

CBRE ECONOMETRIC ADVISORS
Presents

LONGEST CYCLE EVER?

2018 Fall Client Forum
Tuesday October 2 at the Boston Athenaeum

The image features a dark background with a network of glowing green lines and nodes, resembling a data visualization or a city skyline at night. The CBRE logo is positioned in the top left corner.

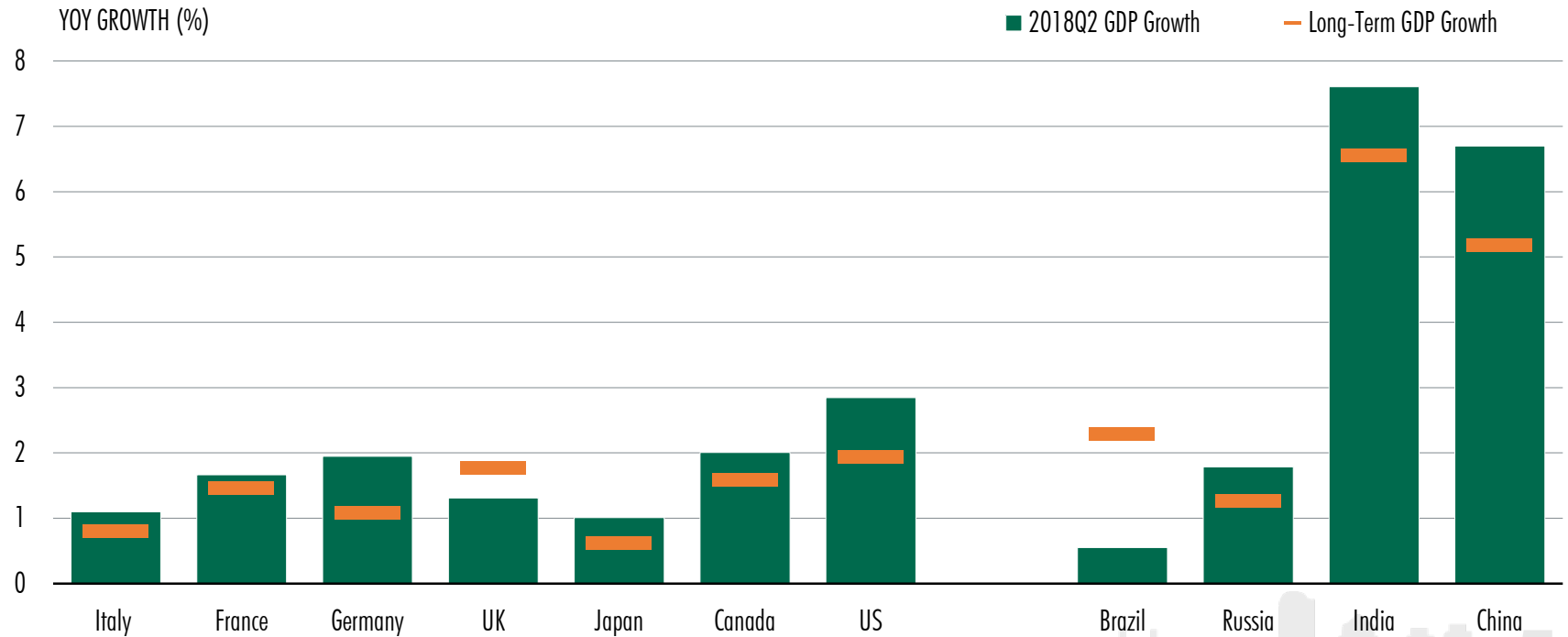
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Will this be the longest cycle ever?

CBRE ECONOMETRIC ADVISORS CLIENT FORUM

RICHARD BARKHAM, PHD MRICS CRE | GLOBAL CHIEF ECONOMIST

GLOBAL GDP GROWTH REMAINS VERY ROBUST



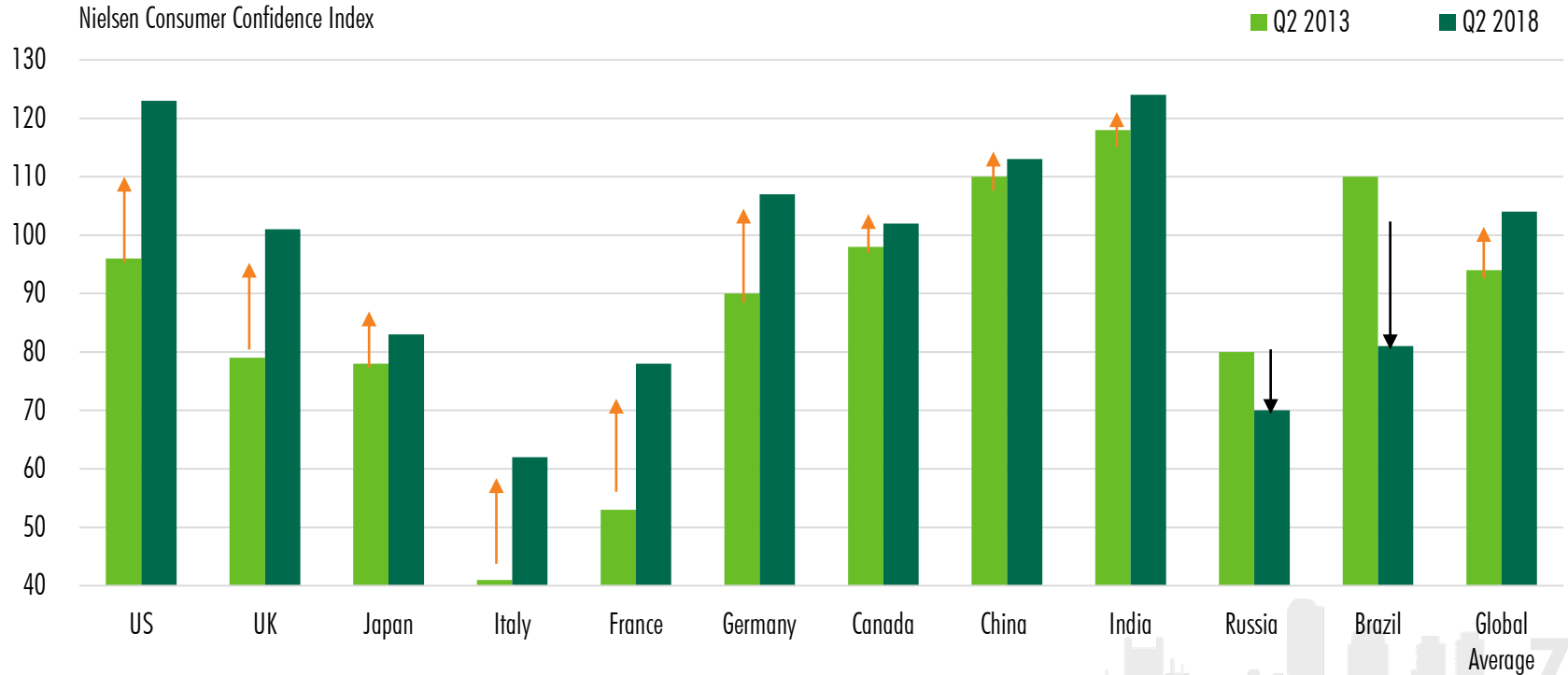
Source: Oxford Economics and CBRE EA, Q2 2018.

WITH STRONG EMPLOYMENT GAINS...

	Employment Gains (000s) – 12 months
EU	3,140
US	2,309
Japan	1,420
Total	6,896

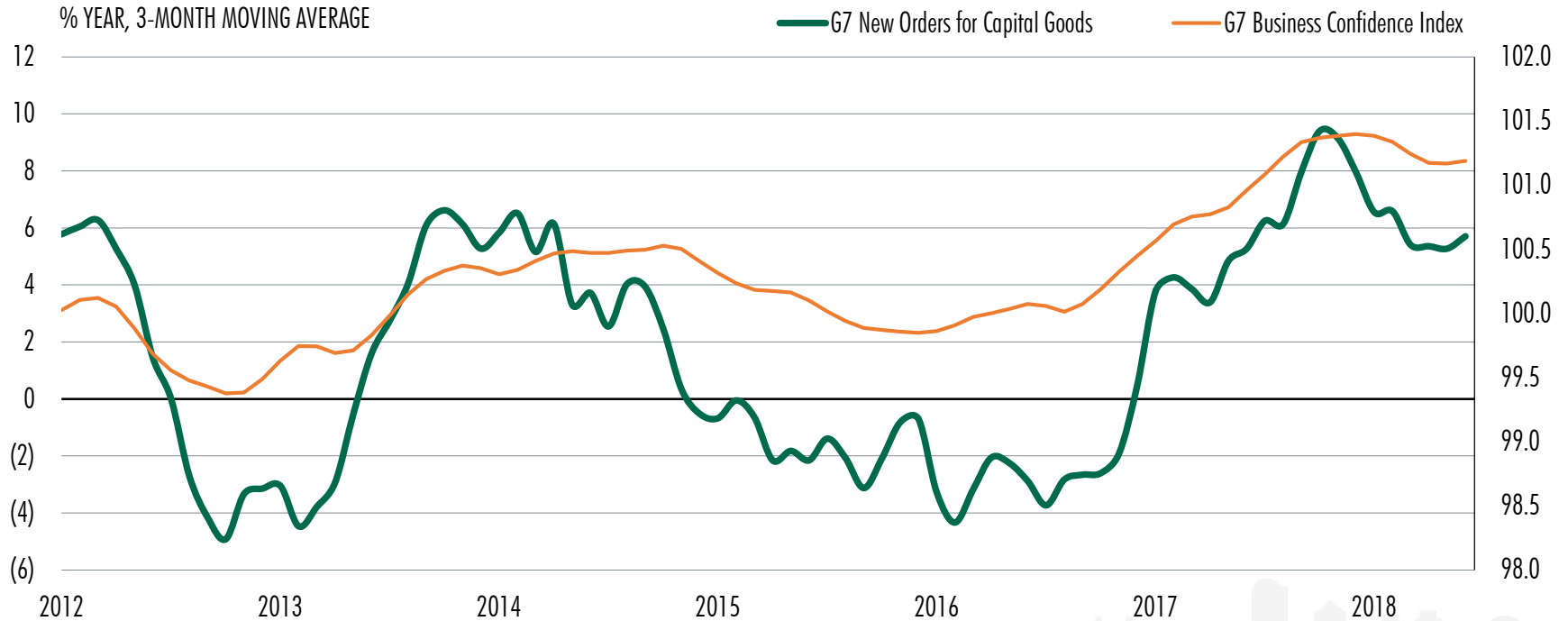
Source: Oxford Economics and CBRE EA, Q2 2018.

...AND BUOYANT CONSUMERS



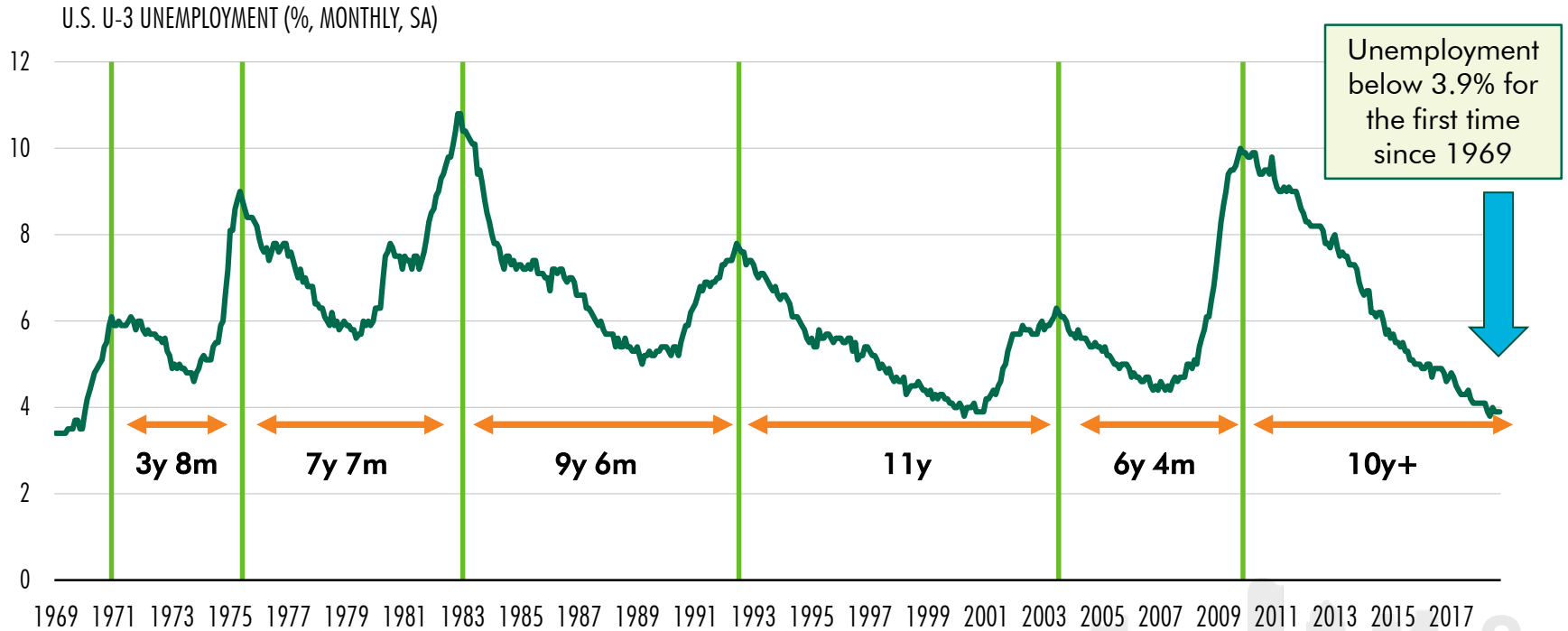
Source: Nielson, CBRE EA, Q2 2018.

BUSINESS SENTIMENT IS ALSO STRONG



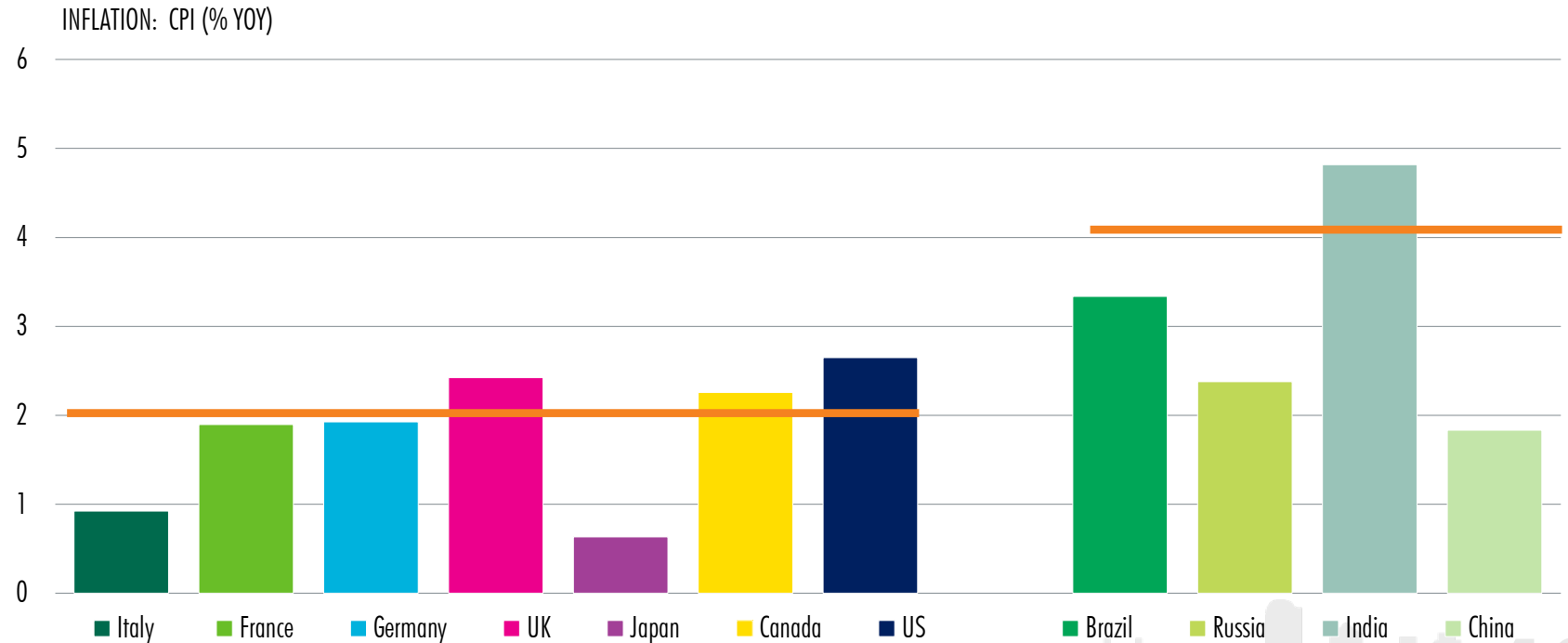
Source: Oxford Economics, Macrobond, OECD and CBRE EA, Q2 2018.

10 YEARS INTO EXPANSION, END OF CYCLE FEARS ARE GROWING



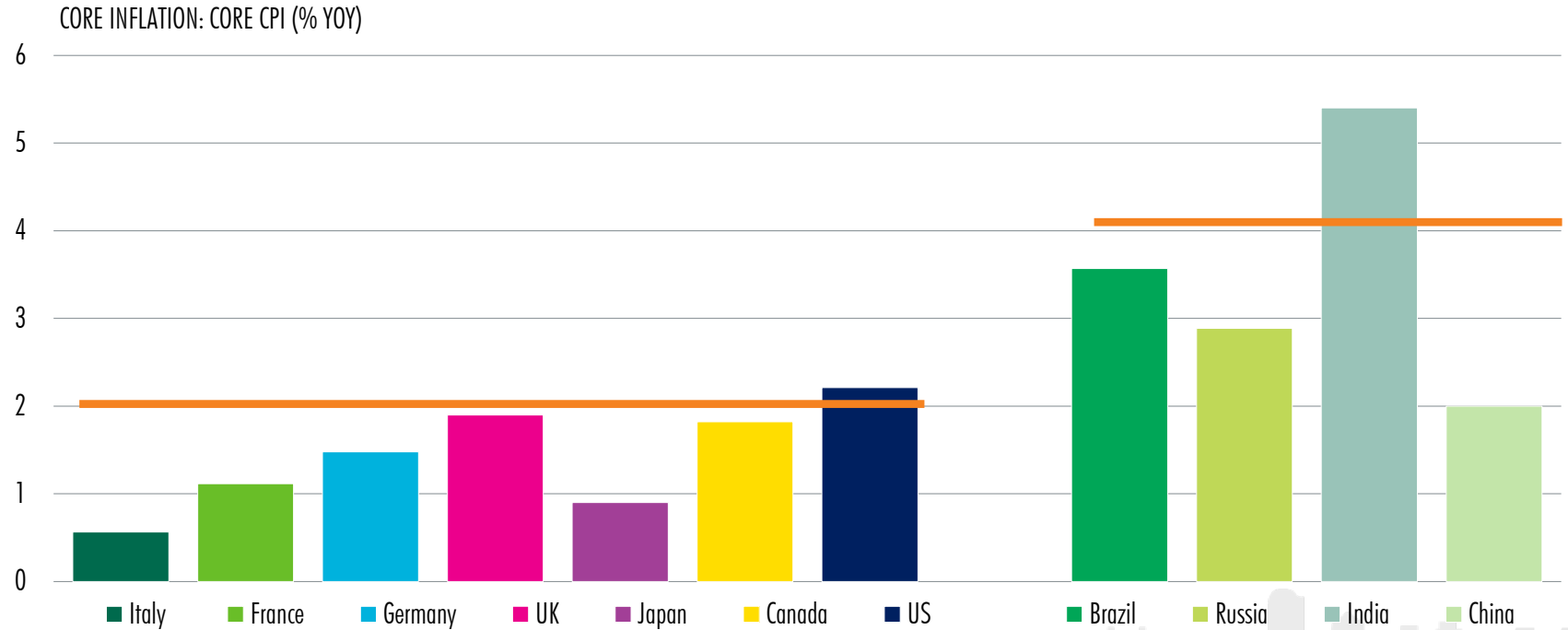
Source: U.S. Bureau of Labor Statistics & CBRE Research, Q2 2018.

HEADLINE INFLATION IS NOT AN ISSUE



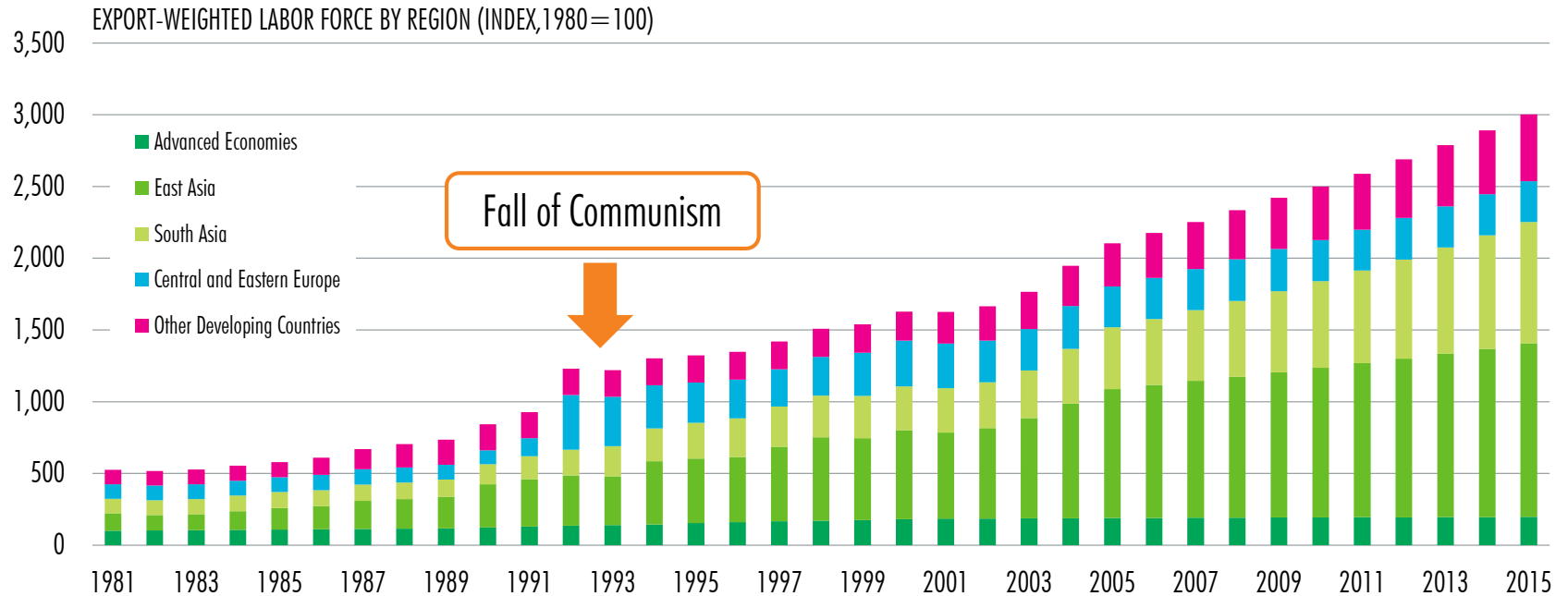
Source: Oxford Economics, OECD and CBRE EA, Q2 2018.

