

Tourism, economic uncertainty, and fat-tailed risk

Presentation prepared for the

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*by Paul H. Brewbaker, Ph.D., CBE
TZ Economics, Kailua, Hawaii
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Three Hawaii tourism fat-tailed risks with stochastic arrival times

- *Geophysical event risk*: volcanic, seismic (earthquakes, tsunami), cyclonic
- *Geopolitical event risk*: terrorism (9/11), war (Iraqnaphobia), bad economic policy (unilateralism, tit-for-tat trade policy)
- *Biological event risk*: Wuhan coronavirus (2019-nCoV), H1N1-A (2009), SARS (2003)

Remember: low- to no-growth tourism or economies *do not avoid fat-tailed risk*;
in fact, risk exposure is heightened (risk-adjusted returns are reduced);
pandering to populist sentiment (NIMBY) *lowers* risk-adjusted returns

Risk-mitigation strategies: *diversification* (domestic v. international; mature v. emerging),
securitization (condo, interval ownership), *innovation* (app-based lodging management)

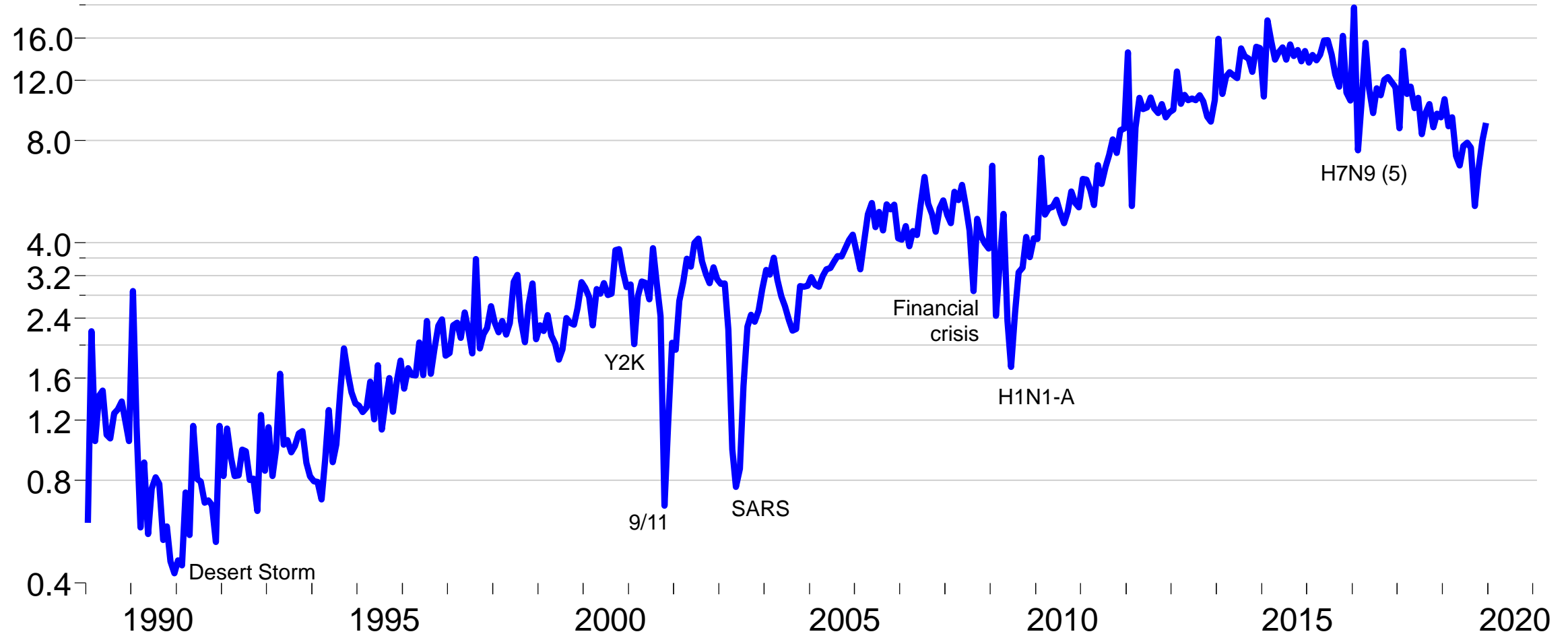


China, Japan Hawaii tourism examples: macro + risk forces converge

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Hawaii visitor arrivals from China: timely example—biological risk, macroeconomic deceleration, post-bubble asset prices, Trade War

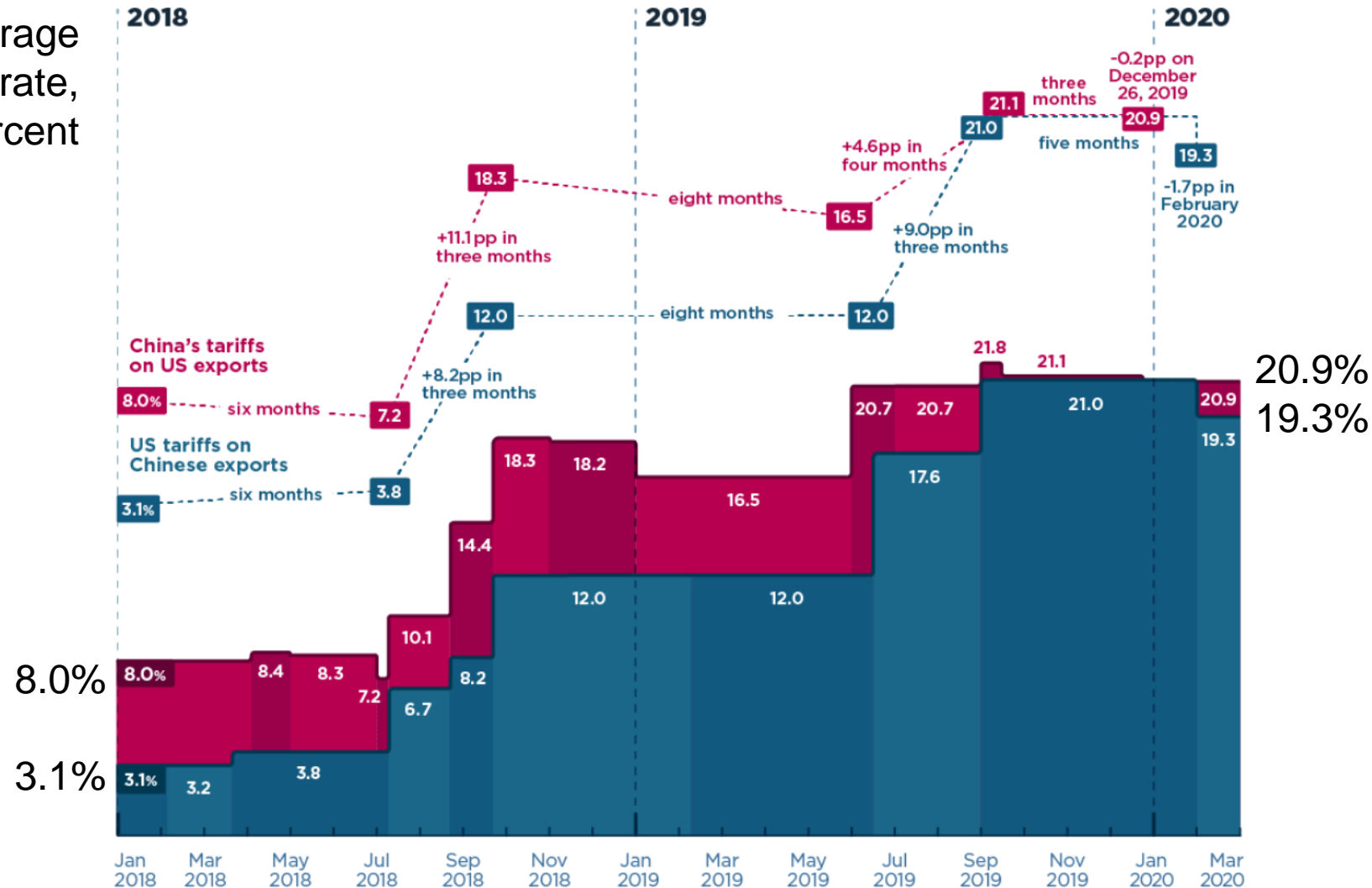
Monthly, thousands, s.a. (log scale)



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In just two years Trump's Trade War has raised average tariffs between U.S. and China to 20 percent (tax on residents' imports)

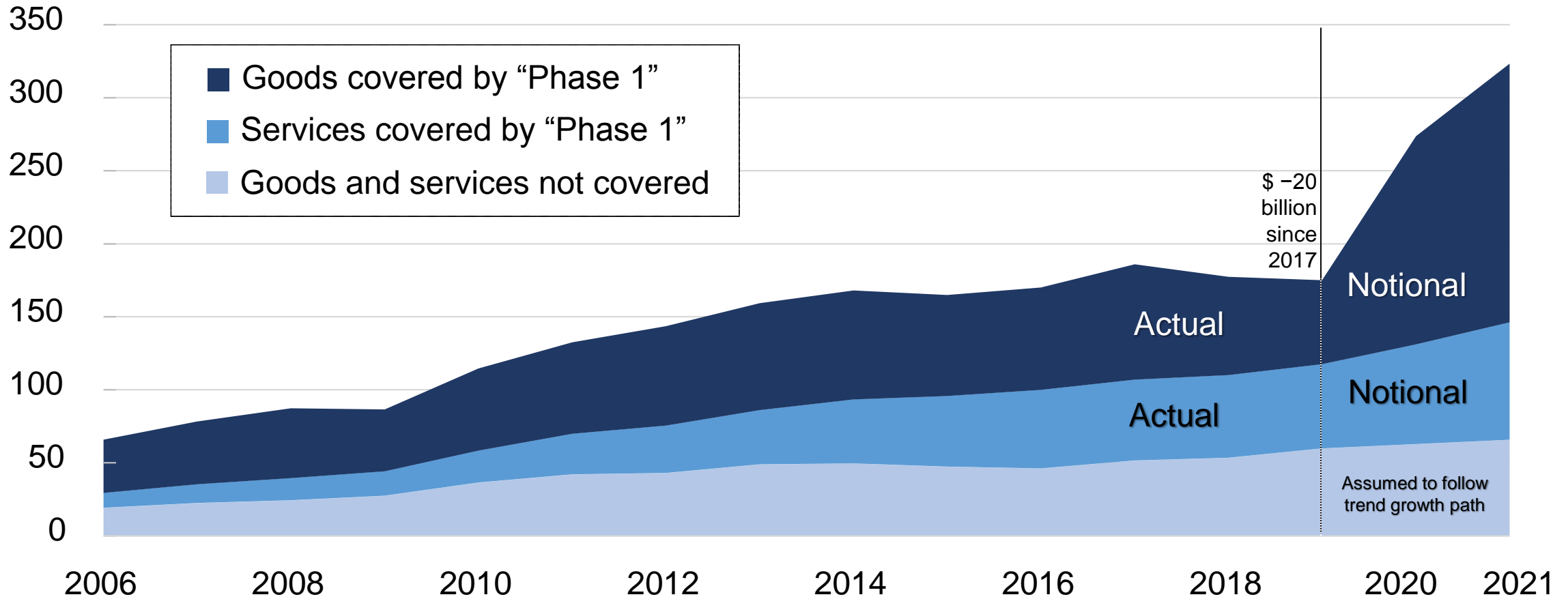
Average
tariff rate,
percent



Tariff rate increases unilaterally initiated by the Trump Administration in early 2018, combined with tit-for-tat retaliatory Chinese tariffs in several waves, reduced U.S. China trade

Actual U.S. exports to China and ambitious targets in Trump's U.S.-China "Phase One" Trade Deal (which does not remove most tariffs)

Billion USD, stacked cumulatively

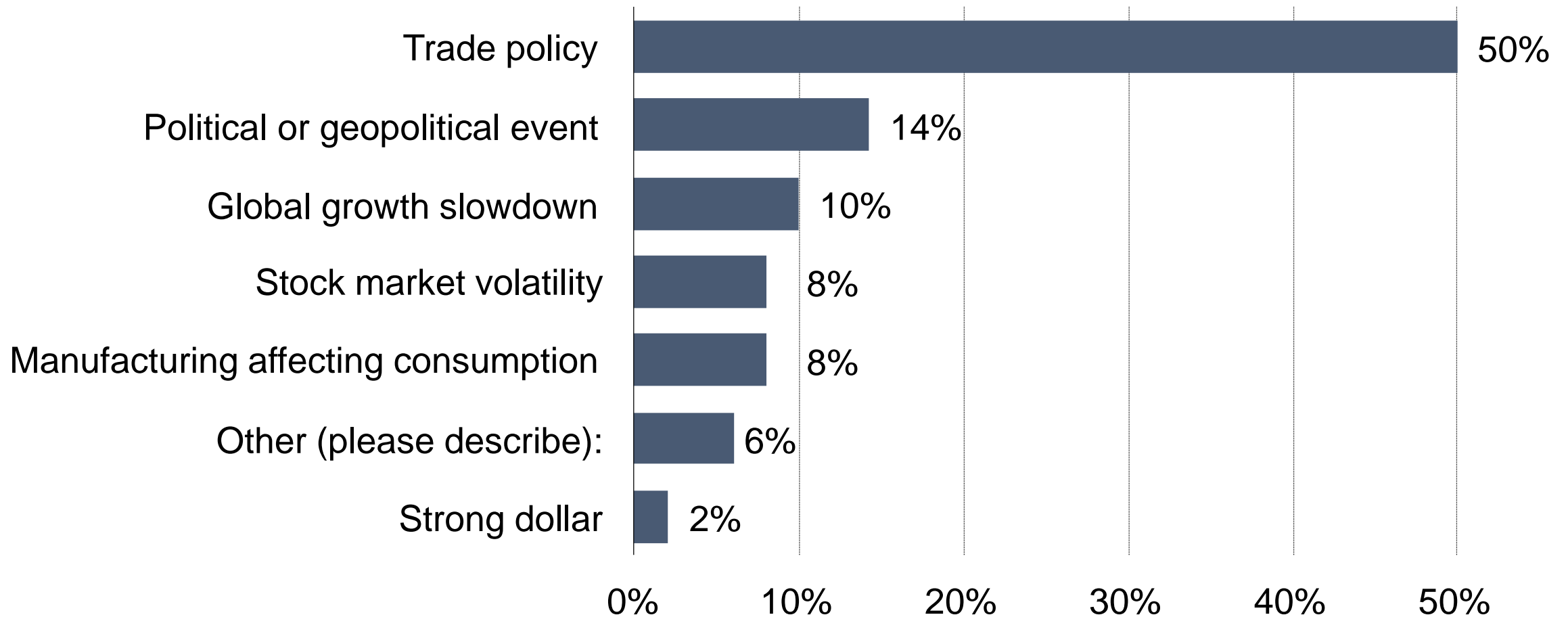


*Most tariffs remain in place, agreement neither addresses Chinese industrial subsidies nor state-owned enterprises (SOEs), the very issues which putatively prompted the Trade War, and ignores uncovered exports; managed trade targets are likely to be trade-diverting rather than trade-creating.

