



What drives pension reform measures?

Evidence based on a new comprehensive dataset and theory

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Motivation

Old-age dependency ratios in OECD countries are now 60% higher than in 1970 and are expected to rise another 60% until 2040

- This renders most pay-as-you-go financed pension systems unsustainable
- Economic theory (and common sense) suggest a tight link between ageing and pension design

This paper

Do changes in demographic forecasts coincide (trigger/drive?) with pension reform measures? (Short answer: no)



Literature

- Spruk and Verbic (undated) and Leibrecht and Fong (2017)
 - Similar but less detailed datasets, focus on political variables
 - Empirical analysis uses levels of explanatory variables (especially the old-age dependency ratio) to explain occurrence of reform measures
- Persson & Tabellini (2000) and many others
 - Mostly theoretical contributions (both normative and positive) that link old-age dependency ratio to the size/design of the PAYG system
- Rodrik (1996), Tommasi & Velasco (1996), Tommasi (2017)
 - Crisis induced structural change



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Data

- 23 OECD countries

- Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Japan, Luxembourg, the Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom, United States

- 1970 – 2013, yearly

- Includes baby bust, longevity shocks, 70's oil crisis, early 80's recession, great moderation, EMU, dot-com crisis, great recession, sovereign debt crisis and retirement of baby boom



Pension reform measures

- In each year, and for each country we **count** and **classify** pension reform measures based on a careful reading of documents from the International Social Security Association, the OECD and the International Labor Organization
 - If additional information was needed, we consulted other, mostly national sources.
 - We date reform measures according to the year in which they are legislated
- Total of 938 reform measures, 604 classify as “expanding” or “contracting” which are used in our analysis

Pension reform measures: classification

Expanding reform measures

Coverage

Reform measures that *expand* the coverage, for example by weakening the eligibility criteria

Generosity & adequacy

Reform measures that *expand* the generosity of the pension system, for example by raising the benefit level

Contracting reform measures

Financial & fiscal sustainability

Reform measures that *enhance* the financial sustainability of the pension arrangement

Work incentives

Reform measures that *enhance* work incentives

Database also contains subcategories and other categories such as “administrative efficiency”, etc.



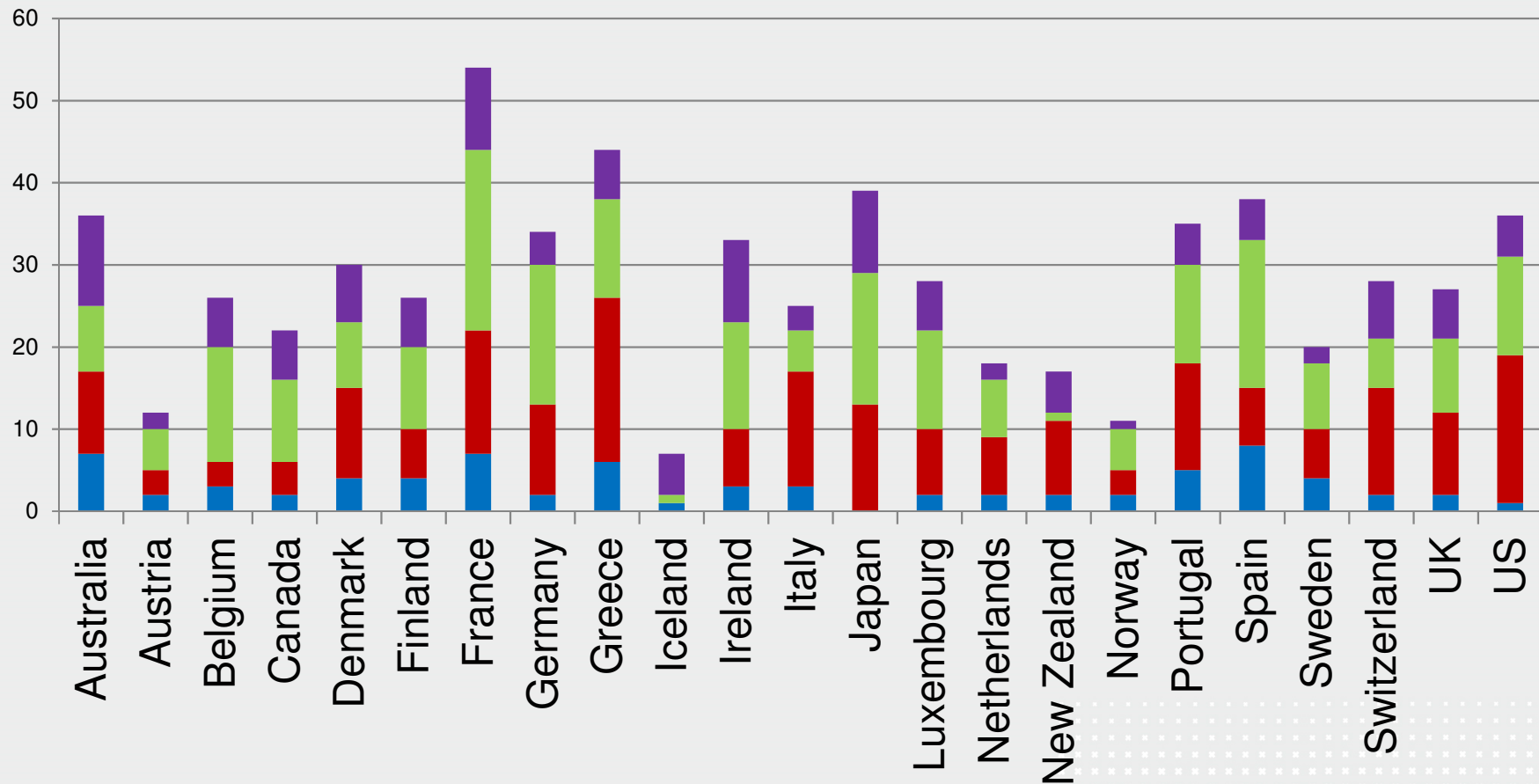
Pension reform measures: examples classification

