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World Economic Forum Bubble Early Warning System

Center for Real Estate Finance Research
December 2015

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Big Picture: the World Economic Forum's initiative on an early warning system for the detection of real estate bubbles.

- Goal of the overall project
  - Can we create a model that would tell us whether we are in a real estate bubble, i.e. whether current prices have deviated unjustifiably from the fundamental value of the underlying property?
  - Determine whether we can use data that we have access to in order to correctly identify a bubble in individual metros and the nation
- NYU Scope
  - In order to shed light on whether the current boom is a bubble, we use data (total returns, income yields) from U.S. equity REITs and transactional data to calculate implied dividend growth expectations

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Newmark Knight Frank

WORLD ECONOMIC FORUM

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Real Estate Market

A Brief Introduction

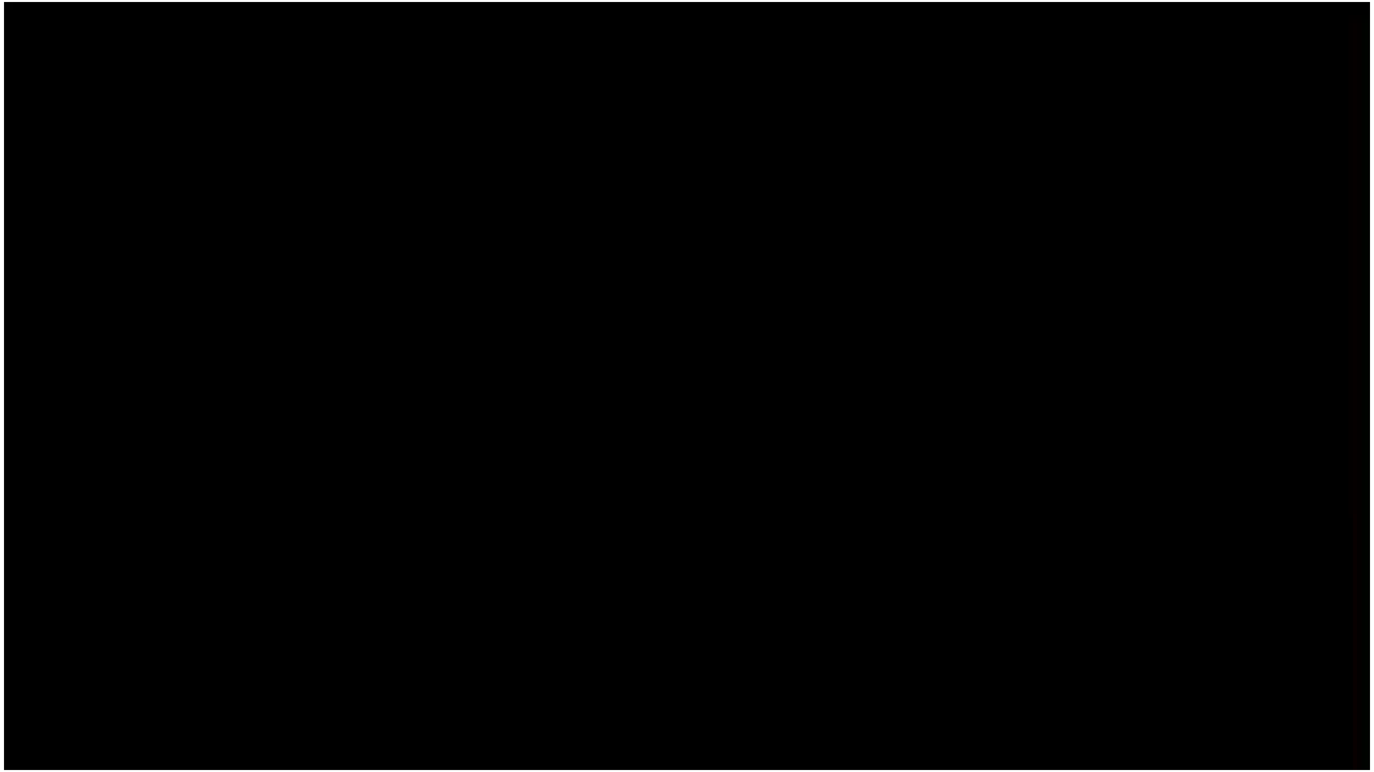
There is no agreed upon definition for a bubble and any definition must distinguish itself from a cycle