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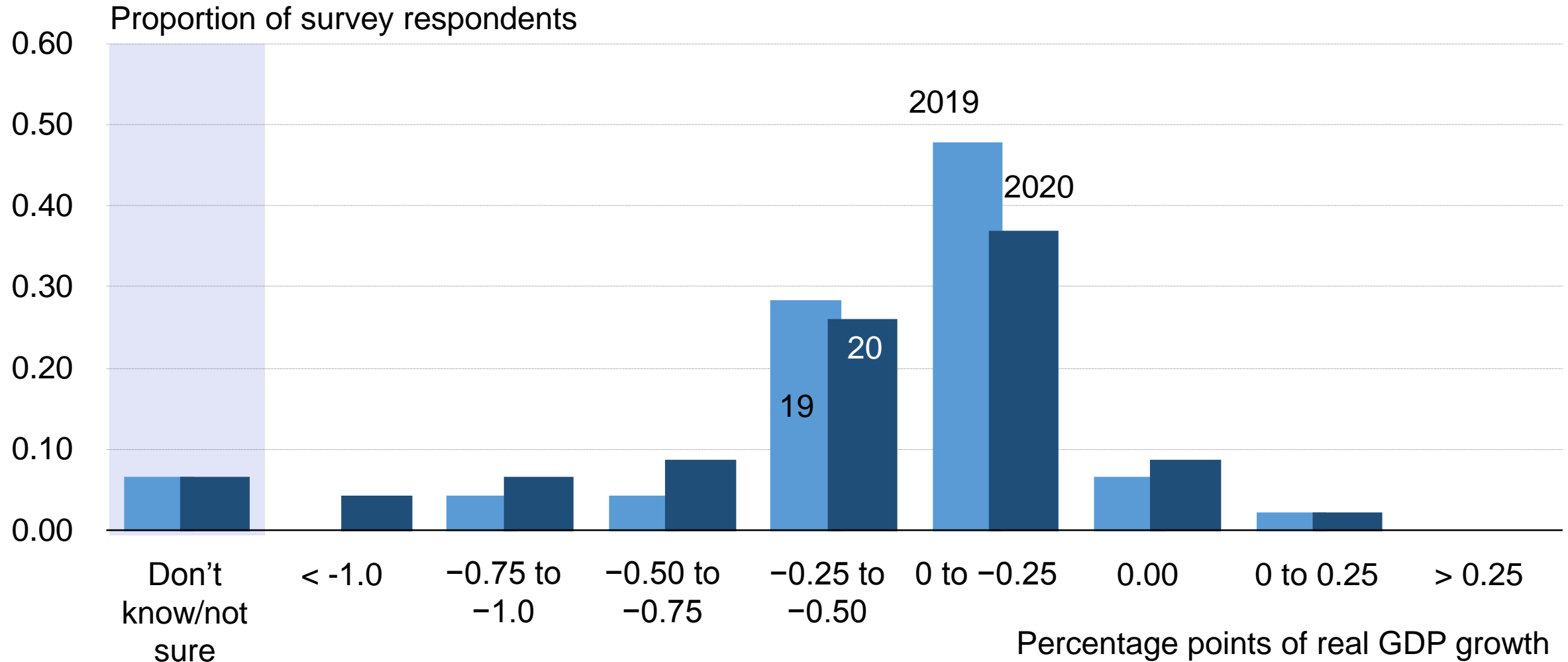
Source: Peterson Institute for International Economics (PIIE) (January 21, 2020) *Unappreciated hazards of the US-China phase one deal* (<https://www.piie.com/blogs/trade-and-investment-policy-watch/unappreciated-hazards-us-china-phase-one-deal>) identifies five other problems: (1) uncertainty; (2) tech export controls; (3) China slowdown; (4) prior sourcing diversion; (5) lower demand from event risk (i.e. African swine fever).

NABE Survey December 2019: “What is the greatest downside risk to the economy through 2020, considering probability...and potential impact?”



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NABE December 2019 survey: “How has U.S. trade policy (including other nations’ reactions) affected your real GDP forecasts in 2019 & 2020?”

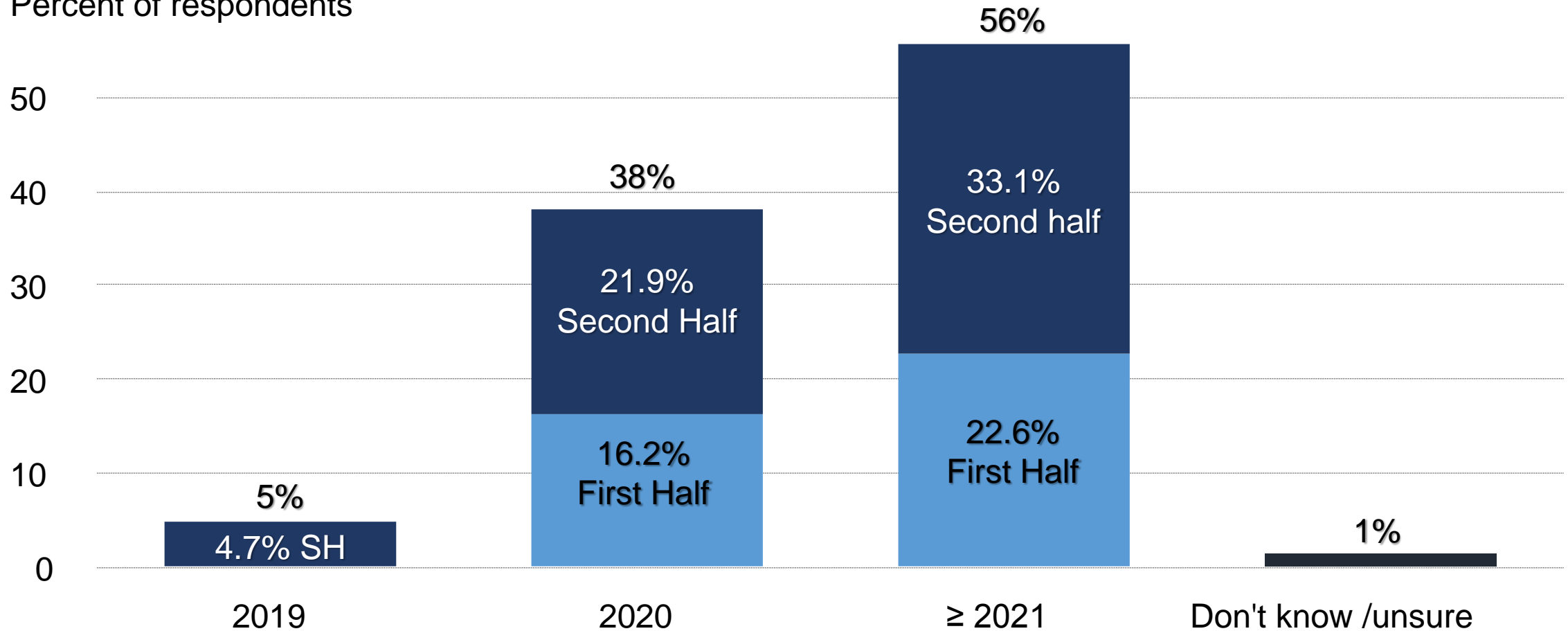


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Source: NABE Outlook Survey (December 2019) (https://www.nabe.com/NABE/Surveys/Outlook_Surveys/December_2019_Outlook_Survey_Summary.aspx); Question: “How has U.S. trade policy (including other nations’ reactions) affected your real GDP forecasts in 2019 & 2020? (check one with an “X” that applies to each year)

December 2019 NABE Survey: “What are the odds of a recession in [these] time periods?” 5% in 2019, 38% in 2020, 56% in or after 2021

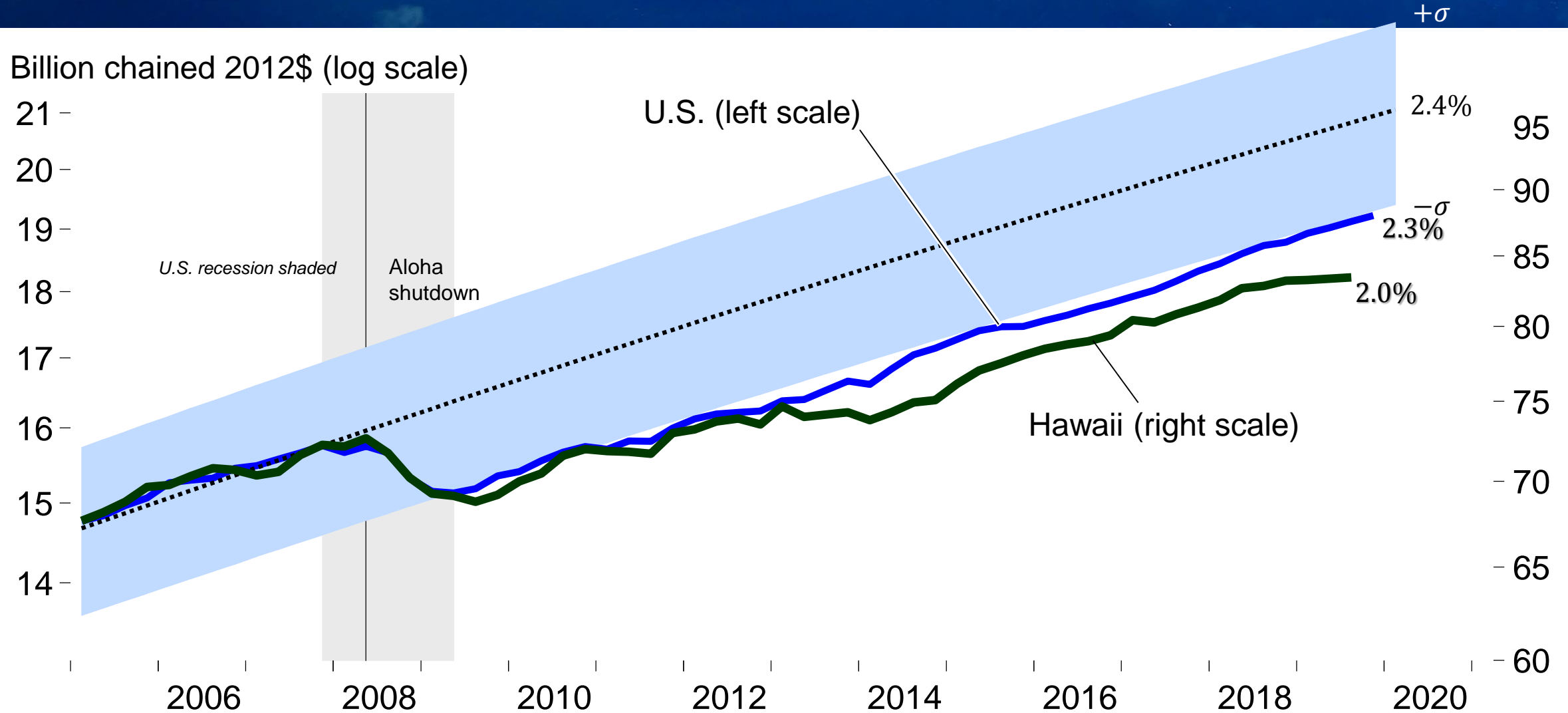
Percent of respondents



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Source: National Association for Business Economics Outlook Survey (June 2019) (<https://www.nabe.com/NABE/Surveys/NABE/Surveys/Surveys.aspx?hkey=ad87bb1b-3b99-4bee-aa52-c9cf742c2d83>); Question: “What are the odds the next recession starting in each of the following time periods? (Please indicate your response without the % sign – for 25%, type 25; for 0% type 0. No text; No ranges please.)

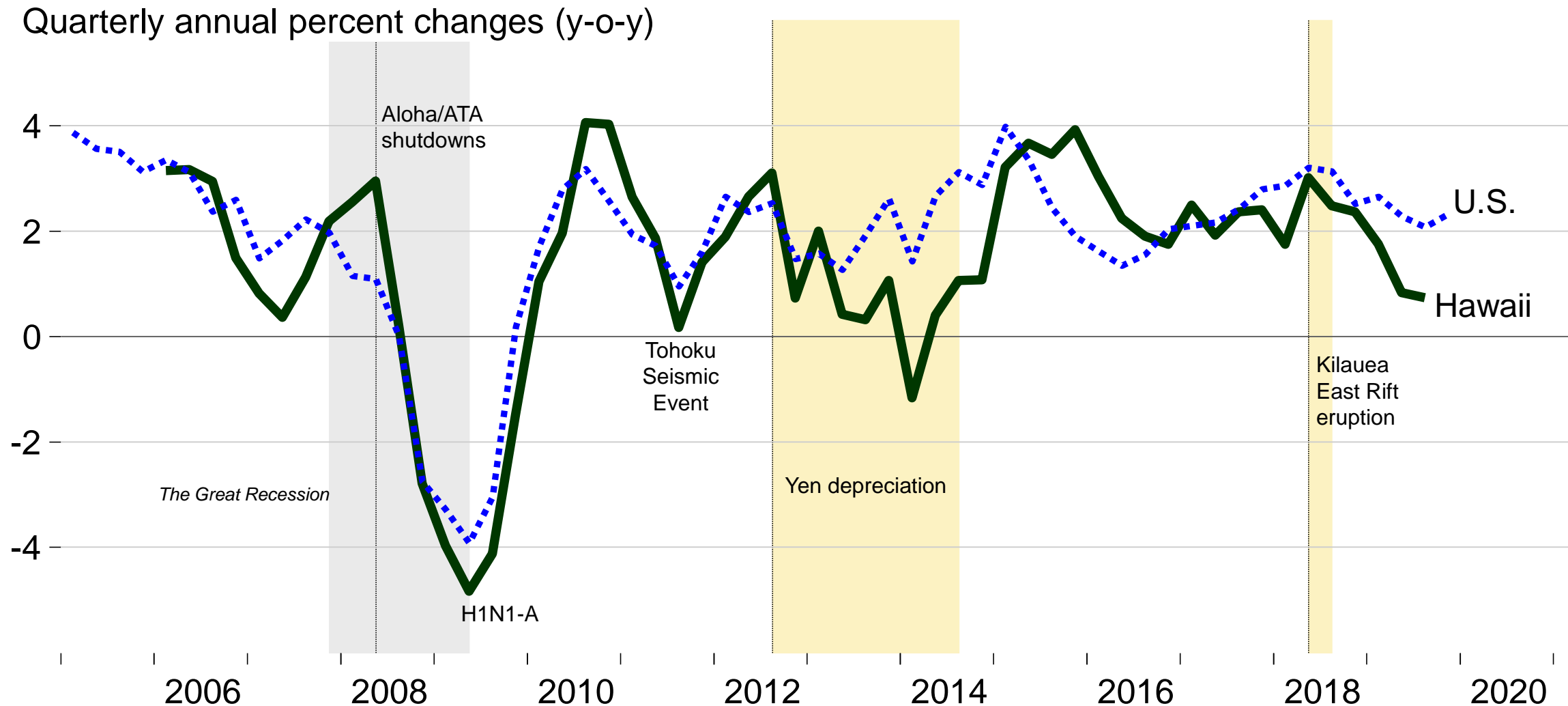
Hawaii and U.S. experienced structural break in the Great Recession; real Hawaii GDP failed to keep pace with U.S. during 2010s expansion



