

WORK FROM HOME  
AND THE OFFICE REAL ESTATE APOCALYPSE

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# THIS PAPER: DECOMPOSES EFFECTS OF WFH ON OFFICE VALUES

- Take Campbell-Shiller decomposition and apply it to NYC office buildings:

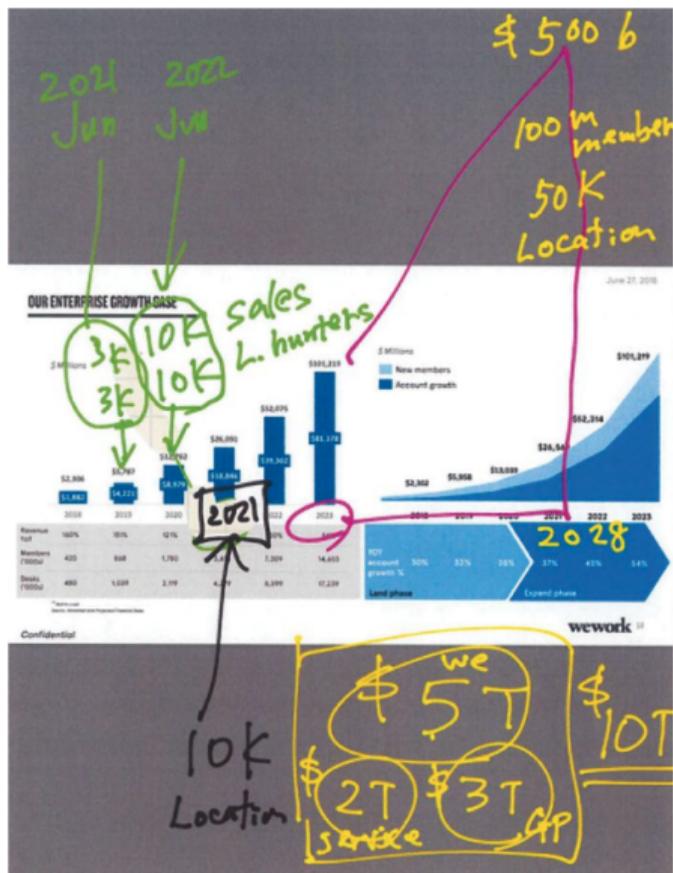
$$p_{t+1} - \mathbb{E}_t[p_{t+1}] = \underbrace{(d_{t+1} - \mathbb{E}_t[d_{t+1}])}_{\text{observed leasing flows}} + \underbrace{(\mathbb{E}_{t+1} - \mathbb{E}_t) \sum_{j=1}^{\infty} \rho^{j-1} \Delta d_{t+1+j} - (\mathbb{E}_{t+1} - \mathbb{E}_t) \sum_{j=1}^{\infty} \rho^{j-1} r_{t+1+j}}_{\text{asset pricing model w/WFH SDF}}$$

- Estimate initial decline in CF from net effective rent (NER) in Compstak leasing data during COVID crisis period: 2020-21
- Last two terms reflect shifts in expected CF and returns → need asset pricing model
  - ▶ SDF matches risk-free rate, equity premium, and returns on WFH risk factor
  - ▶ Build WFH factor: long-short market cap weighted basket (monthly rebalanced)
  - ▶ Factor goes long on healthcare/biotech + IT/telecomm; short on transport + hospitality

# BIG PICTURE: WHAT THIS PAPER CONTRIBUTES

- **Path-breaking paper dealing with difficult and important forecasting problem**
  - ▶ U.S. CRE is a very large asset class: \$32.8 trillion, or \$4.7 trillion in investable stock as of 2020 (Goetzmann, Spaenjers, Van Nieuwerburgh 2021)
  - ▶ Contributes numbers to ongoing policy debates surrounding pecuniary (housing affordability) and real (productivity) externalities of WFH persistence
- **Contributions in execution of both empirics and structural estimation**
  - ▶ Embed pro forma statements for cash flow-generating properties into office valuation model
    - ★ Consider everything down to tenant improvements, renewal options, commissions, etc.
  - ▶ Hand collect property portfolio data from major REIT 10-Ks → overcomes issues with sample churn in other commonly used databases (e.g. S&P Global Market Intelligence)
  - ▶ REIT Schedule III standards changed during COVID leading to strange aggregations

