Prefatory Note

The attached document represents the most complete and accurate version available based on original files from the FOMC Secretariat at the Board of Governors of the Federal Reserve System.

Please note that some material may have been redacted from this document if that material was received on a confidential basis. Redacted material is indicated by occasional gaps in the text or by gray boxes around non-text content. All redacted passages are exempt from disclosure under applicable provisions of the Freedom of Information Act.

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Report to the FOMC on Economic Conditions and Monetary Policy

Book A

Economic and Financial Conditions:
Outlook, Risks, and Policy Strategies

May 29, 2020

Prepared for the Federal Open Market Committee
by the staff of the Board of Governors of the Federal Reserve System

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Domestic Economic Developments and Outlook

Economic activity plummeted in April as a result of the social-distancing and other measures taken to control the spread of the coronavirus (COVID-19), putting GDP on track to decline at an annual rate of over 40 percent in the second quarter. Likewise, net job losses totaled more than 20 million in April. We anticipate further sizable employment declines in May, which we expect will push the reported unemployment rate to 18 percent, a level last seen in the 1930s.

Many states have started to roll back restrictions on activity sooner than we had assumed in the April Tealbook. As households and firms reengage, we anticipate that economic activity will bounce back, boosted substantially by unprecedented fiscal stimulus and an array of supportive monetary policy measures. However, we also expect that the rollback of restrictions, coupled with inadequate testing and contact tracing, will lead to periodic flare-ups of the virus around the country, further rounds of local restrictions, and *greater* social distancing, on balance, in the second half of this year than we had assumed in April. As a result, we project appreciably weaker GDP growth in 2020, and the employment-to-population ratio ends the year considerably lower than in the April Tealbook. Thereafter, although we assume that household and business activity remains somewhat suppressed by the virus, the recessionary impetus unwinds and GDP growth is above trend in 2021 and 2022. The unemployment rate moves down to 4.5 percent by the end of the medium term.

A defining feature of the current economic environment is uncertainty about the COVID-19 pandemic—the prevention, treatment, and epidemiology of the disease; policy interventions at all levels of government; and the reactions of households and firms to the unfolding situation. We present a baseline economic forecast predicated on moderately successful containment of the pandemic, but we consider equally plausible an alternative scenario of a resurgence of the disease this fall that results in another round of intense social distancing and a more substantial and protracted impairment of economic activity.

Consumer prices have fallen sharply as restraint on demand from social distancing has dominated upward pressure from supply constraints. On a 12-month change basis, we expect core inflation to bottom out at 0.9 percent in July and August

before edging back up to 1.1 percent by the end of the year. As the economy strengthens further after this year, we see core inflation rising to 1.7 percent in 2022. With the steep drop in energy prices outweighing increases in food prices, we expect total inflation to run below core inflation this year and then in line with core thereafter.

KEY BACKGROUND FACTORS

COVID-19 Pandemic and Response

The staff's baseline forecast is predicated on assumptions about the development of medical interventions to treat and prevent COVID-19 infections, about public health measures introduced to slow the spread of the virus, and about how households and firms react to the containment measures and to the pandemic itself. Drawing clear implications for our economic forecast from these assumptions is unusually challenging.

In our baseline forecast, we are fairly optimistic about **medical interventions** to prevent and treat COVID-19. Most importantly, we assume an effective vaccine emerges in the fall of 2021 and becomes widely available soon thereafter. Relative to historical experience, this time frame for developing a vaccine is short, so this objective entails a concerted research and development effort yielding unprecedented success.[1]

Extreme **mandatory social-distancing** measures, such as stay-at-home orders and closing nonessential businesses, peaked in late April, when more than 90 percent of the population was covered by lockdowns, and have fallen off rapidly since then. We assume that looser mandatory restrictions for shopping and socializing, such as capacity constraints in retail establishments and limits on the size of gatherings, remain in place—with some variation in time and space—through the end of 2021. **Voluntary social distancing** plays an important role as well—namely, individual choices to limit activity in light of the health risks.

At the same time, efforts are under way to ramp up **public health measures** involving changes to workplaces, schools, and recreational environments, as well as a system of testing, contact tracing, and isolation. We assume these measures receive

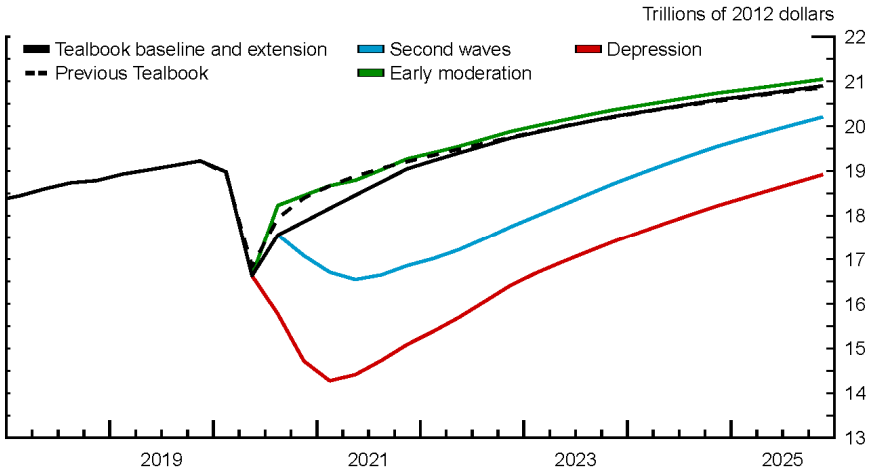
[1] Historically, vaccine development and distribution have taken much longer than we assume for COVID-19. For example, the polio vaccine developed by Jonas Salk was approved for widespread use in the United States in 1955, seven years after sustained concerted effort at vaccine development began. Further, successful development is not a foregone conclusion; we have yet to develop vaccines for some viruses, such as HIV. On a more hopeful note, experience developing vaccines for other strains of coronavirus, such as SARS and MERS, is expected to accelerate development for COVID-19.

sufficient resources from governments and adequate compliance by the public to contribute to disease containment until they are no longer needed.

Our assumptions about virus containment are somewhat less optimistic than in the April Tealbook, when we assumed that stay-at-home orders in nearly all states would last through May and that adequate testing and contact tracing would be in place by then.[2] With most areas of the country already reopening and social contact increasing, we now assume caseloads will not decline as much as in our previous forecast and that flare-ups of the virus will occur in some places. As a result, people are expected to become less confident about going back out—and states will be more cautious about fully opening—so that by the fall of this year, we end up with *more* social distancing, both voluntary and mandatory, than in the April Tealbook.

Because of the uncertainty surrounding the pandemic, we view the subjective probability of the baseline forecast coming to pass as lower than usual. In an alternative scenario that we view as equally plausible, a second wave of the virus occurs in the fall, necessitating a reinstatement of strict mandatory social-distancing rules until a vaccine is available in the second half of 2021.

The Staff's Baseline Forecast and Alternative Scenarios for the Level of Real GDP



[2] Although the prevalence of testing has risen, it remains below levels recommended by public health professionals. Moreover, asymptomatic infected individuals, capable of transmitting the virus, may not seek a test. In mandatory testing of all employees at five Tyson Foods poultry- and pork-processing plants, more than half of the positive tests were for asymptomatic individuals.

The baseline and second-wave scenarios have markedly different consequences for the economy. In the baseline, GDP returns to its pre-pandemic level early in 2022, whereas in the second-wave scenario, this return does not occur until 2024. At the end of 2022, the unemployment rate is roughly 5 percentage points higher in the second-wave scenario than in the baseline, and this additional slack implies a ½ percentage point lower inflation rate at that time. The federal funds rate begins to edge up at the beginning of 2023 in the baseline but remains at the effective lower bound through 2025 in the second-wave scenario. We explore this scenario and two others in the Risks and Uncertainty section: (1) an earlier recovery as reopening proves less harmful than assumed in the baseline; and (2) a deep, prolonged depression as relaxing social distancing backfires and effective treatments and vaccines are slow to materialize.

Fiscal Policy

Thus far, nearly $3 trillion of federal COVID-19-related legislation has been enacted. We project that another $500 billion in yet-to-be-enacted legislation, in the form of another stimulus payment to households and aid to state and local governments, will be forthcoming in the third quarter. While the overall amount of stimulus in this forecast is similar to that in the April Tealbook, the boost to GDP growth is now projected to occur more quickly, as the disbursement of stimulus dollars (including unemployment insurance) and the spend-out from these payments appear to have been faster than we had assumed earlier.

As shown in the table below, we expect these policies to boost GDP growth significantly in 2020 and then to restrain output growth in 2021 and 2022 as the effects of the stimulus unwind.

First-Round Direct Effects of COVID-19 Fiscal Stimulus on GDP Growth

(Percentage point contribution to real GDP growth, annual rate)

		2020				2020	2021	2022
		Q1	Q2	Q3	Q4		Q4/Q4	
(1)	**Total**	**0**	**16.7**	**3.7**	**-3.3**	**4.2**	**-2.7**	**-.6**
(2)	Government purchases and grants	0	2.2	.9	.3	.8	.5	-.3
(3)	Household support	0	11.7	.5	-2.6	2.4	-2.4	-.1
(4)	Business support*	0	2.8	2.4	-1.0	1.0	-.8	-.2
(5)	***Total, April Tealbook***	***0***	***10.1***	***7.2***	***2.1***	***4.6***	***-3.2***	***-.8***
	Memo: Yet to be enacted							
(6)	Phase 5 stimulus placeholder**	0	.2	3.7	-.3	.8	-.2	-.1

Note: Numbers may not sum to total due to rounding.
* Excludes the Main Street Lending Program and other Federal Reserve and Treasury lending programs to facilitate loans to businesses and state and local governments.
** Included in lines [1], [2], and [3].

Despite our assumption that state and local governments will ultimately receive around $450 billion in federal stimulus aid, we nevertheless expect them to cut back on spending over each of the next several years as they gradually recover from an extraordinarily sharp decline in tax receipts; this drag is more pronounced than in the April Tealbook, as we now anticipate greater budgetary strain.

Financial Conditions

As described in the financial sections of this Tealbook, investor sentiment has improved since the April Tealbook, boosted by news on the easing of stay-at-home measures and their expected positive effect on near-term economic activity, as well as news on reported development of potential COVID-19 treatments. U.S. equity prices have increased about 11 percent since the April Tealbook, while longer-term Treasury yields have edged up on net. In addition, investment-grade corporate bond spreads have narrowed modestly, speculative-grade bond spreads have decreased notably, and the dollar has fallen about 1 percent.

In contrast, access to traditional sources of credit remains limited for lower-rated corporations, small businesses, and nonprime households. Credit availability continued to be supported by the several Federal Reserve facilities established for this purpose, particularly benefiting the issuance of corporate and municipal bonds and asset-backed securities. Credit quality, however, showed signs of deterioration, especially for businesses, amid sharp downward revisions in projected earnings and an increase in corporate debt downgrades and defaults.

As in the April round, monetary policy continues to provide considerable support to economic activity over the next few years, as interest rates are projected to remain low by historical standards. The federal funds rate is assumed to stay at its effective lower bound through the medium term, while Treasury and private borrowing yields remain low. The effect of the recent Fed balance sheet actions on Treasury yields is roughly offset by the effect of the expected increase in issuance to finance the fiscal stimulus.[3] Although spreads on corporate bonds and mortgage rates are expected to remain elevated through the end of this year, they gradually reach average levels over the next year. Stock prices rose substantially more than expected since the April Tealbook, but with a

[3] At this time, we assume that the balance sheet follows its April baseline path in regard to its size and composition, but these projections could be revised when Tealbook B is finalized next week.

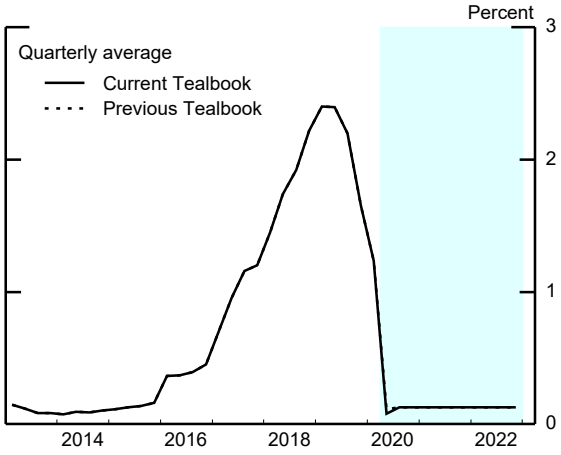
modestly lower rate of appreciation going forward, they end the medium-term at roughly the same level as in the April Tealbook.

Oil Prices

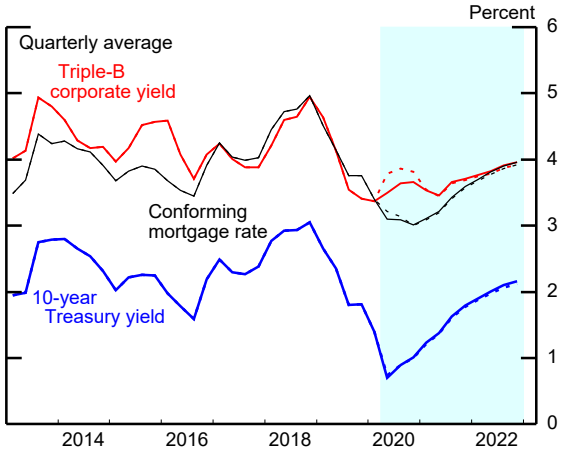
The spot price of Brent crude oil has risen about $7 since the April Tealbook, to $35 per barrel, still only about half of its price in late 2019. About half of this increase was priced into our April Tealbook forecast, and the remainder reflects recent supply and demand developments. Although demand remains quite weak, it does appear to be increasing, especially in China, as countries have begun to ease their COVID-19 lockdown policies. Moreover, oil producers around the world are undertaking large production cuts, which has eased pressures on oil inventory capacity. Farther-dated futures prices are up by less than spot prices and remain well below levels at the beginning of the year.

Key Background Factors Underlying the Baseline Staff Projection

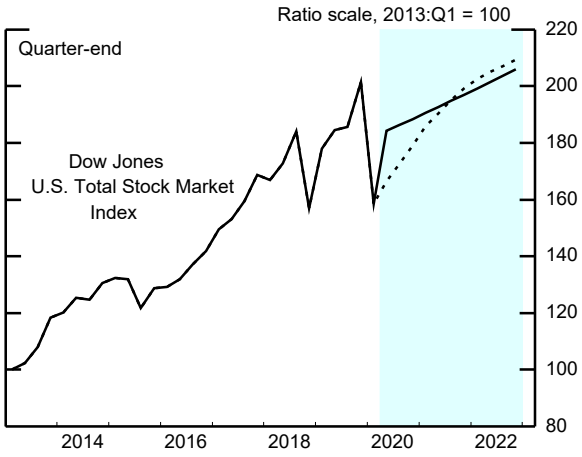
Federal Funds Rate



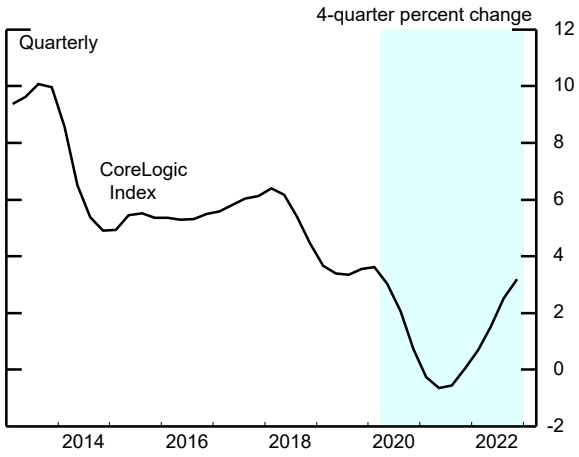
Long-Term Interest Rates



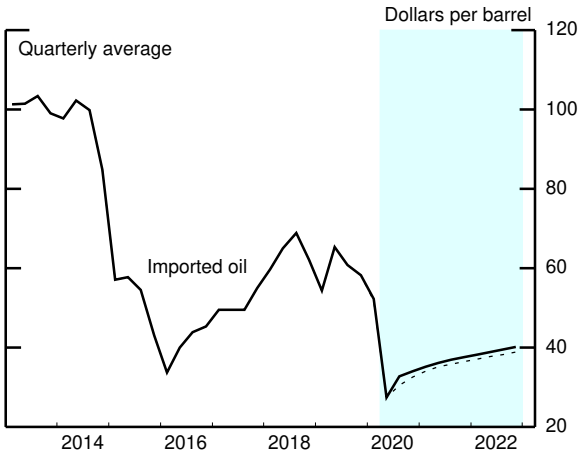
Equity Prices



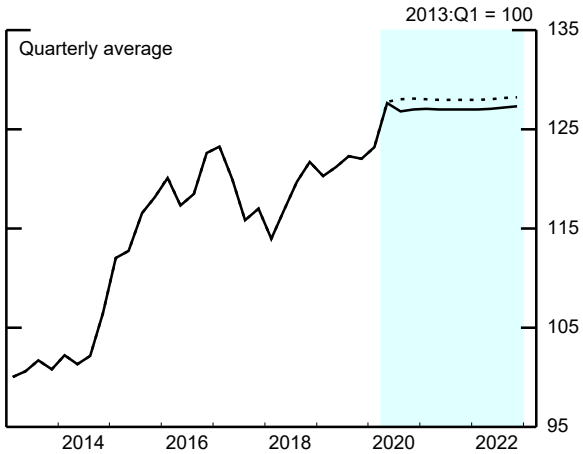
House Prices



Oil Prices



Broad Real Dollar



Summary of the Near-Term Outlook for GDP

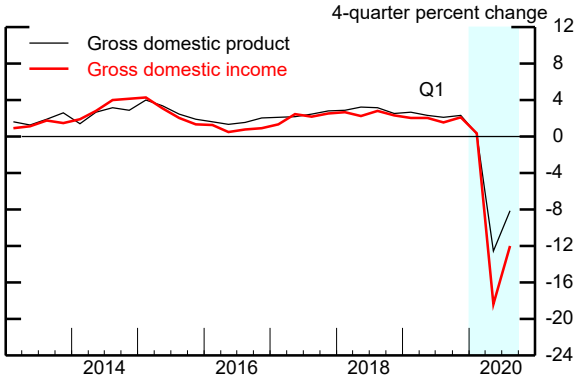
(Percent change at annual rate except as noted)

Measure	2020:Q2		2020:Q3		2020:Q4	
	Previous Tealbook	Current Tealbook	Previous Tealbook	Current Tealbook	Previous Tealbook	Current Tealbook
Real GDP	**-37.4**	**-41.0**	**28.9**	**24.1**	**10.4**	**7.0**
Private domestic final purchases	-44.9	-45.3	36.0	31.1	13.4	6.7
Personal consumption expenditures	-41.5	-45.2	47.8	46.4	9.8	4.6
Residential investment	-66.0	-62.2	-9.1	-23.8	44.1	36.9
Nonres. private fixed investment	-54.2	-39.8	-5.8	-16.4	28.3	11.6
Government purchases	3.4	1.8	10.9	3.7	.4	-2.4
Contributions to change in real GDP						
Inventory investment[1]	-3.7	-4.7	.3	-1.4	.2	1.3
Net exports[1]	5.9	2.4	-2.5	-.4	-.9	.5

1. Percentage points.

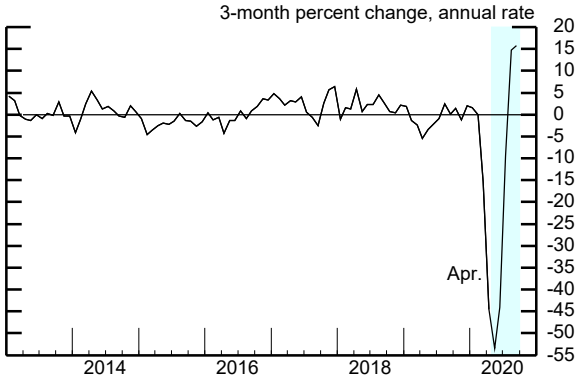
Recent Nonfinancial Developments (1)

Real GDP and GDI



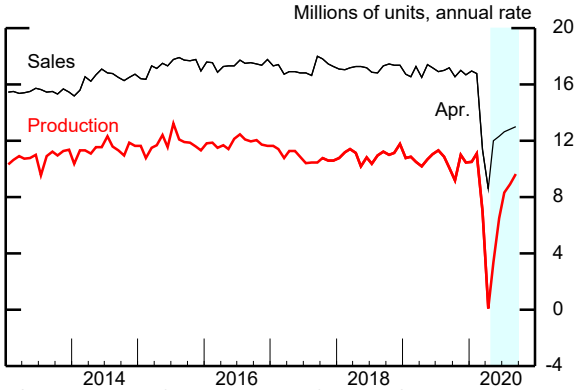
Source: U.S. Dept. of Commerce, Bureau of Economic Analysis.

Manufacturing IP ex. Motor Vehicles and Parts



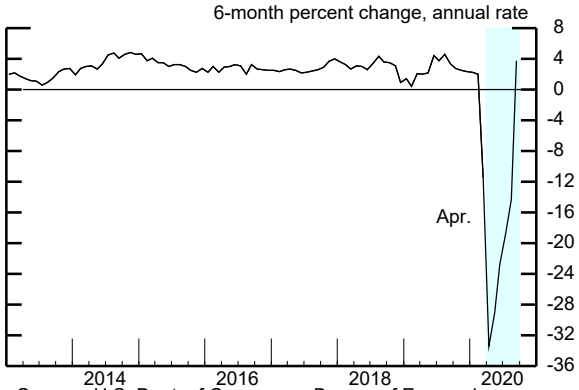
Source: Federal Reserve Board, G.17 Statistical Release, "Industrial Production and Capacity Utilization."

Sales and Production of Light Motor Vehicles



Source: Ward's Communications; Chrysler; General Motors; FRB seasonal adjustments.

Real PCE Growth



Source: U.S. Dept. of Commerce, Bureau of Economic Analysis.

RECENT DEVELOPMENTS AND NEAR-TERM OUTLOOK

Spending and Production

Our standard data sources, mostly reflecting developments through April, have begun to show the devastating effect on real activity of the COVID-19 pandemic. We project that GDP will decline at an annual rate of 41 percent this quarter after moving down 5 percent in the first quarter. More recently, high-frequency indicators suggest that people have ventured out more as mandatory social-distancing rules were relaxed and many establishments resumed operations. (We have added several new exhibits to show some of these indicators.) We anticipate a partial rebound in GDP in the third quarter, boosted by the beginnings of a recovery in both consumer spending and exports.

- **Consumer spending** fell 13 percent in April and is expected to fall 45 percent (annual rate) in the second quarter. In April, motor vehicle sales tumbled to the depths seen in the financial crisis, and Census retail sales excluding motor vehicles and parts plunged 17 percent at a monthly rate, the largest single-month drop in the history of the series.
    - Weekly tracking data point to a partial rebound in spending on nonfood retail goods and for sales of motor vehicles in recent weeks. Despite these pockets of improvement, indicators of spending on discretionary services—such as hotel stays, air travel, and in-person restaurant dining—as well as elective health services remain depressed. Moreover, in recent readings, sentiment has flattened out at a low level, indicative of ongoing spending restraint in the months ahead.
    - The recent pickup in goods spending, which is apparent across all states, coincided with the first tranche of stimulus payments and large outlays of unemployment insurance benefits in mid-April. In addition, the relaxation of mandatory social distancing seems to have had a modest effect on spending, especially in certain categories like restaurants and clothing stores, as the pickup in spending was larger in

states that have reopened.[4] (See the box "Reopening the Economy amid the COVID-19 Pandemic.")

- **Disposable personal income** took a massive hit in March but rose by even more in April. Wages and salaries declined more than a cumulative $1 trillion (annual rate) in March and April. However, April income was bolstered by a historic $3 trillion infusion of transfer payments, reflecting stimulus payments and a wave of unemployment insurance participation. The April reading of the personal saving rate, at 33 percent, suggests the immediate impetus to spending was muted by unusually high precautionary savings.

- All told, we project consumption in the third quarter will surge, though to a level well below the beginning of the year.

- **Business activity** has collapsed since the advent of the pandemic as firms pulled back sharply on investment and as industrial activity took a historic plunge.

  - In the face of heightened uncertainty and depressed profit expectations, businesses have retrenched and are expected to slash **fixed investment** 40 percent (annual rate) in the second quarter, exceeding the reductions seen in the financial crisis, and to cut investment further in the third quarter. Drilling investment, in particular, has fallen off sharply in the face of historically low oil prices.

  - **Manufacturing output** plunged 20 percent (not at an annual rate) from February to April, the largest two-month decline since 1945, and the very low readings on new orders in the national and regional economic surveys point to continued weakness ahead. We anticipate a less sizable decline in May, as production from motor vehicle and aircraft plants coming back on line partially offsets further declines elsewhere in manufacturing. The pandemic is likely to restrain the

[4] The decline and rebound in visits to grocery stores and pharmacies—generally exempt from shopping restrictions—suggest the recent pickup in consumption is not due to the retraction of mandatory social distancing alone.

rebound in factory activity in the coming months: Social distancing in factories reduces their productivity; supply shortages of intermediate inputs are an ongoing concern; outbreaks remain a major risk for plants with workers at close quarters, such as meatpacking; and the decline in oil prices will hold down demand from the mining sector for manufactured goods.[5]

- **Residential investment** in the current quarter is expected to post its largest decline in the postwar era. Starts and permits plunged in April, as did pending and existing home sales. Given the typical length of the construction process, we expect residential investment to decline in the third quarter and to pick up at the end of the year.

- Depressed foreign manufacturing and foreign household spending reduced demand for U.S. goods and services in the first quarter, and real **exports** dropped at a nearly 9 percent pace. In April, preliminary data suggest that goods exports plummeted further. Exports of capital goods and automotive products posted particularly large declines. In addition, the near-complete halt of international visitors to the United States has been a major drag on U.S. exports of services. We forecast exports to decline 63 percent at an annual rate in the second quarter, and then to recover at a 44 percent rate in the second half, as foreign activity picks up. (The box "Export Perspectives: A Comparison with the 2008–09 Trade Collapse" puts our forecast for the collapse in trade in historical context.)

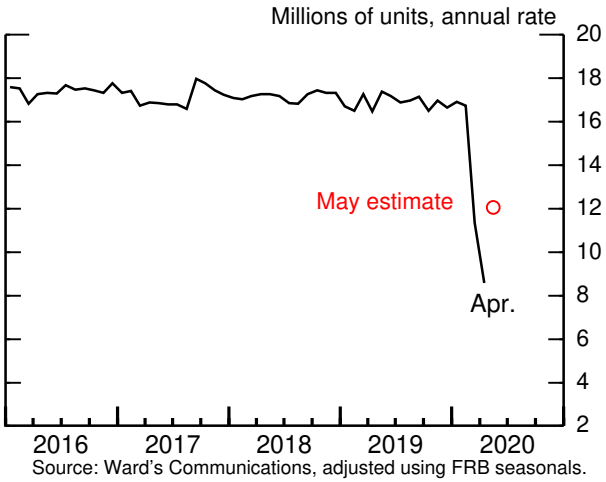
    - Despite the collapse in exports, the **net export contribution** to U.S. GDP growth in the second quarter is projected to be 2.4 percentage points, as plummeting U.S. demand causes **imports** to fall at a 64 percent pace. Indeed, the preliminary trade data for April show that goods imports have plunged. As with exports, imports are expected to partially bounce back in the second half of the year, and we expect net exports to make a slightly positive contribution in the second half.

[5] In recent weeks, reopened motor vehicle assembly plants have experienced temporary shutdowns due to cases of the virus among workers and component shortages. Some foreign sources of intermediate inputs, such as Mexican maquiladoras, continue to struggle with outbreaks of the virus.

Domestic Econ Devel & Outlook

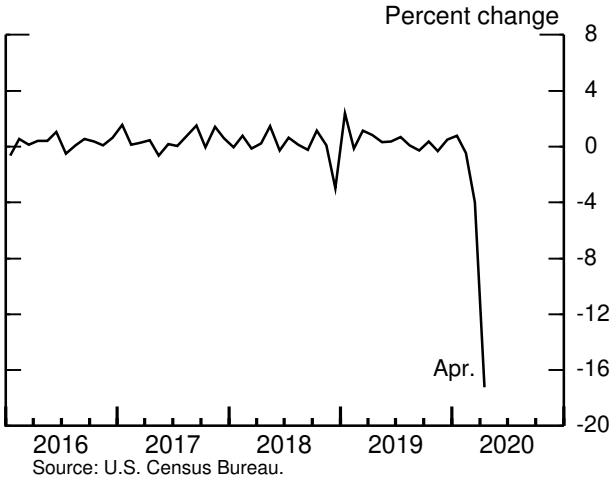
Consumer Spending

Light Vehicle Sales



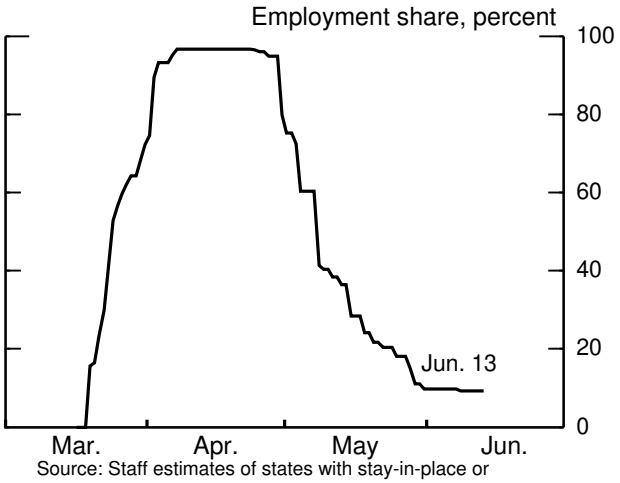
Source: Ward's Communications, adjusted using FRB seasonals. May is J.D. Power tracking estimate.

Retail Sales ex. Motor Vehicles and Parts



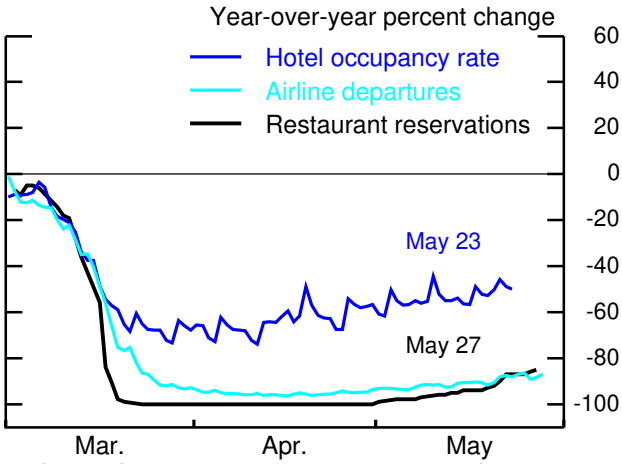
Source: U.S. Census Bureau.

Population Under Stay-at-Home Order



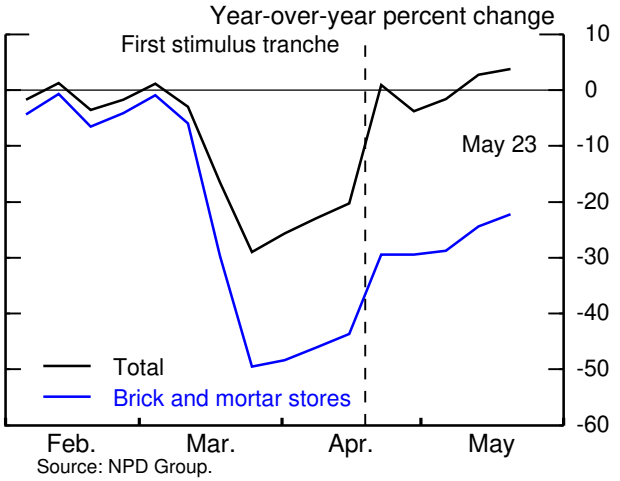
Source: Staff estimates of states with stay-in-place or non-essential business closures orders; these estimates do not reflect additional city or county regulations.

Hotel, Restaurants, and Air Travel



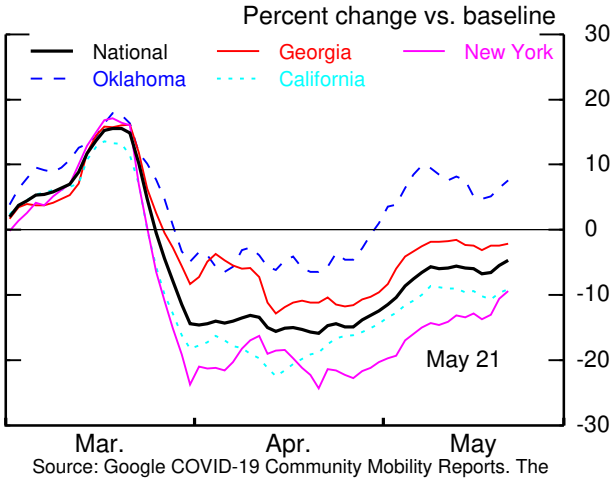
Source: OpenTable.com accessed through Haver; STR; Transportation Security Administration.

Spending on Non-Food Retail Goods



Source: NPD Group.

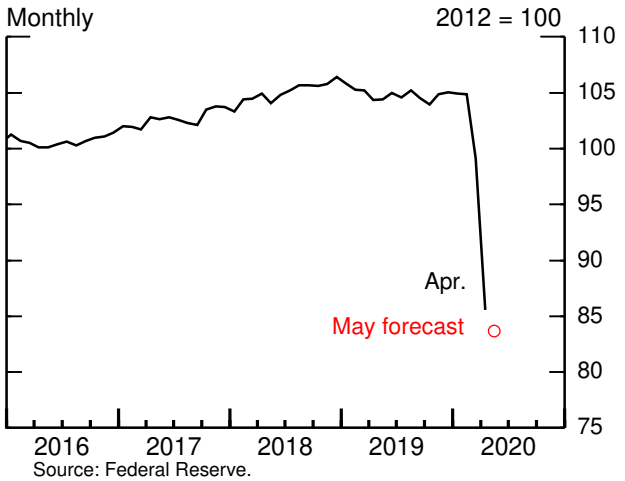
Visits to Grocery and Drug Stores



Source: Google COVID-19 Community Mobility Reports. The baseline is the median value for the corresponding day of the week during January 3 to February 6, 2020. Data are 7-day moving average.

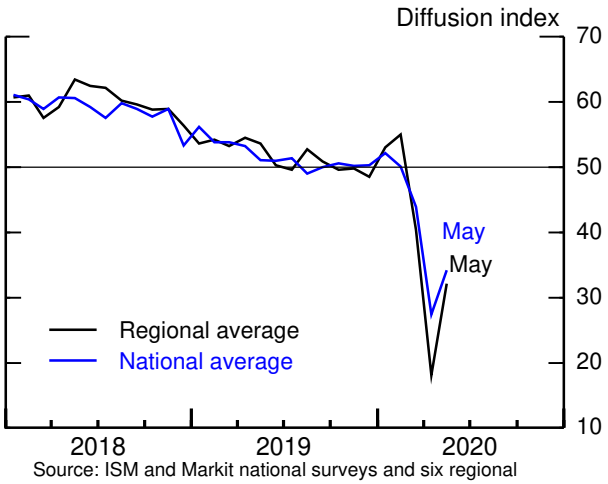
Industrial Sector & Housing

Industrial Production Index: Manufacturing



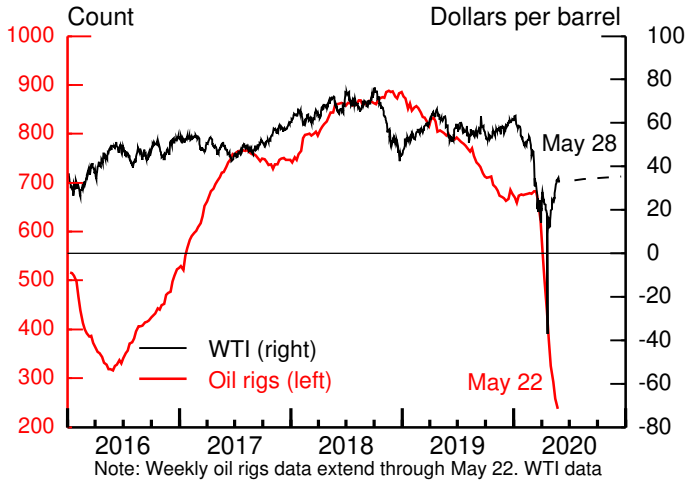
Source: Federal Reserve.

Manufacturing New Orders Indexes



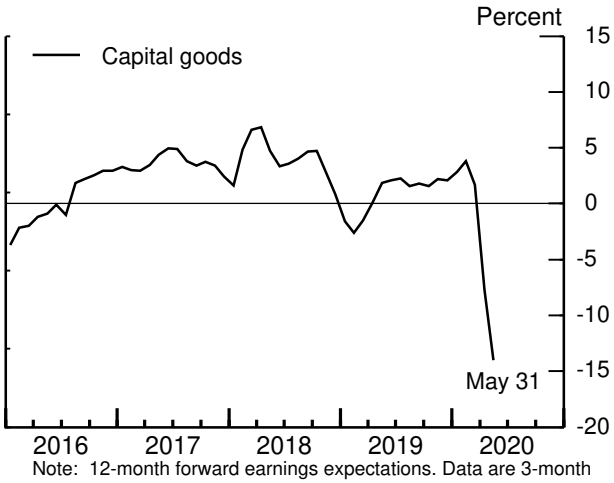
Source: ISM and Markit national surveys and six regional surveys.

Oil Price and Drilling Rigs



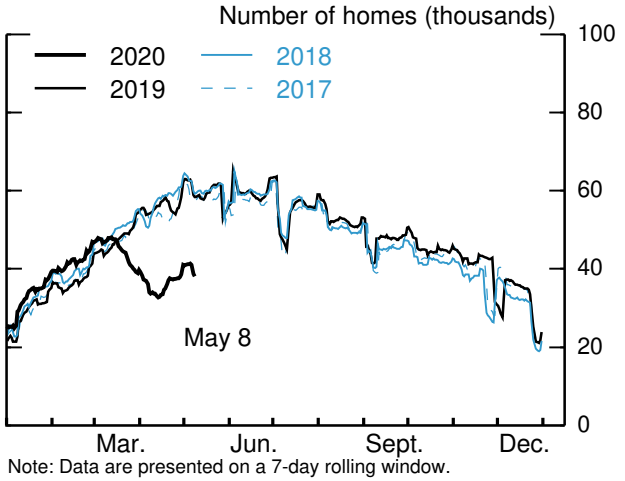
Note: Weekly oil rigs data extend through May 22. WTI data extend through May 28; dashed lines are monthly futures contracts.
Source: Baker-Hughes (drilling rigs).

Expectations of Near-Term Profit Growth



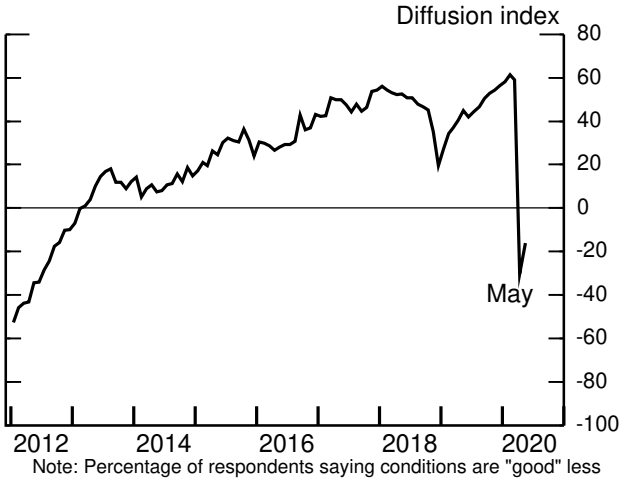
Note: 12-month forward earnings expectations. Data are 3-month percent changes; excludes transportation equipment.
Source: Staff calculations from Thomson Reuters I/B/E/S.