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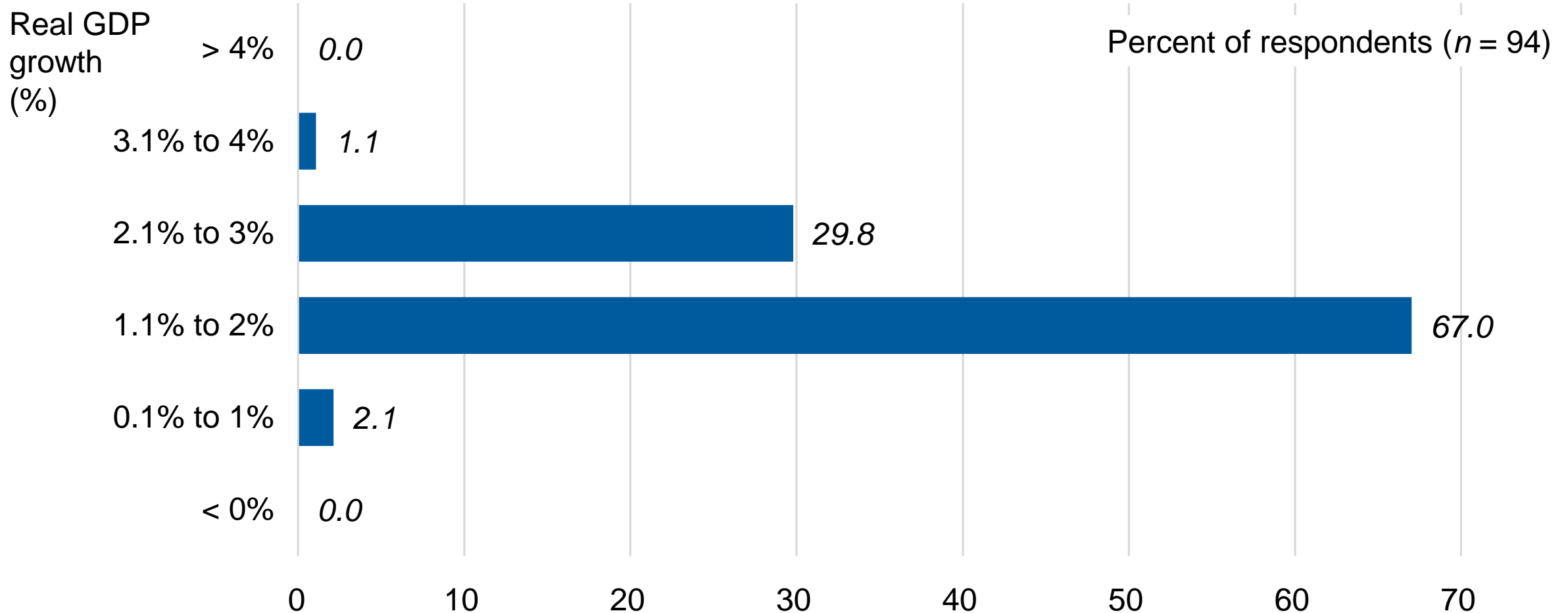
Sources: Bureau of Economic Analysis, U.S. Department of Commerce (<https://www.bea.gov/data/gdp/gross-domestic-product>); U.S. quarterly data through 2019Q4, Hawaii quarterly data through 2019Q3 including revisions; second-order polynomial regression of U.S. real GDP on time depicted with two standard error bandwidth, 1947-2007, projected forward through 2019 by TZE

Your mileage may vary: because Hawaii has hit a couple *idiosyncratic* headwinds, its real GDP growth lagged the U.S. average twice in 2010s



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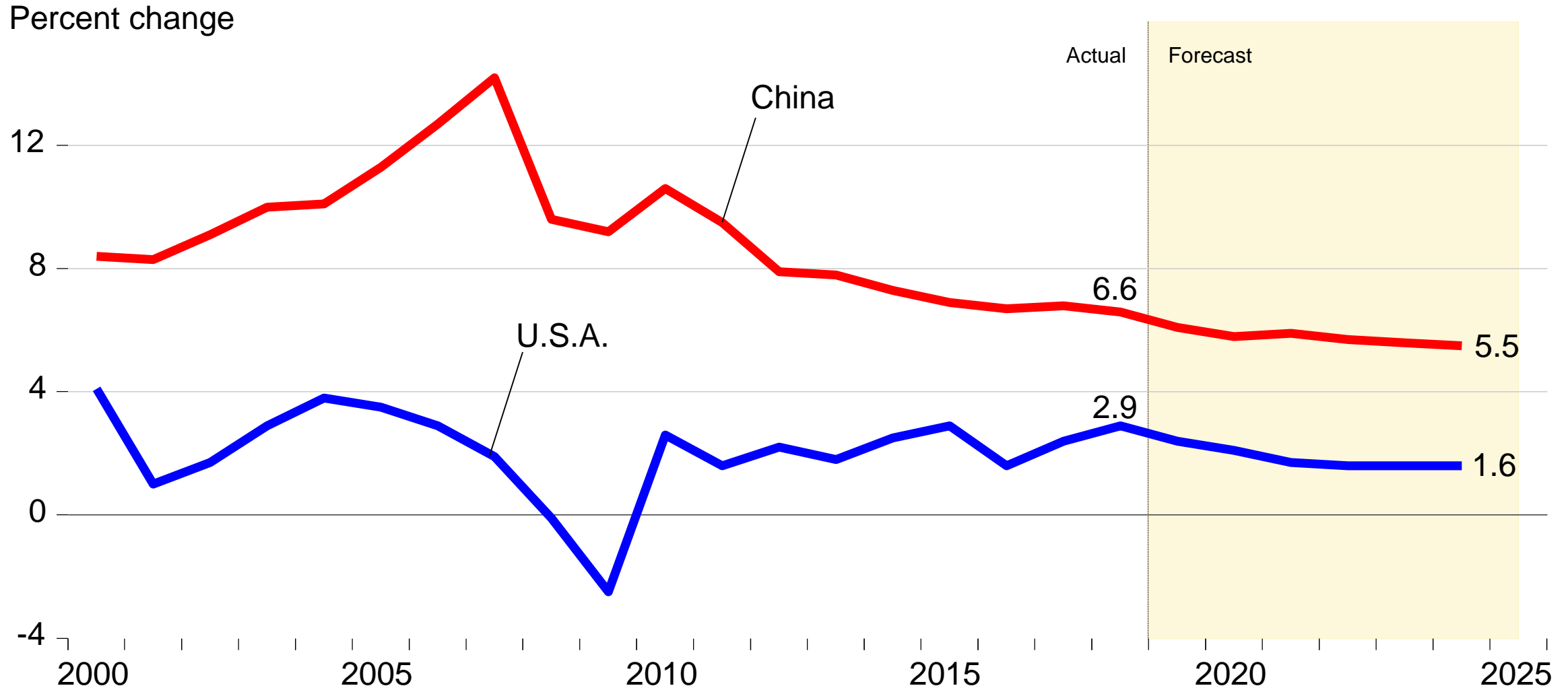
NABE U.S. real GDP growth forecasts underpinning 2020 business planning assumptions (January 2020 Business Conditions Survey)



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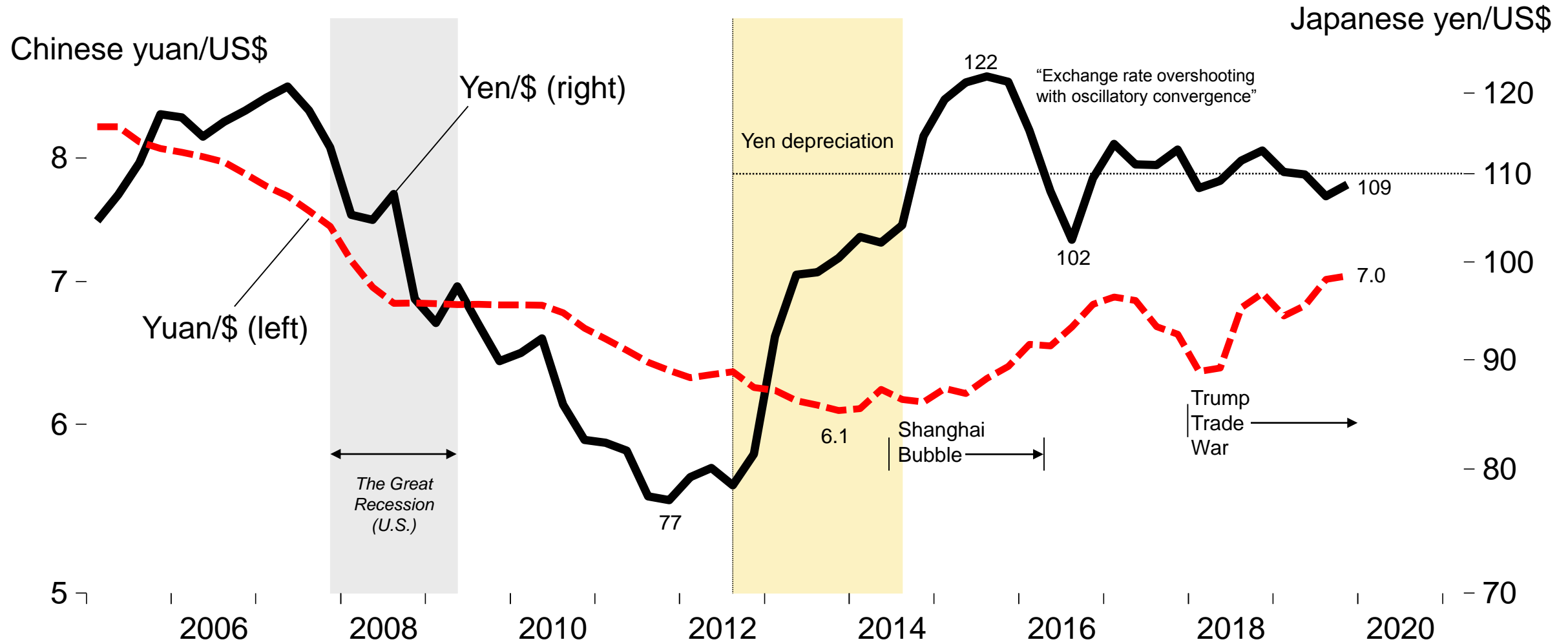
Source: National Association for Business Economics (NABE) Business Conditions Survey (January 2020) responses to the question "My company's planning for the next four quarters assumes the following change in real GDP from the first quarter of 2019 to the first quarter of 2020." (See https://nabe.com/NABE/Surveys/Business_Conditions_Surveys/January_2020_Business_Conditions_Survey_Summary.aspx)

China is facing a secular deceleration in real GDP growth rates while U.S. real GDP growth is subsiding to long-term potential rates



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Exchange rates: after mid-2012, US\$ got 50% more expensive (settled at +37.5%) to Japanese; Chinese yuan lost after equity bubble (“flight”)



Shanghai Stock Exchange Composite Index values—bubblicious in 2014-2015, current levels since 2016, weight of Trump Trade War

Index, December 19, 1990 = 100 (log scale)

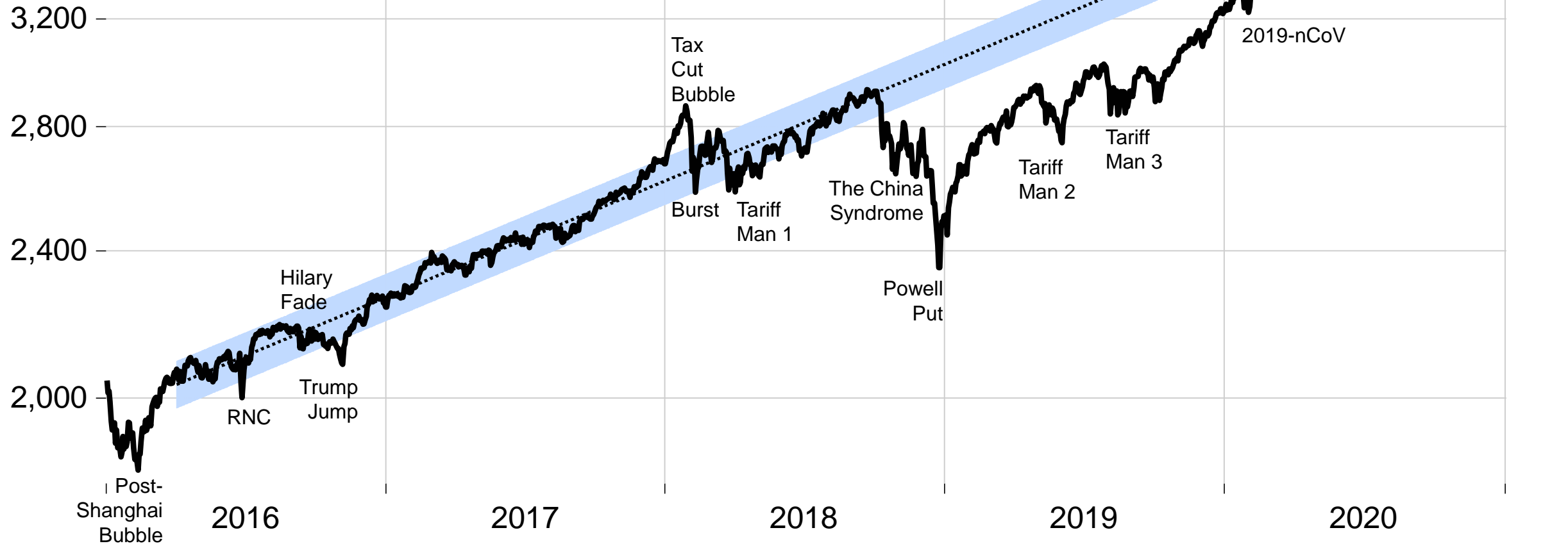


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Sources: Shanghai Stock Exchange (SSE), Yahoo Finance (<https://finance.yahoo.com/quote/000001.SS/history?p=000001.SS>), daily adjusted closing data through February 3, 2020 (following extended market closure for Lunar New Year because of 2019-nCoV (Wuhan Coronavirus) outbreak) Peterson Institute for International Economics (<https://www.piie.com/blogs/trade-investment-policy-watch/trump-trade-war-china-date-guide>).