# WORK MODES DIFFICULT TO FORECAST EVEN PRE-PANDEMIC



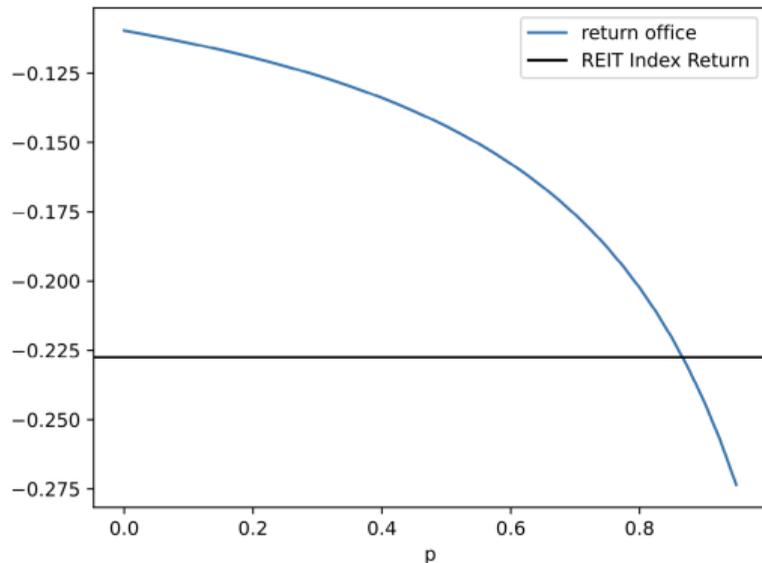
- Masayoshi Son's 2018 projection that WeWork would be worth \$10 trillion by 2028
- **WeWork's founder back in news this week**
  - ▶ \$350M investment in company ("Flow") buying apartments in Sun Belt and standardizing amenities (like high-end villas)
  - ▶ Bet on persistence of WFH norms



## COMMENT #1: EXTERNAL VALIDITY AND SANITY CHECKS

- Key model parameter:  $\mathbf{p}$  probability of remaining in WFH state
  - ▶ Obviously, we do not have direct evidence on the ergodic process for  $\mathbf{p}$ , since COVID is a relatively new shock!
  - ▶ Decline in CRE value varies convexly from  $-33\%$  ( $\mathbf{p} = 0.87$ ) to  $-23\%$  ( $\mathbf{p} = 0.62$ )
    - ★ Barrero, Bloom, Davis (2021) survey says WFH hours went from 5% pre-COVID to 60% in Spring 2020, and projected to go back to 20% (now at 30%)  $\rightarrow \mathbf{p} = 0.62$  is plausible
- $\mathbf{p}$  is also an industry-specific parameter (white-collar vs. blue-collar employment)
  - ▶ Dingel & Neiman (2020): 100% WFH feasibility for IT vs. 0% for construction
  - ▶ **Estimate the model for different tenant sectors and link to sectoral survey results**
  - ▶ We already have some evidence from the initial outbreak on immediate CF and risk implications from  $\alpha$  of specialized REIT portfolios (Ling, Wang, Zhou 2020 *RAPS*)
    - ★ Authors add evidence by linking job listings to space demand for  $N = 135$  large tenants
  - ▶ Do long-run impacts on sector-specific CRE values mirror early winners/losers?

## PIN DOWN $p$ USING EXPECTED RETURNS FOR A+ OFFICES



- Dimensions of sample selection:

1. Based on unlevered returns to NYC office REITs
2. Roughly corresponds to A+ segment of the CompStak data
  - ★ Defined as top 10% of NER in each submarket and quarter
3. CompStak covers only  $\approx 35\%$  of leasing inventory