CORE INFLATION IS REMARKABLY SUBDUED



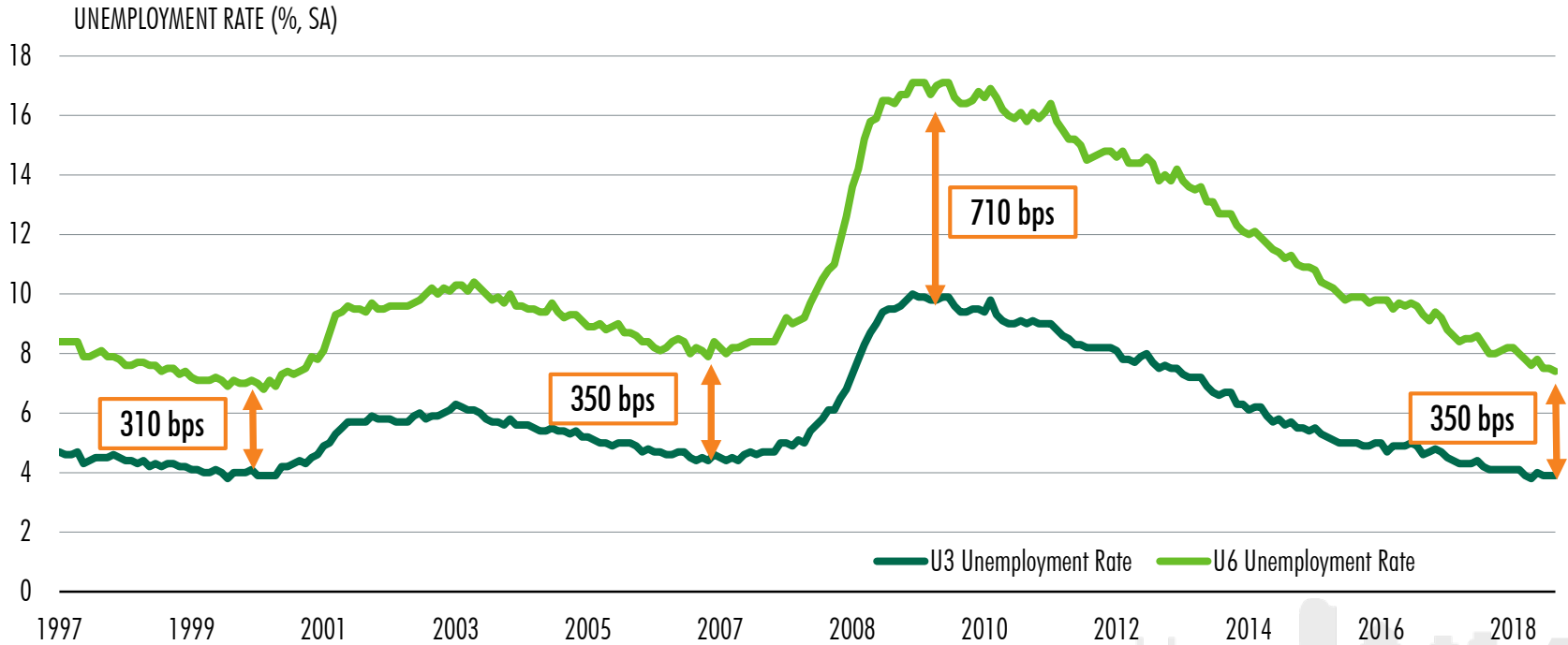
Source: Oxford Economics, OECD and CBRE EA, Q2 2018.

WORLD REMAINS IN THE GRIP OF A MASSIVE LABOR SUPPLY SHOCK



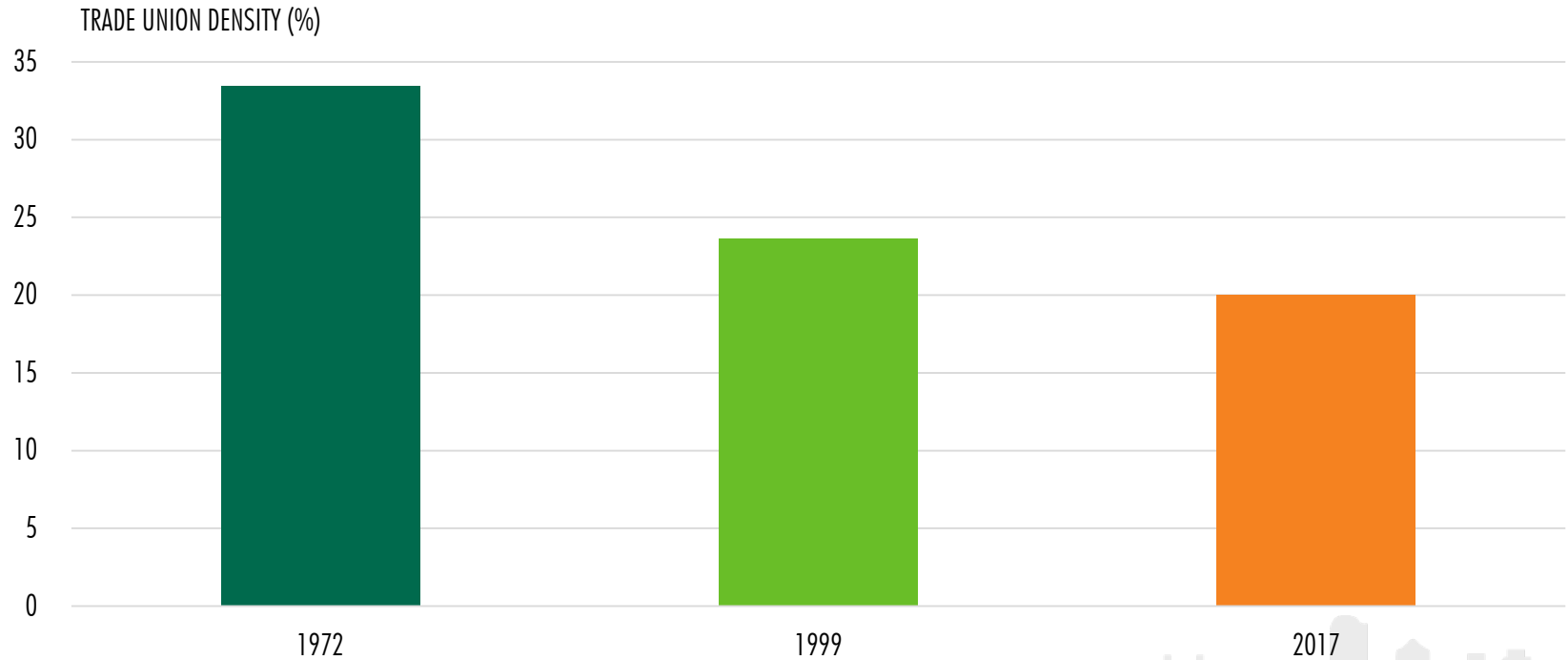
Source: IMF World Economic Outlook, CBRE Econometric Advisors.

THE U.S. STILL HAS A DEGREE OF HIDDEN UNEMPLOYMENT



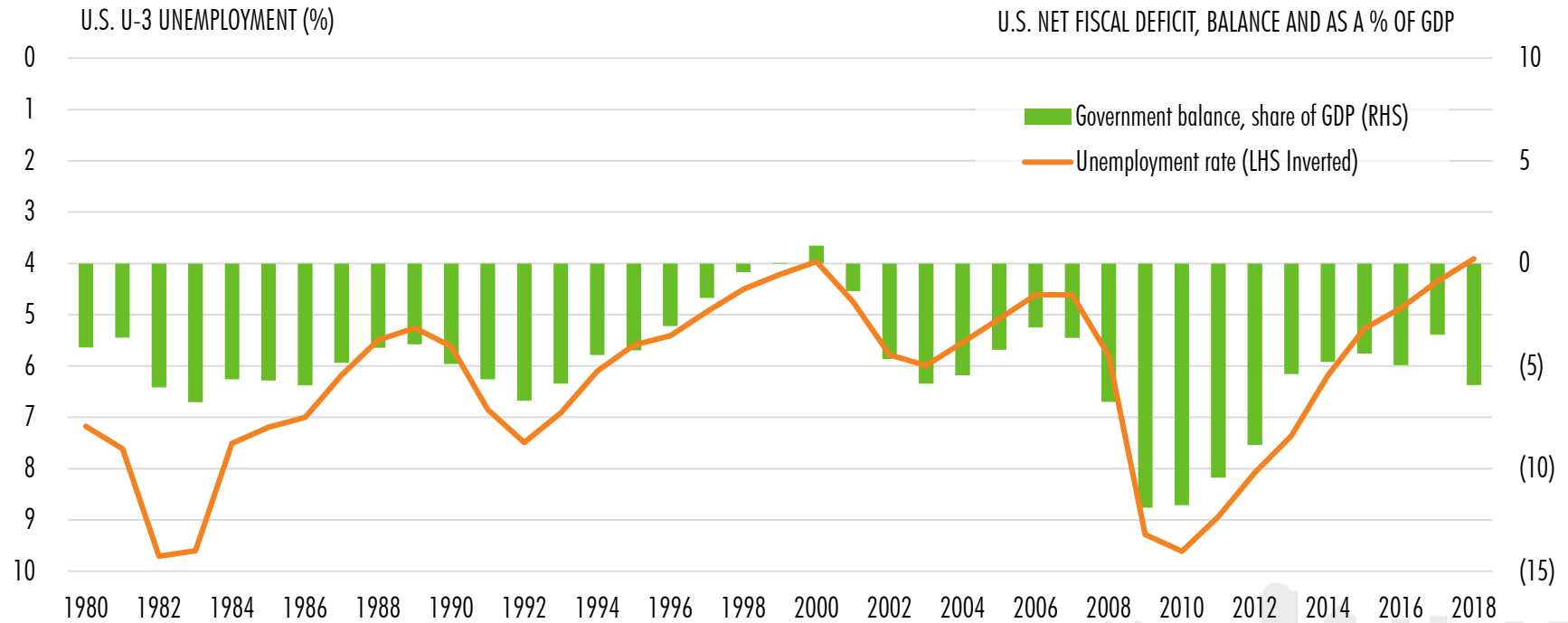
Source: U.S. Bureau of Labor Statistics & CBRE Research, Q2 2018.

DECLINE IN LABOR POWER ALSO A FACTOR



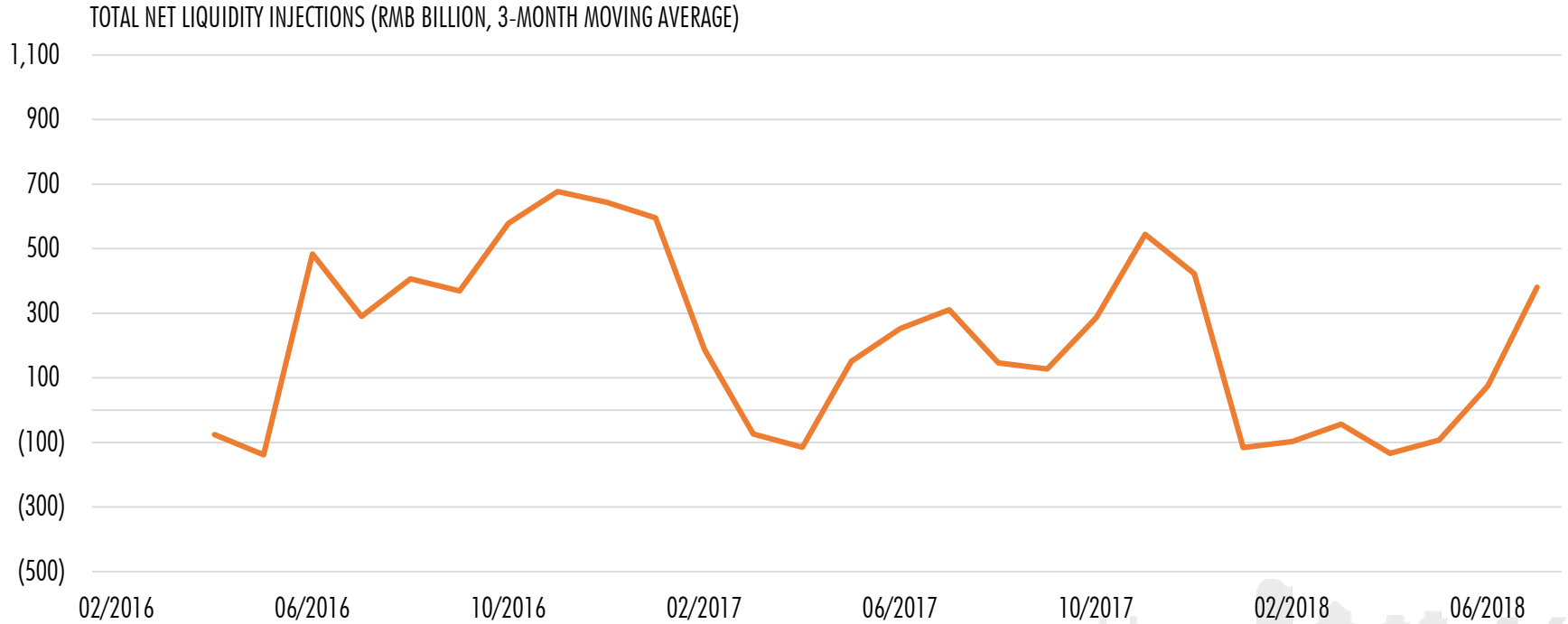
Source: OECD and CBRE EA, Q2 2018.

SO, PLENTY OF ROOM FOR STIMULUS



Source: Oxford Economics, Federal Reserve Bank of St. Louis and CBRE EA, Q2 2018.

ALSO IN CHINA

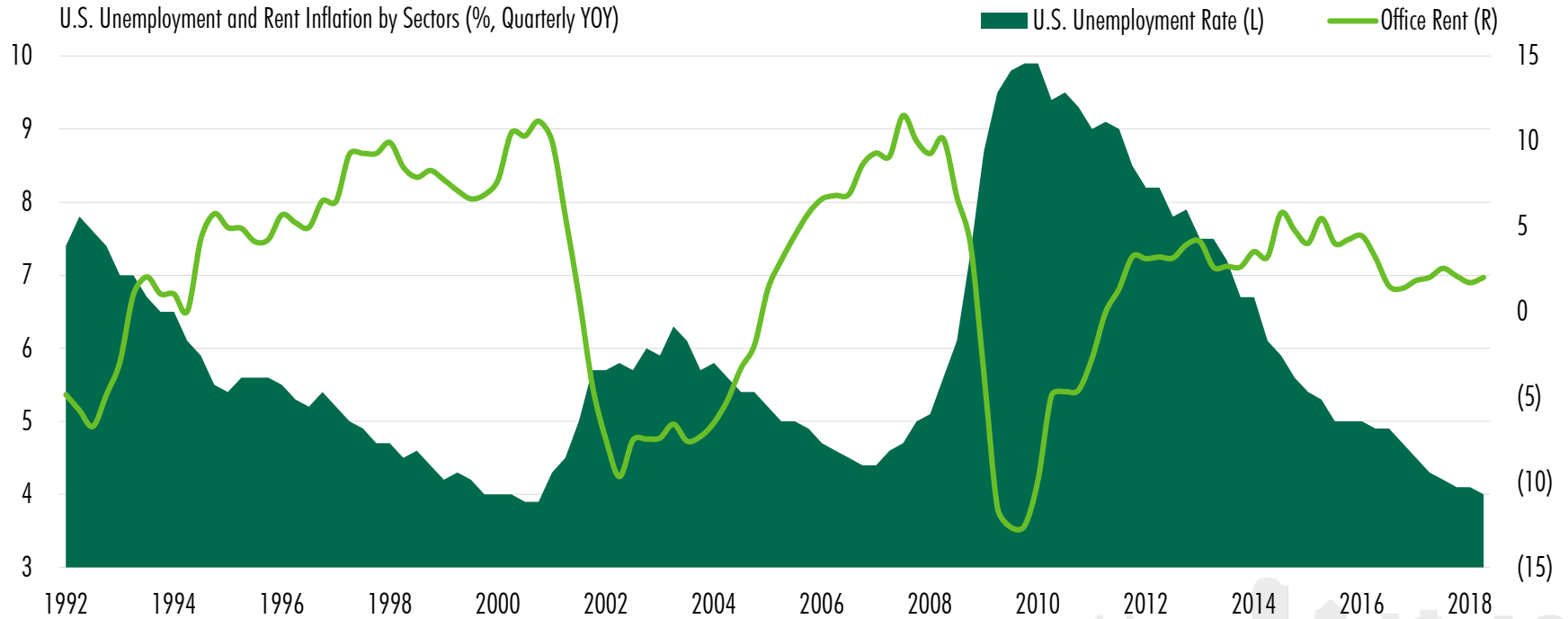


Source: Enodo Economics and CBRE EA, Q2 2018.

A low-angle, upward-looking photograph of several modern skyscrapers with glass facades. The buildings are dark, and many windows are illuminated from within, creating a grid of light points. The sky is a pale, overcast blue. The perspective makes the buildings appear to converge towards the top of the frame.

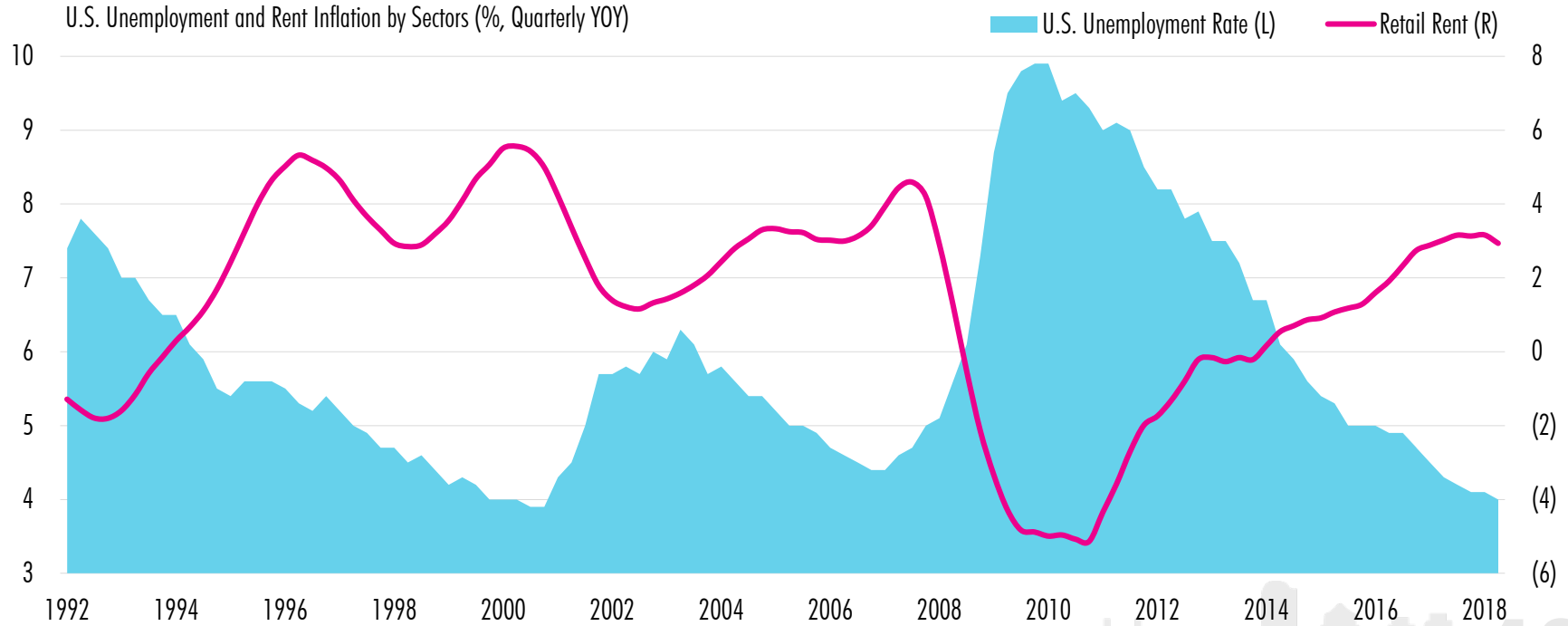
WHAT ABOUT THE REAL ESTATE CYCLE?

OFFICE—A MUTED CYCLE



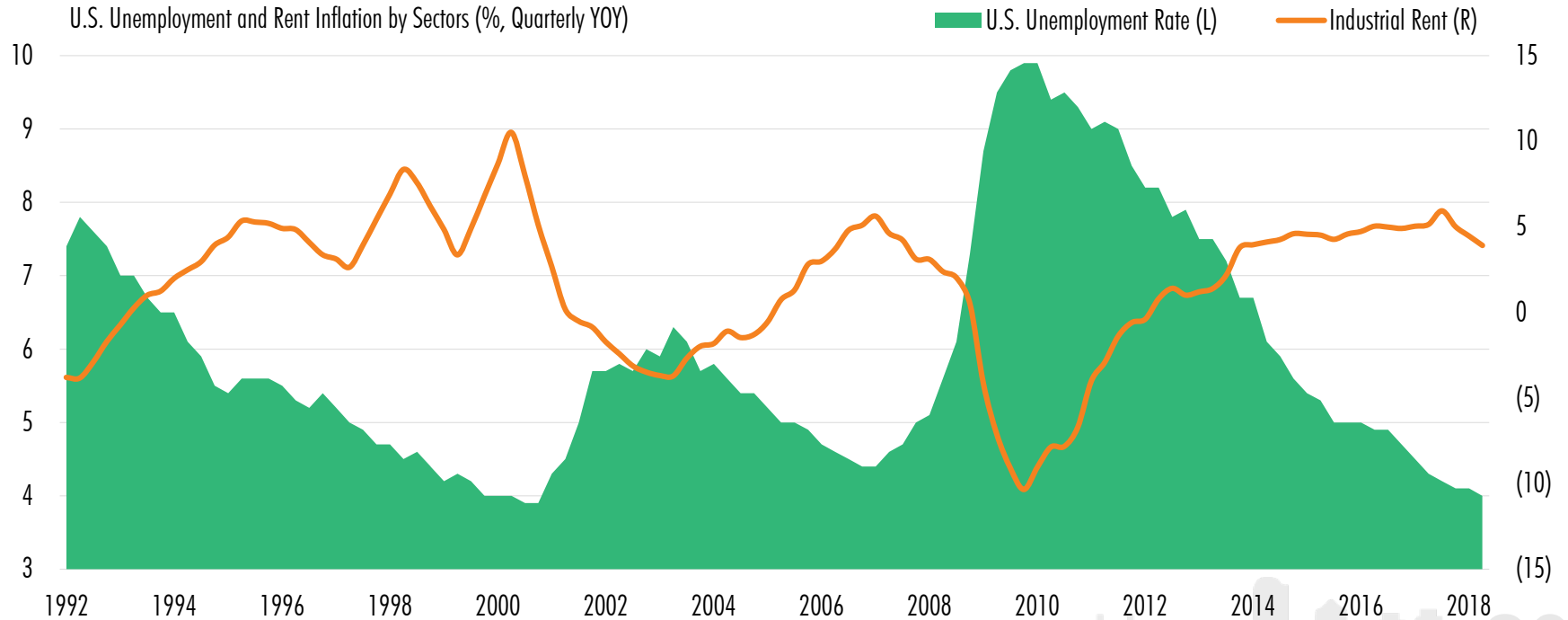
Source: U.S. Bureau of Labor Statistics, CBRE Econometric Advisors & CBRE Research, Q2 2018.