Pending Home Sales



Note: Data are presented on a 7-day rolling window.
Source: Data provided by Redfin, a national real estate brokerage.

Builders' Ratings of Current Sales



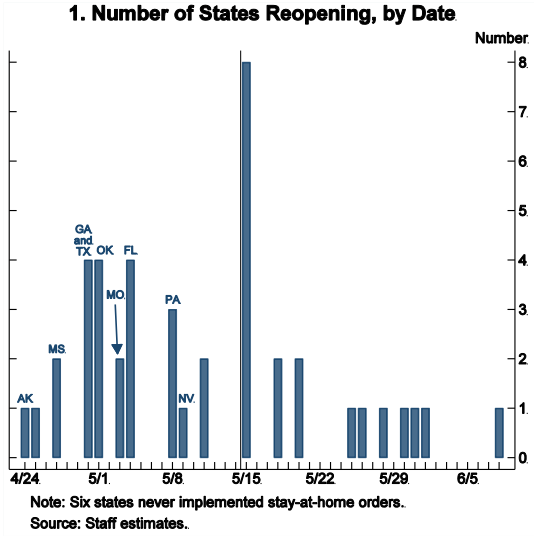
Note: Percentage of respondents saying conditions are "good" less percentage responding that conditions are "poor."
Source: National Association of Home Builders.

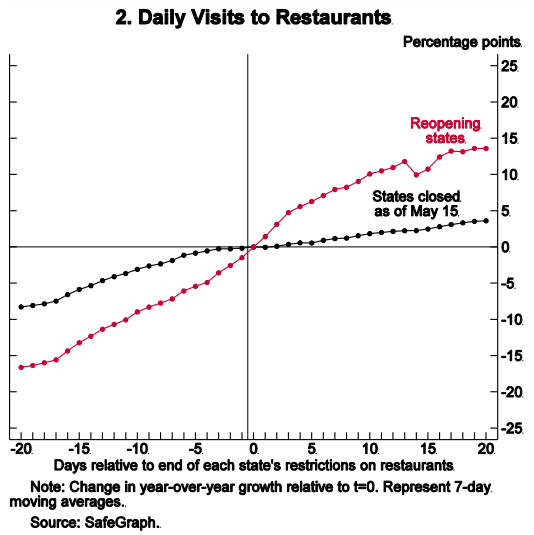
Reopening the Economy amid the COVID-19 Pandemic

In contrast to the sudden and sweeping adoption of social-distancing policies across much of the United States in March, the reopening of the economy in recent weeks has been much more staggered. Before May 15, 24 states had implemented plans to ease limitations on nonessential activities, beginning in late April with Alaska (see figure 1).[1] This discussion utilizes these differential reopening dates to show that economic activity has picked up somewhat in states easing restrictions, but that it is too soon to determine if this has also contributed to an increase in new COVID-19 cases.

There are many challenges in implementing this type of analysis. First, it is very difficult to track and categorize the various state-level restrictions. These orders change frequently, vary according to industry and date, differ in their details, and can be overruled by local governments. Second, few data sources are available at a high enough frequency to conduct this analysis in a timely manner. Third, because of the long incubation period of COVID-19, the effects of these state reopenings on the transmission of the virus will only be observable with substantial lags.[2]

One method for assessing the effect of restrictions on economic activity is to use an event-study framework, comparing outcomes in a state following its reopening with those in other states that continue to maintain restrictions (that is, a control group). To simplify the presentation, the figures that follow represent the average across all reopening states; because these averages are calculated across reopenings that occur on different days, the dates are rescaled to be relative to the reopening date (t=0), with each line indexed to be equal to zero on this date. One metric for analyzing economic activity around these state reopenings is a daily measure of visits to select businesses based on cellphone GPS signals.[3] Figure 2 illustrates changes in restaurant visits for states that had eased restrictions on restaurants (the red line) compared with those states that had maintained restrictions





[1] By the end of May, 41 states will have eased restrictions on nonessential activities.

[2] The analysis in this discussion takes existing data on new cases at face value, though trends in cases may also reflect changes in testing capabilities. More generally, data at this level of frequency in real time exhibit significant noise.

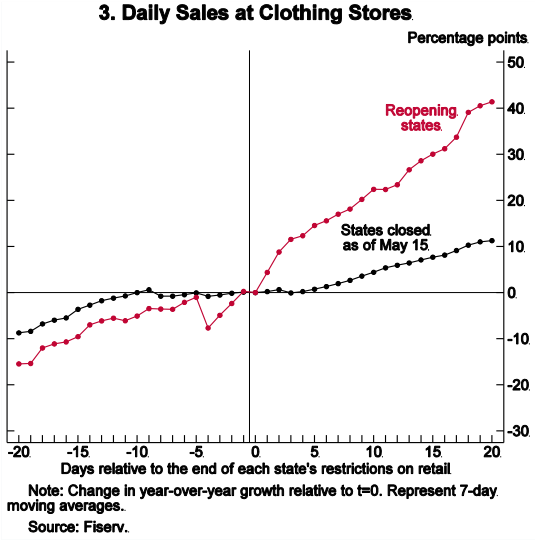
[3] The data are sourced from SafeGraph. The data encompass more than 40 million devices and identify visits to about 3 million establishments.

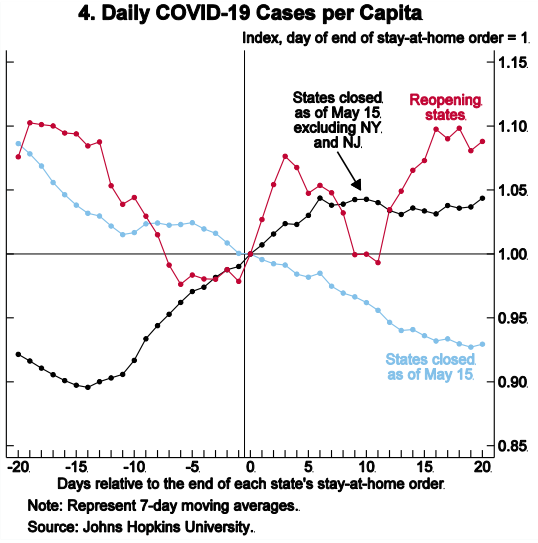
through May 15 (the black line). Figure 2 shows that reopening states had been recording faster increases in restaurant customers even before the restrictions on in-person dining were lifted. In the days following the order, restaurant visits continued to rise in reopening states, while the rate of change in restaurant customers plateaued for states remaining closed. Part of the recovery in both series—particularly in the period before restrictions were eased—could be an expansion of carry-out service.

Figure 3 repeats this event-study exercise for clothing stores but uses daily spending at select merchant locations.[4] The results indicate a larger effect of state reopening for clothing stores than for restaurants based on daily visits; this could reflect the fact that, unlike restaurants—which have the potential to offer takeout—clothing stores should have been largely closed under restrictions on nonessential retail. Nevertheless, not all areas of spending were equally affected by restrictions on in-person visits. A broader measure of retail sales suggests a more modest pickup in spending associated with state reopening (not shown), with current levels still being a far ways off from making up for lost spending during the contraction of the COVID-19 crisis.

The evidence on new cases is summarized in figure 4. States that loosened restrictions on nonessential activities earlier than May 15 (the red line) have failed to achieve the significant declines in new COVID-19 cases seen by the rest of the country (the blue line). Yet, most of these declines have been driven by New York and New Jersey (as shown by the black line); absent these two states, it appears too early to tell whether reopening has led to rising cases.

Taken altogether, this analysis of state reopenings suggests that both demand and supply conditions may be playing a role in recent consumer behavior. On the one hand, indicators were moving up for all states before some began to ease restrictions, suggesting recoveries in underlying demand. On the other hand, notable divergences in the experiences of reopening states versus those remaining closed suggest that supply restrictions may also be a factor.[5]





[4] The data are sourced from Fiserv, a provider of payment processing services.

[5] Although the set of reopening states may have differed along other dimensions affecting the path of recovery, these states had a similar increase in unemployment insurance claims (as a share of covered employment) to those states that remained closed as of May 15.

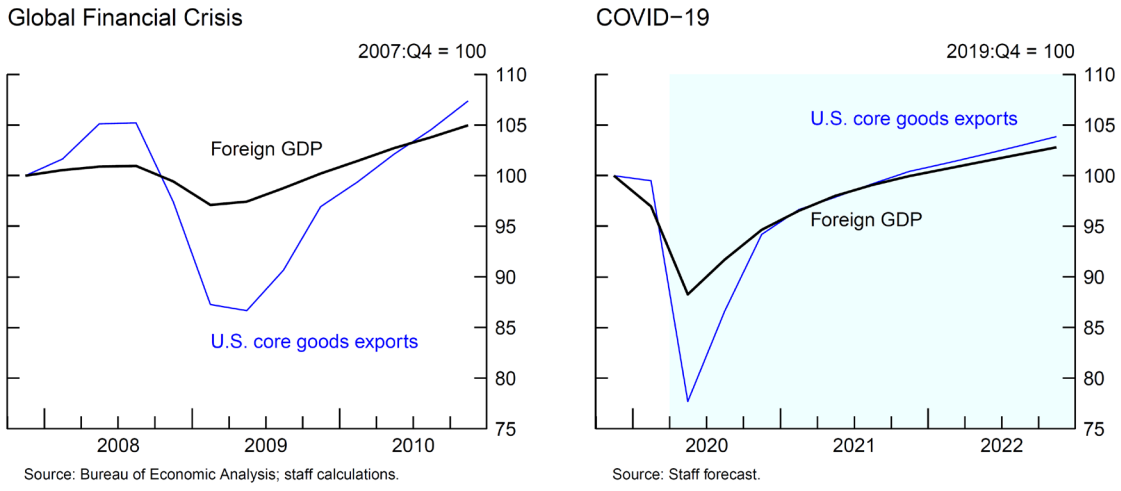
Export Perspectives: A Comparison with the 2008–09 Trade Collapse

U.S. exports are expected to plummet in the first half of 2020. Already in the first quarter, real exports declined 9 percent at an annual rate, and exports will likely fall at a faster pace in the second quarter. Compared with past recessions—and even compared with the "great trade collapse" of the 2008–09 Global Financial Crisis—the current tailspin in trade is expected to be much larger, both because the drop in foreign growth is especially deep this time and because this episode features an unusual hit to services exports.

Although the drop in the first half of 2020 in foreign GDP is dramatic, we forecast goods exports to drop far more than foreign GDP (figure 1, right panel). This prediction incorporates a pattern we already saw in the great trade collapse: Goods exports are more responsive to foreign GDP during recessions than in normal times. This heightened sensitivity reflects that a majority of the products that compose international goods trade are durable goods and the intermediate goods used to make them. During downturns, consumers and firms postpone purchases of durables and capital expenditures more than other expenditures, and, as a consequence, trade falls relatively more sharply than GDP. Although this current collapse in foreign GDP caused by COVID-19 does reflect a greater decline than usual in foreign countries' own services demand, the decline in foreign demand for tradable goods is still expected to outpace that of overall foreign GDP. Looking ahead, we expect exports to pick up in the second half of 2020 as foreign growth begins to recover.

Along with the sharp decline in goods exports, we also expect a sharp decline in U.S. exports of services, which did not happen during the 2008–09 great trade collapse. The decline in U.S. exports of services reflects the near halt of

Figure 1: Real Goods Exports and Foreign GDP



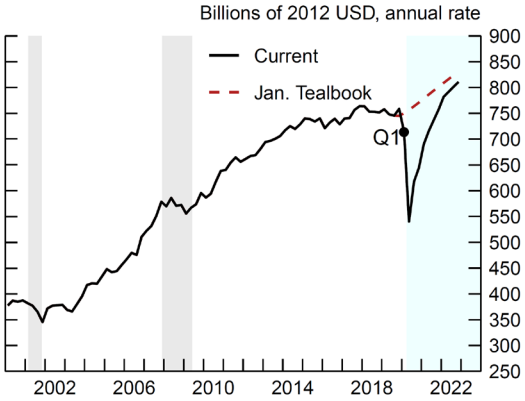
Source: Bureau of Economic Analysis; staff calculations.

Source: Staff forecast.

international travel to the United States, which started in March. Though travel services make up only about one-fourth of U.S. services exports, their steep decline is playing an outsized role in the contour of total U.S. trade. We expect very little international travel in the second quarter, only about half the normal level at the end of 2020, and a full recovery no earlier than the beginning of 2022. These reductions in travel cause services exports and imports to both fall dramatically and remain below our pre-COVID-19 path through 2022 (figures 2 and 3).

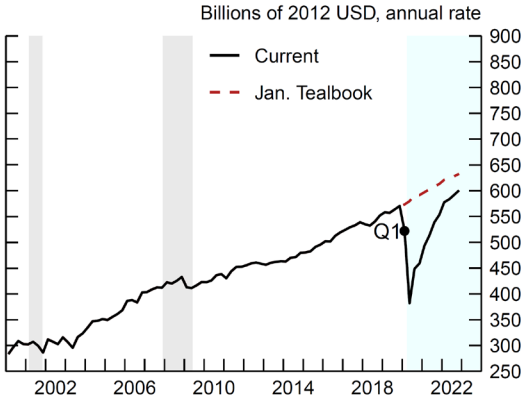
Despite a historic trade collapse in the baseline forecast, risks to the export outlook are still tilted to the downside. Second waves of COVID-19 may lead to a renewal of widespread lockdowns in both the United States and abroad, leaving trade depressed throughout the medium term. The recovery in trade may also face renewed headwinds from adverse trade policy developments. Tensions between China and the United States are mounting again. In addition, several countries, including the United States, have imposed export bans or restrictions on products related to the pandemic response, which could last for some time. Intensifying protectionism and uncertainty about trade policy may impede a recovery in trade and weigh on growth and productivity worldwide.

Figure 2: Real Exports of Services



Note: Gray shading indicates NBER recession.
Source: Bureau of Economic Analysis; staff forecast.

Figure 3: Real Imports of Services



Note: Gray shading indicates NBER recession.
Source: Bureau of Economic Analysis; staff forecast.

The Labor Market

- As reported by the BLS, **payrolls** were hammered by the pandemic, with net job losses totaling more than 20 million in April. Balancing the signals from unemployment insurance claims, information on mandatory closures, estimated support from the Paycheck Protection Program, and the ADP microdata, we anticipate payrolls will decline another 4 million in May before turning up in June as businesses reopen and furloughed workers return.
    - Unemployment insurance filings remain extremely elevated, although they have moderated from their peak. Roughly 2 million claims were filed for unemployment insurance benefits in the week ended May 23. (Claims do not map one-for-one into payroll employment. See the box "Initial Claims and Payroll Employment" for more details.)
    - Weekly estimates of payrolls constructed from ADP microdata indicate employment may be bottoming out, or even turning up, in May.
- With these massive job losses, the **unemployment rate** jumped 10 percentage points to 14.7 percent in April, the largest monthly increase on record. Further, the BLS indicated that misclassification of laid-off workers as employed may have led to an understatement of the unemployment rate by as much as 5 percentage points. We anticipate ongoing job losses will drive the reported unemployment rate up further, to 18 percent in May, before it falls back to 12 percent in June.

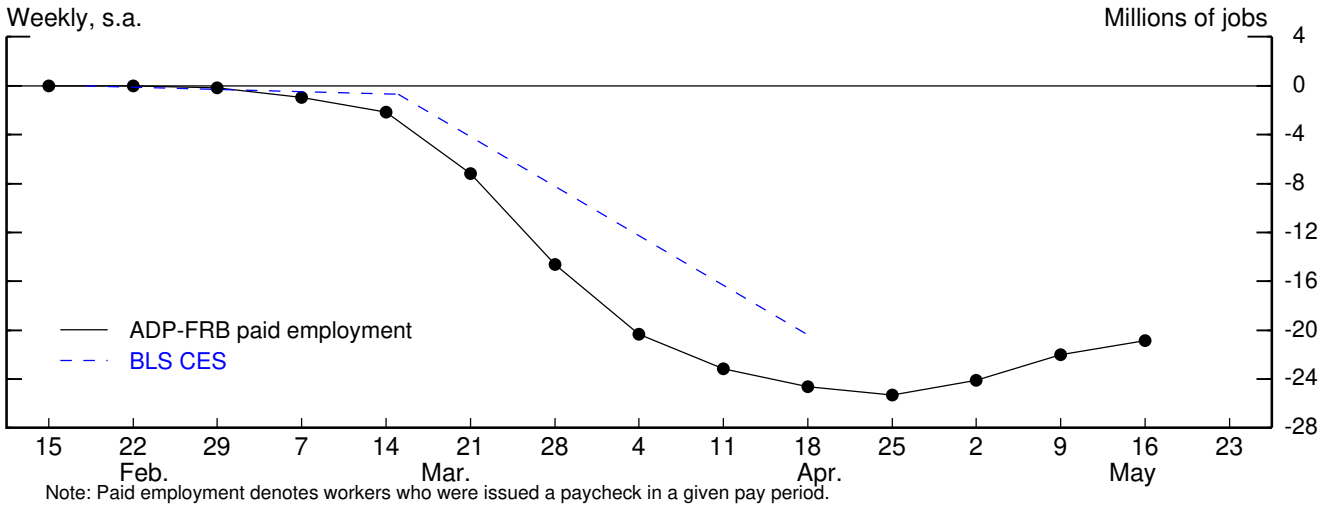
Near-Term Labor Market Forecast

	2020				2020	
Labor market indicator	Mar.	Apr.	May	June	Q3	Q4
Payroll employment [1]	-880	-20,540	-4,420	9,070	1,760	480
Unemployment rate (percent)	4.4	14.7	17.9	11.6	9.9	9.3
LFPR (percent)	62.7	60.2	60.2	60.4	61.2	61.9
EPOP (percent)	60.0	51.3	49.4	53.4	55.2	56.2

Note: LFPR is labor force participation rate and EPOP is employment-to-population ratio.
1. Average monthly change, thousands, rounded to nearest 10,000.
Source: Bureau of Labor Statistics; staff calculations.

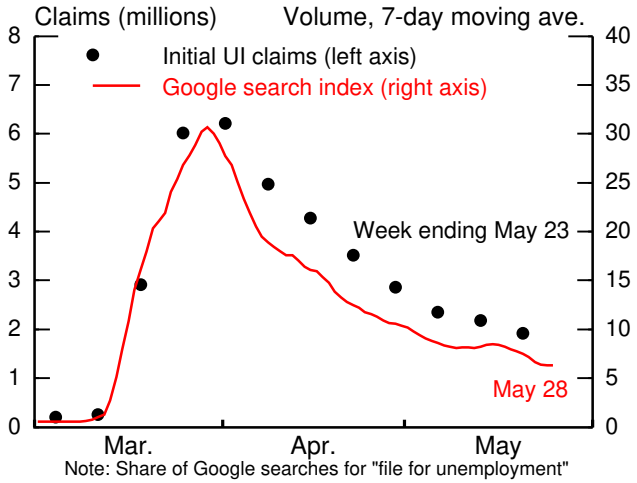
Labor Market

Cumulative Job Loss since February 15, 2020



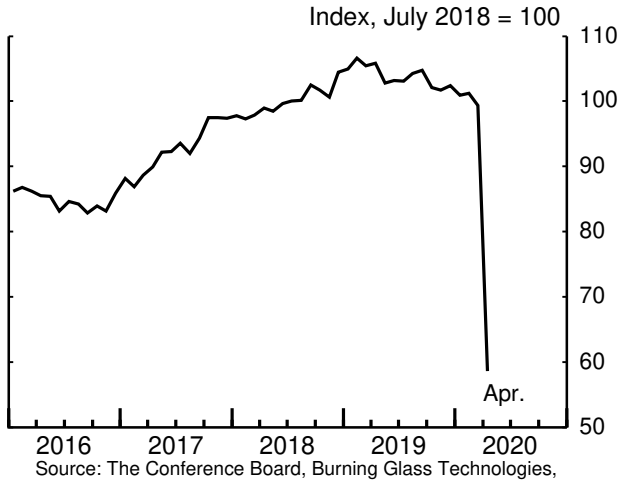
Note: Paid employment denotes workers who were issued a paycheck in a given pay period.
Source: BLS, ADP, staff estimates.

Initial UI Claims and Google Searches



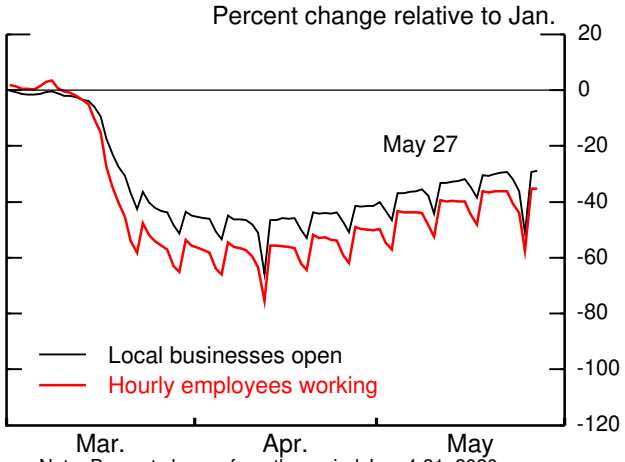
Note: Share of Google searches for "file for unemployment" relative to March 8 to 14 period.
Source: Department of Labor, Google.

Help Wanted Online Index



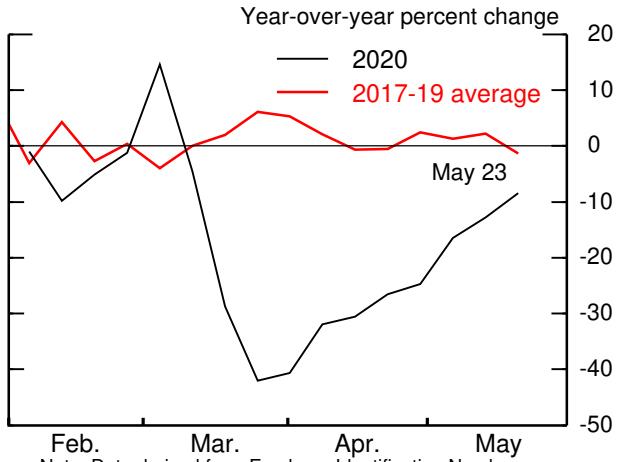
Source: The Conference Board, Burning Glass Technologies, Bureau of Labor Statistics.

Small Business Activity



Note: Percent change from the period Jan. 4-31, 2020.
Source: Homebase. Data show their customer base of 60,000 small businesses, which are concentrated in leisure, hospitality, and retail industries.

New Business Applications



Note: Data derived from Employer Identification Number applications. Series include all applications indicating a planned date for paying wages.
Source: U.S. Census Bureau.

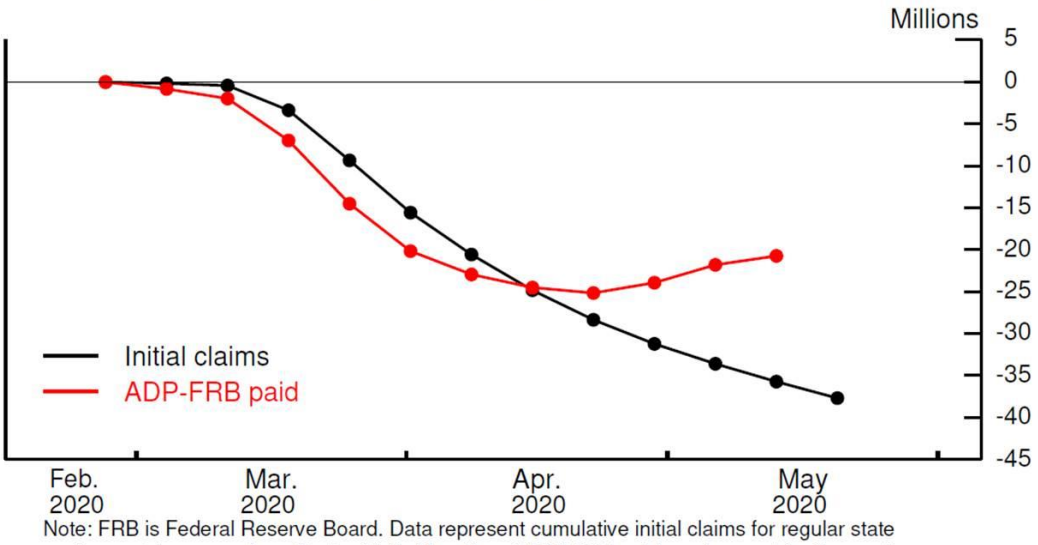
Initial Claims and Payroll Employment

Two of the most informative indicators of the extent of the labor market downturn have been initial claims for unemployment insurance (UI) and payroll employment. Staff labor market projections rely importantly on each. This discussion reviews reasons why these two measures of the labor market effect of COVID-19 can differ. The discussion applies to both Bureau of Labor Statistics (BLS) payroll data and ADP-FRB payroll data, but we focus on ADP-FRB data because they are weekly—facilitating comparisons with initial claims—and extend well beyond the April reference week, the last data point for BLS payroll data.

As of the week ending May 16, cumulative non-seasonally-adjusted initial claims since the end of February totaled 36 million, while the net decline in the ADP-FRB measure of payroll employment totaled 21 million.[1] The net change in payroll employment can be thought of as the sum of individuals who have become employed over that period (gross job gains) minus the sum of individuals who have moved out of employment (gross job losses). Initial claims are an indicator of gross job losses and, as a result, would normally be expected to be greater than the net decline in employment given that gross job gains, though greatly diminished, remain significant: The number of individuals moving into employment between mid-March and mid-April, for example, was 4.6 million.

However, in the early weeks of the downturn, cumulative claims likely significantly understated the amount of gross job losses because of the time lag between the date of job loss and the processing of an

Initial Claims and ADP Payroll Employment



Note: FRB is Federal Reserve Board. Data represent cumulative initial claims for regular state unemployment insurance benefits (multiplied by -1) and ADP-FRB paid employment for firms active in consecutive weeks as calculated by FRB staff using ADP payroll data.
Source: For initial claims, Department of Labor. For ADP, ADP microdata.

[1] Most press reports have focused on seasonally adjusted initial claims, which totaled 39 million from the end of February through May 16. However, claims tend to be seasonally low in March, April, and May, leading standard seasonal adjustment procedures to exaggerate the number of claims filed in response to the severe labor market downturn.

The ADP-FRB series does not include employment losses due to business exit, though we are currently developing a series that does account for these losses. Preliminary estimates suggest that cumulative employment losses due to business exit from the ADP sample since February would subtract roughly 1 million from the latest reading of the ADP-FRB paid employment series shown in the figure.

initial claim. This lag could result from individuals waiting before applying for UI and from processing delays at state UI agencies—it may be one reason why claims have continued to accumulate at an unprecedented pace despite an apparent flattening out in the level of payroll employment in recent weeks. Another reason cumulative claims may understate gross job losses regardless of timing lags is that not all job losers file for unemployment insurance. However, given the strong incentives to apply for UI provided by the Cares Act, we would expect nearly all individuals who lost a job without quickly finding another to have filed a claim.[2]

More recently, as processing delays at state UI agencies have eased, cumulative initial claims may be overstating gross payroll job losses because the Pandemic Unemployment Assistance (PUA) program, a component of the Cares Act, expanded UI eligibility to self-employed and gig workers. These workers are not included in firm payrolls. However, because almost all states require self-employed and gig workers to first file (and be rejected) for regular UI benefits before filing for PUA, initial claims data reflect employment losses for these workers. As a rough gauge of the importance of this factor, the mid-March to mid-April decline in unincorporated self-employment reported by the BLS was 1.2 million.[3]

Another reason cumulative claims may be overstating gross job losses more recently is that many of the nearly 4 million individuals who were unemployed but did not receive UI compensation before March have likely filed claims since then because UI is both more widely available and generous and because job-finding prospects have worsened. It is also likely that claims have been boosted, and perhaps significantly, by fraudulent claims and multiple claims filed per person, though it is difficult to gauge the extent of either factor.

Putting these pieces together, cumulative claims early on in the downturn were unlikely to have captured the full extent of the enormous number of gross payroll job losses. More recently, though, cumulative claims may be overstating these losses. The transition from understatement to possible overstatement of gross job losses, together with still-significant gross job gains, have led cumulative claims to well exceed the cumulative net decline in payrolls in recent weeks, and we expect this pattern to continue going forward.

Many observers have also compared cumulative initial claims with the change in the number of individuals whose claims for regular state UI or PUA benefits have been accepted or are pending, which can be loosely thought of as the change in the number of individuals drawing UI benefits. From the end of February through May 9 (the latest date for which data are available) the change in the number of these individuals was 29 million. This total is somewhat less than the 34 million cumulative initial claims over this period because some claimants have been rejected, some UI recipients have found jobs, and some individuals have filed multiple claims.

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[2] The Cares Act increased weekly UI benefits by $600, expanded eligibility for UI, and increased the maximum duration of UI benefits.

Multiple job holding may also cause claims to understate gross payroll job losses. An individual who held two jobs before March and lost one of them subsequently may not have filed an initial claim. An individual who lost two jobs would have likely filed one claim, though two payroll jobs were lost. Between mid-March and mid-April, the number of individuals with multiple jobs dropped by 1.8 million.

[3] The number of individuals filing claims for PUA provides another gauge of the reduction in self-employment and gig work. As of May 9, PUA claimants totaled nearly 8 million. Not all states have started reporting PUA claims, suggesting that this figure may understate employment losses for the self-employed. However, the figure of 8 million could overstate losses because the BLS estimates that self-employment was only 9.5 million in February and because PUA is also open to wage and salary workers who did not meet the earnings thresholds for regular UI benefits and to workers who left their jobs for reasons related to COVID-19.

- The **labor force participation rate** (LFPR) sank 2.5 percentage points to 60.2 percent in April, as stay-at-home orders, a drop in job openings, and concerns about the risk posed by the viral outbreak were disincentives to actively search for work.

- The unemployment rate rose in April by a bit less than we expected, but the LFPR fell by a good bit more. When the two are put together, the **EPOP ratio** plunged 8.6 percentage points to 51.3 percent, 1 percentage point lower than we expected in the April Tealbook.

THE MEDIUM-TERM OUTLOOK FOR REAL ACTIVITY

Economic activity is projected to rebound in the second half of 2020, as social distancing diminishes while public health efforts help contain the spread of the disease. Even so, a degree of drag from social distancing persists until a viable vaccine is in hand in the second half of 2021. As a result, GDP ends 2020 more than 7 percent below its level of a year earlier and only returns to its pre-recession level at the start of 2022. Similarly, after peaking at 18 percent in May, the unemployment rate falls to 9.3 percent by the fourth quarter of this year and then moves down steadily to 5.7 percent at the end of 2021. With GDP growth projected to remain above trend in 2022, unemployment falls to 4.5 percent at the end of that year.

The table below presents a judgmental split of the COVID-19 effects on GDP growth into five components: (1) the direct effects from social distancing and other disruptions, (2) fiscal stimulus, (3) standard macro dynamics, (4) recessionary dynamics, and (5) potential output.

The Contour of Real GDP Growth and COVID-19 Effects
(Contributions to annualized percent change)

	2020				2020	2021	2022
	Q1	Q2	Q3	Q4	Q4/Q4	Q4/Q4	Q4/Q4
Real GDP	- 5.0	-41.0	24.1	7.0	- 7.1	6.7	3.6
April Tealbook	*- 5.9*	*-37.4*	*28.9*	*10.4*	*- 4.3*	*4.4*	*2.8*
COVID-19 effects	**- 7.2**	**-43.6**	**21.4**	**4.6**	**- 9.6**	**4.6**	**1.9**
1. Social distancing and other disruptions	- 8.4	-45.3	33.6	9.2	- 6.1	6.4	.0
2. Fiscal stimulus	.6	16.7	3.7	- 3.3	4.4	- 2.7	- .6
3. Standard macro dynamics	.9	- 5.3	- 6.2	- 2.7	- 3.5	2.7	- .2
4. Recessionary dynamics	- .3	- 8.8	- 8.9	2.3	- 3.7	- .7	2.9
5. Potential output	.0	- .9	- .9	- .9	- .7	- 1.2	- .2

- **Social-distancing** effects, including mandatory business shutdowns, stay-at-home orders for households, and voluntary isolation, leave a colossal negative imprint on GDP in the second quarter that unwinds by the end of 2021, when the baseline forecast assumes behavior largely returns to normal.

- **Fiscal stimulus** provides massive support in the middle of 2020 but is a drag on growth in 2021 as the spending effect unwinds.

- The second-half rebound in activity is restrained by the effects of **standard macro dynamics**, which capture the usual response of household and business spending to lower income, profits, and wealth.

- **Recessionary dynamics**, which are the additional negative forces that are particularly active during recessions, weigh heavily on output for the remainder of 2020 and in 2021. During recessions, households' discretionary purchases and business investment tend to decline beyond the standard effects of income and profits, driven by heightened pessimism, risk aversion, and reduced access to credit. Furthermore, pre-existing imbalances, such as economic inequality and excessive corporate debt, may end up compounding the effect of this especially large economic shock.

- Output growth is also held down by a reduction in the growth rate of **potential output**. A projected surge in permanently laid-off workers, who typically experience longer-than-normal spells of unemployment as they seek new jobs, has led us to increase our assumption for the path of the natural rate of unemployment over the medium term. We have also lowered our assumptions for structural productivity growth in response to weaker capital investment and as permanent business closures destroy organizational capital.

- **Monetary policy** actions taken during the pandemic affect growth through multiple channels. The reduction in the federal funds rate to its effective lower bound and ongoing asset purchases operate through standard macro dynamics, lowering the cost of business and household borrowing. The raft of new lending programs serves to temper the reduced access to credit that arises through recessionary dynamics. As both of these actions encourage investment and reduce business closures, they contribute over time to

potential output growth by limiting the declines in the capital stock and therefore labor productivity.

- Compared with the April Tealbook, the COVID-19 effects are a greater drag on activity in 2020: Although fiscal stimulus is more front-loaded within the year, social distancing restrains growth somewhat more in 2020 and recessionary dynamics are a greater drag than previously estimated both this year and next. All told, GDP drops by more in 2020, and the path of recovery is steeper in 2021 and 2022. The level of GDP at the end of the medium term is little revised relative to the April Tealbook.

THE OUTLOOK FOR INFLATION

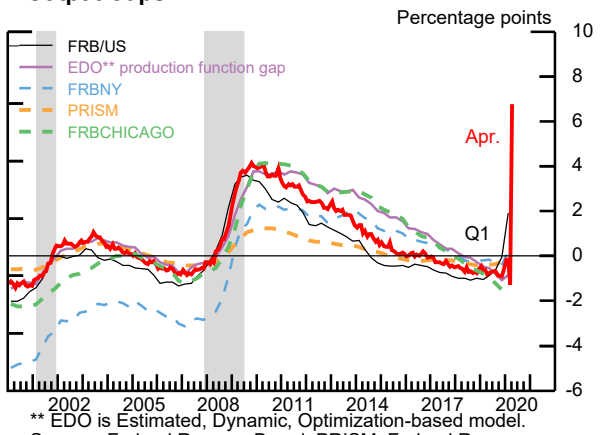
Both core and total PCE prices fell over March and April, dragged down by plunging prices for categories most directly affected by voluntary social distancing. We expect prices to partially recover in the second half of the year as economic activity picks up; nevertheless, with substantial domestic and foreign economic slack remaining, inflation this year runs well below its level before the onset of the pandemic. Importantly, longer-term inflation expectations are assumed to hold reasonably stable, as they did during the financial crisis, limiting the extent and persistence of this decline in inflation. Thus, with economic slack diminishing further after this year, we expect core inflation to move back up, reaching 1.7 percent in 2022. Given the recent sharp drop in energy prices, which more than outweighs a sizable increase in food prices, total PCE price inflation is projected to be lower than core PCE inflation this year and then move up in line with core thereafter. Our projection for core PCE inflation in 2020, at 1.1 percent, is 0.3 percentage point lower than in the April Tealbook due to greater projected economic slack and sharper-than-expected declines in the incoming price data.

- **Both core and total PCE** prices fell in March and April, leaving the 12-month changes at 0.5 percent and 1.0 percent, respectively, down markedly from 1.8 percent in February. The **latest monthly readings** bear the imprint of both supply and demand effects of the pandemic. Prices fell dramatically for categories most directly affected by voluntary social distancing, such as airfares, accommodations, and apparel. In addition, there were marked declines in the price index for portfolio management, part of nonmarket prices. Meanwhile, increases in food prices likely were exacerbated by disruptions in supply chains.

Alternative Measures of Slack

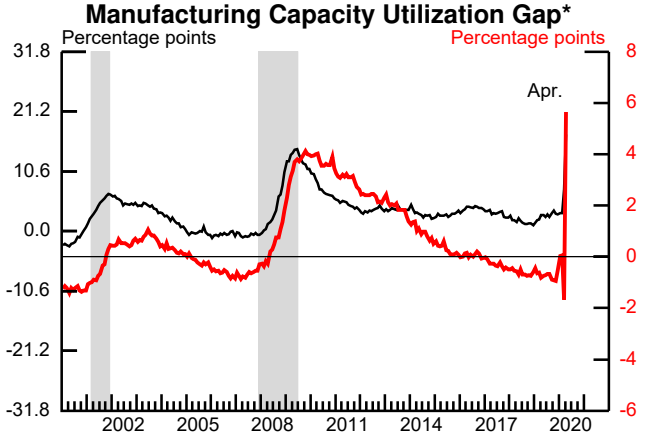
The red line in each panel is the staff's measure of the unemployment rate gap (right axis).

Output Gaps



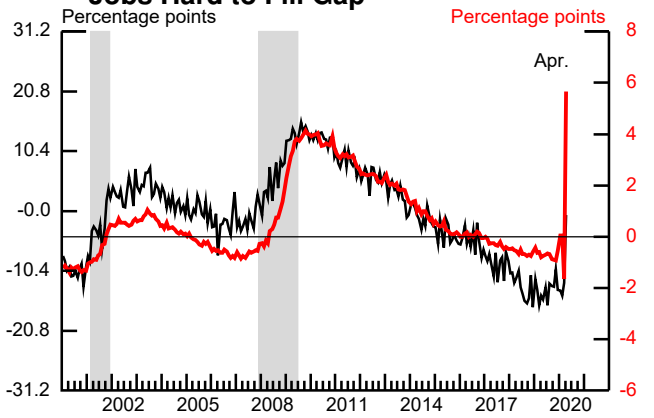
** EDO is Estimated, Dynamic, Optimization-based model.
Source: Federal Reserve Board; PRISM: Federal Reserve Bank of Chicago; Federal Reserve Bank of Philadelphia, PRISM Model Documentation (June 2011); FRBNY: Federal Reserve Bank of New York Staff Report 618 (May 2013, revised April 2014).