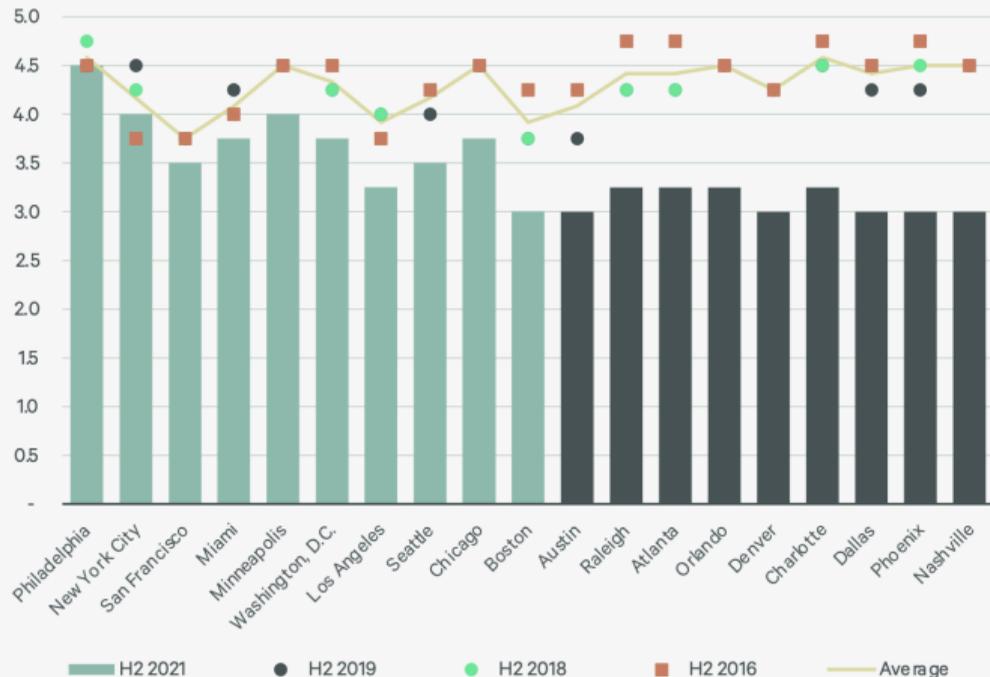
- Compare to CoStar/Cushman & Wakefield market reports?

### On external validity...

If valuation decline is this bad for very top of CRE office space market, then how bad is it for secondary/tertiary markets with lower-quality tenants (or, San Francisco)?

# AND YET, AGGRESSIVE CRE VALUATIONS IN SUN BELT...

FIGURE 6: H2 2021 cap rate levels relative to the average of previous Cap Rate Surveys (%)

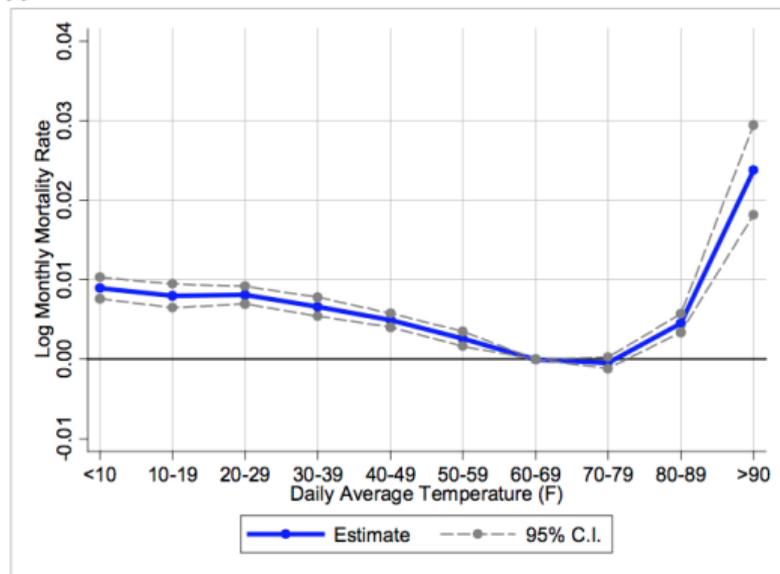


Note: Markets ranked by the spread between present and historic average yield levels.

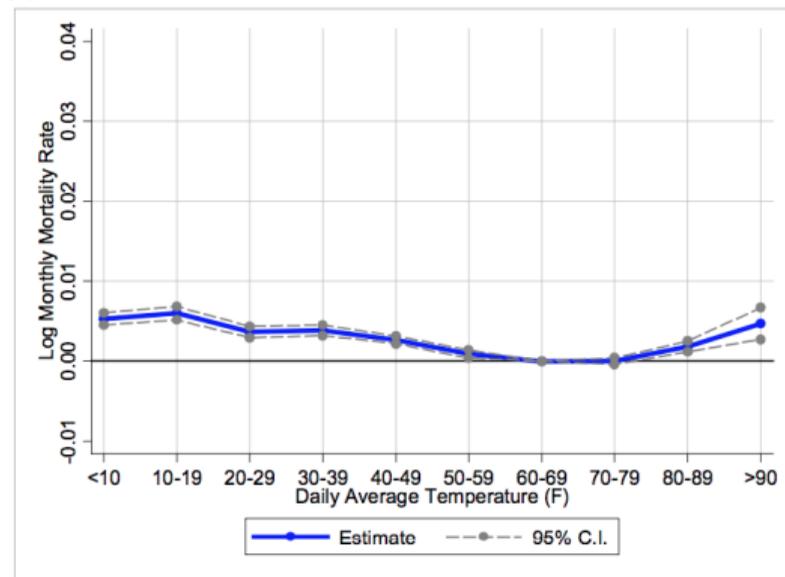
Source: CBRE Research.