If we had to define it, what's a bubble?
In economics, a bubble is formed when trade in an asset drives prices so high up that they no longer reflect the asset's intrinsic (justified or fundamental) value and instead appear based on implausible or inconsistent views of the future

Why are real estate bubbles so dangerous?
Real estate is a major storage of personal wealth and a sudden decline in prices can cut the wealth of households, affect retirement plans, and destabilize the economy

How do we spot one?
As it is difficult to determine intrinsic value, bubbles are often only spotted in retrospect (i.e. too late) when prices drop

How REITS work



Valuing Real Estate Investments:

Value = $\dfrac{\text{Net Operating Income}}{\text{Cap Rate}}$

Cap rate = r – g

- **Capitalization rate** is the rate of return on a real estate investment property based on the income that the property is expected to generate.

Cap rate is the difference between:

- PV of the sum of expected future returns, *r*
- PV of the sum of expected future dividend (NOI) growth, *g*

$$dp_t = \overline{dp} + E_t\left[\sum_{j=1}^{+\infty} \rho^{j-1}\left(r_{t+j} - \bar{r}\right)\right] - E_t\left[\sum_{j=1}^{+\infty} \rho^{j-1}\left(\Delta d_{t+j} - \bar{d}\right)\right]$$

Data sources: REITS and Transactional Cap Rates

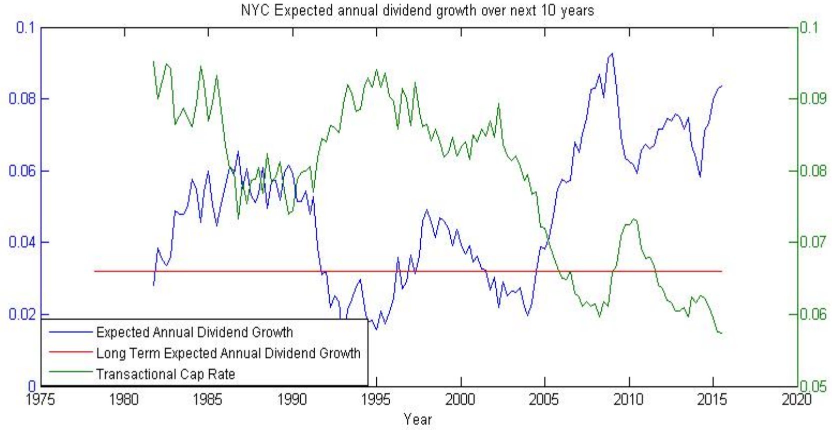
- U.S. REITS are good proxies for the overall valuation dynamics in commercial real estate