RETAIL—SLOW OUT OF THE TRAPS



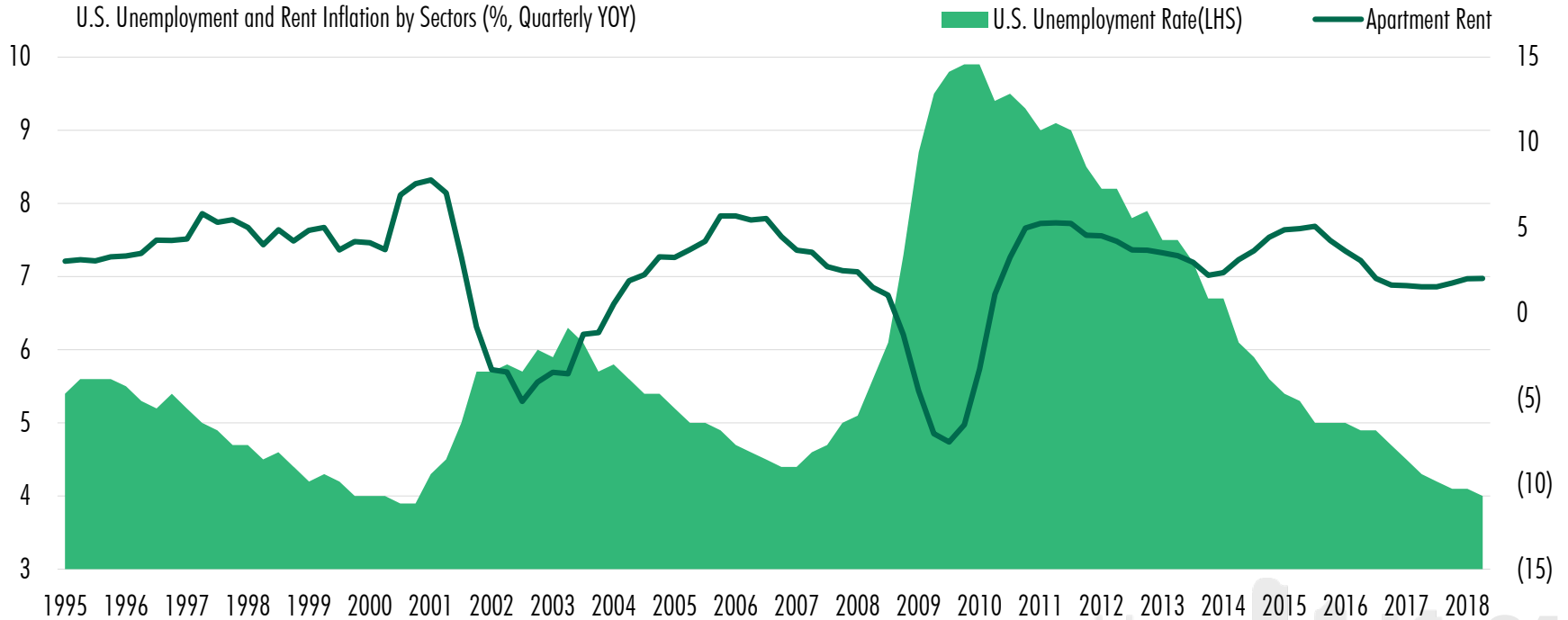
Source: U.S. Bureau of Labor Statistics, CBRE Econometric Advisors & CBRE Research, Q2 2018.

INDUSTRIAL—STRONG AND SUSTAINED GROWTH



Source: U.S. Bureau of Labor Statistics, CBRE Econometric Advisors & CBRE Research, Q2 2018.

MULTIFAMILY—HUGE STRUCTURAL BOOST



Source: U.S. Bureau of Labor Statistics, CBRE Econometric Advisors & CBRE Research, Q2 2018.

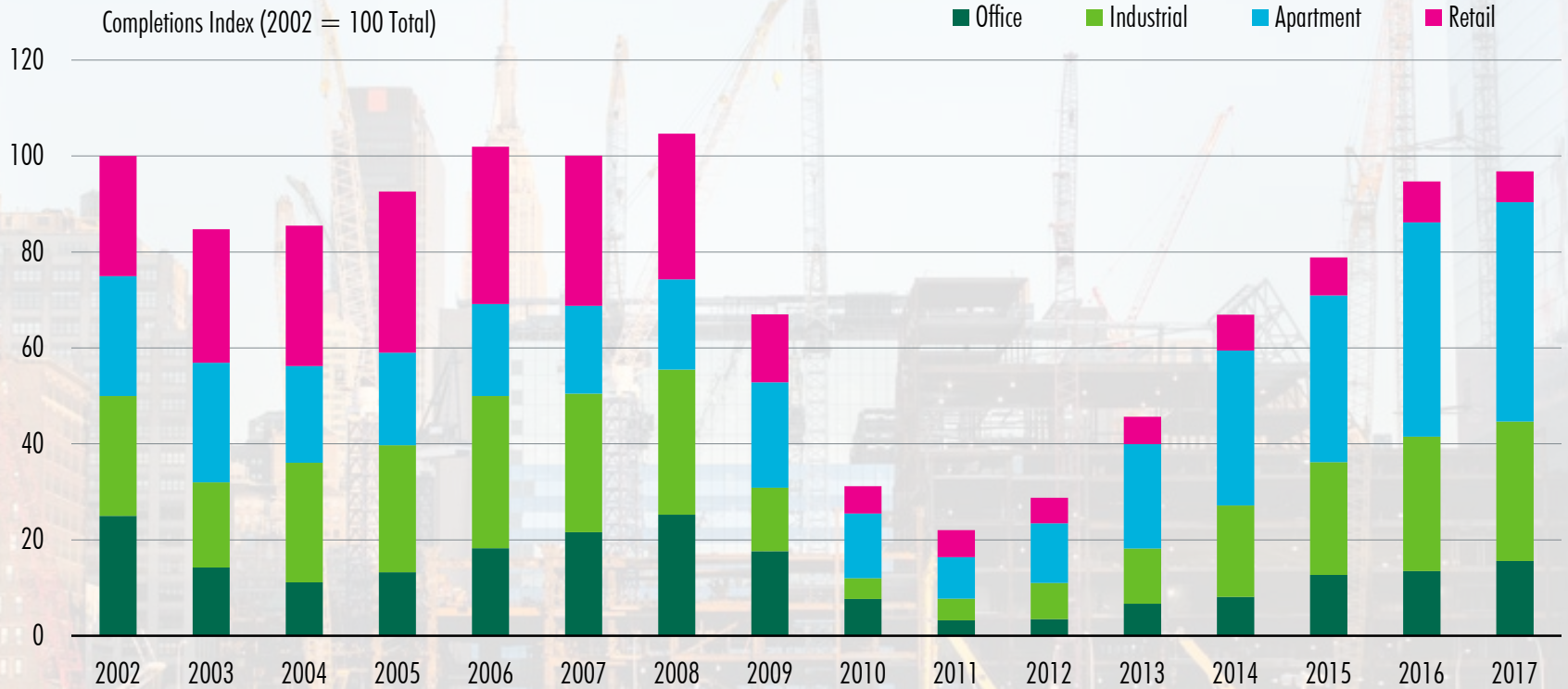
DUE TO SHIFT AWAY FROM OWNER OCCUPATION



REAL ESTATE LOOKS IN GOOD SHAPE BUT...



NEW SUPPLY IS RAMPING UP



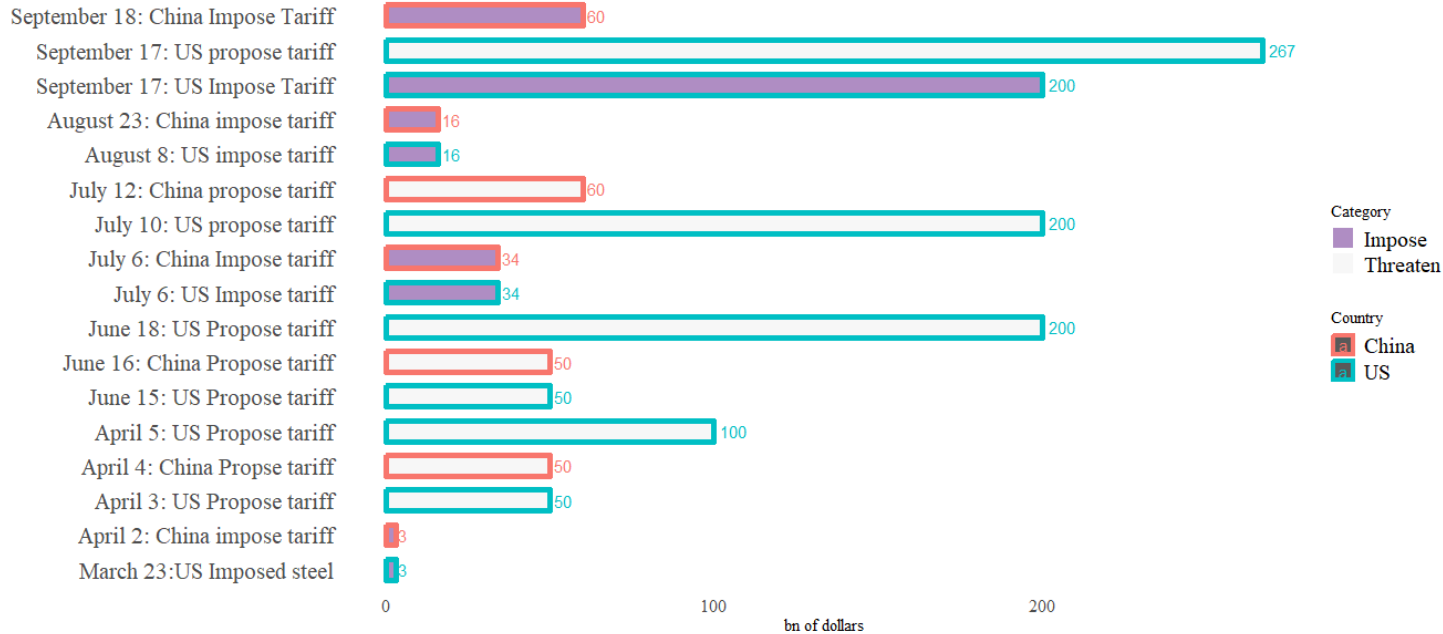
Source: CBRE Econometric Advisors, February 2018.



WHAT COULD GO WRONG?

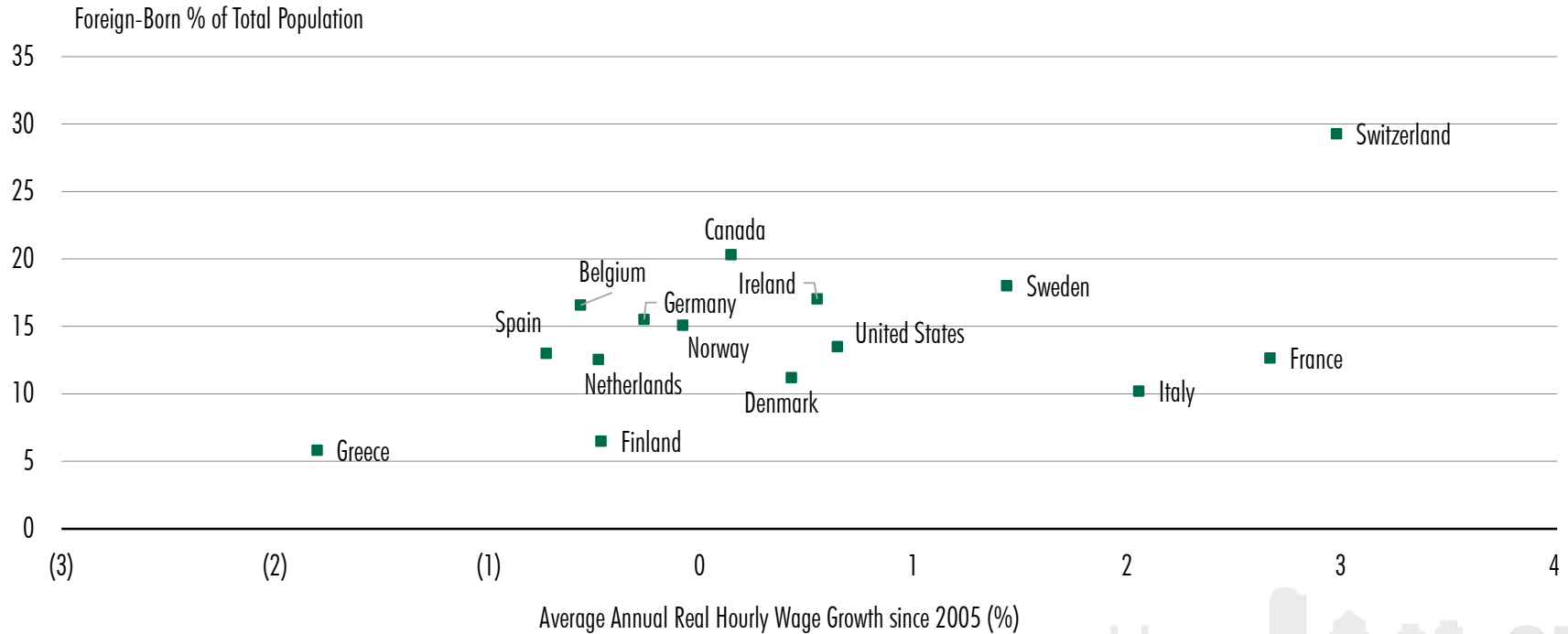
WHAT COULD POSSIBLY GO WRONG?

Trade War Timeline (amounts in billions of dollars)



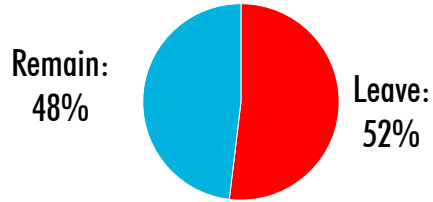
Source: WSJ, BBC, and CBRE EA, Q2 2018.

FOREIGN-BORN AND REAL WAGE GROWTH—A TOXIC MIX

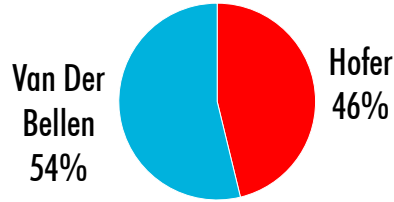


Source: Oxford Economics, OECD and CBRE EA, Q2 2018.

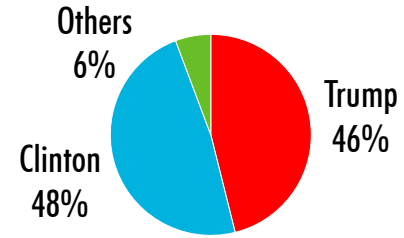
POPULISM ON THE RISE



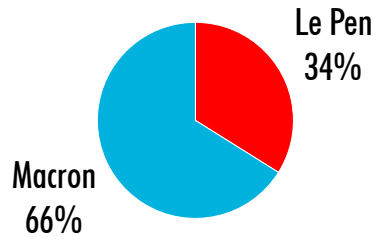
United Kingdom: EU Membership Referendum



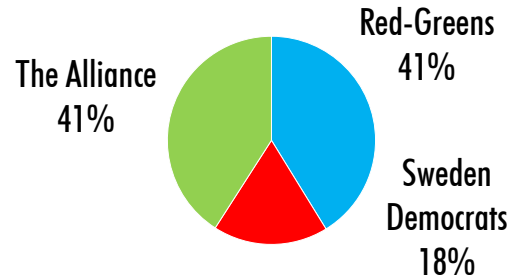
Austria: Presidential Election



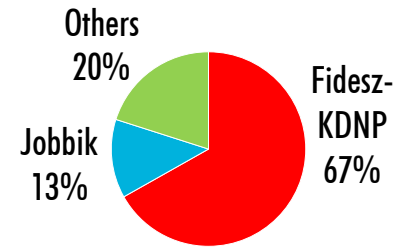
United State: Presidential Election



France: Presidential Election



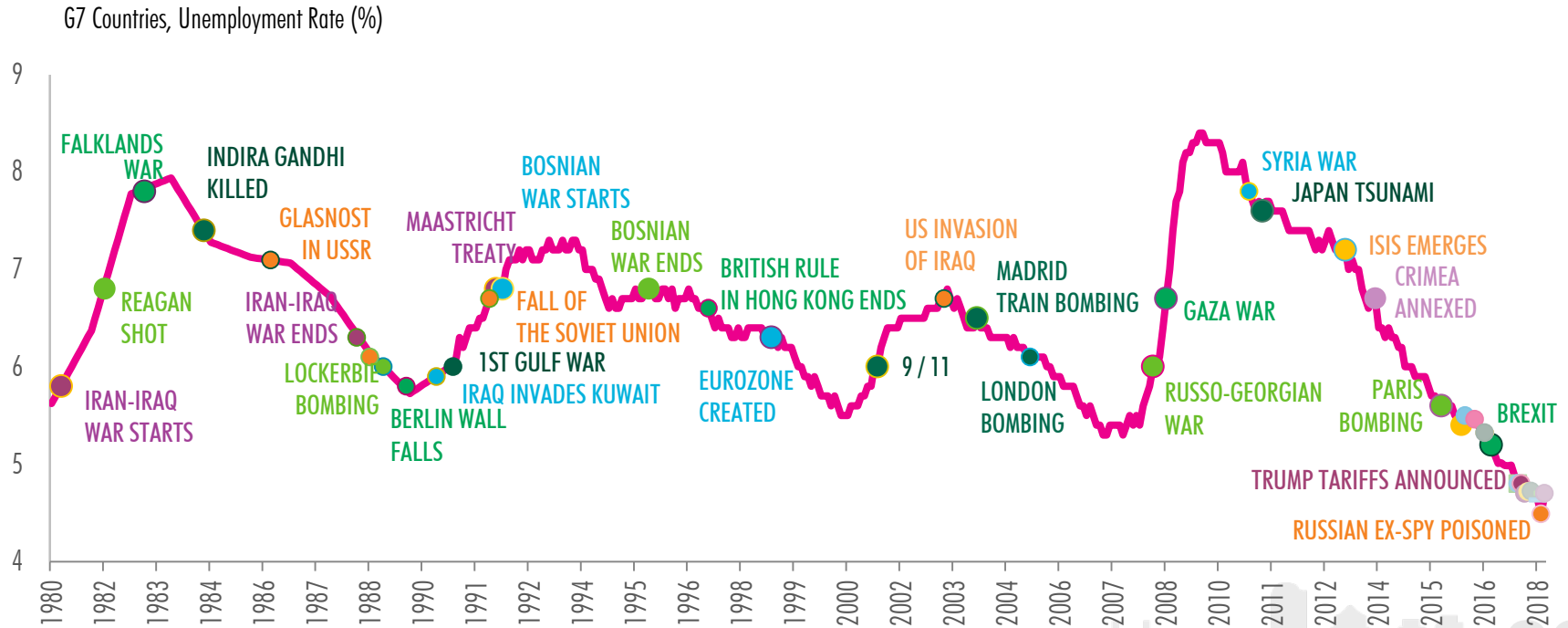
Sweden: General Election



Hungary: Parliamentary Election

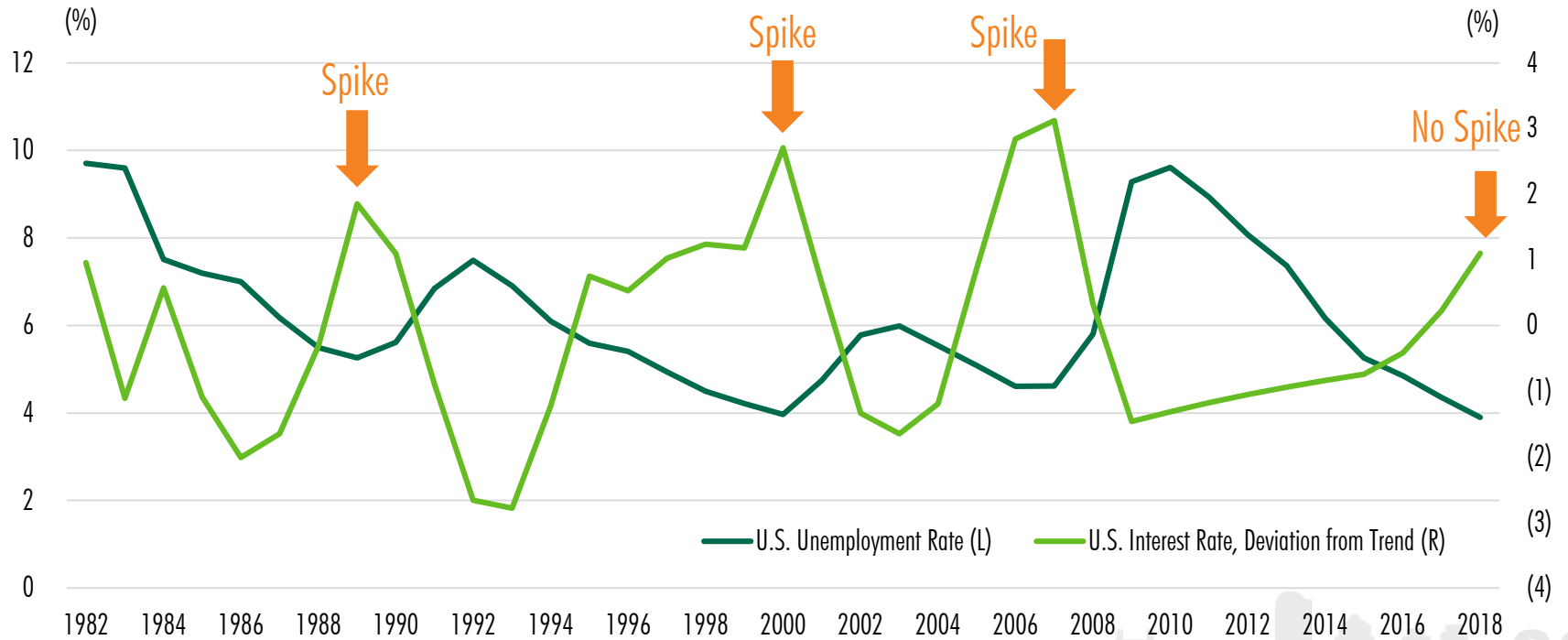
Source: Wikipedia, BBC, Financial Times and CBRE EA, Q2 2018.