# ANALOGOUS TO PROBLEMS IN CLIMATE CHANGE LITERATURE

(c) 1929-1959



(d) 1960-2004



Source: Barreca et al. (2016): "Adapting to Climate Change," *Journal of Political Economy*, 124(1): 105-159.

- Climate change would have looked bad from perspective of early 1900s if not for invention and improvements in air conditioning technology!
- Pre-pandemic we were already seeing adaptation of office space (e.g. WeWork)



## Los Angeles, CA Looks to Expand Building Types Eligible for Adaptive Reuse



zFigure 5: A conceptual rendering of a City of Los Angeles-owned office building that will be converted into market rate housing units. [Source](#)

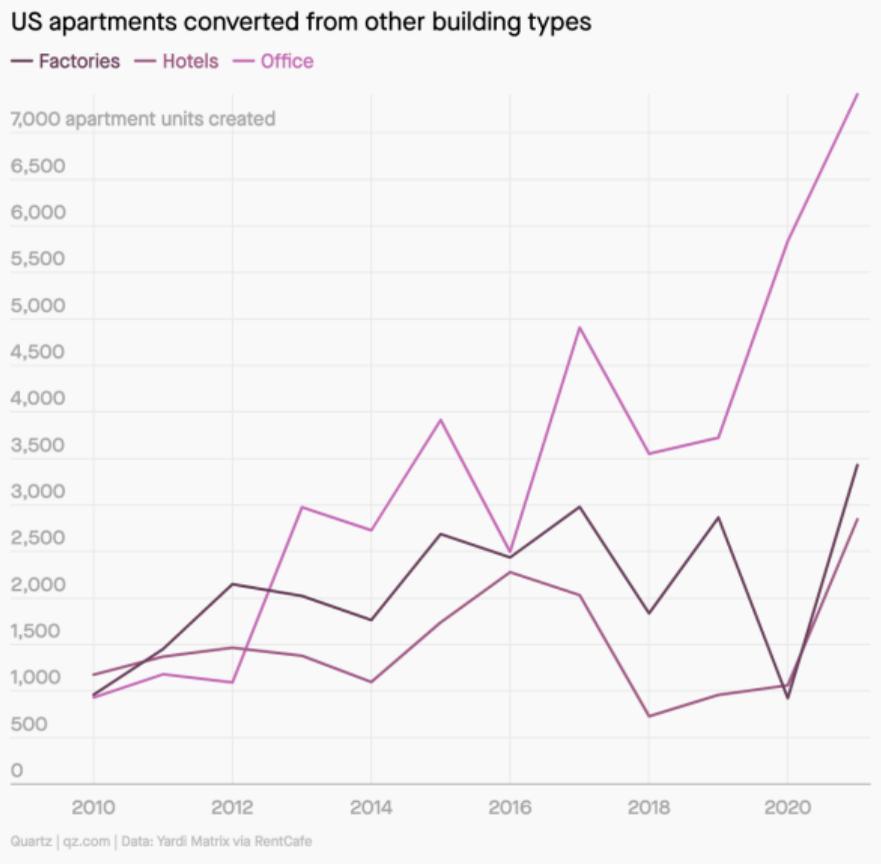
[Los Angeles, CA \(population 3,792,621\)](#): The City of Los Angeles, CA first passed an [adaptive reuse ordinance](#) in 1999, [allowing historic downtown buildings to be converted into new uses such as housing and hotels](#). While this has contributed to the revitalization of downtown neighborhoods and the preservation of their

unique heritage, the need for more affordable housing has continued to be a pressing issue for LA residents. To address this continued need, the City Planning Department has expanded the types of downtown buildings eligible for adaptive reuse to include warehouses, manufacturing facilities, parking lots, and other types of under-utilized spaces. This includes any place in the city with older, large-scale commercial buildings. In the future the city may also consider expanding allowable building types even further to include smaller commercial strips and vacant big box stores, many of which are closing their doors in response to increased reliance on online shopping – a trend which has been exacerbated by the coronavirus pandemic. The city is still weighing this option against demolishing these types of buildings and rebuilding with large buildings that have a mix of affordable housing and ground-floor amenities, including retail. Included in the hyperlinked article are several examples of how specific strip malls, big box stores, and light industrial buildings might be repurposed into housing.