Daily S&P 500 Index closing values through February 4, 2020: displaced from prior trajectory by Trump's Trade War

Index: 1941-43 = 100 (log scale)



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Sources: S&P Dow Jones Indices LLC, S&P 500 [SP500], from FRED, Federal Reserve Bank of St. Louis (<https://fred.stlouisfed.org/series/SP500>), daily closing values through February 4, 2020; trend regression on natural logarithm of daily closing values, April 1, 2016 – November 25, 2017, and two standard-error bandwidth by TZ Economics, projected forward through 2020 as if bad trade policy never happened after the tax cut.



Summarizing to this point of presentation

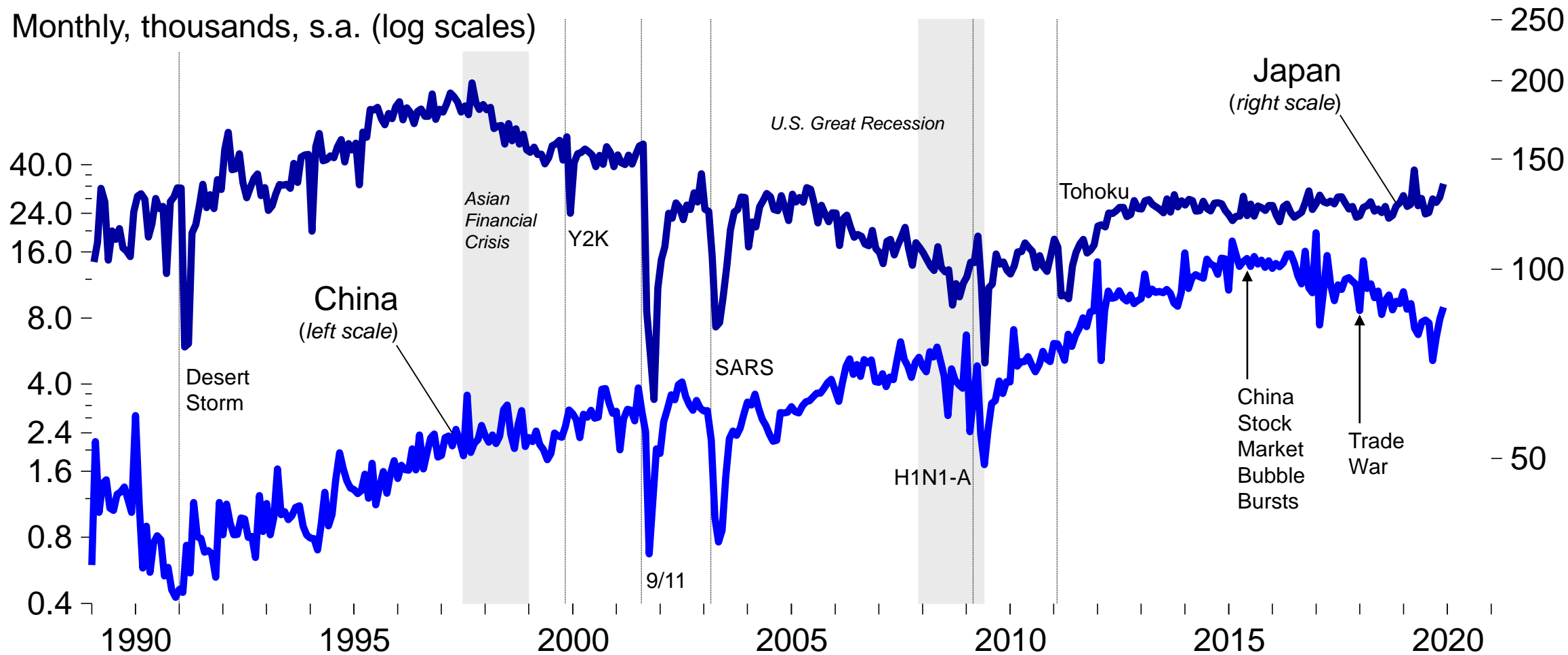
- Biological “Black Swan” event risk posed anew by Wuhan Coronavirus—while many in half the population (GenXers and Millennials) without herd immunity embrace anti-science denialism (anti-VAX)
- 2018-2019 macroeconomics: bad trade policy undermined investor confidence, global real GDP growth
- Immediate U.S. recession risks have subsided somewhat thanks to monetary policy at the zero real lower bound for interest rates; longer-term real GDP growth prospects are even lower
- For decade(s) Hawaii’s economy has underperformed U.S.—in mid-2019, *worst* performing state in the country—while “every year is another tourism record”
- Asset pricing trends also problematic, strong dollar is Hawaii tourism headwind; wealth proxies



Shift focus to applying asset price dynamics *tools* for risk, uncertainty

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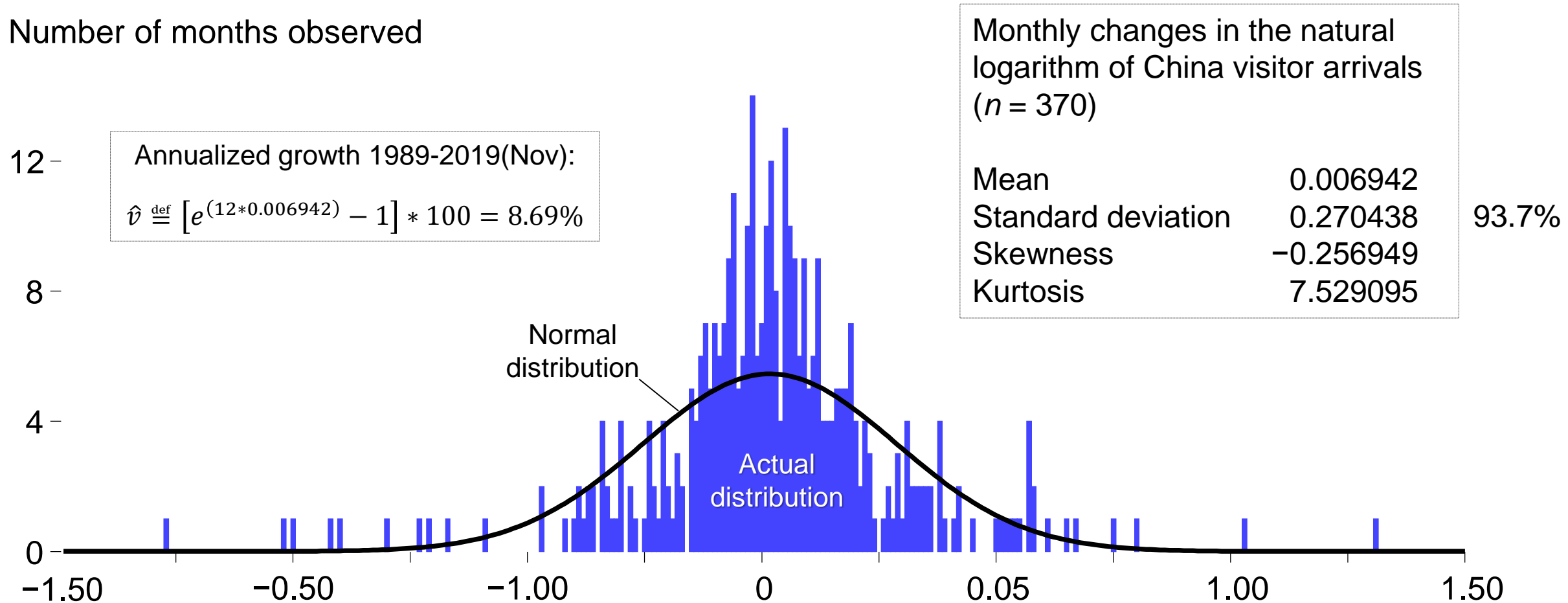
Contrasts between mature and emerging travel market volumes: latter grew 10X faster than former 1989-2019; differential resilience patterns



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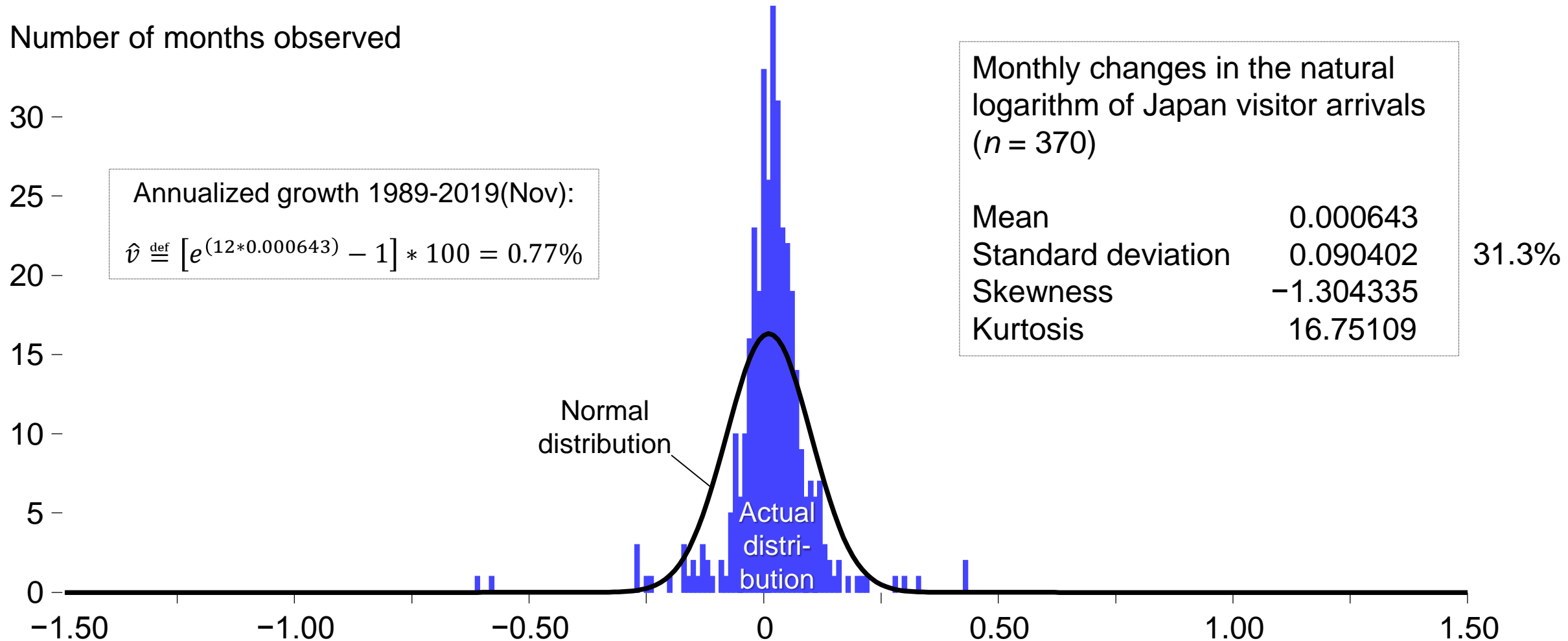
The monthly log change of China visitor arrivals for the last 30 years yields estimated 8.7% annualized growth, high dispersion, “fat-tails”

Number of months observed



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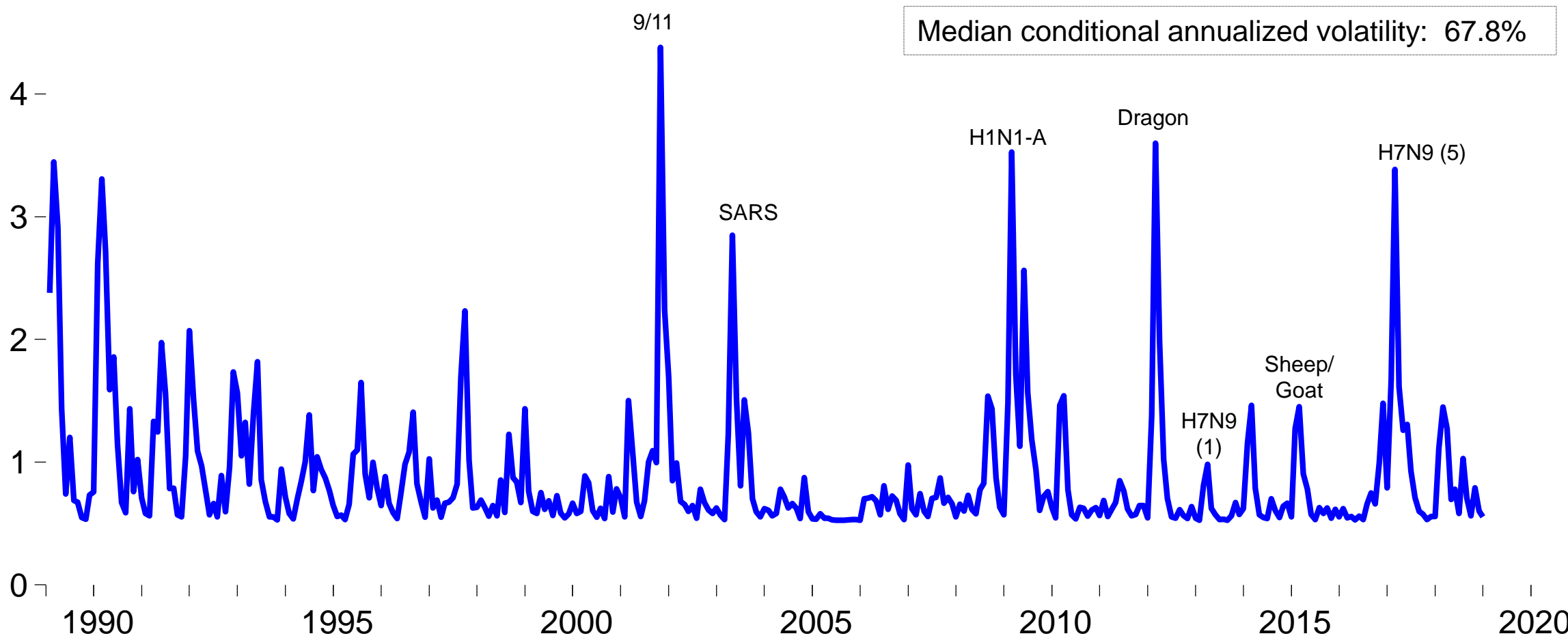
The monthly log change of Japan visitor arrivals for the last 30 years yields estimated 0.8% annualized growth, lower dispersion, “fat-tails”



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Conditional annualized volatility of Chinese monthly visitor arrivals in Hawaii: massive Black Swan shocks and high ambient volatility

