FEA Economic Outlook

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Savannah, Georgia
March 22, 2019

Brendan Lowney
US Macroeconomic Landscape
Small Business Confidence Waning From Record High

NFIB Small Business Confidence Index
Economic Expansions Do Not Die in Their Sleep, They Are Murdered by the Fed

Effective Federal Funds Rate
The Yield Curve Sending Ominous Signal

10-Year Treasury Yield Minus 3-Month Treasury Yield

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Bond Market Participants Expect Low Inflation Over Next Decade

Expected Rate of CPI Inflation over 10-Year Horizon

Fed’s Inflation Target

Source: Cleveland Fed

1.72%
Federal Budget to Remain in the Red Despite Strong Economy

US Federal Budget Balance as a Percent of GDP

Source: Congressional Budget Office, January 2019 Projections
Real Oil Prices Spiked Prior to Five of the Last Six Recessions

Price per Barrel of WTI Crude in $2017
New Home Inventories Bear Watching

New Home Inventory, Months of Supply

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Job Market is Tight as a Drum

Number of unemployed persons per job opening, seasonally adjusted

Source: Bureau of Labor Statistics, JOLTS
Main US Wage Indices Finally Gaining Momentum

Atlanta Fed Wage Tracker and Average Hourly Earnings

Employment Cost Index – Wages and Salaries
Compensation Tracks Productivity (plus Inflation)

Five-Year Annualized Change

- Recession
- Compensation per hour
- Productivity plus inflation

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Real GDP Growth Will Slow in 2019

Real GDP Growth, Actual and Forecast
- Trump Target Range
- CBO Estimate of Trend GDP Growth
- Fed Lower Bound
- Fed Upper Bound

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Real Household Incomes Have Rebounded

Median Real Household Income in 2017 US Dollars

12.5% increase from 2012-2017
Fewer Than 30% of US Households Earned More than $100K in 2017

Distribution of Household Income in 2017, Percentage of Households in Income Category

Source: US Census Bureau
Health Care Premiums Approaching $20K per Family

Average Annual Contributions to Premiums for Family Health Coverage

Source: Kaiser Family Foundation
Student Loan Share of Total Debt Has Doubled

2008
- Mortgage 80.4% ($10,700 Bil.)
- Auto (6.0% ($798 Bil))
- Credit Card 7.4% ($986 Bil)
- **Student Loan 4.7%, $627 Bil.**
- Personal Loan, Other 1.4% ($208 Bil.)

2018
- Mortgage 72.4% ($10,144 Bil.)
- Auto (8.1% ($1,139 Bil))
- Credit Card 7.1% ($1,000 Bil)
- **Student Loan 10.9%, $1,530 Bil.**
- Personal Loan, Other 1.5% ($186 Bil.)

Source: Federal Reserve
Purchasing Managers’ Indices Show Manufacturing Sector is Slowing

Purchasing Managers’ Indices, Breakeven Level = 50

Source: Institute of Supply Management
US Exports are Getting More Expensive

Source: US National Income and Product Accounts from the BEA
Trade is a Small Share of US Economy

Exports as a Percent of GDP

- Euro Area
- Korea
- Mexico
- Canada
- UK
- China
- India
- Japan
- Brazil
- United States

Source: World Bank
International Issues
North American is Only Major Economy With Growing Working-Age Population

Source: UN Population Division, Estimates and Medium Variant Forecast

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Chinese Growth is Slowing

Chinese Real GDP Growth

GDP Growth
IMF Forecast*

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China’s Debt Has Soared Since the GFC

Credit to Private Nonfinancial Sector as Percent of GDP

- China
- Japan
- United States
China’s Working Age Population Following Japan’s Lead

China (Pop. Aged 15-64 in millions)

Japan (Pop. Aged 15-64 in millions)

Source: Charles Schwab & Co. Inc. based on United Nations Population estimates and projections: The 2017 Revision
Population Dynamics Between Europe and MENA Are Striking

Population Change in Millions

- Russia: -4.8
- Europe ex Russia: -28.0
- US: 34.0
- China: 39.5
- N. Africa: 58.6
- West Asia: 64.3

Source: UN Population Division
Medium Variant Projections
US Wood Household Furniture
Billions of 2018 USD

The Import Share Continues to Trend Higher

Imports boosted 20% for comparison

Sources: AHFA; Mann, Armistead & Epperson, Ltd; US ITC

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US Housing Overview
“Mary, I’m just having one more pint with the lads. If I’m not home in 20 minutes read this message again”
The 2018 Level of Housing Completions Was Typical of a Recessionary Low in Previous Economic Cycles.
Our Favorite Indicator for Near-Term Housing Demand Improved in November

