

Predicting Long Term Asset Returns using Demographic Data

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About the speaker



- **Jaideep Oberoi**
- Lecturer in Finance, University of Kent
- Jaideep researches and teaches risk management and asset pricing at Kent Business School.



- **Kent Business School**
- University of Kent: The UK's European University with 4 European campuses
- Top 20 UK business school
- 8th for graduate prospects in Accounting & Finance in The Guardian University Guide 2018.

Motivation

- Demographic ratios (M/O or M/Y) may partially explain long term movements in asset valuations
 - Theoretical work – Yoo 1994, Brooks 2002, Poterba 2004, Geanakoplos et al. 2004
 - Empirical work – Ang & Maddaloni 2005, Favero *et al.* 2011, Liu & Spiegel 2011, Chen *et al.* 2018
- Driven by changing savings rates and possibly risk preferences
- May explain the very persistent low frequency movement in dividend- or earnings-price ratios

Motivation



- This work builds on Ang & Maddaloni 2005 and Chen *et al.* 2018 (CGMP) using their two features
- It addresses global developed market equities to exploit cross-country heterogeneity
- It exploits forecasts of *future* demographic changes to generate forecasts of *future* equity market valuations

CGMP Empirical Forecast Model



- Short horizon predictive regression:

$$r_{t+1} = f(x_t) + \epsilon_{t+1}$$

- where r_{t+1} is log stock returns, and x_t is one or more lagged predictors
- Long horizon prediction

$$r_{t+k}^{\hat{}} = f(x_{t+1-k}^{\hat{}})$$

Ang & Maddaloni Panel Regressions



- Short horizon predictive regression:

$$y_{t+1} = a + b * x_t + \epsilon_t$$

where y refers to the equity premium, x_t consists of predictors including demographic indicators, change in the log of consumption and the term premium

- In keeping with CGMP, we also run these regressions for the dividend yield and for the total return index of the domestic stock market index

Demographic predictors

Ang & Maddaloni use

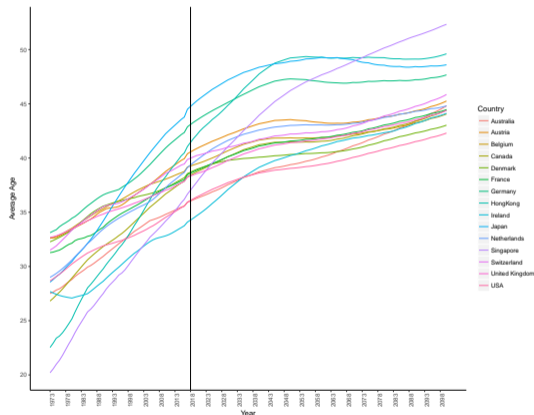
- d_{age} : the log change in the average age of the population age 20 years and older; *we also use the median age*
- $d_{\%age65}$: the log in the fraction of adults over 65 years old
- $d_{\%working}$: the log change in the share of people in the 20 to 64 age group

Data

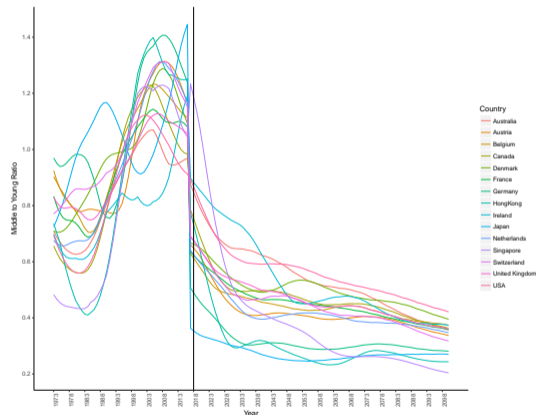


- Countries: Australia, Austria, Belgium, Canada, Denmark, France, Germany, Ireland, Japan, Netherlands, Switzerland, USA, and UK. Equity data from Datastream, consumption from World Bank, interest rates from the US Fed's FRED database and some national central banks.
- Period: 1989 to 2016, 660 firm-year observations