Manufacturing Capacity Utilization Gap*



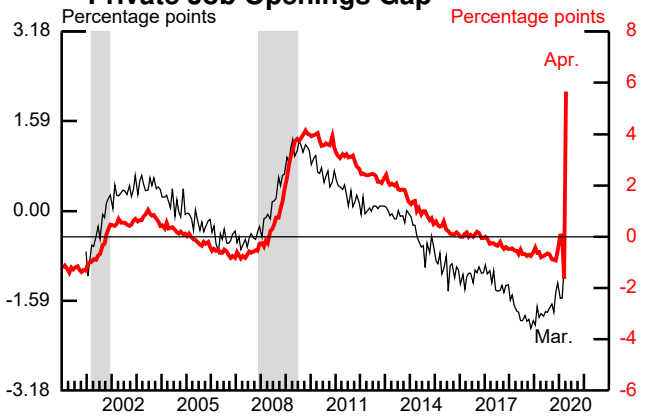
Source: Federal Reserve Board.

Jobs Hard to Fill Gap*



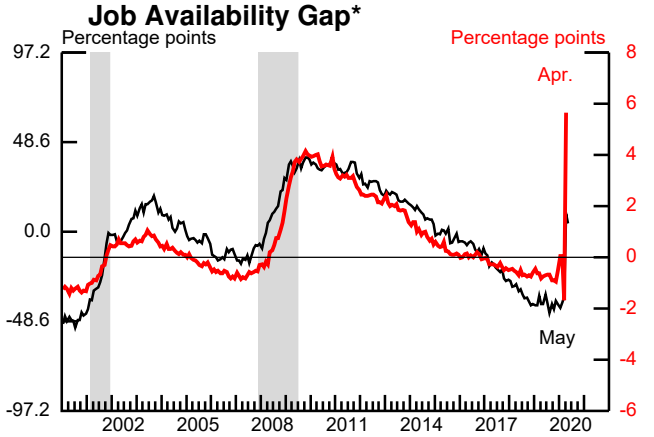
Note: Percent of small businesses surveyed with at least one "hard to fill" job opening. Seasonally adjusted by Federal Reserve Board staff.
Source: National Federation of Independent Business, Small Business Economic Trends Survey.

Private Job Openings Gap*



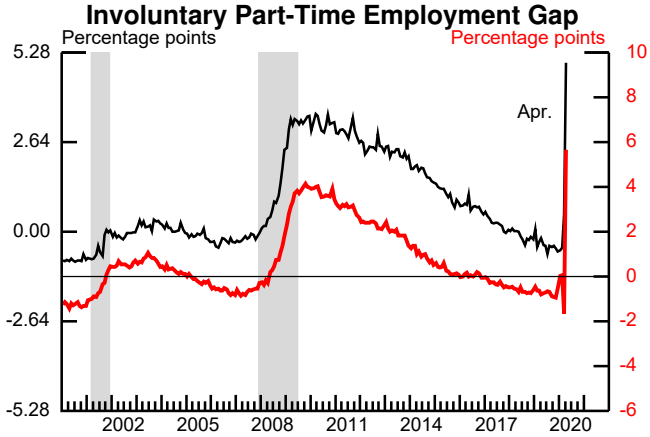
Note: Job openings rate is the number of job openings divided by employment plus job openings.
Source: Job Openings and Labor Turnover Survey; U.S. Department of Labor, Bureau of Labor Statistics, Current Employment Statistics.

Job Availability Gap*



Note: Percent of households believing jobs are plentiful minus the percent believing jobs are hard to get.
Source: Conference Board.

Involuntary Part-Time Employment Gap



Note: Percent of employment.
Source: U.S. Department of Labor, Bureau of Labor Statistics, Current Population Survey.

* Plots the negative of the gap to have the same sign as the unemployment rate gap.
Note: The shaded bars indicate a period of business recession as defined by the National Bureau of Economic Research. Output gaps are multiplied by negative 0.52 to facilitate comparison with the unemployment rate gap. Manufacturing capacity utilization gap is constructed by subtracting its average rate from 1972 to 2018. Other gaps were constructed by subtracting each series' average in 2004:Q4 and 2005:Q1.

- The recent price softness has been fairly widespread, and the staff's measure of "common core" inflation has declined notably. Even so, the Dallas Fed's trimmed mean measure, an alternative inflation measure intended to reduce the influence of idiosyncratic price movements, fell less than the core PCE measure over the same time period. Its 12-month change declined from 2.1 percent in February to 1.9 percent in April.

- In the **near term**, we expect core prices to pick up, but reversing the effects of the recent drops could be a protracted process. We expect the 12-month change in core inflation to bottom out 0.9 percent in the summer and edge up to just 1.1 percent by year-end.

- Given the recent declines in core and consumer energy prices, the 12-month change in **total PCE prices** stepped down from 1.8 percent in February to only 0.5 percent in April, and we expect it to remain between 0.6 and 0.7 percent through the summer.

- In contrast, prices for **food at home** rose at an unprecedented rate in April, pushing the 12-month change from below 1 percent in February to nearly 4 percent in April. While we expect consumer food price inflation to slow after April , there remains a notable upside risk to our forecast from worsening supply chain disruptions attributable to a lack of farm workers, additional closings of food-processing facilities, and continuing difficulties shifting output from the supply chain for restaurants to food destined for grocery stores.

- Lower **import prices** are another channel through which the global economic decline is expected to contribute to soft inflation this year. We expect that the effective (that is, tariff-inclusive) prices for imported core goods will decline about 1.3 percent this year, reflecting the drag from a higher dollar and lower commodity prices. Starting next year, effective core import price inflation is expected to pick up to about 1 percent, a still-subdued pace.

- Despite the tumultuous situation, **longer-term inflation expectations** are only little changed on balance. The Michigan 5-to-10-year measure moved up to 2.7 percent in May, above the high end of its recent range. At the same time,

median long-run expectations from the Survey of Professional Forecasters ticked down 0.1 percentage point to 1.9 percent in the second quarter. This reading is historically low for this measure, but the change was driven by lower inflation expectations for the next couple of years. Breakeven inflation from TIPS, at 1.4 percent, is roughly unchanged since the April Tealbook but is down nearly 0.4 percentage point from the beginning of the year; as usual in periods of market stress, these movements likely reflect liquidity and risk premiums more than expected inflation. Combining these and other expectations measures, the staff's common inflation expectations index is little changed from the beginning of the year but lower than its level from a couple of years ago.

Labor Compensation

We expect the tremendous increase in labor market slack to put downward pressure on labor compensation. Reliable current data are limited, as some of the measures are importantly affected by composition effects and others are outdated.

- Anecdotal reports of **cuts to wages and benefits**—including in the Beige Book—are fairly widespread, and we expect them to more than offset reports of premium pay for scarce workers in essential industries. Wage indicators based on surveys by the National Association for Business Economics and the National Federation of Independent Business show sharp declines in the net percentage of firms reporting an increase in worker compensation.

- The Federal Reserve Bank of Atlanta's wage growth measure, which tracks the median 12-month wage growth of individuals reporting to the Current Population Survey and who were employed both in the current survey and 12 months earlier, moved down for a second consecutive month but still shows moderate gains.

- Other common wage measures are marred by sizable recent changes in the composition of the workforce. In particular, the 12-month change in **average hourly earnings** skyrocketed to nearly 8 percent in April. The large gain resulted from the relatively greater reduction in hours for lower-paid hourly workers, which has shifted the composition of employment toward higher-paid work. The same compositional effects will leave an imprint on compensation per hour in the business sector, which we expect to increase at

an annual rate 15 percent in the second quarter. These compositional effects should reverse as payrolls recover.

THE LONG-TERM OUTLOOK

As recessionary influences fade, the economy returns to being governed by standard macroeconomic dynamics.

- The natural rate of unemployment is assumed to gradually edge down from 4.7 percent in 2022 to its longer-run value of 4.3 percent in the second half of this decade. Potential output growth is 1.8 percent in early 2023 and gradually decreases toward its long-run value of 1.7 percent afterward.

- The real long-run equilibrium federal funds rate is still assumed to be 0.5 percent, and the nominal yield on 10-year Treasury securities is 3.0 percent in the longer run.

- As in the April Tealbook, we assume that the long-term federal debt-to-GDP ratio is 125 percent. While the elevated level of federal debt puts upward pressure on longer-term interest rates, we assume that the increase in the size of the SOMA portfolio offsets much of that pressure, leaving the term premium on the 10-year Treasury yield in the longer run unchanged.

- Core PCE price inflation increases from 1.7 percent at the end of the medium term to its long-run value of 2.0 percent in 2024. Given this subdued path for core inflation, the nominal federal funds rate increases only slowly from 0.1 percent at the end of 2022 to 2.2 percent in 2025.

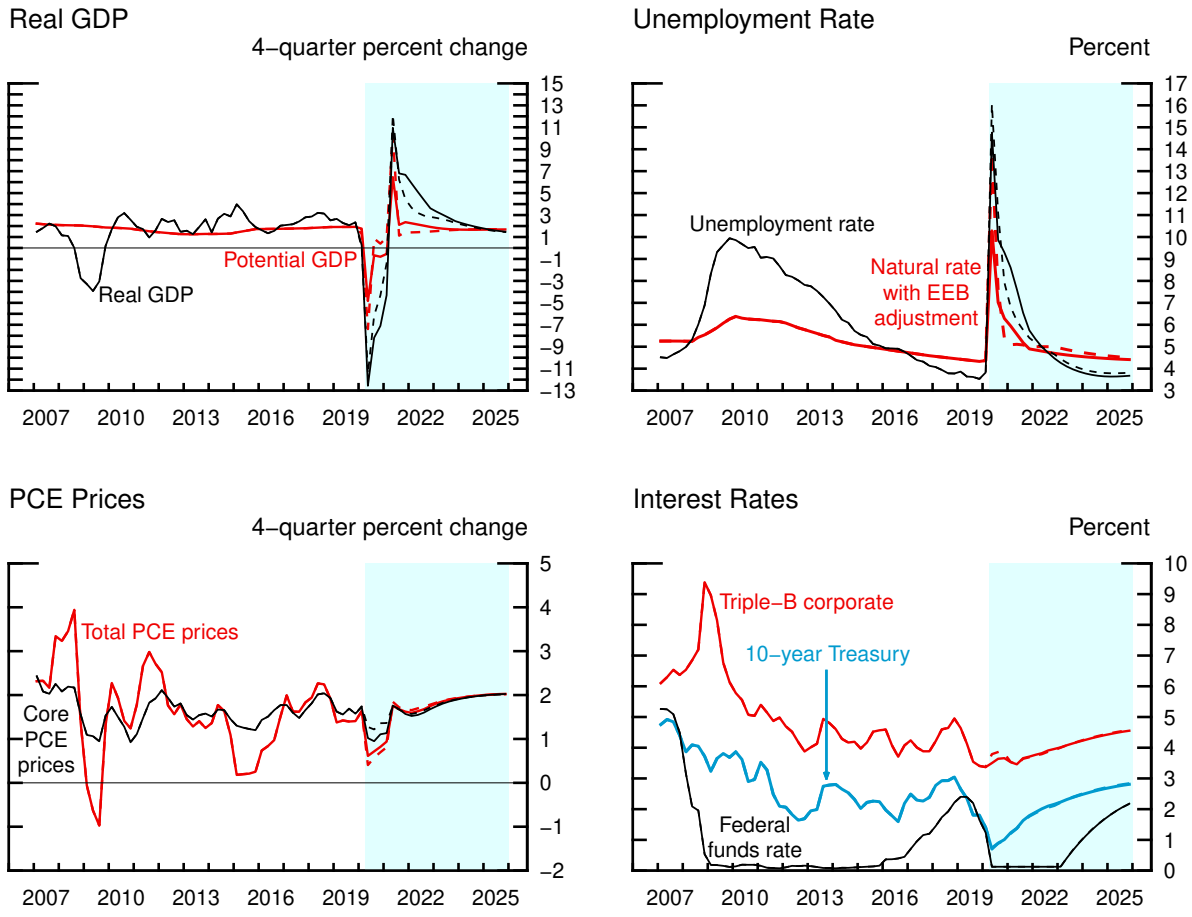
- As monetary policy is assumed to be moderately accommodative beyond the medium term, the unemployment rate continues to fall from 4.5 percent at the end of 2022 to 3.6 percent in 2024 before rising gradually to its long-run value thereafter. GDP growth moves down from 3.6 percent in 2022 to 1.5 percent in 2025 and moves up to its long-run value of 1.7 percent afterward.

The Long–Term Outlook

(Percent change, Q4 to Q4, except as noted)

Measure	2020	2021	2022	2023	2024	2025	Longer run
Real GDP	-7.1	6.7	3.6	2.4	1.8	1.5	1.7
Previous Tealbook	*-4.3*	*4.4*	*2.8*	*2.3*	*1.8*	*1.4*	*1.7*
Civilian unemployment rate[1]	9.3	5.7	4.5	3.9	3.6	3.7	4.3
Previous Tealbook	*7.9*	*5.4*	*4.7*	*4.0*	*3.8*	*3.8*	*4.3*
PCE prices, total	.8	1.6	1.7	1.9	2.0	2.0	2.0
Previous Tealbook	*.7*	*1.7*	*1.8*	*1.9*	*2.0*	*2.0*	*2.0*
Core PCE prices	1.1	1.6	1.7	1.9	2.0	2.0	2.0
Previous Tealbook	*1.4*	*1.6*	*1.7*	*1.9*	*2.0*	*2.0*	*2.0*
Federal funds rate[1]	.13	.13	.13	.91	1.67	2.18	2.50
Previous Tealbook	.13	.13	.13	.92	*1.68*	*2.17*	*2.50*
10-year Treasury yield[1]	1.0	1.8	2.2	2.5	2.7	2.8	3.0
Previous Tealbook	*1.0*	*1.8*	*2.1*	*2.5*	*2.7*	*2.8*	*3.0*

1. Percent, average for the final quarter of the period.



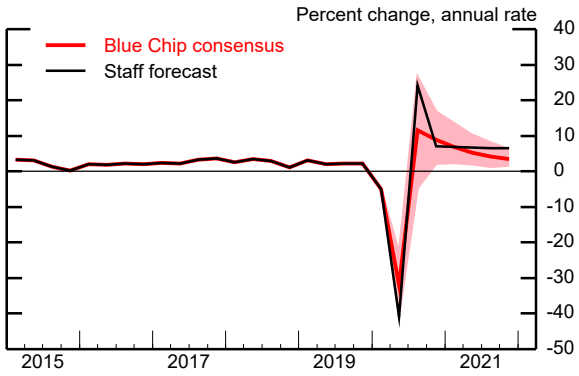
Note: In each panel, shading represents the projection period, and dashed lines are the previous Tealbook.

COMPARING THE STAFF PROJECTION WITH OUTSIDE FORECASTS

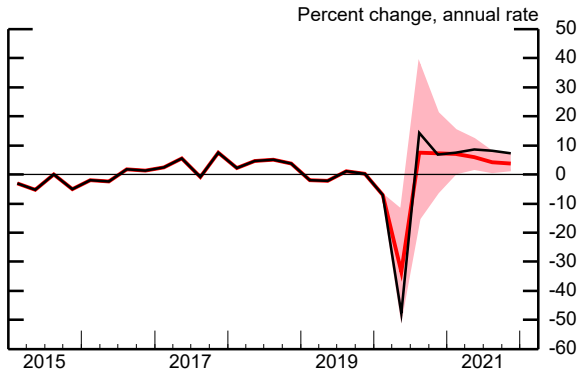
Although the staff forecasts for GDP and the unemployment rate are close to those from the Blue Chip consensus forecast for the second quarter, the staff is noticeably more optimistic next quarter. However, the Blue Chip consensus dates from the first week of May, and the staff projection for the second half of the year is aligned with more recently released outside forecasts for GDP (these individual projections can be seen in the table and charts following the Blue Chip exhibit). For 2021, the staff forecast for GDP is near the high end of the range of outside forecasts. The dispersion of forecasts among Blue Chip participants for GDP growth next year is substantial, with the middle 50 percent of forecasters ranging from 3 to 5 percent, a spread that is appreciably wider than the forecasts at the onset of the financial crisis.

Tealbook Forecast Compared with Blue Chip
(Blue Chip survey released May 10, 2020)

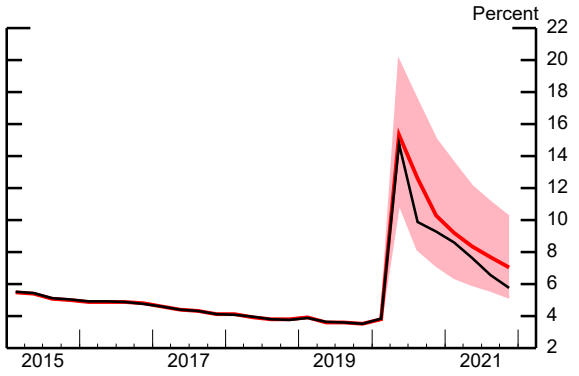
Real GDP



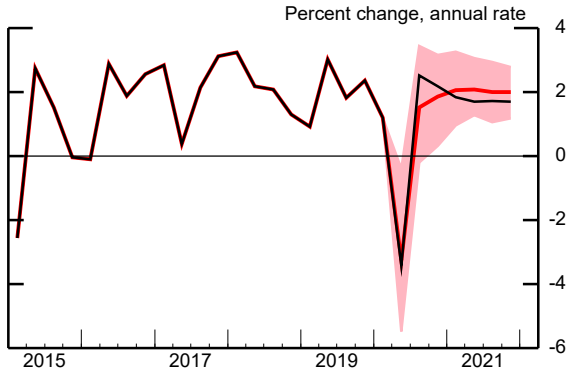
Industrial Production



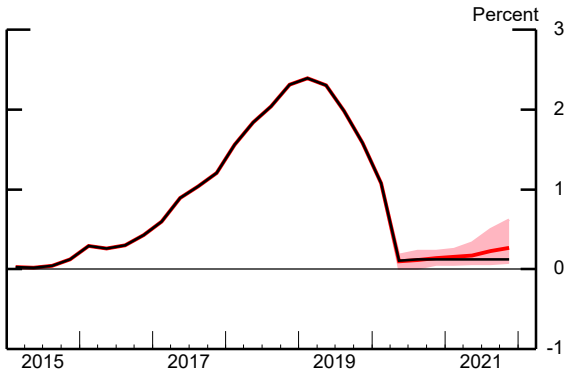
Unemployment Rate



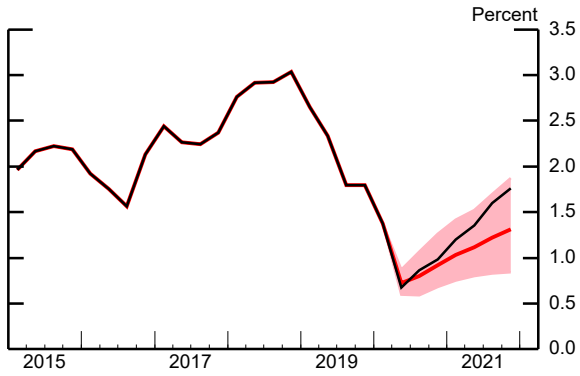
Consumer Price Index



Treasury Bill Rate



10-Year Treasury Yield



Note: The yield is for on-the-run Treasury securities. Over the forecast period, the staff's projected yield is assumed to be 3 basis points below the off-the-run yield.

Note: The shaded area represents the area between the Blue Chip top 10 and bottom 10 averages.

Comparison of Staff and Outside Forecasts for Real GDP Growth

Source	Date of forecast	2020				2020	2021
		Q1	Q2	Q3	Q4		
IHS Markit[1]	May 29	-5.0	-42.9	6.1	9.4	-8.5	7.8
J.P. Morgan[2]	May 29	-5.0	-40.0	23.0	10.0	-6.2 **	3.5 *
Goldman Sachs[3]	May 28	-6.5	-39.0	29.0	11.0	-5.2 **	5.9 **
Pantheon Macroeconomics	May 28	-4.8	-40.0	30.0	10.0	-4.9 **	n.a.
Barclays	May 27	-4.8	-40.0	25.0	8.0	-6.3 **	4.0 **
Morgan Stanley	May 22	-4.8	-37.9	20.7	15.9	-4.6 **	5.3 *
Nomura	May 22	-4.8	-49.2	30.0	5.2	-9.8 **	6.1 **
Citi	May 21	-4.8	-27.6	22.2	9.9	-2.0 **	4.1 *
UBS	May 20	-4.8	-35.2	2.0	5.5	-9.7	6.9
CBO	May 19	-4.8	-37.7	21.5	10.4	-5.6	4.4 *
Survey of Professional Forecasters	May 15	n.a.	-32.2	10.6	6.5	-5.6 *	3.1 *
Wells Fargo	May 14	-4.8	-24.7	6.7	4.4	-5.5 **	2.3 **
Blue Chip	May 10	-4.8	-32.1	11.6	8.8	-5.9	4.9
Deutsche Bank	May 5	-4.8	-38.7	15.0	6.5	-8.0	4.2
Median of outside forecasts		*-4.8*	*-38.3*	*21.1*	*9.1*	*-5.8*	*4.4*
May Tealbook	**May 29**	**-5.0**	**-41.0**	**24.1**	**7.0**	**-7.1**	**6.7**

Note: Quarterly rates are annualized percent change from previous quarter. Annual rates are Q4/Q4 growth rates from previous year to current year except where indicated by *.

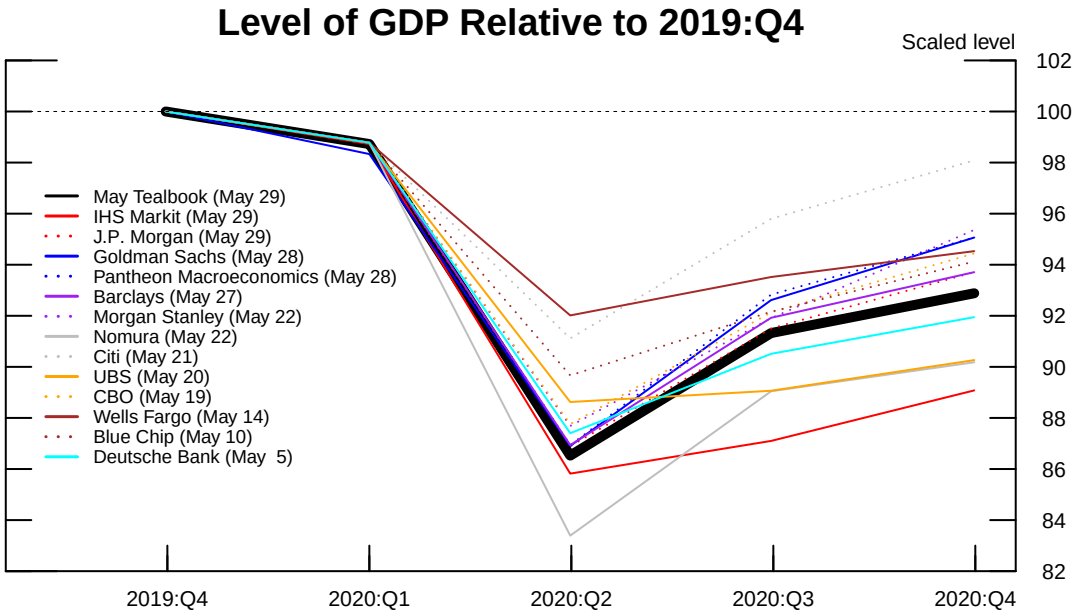
1. Estimates from IHS Markit are as of May 29 for 2020:Q1 and 2020:Q2 and May 18 for other periods.
2. J.P. Morgan estimates are as of May 28 for 2020:Q1, May 29 for 2020:Q2, and May 27 for other periods.
3. Estimates from Goldman Sachs are as of 5/28 for 2020:Q1, 5/26 for 2020:Q2, and May 22 for other periods.

* Annual growth rates are on an annual average basis.

** Staff calculations using information in the forecaster's report.

n.a. Not available.

Source: For CBO, Congressional Budget Office; for Deutsche Bank, Deutsche Bank Research Department; for Morgan Stanley, Morgan Stanley Research; for Nomura, Anchor Report, Global Markets Research; for all others, internal Board repository of bank and broker newsletters.



Source: For CBO, Congressional Budget Office; for Deutsche Bank, Deutsche Bank Research Department; for Morgan Stanley, Morgan Stanley Research; for Nomura, Anchor Report, Global Markets Research; for all others, internal Board repository of bank and broker newsletters.

Revisions to the Staff Projection since the Previous SEP

The FOMC most recently published its Summary of Economic Projections, or SEP, following the December FOMC meeting. The following table compares the staff's current economic projection with the one we presented in the Tealbook from late November, before the December meeting.

The current projection for economic activity is much weaker than in the November Tealbook, reflecting the economic disruptions caused by COVID-19. The lower path for GDP reflects both a much lower path for aggregate demand as well as a lower path for potential output. Relative to the November Tealbook, potential output is held down by a higher natural rate of unemployment, less capital accumulation, and lower multifactor productivity. In the longer run, potential output growth is expected to return to the rate previously assumed. Headline inflation is noticeably lower in 2020 than in the November Tealbook because of a drop in oil prices and a sharp deceleration in core inflation. As we continue to assume that longer-term inflation expectations will remain roughly stable, we project inflation to move back up after this year. Even so, given the projection for resource utilization, inflation is somewhat lower in 2021 and 2022 than in the November Tealbook.

The federal funds rate is assumed to be at the effective lower bound throughout the medium-term projection, reflecting both low inflation and low resource utilization along with the forward guidance provided in the March and April FOMC statements.

Staff Economic Projections Compared with the November Tealbook

Variable	2019	2020		2020	2021	2022	Longer run
		H1	H2				
Real GDP[1]	2.3	-25.1	15.3	-7.1	6.7	3.6	1.7
November Tealbook	*2.1*	*2.2*	*2.0*	*2.1*	*1.9*	*1.7*	*1.7*
Unemployment rate[2]	3.5	14.8	9.3	9.3	5.7	4.5	4.3
November Tealbook	*3.6*	*3.5*	*3.5*	*3.5*	*3.5*	*3.5*	*4.4*
PCE inflation[1]	1.4	-.2	1.8	.8	1.6	1.7	2.0
November Tealbook	*1.5*	*1.7*	*1.8*	*1.7*	*1.9*	*1.9*	*2.0*
Core PCE inflation[1]	1.6	.3	1.9	1.1	1.6	1.7	n.a.
November Tealbook	*1.6*	*1.9*	*1.8*	*1.9*	*1.9*	*1.9*	*n.a.*
Federal funds rate[2]	1.65	.08	.13	.13	.13	.13	2.50
November Tealbook	*1.65*	*1.88*	*2.05*	*2.05*	*2.34*	*2.49*	*2.50*
Memo: Federal funds rate, end of period	1.63	.05	.13	.13	.13	.13	2.50
November Tealbook	*1.64*	*1.89*	*2.06*	*2.06*	*2.37*	*2.53*	*2.50*
Output gap[2,3]	1.5	-6.9	-5.0	-5.0	-1.0	.7	n.a.
November Tealbook	*1.5*	*1.7*	*1.8*	*1.8*	*1.8*	*1.7*	*n.a.*

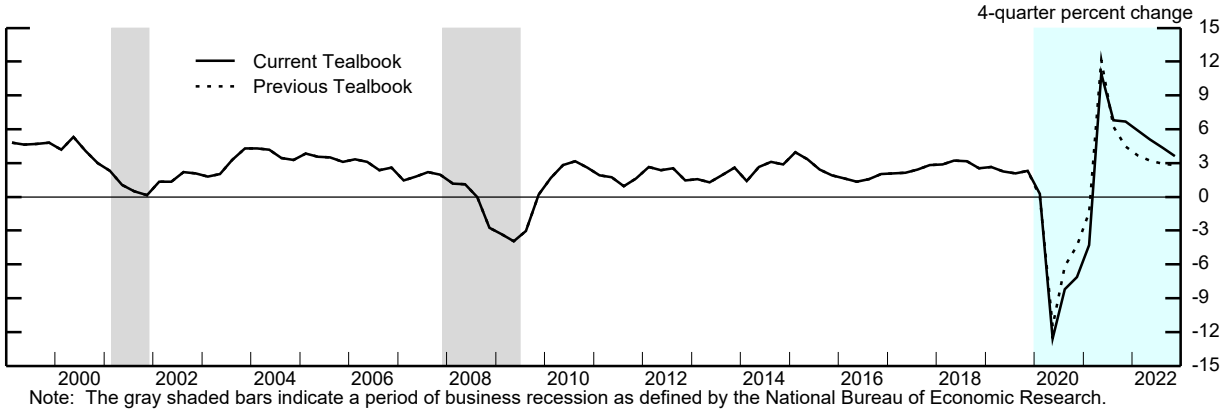
1. Percent change from final quarter of preceding period to final quarter of period indicated.
2. Percent, final quarter of period indicated.
3. Percent difference between actual and potential. A negative number indicates that the economy is operating below potential.
n.a. Not available.

Projections of Real GDP and Related Components

(Percent change at annual rate from final quarter of preceding period except as noted)

Measure	2019	2020 H1	2020 H2	2020	2021	2022
Real GDP	**2.3**	**-25.1**	**15.3**	**-7.1**	**6.7**	**3.6**
Previous Tealbook	*2.3*	*-23.3*	*19.3*	*-4.3*	*4.4*	*2.8*
Final sales	2.7	-22.6	15.0	-5.6	5.2	2.6
Previous Tealbook	*2.7*	*-20.8*	*18.7*	*-3.0*	*4.0*	*1.9*
Personal consumption expenditures	2.7	-28.5	23.8	-5.9	5.1	3.1
Previous Tealbook	*2.7*	*-25.4*	*27.4*	*-2.5*	*3.3*	*2.8*
Residential investment	1.7	-33.1	2.2	-17.3	20.0	8.3
Previous Tealbook	*1.7*	*-36.8*	*14.5*	*-14.9*	*18.3*	*1.5*
Nonresidential structures	-6.2	-33.8	1.9	-17.9	12.1	7.3
Previous Tealbook	*-6.2*	*-51.6*	*26.8*	*-21.7*	*18.1*	*3.3*
Equipment and intangibles	1.3	-23.2	-4.7	-14.5	15.5	5.8
Previous Tealbook	*1.3*	*-30.1*	*6.3*	*-13.8*	*13.2*	*4.3*
Federal purchases	4.3	13.7	2.2	7.8	-.5	-2.3
Previous Tealbook	*4.3*	*11.6*	*7.3*	*9.5*	*-1.8*	*-2.8*
State and local purchases	2.2	-5.9	-.5	-3.2	-1.1	-1.3
Previous Tealbook	*2.2*	*-5.0*	*4.4*	*-.4*	*-.3*	*-1.8*
Exports	.3	-42.0	43.8	-8.7	10.3	4.8
Previous Tealbook	*.3*	*-36.4*	*39.5*	*-5.8*	*6.1*	*3.8*
Imports	-2.1	-44.8	35.8	-13.4	12.8	6.6
Previous Tealbook	*-2.1*	*-47.1*	*54.9*	*-9.5*	*8.2*	*4.8*
	Contributions to change in real GDP (percentage points)					
Inventory change	-.4	-2.6	.0	-1.5	1.3	1.0
Previous Tealbook	*-.4*	*-2.5*	*.3*	*-1.3*	*.4*	*.9*
Net exports	.4	1.7	.0	.9	-.5	-.3
Previous Tealbook	*.4*	*2.9*	*-1.8*	*.7*	*-.4*	*-.2*

Real GDP



Note: The gray shaded bars indicate a period of business recession as defined by the National Bureau of Economic Research.
Source: U.S. Department of Commerce, Bureau of Economic Analysis.

The Outlook for the Labor Market

Measure	2019	2020 H1	2020 H2	2020	2021	2022
Nonfarm payroll employment[1]	178	-2,718	1,120	-799	572	380
Previous Tealbook	*178*	*-2,923*	*2,093*	*-415*	*321*	*186*
Private employment[1]	162	-2,559	1,056	-752	576	392
Previous Tealbook	*162*	*-2,972*	*2,127*	*-422*	*350*	*200*
Labor force participation rate[2]	63.2	60.3	61.9	61.9	62.2	62.5
Previous Tealbook	*63.2*	*62.3*	*62.5*	*62.5*	*62.5*	*62.5*
Civilian unemployment rate[2]	3.5	14.8	9.3	9.3	5.7	4.5
Previous Tealbook	*3.5*	*16.0*	*7.9*	*7.9*	*5.4*	*4.7*
Employment-to-population ratio[2]	61.0	51.4	56.2	56.2	58.6	59.7
Previous Tealbook	*61.0*	*52.3*	*57.5*	*57.5*	*59.1*	*59.6*

1. Thousands, average monthly changes.
2. Percent, average for the final quarter in the period.
Source: U.S. Department of Labor, Bureau of Labor Statistics; staff assumptions.

Inflation Projections

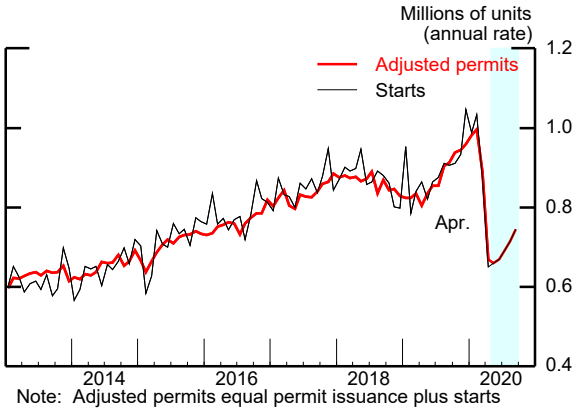
Measure	2019	2020 H1	2020 H2	2020	2021	2022
Percent change at annual rate from final quarter of preceding period						
PCE chain-weighted price index	1.4	-.2	1.8	.8	1.6	1.7
Previous Tealbook	*1.4*	*-.6*	*2.0*	*.7*	*1.7*	*1.8*
Food and beverages	.9	8.6	.8	4.6	1.3	2.0
Previous Tealbook	*.9*	*2.9*	*.7*	*1.8*	*1.5*	*2.0*
Energy	-1.3	-27.9	4.2	-13.3	3.8	2.9
Previous Tealbook	*-1.3*	*-34.9*	*9.5*	*-15.6*	*4.0*	*2.8*
Excluding food and energy	1.6	.3	1.9	1.1	1.6	1.7
Previous Tealbook	*1.6*	*.9*	*1.9*	*1.4*	*1.6*	*1.7*
Prices of core goods imports[1]	-1.1	-.8	-1.2	-1.0	1.2	1.0
Previous Tealbook	*-1.1*	*-.9*	*-1.2*	*-1.1*	*1.2*	*1.0*

	Mar. 2020	Apr. 2020	May 2020[2]	June 2020[2]	July 2020[2]	Aug. 2020[2]
12-month percent change						
PCE chain-weighted price index	1.3	.5	.6	.7	.6	.7
Previous Tealbook	*1.3*	*.4*	*.4*	*.4*	*.4*	*.5*
Excluding food and energy	1.7	1.0	1.0	1.0	.9	.9
Previous Tealbook	*1.7*	*1.3*	*1.3*	*1.2*	*1.1*	*1.2*

1. Core goods imports exclude computers, semiconductors, oil, and natural gas.
2. Staff forecast.
Source: U.S. Department of Commerce, Bureau of Economic Analysis.

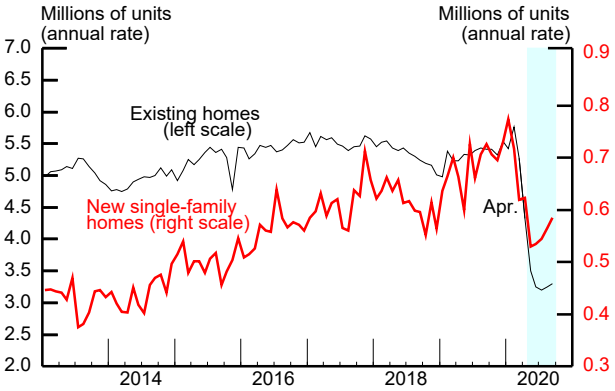
Recent Nonfinancial Developments (2)

Single-Family Housing Starts and Permits



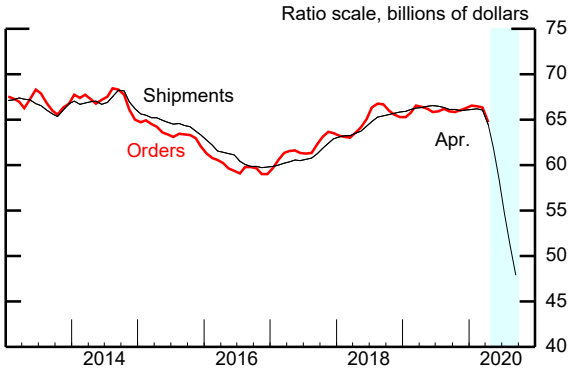
Note: Adjusted permits equal permit issuance plus starts outside of permit-issuing areas.
Source: U.S. Census Bureau.

Home Sales



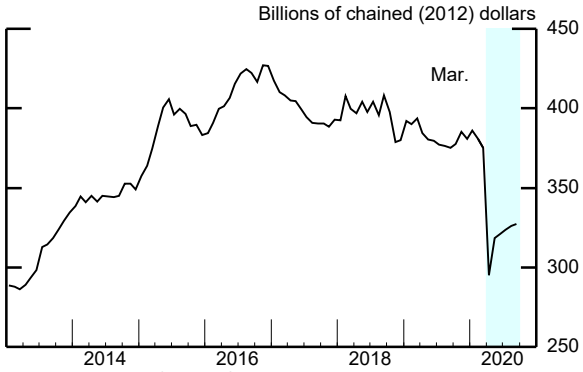
Source: For existing, National Association of Realtors; for new, U.S. Census Bureau.

Nondefense Capital Goods ex. Aircraft



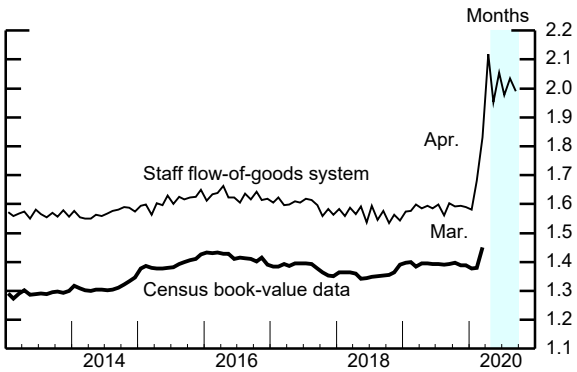
Note: Data are 3-month moving averages.
Source: U.S. Census Bureau.

Nonresidential Construction Put in Place



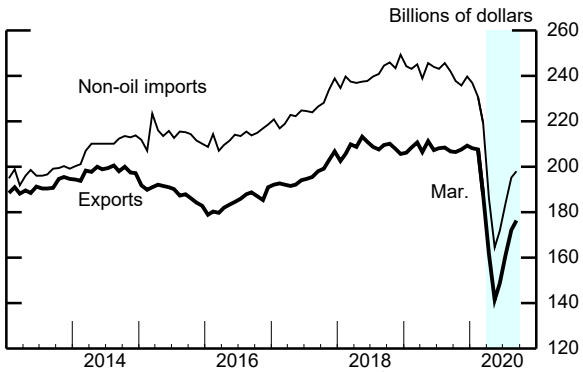
Note: Nominal CPIP deflated by BEA prices through 2019:Q4 and by the staff's estimated deflator thereafter.
Source: U.S. Census Bureau.