IT PROBABLY WON'T BE GEOPOLITICS



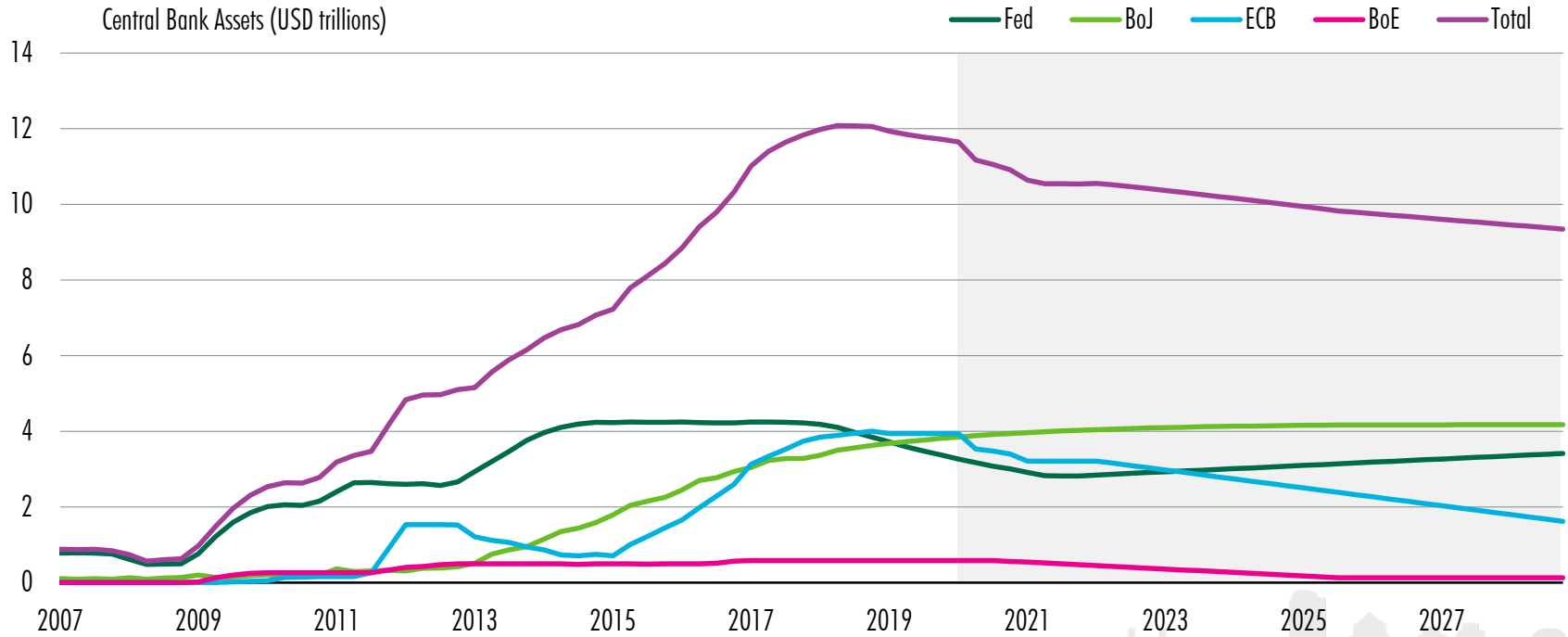
Source: OECD, Stratfor and CBRE Research, August 2018.

IT IS RELATIVE INTEREST RATES THAT MATTER



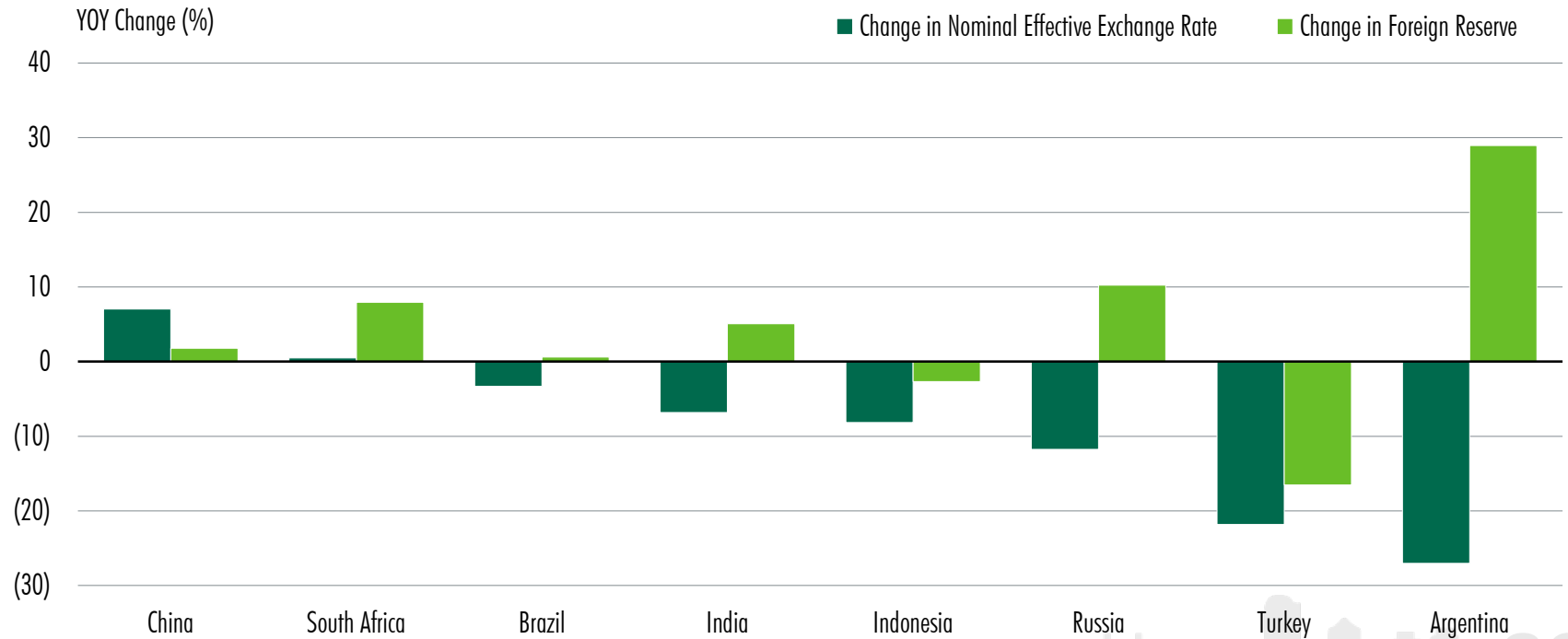
Source: Macrobond, Federal Reserve Bank of St. Louis and CBRE EA, Q2 2018.

WITH QUANTITATIVE TIGHTENING ALSO A FACTOR



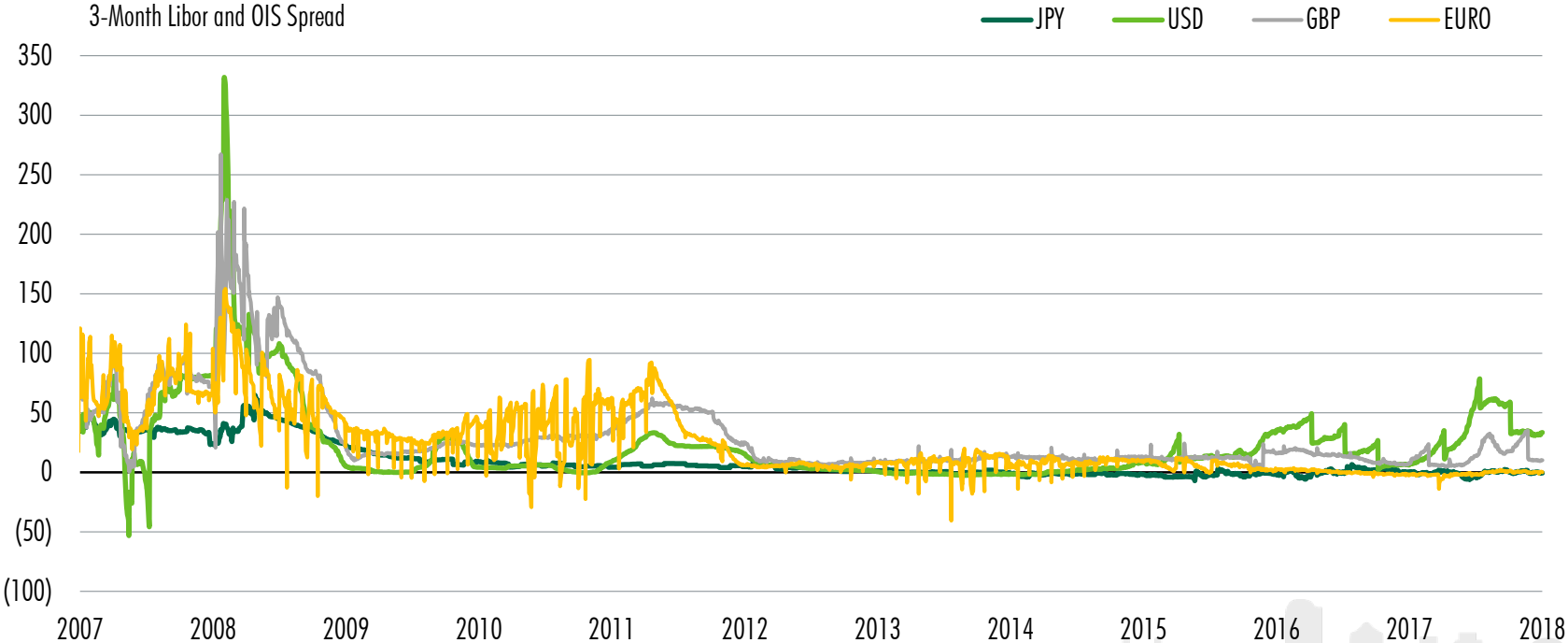
Source: Oxford Economics and CBRE EA, Q2 2018.

RISING RATES ARE ALREADY HITTING EMERGING MARKETS



Source: Oxford Economics and CBRE EA, Q2 2018.

SOME EVIDENCE OF AN OFFSHORE DOLLAR SHORTAGE



Source: Federal Reserve Bank of St. Louis, Macrobond and CBRE EA, Q2 2018.

CONCLUSIONS

- This economic cycle has legs, and could be the longest ever....
-as globalization continues to suppress inflation;
- We could be at a turning point for globalization...
-but that will play out over the next 10 years;
- For now, rising interest rates will bring this cycle to an end...
- ...but not for about two years;
- For now, positive economics and innovation...
-Trump late-cycle property markets.

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The image features a dark background with a network diagram of glowing green nodes and lines. The nodes are connected by thin lines, creating a complex web of connections. The overall aesthetic is futuristic and data-driven.

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Forecasting in an extended cycle: What's different this time?

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NEIL BLAKE, PHD | EMEA CHIEF ECONOMIST, GLOBAL HEAD OF FORECASTING

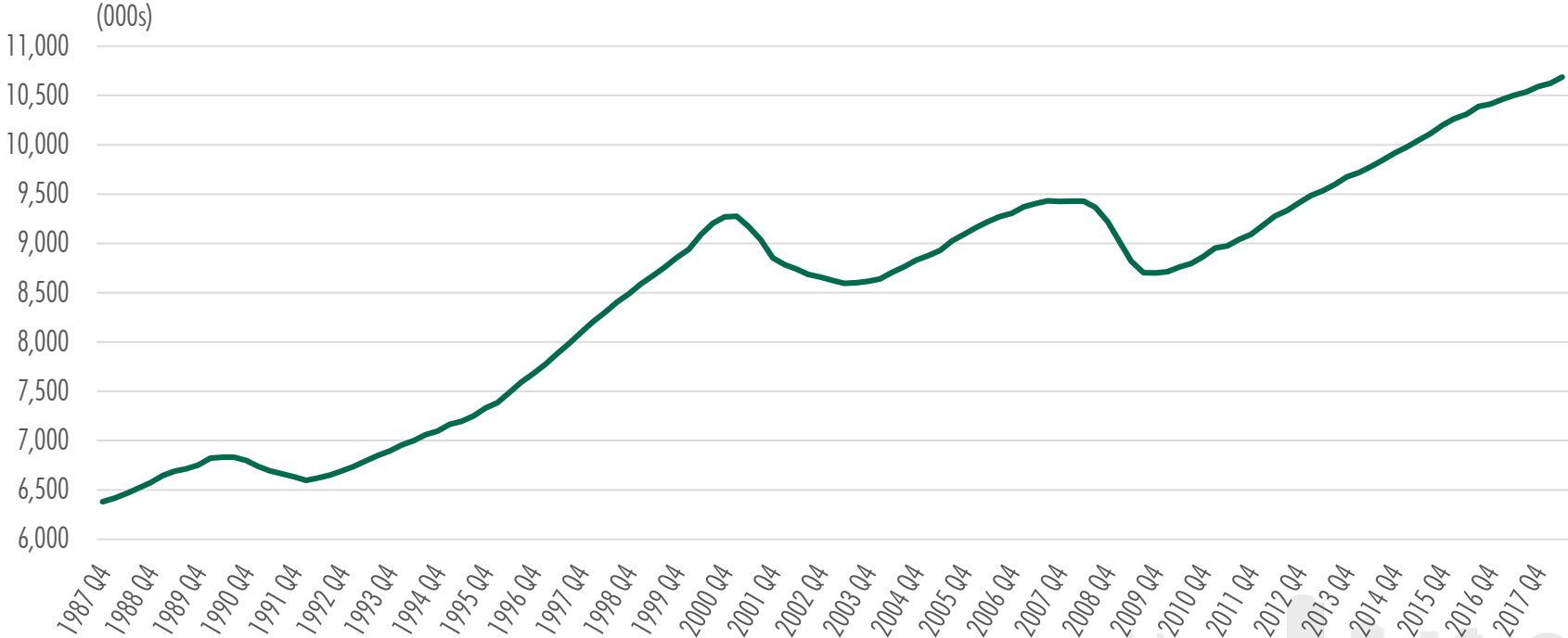
OVERVIEW

“In the 10 years since 2008, most economies have fully recovered, and some are roaring ahead. This is also true for many city economies. Meanwhile, the real estate sector within these economies has done okay, but its recovery has been quite tame. Unlike in other economic recoveries, there have been building booms and rent/price spikes in only a few select markets and property types.”

WHY IS IT DIFFERENT THIS TIME?

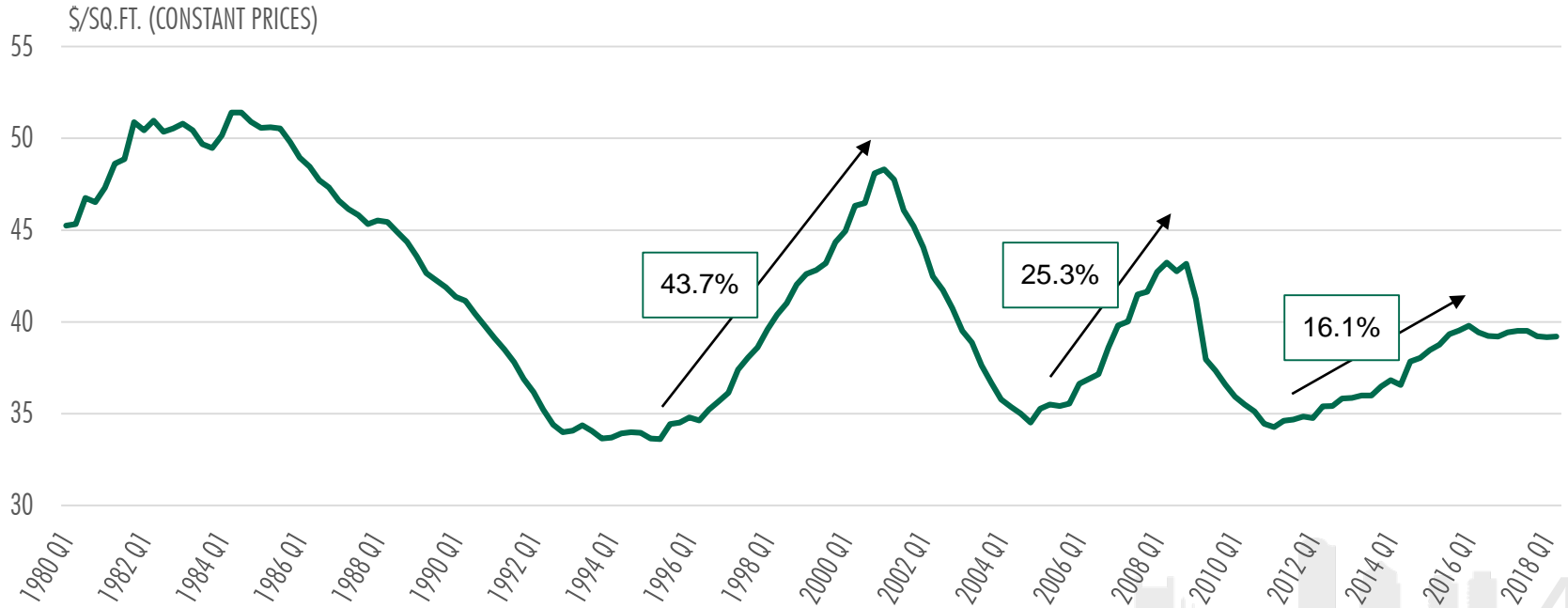
IS IT DIFFERENT THIS TIME?

OFFICE-USING EMPLOYMENT (TOP 16 U.S. CITIES)



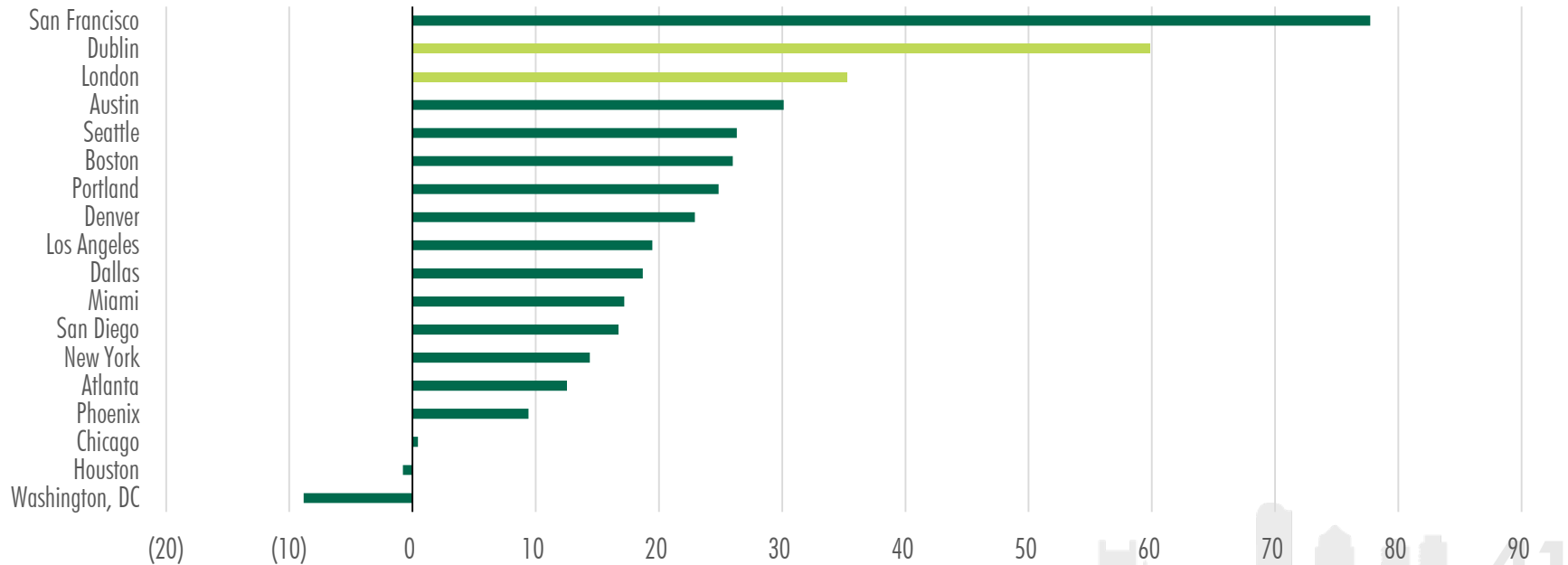
...BUT IT'S STILL NOT BEEN MUCH OF AN UPSWING FOR OFFICE RENTS

REAL OFFICE RENT, TOP 16 U.S. CITIES



THOUGH THE CYCLE HAS VARIED BY CITY

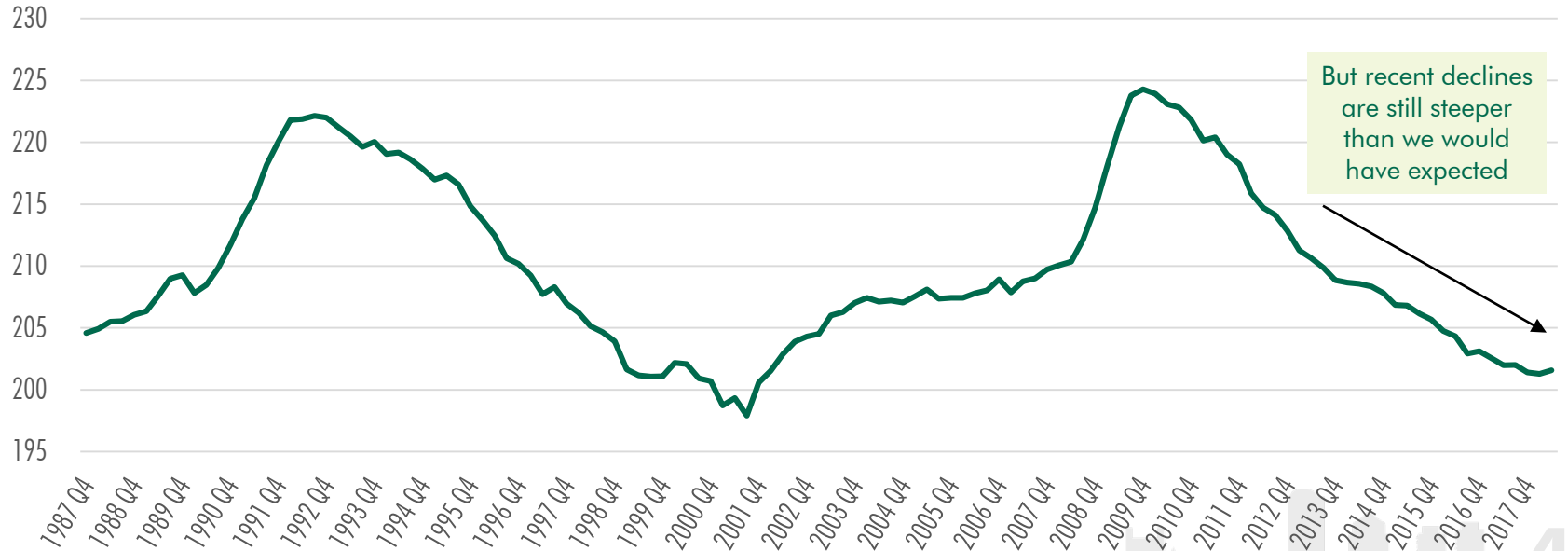
PERCENTAGE CHANGE IN REAL RENTS, Q2 2011 – Q2 2018



Source: CBRE Econometric Advisors, MSCI.