## COMMENT #2: SIMULATING AN ADAPTATION SHOCK

- **How important is repurposing of CRE space to the valuation exercise?**
  - ▶ Challenges: inv. adjustment costs, forecasting amenity demand, zoning/urban planning
  - ▶ Good news: for NYC A+ office stock, adaptation less likely
  - ▶ Does the notion of NER in the model capture secondary source of revenue from parking lots, retail rent-sharing agreements?
  - ▶ Cross-sectional Bartik design using pre-COVID share of older buildings which are easier to adapt (only need build year)
- **How to operationalize this in the context of the structural model?**
  1. Endogenize depreciation  $\delta$  through quality-upgrading capital investment
  2. Alter proportionality of fixed and variable costs across WFH and non-WFH states
- **“Flight to quality” is another form of adaptation (substitution effects)**
  - ▶ Many statements about this in the paper, but no segmentation in model

# LARGE SHARE OF NEWLY CREATED APARTMENTS WERE OFFICES

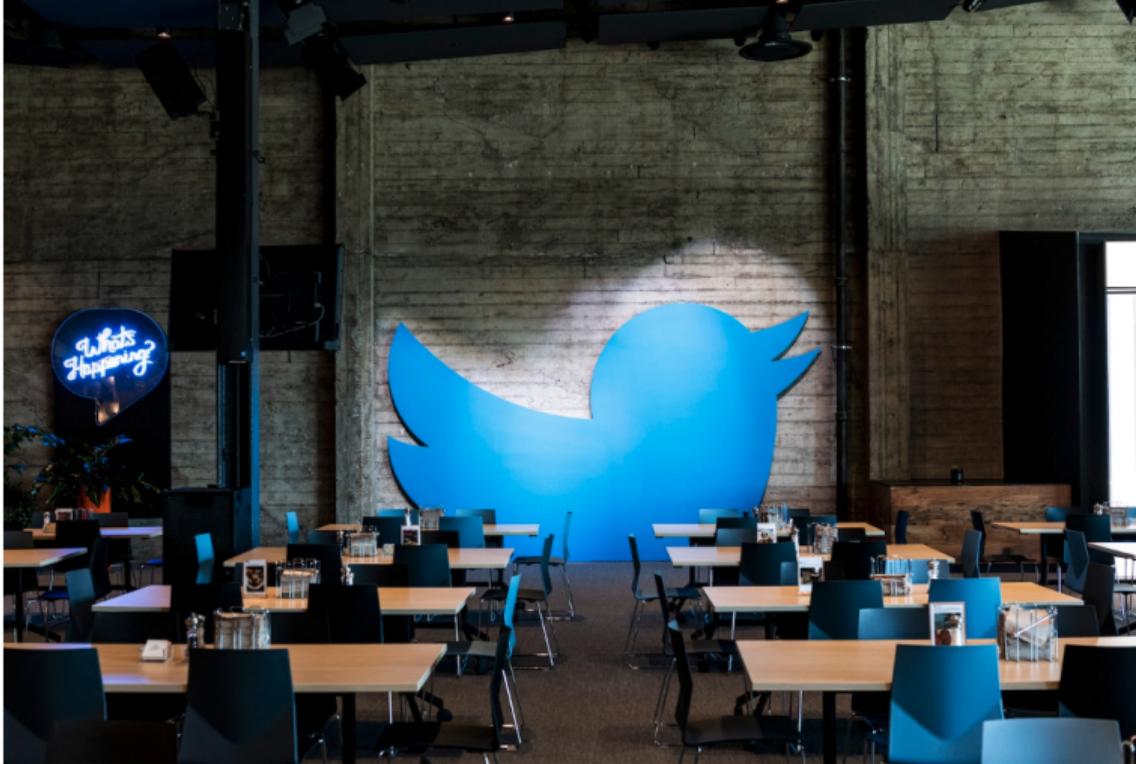


## COMMENT #3: POLICY IMPLICATIONS OF “INEFFICIENT” VACANCY

- This is a partial equilibrium asset pricing model with no notion of inefficiency
- In practice, **externality** problems due to non-transitional vacancy in office space, at least in short-run when adaptation is infeasible/limited
  - ▶ Fiscal externalities: spillovers to property and retail sales tax bases
  - ▶ Pecuniary externalities: investors do not internalize how individual asset demand  $\implies$  price spillovers to other sectors like housing
  - ▶ Real externalities: TFP may be higher or lower in sectors due to reduction in F2F work
    - ★ Bloom et al. (2022): U.K. total TFP fell by 5% during 2020-21