Mapping New Single-Family Home Sales to Housing Starts

<table>
<thead>
<tr>
<th></th>
<th>610*</th>
<th>657**</th>
</tr>
</thead>
<tbody>
<tr>
<td>New Single-Family Home Sales</td>
<td>610*</td>
<td>657**</td>
</tr>
<tr>
<td>Owner Build Share</td>
<td>25%</td>
<td>25%</td>
</tr>
<tr>
<td>Single-Family Starts Needed to Replenish Sales</td>
<td>813</td>
<td>876</td>
</tr>
<tr>
<td>Not All Starts Completed</td>
<td>98%</td>
<td>98%</td>
</tr>
<tr>
<td>Single-Family Starts Needed to Replenish Sales</td>
<td>830</td>
<td>894</td>
</tr>
<tr>
<td>Single-Family Share</td>
<td>70%</td>
<td>70%</td>
</tr>
<tr>
<td>Total Housing Starts Needed to Keep Inventories Flat</td>
<td>1,186</td>
<td>1,277</td>
</tr>
</tbody>
</table>

* Average of last 6 months
** Number required to meet 2019 Forecast
US Housing Starts Continue Grinding Recovery

Housing Starts in Millions

- US Recession
- Housing Starts
- Trend from 2011- August 2018

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Employment in Residential Construction Has Stalled Even as the Unemployment Rate for Construction Workers Has Plunged
It's Getting Even Tougher to Hire in the Trades

<table>
<thead>
<tr>
<th>Position Types that General Contractors are Having Trouble Filling</th>
<th>2017</th>
<th>2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carpenters</td>
<td>51%</td>
<td>58%</td>
</tr>
<tr>
<td>Concrete Workers</td>
<td>51%</td>
<td>67%</td>
</tr>
<tr>
<td>Cement Masons</td>
<td>47%</td>
<td>66%</td>
</tr>
<tr>
<td>Roofers</td>
<td>41%</td>
<td>64%</td>
</tr>
<tr>
<td>Equipment Operators</td>
<td>47%</td>
<td>64%</td>
</tr>
<tr>
<td>Bricklayers</td>
<td>53%</td>
<td>63%</td>
</tr>
<tr>
<td>Drywall Installers</td>
<td>44%</td>
<td>63%</td>
</tr>
<tr>
<td>Plumbers</td>
<td>50%</td>
<td>51%</td>
</tr>
<tr>
<td>Electricians</td>
<td>53%</td>
<td>60%</td>
</tr>
<tr>
<td>Laborers</td>
<td>53%</td>
<td>60%</td>
</tr>
<tr>
<td>Painters</td>
<td>34%</td>
<td>47%</td>
</tr>
</tbody>
</table>

Source: Associated General Contractors of America, 2017 and 2018 Surveys
Home Prices Once Again Above Their Long-Term Trend

Median Existing Single-Family House Price in 2018 USD

Sources: Dallas Fed, National Association of Realtors, FEA calculations
Home Prices Are Surging Relative to Rents

Median Home Price-to-Rent Measured in Years of Rent Required for Purchase

Source: US Census Housing Vacancy and Homeownership Survey
On a National Basis, Housing Will Remain Affordable Despite Higher Mortgage Rates and Home Prices

A value of 100 means that a family with the median income has exactly enough income to qualify for a mortgage on a median-priced home. An index above 100 signifies that family earning the median income has more than enough income to qualify for a mortgage loan on a median-priced home, assuming a 20% down payment.

*Assumes mortgage rate gradually increases to 6% by end of 2019, nominal income growth averages 3% annually, and home prices increase at a 7% annual rate.

Source: NAR, FEA
Affordability is Regional Problem

The U.S. does not have a national affordability problem
Household-weighted distribution of price-income ratio, 2012-16

Note: Graph shows the distribution of the home price-income ratio in Census tracts weighted by the number of households living in each tract. Vertical lines indicate national percentile breaks.
Source: Brookings analysis of 2012-16 ACS data
Housing is Expensive on West Coast and Northeast

Hard to become a homeowner vs. hard to build housing wealth
Average price-income ratio by metro area, 2012-16

Note: Metro-level price-income ratios are averages across constituent tracts. Price-income categories are assigned based on the national distribution, as follows: very low (bottom 10%), low (11-25%), normal range (26-75%), high (76-89%), and very high (top 10%).
Source: Brookings analysis of 2012-16 American Community Survey data
California is Massively Underbuilding

Ratio of Total Housing Permits per Thousand Employed People, Annual Rate

USA

California
San Jose, California
Sold! (for a mere $938,000)
Sugarland, Texas
(List Price: $950,000)
Are US Houses Expensive? (1)

Real Home Prices, 1980Q1=100

Source: Federal Reserve Bank of Dallas
Are US Houses Expensive? (2)

