	-0.0013 [0.011]	0.0081 [0.016]	-0.0189 [0.115]	-0.0257 [0.080]	0.0026 [0.018]	0.0058 [0.042]	-0.0117 [0.305]
Cash Holdings	0.0005 [0.001]	0.0012 [0.001]	0.0001 [0.000]	-0.0001 [0.001]	0.0004 [0.001]	0.0012*** [0.000]	0.0001 [0.000]	0.0002 [0.003]
ADR	-0.1039*** [0.015]	0.0214 [0.015]	0.0018 [0.006]	-0.0625 [0.051]	-0.0931 [0.286]	0.0241 [0.066]	0.0031 [0.151]	0.0139 [1.095]
Turnover	0.0704 [0.692]	0.0618 [0.135]	0.1429 [0.112]	-1.3897 [0.930]	0.3963 [0.646]	-0.0567 [0.149]	0.1437 [0.340]	-1.5666 [2.470]
Observations	5522	5522	5522	5522	5522	5522	5522	5522
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed effects	No	No	No	No	Yes	Yes	Yes	Yes

\*\*\* Significant at 1%, \*\* Significant at 5%, \* Significant at 10%

Note: OLS Estimates. Dependent variable is the share of SWF ownership in the firm as percentage of market capitalisation. Robust standard errors (in brackets) clustered at the country level. Baseline control variables include: firm size, leverage, investment opportunities, return on equity, dividend yield, R&D investment, capital expenditure, cash holdings, dummy for American Depository Receipts, foreign sales, share turnover, GDP on firm's country, market capitalisation of firm country, time dummies and country effects (where specified).

# Non-Commodity Fund

## Investing in one risky asset

Two assumptions:

- Uncertainty of fund size
- Dependence on secondary revenues (exports/ export price)
- The decision making problem In this case, the SWF faces the problem of investing its financial wealth in a single asset (i.e. global market portfolio) or leave them at the rate that government earns on liquid foreign assets/reserves. Returns for this performance are normally distributed and given by equation:

$$\tilde{r}_a \sim N(\mu_a, \sigma_a^2)$$

$\mu_a$ : Expected risk premium (over reserves returns)  $\sigma_a$ : Asset volatility.

- Reserves returns also normally distributed:

$$\tilde{r}_e \sim N(\mu_e, \sigma_e^2)$$

and correlate positively with asset returns, i.e.

$$\text{Cov}(r_a, \tilde{r}_e) = \rho_{a,e} > 0$$

Assumption: No risk premium of holding reserves  $\rightarrow \mu_e = 0$ .

- $\theta$  is not known for the non-commodity fund.  $\theta$  depends on economic activity (i.e. export revenues), which a function of labour, capital and a minimum of factor endowments  $E$ , and therefore  $\partial\theta/\partial E > 0$ . Assume a distribution for  $\theta$  such that:

$$\theta \sim U(\bar{\theta} - \epsilon, \bar{\theta} + \epsilon)$$

- Assuming independence of uncertainty on fund size and asset risk, the joint f.d.p. of  $\theta$  and  $r_a$  is given by:

$$f(\theta, r_a) = f(\theta)f(r_a) = \frac{1}{\sigma_a\sqrt{2\pi}} e^{-\frac{1}{2}\left(\frac{r_a - \mu_a}{\sigma_a}\right)^2} \frac{1}{(\bar{\theta} + \epsilon) - (\bar{\theta} - \epsilon)}$$

- Then, to estimate the variance:

$$\begin{aligned} \text{Var}(\tilde{\theta}r_a) &= E[(\tilde{\theta}r_a)^2] - E[(\tilde{\theta}r_a)]^2 \\ &= \frac{1}{3}(\epsilon^2 + 3\bar{\theta}^2)(\mu_a^2 + \sigma_a^2) - \mu_a^2\bar{\theta}^2 \\ &= \bar{\theta}^2\sigma_a^2 + \epsilon^2\frac{\mu_a^2 + \sigma_a^2}{3} \end{aligned}$$

- If there is uncertainty on the size of the fund, the optimal asset allocation for the SWF (in the one-asset case) is:

$$w_U^* = \frac{1}{\lambda} \frac{\bar{\theta}\mu_a}{\bar{\theta}^2\sigma_a^2 + \epsilon^2\frac{\mu_a^2 + \sigma_a^2}{3}}$$

- If there is no uncertainty risk then  $w^* = \frac{1}{\bar{\theta}} \frac{\mu_a}{\lambda\sigma_a^2}$ . It can be shown that

$$w^* > w_U^*$$

Therefore uncertainty implies a reduction in the demand for the risky asset.