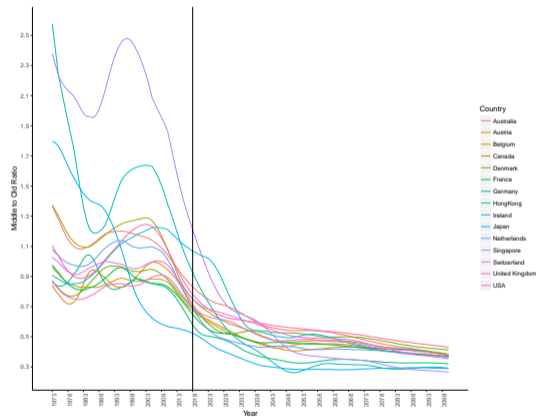
Patterns of aging 1: Average age



Patterns of aging 2: Middle to young ratios



Patterns of aging 3: Middle to old ratios



Preliminary Results: A&M updated

Dependent Variable: **Equity Premium**

	d%age65	d%working	dAge	dCon	terms
(1)	5.90***				
(2)		-9.78			
(3)			0.49		
(4)	7.04	2.37	-12-24		
(5)				-2.11	0.09***
(6)	5.87	7.64	-11.14	-3.76**	
(7)	12.60**	28.29*	-44.20*		0.10***
(8)	11.78**	30.24*	-42.51	-2.02	0.10***

Preliminary Results: Equity Returns



Dependent Variable: **Total Returns**

	d%age65	d%working	dAge	dCon	terms
(1)	-1.75*				
(2)		5.60***			
(3)			5.24		
(4)	-0.41	6.16*	-2.57		
(5)				1.00	0.04***
(6)	-0.29	7.62**	-4.26	-0.89*	
(7)	4.03	20.39***	-26.73*		0.04***
(8)	4.17	20.07**	-27.00*	0.32	0.04***

Preliminary Results: Dividend Yield

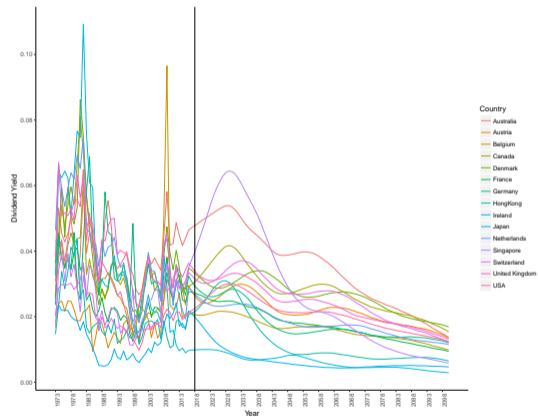
Dependent Variable: **Dividend Yield**

	d%age65	d%working	dAge	dCon	terms
(1)	3.37***				
(2)		-2.27			
(3)			-2.26		
(4)	6.02***	7.59**	-18.22***		
(5)				3.03***	-0.02**
(6)	5.59***	2.26	-12.08*	3.23***	
(7)	0.67	3.29	6.31		-0.03***
(8)	2.03	0.04	3.51	3.36***	-0.02**

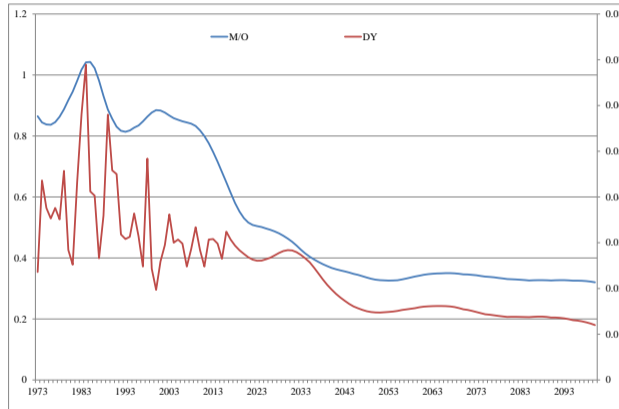
Discussion

- A & M results only partially hold in updated sample
- Time effects and lagged dependent variables moderate some of the results
- Domestic currency returns highly dependent on share of working age population