- Belgium 1971:
 - ILO NATLEX (2014) writes “Royal Decree adapting certain legal provisions with the provisions of the Act of 21 December 1970 establishing a National Social Insurance Institute for freelancers.”
 - We classify this as **Coverage (expanding)**
- Switzerland 2009:
 - OECD (2012) writes “Minimum rate of return on mandatory private pensions cut from 2.75% to 2% in 2009 and to 1.5% from 2012.”
 - We classify this as **Financial & fiscal sustainability (contracting)**

Pension reform measures

By country and type

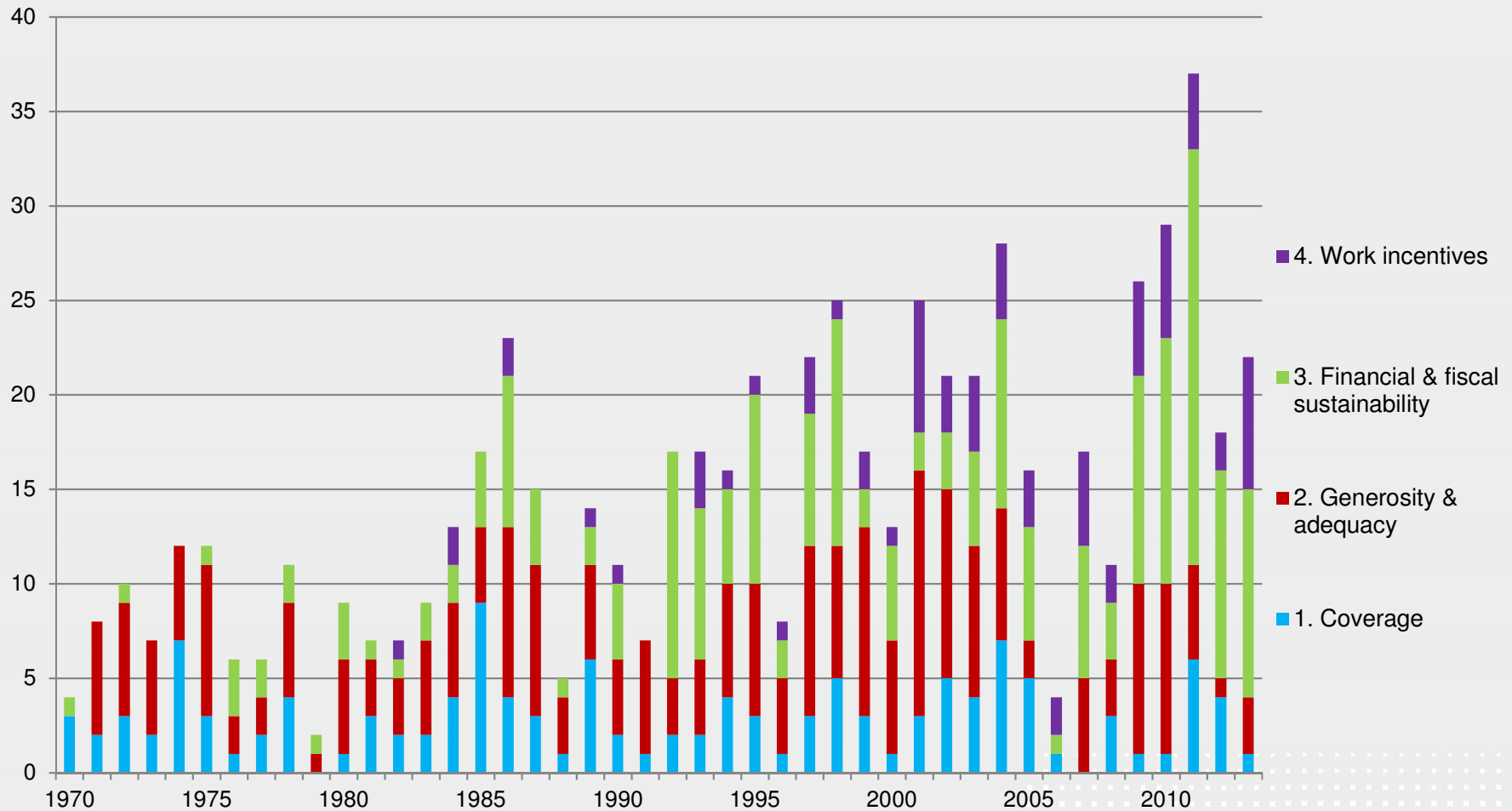
■ 1. Coverage
 ■ 2. Generosity & adequacy
 ■ 3. Financial & fiscal sustainability
 ■ 4. Work incentives