THE RELATIONSHIP BETWEEN OFFICE OCCUPANCY AND EMPLOYMENT LOOKS MORE CYCLICAL THAN TRENDED

OCCUPIED STOCK/OFFICE-USING EMPLOYMENT: TOP 16 U.S. CITIES



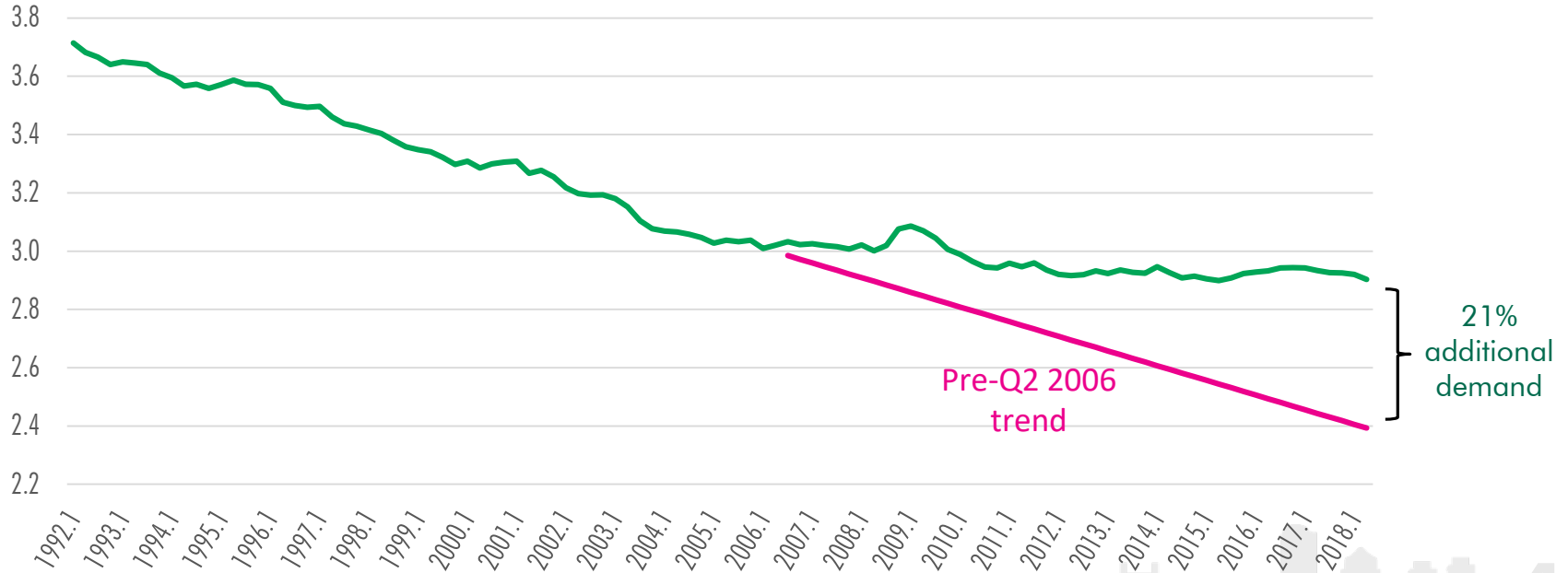
LESS SURPRISING FOR RETAIL

OCCUPIED STOCK (T16) / RETAIL SALES (NATIONAL)



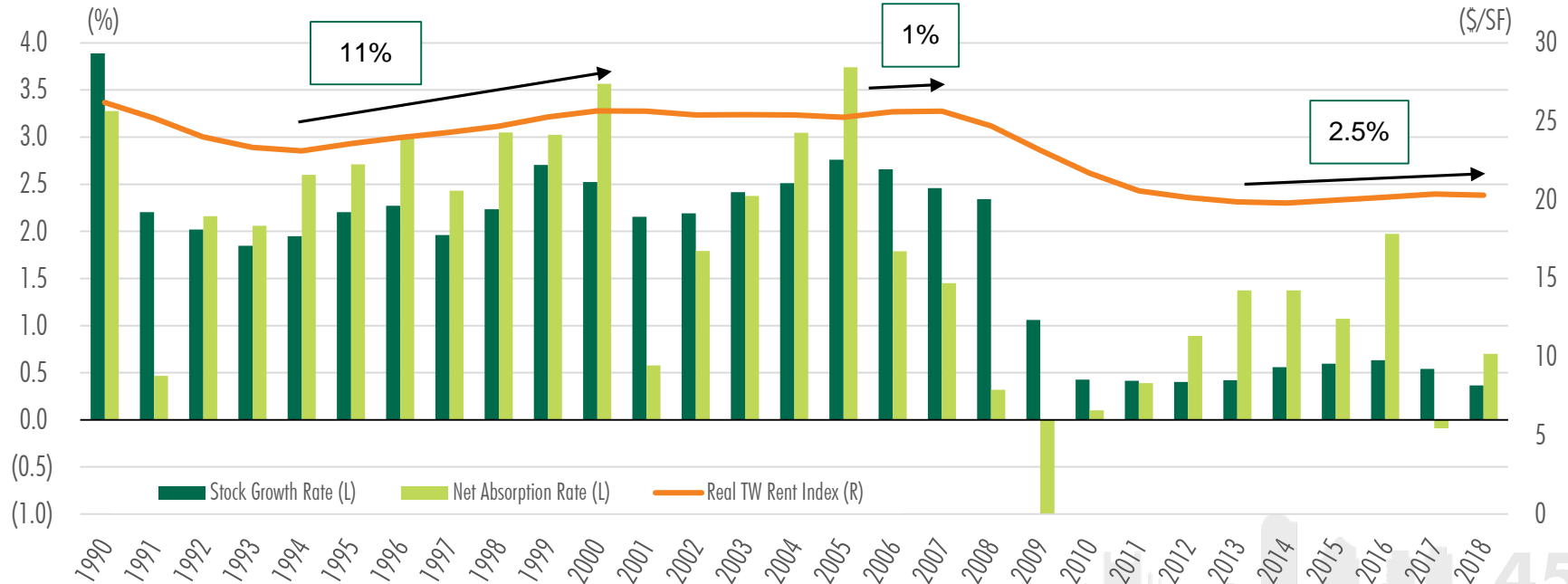
A CHANGE IN TREND FOR INDUSTRIAL

OCCUPIED SPACE TO GDP RATIO



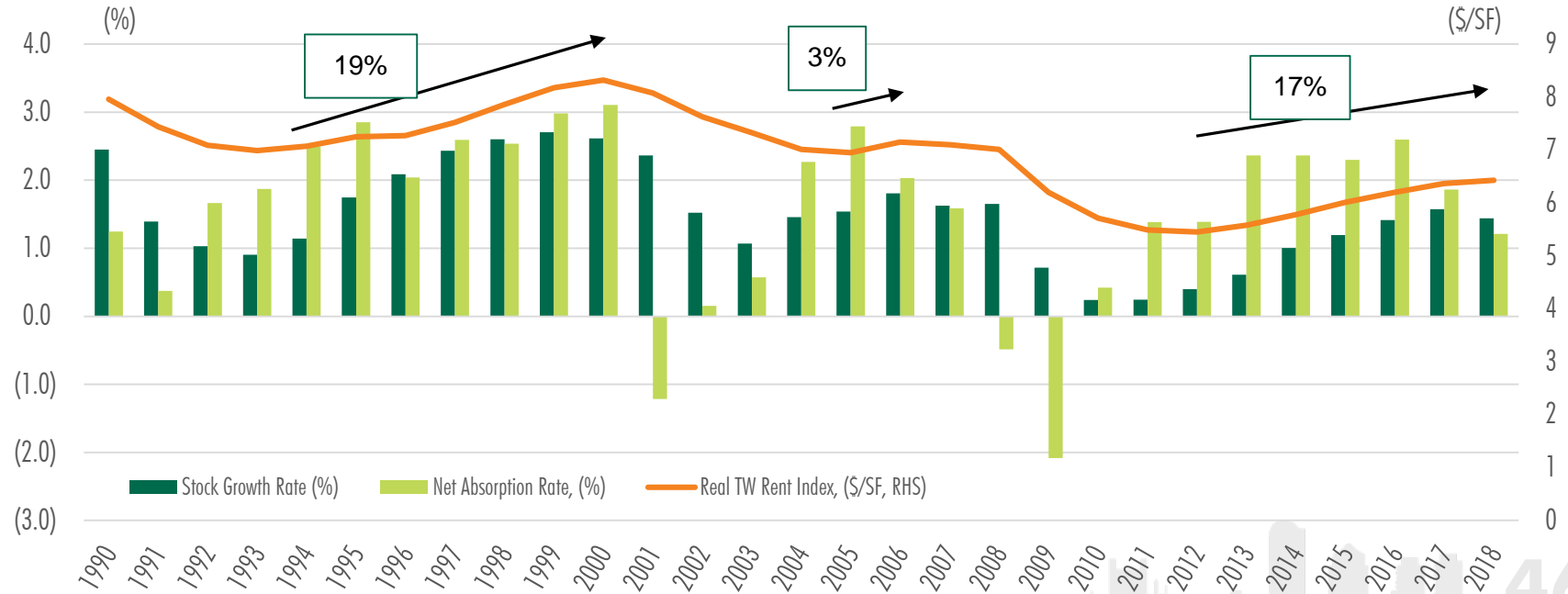
U.S. RETAIL

U.S. RETAIL SUM OF MARKETS



U.S. INDUSTRIAL

U.S. INDUSTRIAL SUM OF MARKETS



RECAP

- Economic upswing comparable to the 1990s
- ...But rental growth (and development) much weaker
- For office, some evidence of a change in the economy-demand relationship
- For retail and industrial (and apartment), massive evidence of a change in the economy-demand relationship



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Forecasting in an extended cycle: What's different this time? Secular factors.

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WILLIAM WHEATON, PHD | MIT, PROFESSOR EMERITUS

TECHNOLOGY AND REAL ESTATE:

RESHAPING PROPERTY DEMAND RELATIVE TO PAST ECONOMIC RECOVERIES

RETAIL

Internet choice-with-delivery platform replacing store choice and consumer travel

INDUSTRIAL & WAREHOUSE

Definitely benefiting from retail misery, but robots and automation are a drag

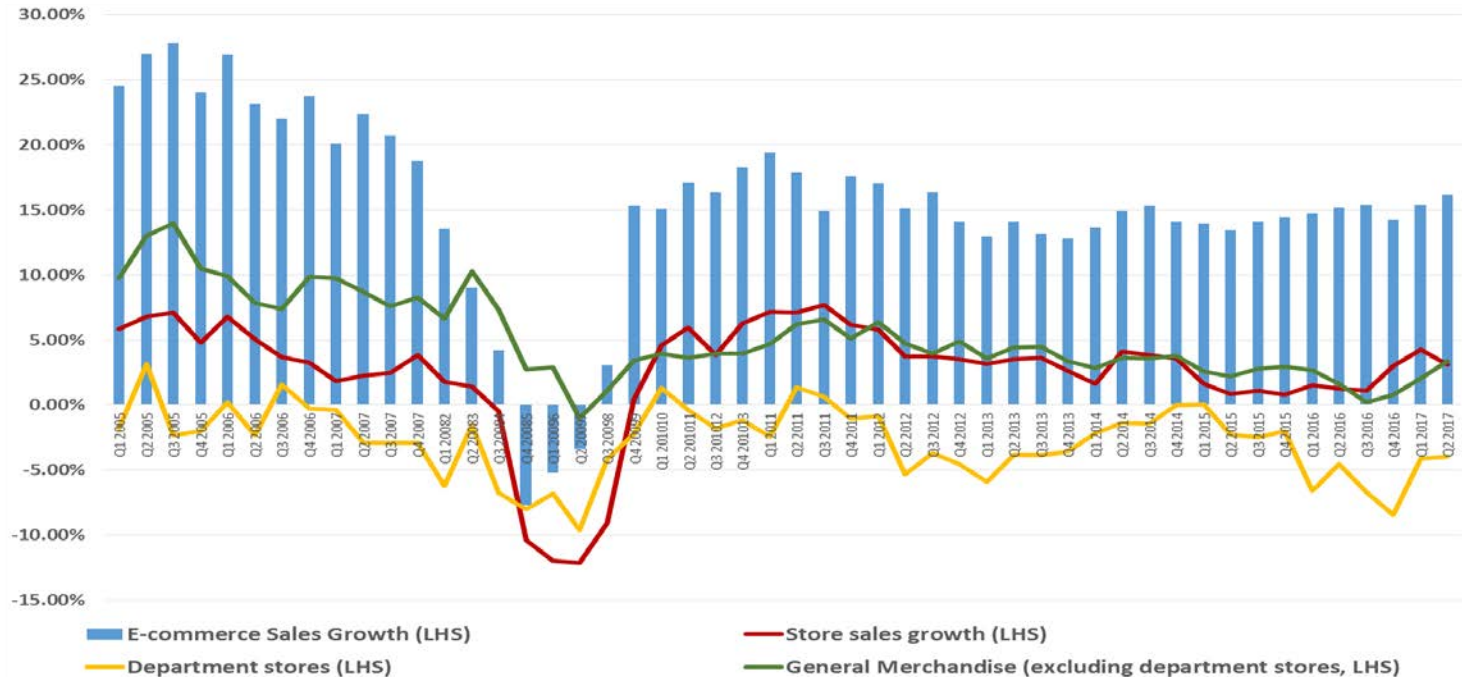
OFFICE

Sharing/flexible space expanding offsite remote working

THREE RESEARCH INITIATIVES AT CBRE HELP US UNDERSTAND
THE SECULAR FORCES AT WORK IN THIS RECOVERY

HOW AND WHERE PEOPLE SHOP IS CHANGING: DEPARTMENT LOSING TO BIG BOX, EVERYONE MOVING TO E-COMMERCE

YOY GROWTH: E-COMMERCE, 15% | ALL STORES, 3.4% | BIG BOX, 3.6% | DEPARTMENT STORES, -2.8%



SALES METRICS FOR GOODS DELIVERED BY FIRMS USING INTERNET VERSUS TRADITIONAL DISTRIBUTION CHANNELS

Store	GP/worker(US) ¹	GP/sqft ²	Internet Revenue % ³
Amazon (US)	\$121,000	\$298	91%
Walmart (US)	\$62,000	\$226	4%
Macy's	\$75,000	\$72	21%
Publix	\$48,000	\$157	0%
Best Buy	\$79,000	\$192	18%
Land's End	\$119,000	\$503	89%

1. Gross Profit = Revenue - COG, annual 10k. U.S. operations only.
2. Annual 10k. U.S. operations, store + distribution space.
3. Share of gross profits earned from internet sales, 10k, 2016.

EVENTUAL SPACE TRANSITIONS

MOVE \$1M IN SALES FROM MACY'S OVER TO AMAZON AND...

Store space demand drops by 14,000 sq. ft., and warehouse space demand rises by 3,400 sq. ft.

MORE GENERALLY: MOVE \$1M OF SALES FROM A BROAD RANGE OF STORES OVER TO AN INTERNET PLATFORM AND...

Store space demand drops by 2,000 sq. ft., and warehouse space demand rises by 1,300 sq. ft. (regression model, 122 firms).

WHEN WE MOVE FROM A WORLD OF ACTUAL STORES WHERE PEOPLE SHOP IN PERSON, TO ONE OF VIRTUAL STORES WHOSE GOODS ARE DELIVERED, AGGREGATE SPACE DEMAND SHRINKS.

54

INDUSTRIAL AUTOMATION

- Robots are made by a number of companies internationally
- IFR tracks when and where each robot is sold and installed since 1990
- Industrial robots concentrated in selected areas/industries: auto, electronics, chemicals, plastics
- With IFR data can estimate the growth in robots per worker in each U.S. MSA since 1990 through 2007



STATISTICAL ANALYSIS:

HOW ROBOT “ADOPTION” IMPACTS A LOCAL INDUSTRIAL SPACE MARKET

REGRESSION MODEL RESULTS ACROSS 44 MSAs:

An increase of 2 robots per worker over 1990-2007...

1. Reduces cumulative growth in occupied space by 18% over the period—from 33% to 15%.
2. Decreases cumulative growth in constant-dollar industrial rents by 23% over the period—from -4% to -27%.

AUTOMATION IS AS BAD FOR INDUSTRIAL SPACE DEMAND
AS IT IS FOR LABOR DEMAND!

WORKING FROM HOME IS INCREASINGLY COMMON

CAN FLEXIBLE, REMOTE COWORKING SPACE PROVIDE A COMMERCIAL ALTERNATIVE THAT WILL FURTHER REDUCE OFFICE SPACE PER WORKER?

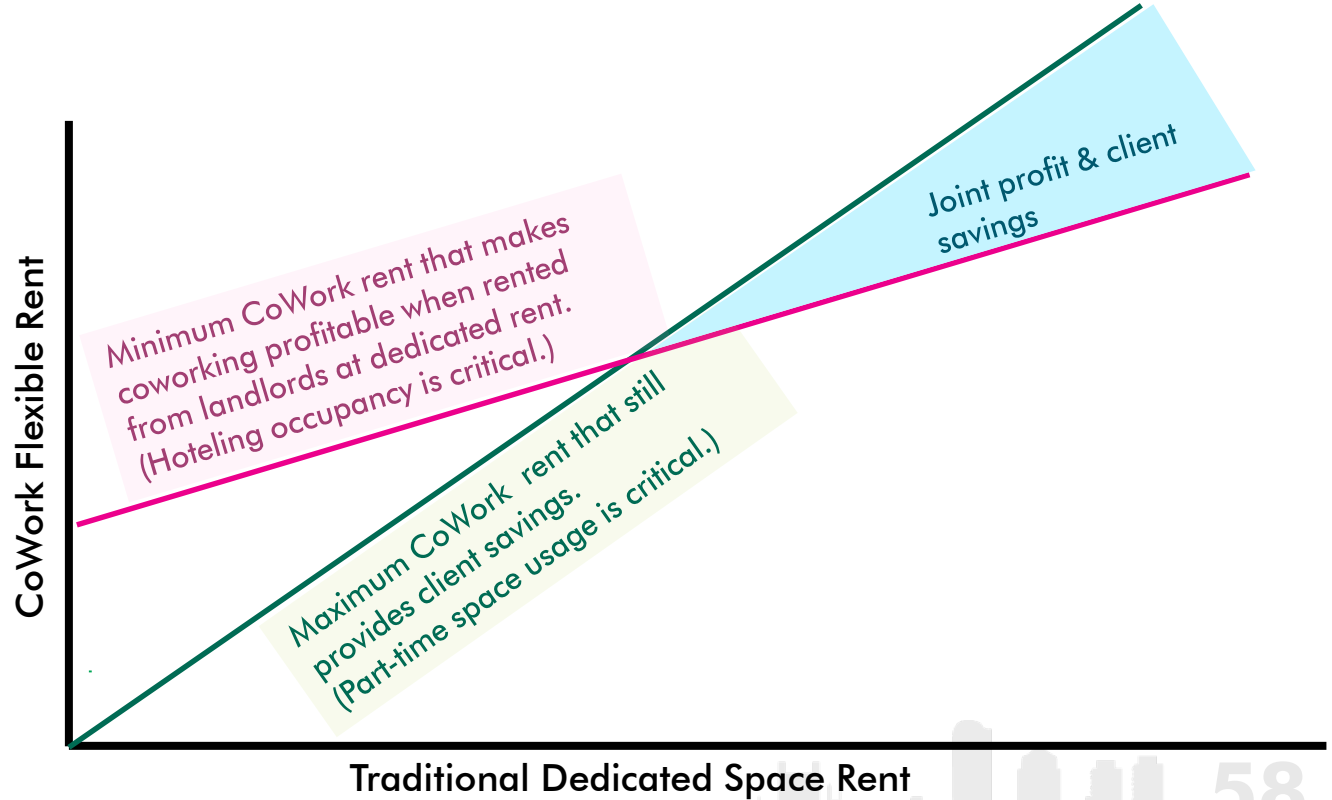
	1991	1997	2004	2015
Work some or all at home	19,967	21,478	26,265	33,970
Paid	7,432	10,116	11,958	NA
35 hours or more	1,070	1,791	1,852	NA
Full-time, not self-employed	94	583	611	NA
At home / total employed	18.50	17.40	19.80	23.80

Source: Bureau of Labor Statistics.

COWORKING PRICING MODEL: FLEXIBLE RENT VS. TRADITIONAL

PART-TIME CO-WORKING SPACE RENT MUST PROVIDE:

- Client savings with equal worker productivity
- High enough hotel-type occupancy for profitability



So the jury is still out...

Where do we go from here?



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The image features a dark background with a network diagram of glowing green nodes and lines. The nodes are connected by thin lines, creating a complex web of connections. The overall aesthetic is modern and technological.