1.0 = “100 percent (per annum)”

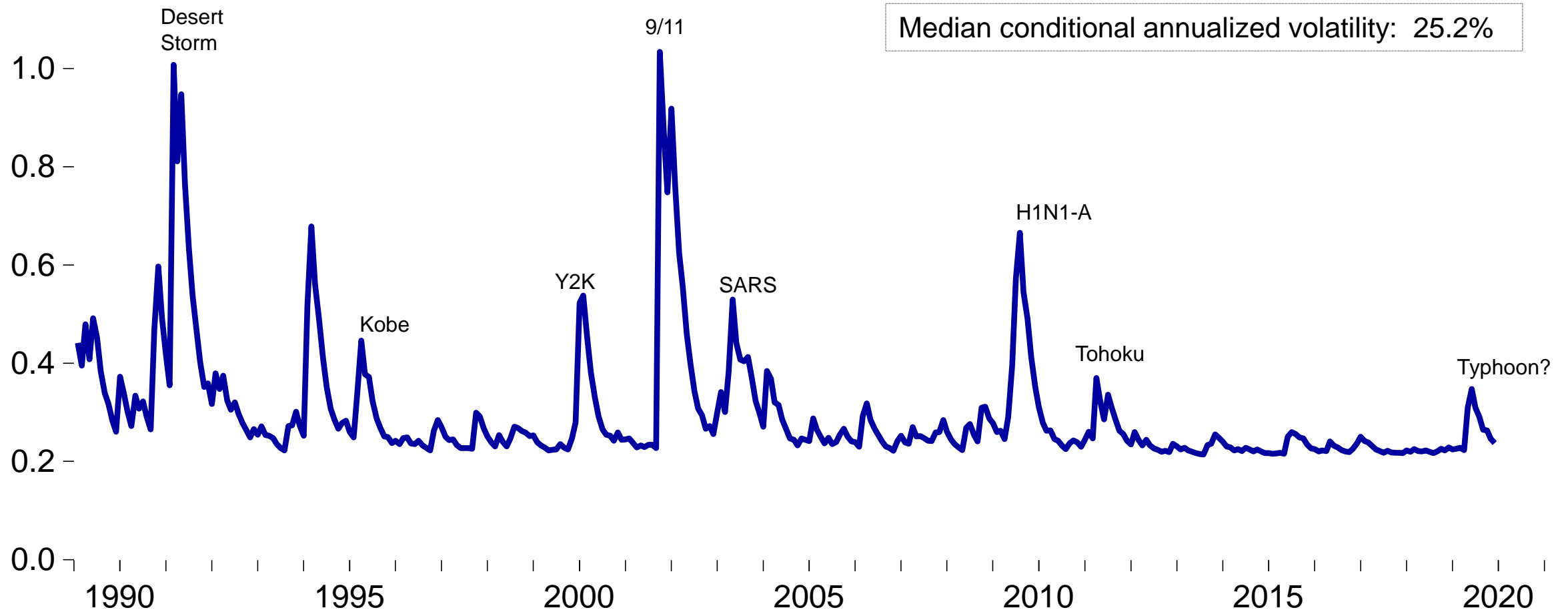


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Sources: Hawaii Tourism Authority and Hawaii DBEDT as in prior slides, Wikipedia (https://en.wikipedia.org/wiki/Influenza_A_virus_subtype_H7N9); monthly data January 1989 through December 2019, seasonal adjustment and estimates of annualized standard deviations from a Threshold Autoregressive Conditional Heteroskedasticity (TARCH) model of the monthly log change in Chinese arrivals in Hawaii by TZ Economics

Hawaii visitor arrivals from Japan conditional annualized volatility: relatively mature segment, 25% ambient volatility; jumps, clusters

0.2 = “20 percent (per annum)”

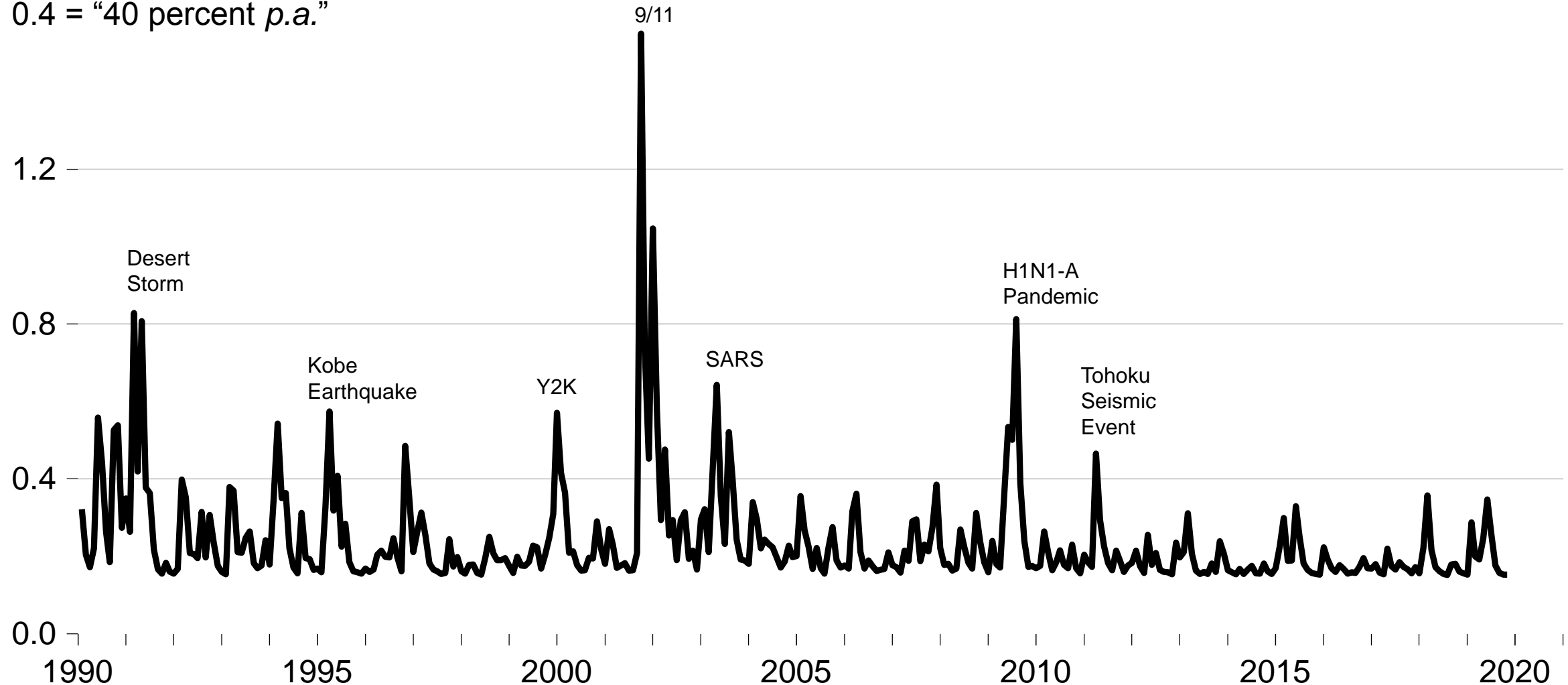


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Sources: Hawaii Tourism Authority and Hawaii DBEDT as in prior slides; monthly data January 1989 through December 2019, seasonal adjustment and estimates of annualized standard deviations from a Generalized Autoregressive Conditional Heteroskedasticity (GARCH) model of the monthly log change in Japanese arrivals in Hawaii by TZ Economics

Conditional annualized volatility jumps in international Oahu arrivals reflect several travel shocks despite attenuation through diversification

0.4 = “40 percent *p.a.*”



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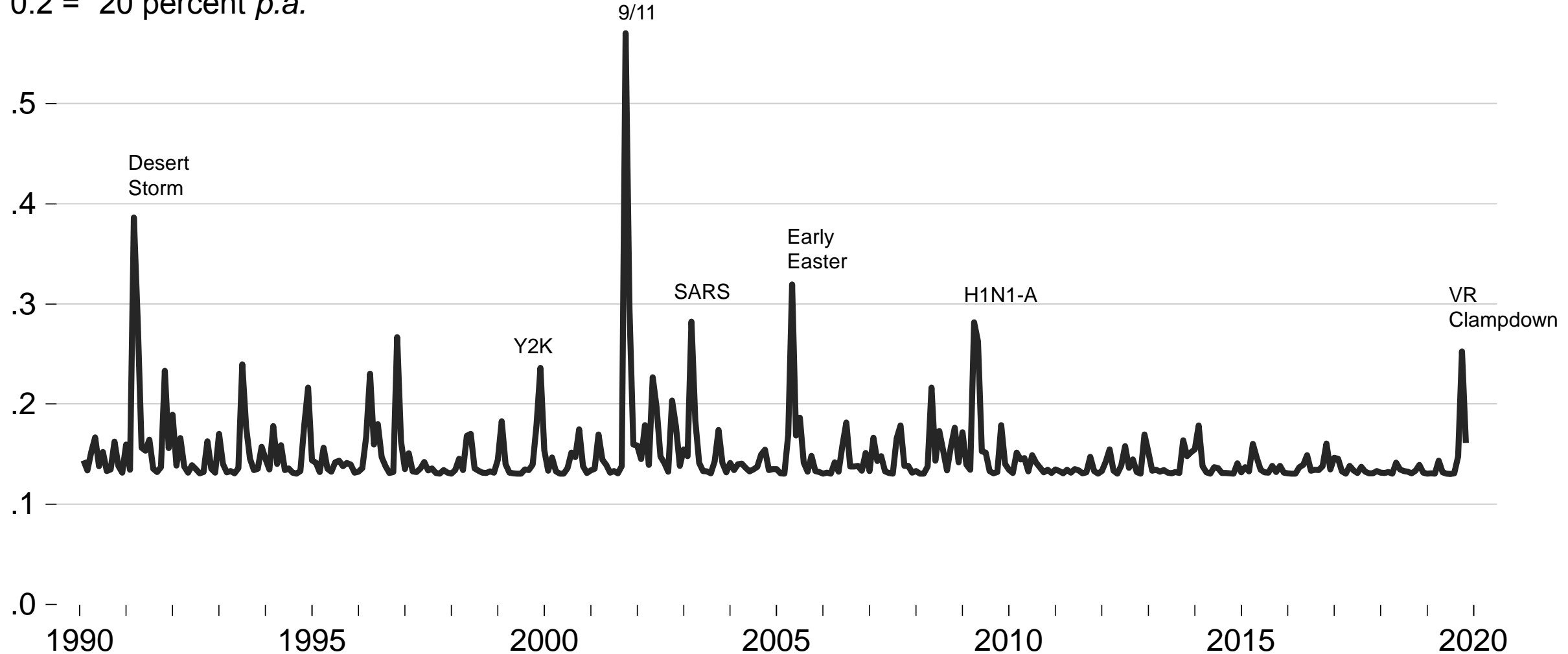
Sources: Monthly data through November 2019 from Hawaii Tourism Authority, Hawaii DBEDT (<http://dbedt.hawaii.gov/economic/mei>), Threshold Autoregressive Conditional Heteroskedasticity (TARCH) estimates of annualized standard deviation of log changes of seasonally-adjusted monthly visitor arrivals by TZE

Rising uncertainty? Recession risk? Good time for a VR Beat Down?

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Conditional monthly annualized volatility of domestic Oahu arrivals: Oh snap, you picked *this* moment for a vacation rental clampdown?

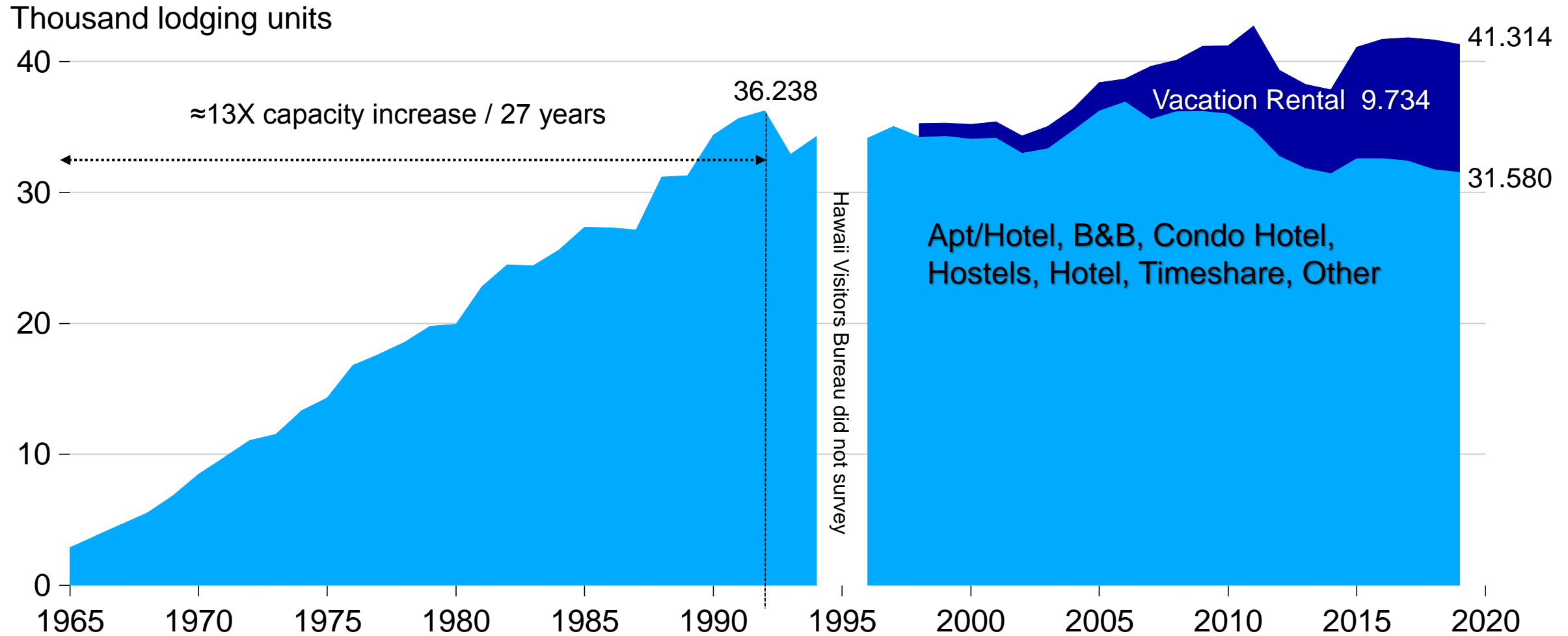
0.2 = "20 percent *p.a.*"