Inventory Ratios



Note: Flow-of-goods system inventories include manufacturing and mining industries and are relative to consumption. Census data cover manufacturing and trade, and inventories are relative to sales.
Source: U.S. Census Bureau; staff calculations.

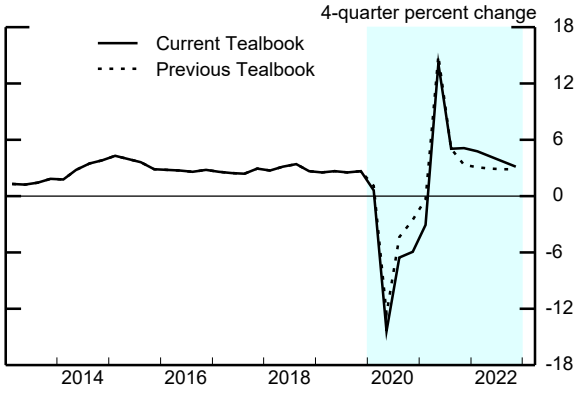
Exports and Non-oil Imports



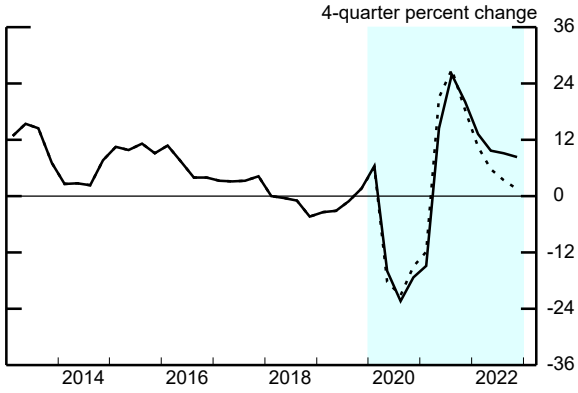
Note: Forecasts are linear interpolations of quarterly values.
Source: U.S. Dept. of Commerce, Bureau of Economic Analysis; U.S. Census Bureau.

Components of Final Demand

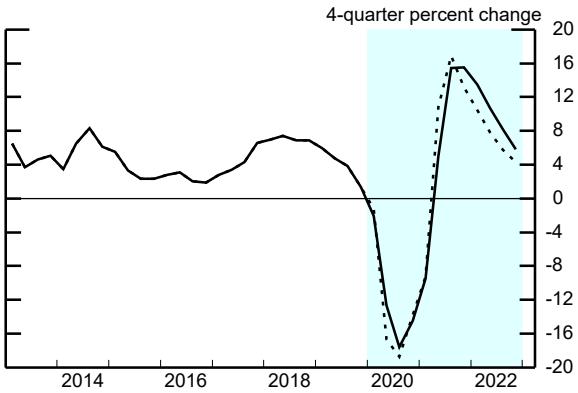
Personal Consumption Expenditures



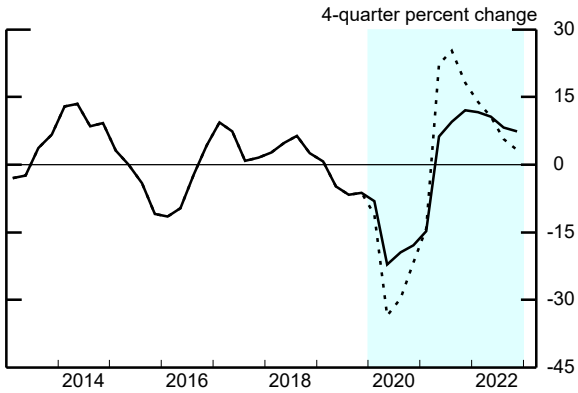
Residential Investment



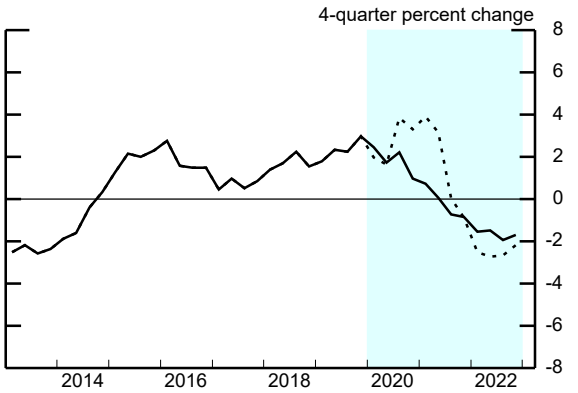
Equipment and Intangibles



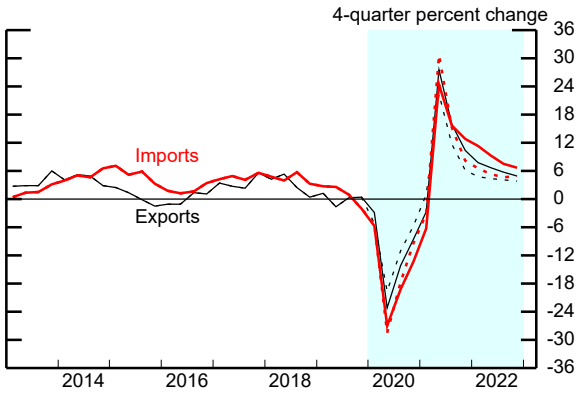
Nonresidential Structures



Government Consumption and Investment



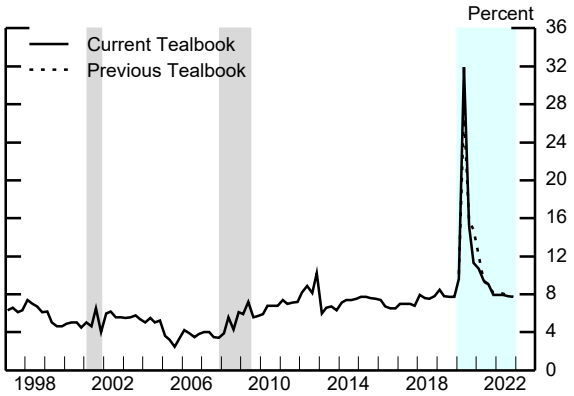
Exports and Imports



Source: U.S. Department of Commerce, Bureau of Economic Analysis.

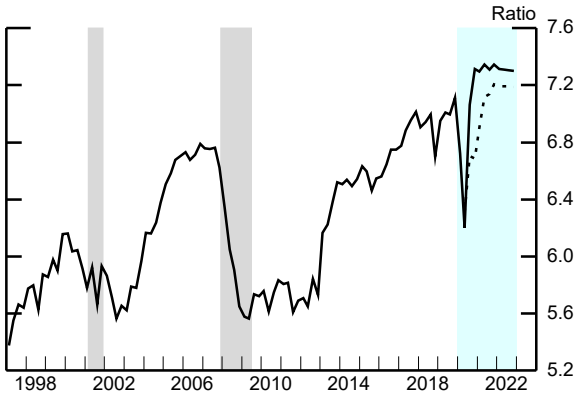
Aspects of the Medium-Term Projection

Personal Saving Rate



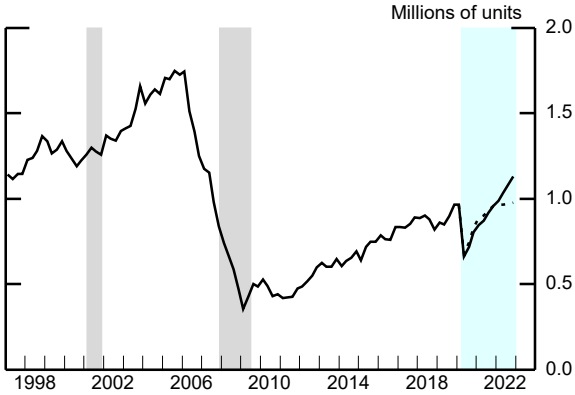
Source: U.S. Dept. of Commerce, Bureau of Economic Analysis.

Wealth-to-Income Ratio



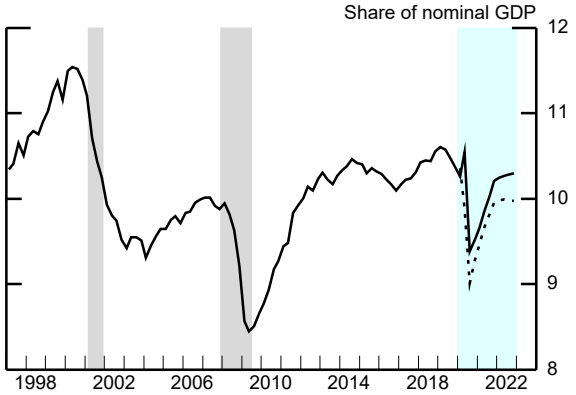
Note: Ratio of household net worth to disposable personal income.
Source: For net worth, Federal Reserve Board, Financial Accounts of the United States; for income, U.S. Dept. of Commerce, Bureau of Economic Analysis.

Single-Family Housing Starts



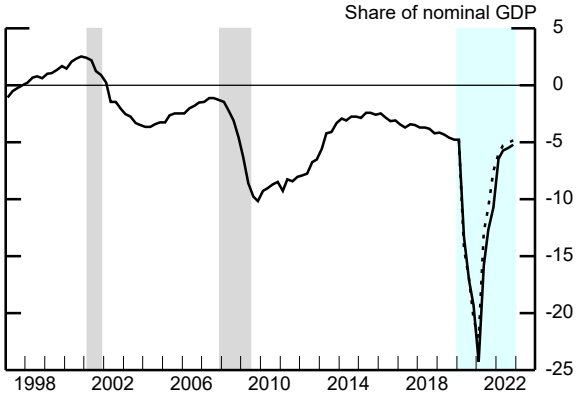
Source: U.S. Census Bureau.

Equipment and Intangibles Spending



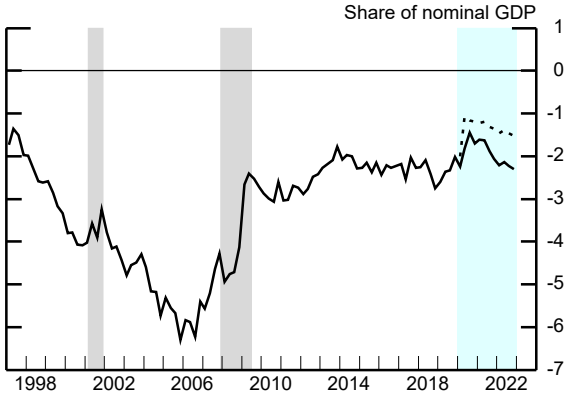
Source: U.S. Dept. of Commerce, Bureau of Economic Analysis.

Federal Surplus/Deficit



Note: 4-quarter moving average.
Source: Monthly Treasury Statement.

Current Account Surplus/Deficit



Source: U.S. Dept. of Commerce, Bureau of Economic Analysis.

Note: The gray shaded bars indicate a period of business recession as defined by the National Bureau of Economic Research.

Domestic Econ Devel & Outlook

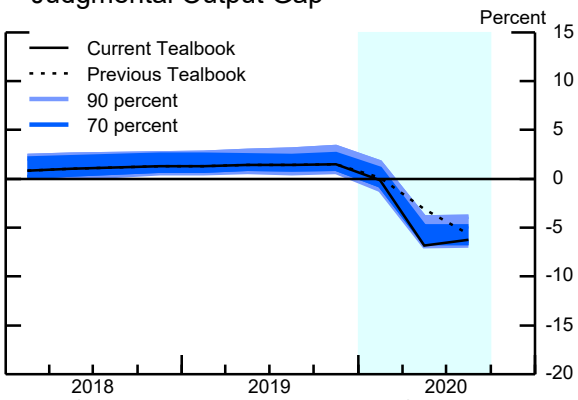
Cyclical Position of the U.S. Economy: Near-Term Perspective

(Percent change at annual rate from final quarter of preceding period except as noted)

Measure	2019	2020	2020 Q1	2020 Q2	2020 Q3	2020 Q4
Output gap[1]	**1.5**	**-5.0**	**-.1**	**-6.9**	**-6.2**	**-5.0**
Previous Tealbook	*1.5*	*-3.3*	*.1*	*-3.1*	*-5.6*	*-3.3*
Real GDP	2.3	-7.1	-5.0	-41.0	24.1	7.0
Previous Tealbook	*2.3*	*-4.3*	*-5.9*	*-37.4*	*28.9*	*10.4*
Measurement error in GDP	.2	.0	.0	.0	.0	.0
Previous Tealbook	*.2*	*.0*	*.0*	*.0*	*.0*	*.0*
Potential output	1.9	-.8	1.3	-22.0	21.0	1.4
Previous Tealbook	*1.9*	*.4*	*-.6*	*-28.8*	*43.4*	*.1*

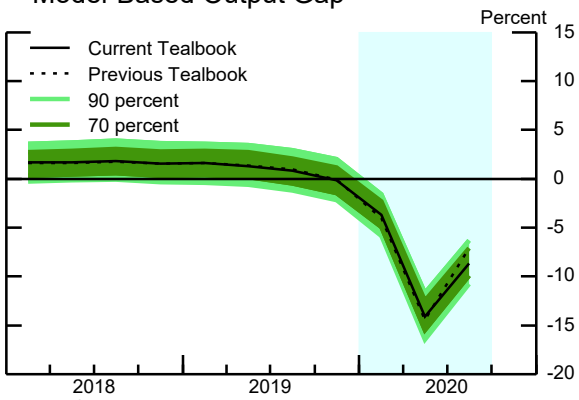
Note: The output gap is the percent difference between actual and potential output; a negative number indicates that the economy is operating below potential. The change in the output gap is equal to real GDP growth less the contribution of measurement error less the growth rate of potential output. For quarterly figures, the growth rates are at an annual rate, and this calculation needs to be multiplied by 1/4 to obtain the quarterly change in the output gap.
1. Percent, average for the final quarter in the period.

Judgmental Output Gap



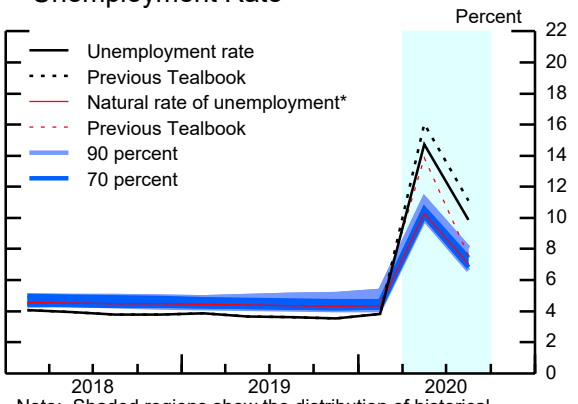
Note: Shaded regions show the distribution of historical revisions to the staff's estimates of the output gap.
Source: Various macroeconomic data; staff assumptions.

Model-Based Output Gap



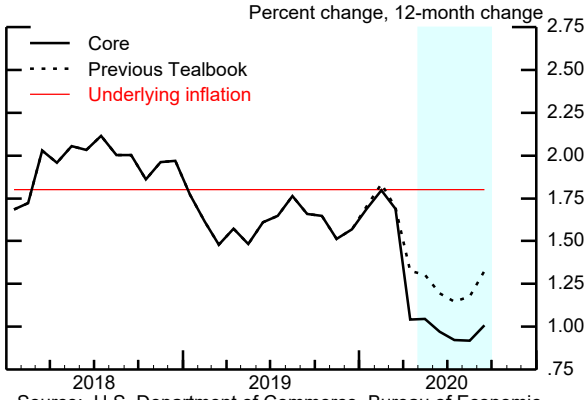
Note: Shaded regions denote model-computed uncertainty bands.
Source: Various macroeconomic data; staff assumptions.

Unemployment Rate



Note: Shaded regions show the distribution of historical revisions to the staff's estimates of the natural rate.
*Staff estimate including the effect of extended and emergency unemployment insurance benefits.
Source: U.S. Department of Labor, Bureau of Labor Statistics; staff assumptions.

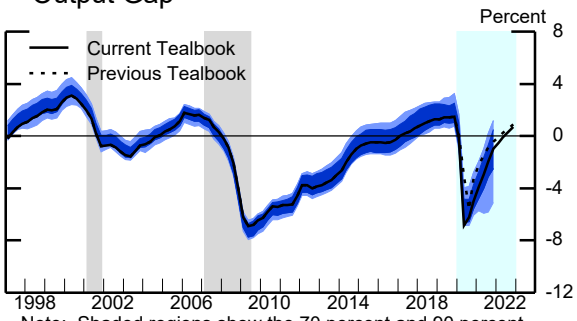
Core PCE Price Inflation



Source: U.S. Department of Commerce, Bureau of Economic Analysis; staff assumptions.

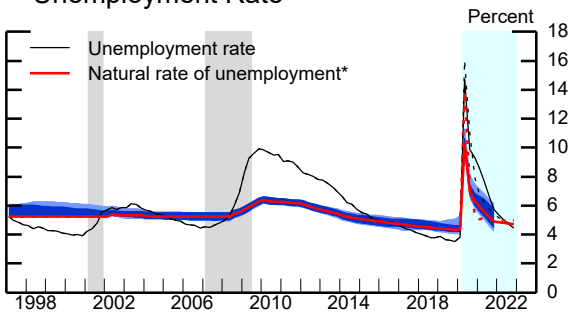
Cyclical Position of the U.S. Economy: Longer-Term Perspective

Output Gap



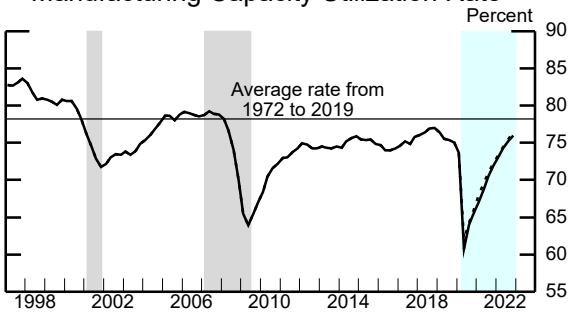
Note: Shaded regions show the 70 percent and 90 percent confidence intervals of the distribution of historical revisions to the staff's estimates of the output gap.
Source: Various macroeconomic data; staff assumptions.

Unemployment Rate



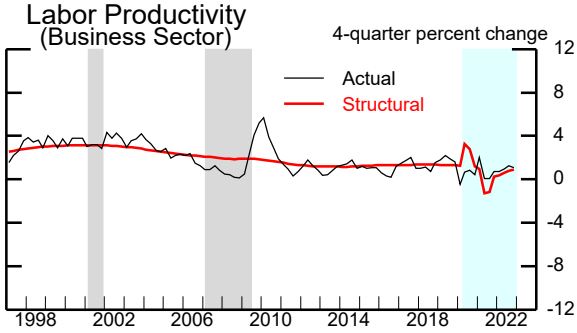
Note: Shaded regions show the 70 percent and 90 percent confidence intervals of the distribution of historical revisions to the staff's estimates of the natural rate.
*Staff estimate including the effect of extended and emergency unemployment insurance benefits.
Source: Various macroeconomic data; staff assumptions.

Manufacturing Capacity Utilization Rate



Source: Federal Reserve Board, G.17 Statistical Release, "Industrial Production and Capacity Utilization."

Labor Productivity (Business Sector)



Source: U.S. Department of Labor, Bureau of Labor Statistics; U.S. Department of Commerce, Bureau of Economic Analysis; staff assumptions.

Note: The gray shaded bars indicate a period of business recession as defined by the National Bureau of Economic Research.

Decomposition of Potential Output

(Percent change, Q4 to Q4, except as noted)

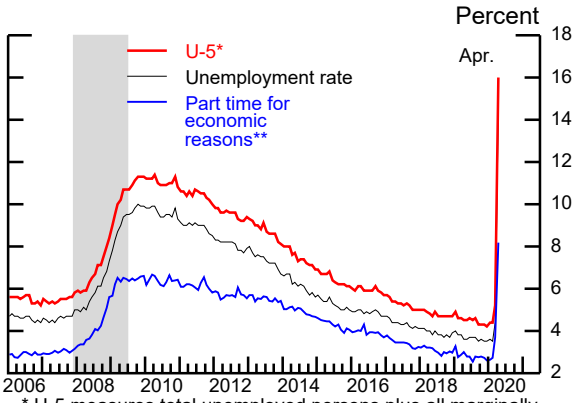
Measure	1974-95	1996-2000	2001-07	2008-10	2011-17	2018	2019	2020	2021	2022
Potential output	3.1	3.6	2.7	1.9	1.5	1.9	1.9	-.8	2.4	1.9
Previous Tealbook	*3.1*	*3.6*	*2.7*	*1.9*	*1.5*	*1.9*	*1.9*	*.4*	*1.5*	*1.5*
Selected contributions:[1]										
Structural labor productivity[2]	1.7	2.9	2.7	1.8	1.3	1.4	1.3	1.2	.2	.9
Previous Tealbook	*1.7*	*2.9*	*2.7*	*1.8*	*1.3*	*1.4*	*1.3*	*1.2*	*.4*	*.9*
Capital deepening	.7	1.4	1.0	.5	.8	.7	.7	1.3	-.9	.2
Multifactor productivity	.8	1.1	1.4	1.0	.2	.5	.4	-.3	1.0	.6
Structural hours	1.5	1.3	.8	.5	.4	.9	.5	-2.8	2.8	1.0
Previous Tealbook	*1.5*	*1.3*	*.8*	*.5*	*.4*	*.9*	*.5*	*-1.1*	*1.2*	*.6*
Labor force participation	.4	-.1	-.2	-.4	-.4	-.1	.0	-1.2	.6	.1
Previous Tealbook	*.4*	*-.1*	*-.2*	*-.4*	*-.4*	*-.1*	*.0*	*-.4*	*.0*	*-.1*
Memo:										
Output gap[3]	-1.2	2.5	.3	-5.4	.6	1.3	1.5	-5.0	-1.0	.7
Previous Tealbook	*-1.2*	*2.5*	*.3*	*-5.4*	*.6*	*1.3*	*1.5*	*-3.3*	*-.4*	*.9*

Note: For multiyear periods, the percent change is the annual average from Q4 of the year preceding the first year shown to Q4 of the last year shown.
1. Percentage points.
2. Total business sector.
3. Percent difference between actual and potential output in the final quarter of the period indicated. A negative number indicates that the economy is operating below potential.

Domestic Econ Devel & Outlook

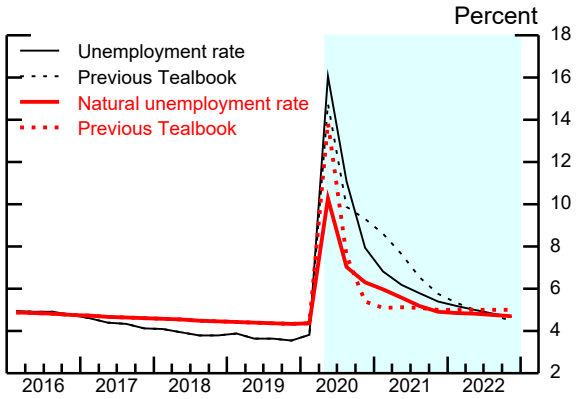
Labor Market Developments and Outlook (1)

Measures of Labor Underutilization



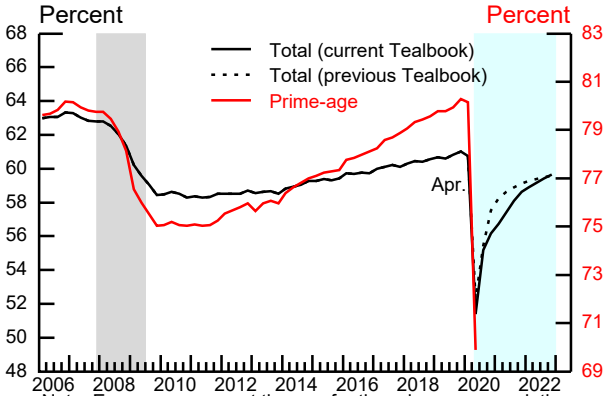
* U-5 measures total unemployed persons plus all marginally attached to the labor force as a percent of the labor force plus persons marginally attached to the labor force.
** Percent of Current Population Survey employment.
Source: U.S. Department of Labor, Bureau of Labor Statistics.

Unemployment Rate



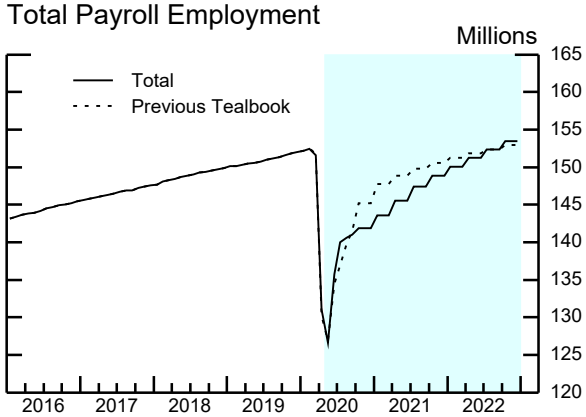
Source: U.S. Department of Labor, Bureau of Labor Statistics.

Employment-to-Population Ratio



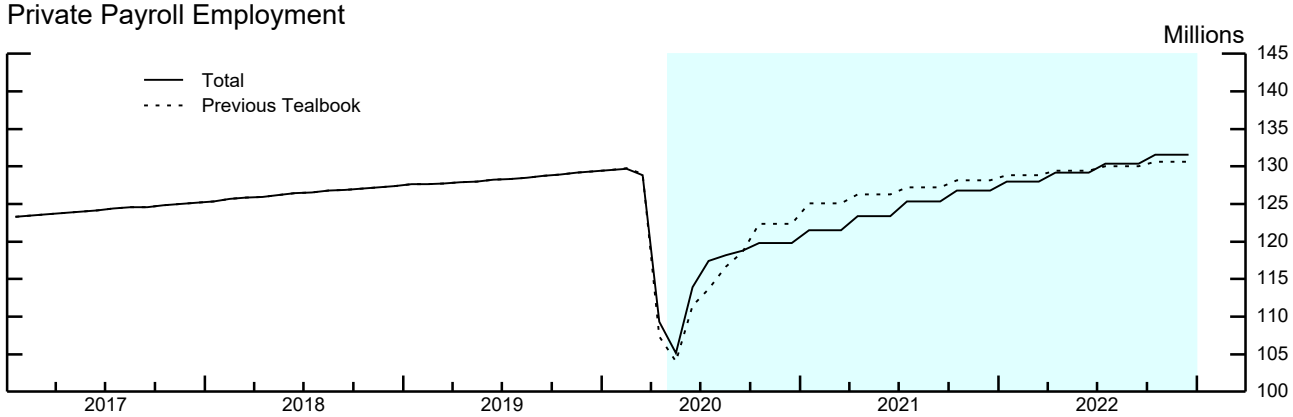
Note: Every curve except the one for the prime-age population corresponds with the left axis.
Source: U.S. Department of Labor, Bureau of Labor Statistics.

Total Payroll Employment



Source: U.S. Department of Labor, Bureau of Labor Statistics.

Private Payroll Employment

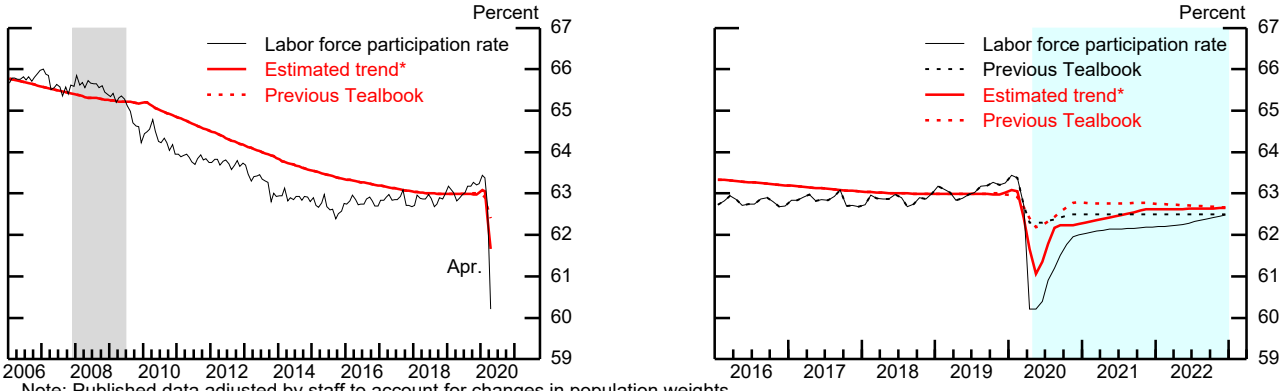


Source: U.S. Department of Labor, Bureau of Labor Statistics.

Note: The gray shaded bars indicate a period of business recession as defined by the National Bureau of Economic Research.

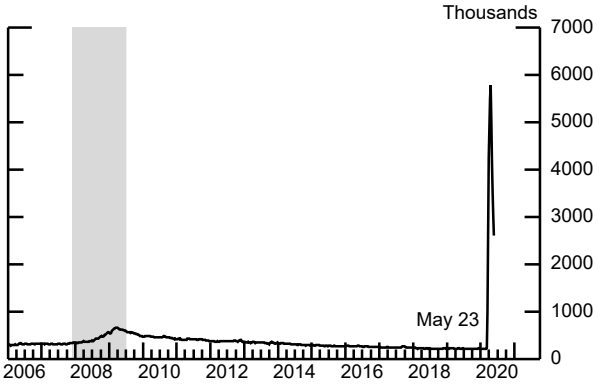
Labor Market Developments and Outlook (2)

Labor Force Participation Rate



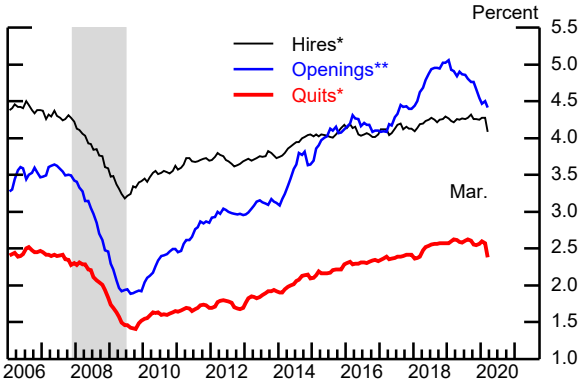
Note: Published data adjusted by staff to account for changes in population weights.
* Includes staff estimate of the effect of extended and emergency unemployment benefits.
Source: U.S. Department of Labor, Bureau of Labor Statistics; staff assumptions.

Initial Unemployment Insurance Claims



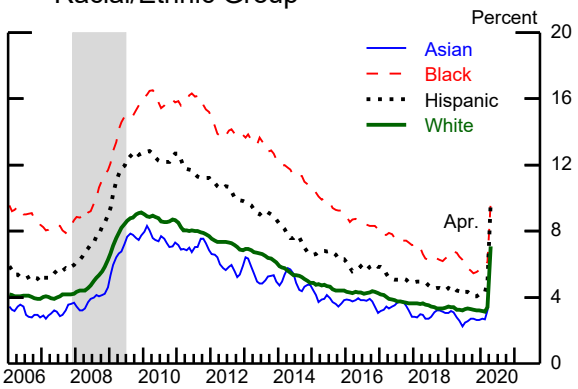
Note: 4-week moving average.
Source: U.S. Department of Labor, Employment and Training Administration.

Hires, Quits, and Job Openings



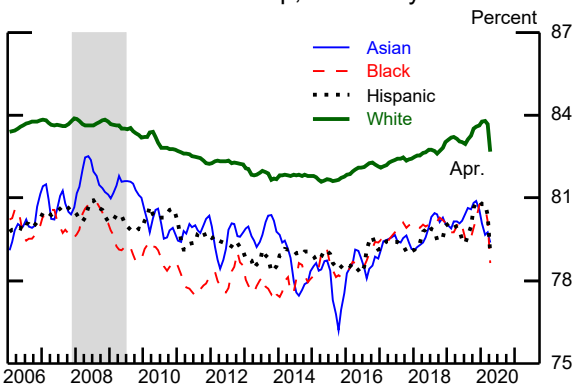
* Percent of private nonfarm payroll employment, 3-month moving average.
** Percent of private nonfarm payroll employment plus unfilled jobs, 3-month moving average.
Source: Job Openings and Labor Turnover Survey.

Unemployment Rate by Racial/Ethnic Group



Note: These categories are not mutually exclusive, as the ethnicity Hispanic may include people of any race. The Current Population Survey defines Hispanic ethnicity as those who report their origin is Mexican, Puerto Rican, Cuban, Central American, or South American (and some others). 3-month moving averages.
Source: U.S. Department of Labor, Bureau of Labor Statistics, Current Population Survey.

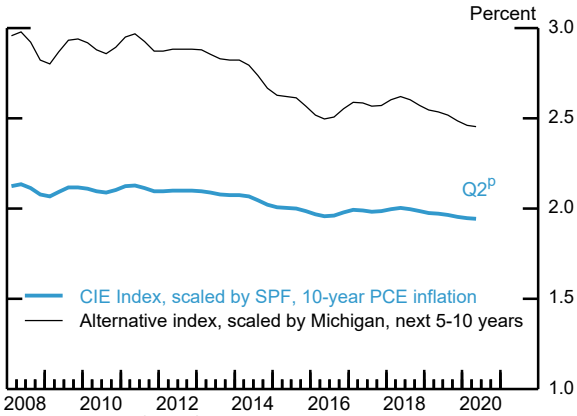
Labor Force Participation Rate by Racial/Ethnic Group, 25 to 54 years old



Note: These categories are not mutually exclusive, as the ethnicity Hispanic may include people of any race. The Current Population Survey defines Hispanic ethnicity as those who report their origin is Mexican, Puerto Rican, Cuban, Central American, or South American (and some others). 3-month moving averages.
Source: U.S. Department of Labor, Bureau of Labor Statistics, Current Population Survey.

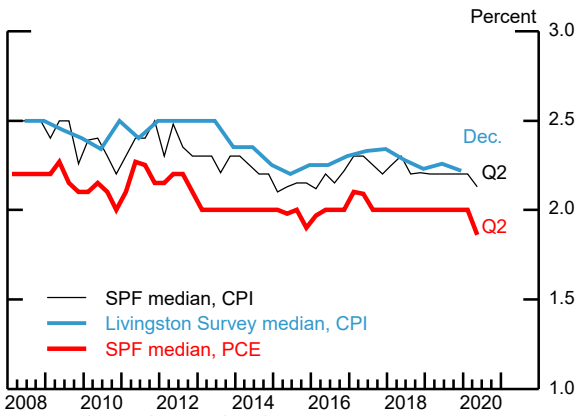
Survey Measures of Longer-Term Inflation Expectations

Index of Common Inflation Expectations



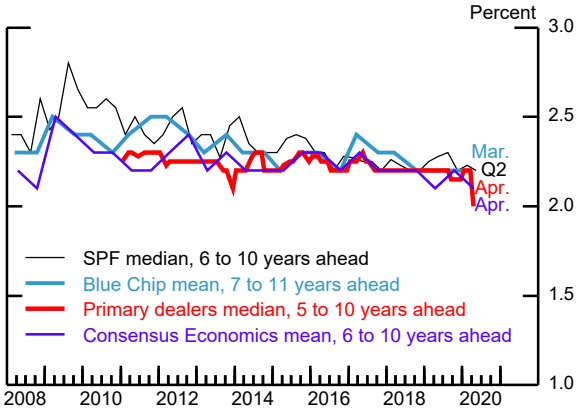
Note: Index of 21 inflation expectations indicators.
p Preliminary estimate based on data available to date.
Source: Staff calculations.

Next 10 Years



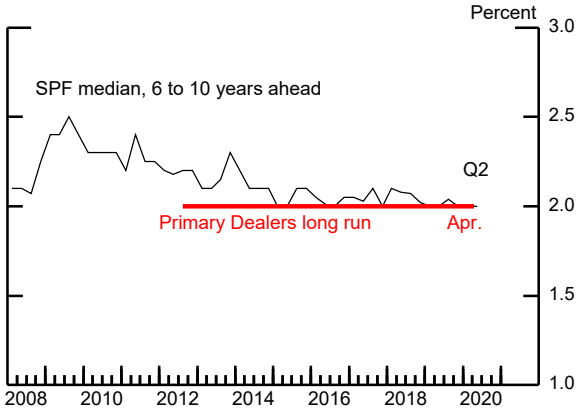
Note: SPF is Survey of Professional Forecasters.
Source: Federal Reserve Bank of Philadelphia.

CPI Forward Expectations



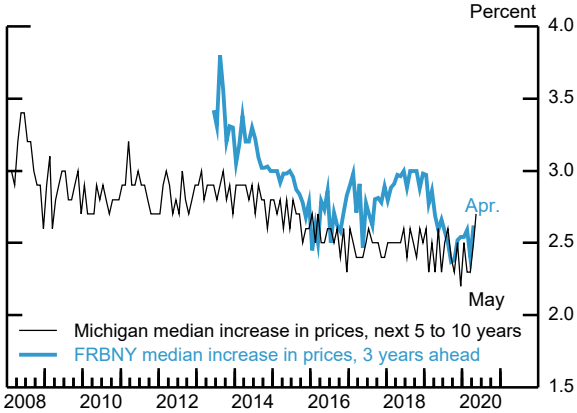
Source: Federal Reserve Bank of Philadelphia; Blue Chip Economic Indicators; Federal Reserve Bank of New York; Consensus Economics.

PCE Forward Expectations



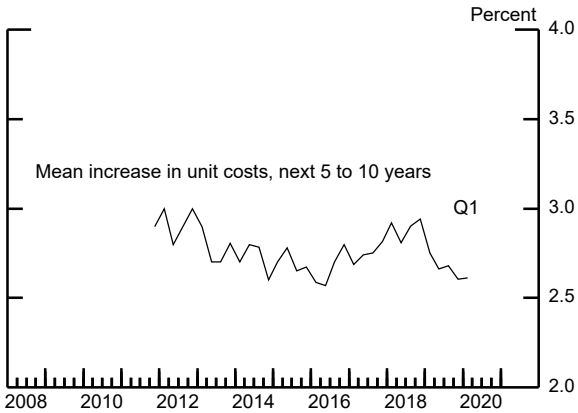
Source: Federal Reserve Bank of Philadelphia; Federal Reserve Bank of New York.

Surveys of Consumers



Note: Federal Reserve Bank of New York (FRBNY) Survey of Consumer Expectations reports expected 12-month inflation rate 3 years from the current survey date. FRBNY data begin in June 2013.
Source: University of Michigan Surveys of Consumers; Federal Reserve Bank of New York Survey of Consumer Expectations.

Survey of Business Inflation Expectations

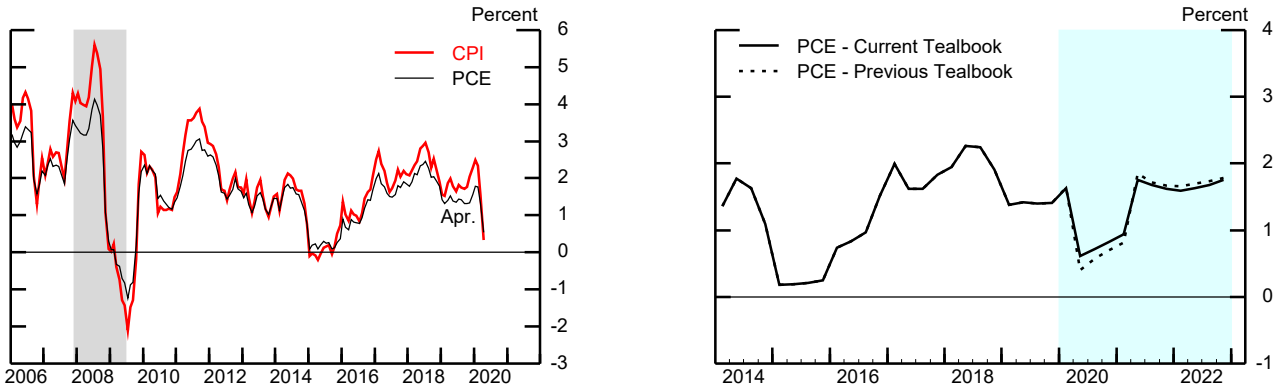


Note: Survey of businesses in the Sixth Federal Reserve District. Data begin in February 2012.
Source: Federal Reserve Bank of Atlanta.