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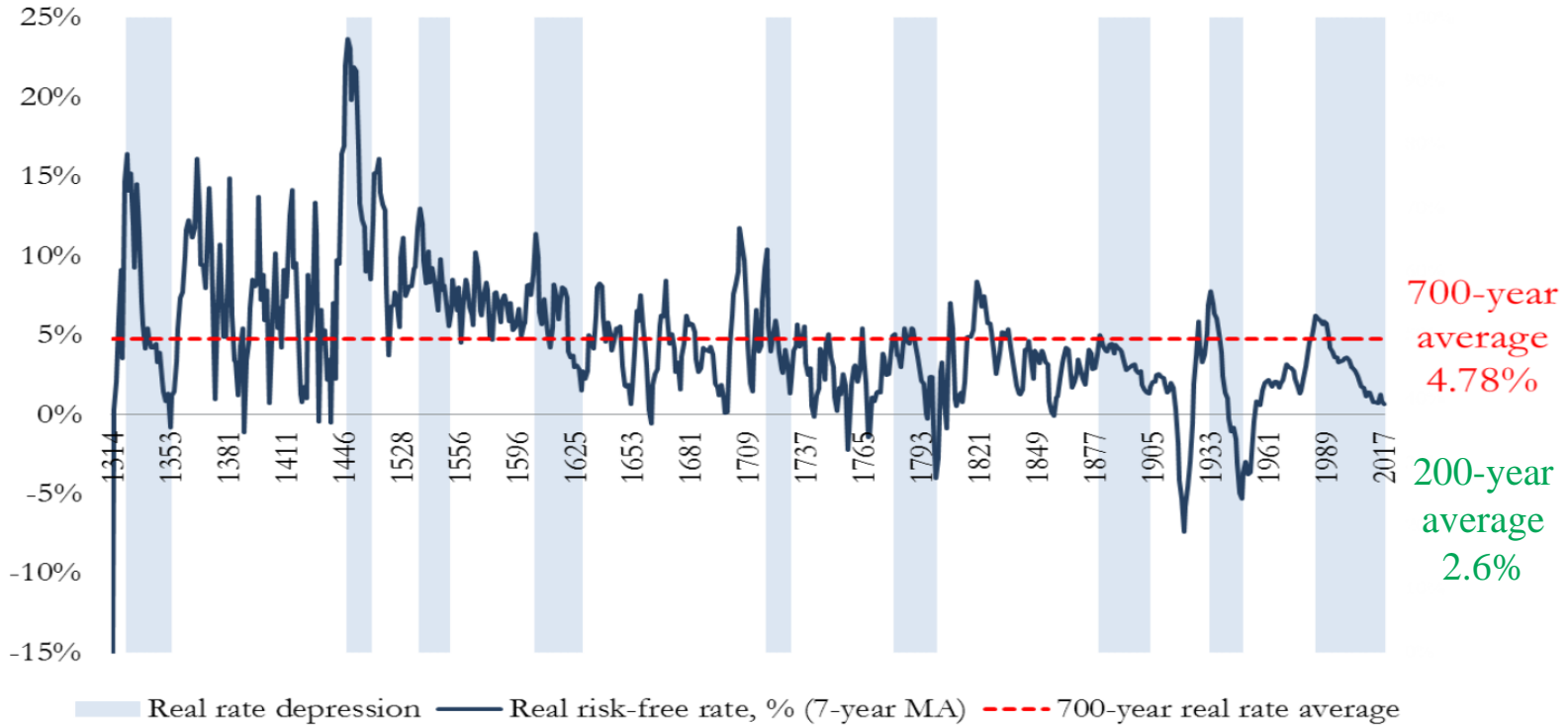
Interest rates in the ultra-long run

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NEIL BLAKE, PHD | EMEA CHIEF ECONOMIST, GLOBAL HEAD OF FORECASTING

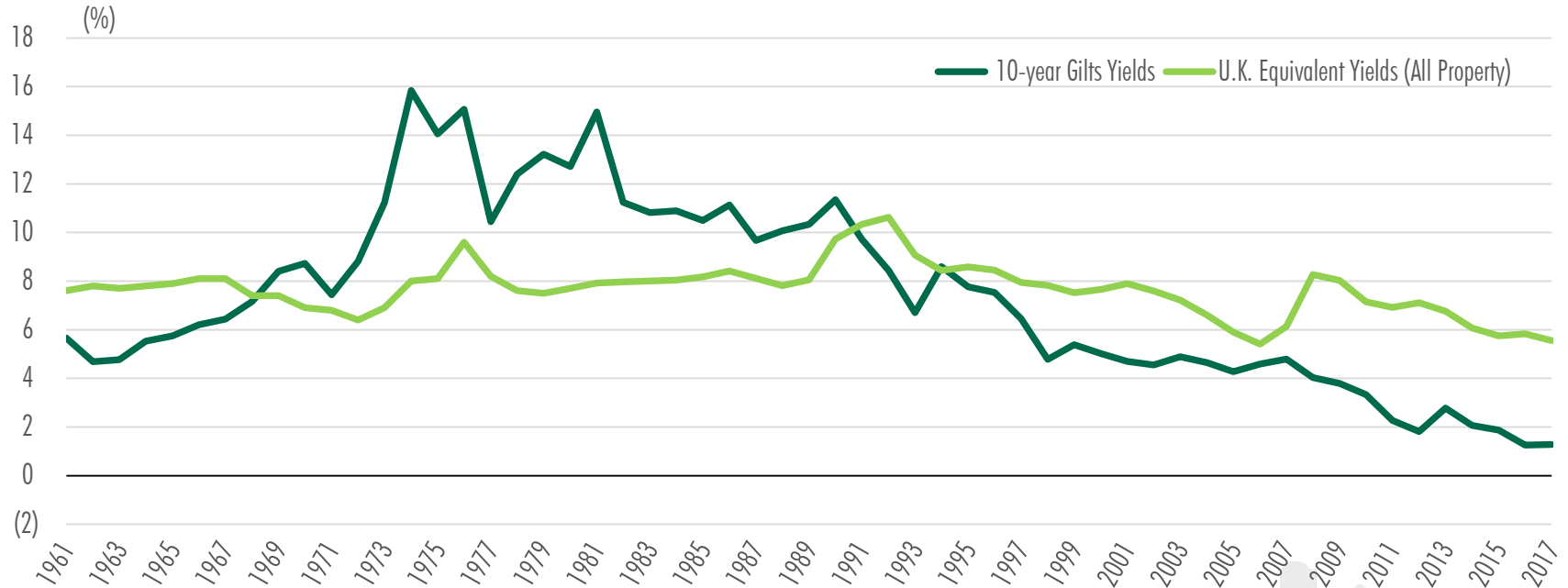
RICHARD BARKHAM, PHD MRICS CRE | GLOBAL CHIEF ECONOMIST

REAL LONG-TERM INTEREST RATES SINCE 1311



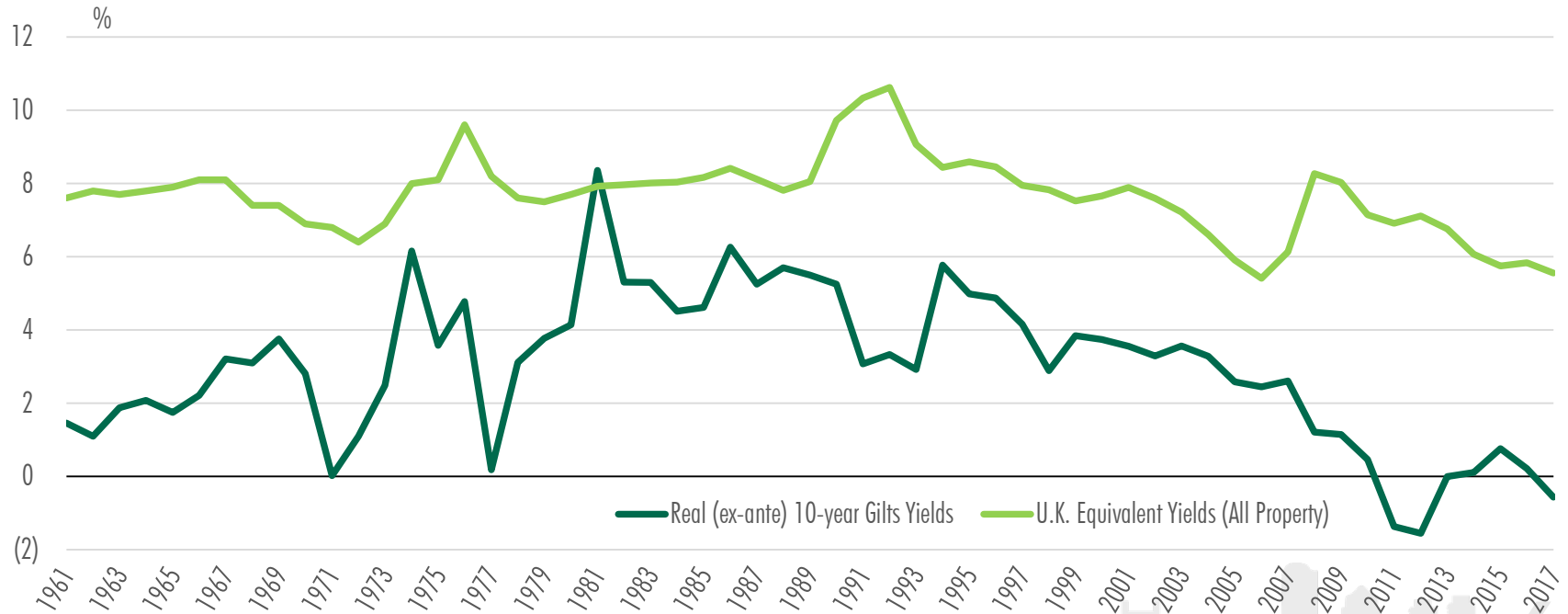
Source: Schmelzing, 2017.

UK OFFICE YIELDS AND NOMINAL LONG-TERM INTEREST RATES



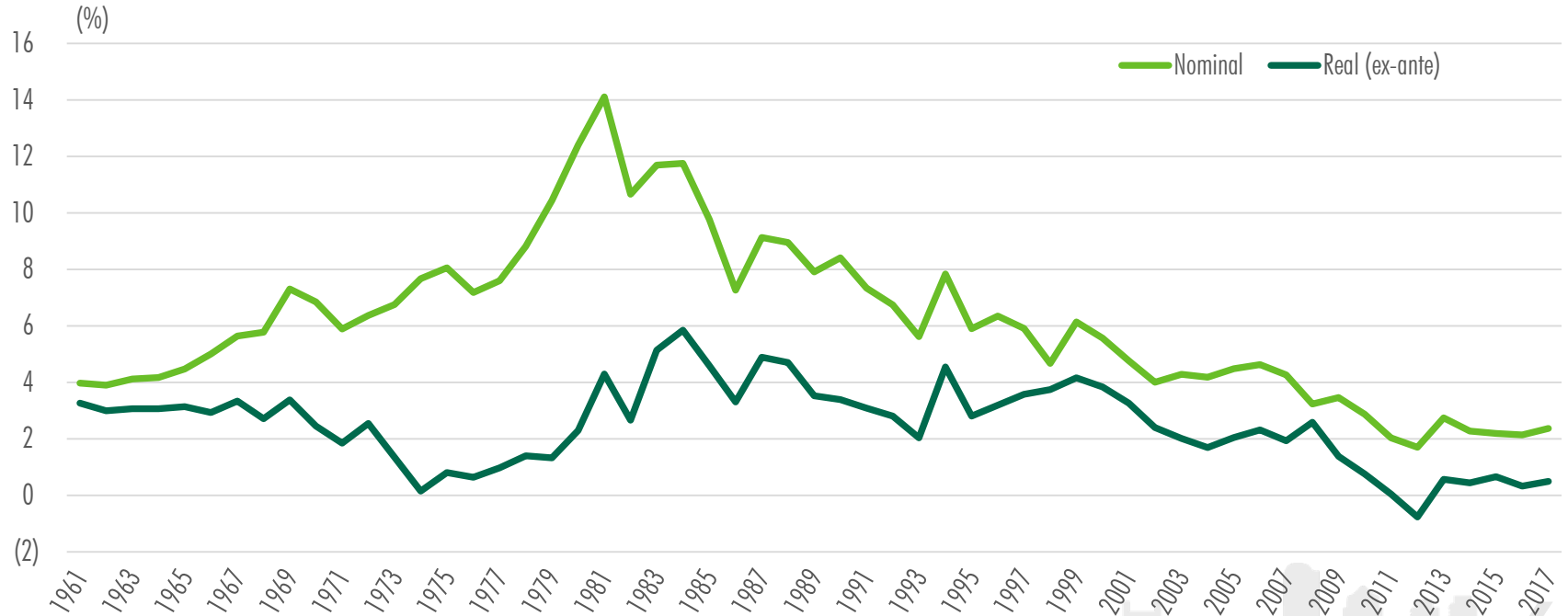
Source: CBRE/Macrobond, MSCI/IPD, August 2018

UK OFFICE YIELDS AND REAL LONG-TERM INTEREST RATES



Source: CBRE/Macrobond, MSCI/IPD, August 2018

REAL AND NOMINAL YIELDS ON 10-YEAR U.S. TREASURY BONDS

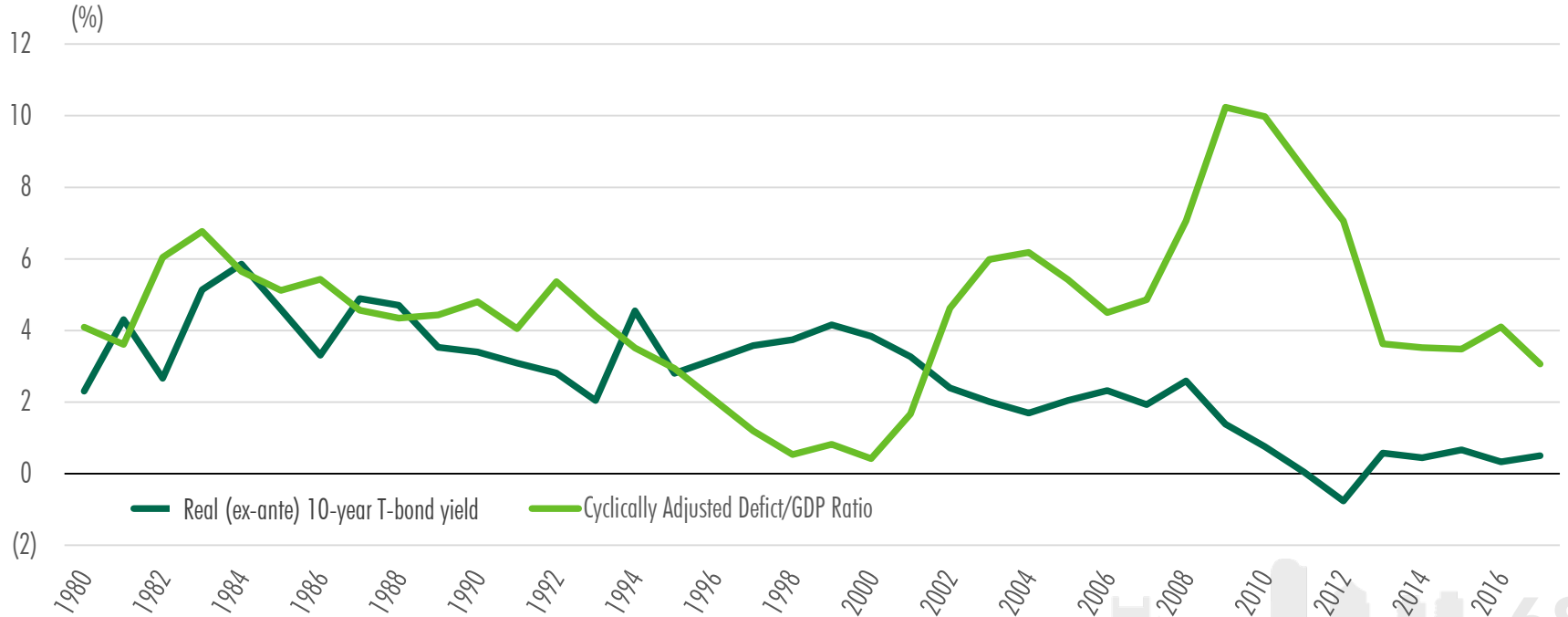


APPROACH

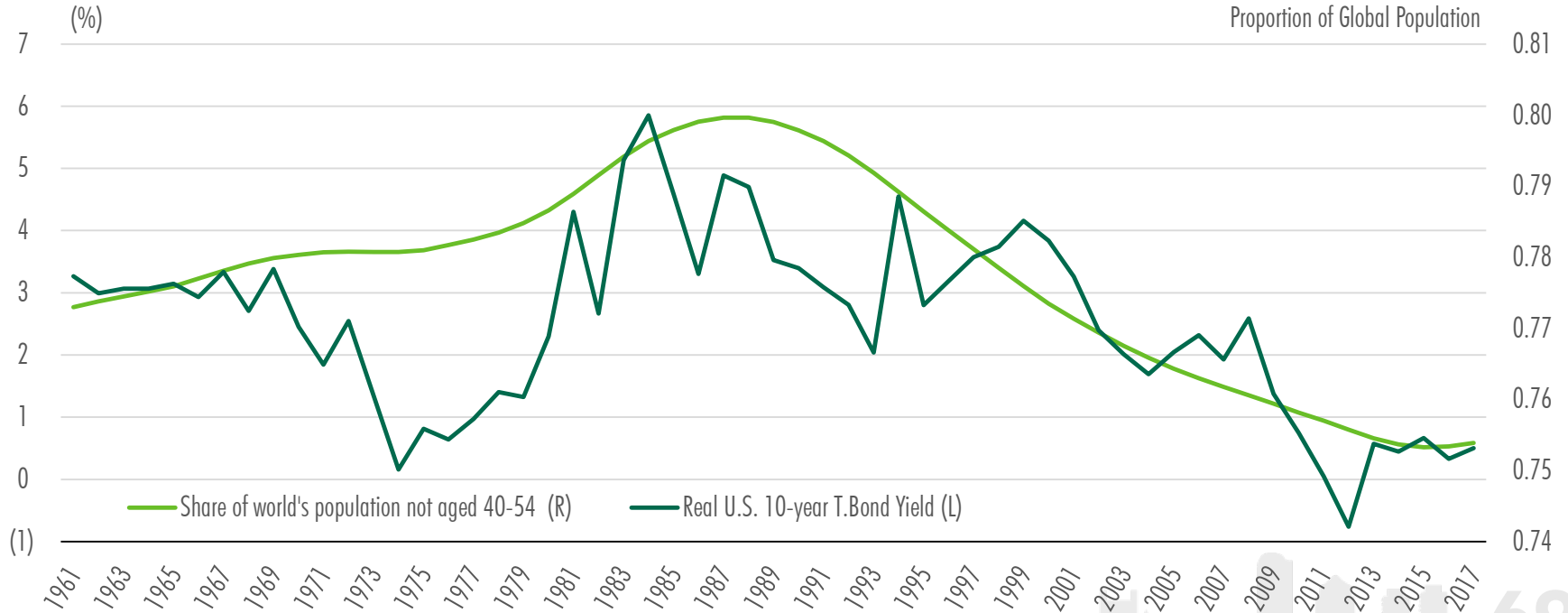
LOOK AT:

- INFLATION (ADAPTIVE EXPECTATIONS)
- GDP GROWTH
- DEMOGRAPHICS
- QUANTITATIVE EASING
- RISE OF CHINA
- INCREASE IN HIGH NET WORTH INDIVIDUALS
- FALLING PRICE OF INVESTMENT GOODS
- GOVERNMENT DEFICITS

U.S.: REAL INTEREST RATES VS. THE BUDGET DEFICIT

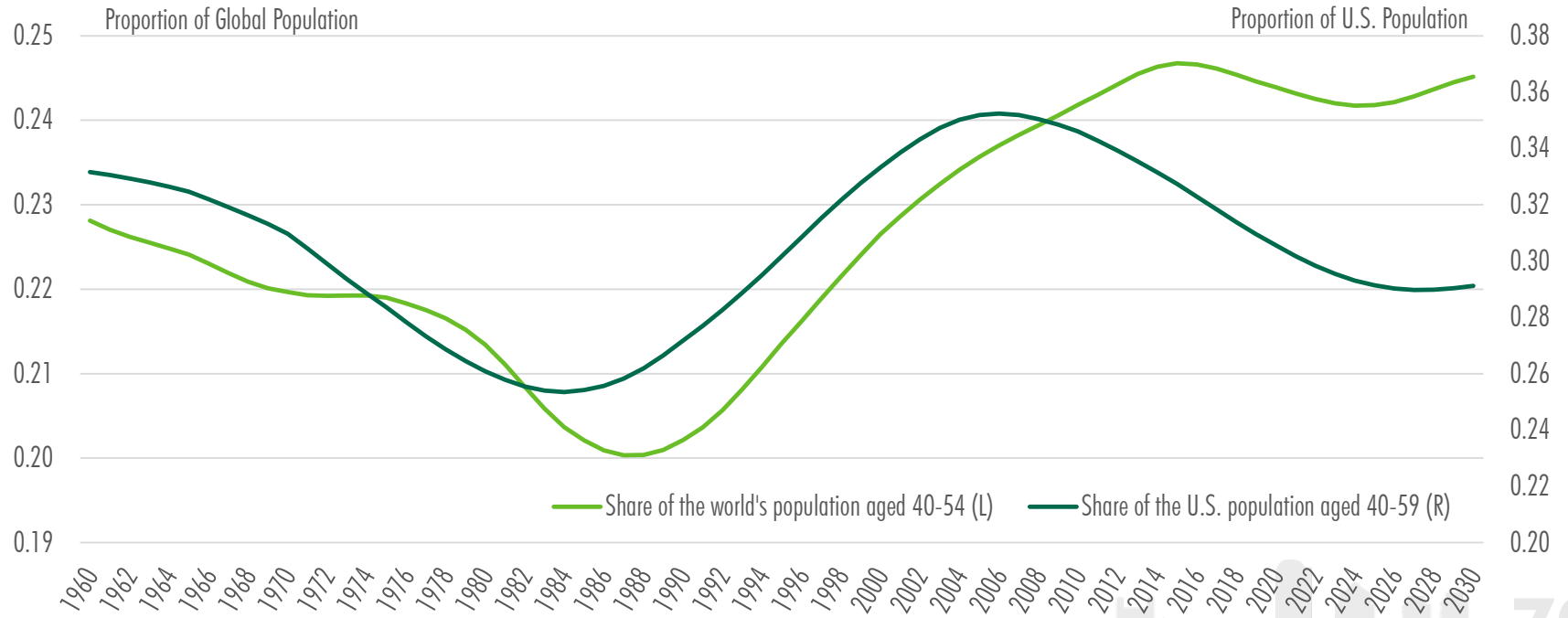


REAL 10-YEAR U.S. TREASURY BOND YIELDS AND DEMOGRAPHICS



Source: CBRE/Macrobond, UN, 2017.

COMPARATIVE DEMOGRAPHIC SHARES



Source: U.N., 2017.

REAL LONG-TERM INTEREST RATES

	U.S.	U.K.	Germany
end-2017	0.5	-0.5	-0.8
2028			
CBRE analysis	0.9	0.5	0.2
"Consensus"	1.6	1.4	1.0
Full Normalization*	2.4	3.1	2.7

assumes a 50% reversal of QE from end-2017

*Full normalization is defined as interest rates returning to their 2000-2007 average.

Source: CBRE, August 2018; Consensus Economics, April 2018.