House Price-to-Income Ratio, Long-Term Average=100

Source: OECD Housing Indicators Database

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US Has Been Underbuilding for a Decade

![Graph showing Housing Starts and Underlying Demand trends from 1970 to 2020. The graph indicates a significant pent-up demand in recent years, suggesting a backlog of housing starts that were not fulfilled during the housing market downturns.]
Cumulative Over-/Underbuilding of Conventional US Homes

![Graph showing cumulative over-/underbuilding of conventional US homes between 1995 and 2017.](image-url)
US Population by Age
(as of July 1, 2019)

Peak Age Groups in 2019:
28- and 29-Year-Olds
Homeownership Rates Increase Markedly In 30-39 Age Cohort

Source: US Census, Housing Vacancy and Homeownership Survey
Women Increasingly Delaying Birth Until Late 30s

Source: US Census Bureau
Multigenerational Living Arrangement on the Rise

% of population in multi-generational households

Source: Pew Research Center
The US Housing Stock Has Aged Considerably

Source: Census Bureau, 2017 American Housing Survey

Note: 54% of US owner-occupied homes were built before 1980; only 4.9% were built between 2010 and 2017
Rapid Increase in Home Equity Should Boost Improvements

Owners’ Equity in Household Real Estate - Net Worth in $Bil.

Trend Since 1980
Improvement Expenditures Remain Above Trend

Billions of 2009 USD
We Are on the Verge of a Revolution in the Construction Industry
The Construction Industry Has A Miserable Productivity Record

US Change in Labor Productivity
Construction vs. Overall Economy

US Industry Overall

Real gross value added per hour worked, 2005$
Index:100 = 1995

US Construction Sector

Source: McKinsey Global Institute, Reinventing Construction Through a Productivity Revolution
Something Needs to Change
## Construction is a Productivity Laggard

<table>
<thead>
<tr>
<th>Industry</th>
<th>Circa 1940s</th>
<th>Circa 2016</th>
<th>Key advances</th>
<th>Productivity Growth$^1$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td></td>
<td></td>
<td>Land assembly and automation for scale Advanced bioengineering to increase yields</td>
<td>1,512</td>
</tr>
<tr>
<td>Manufacturing</td>
<td></td>
<td></td>
<td>Entirely new concepts of flow Modularized and standardized designs Aggressively automated to increase production</td>
<td>760</td>
</tr>
<tr>
<td>Retail</td>
<td></td>
<td></td>
<td>Utilized scale advantages and cutting edge logistics to provide affordable goods to the masses</td>
<td>699</td>
</tr>
<tr>
<td>Construction</td>
<td></td>
<td></td>
<td>Limited improvements in technological capabilities, production methods, and scale</td>
<td>6</td>
</tr>
</tbody>
</table>

1 Cumulative real growth in the United States, %, 1947-2010

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Residential Construction Trails on Productivity & Growth

Source: US Economic Census, McKinsey Global Institute

Productivity, 2012
$ thousand per person employed, 2015 $
Framing is at the bottom of the heap

Source: US Economic Census
McKinsey Global Institute
Single Family Housing isn’t much better

Source: US Economic Census, McKinsey Global Institute
Multi Family Housing is better, but...
It Still Lags Automobile Manufacturing Productivity

Source: US Economic Census, McKinsey Global Institute

Productivity, 2012
$ thousand per person employed, 2015 $
Why Has Automobile Manufacturing Experienced Such High Productivity Growth?

We don’t build cars in our driveways.
Benefits of Offsite Construction

- **Weather**: construction is indoors, where the weather is always sunny! Delivery is JIT and assembly is fast

- **Greater efficiency, quality & predictability**: greater precision in the manufacturing process, resulting in higher quality (fewer callbacks and warranty issues) – *and far less waste!*

- **Greater procurement efficiency**: material requirements more accurately calculated, buying in bulk – *and buying direct from manufacturer*

- **Safety**: Falls from height and equipment accidents not as much of an issue offsite
Brock Commons, in Vancouver recently completed
Marriott is Pioneering Modular
Marriott is Pioneering Modular
Benefits of FIOSS – Faster Build

Stick Framing
- 15 Days or 71 Man-Days

FIOSS
- 4 Days or 14 Man-Days

Productivity Increase of 507%
Join Us in Boston in November

Save the Date!
We’ll be back in 2019 with a bigger, better IWBC conference for innovators and disruptors in the construction field. See you there!
November 4 – 6, 2019

“IWBC 2018 was well-organized and the attendees were serious and engaged. I think much good for all will come of it. Thanks again to you and all your associates and volunteers for your hard work in pulling it all together.”

Teddd Benson,
Founder and CEO, Bensonwood & Unity Homes
Questions?

If you have questions or comments please don’t hesitate to contact me at:

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