Inflation Developments and Outlook (1)

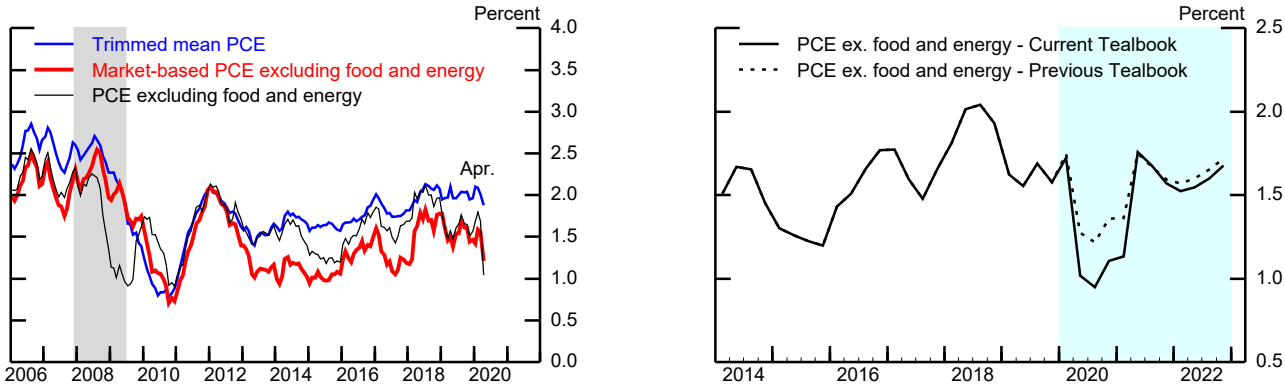
(Percent change from year-earlier period)

Headline Consumer Price Inflation



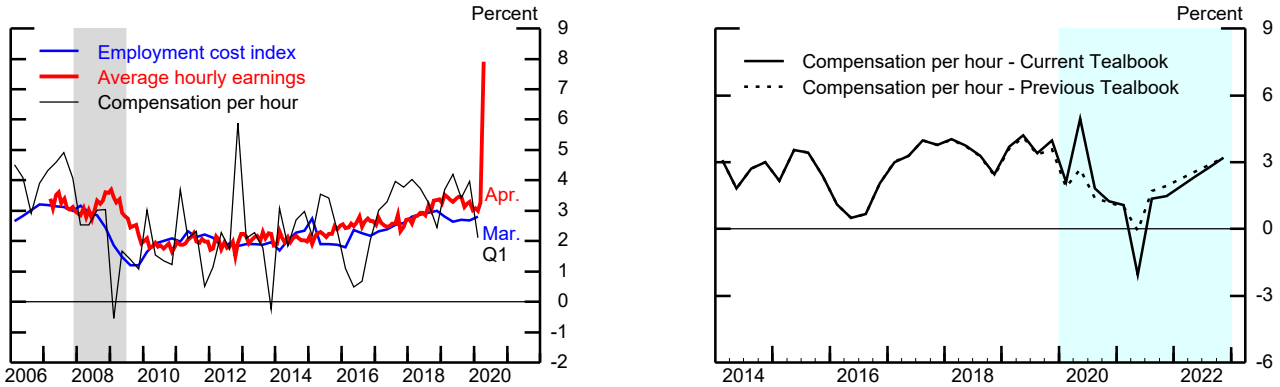
Source: For CPI, U.S. Department of Labor, Bureau of Labor Statistics; for PCE, U.S. Department of Commerce, Bureau of Economic Analysis.

Measures of Core PCE Price Inflation



Source: For trimmed mean PCE, Federal Reserve Bank of Dallas; otherwise, U.S. Department of Commerce, Bureau of Economic Analysis.

Labor Cost Growth



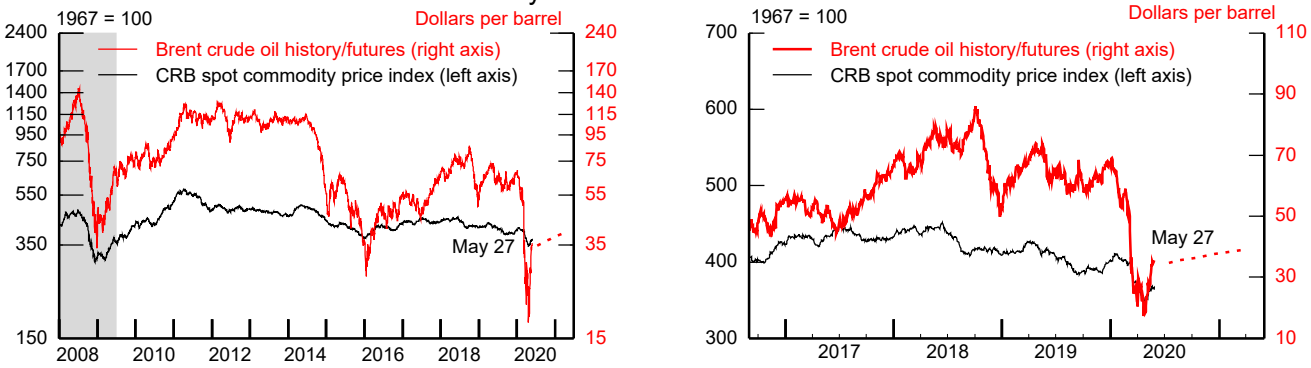
Note: Compensation per hour is for the business sector. Average hourly earnings are for the private nonfarm sector. The employment cost index is for the private sector.
Source: U.S. Department of Labor, Bureau of Labor Statistics.

Note: The gray shaded bars indicate a period of business recession as defined by the National Bureau of Economic Research.

Inflation Developments and Outlook (2)

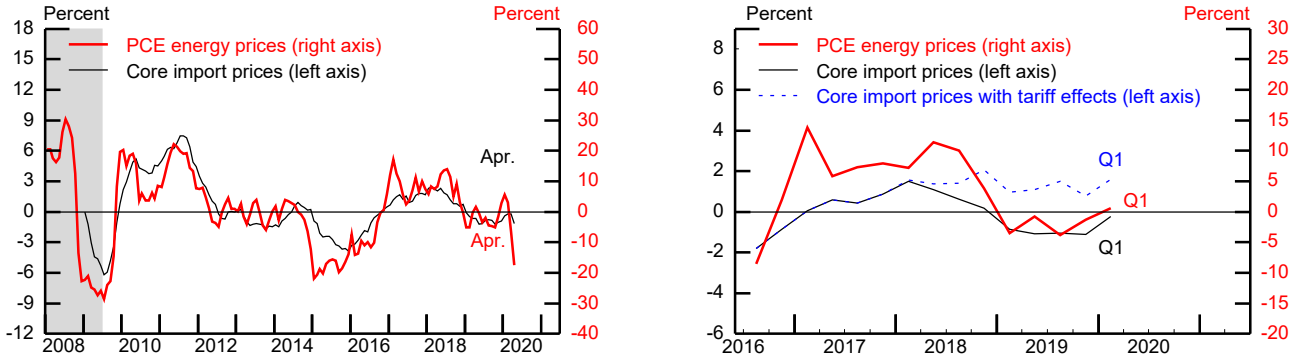
(Percent change from year-earlier period, except as noted)

Commodity and Oil Price Levels



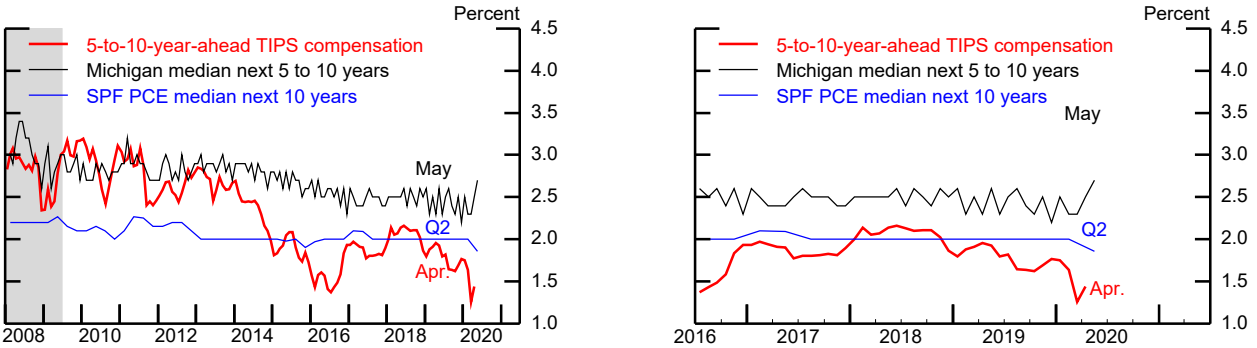
Note: Futures prices (dotted lines) are the latest observations on monthly futures contracts.
Source: For oil prices, U.S. Department of Energy, Energy Information Agency; for commodity prices, Commodity Research Bureau (CRB).

Energy and Import Price Inflation



Source: For core import prices, U.S. Dept. of Labor, Bureau of Labor Statistics; for PCE, U.S. Dept. of Commerce, Bureau of Economic Analysis. For core import prices with a tariff effect, Federal Reserve Board staff calculations.

Long-Term Inflation Expectations and Compensation



Note: Based on a comparison of an estimated TIPS (Treasury Inflation-Protected Securities) yield curve with an estimated nominal off-the-run Treasury yield curve, with an adjustment for the indexation-lag effect.
SPF Survey of Professional Forecasters.
Source: For Michigan, University of Michigan Surveys of Consumers; for SPF, the Federal Reserve Bank of Philadelphia; for TIPS, Federal Reserve Board staff calculations.

Note: The gray shaded bars indicate a period of business recession as defined by the National Bureau of Economic Research.

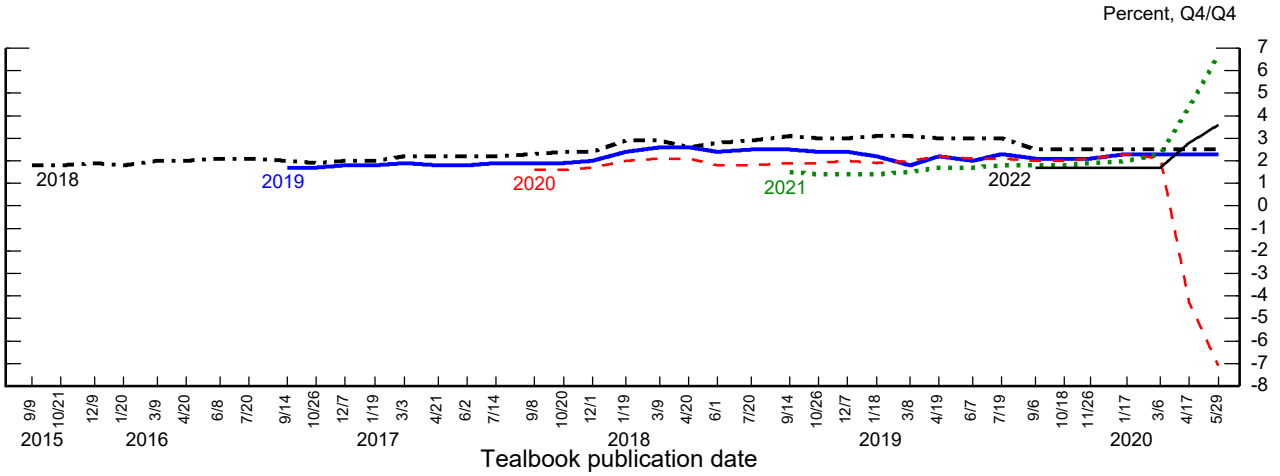
Federal Reserve System Nowcasts of 2020:Q2 Real GDP Growth
(Percent change at annual rate from previous quarter)

Federal Reserve entity	Type of model	Nowcast as of May 28, 2020
Federal Reserve Bank		
Boston	• Mixed-frequency BVAR	-19.3
New York	• Dynamic factor model	-30.3
Cleveland	• Bayesian regressions with stochastic volatility • Tracking model	-41.8 -28.8
Atlanta	• Tracking model combined with Bayesian vector autoregressions (VARs), dynamic factor models, and factor-augmented autoregressions (known as GDPNow)	-41.4
Chicago	• Dynamic factor model	-59.1
St. Louis	• Dynamic factor model • News index model • Let-the-data-decide regressions	-16.3 -49.8 -56.2
Kansas City	• Accounting-based tracking estimate	-44.8
Board of Governors	• Staff judgmental estimate • Mixed-frequency dynamic factor model (DFM-BM) • Mixed-frequency dynamic factor model with small information set (DFM-SM) • Markov-switching dynamic factor model (MS-DFM)	-38.8 -16.0 -13.0 -59.1
Memo: Median of Federal Reserve System nowcasts		-40.1

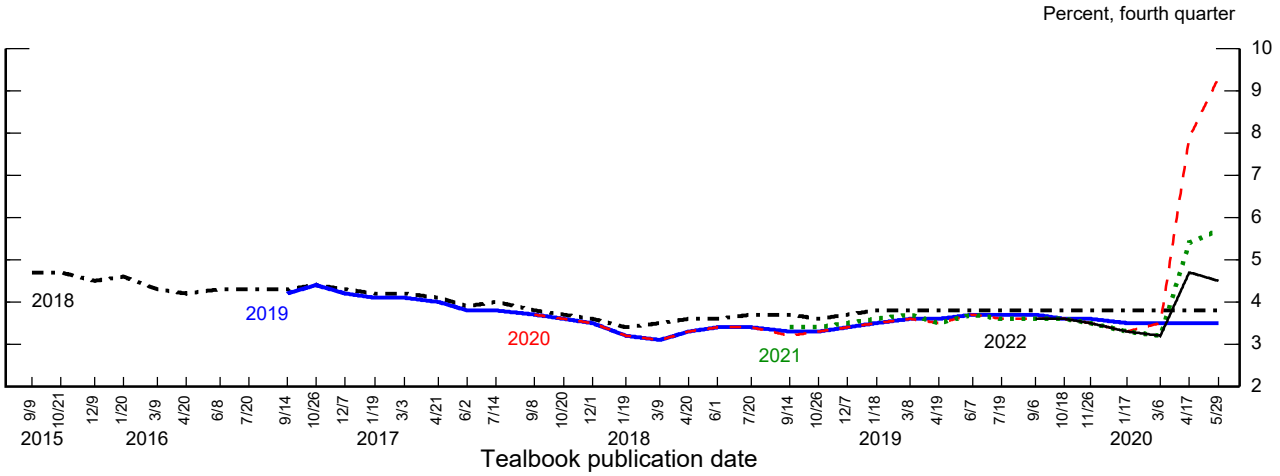
Domestic Econ Devel & Outlook

Evolution of the Staff Forecast

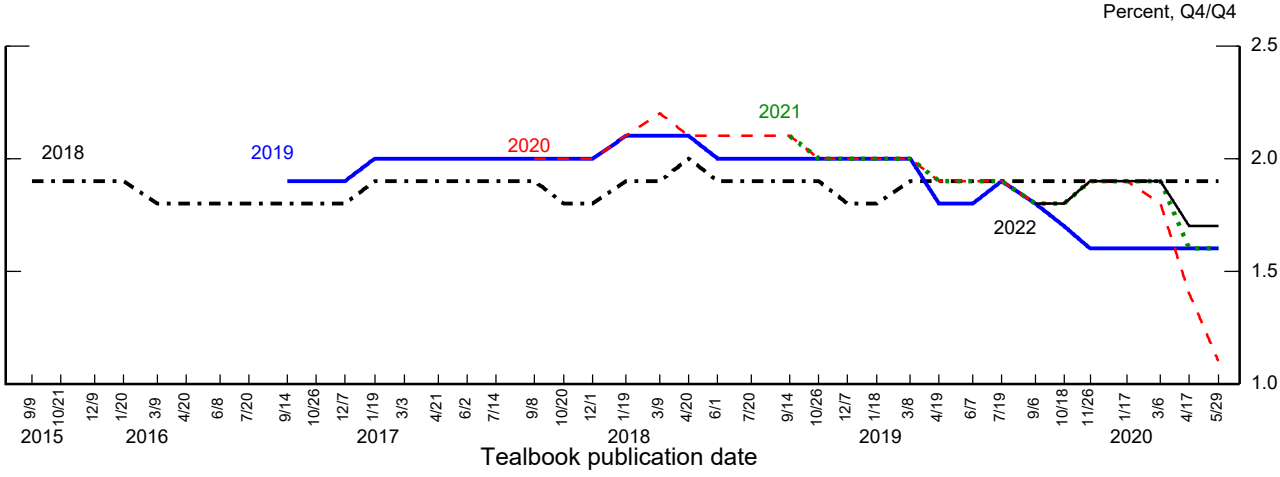
Change in Real GDP



Unemployment Rate



Change in PCE Prices excluding Food and Energy



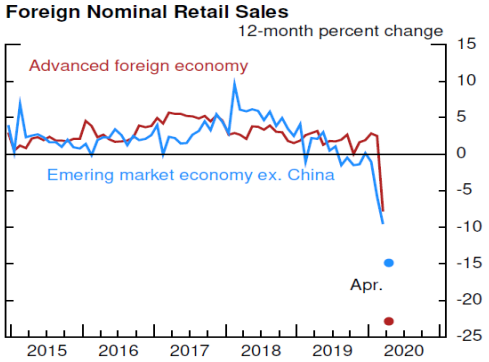
International Economic Developments and Outlook

COVID-19 brought the global economy to a screeching halt in the first quarter . . .

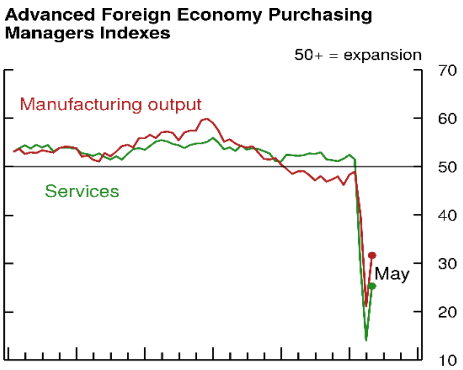
The foreign outlook is being overwhelmingly driven by the trajectory of the coronavirus (COVID-19) and the intensity of measures to contain it. In keeping with the start of widespread restrictions in March, foreign real gross domestic product (GDP) looks to have plunged almost 11 percent at an annual rate in the first quarter. This drop marks the steepest quarterly contraction in generations. Countries that had implemented more-stringent lockdowns experienced the sharpest contraction, and the contractions were widespread across all expenditure components, with private consumption—which had been relatively more resilient during the Global Financial Crisis—exerting the largest drag on growth. (For more details see the boxes "The Evolution and Effects of Restrictions to Contain the COVID-19 Outbreak" in the next page and "Regional Developments and Outlook" at the end of the IEDO section.)

. . . and is projected to bring even more economic devastation in the current quarter

As bad as the first quarter was, we expect growth abroad to fall deeper into the abyss this quarter. With consumer confidence tanking and unemployment rising, foreign retail sales declined sharply in March and April (left figure). Advanced foreign economy (AFE) purchasing managers indexes picked up somewhat in May but from historic lows (right figure). Moreover, this uptick indicates only that the pace of contraction has slowed. Accordingly, we project that second-quarter growth will tumble to negative 31 percent at an annual rate, leaving the level of foreign GDP nearly 12 percent below that at the end of last year.



Note: April estimates are based on data for Canada and the United Kingdom for the advanced foreign economies and Indonesia, Russia, Vietnam, and Taiwan for the emerging marking economies. Trade-weighted aggregates using U.S. bilateral trade weights.
Source: Federal Reserve Board staff calculations via Haver Analytics.



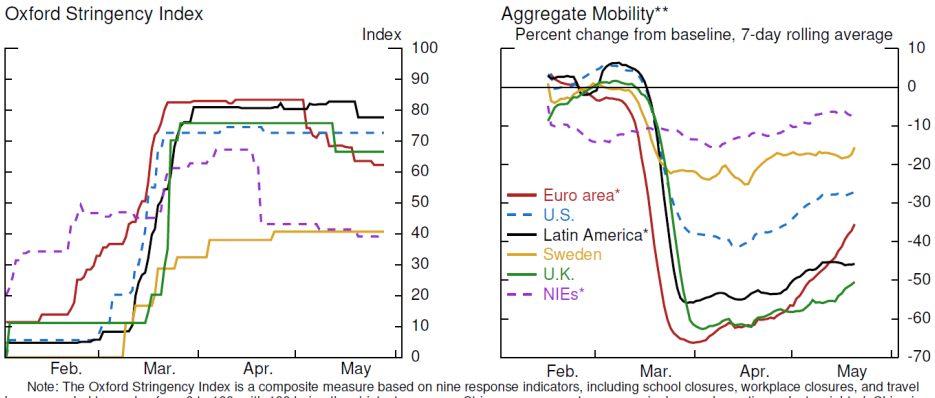
Note: Trade-weighted aggregates using U.S. bilateral trade weights of the euro area, Japan, and the United Kingdom.
Source: Federal Reserve Board staff calculations via IHS Markit.

The Evolution and Effects of Restrictions to Contain the COVID-19 Outbreak

Authorities around the world took unprecedented actions to contain the spread of the coronavirus (COVID-19). The timing and stringency of restrictions have varied across countries, reflecting the pace of the spread of the virus and governments' reactions to that spread (see the left panel of figure 1).[1] China and the newly industrialized economies (NIEs) in Asia were among the first to react, followed by the euro-area countries most severely affected by the virus. Some countries, including the United Kingdom, Sweden, and those in Latin America, responded more slowly both because of the later arrival of the virus and because they initially adopted less-restrictive strategies to contain it. However, even in these countries, restrictions have intensified as case counts and death tolls surged.

Consistent with the widespread social-distancing practices, both enforced and voluntary, there has been a severe drop in people's mobility. The right panel of figure 1 plots the percentage decline in visits to various places, such as stores or work, relative to the pre–COVID-19 period, as reported by Google's *COVID-19 Community Mobility Reports*, which capture smartphone movements for the same countries on the left panel.[2] As the panel depicts, the de jure restrictions caused aggregate mobility to plummet, especially in the United Kingdom and the euro area, where strict nationwide lockdowns were imposed. In contrast, the drop in mobility has been much less severe in countries with less-stringent government responses, such as Sweden and the NIEs.

Figure 1. Stringency of Government Responses to COVID-19 and Mobility



Note: The Oxford Stringency Index is a composite measure based on nine response indicators, including school closures, workplace closures, and travel bans, rescaled to a value from 0 to 100, with 100 being the strictest response. Stringency aggregates are nominal gross domestic product weighted. China is excluded from analyses because Google's mobility index does not cover China.

* The euro area is France, Germany, Italy, and Spain. Latin America is Chile, Colombia, Argentina, Brazil, and Mexico. Newly industrialized economies (NIEs) are South Korea, Taiwan, and Hong Kong.

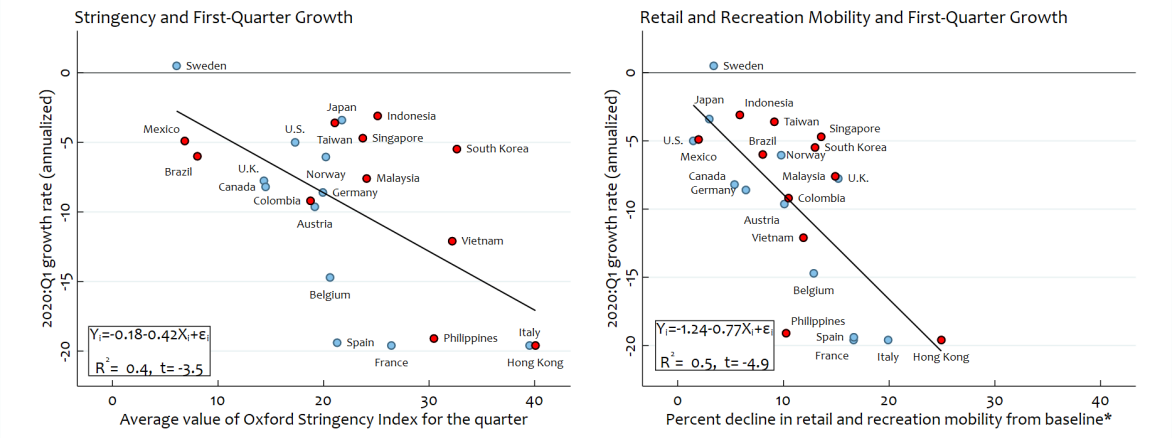
** Google data show changes in mobility compared with the baseline from January 3, 2020, to February 6, 2020. Aggregate includes retail and recreation, transit stations, workplaces, and groceries and pharmacies (simple average of components). Mobility regional aggregates are simple averages of composite countries. Data are seven-day moving average and smoothed for holidays.

Source: Thomas Hale, Sam Webster, Anna Petherick, Toby Phillips, and Beatriz Kira (2020), *Oxford COVID-19 Government Response Tracker* (Blavatnik School of Government); Google *Community Mobility Reports*.

[1] This figure presents one measure of the severity of restrictions, the Oxford Stringency Index (OSI). Researchers at Oxford University compile data for the OSI, which is constructed by summing ordinal scores of nine government response indicators, rescaled to range from 0 to 100, with 100 being the most stringent. The index includes school and workplace closures, restrictions on gatherings and public events, closure of public transport, launch of public information campaigns, restrictions on domestic and international movements, and stay-at-home orders.

[2] Google's mobility index uses smartphone data to measure how visits to and lengths of stay at different places changed compared with a baseline day, which represents the median value for that day of the week from the five-week period of January 3, 2020, to February 6, 2020. The aggregate measure shown in the right panel is the average of four components: retail and recreation, groceries and pharmacies, transit stations, and workplaces.

Figure 2. Relationship between First-Quarter Growth and de jure and de facto Restrictions

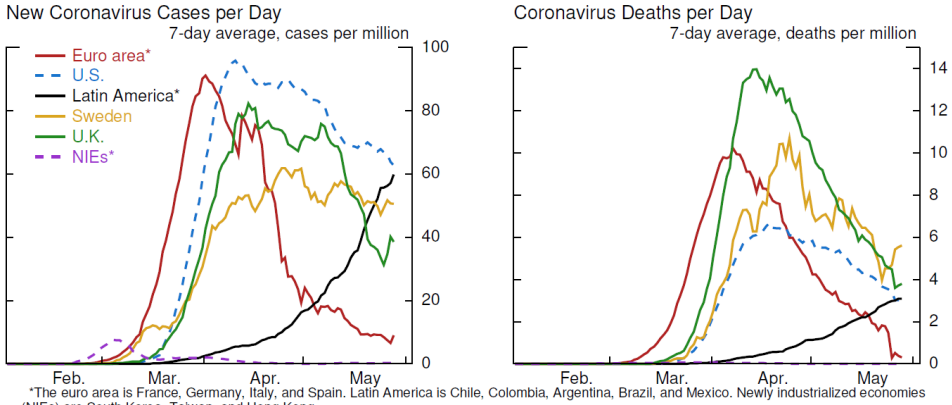


Note: China is excluded from analyses because Google's mobility index does not cover China.
* Average value of the change in mobility data for retail and recreation locations are relative to a baseline day, which is the median value from the five-week period from January 3, 2020, to February 6, 2020. Blue dots represent advanced economies, and red dots represent emerging market economies.
Source: Thomas Hale, Sam Webster, Anna Petherick, Toby Phillips, and Beatriz Kira (2020), *Oxford COVID-19 Government Response Tracker* (Blavatnik School of Government); Google *Community Mobility Reports*.

Although most economies introduced strict restrictions only toward the end of the first quarter, the resulting hit to global economic activity was still enormous. Not surprisingly, countries with more restrictive policies experienced sharper declines in first-quarter gross domestic product (GDP) (left panel of figure 2). Moreover, countries that saw greater declines in mobility related specifically to retail and recreation activities saw larger contractions in economic activity, suggesting that a strong drop-off in consumption contributed to the weakness (right panel of figure 2). Given the stringency of restrictions through May and the highly depressed mobility levels over the past two months, we expect the hit to GDP to be even worse in the second quarter.

Several countries—especially those in the euro area and the NIEs, where the outbreak appears to be under control because of extensive testing and contact tracing—have started gradually easing some of the restrictions, as new COVID-19 cases and deaths have fallen considerably (figure 3). That said, the overall levels of restrictions remain high, as seen in figure 1. Countries have started relaxing stay-at-home orders and partially reopening workplaces. School closures and restrictions on domestic movement eased a bit, too, although they still remain firm. In contrast, we do not observe a meaningful easing of restrictions on international travel and public gatherings and events, suggesting that some areas of the economy, particularly tourism and hospitality sectors, could suffer for longer than the rest.

Figure 3. New COVID-19 Cases and Deaths



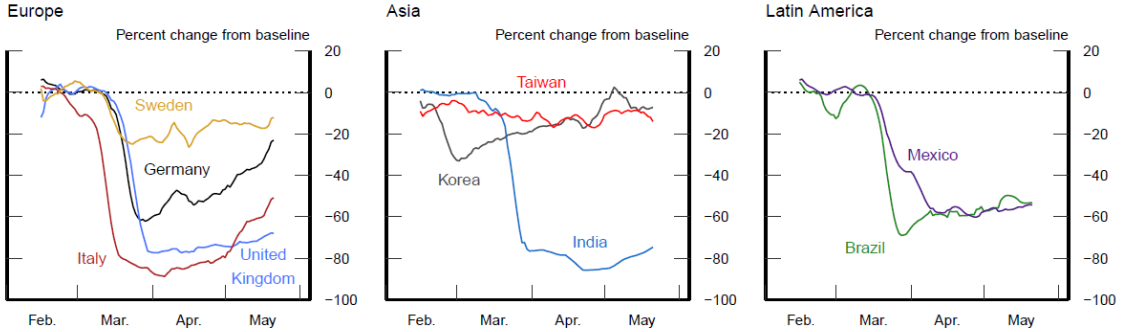
*The euro area is France, Germany, Italy, and Spain. Latin America is Chile, Colombia, Argentina, Brazil, and Mexico. Newly industrialized economies (NIEs) are South Korea, Taiwan, and Hong Kong.
Source: Johns Hopkins Center for Systems Science and Engineering.

China is further along in this process, and its experience provides some early support to the view that recovery will be uneven across sectors. After China started easing lockdown measures in February, industrial production rebounded sharply in March and April. Nominal exports quickly returned to their pre–COVID-19 level, too, as a backlog of orders started to be filled. In contrast, retail sales, which was hit more severely, remains weak, as social distancing continues to depress spending, particularly on hospitality and travel services.

Based on China's experience, we could expect to see a quick rebound in production in other countries as they lift lockdowns. However, this improvement has yet to materialize outside of tentative signs from European purchasing managers indexes in May that suggest some slowing of the pace of decline. In part, it may be too early to see such improvement. The brunt of the virus arrived later in many other economies, so the easing of restrictions has started only recently and stringency levels still remain high. In addition, since China started reopening, global demand has plunged, as evidenced by further declines in new export orders, and this weakness will likely be a strong headwind to any rebound in production, especially in the NIEs.

Also consistent with China's experience, consumers will likely be hesitant to spend. Retail sales has fallen dramatically, especially in the regions that enforced highly stringent restrictions to contain the COVID-19 outbreak. In European countries where restrictions have been eased somewhat, the component of mobility associated with retail sales and recreation has turned up but remains quite depressed (see figure 4). Even in the NIEs, where the fall in retail and recreation mobility was relatively moderate, the level of mobility has yet to return to its pre–COVID-19 levels. Finally, regions that are further behind in battling the virus, such as the United Kingdom, India, and Latin America, show no signs of a recovery yet.

Figure 4. Retail and Recreation Mobility

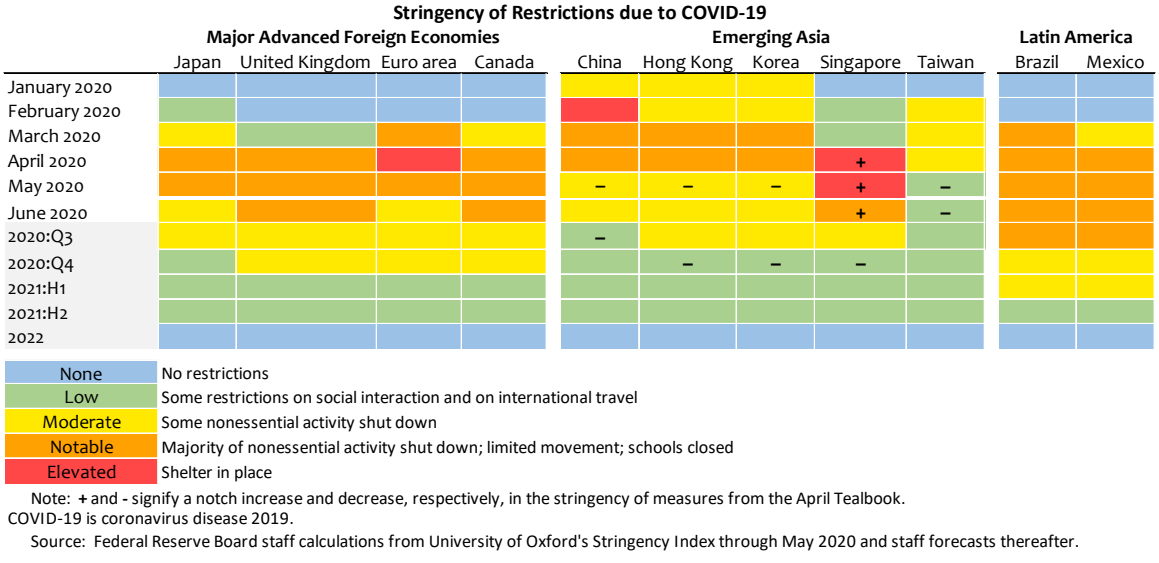


Note: Google data show changes in mobility compared with the baseline from January 3, 2020, to February 6, 2020. Data are seven-day moving average and smoothed for holidays.
Source: Google *Community Mobility Reports*.

Economies around the world are easing restrictions gradually . . .

Lockdowns are being eased at different times across the world, given varying health outcomes and policy preferences (see figure). First, China began easing restrictions, followed by other Asian economies where COVID-19 initially struck. This relaxation reflects the success so far of strong measures to contain the virus and, outside of Singapore, has led us to assume that measures in East Asia will be less restrictive going forward. In Europe, the next region that was heavily hit, governments ramped up restrictions through April, ordering widespread shelter in place (coded in red in figure). Now, following considerable drops in new cases and deaths, many European economies, such as Germany, have started easing restrictions. However, even for countries that are now opening up slowly, the level of restrictions remains very high and, in most cases, tighter than what the United States has in place. In contrast, in Latin America, where the virus spread later, the disease is far from under control and countries are struggling to maintain social-distancing restrictions in the face of economic devastation.

We expect that restrictions will be eased only gradually. Based on our assumption that a vaccine will become widely available only late next year, we see social activities and travel remaining somewhat restricted through the end of 2021. Given the difficulty in containing the virus until then, we expect that strict lockdowns will be reimposed where the disease flares up, especially in those countries that do not have robust testing and tracing in place.



Note: + and - signify a notch increase and decrease, respectively, in the stringency of measures from the April Tealbook.
COVID-19 is coronavirus disease 2019.
Source: Federal Reserve Board staff calculations from University of Oxford's Stringency Index through May 2020 and staff forecasts thereafter.

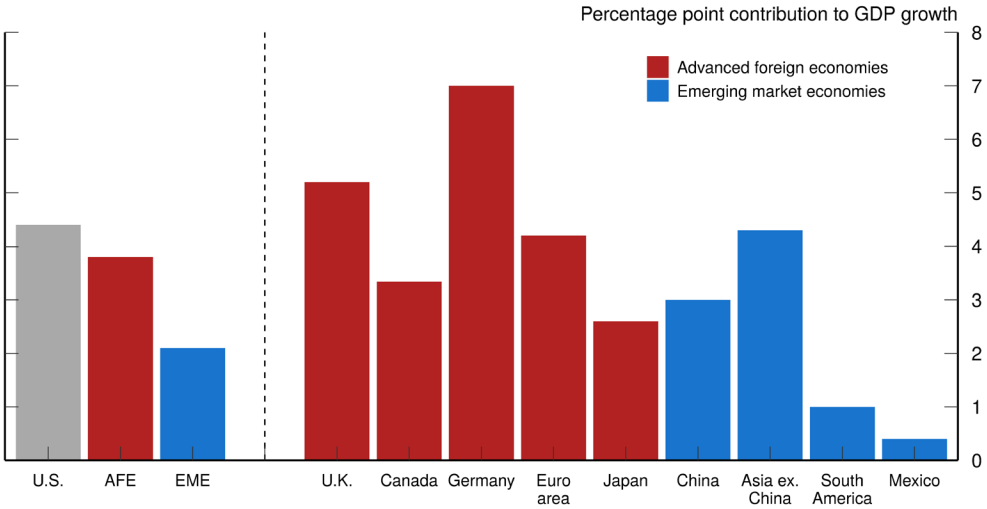
Int'l Econ Devel & Outlook

. . . and foreign authorities are providing considerable policy support . . .

The coronavirus would have inflicted even greater economic damage abroad were it not for the rapid and strong policy actions of foreign authorities. As the pandemic struck, foreign central banks with room to cut lowered their policy rates an average of around 100 basis points, and AFE central banks (several already at their effective lower bound) expanded the size of their balance sheets on the order of about 10 percent of GDP. Some emerging market economy (EME) central banks have also been using balance sheet policy to support the flow of credit and encourage growth. Since the April Tealbook, monetary authorities have provided additional support. The Bank of Japan introduced a new program to support lending to small and medium-sized enterprises, and the Reserve Bank of New Zealand expanded its asset purchase program. Many EME central banks, including those of Brazil, Korea, Mexico, Russia, and Turkey, lowered their policy rates further.

Fiscal authorities have also introduced further steps. Chinese, Japanese, Indian, and Singaporean authorities announced additional stimulus. As shown in the figure, we estimate that fiscal policy will provide considerable support to this year's GDP growth in many economies, on the order of 4 percent of GDP in the AFEs and emerging Asia, in some cases similar in size to that in the United States. However, concerns about soaring public debts could limit the scope for further support in many foreign economies.

Fiscal Stimulus in Response to COVID-19



Note: GDP is gross domestic product. AFE is advanced foreign economy. EME is emerging market economy. COVID-19 is coronavirus disease 2019.
Source: Federal Reserve Board staff estimates.