Pension reform measures

By year and type, main



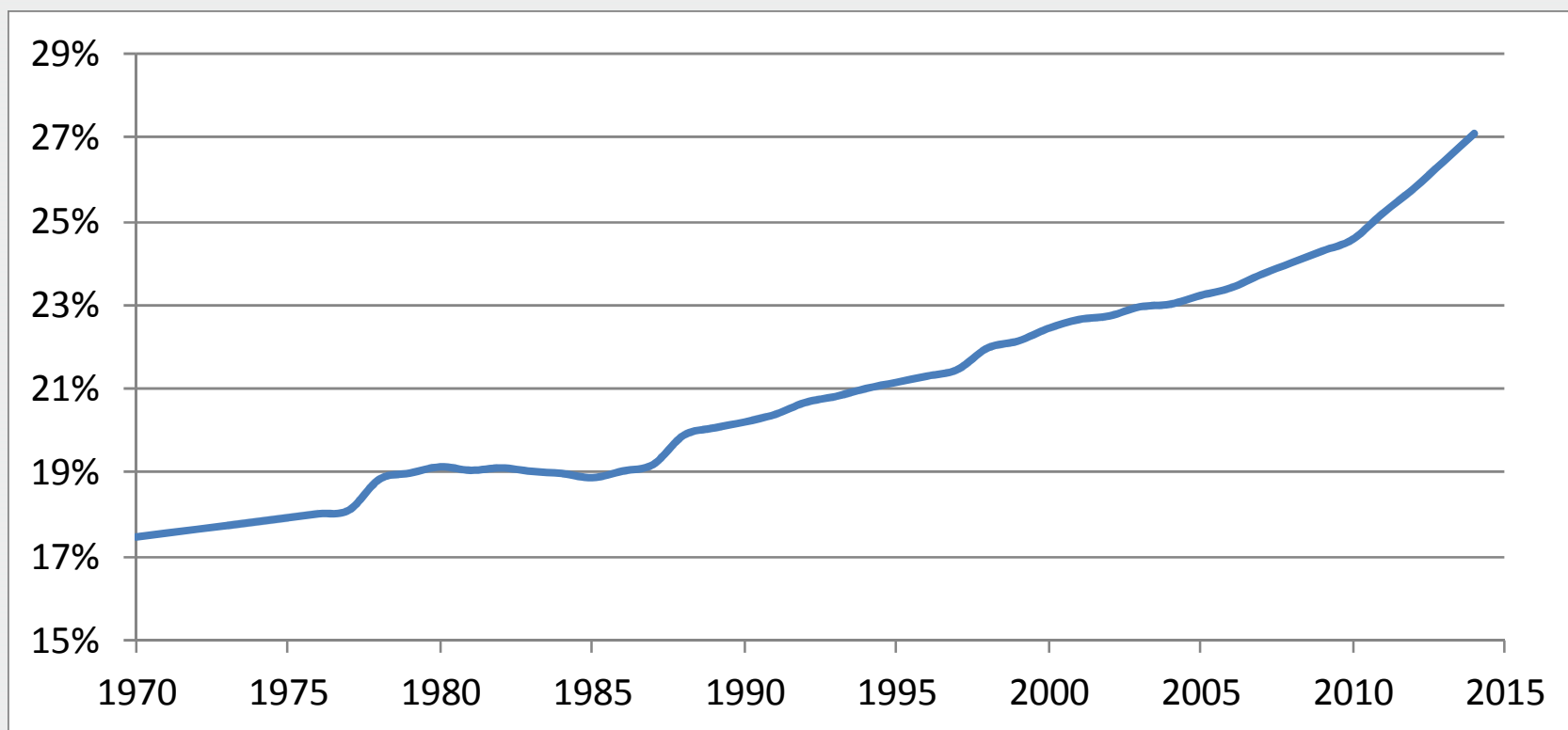


Old-age dependency ratio

- Old age dependency ratio
 - Number of people of 65 and older divided by the number of people in the age category 15-64 (times 100)
- Realisations and forecasts taken from UN World Population Prospects (UN-WPP)
 - Published in 1973, 1978, 1982, 1984, 1988, 1990, 1992, 1994, 1996, 1998, 2000, 2002, 2004, 2006, 2008, 2010 and 2012
 - Projections are only made for specific years ahead at 5-, 10-, or 15-year intervals.

Old age dependency ratio forecasts

Mean of 25 year ahead forecast, e.g. 1980 measures expected old age dependency ratio in 2005





Other variables

- Economic variables
 - Real GDP growth, unemployment rate, openness of trade, inflation, short term interest rate, long term interest rate
- Public finance (% of GDP)
 - Debt, deficit, revenues, disbursements
- Political variables
 - Cabinet orientation, new government, type, election year, ...
- Crisis variables (dummies)
 - Bank crisis, currency crisis, debt crisis



Empirical analysis

- We only observe type and number of reform measures. We do not know quantitative effect of any reform measures
- Panel logit regression with country fixed effects
 - Relation between probability of a certain type of reform measure and macroeconomic and demographic conditions
- Conditional panel logit
 - Coefficients are (virtually) identical to conditional logit. Normal panel allows for easier calculation of mean marginal effects (which require country fixed effects)



Pension reform measures: dummies

- Expanding only
 - 1 if ($\#$ Expanding reform measures > 0 and $\#$ Contracting reform measures $= 0$), 0 otherwise
- Contracting only
 - 1 if ($\#$ Expanding reform measures $= 0$ and $\#$ Contracting reform measures > 0), 0 otherwise
- Expanding & Contracting
 - 1 if ($\#$ Expanding reform measures > 0 and $\#$ Contracting reform measures > 0), 0 otherwise

Given our setup we could also use a multinomial logit regression.



Pension reform measures: dummies

	1970-2013	1970-1991	1992-2013
Expanding	244	115	129
Expanding only	184	101	83
Contracting	159	36	123
Contracting only	99	22	77
Expanding & Contracting	60	14	46
Total	343	137	206