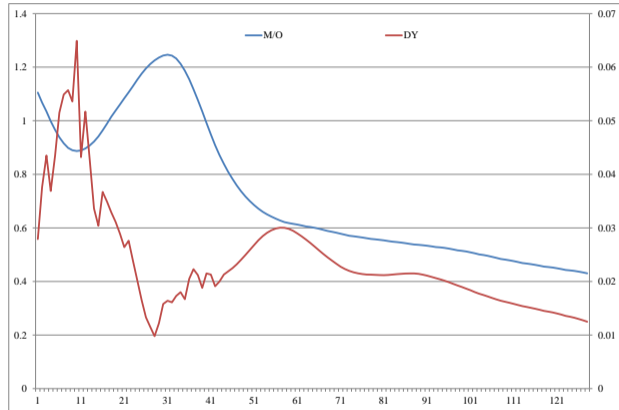
Projections



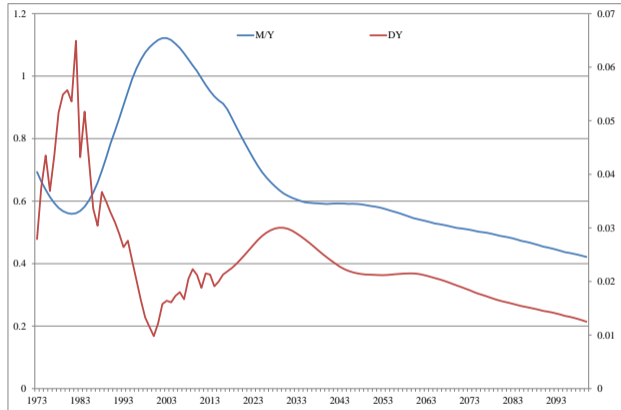
Ratios and dividend yields: Germany



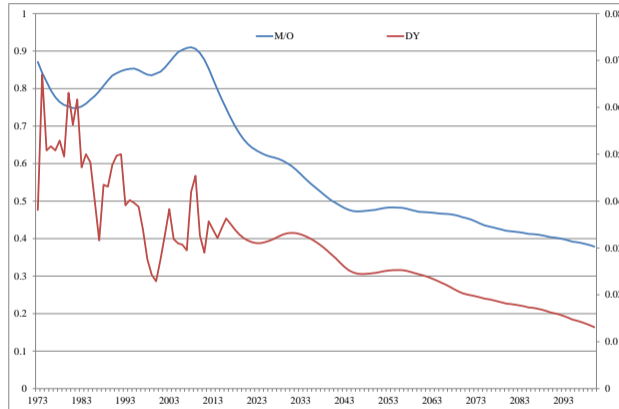
Ratios and dividend yields: USA



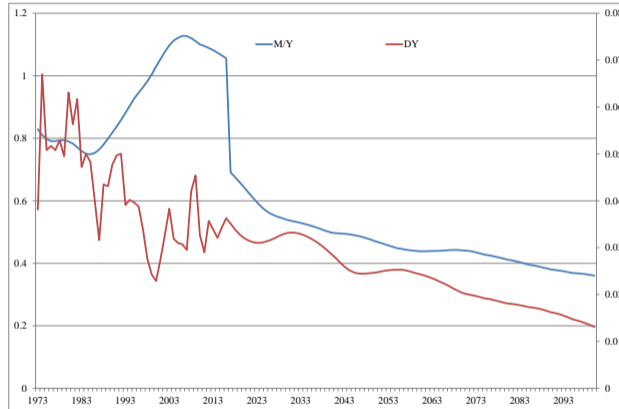
Ratios and dividend yields: USA



Ratios and dividend yields: UK



Ratios and dividend yields: UK



Conclusion

- Negative relation between yields and ratios visible in individual countries, also valid in panel
- Results are still preliminary
- Convergence in population structures requires attention

Thank you very much for your attention!

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