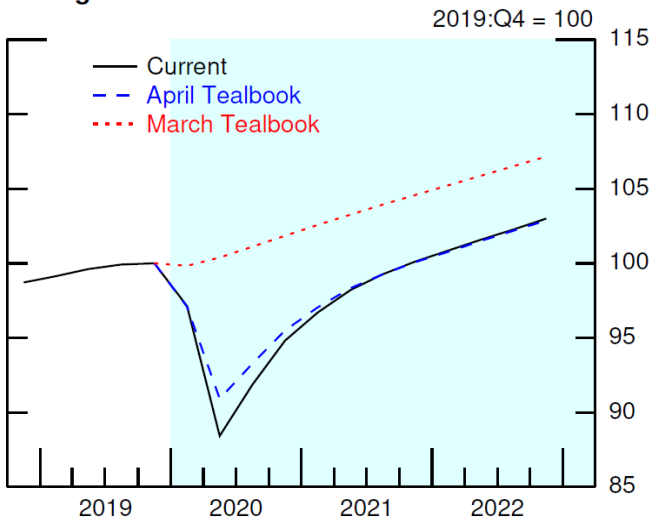
Late in May, the European Commission proposed that the European Union (EU) be given the authority to borrow €750 billion to assist the recovery. This proposal represents a significant amount of stimulus and would bolster the foundations of the EU. We have not yet included this new fiscal stimulus in the baseline forecast because its passage faces considerable hurdles and uncertainties related to its implementation.

. . . which should allow the global economy to start recovering in the summer

As nations have started easing restrictions and policy is providing substantial support, we see some tentative signs that the contraction is bottoming out. However, we anticipate a sluggish recovery. For instance, in China, where the virus began, industrial production snapped back in April, but retail sales and investment improved less, suggesting caution from consumers and firms.

Given the steep contraction in the first half of the year, we expect that even the anticipated modest easing of restrictions will lead to a substantial rebound of growth in the second half. That said, as shown in the figure, the level of foreign GDP is projected to finish the year 5.2 percent below that at the end of 2019. We also see the recovery proceeding relatively slowly in 2021 and 2022 given that some restrictions will remain in place, the policy boost will wane, and negative business cycle dynamics will create additional headwinds. (For a review of the staff's outlook versus those of the International Monetary Fund and private forecasters, see the box "Comparing the Staff International Growth Outlook with Other Forecasts" at the end of this section.)

Foreign GDP Levels



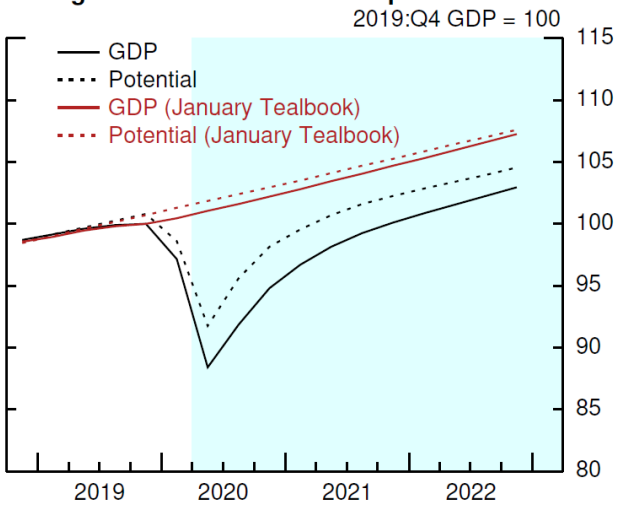
Note: GDP is gross domestic product.
Source: Federal Reserve Board staff forecast.

Even so, COVID-19 will leave a persistent imprint on the global economy

The economic effects of the coronavirus will likely leave scars on the foreign economy for years, lowering potential output. In the first half of this year, potential output is estimated to move almost as much as actual GDP, given that the output collapse resulted largely from business shutdowns and stay-at-home orders. Over the medium term, as restrictions are gradually lifted, potential output should bounce back but will likely not return to its pre–COVID-19 path (see the next figure). Even so, we expect a considerable output gap to open up and persist over the forecast period.

Persistent social-distancing measures will ultimately reduce the capacity of certain sectors, especially in services related to the hospitality and travel industries. Businesses are likely to fail, investment to be deferred, and the formation of new firms to be impaired, all weighing on innovation, capital accumulation, and productivity growth. Moreover, the recessionary dynamics will likely have long-term effects on labor markets. High unemployment could lead to hysteresis and persistently lower labor force participation. In a few countries, especially in Europe, employment has held up better for the time being because of the combination of high firing costs and widespread adoption of short-time-work schemes that provide incentives for firms to reduce hours rather than cut jobs. However, layoffs could spike after these schemes expire, or, in some cases, the schemes may delay a necessary reallocation of labor to other industries.

Foreign GDP and Potential Output



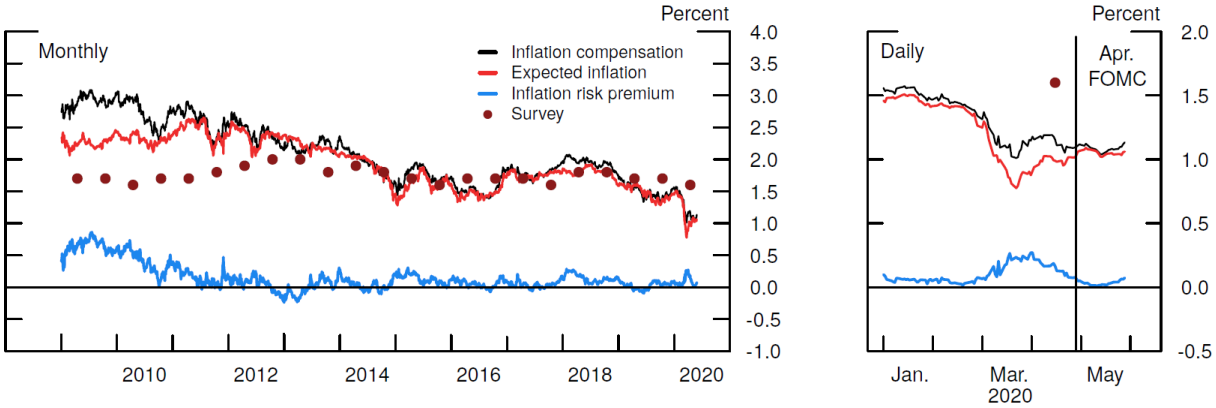
Note: GDP is gross domestic product.
Source: Federal Reserve Board staff forecast.

Foreign inflation looks to be low for years to come

Inflation rates have fallen sharply across most foreign economies. The plunge in oil prices has dragged down headline inflation, bringing 12-month inflation rates close to or below zero in most AFEs. The prolonged period of weak activity will weigh on core inflation as well. Given that substantial output gaps are expected to persist through 2022, we see foreign inflation remaining quite subdued over the entire forecast period, especially in the AFEs.

Market-based measures of inflation compensation have also declined sharply since the COVID-19 outbreak, renewing deflationary concerns for the euro area and Japan. For the euro area, as shown in the panels of the figure, we estimate that the decline in inflation compensation is attributable largely to lower inflation expectations rather than lower inflation risk premiums (red and blue lines, respectively). Survey-based measures of long-term inflation expectations have also declined but only slightly.

Decomposition of Euro-Area Inflation Compensation, 5 to 10 Years Ahead

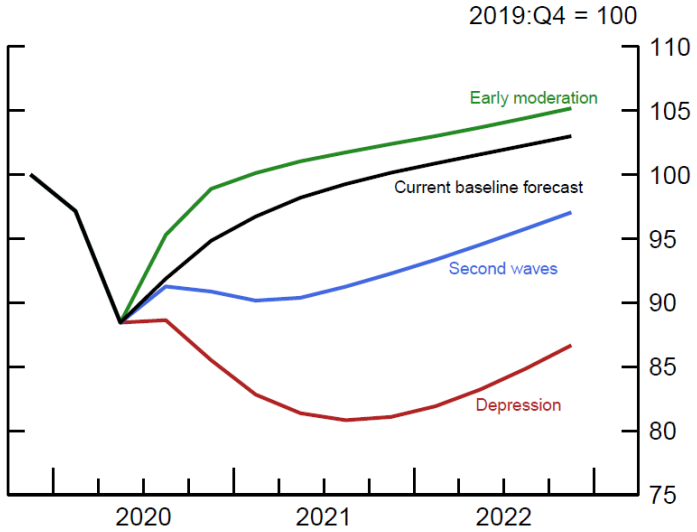


Note: FOMC is the Federal Open Market Committee. The decomposition is based on a Federal Reserve Board staff affine term-structure model that includes survey-based inflation expectations in the estimation. For details, see Canlin Li (2020), "Estimating Real Term Structure Models with Survey Data for Advanced Economies," memorandum, Board of Governors of the Federal Reserve System, Division of International Finance, Janurary 9.
Source: Bloomberg; Consensus Economics.

Many outcomes for growth remain possible

Our conviction in our baseline forecast remains low, as it depends so much on the highly uncertain trajectory of the virus. A wide range of outcomes are plausible, some arguably as likely as our baseline (see the figure). A particularly plausible alternative to our baseline is a scenario of more protracted weakness abroad (blue line). This scenario may reflect a variety of outcomes, including second waves of infections in many foreign economies, less-effective government support programs, or more negative business cycle dynamics. However, we could also see a somewhat earlier recovery than in our baseline, where social distancing diminishes faster because of effective testing and tracking or medical breakthroughs that come earlier than we expect. Though less likely, a far deeper and more prolonged global depression may also materialize, where the pandemic induces large and prolonged financial, social, and political instability around the world and widespread financial crises in EMEs. (The Risks and Uncertainty section explores these scenarios more fully.) Of course, risks remain outside of those related to the pandemic, including, most notably, China's actions regarding Hong Kong and those related to U.S.–China tensions more broadly.

Foreign GDP: Baseline and Scenarios



Note: GDP is gross domestic product.
Source: Federal Reserve Board staff calculations.

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Regional Developments and Outlook

ADVANCED FOREIGN ECONOMIES

- ***Euro Area.*** Gross domestic product (GDP) contracted 14.2 percent at an annual rate in the first quarter amid widespread and strict lockdowns. Although governments started easing social-distancing measures in recent weeks, we expect growth to nosedive further in the second quarter. The subsequent recovery will be aided by substantial monetary and fiscal support, with the latter projected to contribute 4.2 percentage points to growth in 2020.

  The deep recession and plunging commodity prices will weigh considerably on consumer prices, with headline and core inflation projected to be only 0.3 percent in 2020. Thereafter, we see inflation rising to only 1.2 percent over the forecast period, well below the European Central Bank's (ECB's) target.

  In early May, the German Federal Constitutional Court requested that within three months the ECB provide a rationale to the German Parliament for its 2015 Public Sector Purchase Programme. Although the ruling did not directly address the ECB's new €750 billion (6.2 percent of GDP) Pandemic Emergency Purchase Programme (PEPP), its ramifications are uncertain and may even require the Bundesbank to sell any purchased assets and stop participating in the PEPP. This ruling was viewed as challenging the seniority of the European Court of Justice over national courts, potentially revealing new flaws about the euro-area design.

  However, an unexpected positive development came later in May when the European Commission proposed that the European Union (EU) issue common debt to provide €750 billion in grants and loans to countries hard hit by the coronavirus (COVID-19). If approved by all EU countries, such a proposal would represent a significant first step toward a fiscal union, thereby strengthening the foundations of the EU. According to the proposal, the grants will go to finance investments and reforms to help the recovery. We expect political negotiations over the details and passage of the proposal to delay the use of these funds until 2021, providing an upside risk to our baseline forecast.

- ***Japan.*** First-quarter GDP contracted a relatively subdued 3.4 percent, in line with the more contained coronavirus (COVID-19) outbreak in Japan compared with other advanced foreign economies. Even so, rapidly implemented travel restrictions and social-distancing measures resulted in sharp declines in services consumption and exports. As these measures failed to stem the rate of infections, tighter restrictions implemented in April and May contributed to pushing purchasing managers indexes (PMIs) to near-record lows pointing to an unprecedented plunge in GDP in the current quarter. More recently, the number of new COVID-19 cases has declined to very low levels, prompting a relaxation of social-distancing measures, which should allow a gradual recovery to take hold in the second half of the year.

  Additional initiatives of the authorities will support the recovery. The Bank of Japan (BOJ) unveiled the details of a new program aimed at supporting small and medium-sized enterprises (SMEs). Through this program, the BOJ will make available ¥30 trillion (5.4 percent of 2019 GDP) to eligible counterparties for up to one year at a 0 percent interest rate. The collateral accepted for this program includes the interest-free, unsecured

government-guaranteed loans extended to SMEs hit by the pandemic. Furthermore, in late May, the government announced an additional fiscal package of ¥32 trillion to support the recovery. If approved by the legislature, this package could raise the total amount of fiscal support mobilized to address the pandemic to 13 percent of GDP.

- ***United Kingdom.*** GDP fell 7.7 percent in the first quarter, even though the United Kingdom entered into a full lockdown only in the last week of March. Indeed, the U.K. government imposed restrictions relatively late, which has resulted in a particularly severe COVID-19 outbreak and, in turn, in an extended period with strict measures in place. As such, in line with the dismal tone of the incoming data, we project an even sharper contraction this quarter. With a very gradual easing of restrictions having started in mid-May, we see recovery taking hold in the second half of the year, but even so, GDP should contract almost 8 percent in 2020. In addition to the downside risks related to the course of the virus, the possibility of a no-trade-deal Brexit at the onset of 2021 appears increasingly likely given a lack of progress in the negotiations with the EU and the U.K. government's opposition to an extension of the transition period.

- ***Canada.*** Strict social-distancing measures, the oil price collapse, and the deep U.S. contraction have hit the country hard. GDP contracted 8.2 percent in the first quarter, dragged down by sharp drops in consumption and oil exports. Indicators through April, including a plunge in monthly GDP, record-low manufacturing output PMI, and a spike in the unemployment rate to 13 percent, suggest that GDP will tumble almost 50 percent (at an annual rate) in the current quarter. As the spread of the virus slowed, many provinces started some modest loosening of social-distancing measures in mid-May, although most restrictions remain in place. Given our assumption that most businesses will resume operations in the second half of the year, economic activity should recover gradually, supported by accommodative policies and a projected pickup in oil prices.

EMERGING MARKET ECONOMIES

- ***China.*** After collapsing in the first quarter, GDP is expected to bounce back 42 percent at an annual rate in the second quarter, supported by a partial rollback of the restrictions imposed to contain the spread of COVID-19. Industrial production surged in March and April, as factories were reopened and a backlog of export orders were filled. Investment also rebounded in April, supported by government stimulus. That said, consumption seems to be recovering more gradually as social distancing continues to depress spending on restaurants and other services. More recently, Chinese authorities announced additional stimulus measures to support the recovery in the second half of the year. All together, the cumulative stimulus announced to address the COVID-19 crisis amounts to about 4.5 percent of 2019 GDP, well below the stimulus introduced after the Global Financial Crisis, which totaled 12 percent of 2008 GDP. All told, we see economic growth at close to zero this year. Amid the uncertainty, authorities scrapped the country's growth target for the first time in decades.

  The outlook faces headwinds from renewed U.S.–China tensions, as the United States barred the use of U.S. technology by Huawei in retaliation against China's alleged poor handling of the pandemic. In addition, in response to China's move to impose a national security law in Hong Kong, the U.S. Department of State declared that Hong Kong is no

longer autonomous from China, which could lead the U.S. government to lift the special tariff regime for Hong Kong and put the existing phase-one trade deal with China in jeopardy. Finally, if investors perceive the end of "one country, two systems," it could prompt them to flee Hong Kong to other financial centers (such as Singapore), triggering capital flight out of Hong Kong and, in turn, a credit crunch in China (as many of its companies are listed in Hong Kong).

- ***Asia ex. China.*** Aggregate GDP for the region contracted 8.3 percent in the first quarter, a sharp decline but better than we expected. Aggressive contact tracing and testing have allowed for less draconian lockdowns in several higher-income economies, such as Korea and Taiwan, while exports held up better than anticipated. However, second-quarter data suggest that manufacturing and exports are contracting at a faster pace now, as demand from Europe and the United States has plummeted. In addition, a collapse in tourism revenues in some countries, along with the extension of lockdowns in India and Indonesia, has further depressed retail sales as well as consumer and business confidence. All told, we expect the region to contract a further 15 percent in the second quarter before rebounding at an almost 10 percent pace in the second half of the year, led by a recovery in both domestic and external demand.

- ***Mexico.*** The economy contracted 4.9 percent in the first quarter because of COVID-19-related restrictions imposed in mid-March, which, together with lower U.S. demand, resulted in a sharp drop in manufacturing output. Recent indicators, such as PMIs, vehicle sales, and exports, along with high-frequency mobility data, point to a collapse in activity in the second quarter. The virus has spread widely, given very limited testing, high population density, and weak health care infrastructure, and the imposition of social-distancing measures has contributed to the economic collapse. Accordingly, we expect a 7 percent contraction in 2020. Thereafter, the pace of recovery will be curtailed by the expected protracted duration of the pandemic and limited fiscal support.

- ***Brazil.*** GDP contracted 6 percent in the first quarter even though quarantines were in effect for only the last two weeks of March. Despite the imposition of restrictions, COVID-19 has spread quickly throughout the country because of insufficient testing, an uncoordinated response from central and local authorities, and very dense living conditions for segments of the population. The health crisis has also led to political turmoil and social unrest, which have unsettled financial markets. Given the inadequate response at the federal level, states introduced their own lockdown measures and some have already extended them, which should lead to a much steeper decline of activity in the second quarter. Policymakers were quick to introduce a fiscal stimulus package, but, with gross government debt approaching 100 percent of GDP, concerns about debt sustainability will limit the scope for further fiscal stimulus. All told, we see the economy contracting almost 6 percent in 2020.

- ***Argentina.*** On May 22, Argentina defaulted on $500 million of interest payments on foreign-law bonds, as creditors refused the debt restructuring proposed by the country's government in April. The Argentine government was seeking maturity extensions to 2026 and beyond, a three-year moratorium on interest payments, and substantially reduced coupons thereafter on a total of $66 billion of those bonds. However, creditors balked at these terms given the lack of a credible macroeconomic plan to improve debt sustainability.

Despite the default, the third in two decades, negotiations are reportedly continuing, with a new deadline set for June 2. The default has exacerbated an already dire situation, with the economy suffering as a result of COVID-19 and the measures implemented to contain its spread and the plunge in commodity prices. Accordingly, we expect the Argentine economy to contract more than 8 percent in 2020, the worst performance in the region.

Comparing the Staff International Growth Outlook with Other Forecasts

While both the Board's staff and outside forecasters expect the global economy to fall into a deep recession this year, the Board's staff is generally more pessimistic than the International Monetary Fund (IMF) and Consensus Economics. As shown in the first row of the table, the staff forecasts total foreign gross domestic product (GDP) in 2020 to decline noticeably more than projections by the IMF and Consensus Economics.[1] Not surprisingly, given the expectations of deeper declines in 2020, the staff sees faster GDP growth in 2021 than the IMF and Consensus Economies anticipate. By contrast, the staff's outlook is less optimistic than that of the Organisation for Economic Co-operation and Development (OECD) for several foreign economies, including the euro area and China, though not for the United States.

Professional forecasts collected by Consensus Economics have unusually large ranges, underscoring the huge uncertainty currently surrounding the outlook. Notably, the forecasts for 2020 growth for the euro area range from negative 14 percent to negative 4.6 percent and for China run from negative 2.3 percent to positive 3.3 percent.

Both the staff and outside forecasters have revised their outlooks sharply since the beginning of the year. The top panel in the figure on the next page shows the evolution of foreign growth in 2020 on a year-over-year basis and highlights the enormous markdowns in the forecasts for this year for the staff, the IMF, and Consensus Economics. The bottom panel shows that outside forecasters, like the staff, expect a partial rebound in growth next year.

Comparison of Foreign Real GDP Forecasts

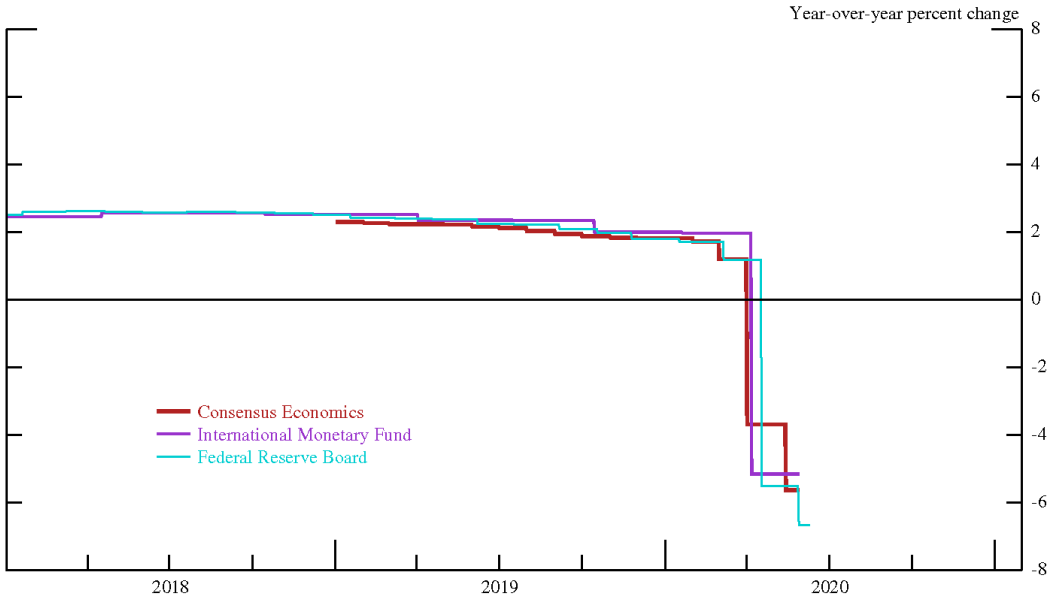
	Year-over-year percent change								Q4/Q4 percent change	
	2020				2021				2020	2021
	FRB	IMF	Consensus	OECD	FRB	IMF	Consensus	OECD	FRB	FRB
1. Total foreign	-6.7	-5.2	-5.6	n.a.	5.8	4.5	4.8	n.a.	-5.2	5.6
2. Advanced foreign economies	-8.4	-6.6	-7.0	-9.2	6.3	4.3	5.3	5.6	-7.1	6.2
3. Canada	-9.7	-6.2	-6.8	-8.4	7.8	4.2	5.3	4.6	-8.2	7.7
4. Euro area	-8.3	-7.5	-7.9	-10.3	6.0	4.7	6.2	7.5	-6.9	5.7
5. Japan	-4.9	-5.2	-5.5	-7.0	2.8	3.0	2.4	1.0	-3.3	3.2
6. United Kingdom	-8.6	-6.5	-7.9	-12.7	4.9	4.0	6.1	9.0	-7.9	5.3
7. Emerging market economies	-4.8	-3.8	-4.2	n.a.	5.4	4.7	4.4	n.a.	-3.2	5.0
8. China	.2	1.2	1.4	-2.9	10.6	9.2	8.1	6.7	4.2	6.5
9. Emerging Asia ex. China	-2.7	-2.6	-2.6	n.a.	5.1	4.5	4.6	n.a.	-1.8	5.5
10. Mexico	-8.4	-6.6	-7.6	-7.3	4.1	3.0	2.7	2.9	-7.0	4.2
11. Brazil	-5.9	-5.3	-5.5	-6.9	2.4	2.9	3.5	3.7	-6.5	3.8
Memo										
Emerging market economies ex. China	-5.9	-4.8	-5.3	n.a.	4.3	3.7	3.6	n.a.	-4.7	4.7
United States	-6.9	-5.9	-5.4	-6.3	4.8	4.7	4.3	4.2	-7.1	6.7

Note: Gross domestic product (GDP) aggregates are weighted by shares of U.S. nonagricultural exports. India is excluded from all year-over-year forecast aggregates, as Consensus Economics reports Indian growth on a fiscal year basis. Federal Reserve Board (FRB) forecasts are from the current Tealbook. International Monetary Fund (IMF) forecasts are from the April 2020 *World Economic Outlook* update. Consensus Economics' forecasts were published on May 14 for advanced economies, May 14 for Asian countries, May 20 for Latin American countries, and May 21 for Russia. Organisation for Economic Co-operation and Development (OECD) forecasts are from the May 2020 *Economic Outlook*.
n.a. is not available.
Source: Federal Reserve Board Tealbook forecasts; International Monetary Fund; Consensus Economics; Organisation for Economic Co-operation and Development.

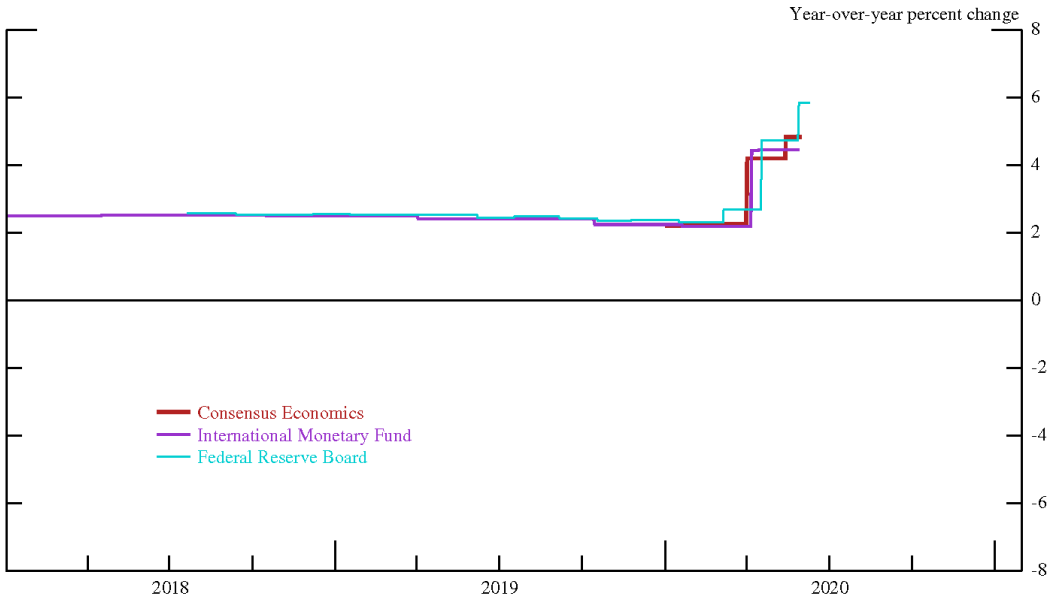
[1] On a Q4/Q4 basis, as shown in the last two columns of the table, the staff forecasts for 2020 are generally a bit less negative than on a year-over-year basis, as the foreign economies are projected to start recovering in the second half of this year.

Evolution of Foreign Growth Forecasts

A. Forecasts of 2020 Real GDP



B. Forecasts of 2021 Real GDP



Note: Gross domestic product (GDP) aggregates are weighted by shares of U.S. nonagricultural exports. India is excluded from all year-over-year forecast aggregates, as Consensus Economics reports Indian growth on a fiscal year basis. Federal Reserve Board forecasts are from the current Tealbook. International Monetary Fund forecasts for all individual countries are from the April 2020 *World Economic Outlook* update. Consensus Economics' forecasts were published on May 14 for advanced foreign economies, May 14 for Asian countries, May 20 for Latin American countries, and May 21 for Russia. Consensus Economics began forecasting 2021 only in 2020, and the Federal Reserve Board and International Monetary Fund began forecasting 2021 earlier.
Source: Federal Reserve Board Tealbook forecasts; International Monetary Fund; Consensus Economics.

The Foreign GDP Outlook

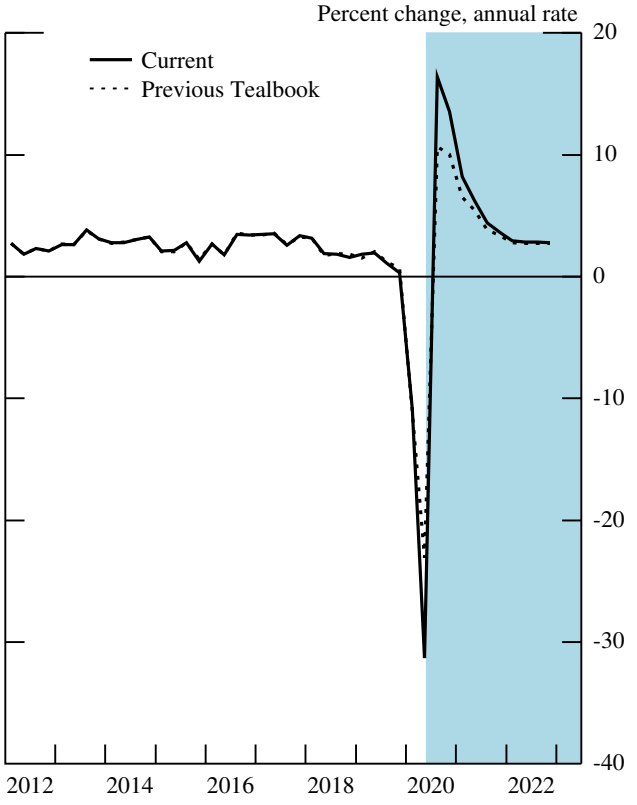
Real GDP* Percent change, annual rate**

	2019			2020			2020	2021	2022
	H1	Q3	Q4	Q1	Q2	H2			
1. Total foreign	1.9	1.1	.3	-10.9	-31.3	15.0	-5.2	5.6	2.8
Previous Tealbook	*1.8*	*1.2*	*.7*	*-11.1*	*-23.0*	*10.3*	*-4.5*	*4.8*	*2.8*
2. Advanced foreign economies	1.8	1.2	-.3	-9.5	-40.4	17.6	-7.1	6.2	2.3
Previous Tealbook	*1.8*	*1.2*	*-.3*	*-9.4*	*-30.1*	*11.4*	*-5.8*	*4.8*	*2.2*
3. Canada	2.2	1.1	.6	-8.2	-49.0	23.1	-8.2	7.7	2.6
4. Euro area	1.2	1.2	.4	-14.2	-35.5	16.5	-6.9	5.7	2.4
5. Japan	2.4	.0	-7.3	-3.4	-19.0	5.8	-3.3	3.2	1.1
6. United Kingdom	1.0	2.1	.1	-7.7	-42.2	16.1	-7.9	5.3	2.2
7. Emerging market economies	2.0	1.0	.9	-12.3	-20.8	12.4	-3.2	5.0	3.4
Previous Tealbook	*1.8*	*1.2*	*1.7*	*-12.9*	*-15.3*	*9.3*	*-3.1*	*4.8*	*3.3*
8. China	6.2	5.5	5.9	-36.3	42.0	14.1	4.2	6.5	5.6
9. Emerging Asia ex. China	2.4	.2	2.5	-8.3	-15.3	9.5	-1.8	5.5	3.6
10. Mexico	.0	-.9	-2.3	-4.9	-40.6	14.9	-7.0	4.2	2.2
11. Brazil	1.6	1.9	1.5	-6.0	-32.0	9.4	-6.5	3.8	2.8
Memo									
Emerging market economies ex. China	1.2	.1	-.1	-6.3	-29.9	12.0	-4.7	4.7	2.9

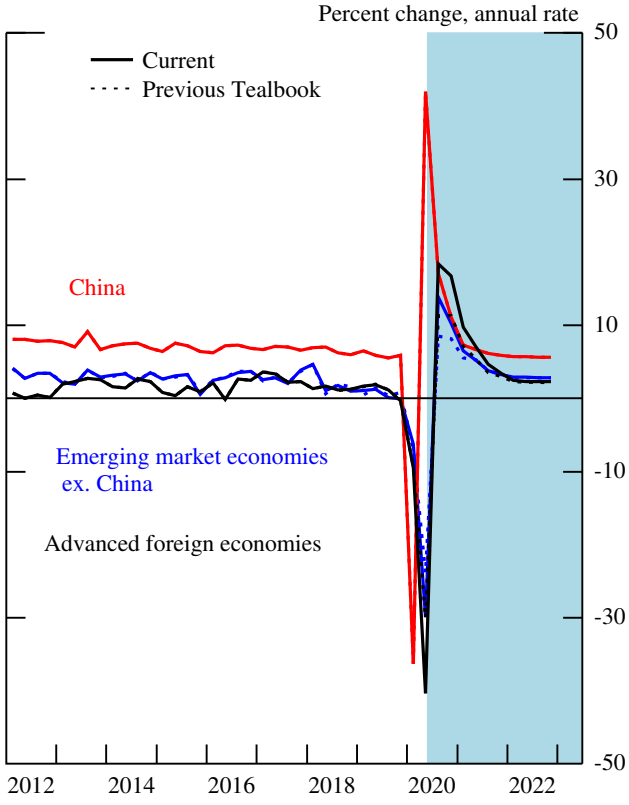
* GDP aggregates weighted by shares of U.S. merchandise exports.
** Annual data are Q4/Q4.

Int'l Econ Devel & Outlook

Total Foreign GDP



Foreign GDP



The Foreign Inflation Outlook

Consumer Prices* Percent change, annual rate**

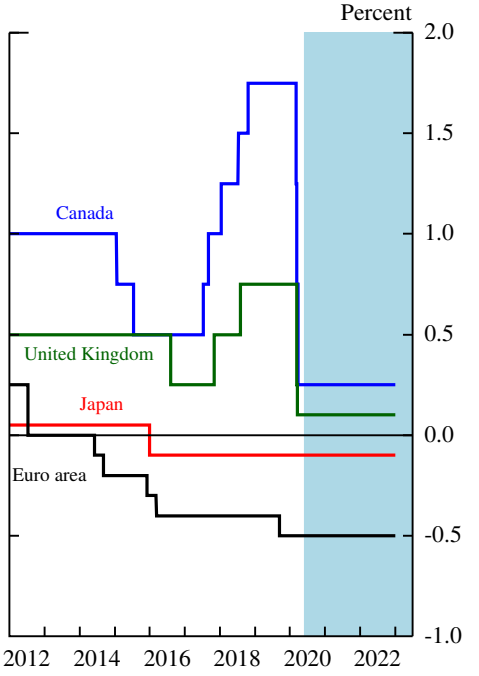
	2019			2020			2020	2021	2022
	H1	Q3	Q4	Q1	Q2	H2			
1. Total foreign	2.2	2.1	3.4	2.4	-1.0	2.0	1.4	2.1	2.1
Previous Tealbook	*2.1*	*2.1*	*3.4*	*2.4*	*.6*	*2.1*	*1.8*	*2.2*	*2.2*
2. Advanced foreign economies	1.4	.9	1.1	.6	-1.2	1.0	.4	1.2	1.2
Previous Tealbook	*1.4*	*.9*	*1.1*	*.7*	*-.9*	*.9*	*.4*	*1.2*	*1.3*
3. Canada	2.5	1.6	1.7	.5	-1.0	1.6	.7	1.7	1.6
4. Euro area	1.1	.7	1.1	.7	-1.6	1.1	.3	1.2	1.2
5. Japan	.4	.4	.8	.3	-1.1	.0	-.2	.3	.5
6. United Kingdom	1.8	1.7	.4	2.1	-1.4	1.6	1.0	1.6	1.4
7. Emerging market economies	2.7	2.9	4.9	3.6	-.9	2.7	2.0	2.7	2.8
Previous Tealbook	*2.6*	*3.0*	*5.0*	*3.6*	*1.5*	*2.9*	*2.7*	*2.8*	*2.8*
8. China	2.8	4.2	7.2	4.2	-.3	2.0	2.0	2.5	2.5
9. Emerging Asia ex. China	1.7	1.2	3.3	2.6	-3.0	3.0	1.4	2.4	2.6
10. Mexico	3.0	2.6	3.2	3.3	-.2	3.3	2.4	3.2	3.2
11. Brazil	4.1	2.2	3.2	4.9	-.8	2.9	2.5	3.7	3.5
Memo									
Emerging market economies ex. China	2.5	2.0	3.4	3.1	-1.3	3.2	2.1	2.9	2.9

* CPI aggregates weighted by shares of U.S. non-oil imports.
** Annual data are Q4/Q4.

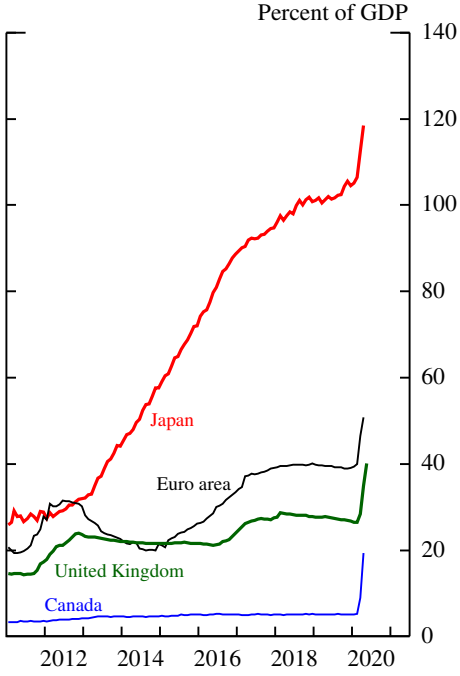
Int'l Econ Devel & Outlook

Foreign Monetary Policy

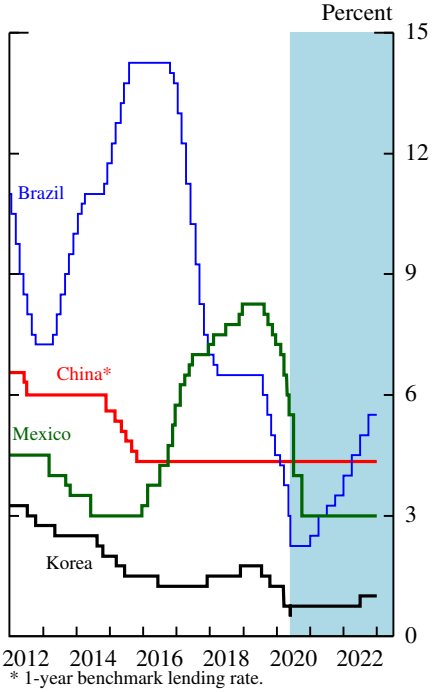
AFE Policy Rates



AFE Central Bank Balance Sheets



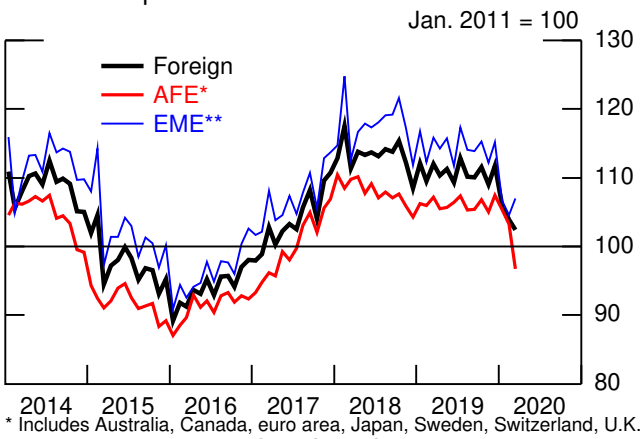
EME Policy Rates



* 1-year benchmark lending rate.