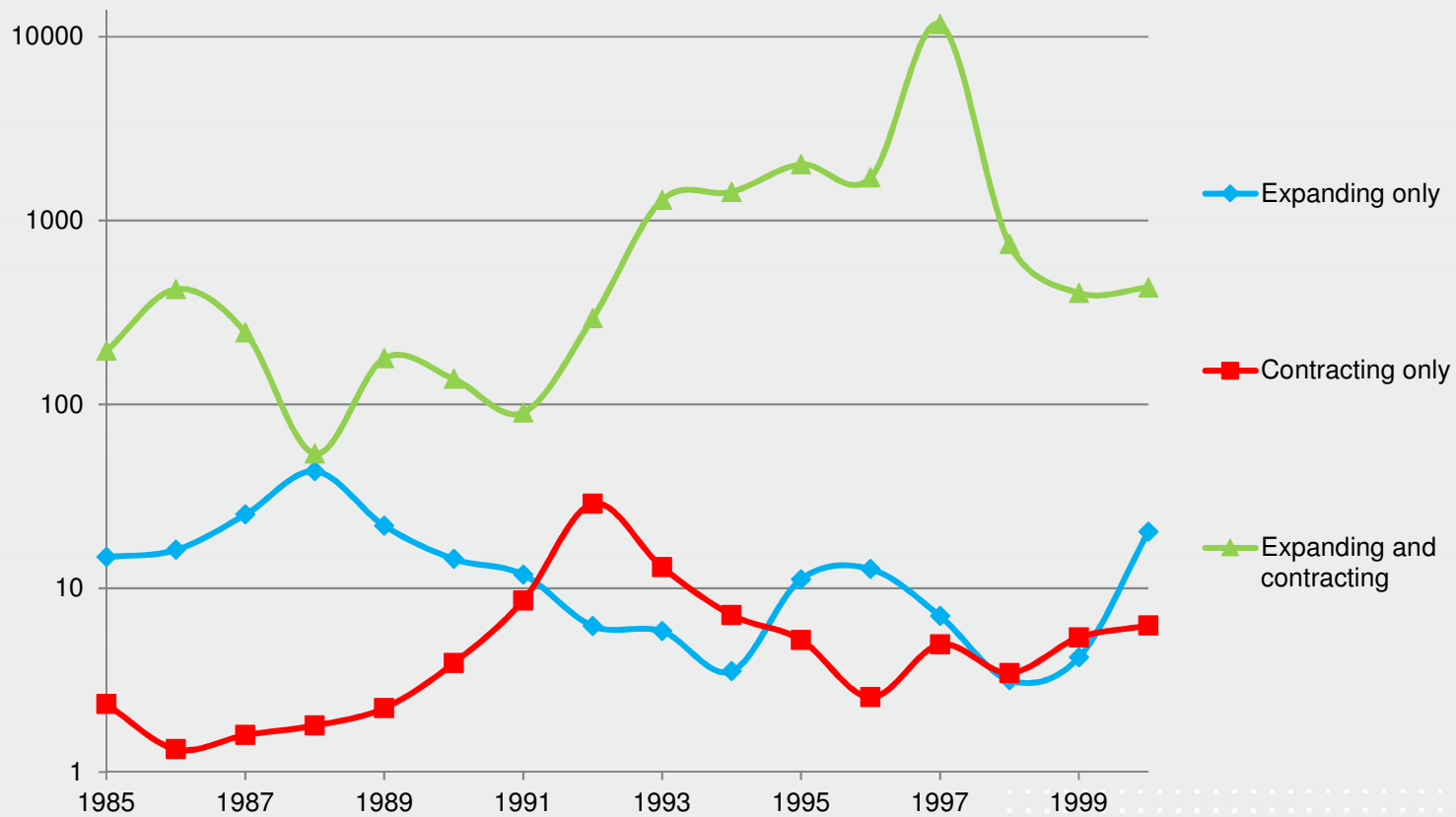


Two periods

- Old-age dependency ratio and occurrence of reform measures show a trend
 - This makes old-age dependency ratio highly significant
 - Simple year dummies do not work (reforms are synchronised, so year dummies render all other variables insignificant)
- Chow (sort of...) break test
 - Allow all coefficients and intercepts to change in a given year
 - Calculate likelihood-ratio of unrestricted to restricted model
 - Do this for all years and plot p-values of break in that year

Two periods

Reciprocal of p-value of test for significance structural break dummy – log scale



Regressions and two periods

- Estimate logit regressions for each type of reform regime (expanding only, contracting only and expanding & contracting)

$$P(\text{reform}) = \frac{\exp(Z_{it})}{1 + \exp(Z_{it})}$$

with

$$Z_{it} = \alpha_i + aD_t + \beta'X_{it} + b'D_tX_{it} + \epsilon_{it}$$

- Second period's coefficients are a *correction* to first period's coefficients
 - We perform Wald tests for the significance of the sum of β and b .