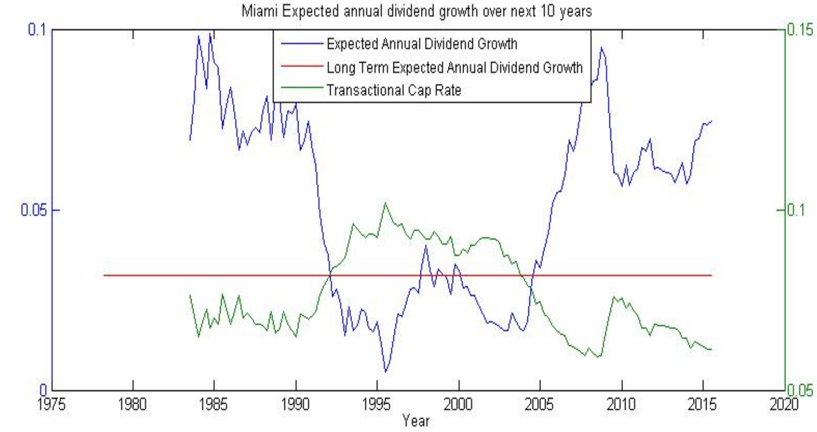
Steps

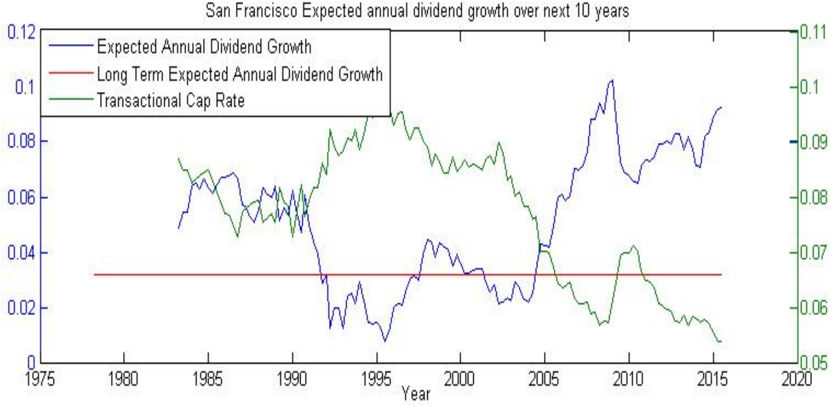
1. Calculate the expected returns for REITS
   - Dynamic five-factor model with stock, bond, value, size, and momentum returns as inputs
   - Run a regression model for risk premia, i.e. expected excess returns, on REITS, and add risk-free rate to get expected returns
2. Calculate investors’ expectations about future dividend (NOI) growth using a present-value model (Campbell and Shiller, 1989)
   - Using the time series of expected returns (Step 1) and the time series of observed price-dividend ratios (inverse cap rates) from REITS
3. Back out the market perception of dividend NOI growth over the next 10 years in order to justify the current valuation ration and given the current expected return
4. Analyze expected dividend growth on REITS to see how they compare to the long-term average growth rate