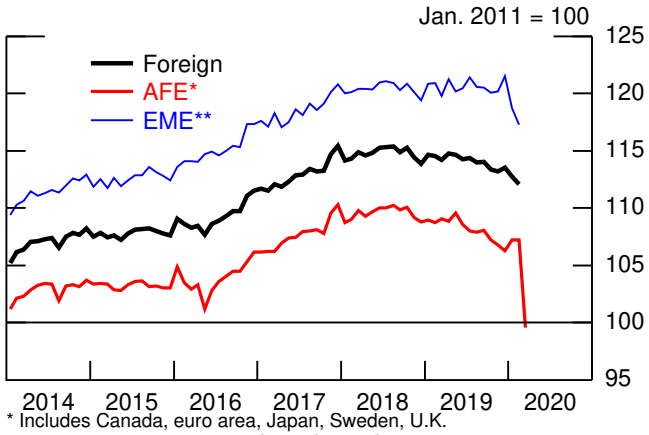
Recent Foreign Indicators

Nominal Exports



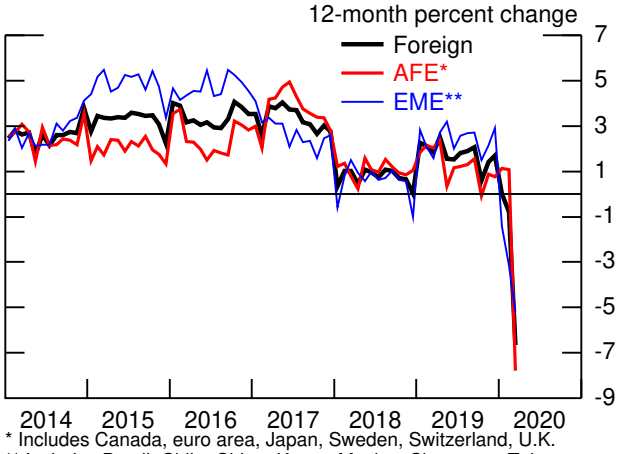
* Includes Australia, Canada, euro area, Japan, Sweden, Switzerland, U.K.
** Includes Argentina, Brazil, Chile, China, Colombia, Hong Kong, India, Indonesia, Israel, Korea, Malaysia, Mexico, Singapore, Taiwan, Thailand.

Industrial Production



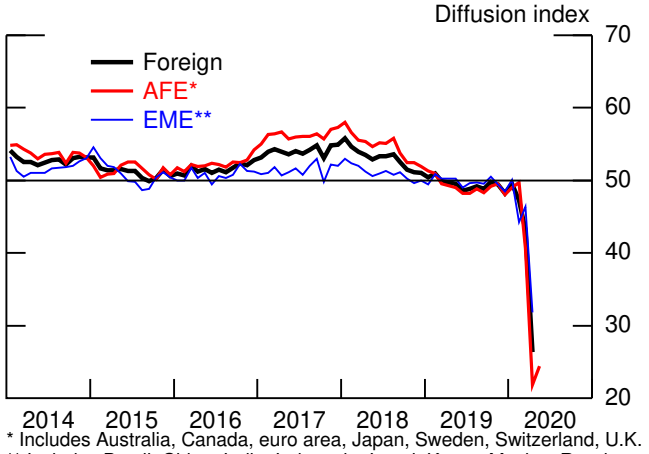
* Includes Canada, euro area, Japan, Sweden, U.K.
** Includes Argentina, Brazil, Chile, China, Colombia, India, Indonesia, Israel, Korea, Malaysia, Mexico, Philippines, Russia, Singapore, Taiwan, Thailand.

Retail Sales



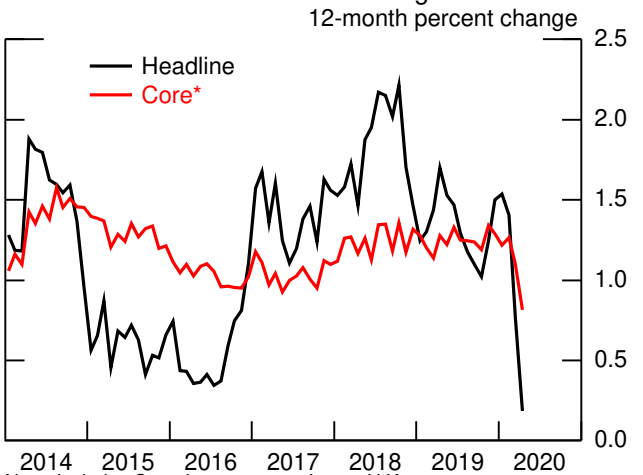
* Includes Canada, euro area, Japan, Sweden, Switzerland, U.K.
** Includes Brazil, Chile, China, Korea, Mexico, Singapore, Taiwan.

Manufacturing PMI



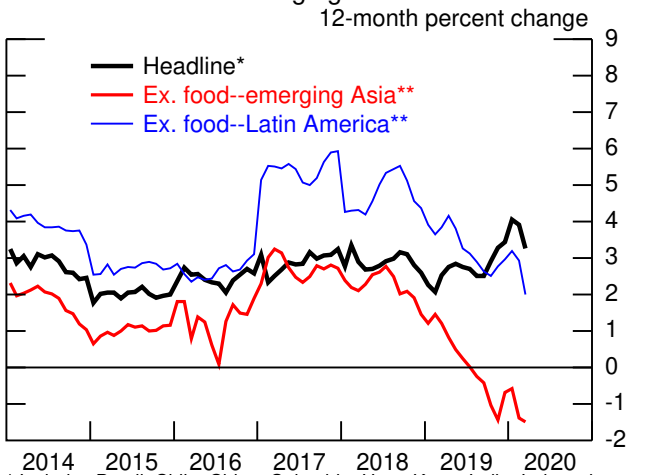
* Includes Australia, Canada, euro area, Japan, Sweden, Switzerland, U.K.
** Includes Brazil, China, India, Indonesia, Israel, Korea, Mexico, Russia, Singapore, Taiwan, Turkey.

Consumer Prices: Advanced Foreign Economies



Note: Includes Canada, euro area, Japan, U.K.
* Excludes all food and energy; staff calculation.
Source: Haver Analytics.

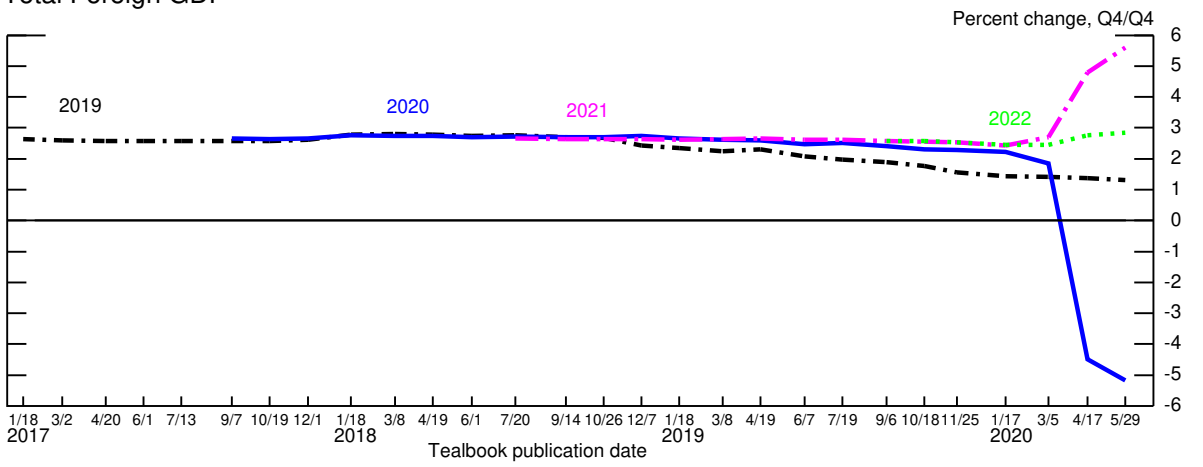
Consumer Prices: Emerging Market Economies



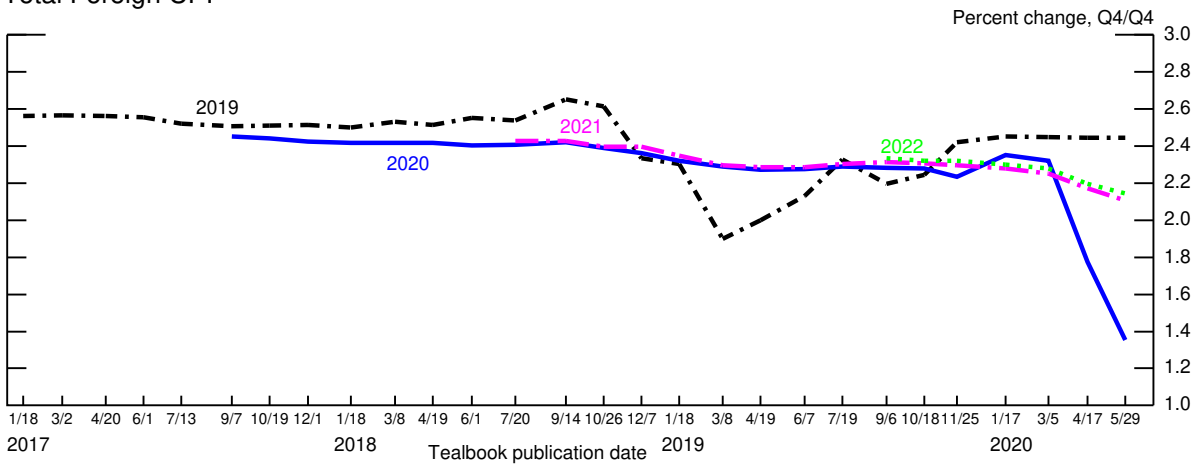
* Includes Brazil, Chile, China, Colombia, Hong Kong, India, Indonesia, Korea, Malaysia, Mexico, Philippines, Singapore, Taiwan, Thailand.
** Excludes all food; staff calculation. Latin America excludes Argentina and Venezuela.

Evolution of Staff's International Forecast

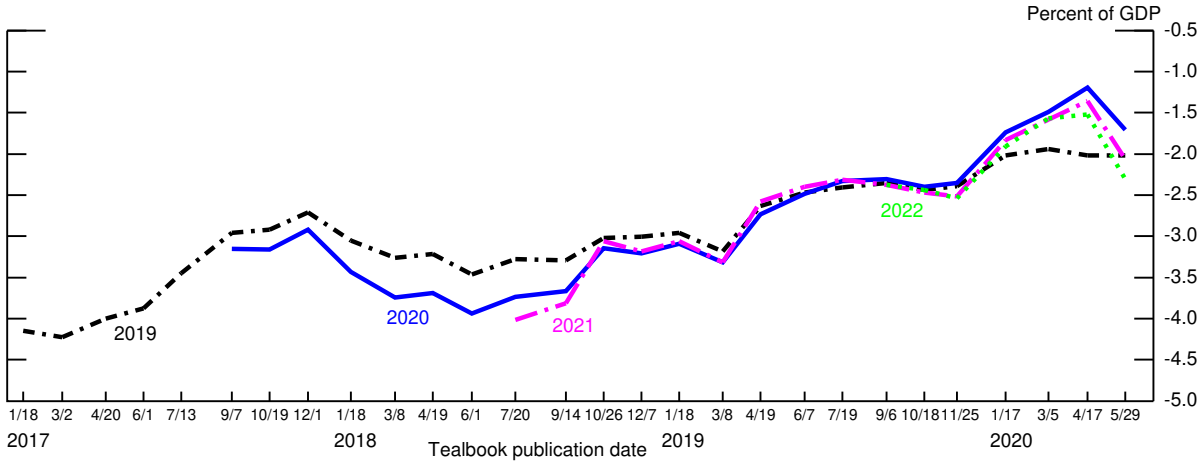
Total Foreign GDP



Total Foreign CPI



U.S. Current Account Balance



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Financial Market Developments

Over the intermeeting period, risk sentiment improved, on net, as optimism over reopening the economy and potential COVID-19 treatments more than offset concerns arising from dire economic data releases, warnings from health experts, and renewed tensions between the United States and China. Equity prices rose and corporate bond spreads narrowed notably. The Treasury yield curve steepened, and the market-implied expected path of the federal funds rate declined somewhat. Liquidity conditions continued to improve in general, but some stress is still evident in several markets.

- On net, the two-year nominal Treasury yield moved down 5 basis points, while the 10- and 30-year Treasury yields rose 6 basis points and 27 basis points, respectively, with longer-term yields likely boosted, in part, by expectations of heavy upcoming issuance.

- Broad equity price indexes increased about 6 percent on net. Spreads on investment- and speculative-grade corporate bonds narrowed 29 basis points and 115 basis points, respectively.

- Conditions in the higher-rated segment of the municipal bond market improved notably, with triple-A municipal bond spreads to comparable-maturity Treasury yields narrowing about 70 basis points.

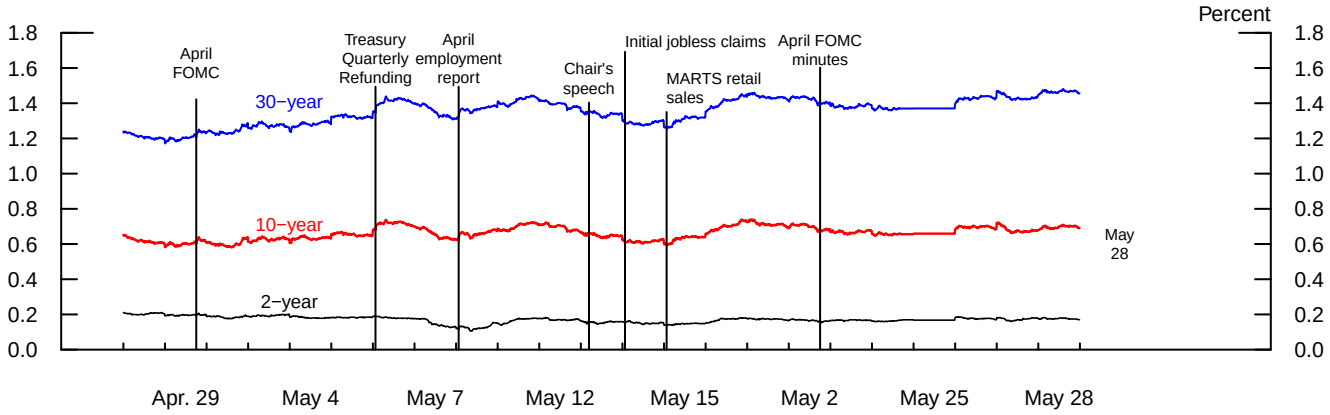
- One-month implied volatility on the S&P 500 index (the VIX) declined 5 percentage points to 29 percent, the 90th percentile of its distribution since 1990.

- Inflation compensation at the 5-year horizon moved up 15 basis points, while 5-to-10-year inflation compensation declined 5 basis points.

- The expected federal funds rate based on a straight read of OIS quotes remains at the effective lower bound (ELB) through the end of 2023. Adjusted for term premiums from staff models, the path stays at the ELB until the second half of 2022.

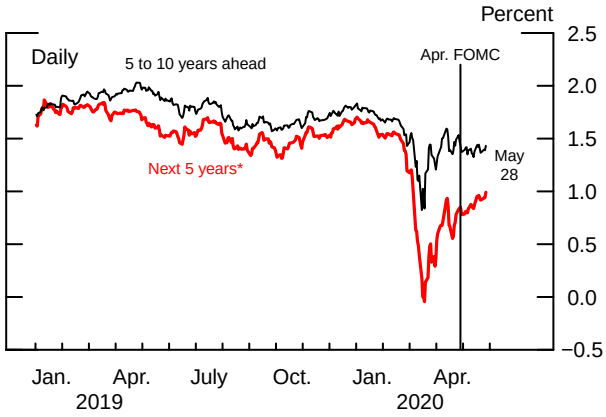
Treasury and Related Markets

Intraday Treasury Yields



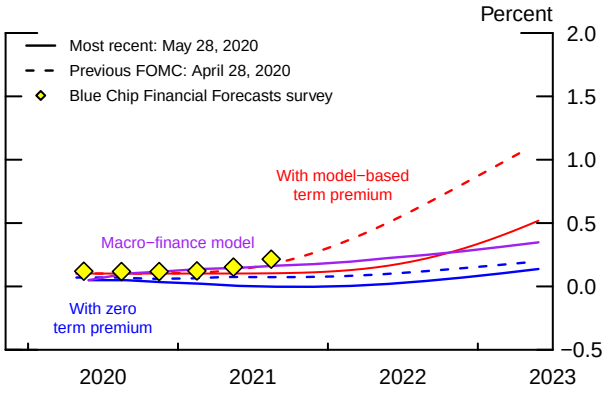
Note: Data are spaced at 5−minute intervals from 8:00 a.m. to 4:00 p.m.
Source: Bloomberg.

TIPS−Based Inflation Compensation



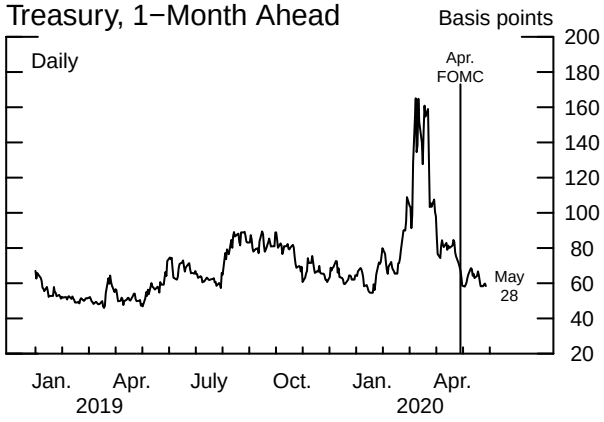
Note: Estimates based on smoothed nominal and inflation−indexed Treasury yield curves.
* Adjusted for lagged indexation of Treasury Inflation−Protected Securities (TIPS) (carry effect).
Source: FRBNY; Board staff calculations.

Implied Federal Funds Rate



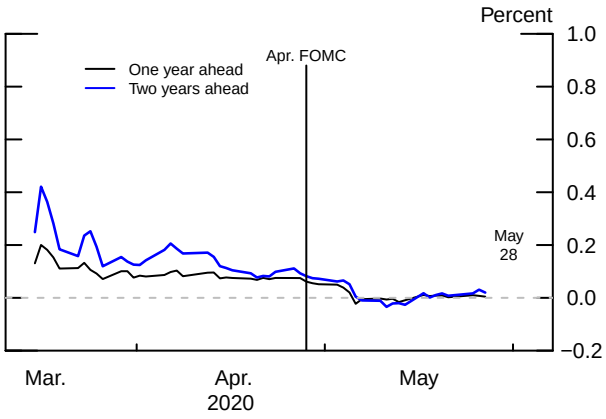
Note: Zero term premium path is estimated using overnight index swap quotes with a spline approach and a term premium of 0 basis points. Model−based term premium path is estimated using a term structure model maintained by Board staff and corrects for term premiums. Macro−finance model path is estimated using regressions of survey−OIS gaps on the covariances between real and nominal variables. The Blue Chip path is the average of respondents' expectations for the federal funds rate in the survey published on May 1.
Source: Bloomberg; Board staff calculations.

Measure of Implied Volatility of 10−Year Treasury, 1−Month Ahead



Source: Barclays.

Estimated Federal Funds Rate



Source: Bloomberg; Board staff calculations.

Financial Markets

- Foreign equity prices posted moderate increases, and the staff's broad dollar index fell about 1.9 percent. Advanced foreign economy sovereign yields were little changed on net.

- Conditions in short-term funding markets continued to improve, as spreads on most unsecured instruments narrowed and issuance held steady.

DOMESTIC DEVELOPMENTS

The Treasury yield curve steepened over the intermeeting period. Two- and five-year Treasury yields dipped to 0.19 percent and 0.37 percent, respectively. Meanwhile, 10- and 30-year yields rose to 0.73 percent and 1.59 percent, respectively, which market commentary linked to increases in expected issuance of longer-term securities as well as some improvement in investor sentiment. On May 20, the Treasury Department issued a 20-year bond for the first time since 1986, and it was met with solid demand.

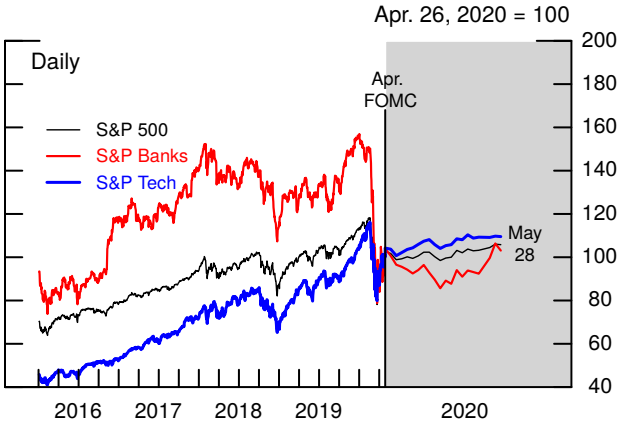
Changes in inflation compensation implied by TIPS were mixed, with 5-year inflation compensation rising 15 basis points as oil prices increased, while the 5-to-10-year measure moved down 5 basis points. At 0.99 percent and 1.43 percent, respectively, both measures are roughly halfway between typical levels in recent years and the lows of mid-March. Staff models continue to imply that substantial TIPS liquidity premiums—near the upper end of their recent pre-COVID-19 ranges—are putting downward pressure on measures of inflation compensation.

The expected path of the federal funds rate based on a straight read of OIS quotes declined a bit and now remains close to the ELB through the end of 2023. The staff's model-based measures that adjust for term premiums put the expected policy rate path at the ELB until the second half of 2022. Market-implied forward rates referring to 2021 and 2022 turned slightly negative on May 7, suggesting that investors attached some probability to negative federal funds rate outcomes. However, market commentary suggests that investors generally do not expect the FOMC to lower the federal funds target range below zero. Forward rates subsequently ticked back up to levels around zero amid Federal Reserve communications reaffirming that negative interest rates do not appear to be an attractive policy tool.

Broad stock price indexes moved about 6 percent higher, on net, boosted by optimism over reopening the economy and potential COVID-19 treatments, although

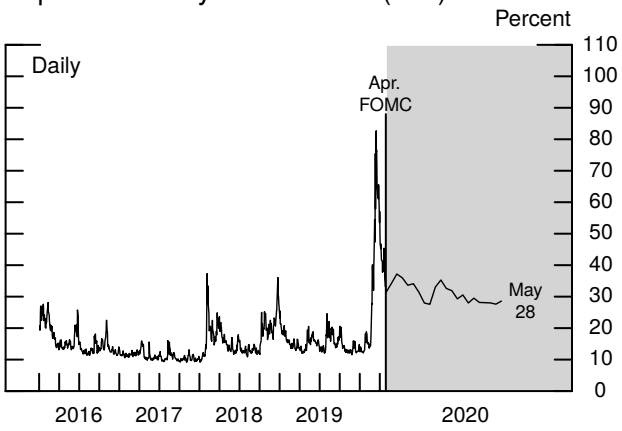
Corporate and Municipal Markets

Stock Price Indexes



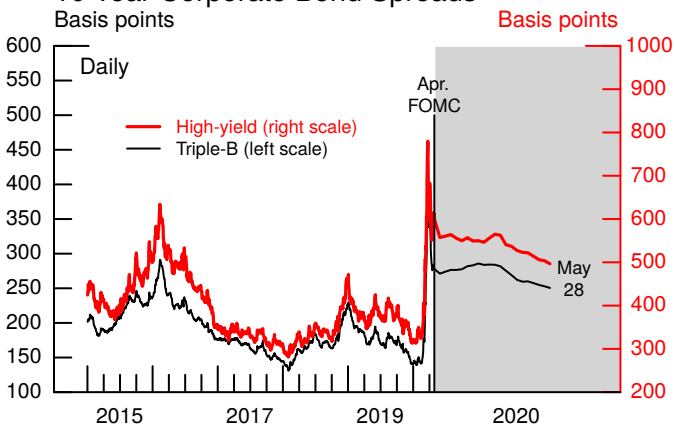
Note: The shaded gray area represents an expanded window focusing on the period following the previous FOMC meeting.
Source: Bloomberg.

Implied Volatility on S&P 500 (VIX)



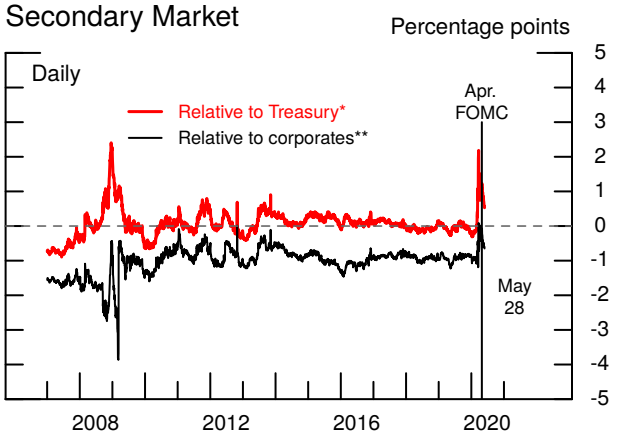
Note: The shaded gray area represents an expanded window focusing on the period following the previous FOMC meeting.
Source: Chicago Board Options Exchange.

10-Year Corporate Bond Spreads



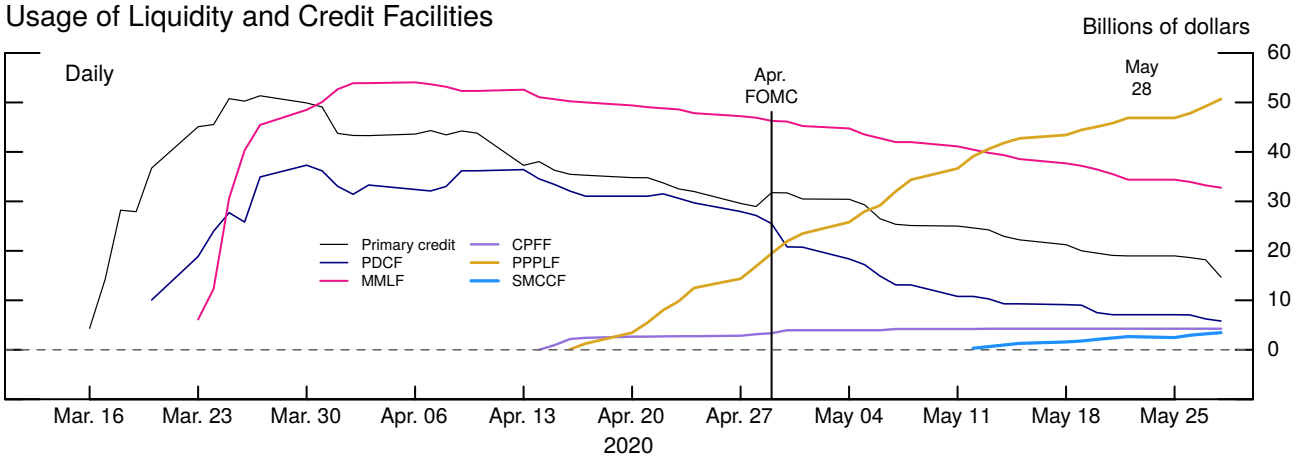
Note: The shaded gray area represents an expanded window focusing on the period following the previous FOMC meeting. Spreads over 10-year Treasury yield.
Source: Merrill Lynch; Federal Reserve Bank of New York; Board staff calculations.

Municipal Bond 20-year Yield Spreads, Secondary Market



* Municipal Market Advisors 20-year index relative to 20-year Treasury.
** Municipal Market Advisors 20-year index relative to estimated triple-A 20-year yield.
Source: Municipal Market Advisors; Merrill Lynch.

Usage of Liquidity and Credit Facilities



Note: The values shown are outstanding amounts. PDCF is Primary Dealer Credit Facility; MMLF is Money Market Mutual Fund Liquidity Facility; CPFF is Commercial Paper Funding Facility; PPPLF is Paycheck Protection Program Liquidity Facility; SMCCF is Secondary Market Corporate Credit Facility.
Source: Federal Reserve Board.

Financial Markets

these effects were partially offset by negative sentiment associated with dire economic data releases, warnings from health experts, and escalating tensions between the United States and China. Outperforming sectors included information technology and communications, which were bolstered by greater demand stemming from remote business activities, and energy, as oil prices partially rebounded from the multiyear lows in March. The banking sector significantly underperformed the broader market in the first two weeks of the intermeeting period, reflecting investor concerns about loan losses and bank profitability, but subsequently bounced back amid renewed investor optimism about the economic outlook and an improvement in loan loss expectations. Stock prices of utility firms, which tend to underperform when risk sentiment improves and long-term interest rates increase, declined a touch. One-month implied volatility on the S&P 500 index (the VIX) declined 5 percentage points to 29 percent, which is slightly above its peak in June 2016 after the Brexit referendum and somewhat below its peak during the market turmoil in December 2018.

Investment- and speculative-grade corporate bond spreads over comparable-maturity Treasury yields declined notably, by 29 basis points and 115 basis points, respectively. While spreads are now well below financial crisis levels, they are still quite elevated. Indeed, spreads remain at levels similar to those in other notable periods of economic or bond market stress in the past two decades, including the 2001 recession, the 2002–03 wave of corporate defaults, the 2011–12 European sovereign debt crisis, and oil market strains in 2016. The Secondary Market Corporate Credit Facility began buying shares of bond exchange-traded funds on May 12 but had little contemporaneous market effect (see the box "Corporate Credit Facilities").

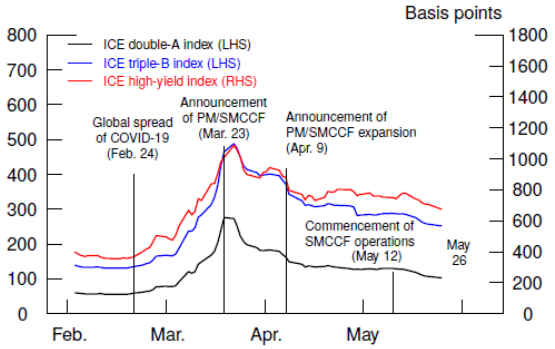
In the municipal bond market, secondary market spreads over comparable-maturity Treasury yields declined about 70 basis points for triple-A-rated bonds but only 40 basis points for triple-B-rated bonds. Although triple-A-rated municipal bond yields are at low levels by historical standards, their spreads over Treasury yields—even after retracing roughly 80 percent of their sharp increases in late March—remain well above those observed since the financial crisis. Spreads on lower-rated municipal bonds have erased a smaller share of their increases in the early weeks of the pandemic. The Municipal Liquidity Facility moved closer to extending loans, as it is now taking notices of interest from potential issuers (see the box "Municipal Liquidity Facility").

Corporate Credit Facilities

Corporate financing conditions began to deteriorate in the last week of February with the global spread of the coronavirus (COVID-19). Corporate bond spreads to comparable-maturity Treasury yields widened dramatically over the following weeks as credit quality concerns and liquidity demands affected all rating segments (figure 1). Primary corporate bond issuance stalled as investment-grade deals became intermittent and high-yield issuance essentially stopped. Meanwhile, bid-ask spreads on corporate bond trades in the secondary market spiked, hitting record levels for investment-grade bonds (figure 2), though trading volumes remained high. Additionally, corporate bond funds experienced record outflows. As liquidity and solvency concerns intensified and earnings outlooks deteriorated, the pace of downgrades jumped, with the volume of fallen angels—bonds downgraded from investment grade to speculative grade—reaching record levels in March.

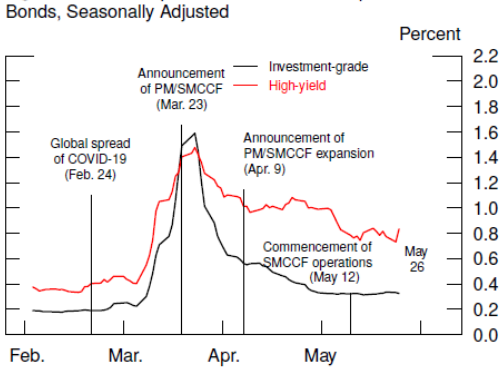
On March 23, as part of a wide array of measures aimed at supporting the economy, the Federal Reserve announced the establishment of the Primary Market Corporate Credit Facility (PMCCF) and the Secondary Market Corporate Credit Facility (SMCCF) to support liquidity and functioning in corporate credit markets.[1] Under the two facilities, the Federal Reserve Bank of New York will lend to the Corporate Credit Facilities LLC (CCF LLC), a special purpose vehicle with a combined size of up to $750 billion.[2] Under the PMCCF, the CCF LLC will purchase qualifying bonds and loans maturing within four years directly from eligible issuers; under the SMCCF, the CCF LLC will purchase eligible individual corporate bonds maturing within five years and bond exchange-traded funds (ETFs) in the secondary market. On April 9, the Federal Reserve announced an expansion

Figure 1: Options-Adjusted Spreads of Corporate Bond Indexes



Note: PMCCF stands for the Primary Market Corporate Credit Facility and SMCCF stands for the Secondary Market Corporate Credit Facility.
Source: ICE Data Indices, LLC.

Figure 2: Bid-Ask Spreads of IG and HY Corporate Bonds, Seasonally Adjusted



Note: PMCCF stands for the Primary Market Corporate Credit Facility and SMCCF stands for the Secondary Market Corporate Credit Facility.
Source: TRACE FINRA.

[1] The PMCCF and SMCCF were established under section 13(3) of the Federal Reserve Act, with the approval of the Secretary of the Treasury. More details about the PMCCF and SMCCF are available on the Board's website at, respectively, https://www.federalreserve.gov/monetarypolicy/pmccf.htm and https://www.federalreserve.gov/monetarypolicy/smccf.htm.

[2] The special purpose vehicle received an initial equity investment from Department of the Treasury using funds appropriated to the Exchange Stabilization Fund through the Cares Act.

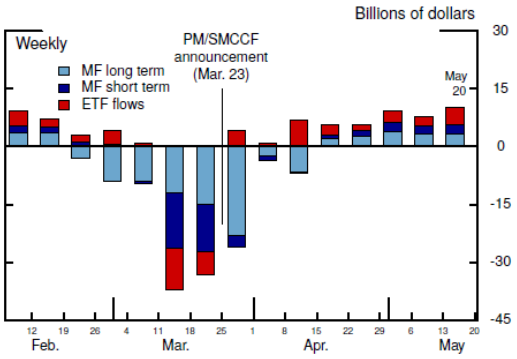
to the list of eligible issuers, bonds, and bond ETFs to include eligible bonds of firms recently downgraded to double-B as well as high-yield ETFs, in addition to the originally eligible investment-grade corporate debt.

Within days of the initial PMCCF and SMCCF announcement, stress in the corporate bond market began to ease. The peaks in corporate bond spreads to comparable-maturity Treasury yields, which topped those associated with the 2001 recession, stopped well short of their highs during the financial crisis, and yield spreads began to narrow across the rating and maturity spectrums (figure 1). Bid-ask spreads for investment-grade bonds declined substantially, retracing much of their increase in March, while those for speculative-grade bonds also compressed but remained at very elevated levels (figure 2). Moreover, corporate bond funds saw a reversal in net flows, a turnaround that was more immediate for bond ETFs (figures 3 and 4). Meanwhile, investment-grade corporate bond issuance surged, setting new weekly records as issuers took advantage of the more favorable market conditions (figure 5). However, high-yield issuance did not return until later in April.

Reflecting the entire series of government and Federal Reserve stimulus, credit quality concerns eased somewhat. Market-based measures of expected default partially retraced from their peaks in March, and the volume of fallen angels slowed in April and so far in May (figure 6). However, overall downgrades continued at a fast pace into May.

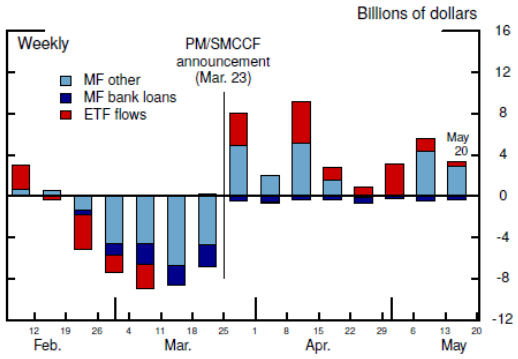
On May 12, the SMCCF began operations to buy corporate bond ETFs and on the first day purchased $305 million in bond ETFs.[3] Market participants generally acknowledged that operations commenced smoothly, though market reaction to the purchases was relatively muted, having reacted strongly to the two announcements. Corporate bond spreads narrowed just a touch over the day, and both prices and net asset values of bond

Figure 3: Investment-Grade Bond Fund Flows



Note: MF stands for mutual funds and ETF stands for exchange-traded funds. PMCCF stands for the Primary Market Corporate Credit Facility and SMCCF stands for the Secondary Market Corporate Credit Facility.
Source: Morningstar Direct; ICI.

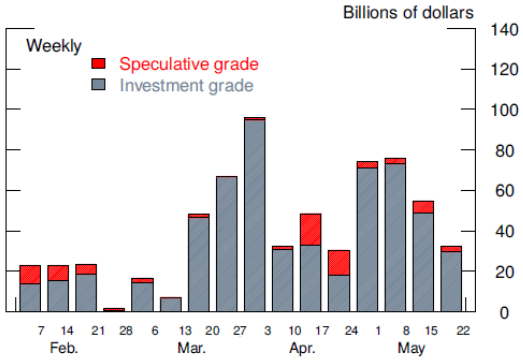
Figure 4: High-Yield Bond Fund Flows



Note: MF stands for mutual funds and ETF stands for exchange-traded funds. PMCCF stands for the Primary Market Corporate Credit Facility and SMCCF stands for the Secondary Market Corporate Credit Facility.
Source: Morningstar Direct; ICI.

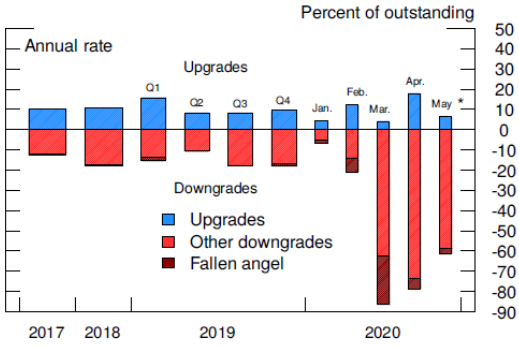
[3] For the CCF LLC volumes for the first week and subsequent weeks, see Board of Governors of the Federal Reserve System (2020), Statistical Release H.4.1, "Factors Affecting Reserve Balances" (May 21), https://www.federalreserve.gov/releases/h41.

Figure 5: Nonfinancial Corporate Bond Issuance



Source: Mergent.

Figure 6: Nonfinancial Ratings Changes



Note: Computed as a percent of nonfinancial bonds outstanding and reported at an annual rate. Fallen angels are investment-grade bonds that are downgraded to speculative-grade status.
* Preliminary
Source: Board staff calculations using composite ratings from Mergent Fixed Income Securities Database.

ETFs were also little changed, while net ETF share creation increased. So far through May 22, the SMCCF has purchased a total of $2.7 billion of eligible bond ETFs, averaging about $330 million each day. The vast majority of the ETF shares purchased are investment grade and have intermediate or broad-based maturity (see the table). Overall, while pricing and functioning in corporate bond markets appear to be normalizing, markets continue to price in substantial credit risk amid an earnings outlook that remains grim, a continued stream of downgrades, and upward revisions to forecasts of future defaults.

Corporate Bond ETFs Purchased under the SMCCF

ETF Type	Volume (billions of dollars)	Percent
Rating		
Investment-grade	2.3	85
High-yield	.4	15
Maturity		
Short-dated	.9	33
Intermediate/broad-based	1.8	67

Note: Data as of May 22. ETFs stands for exchange-traded funds. SMCCF stands for the Secondary Market Corporate Credit Facility.
Source: Federal Reserve Bank of New York.