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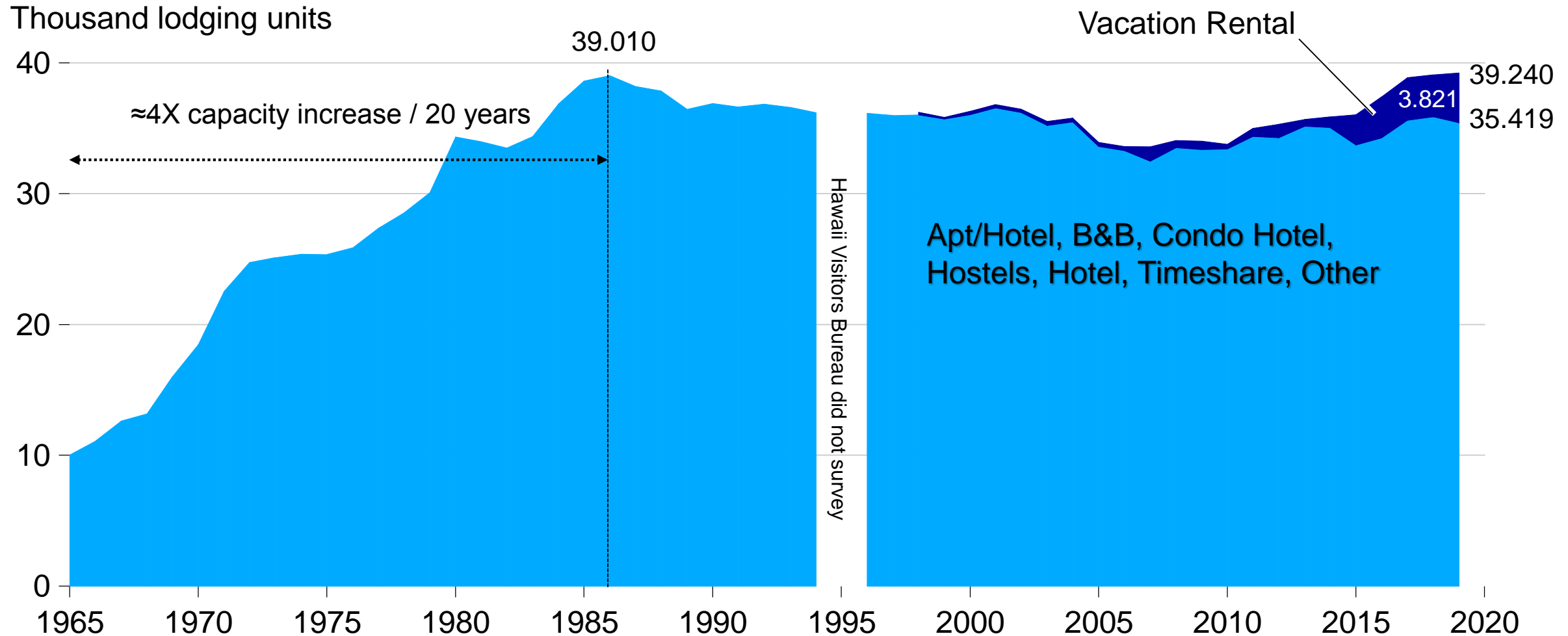
Sources: Monthly data through November 2019 from Hawaii Tourism Authority, Hawaii DBEDT (<http://dbedt.hawaii.gov/economic/mei>), Threshold Autoregressive Conditional Heteroskedasticity (TARCH) estimates of annualized standard deviation of log changes of seasonally-adjusted monthly visitor arrivals by TZE

Neighbor Isle traditional lodging capacity growth ended 28 years ago; one-quarter now vacation rentals contesting global brands' oligopoly



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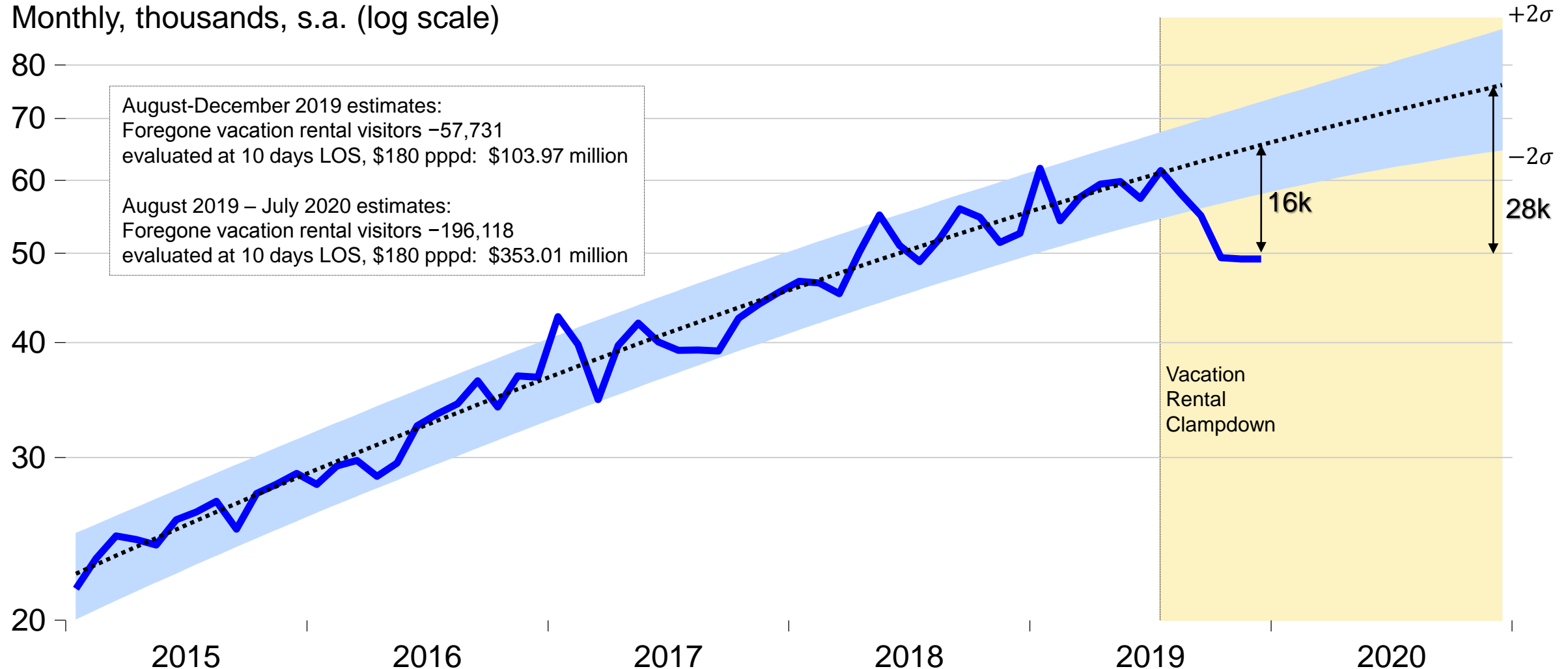
Oahu traditional lodging capacity growth ended 34 years ago; capacity growth since was in vacation rentals subverting exclusionary zoning



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Monthly Oahu visitor arrivals (intending to stay in a rental house, private room, or shared room in a private house (narrow definition))

Monthly, thousands, s.a. (log scale)

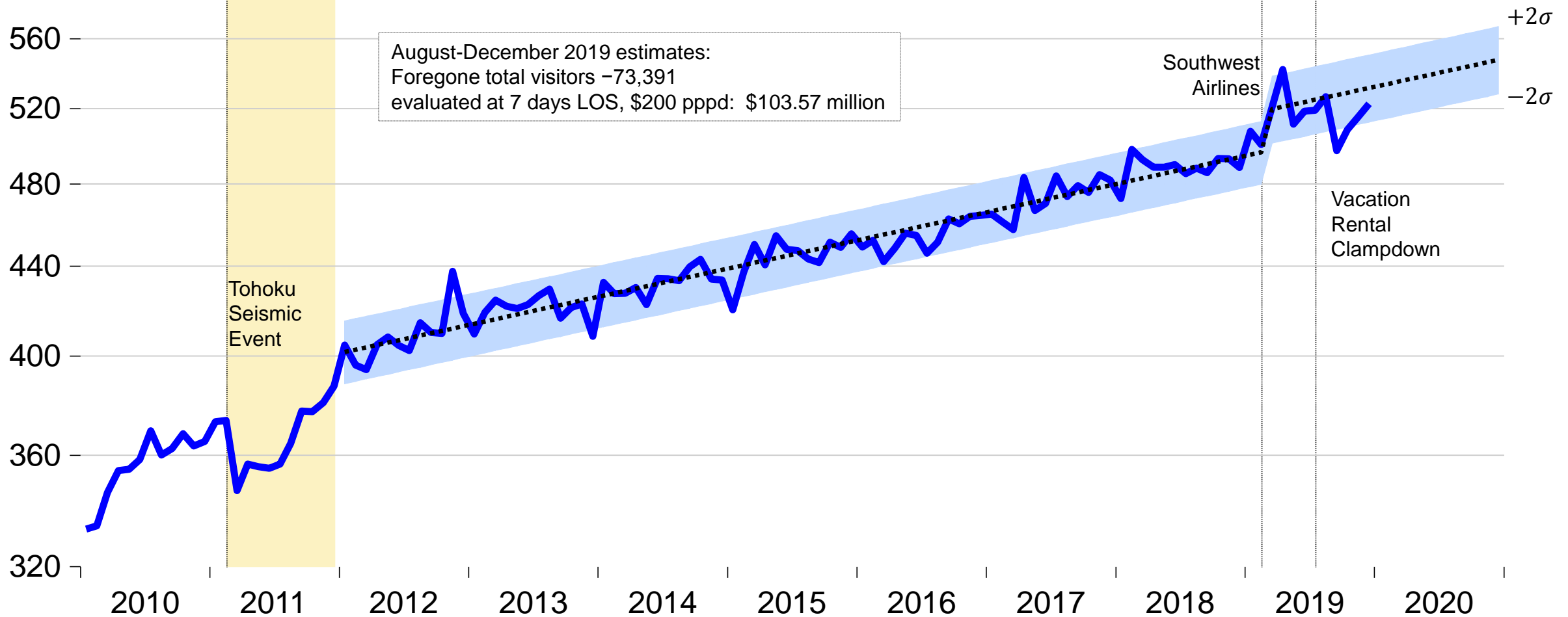


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Source: Hawaii Tourism Authority (<https://www.hawaiitourismauthority.org/research/monthly-visitor-statistics/>); monthly data through December 2019, seasonal adjustment using, nonlinear trend regression through July 2019 by TZE [$\ln(\text{VREVOVR3_D11}) = -34.2837734267 + 0.0508333271106 \cdot t - 1.20633926677e-14 \cdot t^2$]; trend growth rate through July 2019 was 20.2 percent p.a. (2.2 percent p.a. for hotel-condo-timeshare visitors)

Assume Oahu visitor arrivals *log-linear* before Southwest Airlines entry: conservative foregone arrivals estimate includes substitution response

Monthly, thousands, s.a. (log scale)



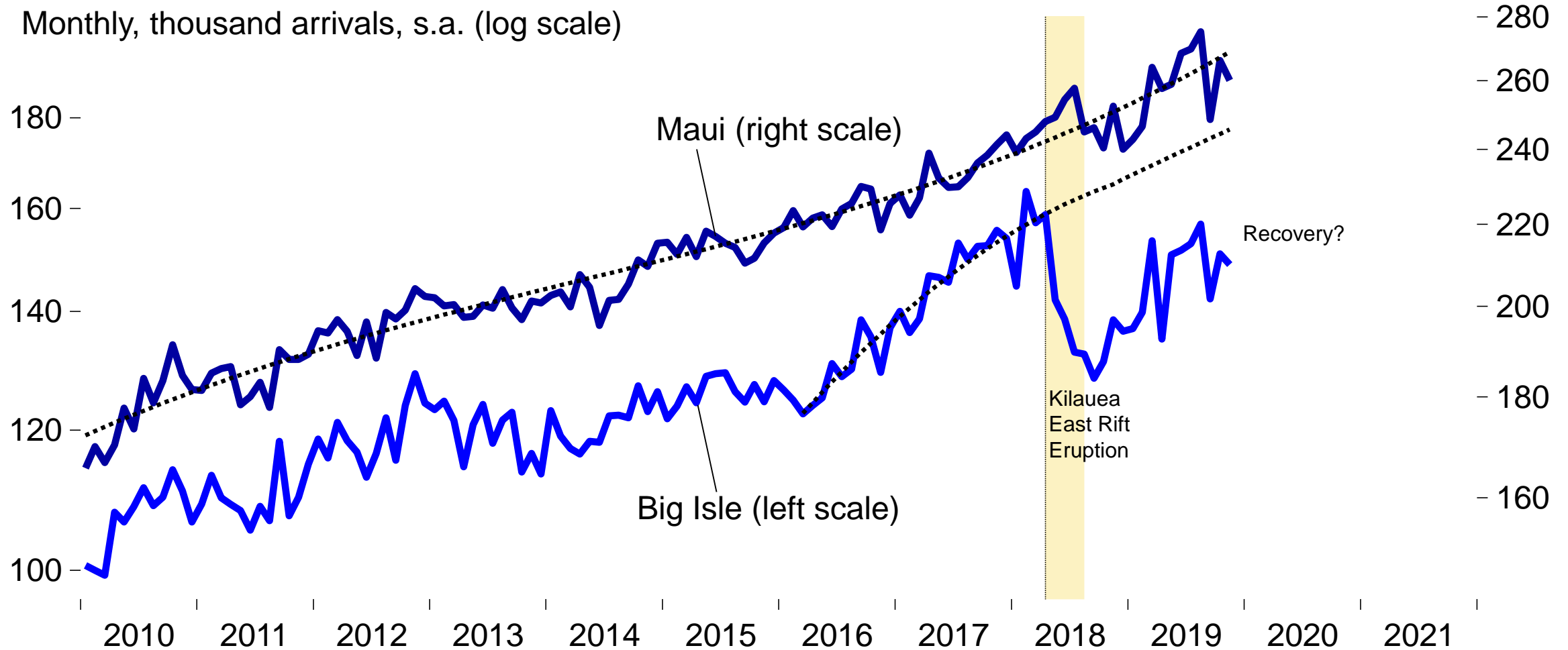
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Sources: Hawaii Tourism Authority, Hawaii DBEDT (<http://dbedt.hawaii.gov/economic/mei/>), data through December 2019; seasonal adjustment using Census X-13 ARIMA filter, 2010.01-2019.07 interval trend regression projected through 2020 by TZE: $\ln(OVREV_D11) = 4.02426474957 + 0.0024893217831t + 0.0433629433769 \cdot DUMSW$; residuals are 0.014 percent of mean arrivals, all P-values including F-stat are 0.000000.