NOMINAL LONG-TERM INTEREST RATES

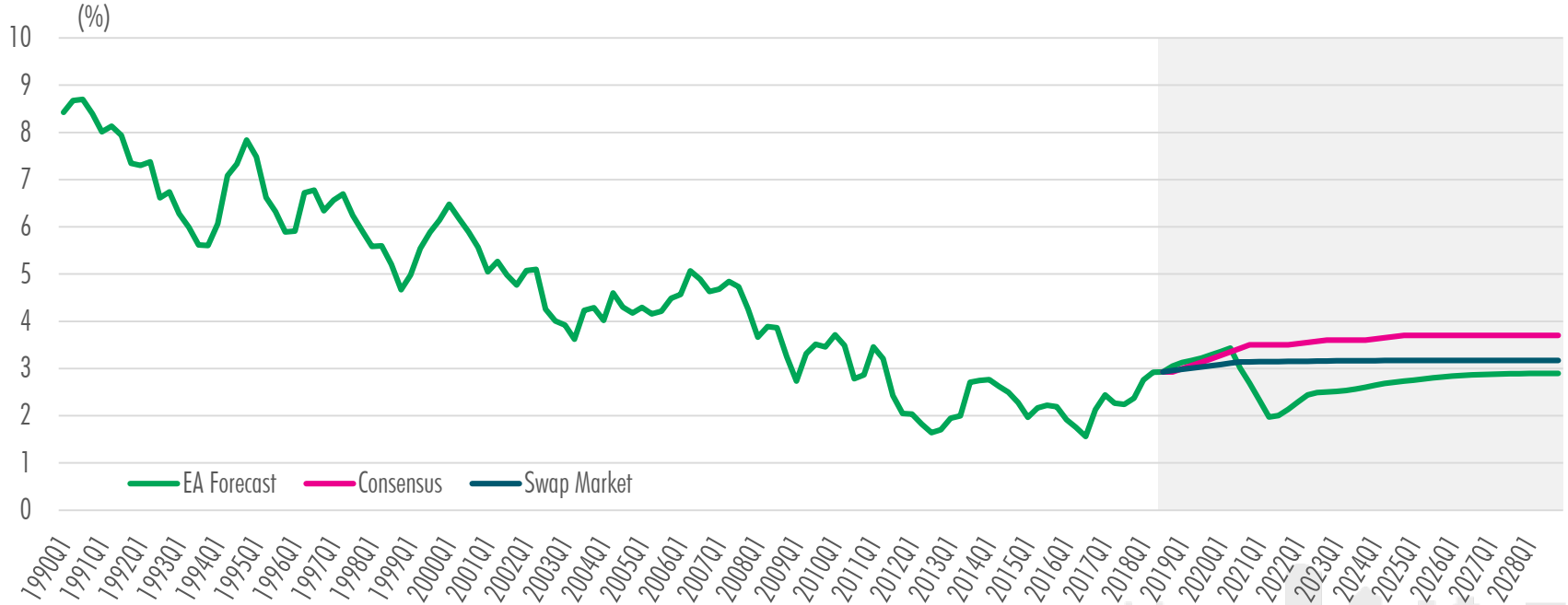
	U.S.	U.K.	Germany
end-2017	2.4	1.3	0.4
2028			
CBRE analysis	2.9	2.5	2.0
"Consensus"	3.7	3.5	2.8
Full Normalization*	4.5	4.7	4.3

assumes a 50% reversal of QE from end-2017

*Full normalization is defined as interest rates returning to their 2000-2007 average.

Source: CBRE, August 2018; Consensus Economics, April 2018.

YIELD ON 10-YEAR T-BILLS – THE TEN YEAR FORECAST



Source: CBRE EA; Consensus Economics, April 2018; Macrobond.

SUMMARY

- It's all about demographics and the savings-investment balance.

But

- That doesn't mean we've seen the end of the cycle in long-term interest rates.



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Where do cap rates go from here? A new approach

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JING REN, PHD | ECONOMIST

TIM SAVAGE, PHD | DATA SCIENCE ADVISOR

WHERE DO CAP RATES GO FROM HERE?

Cap rates are affected by both macroeconomic and microeconomic factors.

Macroeconomic

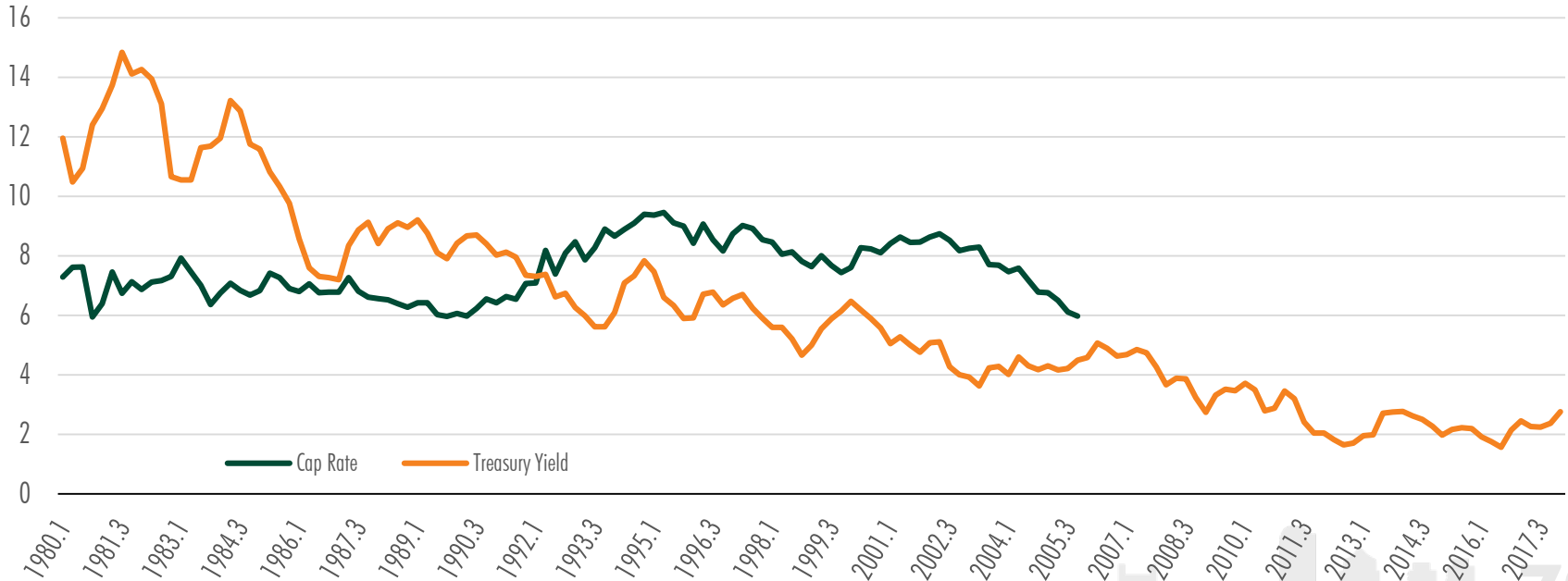
- Bond yields and inflation, among others
- International capital flows

Microeconomic

- Economics of super-agglomeration, such as in San Francisco and other tech markets
- Individual market models

HOW INFORMATIVE ARE NOMINAL U.S. TREASURYS?

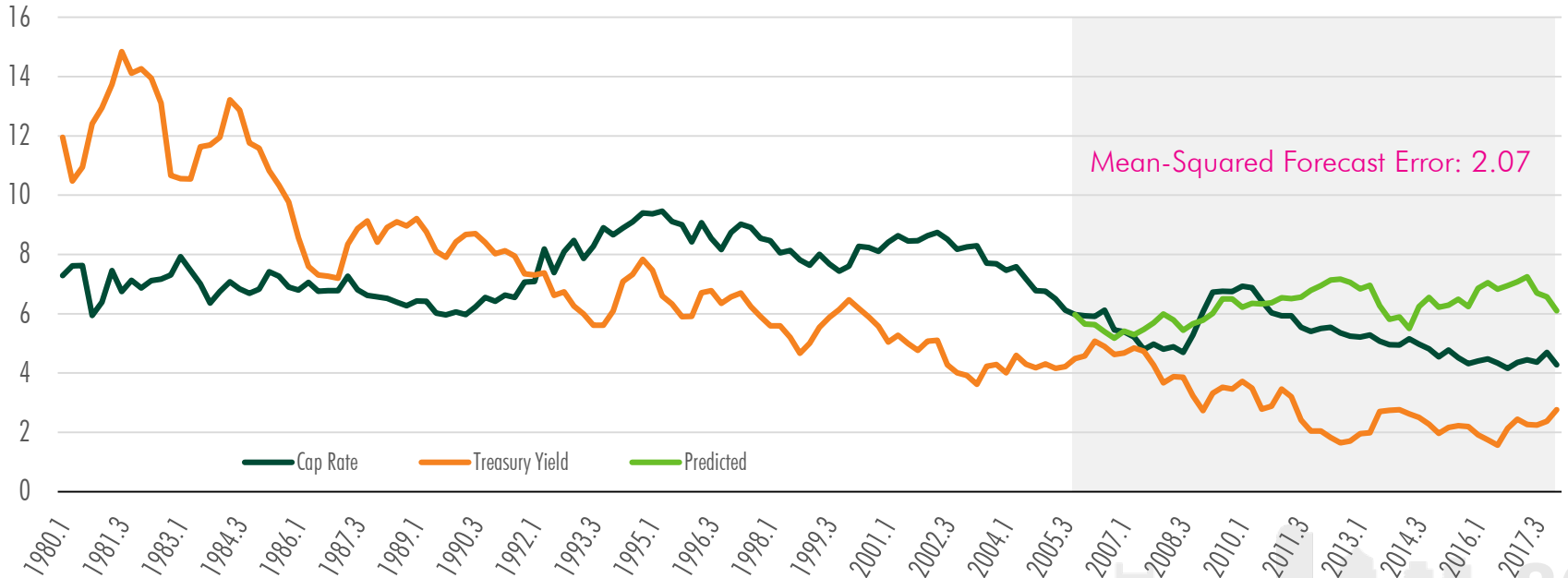
OFFICE CAP RATES AND NOMINAL 10-YEAR TREASURY YIELDS



Source: NCREIF, FRED.

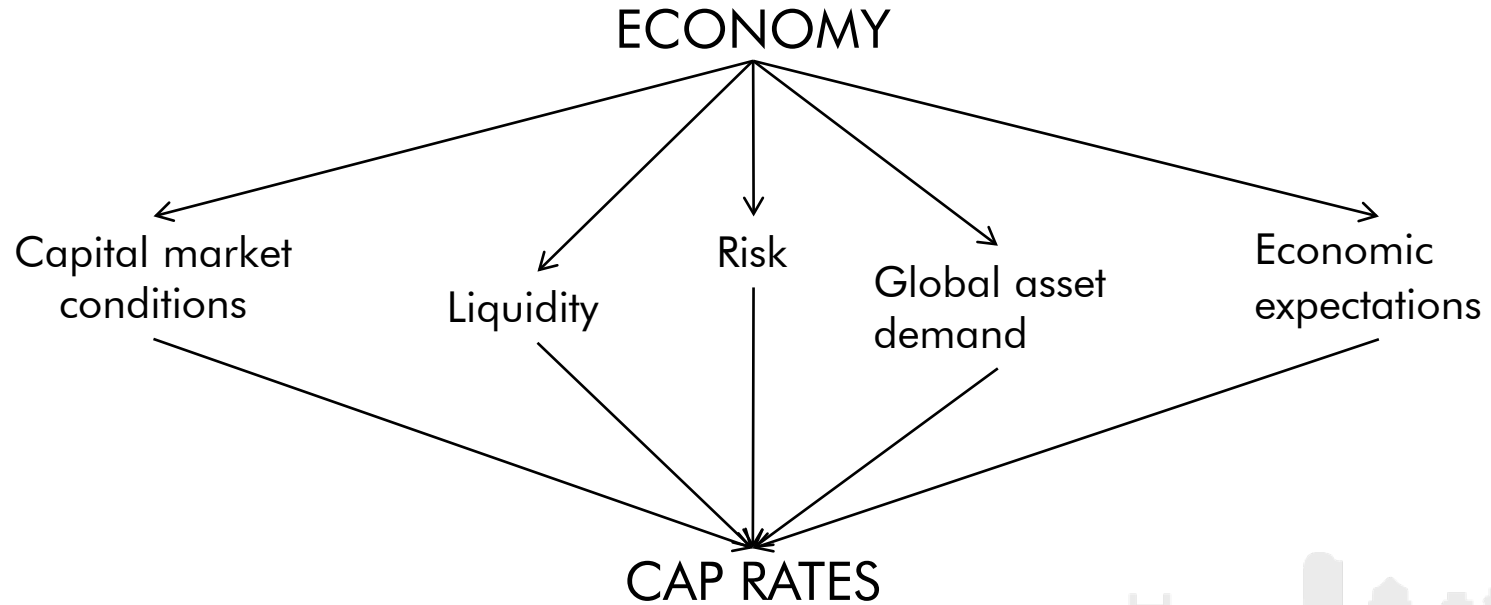
LIMITED

OFFICE CAP RATES AND 10-YEAR TREASURY YIELDS



Source: NCREIF, FRED.

CHANNELS OF INFLUENCE



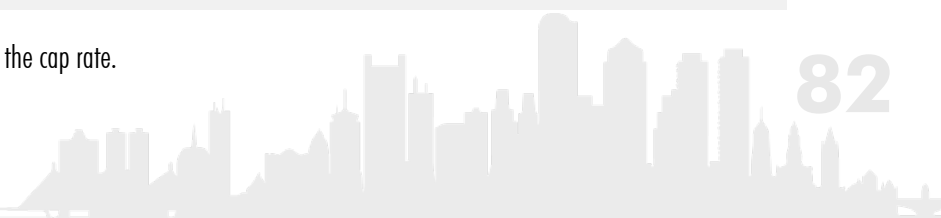
Source: CBRE Econometric Advisors.

THEORY AND RESULTS

Factor Group	Model Variable	Theory	Coefficients*	P value
Capital Market Conditions	Nominal Treasury Yield			
	Inflation			

* Estimated coefficients represent the long-term relationship between each macro variable and the cap rate.

Source: CBRE Econometric Advisors.



THEORY AND RESULTS

Factor Group	Model Variable	Theory	Coefficients*	P value
Capital Market Conditions	Nominal Treasury Yield	+	0.445	0.000
	Inflation	?	-0.264	0.000
Fed QE	QE			
Liquidity	Debt Growth			

* Estimated coefficients represent the long-term relationship between each macro variable and the cap rate.

Source: CBRE Econometric Advisors.

THEORY AND RESULTS

Factor Group	Model Variable	Theory	Coefficients*	P value
Capital Market Conditions	Nominal Treasury Yield	+	0.445	0.000
	Inflation	?	-0.264	0.000
Fed QE	QE	-	-0.266	0.000
Liquidity	Debt Growth	-	-0.230	0.000
Risk	AAA-Bond Spread			
Global Asset Demand	Dollar Value			

* Estimated coefficients represent the long-term relationship between each macro variable and the cap rate.

Source: CBRE Econometric Advisors.

THEORY AND RESULTS

Factor Group	Model Variable	Theory	Coefficients*	P value
Capital Market Conditions	Nominal Treasury Yield	+	0.445	0.000
	Inflation	?	-0.264	0.000
Fed QE	QE	-	-0.266	0.000
Liquidity	Debt Growth	-	-0.230	0.000
Risk	AAA-Bond Spread	+	0.959	0.000
Global Asset Demand	Dollar Value	+	0.223	0.000
National Economic Expectation	Unemployment Rate Change			
Local Economic Expectation	Local RE, Real Rent			

* Estimated coefficients represent the long-term relationship between each macro variable and the cap rate.

Source: CBRE Econometric Advisors.

THEORY AND RESULTS

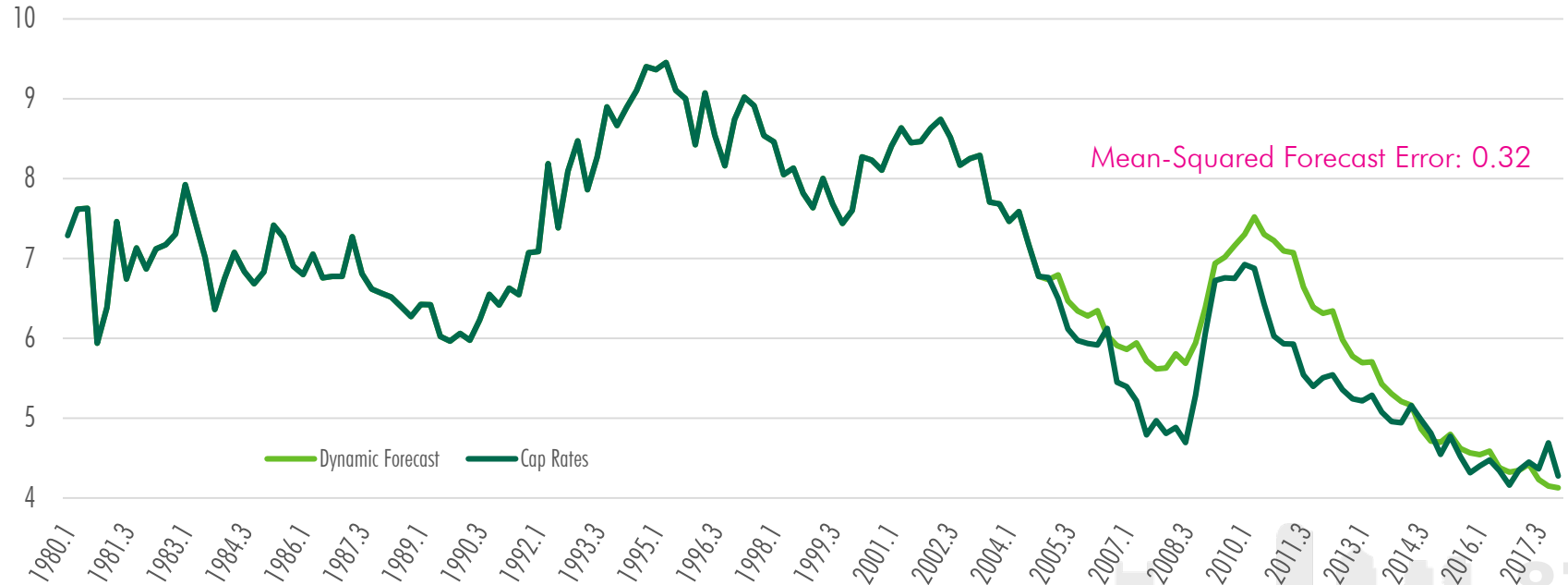
Factor Group	Model Variable	Theory	Coefficients*	P value
Capital Market Conditions	Nominal Treasury Yield	+	0.445	0.000
	Inflation	?	-0.264	0.000
Fed QE	QE	-	-0.266	0.000
Liquidity	Debt Growth	-	-0.230	0.000
Risk	AAA-Bond Spread	+	0.959	0.000
Global Asset Demand	Dollar Value	+	0.223	0.000
National Economic Expectation	Unemployment Rate Change	+	0.687	0.000
Local Economic Expectation	Local RE, Real Rent	?	-0.063	0.000

* Estimated coefficients represent the long-term relationship between each macro variable and the cap rate.

Source: CBRE Econometric Advisors.

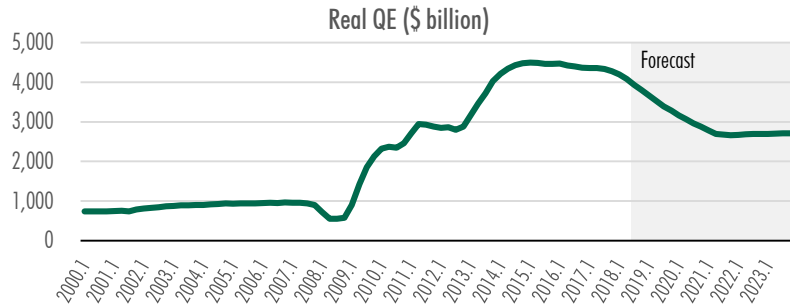
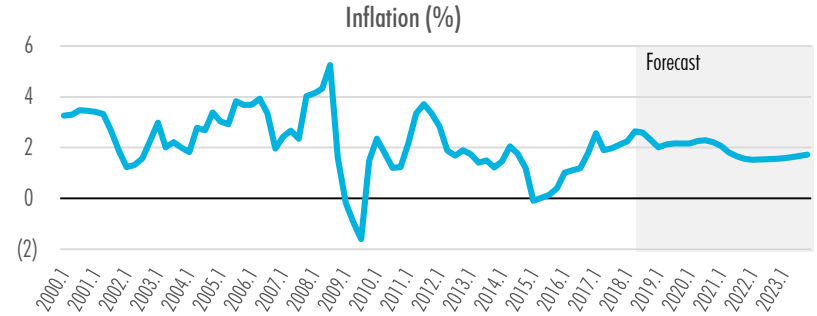
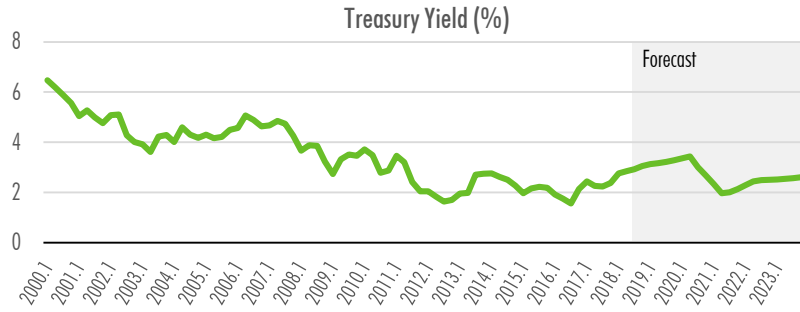
ENHANCED MODEL IMPROVES FORECAST ACCURACY

NATIONAL OFFICE CAP RATE FORECAST, BACKTEST OF 2005-2018



Source: CBRE Econometric Advisors, NCREIF.