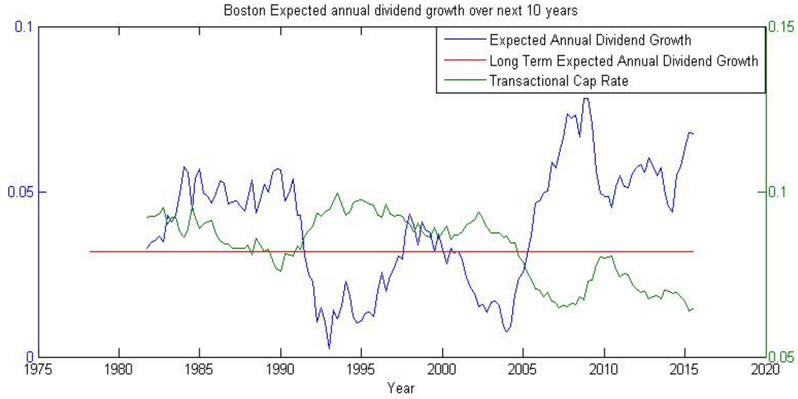
Data Summary + Takeaways

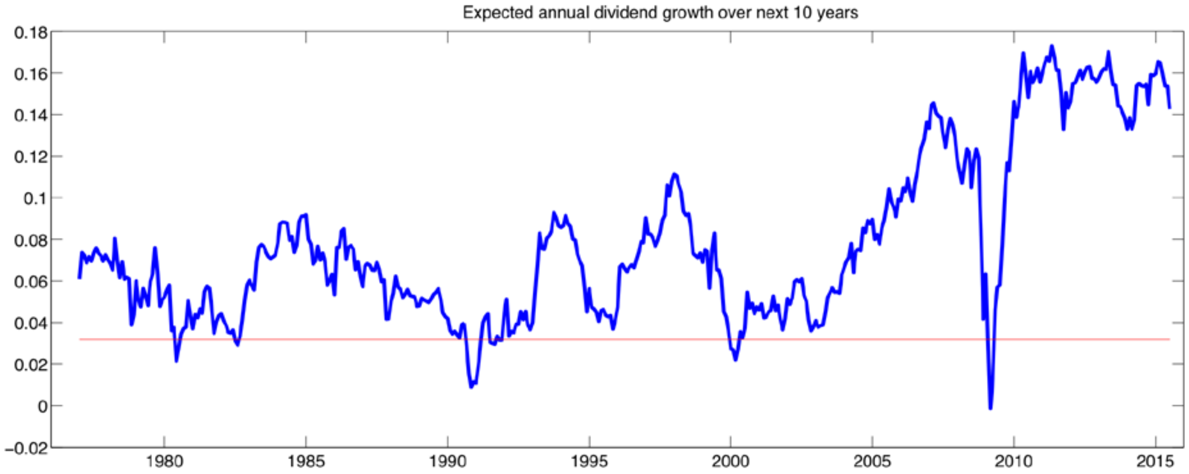
Data Summary: Metropolitan











National expected annual dividend growth over next 10 years

The graph above shows that the market currently expects dividend growth on REITS to be at around 15% per year (for the next 10 years). This is not only aggressive in absolute terms, but it is also high relative to the long-term average growth rate of 3.0% (solid red line) and relative to the implied growth rate over the past 30 years. The implied growth assumptions priced in are at the same level as they were in 2007 at the peak of the boom.

Users of Data

Equity Investor	Description	Example
Private Equity Fund	A private equity fund is a collective investment structure used for making investments in various equity and debt securities and/or assets according agreed to investment strategies. Private equity funds are typically limited partnerships with a fixed term of 10 years	TPG Partners, Blackstone, Fortress, Kohlberg, Kravis, Roberts (KKR)
REOC (Real Estate Operating Company)	A real estate operating company (REOC) is similar to a real estate investment trust (REIT), except that an REOC will reinvest its earnings into the business, rather than distributing them to unit holders like REITs do. REOCs can be private, public non-traded, or publically traded	Landmark Infrastructure Partners LP, Alexander's Inc.
Property REIT (Real Estate Investment Trust)	Real Estate Investment Trust (REIT) is a type of entity that invests in real estate through property or mortgages. It can be privately or publically traded. REITs distribute 90% of taxable net income. Equity REITs invest in and own properties. Public REITs can provide investors with a liquid stake in real estate	American Health Properties, Phillips International Realty
Pension Fund	A fund established by an employer to facilitate and organize the investment of employees' retirement funds contributed by the employer and employees	Social Security Trust Funds (US), Government Pension Investment Fund (Japan)
High Net Worth – Family Office	High Net Worth is a classification used by the financial services industry to denote an individual or a family with high net worth. Although there is no precise definition of how rich somebody must be to fit into this category, high net worth is generally quoted in terms of liquid assets over a certain figure and access to private equity funds, hedge funds, pre-IPO and IPO (initial public offering) shares, etc. There is an ability to purchase large properties or portfolios with little to no liquidity issues or need for debt financing. "Family Office" generally refers to the group charged with managing the High Net Worth individual or family	Bill Gates, Warren Buffett