Logit estimations for the baseline regressions

Independent variables	Expanding Only (break in 1988)	Contracting only (break in 1992)	Expanding & Contracting (break in 1997)
Δ OAD	0.279 (0.80)	-0.184 (-0.24)	0.387 (0.61)
Δ OAD25	0.172 (1.13)	0.006 (0.02)	-0.112 (-0.38)
GROWTH	-0.025 (-0.46)	-0.184** (-2.21)	0.178 (1.57)
DEF	-0.038 (-0.82)	-0.051 (-0.64)	0.230** (2.56)
UNEMPL	0.044 (0.91)	0.133 (1.63)	-0.032 (-0.37)
D_y	-0.145 (-0.40)	0.848 (1.49)	1.743** (2.56)
$D_y \times \Delta$ OAD	-0.436 (-0.95)	0.704 (0.83)	-0.322 (-0.41)
$D_y \times \Delta$ OAD25	-0.307* (-1.69)	-0.033 (-0.11)	0.196 (0.60)
$D_y \times$ GROWTH	0.178** (2.37)	0.040 (0.40)	-0.137 (-1.00)
$D_y \times$ DEF	0.067 (1.32)	0.026 (0.31)	-0.118 (-1.25)
$D_y \times$ UNEMPL	-0.022 (-0.40)	-0.002 (-0.02)	0.049 (0.51)



Wald tests significance second sub-period

ΔOAD	0.24	2.11	0.02
$\Delta OAD25$	2.09	0.06	0.39
$GROWTH$	9.35***	6.35**	0.27
DEF	0.84	0.34	4.75**
$UNEMPL$	0.28	5.95**	0.08



Expanding only

Mean marginal effects

Independent variables	1970-2013	1970-1987	1988-2013
Δ OAD	0.002 (0.07)	0.040 (0.77)	-0.020 (-0.52)
Δ OAD25	-0.002 (-0.16)	0.025 (1.07)	-0.017 (-1.41)
GROWTH	0.012** (2.16)	-0.002 (-0.30)	0.020*** (2.99)
DEF	0.000 (0.08)	-0.005 (-0.78)	0.004 (0.84)
UNEMPL	0.005 (0.87)	0.007 (0.92)	0.003 (0.54)
D_{1988}	-0.059* (-1.86)	-0.021 (-0.65)	-0.086** (-2.31)

Contracting only

Mean marginal effects

Independent variables	1970-2013	1970-1991	1992-2013
Δ OAD	0.011 (0.42)	-0.006 (-0.24)	0.058 (1.46)
Δ OAD25	-0.001 (-0.08)	0.000 (0.02)	-0.003 (-0.25)
GROWTH	-0.010*** (-3.28)	-0.006** (-2.31)	-0.016** (-2.56)
DEF	-0.002 (-0.78)	-0.002 (-0.64)	-0.003 (-0.59)
UNEMPL	0.008** (2.40)	0.004* (1.65)	0.015** (2.44)
D ₁₉₉₂	0.064*** (3.51)	0.050*** (2.81)	0.079*** (3.82)

Expanding & Contracting

Mean marginal effects

Independent variables	1970-2013	1970-1996	1997-2013
Δ OAD	0.010 (0.61)	0.009 (0.61)	0.006 (0.14)
Δ OAD25	-0.001 (-0.19)	-0.003 (-0.38)	0.008 (0.62)
GROWTH	0.005* (1.71)	0.004 (1.62)	0.004 (0.52)
DEF	0.007*** (3.27)	0.006*** (2.60)	0.010** (2.20)
UNEMPL	0.000 (-0.19)	-0.001 (-0.36)	0.002 (0.28)
D ₁₉₉₇	0.089*** (4.22)	0.090*** (3.56)	0.085*** (4.71)



Empirical analysis: stylised facts

- Reform measures are relatively infrequent in most countries
- Shocks to ageing forecasts do not coincide with reform measures
- Business cycle swings do coincide with reform measures
- Ageing (or time) does result in more reforms





Theoretical explanation

- News arrives continuously, but does not always trigger a reform
- Suggests some fixed “costs” of reforms
- Borrow from microeconomics: menu cost model (fixed adjustment costs)



Conclusion

- We have a unique dataset of pension reform measures for a broad set of OECD countries for the period 1970-2013
- Empirical analysis shows that pension reform measures tend to coincide with business cycle shocks
- Demographic forecasts are relevant for the type of reform measures, not the timing of the measure
- Empirical findings are consistent with a menu cost model of pension reform



Conclusion

- Attempts to contract pension arrangements may be more effective in downturns and/or when public budgets are under pressure
- EU Stability and Growth Pact allows temporary deviation from (path to) medium term objective due to costs of pension reform
- However, such deviation is not allowed from 3% deficit limit, which is most likely to be binding during a recession
- Hence, Eurozone member states are incentivized to implement contracting pension reform measures outside recessions