- **What role does policy play in stabilizing the CRE market?**
  - ▶ Exercise: how much of a direct CAPX subsidy is needed if want to guarantee a CRE value rebound, compared to estimates of costs from externalities
  - ▶ From model perspective, intervention could come through **restricting contract space**

# Americans might never come back to the office, and Twitter is leading the charge.

Twitter's plans for work from home indefinitely have prompted a wave of copycats. But its transformation has been two years in the making — and the rest of America can learn some lessons.



The deserted cafeteria of the Twitter building in San Francisco in May.

## COMMENT #4: WFH AS AMENITY PROVISION + REGULATIONS

- **What is driving investors' expectations about the persistence of WFH?**
  - ▶ “WFH factor” reflects expediencies of early crisis period: go long on pharma, short hotels
- In reality, WFH state is endogenous to many factors, including...
  1. Corporate culture: firms virtue signal via return to office policies (e.g. Twitter)
    - ★ Prioritize health/well-being of workforce in bid to increase productivity
  2. Concessions to workers: firms compete for workers by offering more flexible WFH schedules
  3. Local regulations: prominent early in the crisis (e.g. “essential” businesses) but responsive to future public health outbreaks (Spiegel & Tookes 2021 *RFS*)
    - ★ Stringency of county-level NPIs predicts short-run drops in CRE deals (Arefeva 2021)
- Spatial variation in this list influences true aggregate effect on U.S. CRE stock (does it scale up to a \$500 bil. loss?)

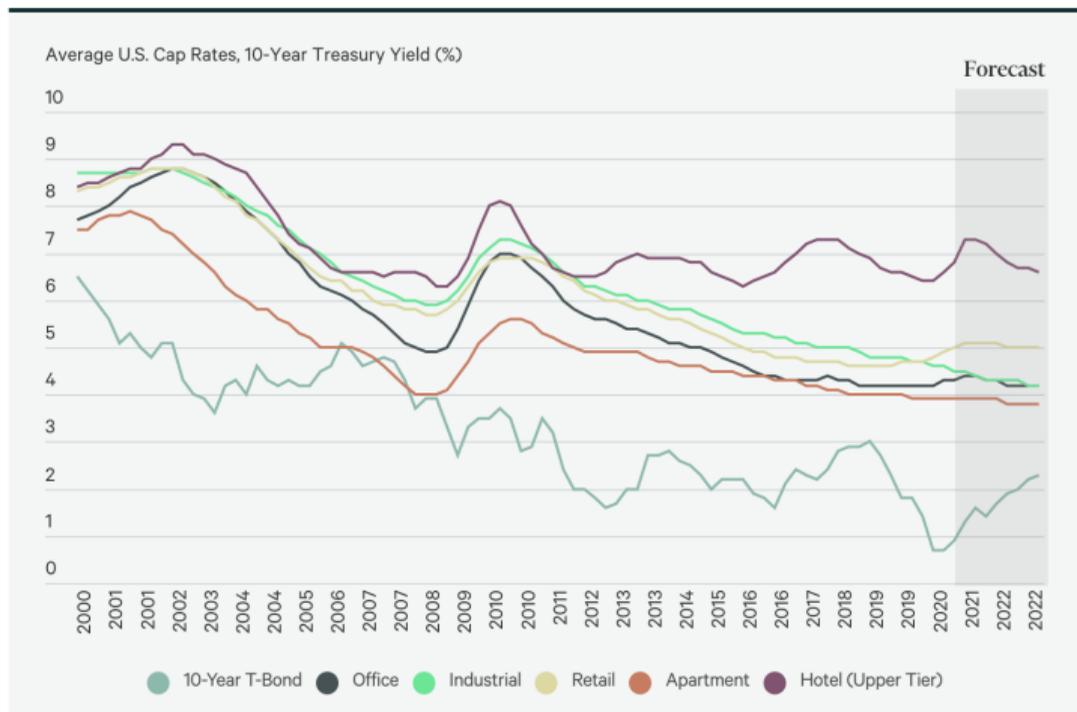
## MISCELLANEOUS POINTS

- Gordon growth model with constant NOI growth  $g$  and discount rate  $r$  implies:

$$P_t = \mathbb{E}_t[NOI_{t+1}]/c = \mathbb{E}_t[NOI_{t+1}]/(r - g) = \mathbb{E}_0[NOI_1] \times (1 + g)^t / (r - g)$$

- ▶  $\implies \Delta P_{t+1}$  due to combination of change in steady state CF growth or cap rate
- *Ex ante* not obvious why back-of-envelope calculation using one-time shock to Gordon growth model isn't enough here to infer  $\Delta P$  (what numbers would this produce?)
  - ▶ Time-varying  $g$  and risk premia important to the extent WFH is not an absorbing state
  - ▶ Answer to this question doesn't come up until pg. 36
  - ▶ Given that calibrated  $\mathbf{p}$  is high, two approaches should deliver similar results
- Where are the CRE depreciation estimates coming from?
  - ▶ 1.8% sounds reasonable for economic depreciation (LaPoint 2021 for Tokyo offices)

# CAP RATES CONTINUING THEIR DOWNWARD SECULAR TREND



Source: CBRE Econometric Advisors, U.S. Federal Reserve Board, October 2021.

- During  $E \rightarrow R$  transition,  $c \uparrow$  (risk premium term dominates) and  $g \uparrow$
- But in new steady state, most likely  $c \downarrow$  and  $g \downarrow$ , so Gordon growth identity has **ambiguous** predictions for  $\Delta P$
- Model IRFs (Figure 10)  $\implies \Delta P$  almost entirely driven by change in  $g$  rather than  $c$ 
  - ▶ Compare average across all states vs. state where WFH continues each year

# MINOR SUGGESTION: MORE DISCURSIVE CALIBRATION TABLE

Table 2: Calibration for NYC

Variable	Symbol	E	R	WFHE	WFHR
Market NER growth	$\epsilon$	0.026	-0.044	0.000	-0.050
Supply growth	$\eta$	-0.006	-0.003	-0.016	-0.013
Lease renewal share	$s^O$	0.798	0.742	0.622	0.579
New leasing share	$s^V$	0.189	0.095	0.146	0.073
Fixed cost/rent ratio	$c^{fix}$	0.200	0.200	0.200	0.200
Variable cost/rent ratio	$c^{var}$	0.230	0.230	0.230	0.230
Leasing commission new	$LC^N$	0.300	0.300	0.240	0.240
Leasing commission renewals	$LC^R$	0.150	0.150	0.120	0.120

- Summarize within table what each parameter is set to match
  - ▶ Table is also missing a few “meta” parameters:  $\delta$ ,  $\mathbf{p}$ ,  $\mathbf{q}$ ,  $\chi$  (lease expiration rate)
- **Calibration assumes non-rent pro forma items do not vary across the four states**
  - ▶ Empirical evidence during the WFH-R to WFH-E episode to support this?
  - ▶ Example: if lease is paid in advance then variable cost-rent ratio  $\downarrow$  for things like utilities
  - ▶ Pay-in-advance structure consistent with CRE mortgage delinquency lags in 2020-21

# OVERALL TAKEAWAYS

- **Authors deserve credit for taking first stab at a difficult forecasting problem**
  - ▶ Apply canonical Campbell-Shiller decomposition to largest real asset class
  - ▶ Structural model consistent with minutiae of existing accounting practices for CRE pro forma
  - ▶ New data collection and asset pricing implications of the WFH factor
- **My impression: forecasted value declines seem quite large**
  - ▶ Likely even larger for entire U.S. CRE stock given application to high-end NYC offices
  - ▶ Link calibration exercises more tightly to large WFH + productivity literature that developed during height of the pandemic
  - ▶ Sanity checks: model applied to different tenant sectors and geographic submarkets – are the predictions in line with existing cross-sectional evidence?
- Looking forward to seeing extent to which model predictions come true!



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THANKS!

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