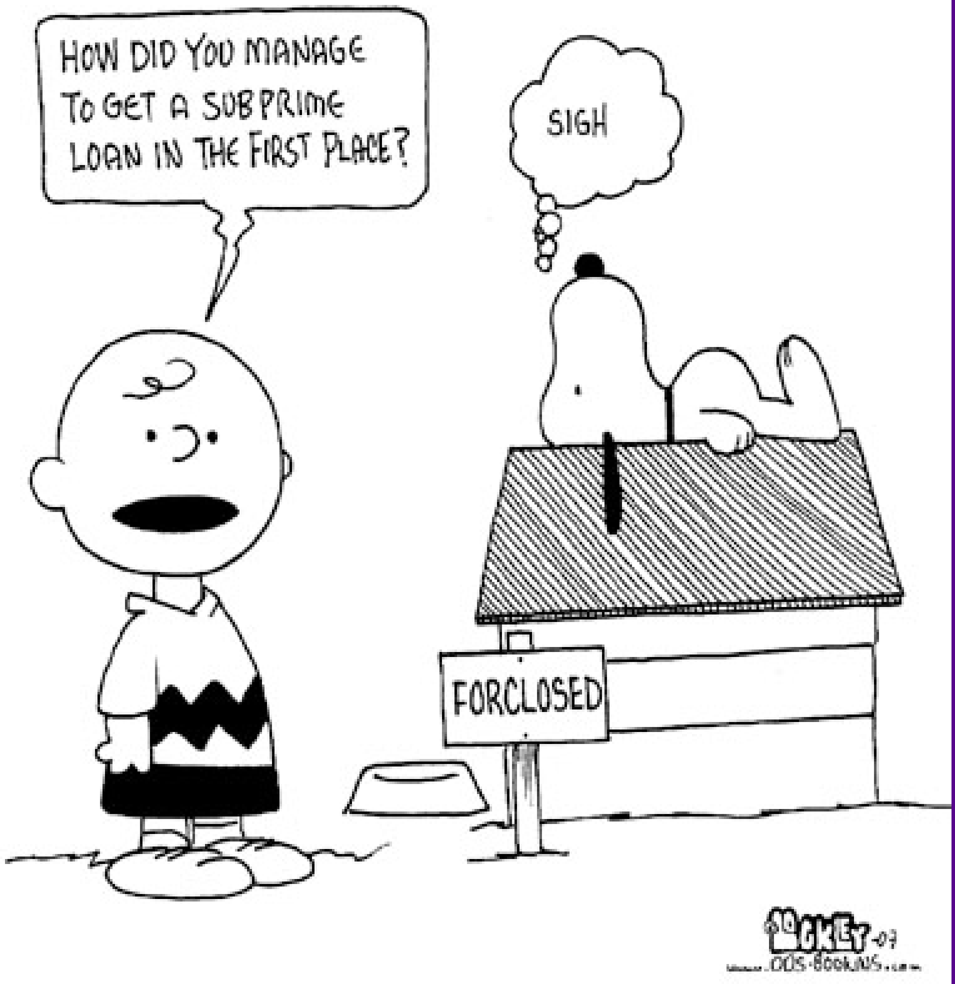
		FOCUS					KPIs																								
	PLAYER	Capital Preservation	Capital Appreciation	Income	Fees	Use	Internal Rate of Return (IRR)	Multiple on Invested Capital	2 and/or 20	Total Return to Shareholders (TRS)	Return on Invested Capital (ROIC)	Earnings Before Interest, Taxes, Dep and Amortization/Gross Asset Value (EBITDA/GAV)	Funds from Operations (FFO)	Share Price	Dividend Yield	Yields	Credit Spreads	Net Operating Income (NOI)	Portfolio Growth	Portfolio Diversification	Debt Service Coverage (DSC)	Debt Service Coverage Ratio (DSCR)	Loan to Value (LTV)	FFO/Share Price	Quality of Guarantees?	Transaction Volume	Assets Under Management (AUM)	Vacancy and Utilization	Net Effective Rent	SF or SM/Person	Favorability of Contract
EQUITY INVESTOR	Private Equity Fund		✓	✓			✓	✓	✓																						
EQUITY INVESTOR	REOC		✓	✓						✓	✓	✓																			
EQUITY INVESTOR	Property REIT		✓	✓								✓	✓	✓	✓																
EQUITY INVESTOR	Pension Fund	✓	✓													✓															
EQUITY INVESTOR	High Net Worth - Family Office 1st Gen		✓	✓														✓	✓	✓											
EQUITY INVESTOR	Succeedding Generations		✓	✓														✓	✓	✓											
EQUITY INVESTOR	Sovereign Wealth		✓	✓												✓			✓	✓											
DEBT INVESTOR	Private Debt		✓	✓												✓	✓				✓		✓								
DEBT INVESTOR	Unregualted Debt		✓	✓												✓	✓				✓		✓								
DEBT INVESTOR	Mortgage REIT			✓																	✓		✓	✓							
DEBT INVESTOR	Regulated Debt		✓	✓												✓	✓					✓	✓		✓						
DEBT INVESTOR	Pension Fund			✓												✓															
MGMT	Investment Manager		✓	✓	✓													✓								✓	✓				
MGMT	Professional RE Manager			✓	✓													✓								✓	✓				
MGMT	Occupant/Tenant					✓																						✓	✓	✓	✓

Some Key Takeaways

- Scalability and flexibility of the model
- Model for the “public good”
- Potential for public-private partnership via information sharing and application

Next Steps

- NYU portion incorporated into Newmark Grubb Knight Frank research
- 2016 World Economic Forum Annual Meeting in Davos, Switzerland, 20-23 January
    - Theme: Mastering the Fourth Industrial Revolution
- Further applications:
    - Potential application to the residential real estate market sector


HOW DID YOU MANAGE TO GET A SUBPRIME LOAN IN THE FIRST PLACE?
SIGH
FORCLOSED

Q&A