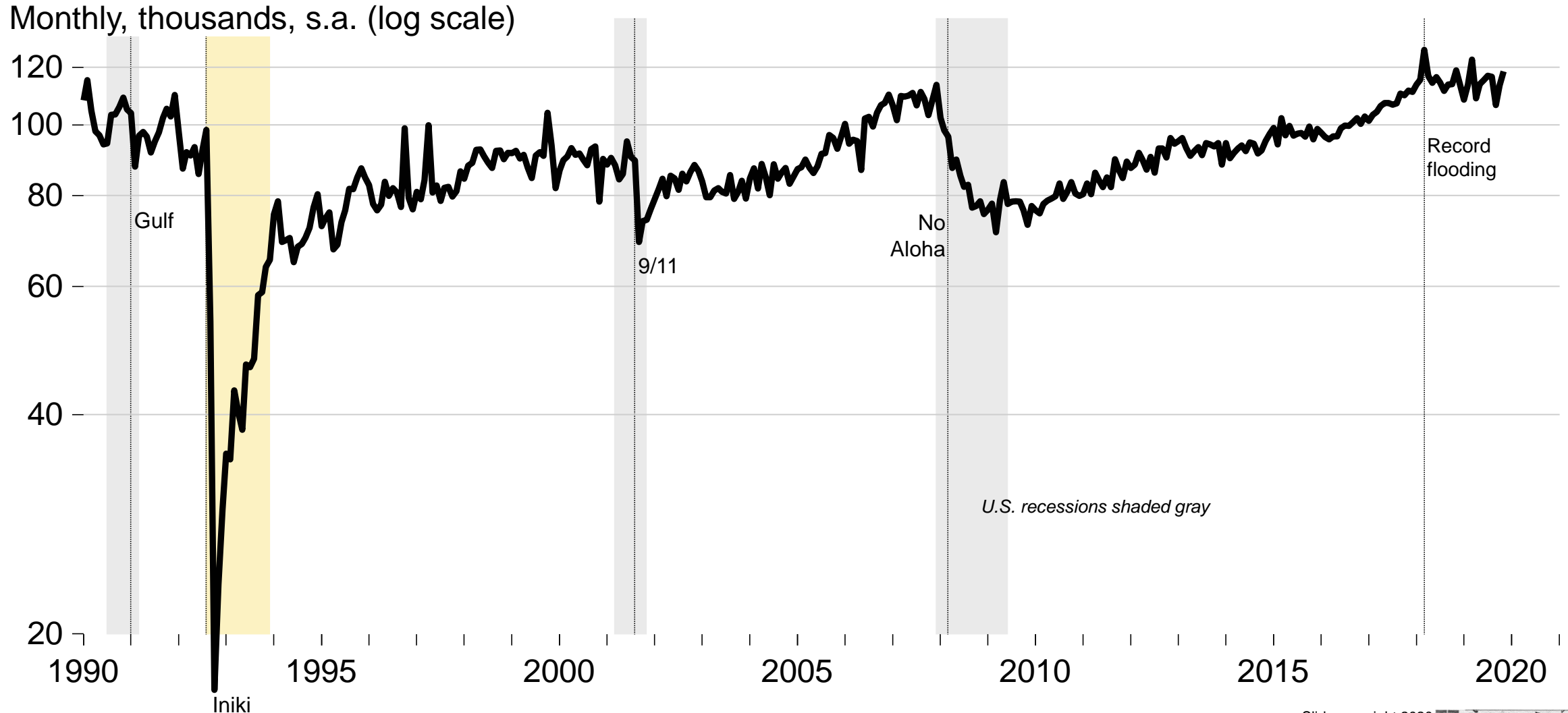
In case you forgot: *that* happened



Kilauea's 2018 eruption reminder: information asymmetry matters—visitors know less about the place than we do; event risk broke trend



Canonical Sitting Duck for next Black Swan? Kauai monthly visitor arrivals—explains why timeshare is 30% of Kauai lodging inventory

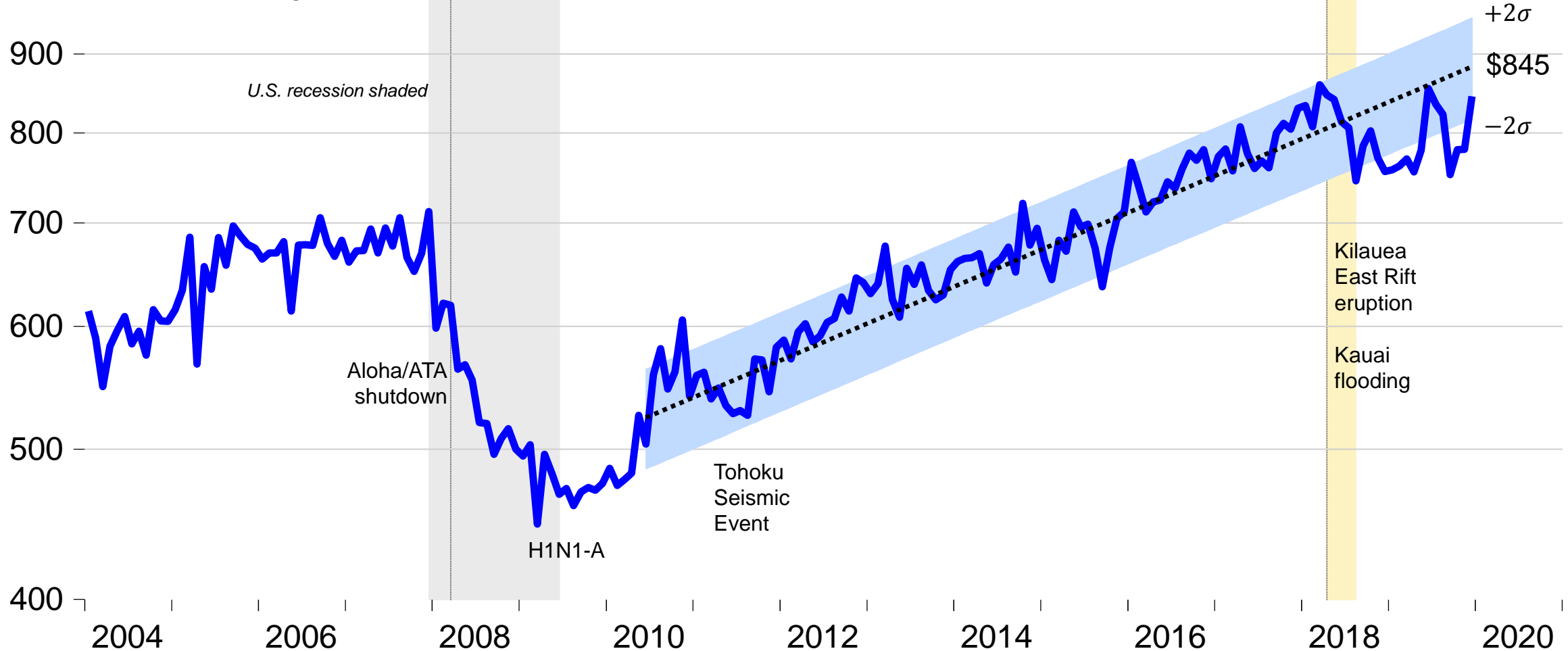


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Sources: Hawaii Tourism Authority, Hawaii DBEDT (<http://dbedt.hawaii.gov/economic/mei/>), annual *Visitor Plant Inventory* reports (<http://dbedt.hawaii.gov/visitor/visitor-plant/>); arrivals data through November 2019; seasonal adjustment using Census X-13 ARIMA filter,

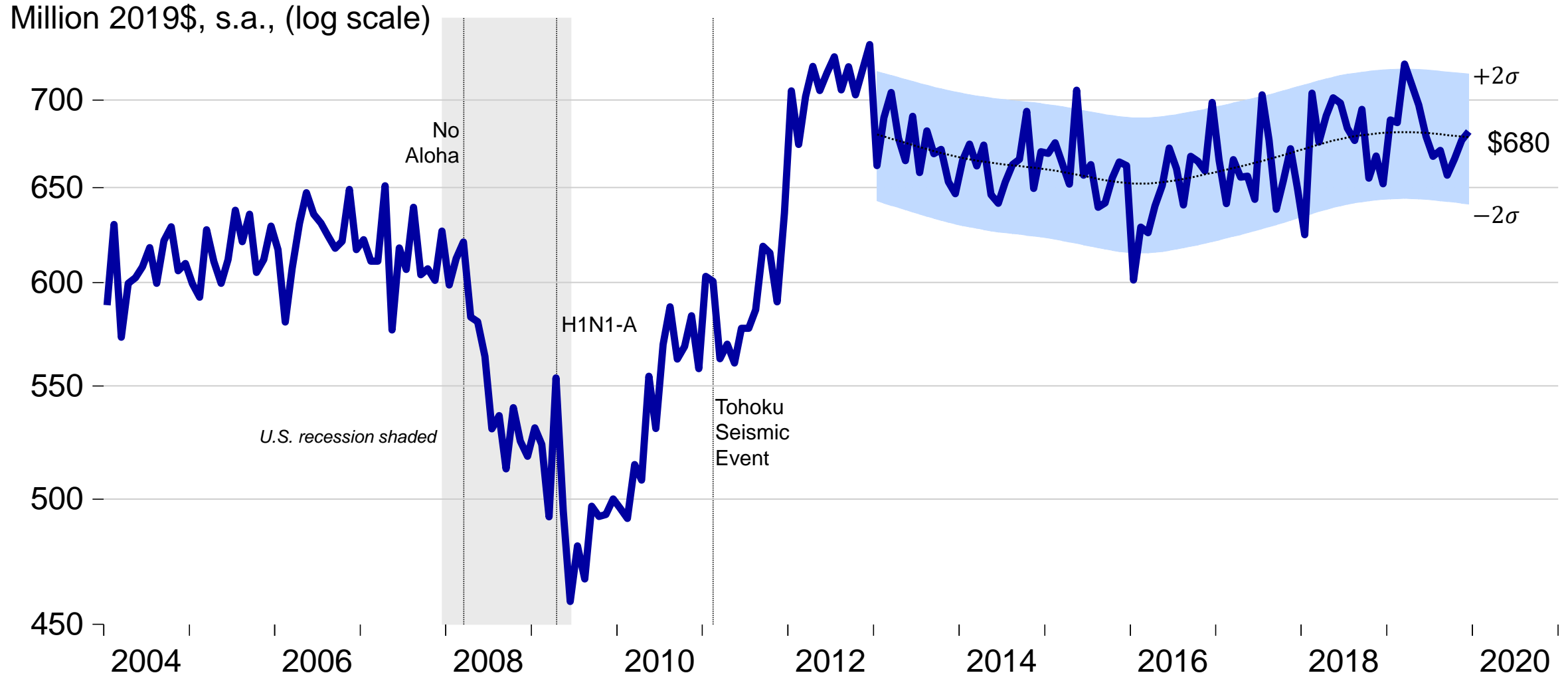
Neighbor Isle real visitor expenditure—constant dollars—had a great run until Kilauea Volcano bombed the party: recovery? -ish?

Million 2019\$, s.a. (log scale)



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Real Oahu total visitor expenditure—constant dollars—sagged during 2010s: strong dollar, fading Asian travel, capacity constraints

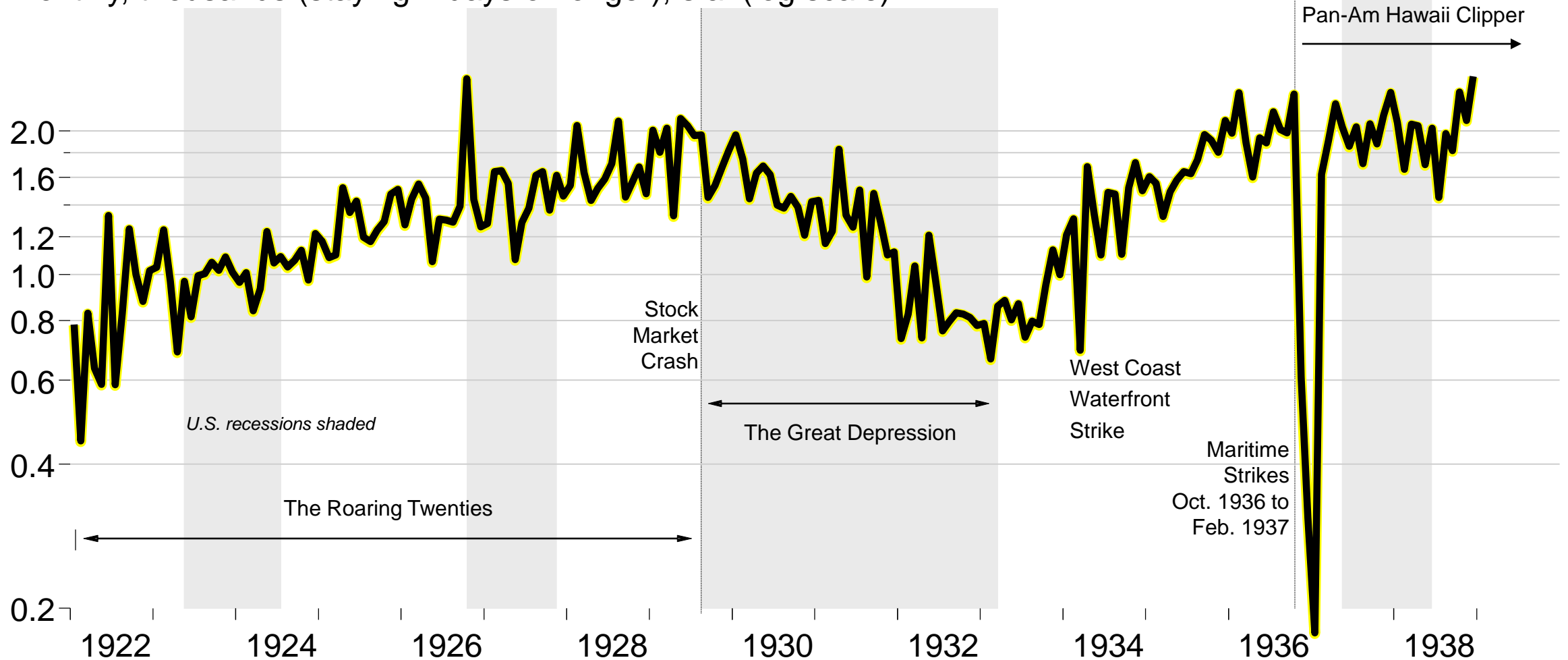


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Sources: Hawaii Tourism Authority, Hawaii DBEDT (<http://dbedt.hawaii.gov/economic/meil/>), U.S. BLS, retrieved from FRED, Federal Reserve Bank of St. Louis; (<https://fred.stlouisfed.org/series/CPIAUCSL>), monthly data through December 2019; seasonal adjustment, deflation, Hodrick-Prescott filter trend and 2 standard deviation bandwidth around noise component 2013-2018 estimated by TZ Economics

Monthly Hawaii visitor arrivals in the 1920-30s—excluding shipboard passengers in transit—exhibit business cycle and jumps just as now

Monthly, thousands (staying 2 days or longer), s.a. (log scale)



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Something gnarly is going to happen for sure—you just don't when, how often, and by how much tourism will get whacked

- Wuhan Coronavirus reminds us of what we already knew and shouldn't have forgotten
- Beyond business cycle-induced changes in tourism performance—stripping out the seasonality, deflating nominal data—volatility is both ambient and jump-laden
- Recent headwinds: strong dollar, weight of uncertainty on investment, asset pricing stumbles
- Leptokurtotic—Black Swan—shocks, big and small, just since 2018!
 1. Intensification along East Rift of Kilauea Volcano of 35-year eruption (Big Island: who knew?)
 2. Flooding below wettest spot on Earth from record 24-hour rainfall (49.69") (Kauai: who knew?)
 3. Bad international trade policy (Trump: who knew?)
 4. Zoonotic viruses jumping from animals to humans to humans (Wet [ew] market: who knew?)
- Let's do vacation rental slam-dance and cram visitors into 85 percent-occupied high-rise towers!