INDIVIDUAL IMPACT BASED ON Q3 ASSUMPTIONS



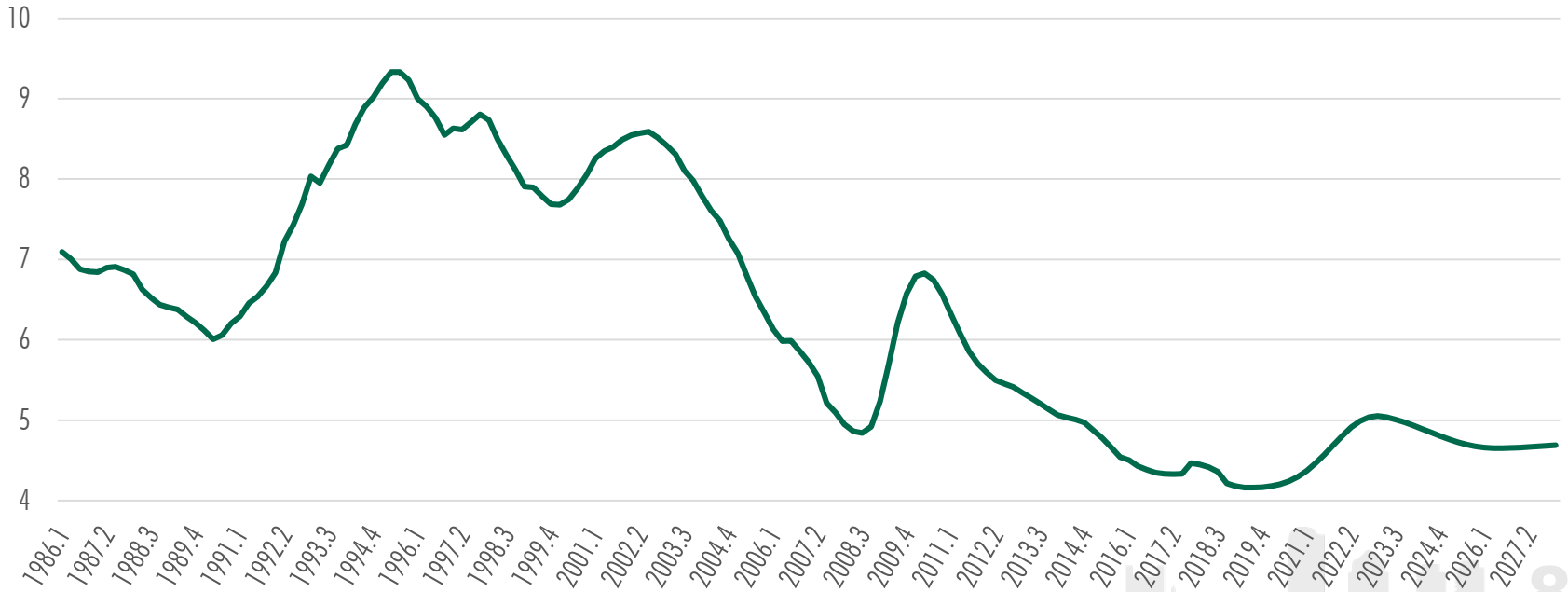
Factor	2-Year Forecast	Projected impact
Inflation	Lower Inflation	↑
QE	Lower QE	↑
Debt Growth	Higher Debt Growth	↓
Dollar Value	Higher Dollar Value	↑
Treasury Yield	Higher Yield	↑
Risk Spread	Higher Risk	↑
Unemployment Rate	Lower Unemployment	↓

Source: CBRE Econometric Advisors.



MODERATE OVERALL RISE UNDER Q3 ASSUMPTIONS

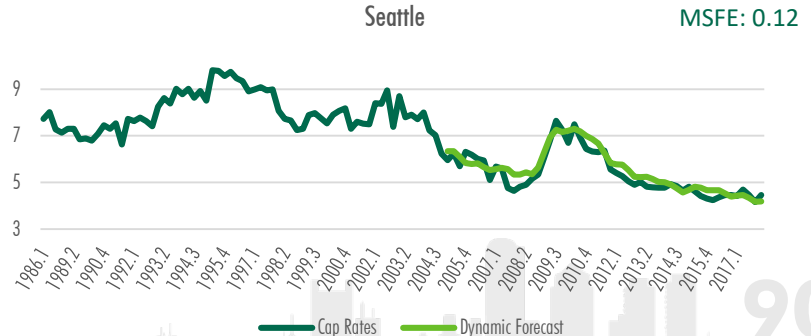
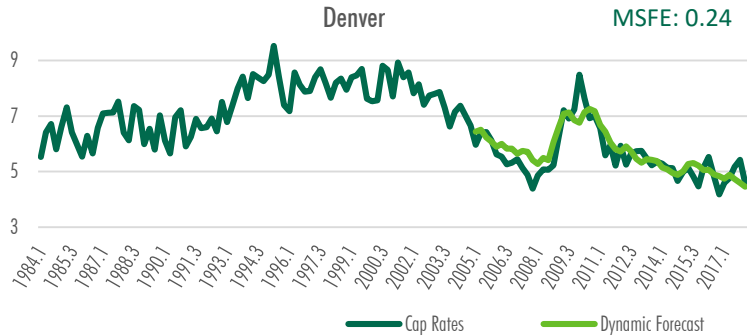
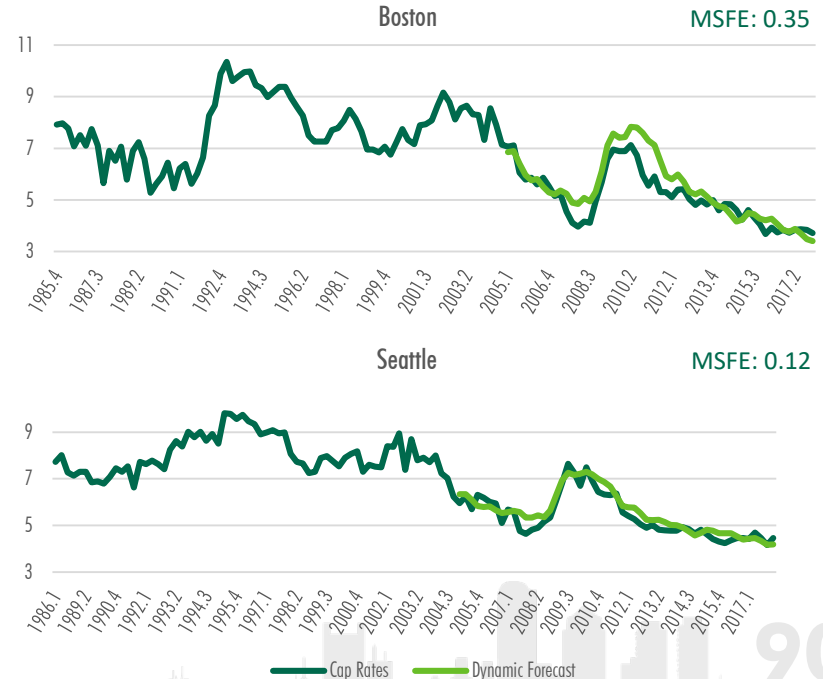
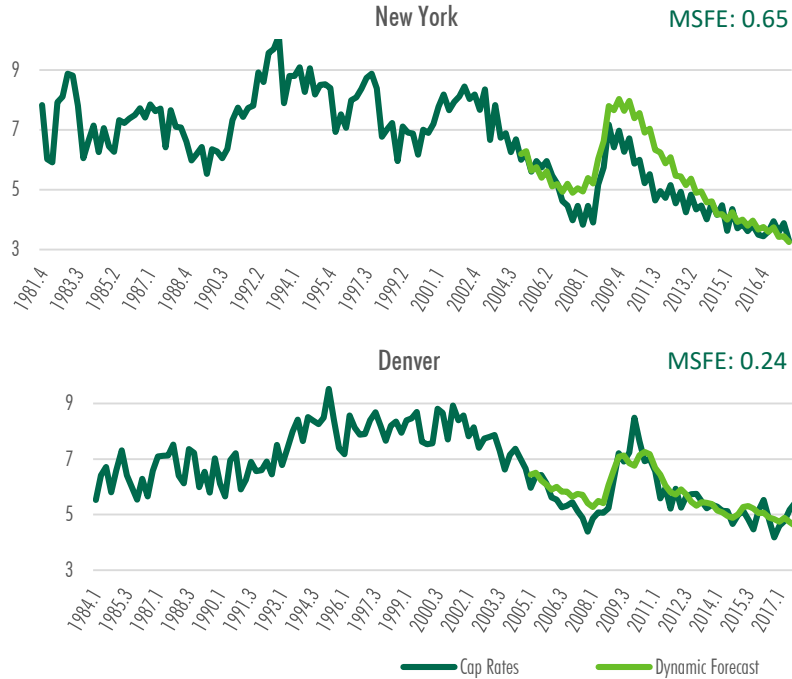
ENHANCED MODEL: NATIONAL OFFICE CAP RATE FORECAST



Source: CBRE Econometric Advisors.

IMPROVED ACCURACY AT THE MARKET LEVEL AS WELL

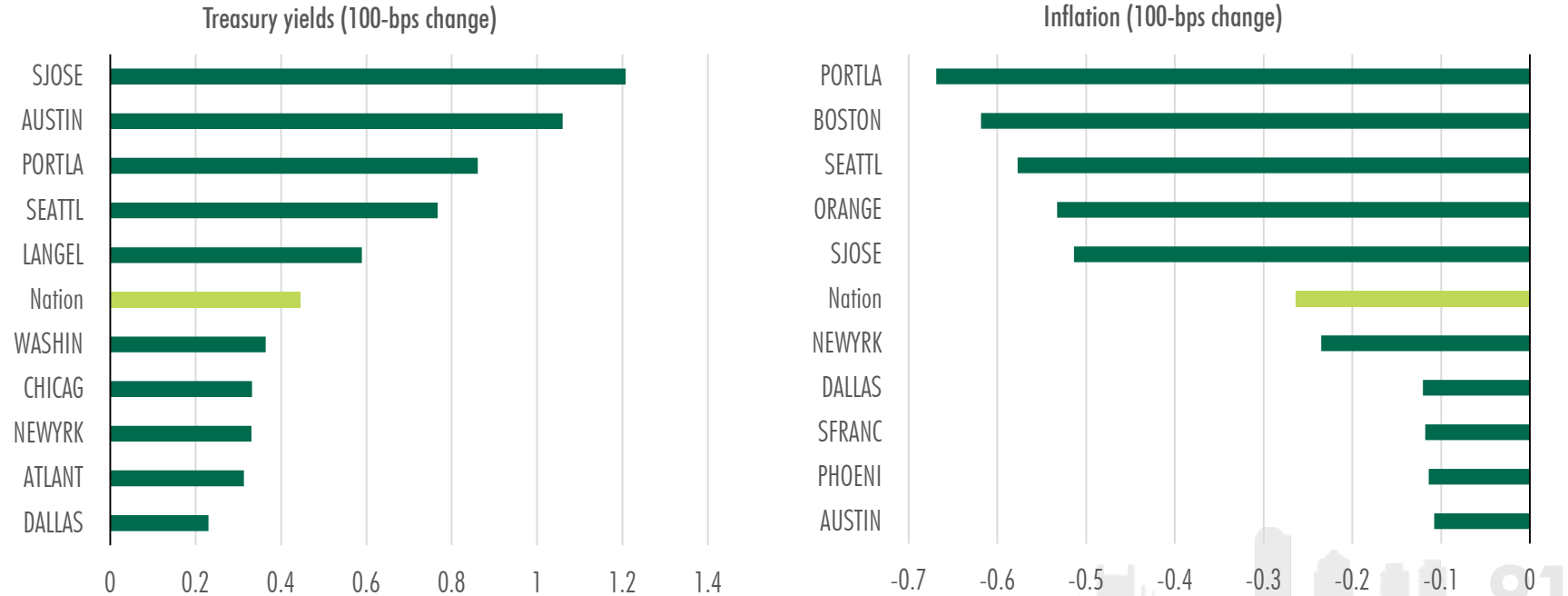
INDIVIDUAL OFFICE MARKET CAP RATE FORECASTS, BACKTEST OF 2005-2018



Source: CBRE Econometric Advisors, NCREIF

MARKET SENSITIVITY TO INDIVIDUAL FACTORS RANGES WIDELY

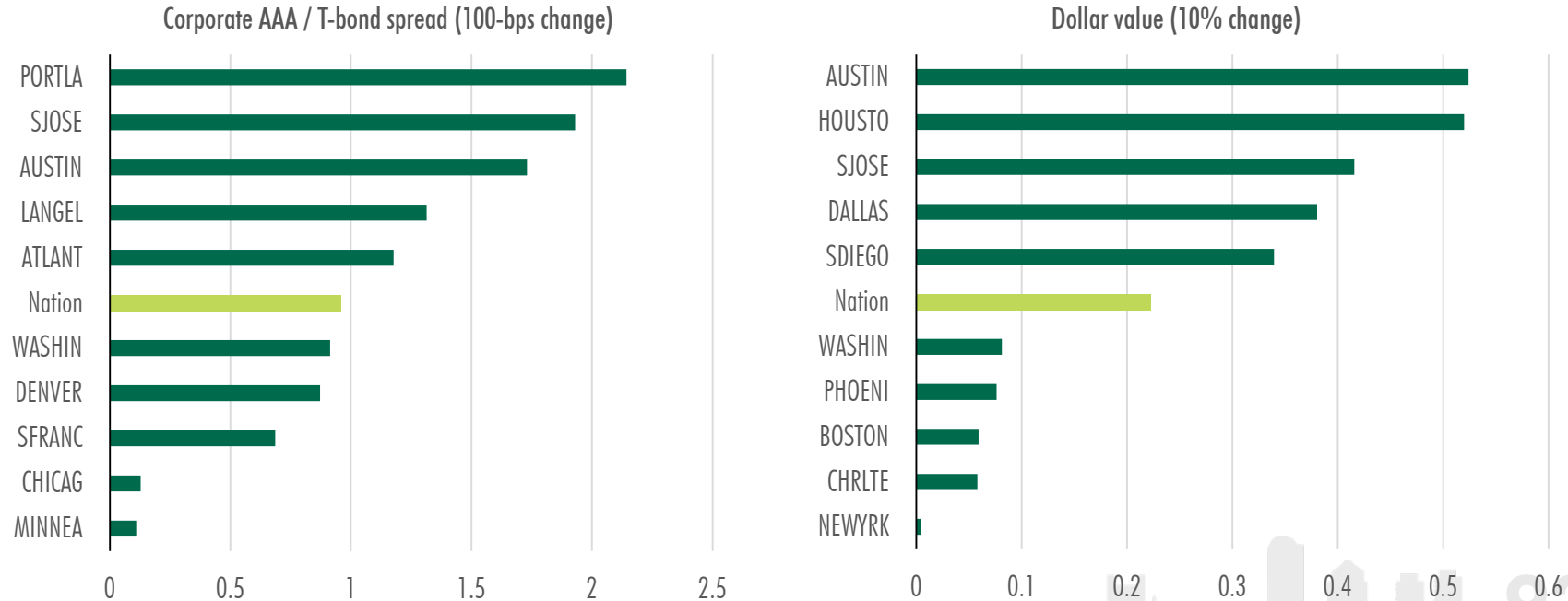
IMPACT ON CAP RATES: TREASURY YIELDS AND INFLATION



Source: CBRE Econometric Advisors.

MARKET SENSITIVITY TO INDIVIDUAL FACTORS RANGES WIDELY

IMPACT ON CAP RATES: AAA BOND SPREAD AND DOLLAR VALUE



Source: CBRE Econometric Advisors.



CBRE

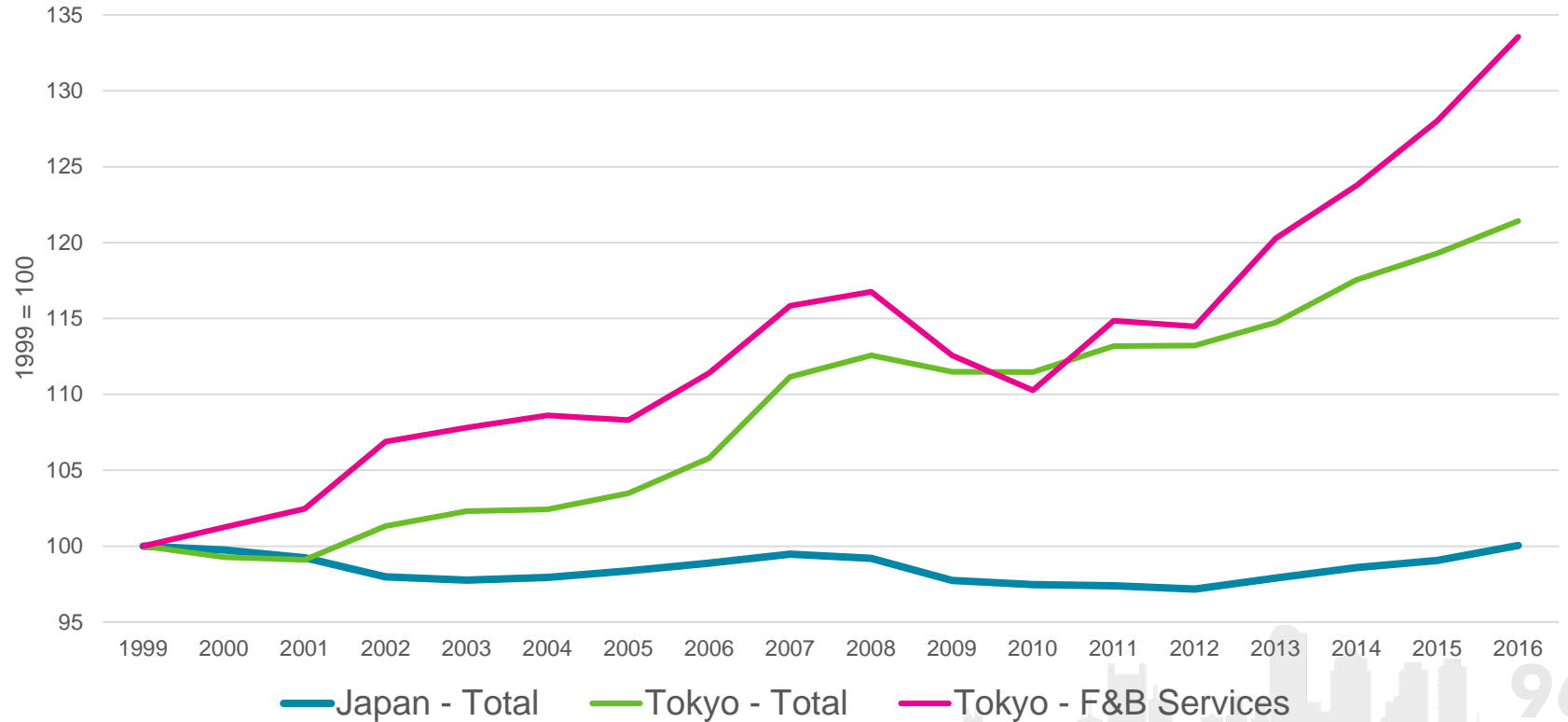
THANK YOU

CBRE ECONOMETRIC ADVISORS CLIENT FORUM

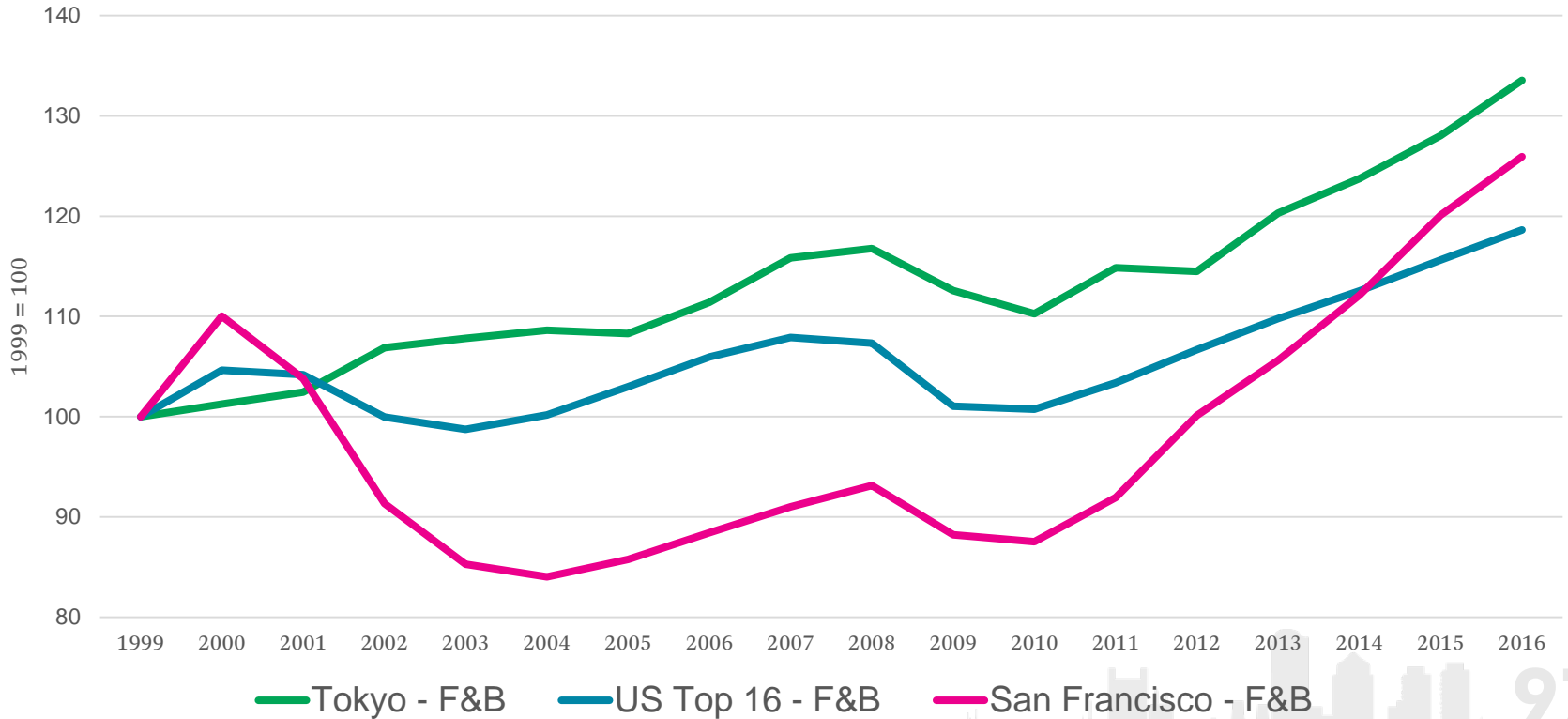
WHAT HAPPENS WHEN EMPLOYMENT STOPS GROWING?

- DEMOGRAPHIC PRESSURES; STAGNATING US EMPLOYMENT
- EMPLOYMENT IN OFFICE USING SECTORS WILL LEVEL OFF TOO
- DEMAND FOR OFFICE SPACE LEVELS OFF – AT BEST
- NO NEW NET COMPLETIONS?
 - *But....*
 - THE US IS NOT A SINGLE OFFICE MARKET
 - SOME CITIES WILL STILL GROW
 - BUT PROBLEMATIC FOR STATIC/DECLINING CITIES
 - *Look for examples elsewhere*

EMPLOYMENT IN JAPAN



EMPLOYMENT – TOKYO & US CITIES COMPARED



SUMMARY

- TECHNOLOGY
 - *Especially for retail & industrials*
- DEMOGRAPHICS
 - *All about cities?*
 - *And who uses offices*
 - *And change of use*

CBRE ECONOMETRIC ADVISORS
Presents

LONGEST CYCLE EVER?

2018 Fall Client Forum
Tuesday October 2 at the Boston Athenaeum