LR real Hawaii visitor expenditures: trading away growth for volatility

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For the State of Hawaii and its Tourism Authority, suffering from the cognitive bias known as money illusion, correction is simple math

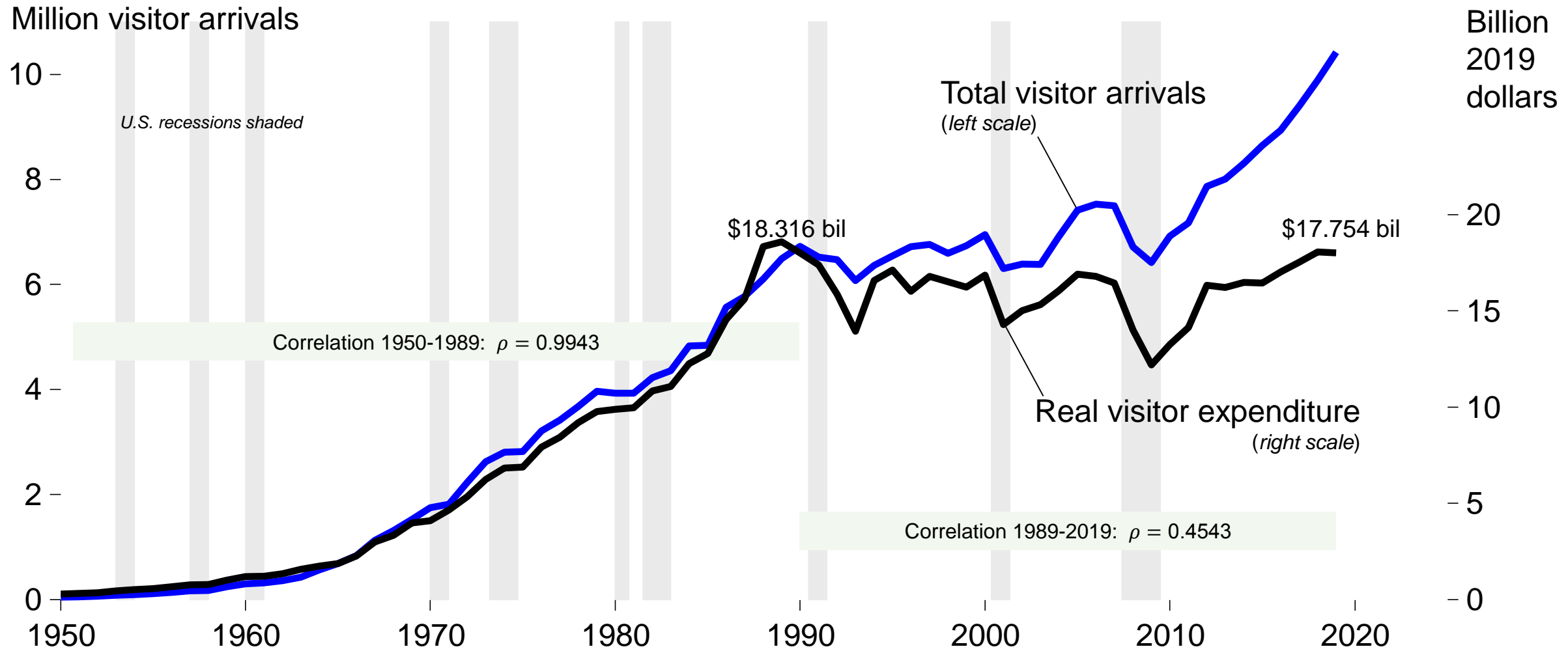
- Hawaii visitor spending increased 1.4 percent in 2019, compared to 2018
(<https://hawaii tourism authority.org/news/news-releases/2020/hawai-i-visitor-statistics-released-for-2019/>)
- Hawaii consumer prices increased 1.6 percent in 2019, compared to 2018
(<https://data.bls.gov/cgi-bin/surveymost?r9>)

Did Hawaii real visitor spending increase in 2019? (HINT: what's 1.4 minus 1.6?) Why imply it—given known cognitive bias? What's real, and what's an illusion?

*“In economics, **money illusion**, or **price illusion**, is the name for the human cognitive bias to think of money in nominal, rather than real, terms. In other words, the face value (nominal value) of money is mistaken for its purchasing power (real value) at a previous point in time. Viewing purchasing power as measured by the nominal value is false, as modern fiat currencies have no intrinsic value and their real value depends purely on the price level.”*

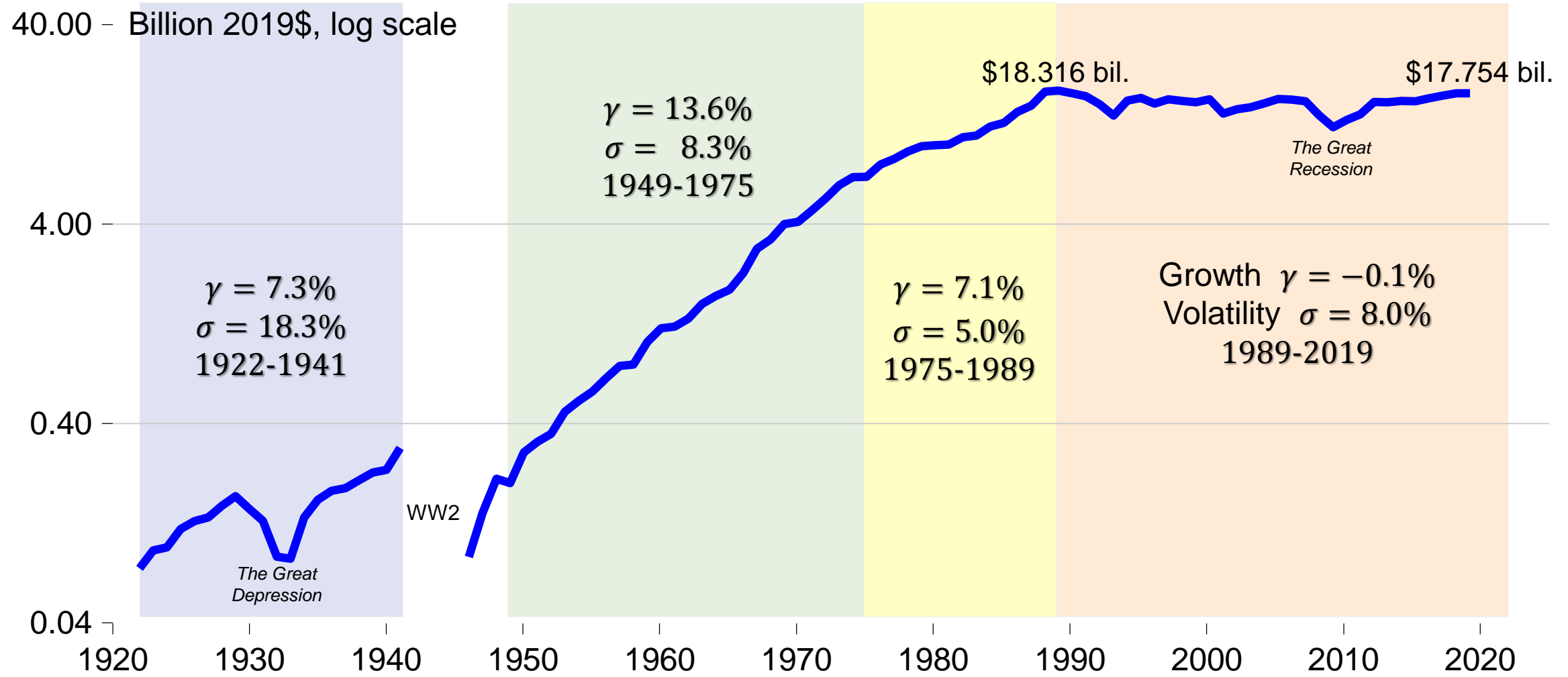
(https://en.wikipedia.org/wiki/Money_illusion)

Hawaii total visitor arrivals grew from 6.5 million (1989) to 10.4 million (2019) while constant-dollar Hawaii total tourism receipts stagnated; OK BOOMER



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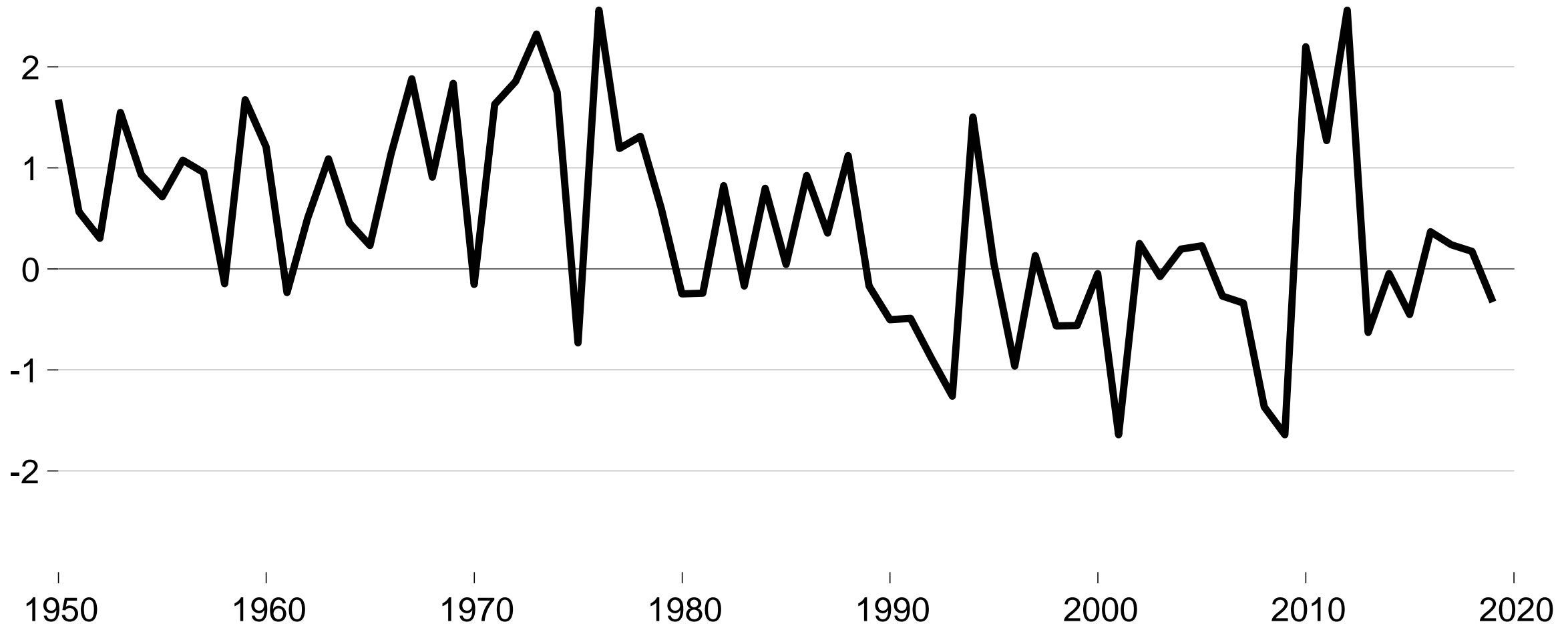
Annualized, interval real growth rates and standard deviations of real tourism receipts, 1922-2019: Hawaii traded away growth for volatility



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A tourism Sharpe Ratio compares real Hawaii tourism growth to proxy for real rate of return on capital: falling real *risk-adjusted* returns

Ratio of excess returns to conditional volatility (e.g. Berkshire Hathaway's Sharpe Ratio is 0.76)



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Note: Tourism Sharpe Ratio is calculated as the annual change in the natural log of constant-dollar Hawaii tourism receipts, minus the log change of potential U.S. real GDP (<https://www.cbo.gov/system/files/2020-01/55022-2020-01-historicaleconomicdata.zip>) divided by generalized autoregressive conditional heteroskedasticity (GARCH) standard deviations of real visitor expenditure: real yield in excess of a proxy for the risk-free real return on capital, divided by conditional volatility. The median Tourism Sharpe Ratio 1989-2019 was -0.160937. The median ratio 1950-1988 was +0.932441. Tourism paid off for Hawaii until the 1989 peak.



Hawaii was the *worst* performing state in the U.S. during 2019Q2, and second worst in 2019Q3 with a *lower* growth rate: what gives?

- Connecting Hawaii economic performance to Hawaii tourism performance
 1. Real quarterly annualized Hawaii GDP growth in mid-2019: 0.5 percent (2019Q2), 0.4 percent (2019Q3) (U.S. real GDP growth in 2019: 2.3 percent, same as entire decade)
 2. Since January 2017, the number of persons employed in Hawaii has declined by 23,350
 3. Hawaii's unemployment rate has been *rising* for two years
 4. Reconciliation? Real visitor expenditure *stagnated* 2017-2019* plus military downsizing since 2016
- Long-run trend: tourism receipts in 2019 remained ½ billion 2019 dollars *lower* than in 1989, while velocity (arrivals) increased from 6.5 to 10.4 million annually, lower risk-adjusted returns
- 2020 SARS-like Wuhan Coronavirus: adverse Hawaii tourism impacts *even if no one in Hawaii gets it*
- Underscores focus on tourism governance, management, leadership, risk-mitigation

* In 2019 dollars, real Hawaii tourism receipts were \$17.27 billion (2017), \$17.79 billion (2018), and \$17.75 billion (2019), with a mean value of \$17.61 billion and standard deviation of \$291 million (1.65 percent of the mean): no real growth in 2019 tourism exports while global trade volumes eroded and global growth slowed.

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Pau