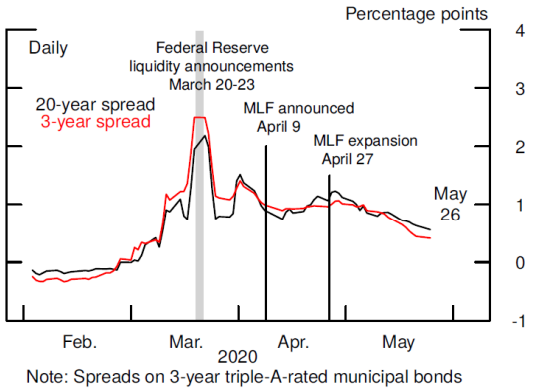
Municipal Liquidity Facility

The municipal bond market experienced extreme stress in mid-March, with spreads on municipal bonds relative to comparable-maturity Treasury yields spiking to their highest levels since the financial crisis. The overall deterioration in municipal market conditions in March coincided with broader financial market turbulence and was exacerbated by forced selling pressure due to large outflows from municipal bond funds and limited capacities of dealers to intermediate trades. Fundamental concerns over the fiscal outlook of state and local governments also likely weighed on investor sentiment. In particular, state and local governments faced the prospect of severe cash flow shortfalls stemming from the extension of tax filing deadlines as well as reductions in tax revenues and increases in expenses due to the coronavirus (COVID-19) pandemic.

To bridge this cash flow shortfall and help issuers meet their funding needs, the Federal Reserve, on April 9, announced the Municipal Liquidity Facility (MLF).[1] On April 27, the Federal Reserve expanded the set of eligible issuers under the facility to include smaller cities and counties and, on May 11, specified pricing details.[2] The MLF will purchase up to $500 billion in eligible notes through a special purpose vehicle (SPV).[3] In particular, the facility will participate in primary market purchases of tax anticipation notes, tax and revenue anticipation notes, bond anticipation notes, and similar short-term notes up to 36 months in maturity from states, eligible local governments, and multistate entities. The facility is currently taking notices of interest and applications.

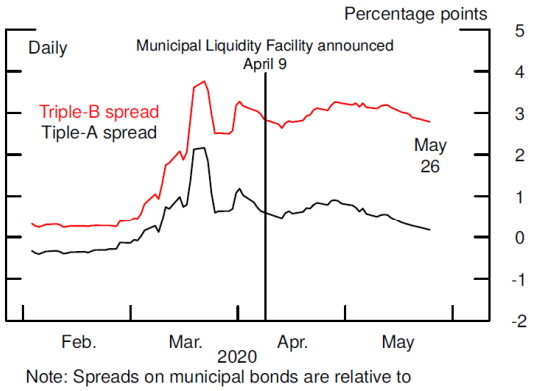
Overall, the municipal market has partially normalized since mid-March, although conditions remain somewhat strained. Figure 1 shows the evolution of spreads on 3-year triple-A-rated municipal

Figure 1: Triple-A-Rated Municipal Bond Spreads by Maturity



Note: Spreads on 3-year triple-A-rated municipal bonds are relative to 3-year overnight index swap rates; spreads on 20-year triple-A-rated municipal bonds are relative to comparable-maturity Treasury yields; MLF is Municipal Liquidity Facility.
Source: Municipal Market Advisors; Bloomberg.

Figure 2: Municipal Bond Spreads by Rating



Note: Spreads on municipal bonds are relative to comparable-maturity Treasury yields.
Source: ICE Data Indices, LLC.

[1] The MLF was established under section 13(3) of the Federal Reserve Act.

[2] Under the expanded MLF, eligible local governments are cities with a population exceeding 250,000 residents and counties with a population exceeding 500,000 residents. Further details are available on the Board's website at https://www.federalreserve.gov/monetarypolicy/muni.htm.

[3] The Department of the Treasury will provide an initial equity commitment to the SPV using funds appropriated to the Exchange Stabilization Fund under section 4027 of the Cares Act.

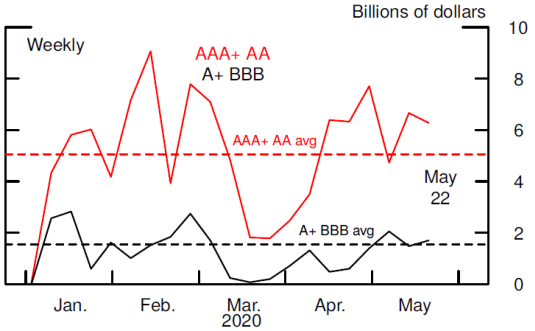
bonds relative to 3-year overnight index swap (OIS) rates as well as spreads on 20-year triple-A-rated municipal bonds relative to comparable-maturity Treasury yields. Municipal spreads peaked on March 23. Since then, spreads on 3-year and 20-year municipal bonds have retraced about 77 percent and 70 percent, respectively, of their dramatic spikes in March.

Notably, much of the improvement in municipal spreads occurred before the announcement of the MLF. Specifically, following their March 23 peak, municipal spreads declined rapidly over the next few days, coinciding with a broader improvement in financial market conditions. The improvement in conditions was supported by announcements regarding several Federal Reserve facilities on March 23—including the addition of municipal variable-rate demand notes to the Money Market Mutual Fund Liquidity Facility and municipal commercial paper to the Commercial Paper Funding Facility. Around that time, primary dealers also posted a substantial amount of municipal collateral to the Primary Dealer Credit Facility for funding. Moreover, investor sentiment may generally have been buoyed by the extensive range of other measures announced by the Federal Reserve on that date as well as legislative progress toward the passage of the Cares Act (Coronavirus Aid, Relief, and Economic Security Act).

Since the announcement of the MLF, spreads on 3-year triple-A-rated municipal bonds have narrowed 58 basis points, while those on 20-year triple-A-rated bonds have narrowed 34 basis points, consistent with the MLF and earlier Federal Reserve interventions having a more direct effect on the shorter end of the market.

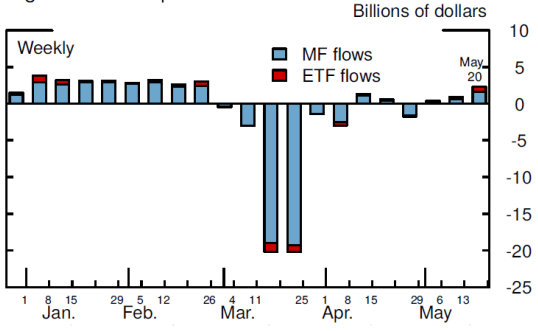
All told, although spreads have fallen notably from their March peaks, they remain at elevated levels, particularly for lower-rated issuers. As shown in figure 2, spreads on triple-A-rated municipal bonds have narrowed far more substantially than those on triple-B-rated bonds. Municipal market issuance, shown in figure 3, has also rebounded from its March lows, with higher-rated investment-grade issuers resuming their normal pace of issuance in April and lower-rated investment-grade issuers returning to the market in May, albeit in several cases paying considerably elevated interest rates compared with pre-pandemic levels. Other measures of municipal market functioning have also shown signs of improvement since March. For example, fund flows into municipal market mutual funds, shown in figure 4, have been close to flat over the past few weeks after experiencing historic outflows in March.[4]

Figure 3: Issuance by Rating



Note: The dashed horizontal lines represent the average issuance for 2018 and 2019.
Source: Mergent.

Figure 4: Municipal Bond Fund Flows



Note: MF is mutual fund; ETF is exchange-traded fund.
Source: Morningstar Direct; ICI.

[4] Secondary market liquidity conditions have also partially normalized, with round-trip transaction costs coming off their mid-March peaks.

Liquidity Conditions in Domestic Markets

Over the intermeeting period, financial market functioning appears to have improved in general, although progress has been uneven. Measures of market liquidity in a number of markets have moved closer to their pre-COVID-19 levels, but some stress is still evident in several places.

In the Treasury market, liquidity measures for on-the-run securities with short- and medium-term maturities continued to recover. Bid-ask spreads have largely returned to pre-COVID-19 levels, although market depth generally remains below the levels seen earlier this year. Market depth is especially low for the on-the-run 30-year security, and its bid-ask spread is still elevated. For off-the-run Treasury securities, bid-ask spreads remain elevated for all tenors. Agency MBS market functioning has largely moved back to pre-COVID-19 levels, although some portions of the market—notably, those for securities excluded from Federal Reserve open market purchases—continue to exhibit strains.

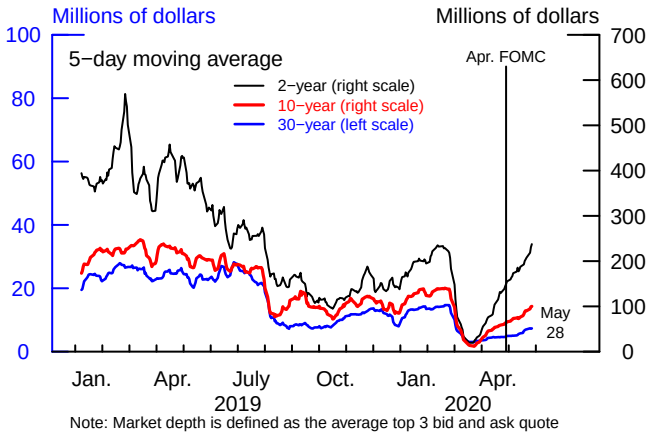
Corporate bond market liquidity has improved considerably since the mid-March turmoil but remains somewhat strained, particularly for speculative-grade bonds. Bid-ask spreads for investment-grade bonds stand just slightly above their levels before the COVID-19 pandemic, while speculative-grade bid-ask spreads have retraced only about half of their increase in March and remain very elevated. Liquidity in the municipal bond markets is still somewhat strained, as roundtrip costs for small and large municipal bond trades were little changed, on net, over the intermeeting period. Liquidity in equity markets improved very slightly but remains poor, as market depth is low and bid-ask spreads are wide compared with historical levels.

Foreign Developments

As in the United States, risk sentiment abroad has improved since the previous FOMC meeting, as optimism arising from substantial monetary and fiscal support around the world and headlines about easing of virus-related restrictions outweighed concerns about weak economic data and the resurgence of U.S.–China tensions. Market functioning and liquidity in dollar funding markets also continued to improve. Sentiment remains fragile, however, and asset prices abroad continue to reflect a substantial deterioration in expectations for growth and uncertainty about the outlook more generally.

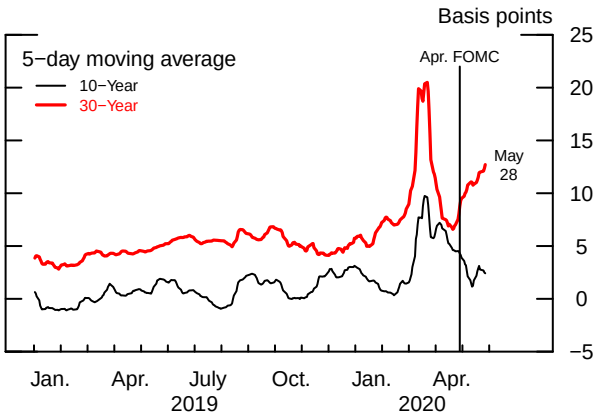
Liquidity Conditions in Domestic Markets

Treasury Market Depth



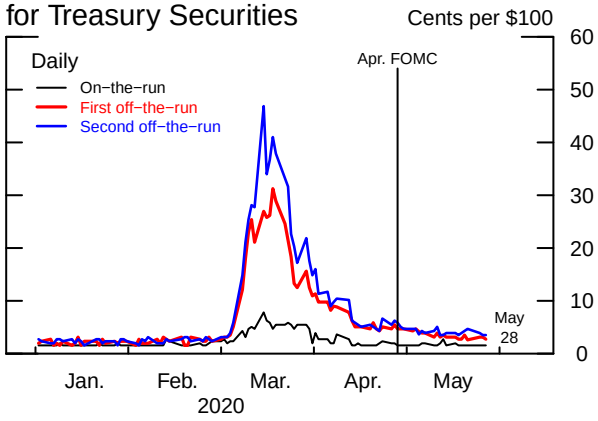
Note: Market depth is defined as the average top 3 bid and ask quote sizes for on−the−run Treasury securities. The tick size of the 2−year is half of the tick size of the 5−year security.
Source: Repo Inter Dealer Broker community.

On−the−Run Treasury Liquidity Premium



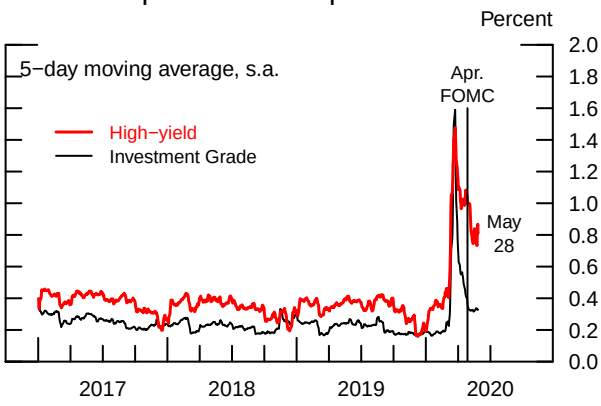
Note: Premium is calculated as spread between regular yields and predicted yields using off−the−run Svensson coefficients.
Source: FRBNY; Board staff calculations.

10−Year Indicative Bid−Ask Spreads for Treasury Securities



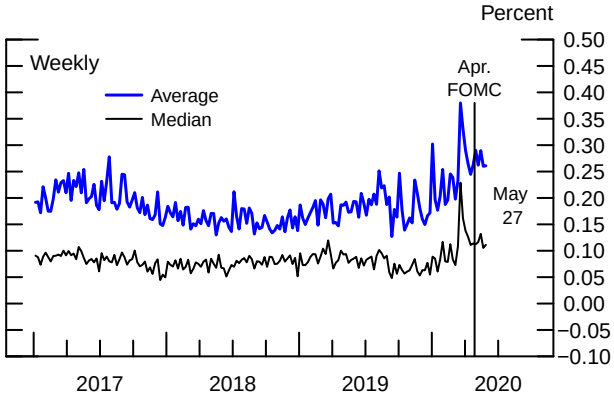
Source: FRBNY.

Bid−Ask Spreads for Corporate Bonds



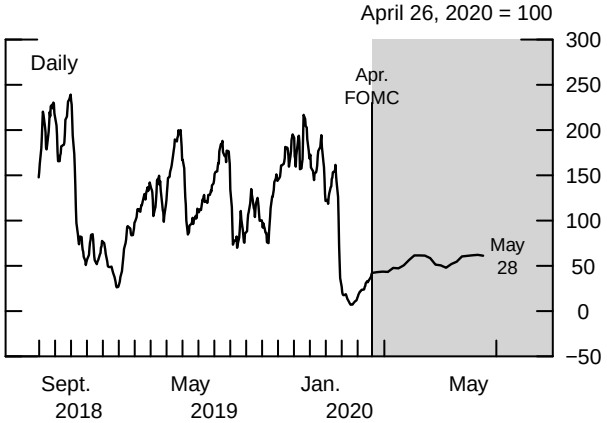
Source: FINRA.

Round−Trip Transaction Costs for Large Municipal Bond Trades (Par Value >= 500K)



Note: Round−trip transactions are pairs of trades that start with a dealer−buy from a customer, and are immediately followed by a dealer−sell to the customer trades of the same par value. Round−trip transaction cost is the percentage change from dealer−sell price to dealer−buy price. Only fixed−coupon bonds that are at least 90 days after issuance and traded between the hours of 8:00 a.m. and 6:00 p.m. on weekdays are included.
Source: Municipal Securities Rulemaking Board; Board staff calculations.

Top−of−the−Book Depth: Equity Index Futures



Note: Figure is based on the E−mini S&P 500. The shaded gray area represents an expanded window focusing on the period following the previous FOMC meeting. Average depth: (Avg. bid size + avg. ask size) / 2.
Source: Tick History.

Financial Markets

On net, risky asset prices abroad posted moderate increases over the period. In the advanced foreign economies, Japanese and euro-area equity indexes ended the period 6 to 9 percent higher, as fiscal authorities announced additional stimulus. In particular, the European Commission proposed that the European Union be given the authority to borrow €750 billion to assist the recovery. The proposal was perceived as an encouraging step toward greater fiscal integration in the region. Euro-area peripheral sovereign spreads narrowed on the news. Measures of implied volatility in European equity markets declined but are still elevated relative to their January levels. European corporate bonds also reflected the improvement in risk sentiment. Primary market corporate bond issuance has been robust, and spreads on European investment-grade and high-yield companies both narrowed but are still elevated by historical standards.

Higher oil prices along with overall improvements in sentiment also boosted risky asset prices in emerging markets, even as the COVID-19 situation continued to worsen in some of the countries. Outflows from emerging market funds continued, albeit at a much slower pace than in March. These outflows were concentrated in emerging markets equity funds. EMBI spreads narrowed but remain elevated. Argentina defaulted on a coupon payment to international creditors, but there was little market reaction as the default was widely expected.

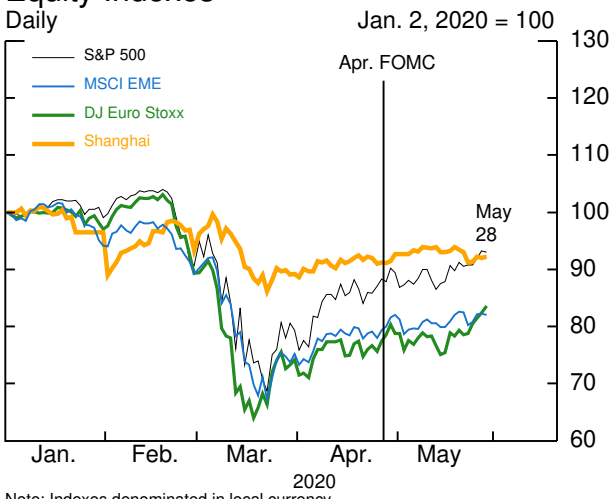
U.S.–China tensions were reignited after China moved to impose national security laws in Hong Kong, which would give China the authority to operate in Hong Kong and punish acts that threaten national security. Following the decision, the U.S. State Department declared that it no longer considers Hong Kong autonomous from China. The U.S. announcement may have implications for Hong Kong's position as an international financial hub. So far, these developments have not generated a market reaction outside of Hong Kong, where equity prices fell about 6 percent over the period.

The improving sentiment also supported several foreign currencies, and the staff's broad dollar index fell about 1.9 percent. The euro appreciated about 2.3 percent over the period, lifted in part by the EU fiscal stimulus proposals. The recovery in oil prices and less-accommodative-than-expected communications by the Bank of Mexico contributed to the Mexican peso's appreciation of about 9 percent.

Dollar funding markets abroad continued to improve, supported in part by Federal Reserve programs. The outstanding amount at the central bank liquidity swap facilities is currently $446 billion and has been near that level since late April, almost all for longer-

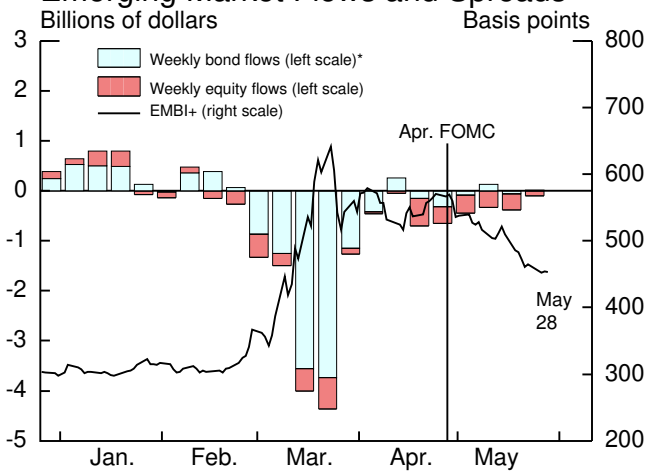
Foreign Developments

Equity Indexes



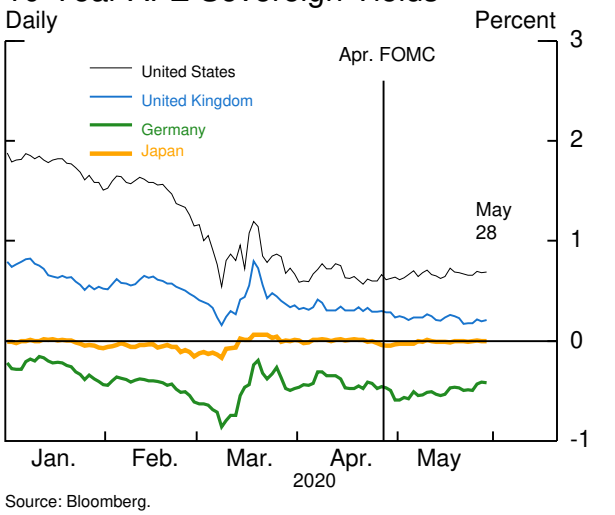
Note: Indexes denominated in local currency.
Source: Bloomberg.

Emerging Market Flows and Spreads



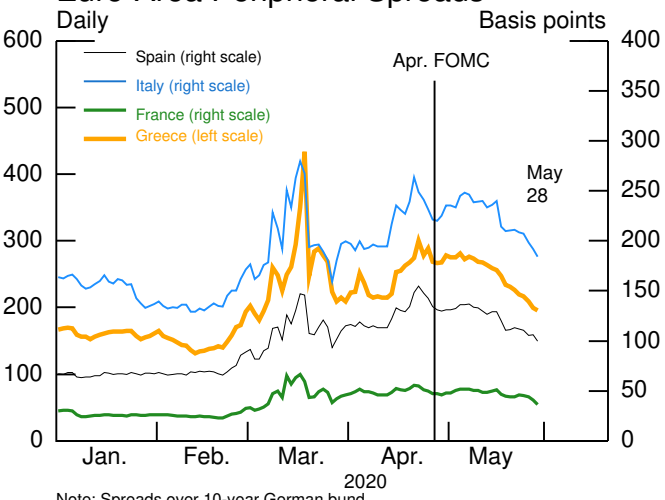
Note: EMBI+ refers to emerging market bond spreads to Treasury securities. Excludes intra-China flows. *Average weekly flow by month.
Source: Emerging Portfolio Fund Research, J.P. Morgan EMBI+.

10-Year AFE Sovereign Yields



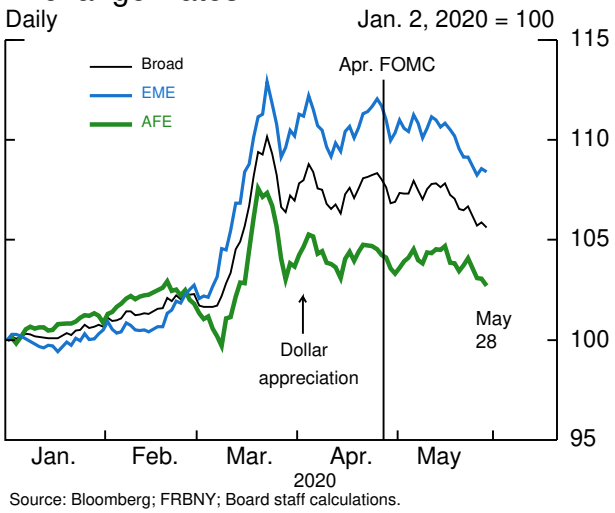
Source: Bloomberg.

Euro-Area Peripheral Spreads



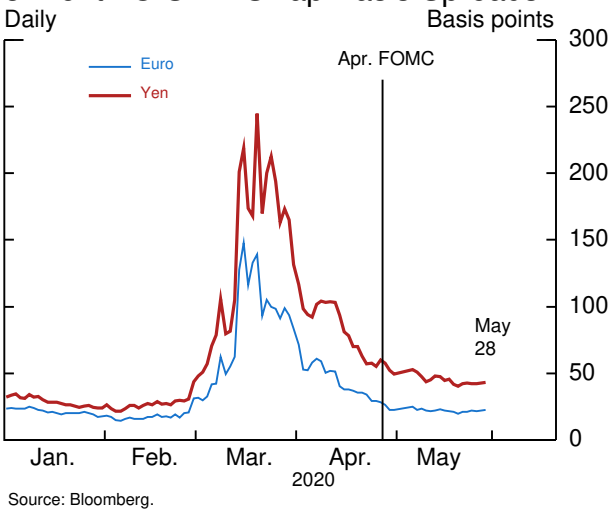
Note: Spreads over 10-year German bund.
Source: Bloomberg.

Exchange Rates



Source: Bloomberg; FRBNY; Board staff calculations.

3-Month OIS FX Swap Basis Spreads



Source: Bloomberg.

term (84 days) swap maturities. Usage of the backstop FIMA Repo Facility, which allows foreign central banks to access dollar funding using their U.S. Treasury securities held in accounts at the Federal Reserve Bank of New York, has been minimal given improving dollar funding market conditions.

Foreign central banks took several policy actions over the intermeeting period. For the most part, their actions were expected and foreign sovereign yields were little changed. As widely expected, the European Central Bank left its policy rate unchanged at its April policy meeting and introduced a measure aimed at supporting banking-sector liquidity (the nontargeted pandemic emergency longer-term refinancing operations). U.K. two-year sovereign yields declined and turned negative amid comments from Bank of England policymakers about the possibility of negative rates.

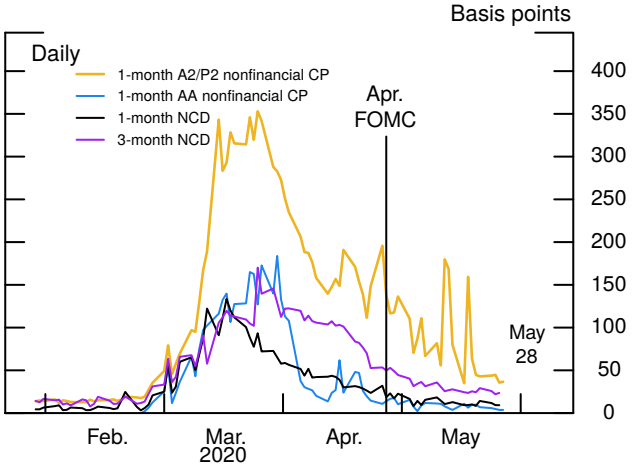
SHORT-TERM FUNDING MARKETS AND FEDERAL RESERVE OPERATIONS

Conditions in unsecured short-term funding markets continued to improve gradually over the intermeeting period, and spreads on most types of commercial paper (CP) and negotiable certificates of deposit (NCDs) narrowed and approached pre-COVID-19 ranges. However, spreads for A2/P2 nonfinancial CP with longer tenors were volatile and remained somewhat elevated. CP and NCD issuance held about steady, and the fraction of CP issuance with overnight maturity—which tends to rise when investors are uneasy about market liquidity—was little changed and remained at the upper end of its pre-pandemic distribution but well below levels seen in March. Prime money market funds (MMFs) and offshore U.S. dollar-denominated money funds attracted modest inflows. In the short-term municipal market, the SIFMA seven-day municipal swap index yield declined a bit further. Amid these improved market conditions, take-up in the Commercial Paper Funding Facility was very small over the intermeeting period, and no loans have been originated under the Money Market Mutual Fund Liquidity Facility since April 23. The current balance of loans outstanding under the Primary Dealer Credit Facility declined to about $6 billion.

Government MMFs, which have received $1.2 trillion in inflows since early March, continued to increase their holdings of Treasury securities. Despite an unprecedented pace of Treasury bill issuance since the end of March, demand from MMFs likely helped hold down rates on Treasury bills as well as other money market rates. The effective federal funds rate printed at 5 basis points almost every day over the

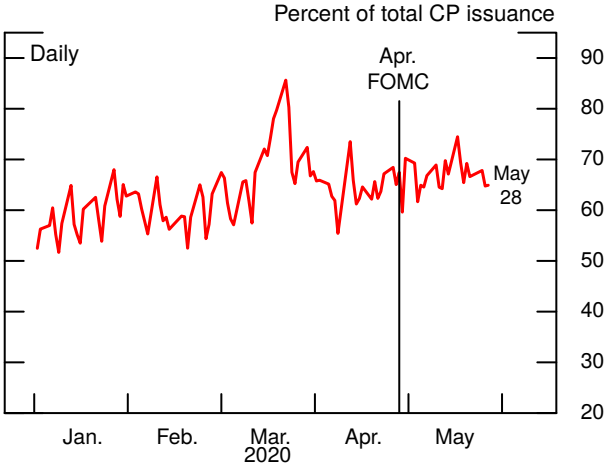
Short-Term Funding Markets and Monetary Policy Implementation

Short-Term Funding Market Spreads



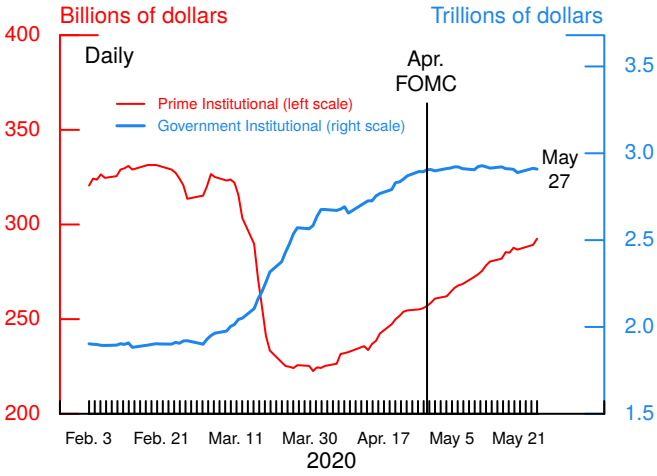
Note: CP is commercial paper; NCD is negotiable certificate of deposit. All spreads are to the overnight index swap rate of the same tenor.
Source: Depository Trust & Clearing Corporation.

Overnight CP Issuance Share



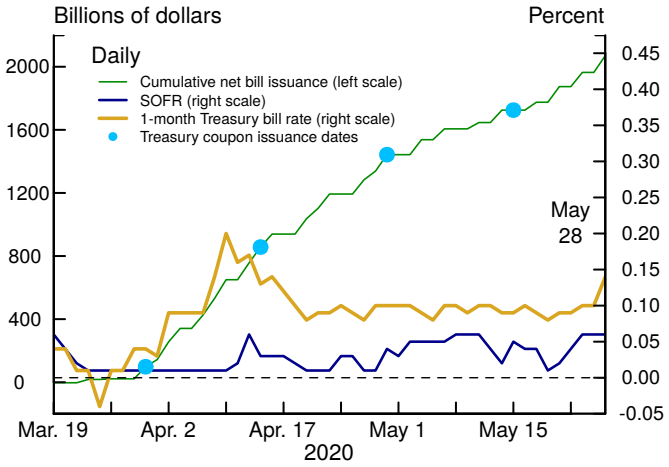
Note: Overnight CP has maturities of 1-4 days.
Source: Depository Trust & Clearing Corporation.

MMF Assets under Management



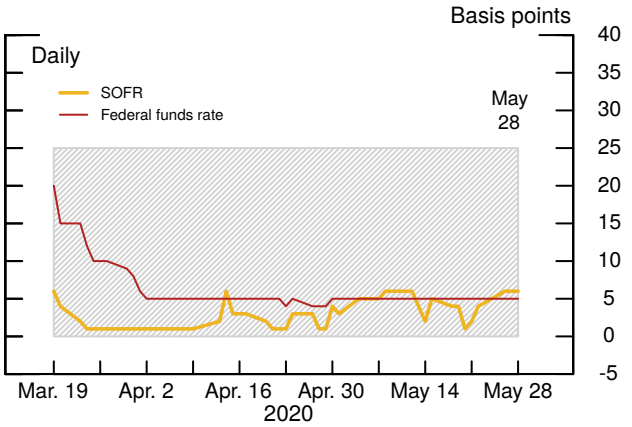
Note: MMF is money market fund.
Source: iMoneyNet.

Rates and Treasury Issuance



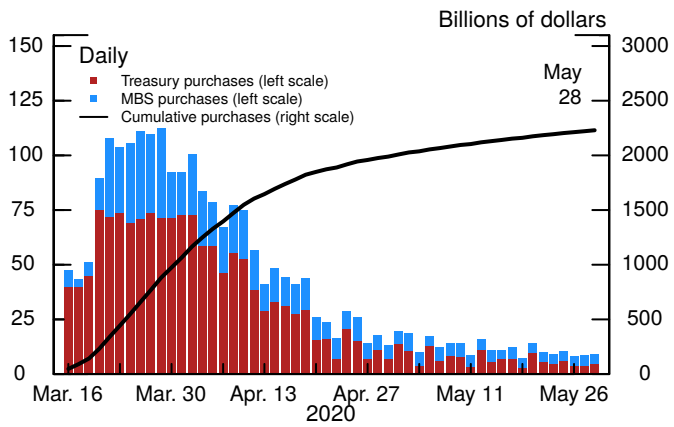
Note: SOFR is Secured Overnight Financing Rate.
Source: Federal Reserve Bank of New York.

Overnight Funding Rates



Note: Shaded area is the target range for the federal funds rate. SOFR is Secured Overnight Financing Rate.
Source: FRBNY; FRB.

Pace of Daily Security Purchases



Note: Cumulative purchases are from March 16.
Source: FRBNY public release.

Financial Markets

intermeeting period. Meanwhile, the Secured Overnight Financing Rate averaged 4 basis points.

Total outstanding Federal Reserve repos averaged about $170 billion, which mostly reflected three-month term repos executed before March quarter-end.[1] Take-up of overnight reverse repos averaged just $2 billion over the intermeeting period. Amid improving market liquidity conditions, Federal Reserve purchases of Treasury securities and agency residential MBS have been reduced to around $5 billion and $4.5 billion per day, respectively.

[1] The Desk announced on May 13 that it would discontinue three-month repo operations in light of more stable repo market conditions.

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Financing Conditions for Businesses and Households

Changes in financing conditions for businesses, households, and state and local governments were mixed during the intermeeting period. Conditions generally eased somewhat for nonfinancial corporations and state and local governments, were largely unchanged for households in mortgage markets, tightened slightly for households in consumer credit markets, and tightened more substantially for small businesses. However, financing conditions overall still appear somewhat strained for lower-rated corporations, lower-rated states and municipalities, and nonprime households—and more strained for small businesses—even as announcements and implementation of Federal Reserve facilities during the intermeeting period were supportive of credit flows. The credit quality of businesses deteriorated substantially further over the period. The credit quality of municipal debt showed some deterioration as well.

- Gross issuance for investment-grade corporate bonds was very strong in April and thus far in May, while issuance for speculative-grade corporate bonds slowed in May from strong levels in late April. Leveraged loan issuance ticked up in April and May but remained quite low. Commercial and industrial (C&I) lending at banks surged again in April.

- Downgrades of corporate bonds and leveraged loans increased significantly, and corporate defaults have started to rise.

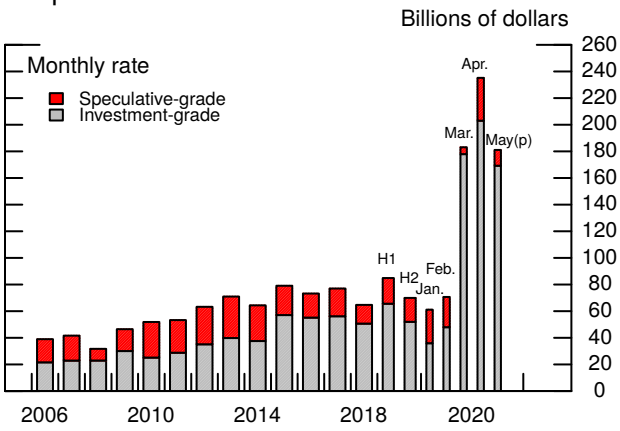
- Financing conditions for state and local governments generally improved. Municipal bond issuance picked up in April and May, and spreads narrowed, more so for higher-rated municipal bonds.

- Lenders reported having significantly tightened small business loan standards and, in some cases, having discontinued this line of lending altogether (other than PPP loans). In addition, a sizable fraction of firms that sought financial assistance since mid-March did not receive it. Delinquency rates on small business loans have started to rise.

- Residential mortgage refinance activity remained strong, as mortgage rates stayed historically low. Purchase mortgage activity picked up in mid-May after having fallen considerably in April. Mortgage forbearance increased

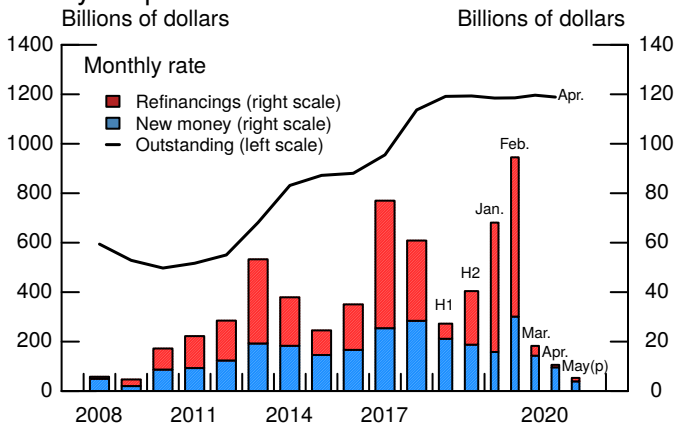
Business Finance

Gross Issuance of Nonfinancial Corporate Bonds



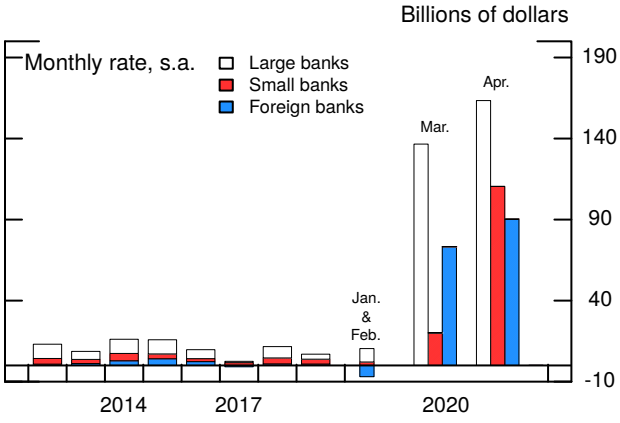
Note: Bonds are categorized by Moody's, Standard & Poor's, and Fitch.
p Preliminary.
Source: Mergent Fixed Income Securities Database.

Institutional Leveraged Loan Issuance, by Purpose



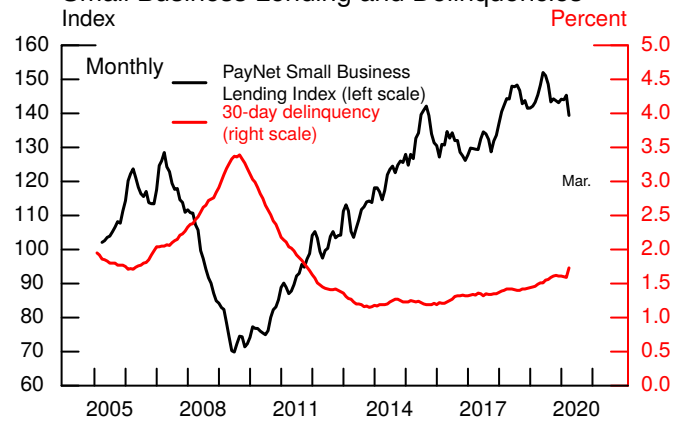
p Preliminary.
Source: Thomson Reuters LPC LoanConnector.

Commercial and Industrial Loans



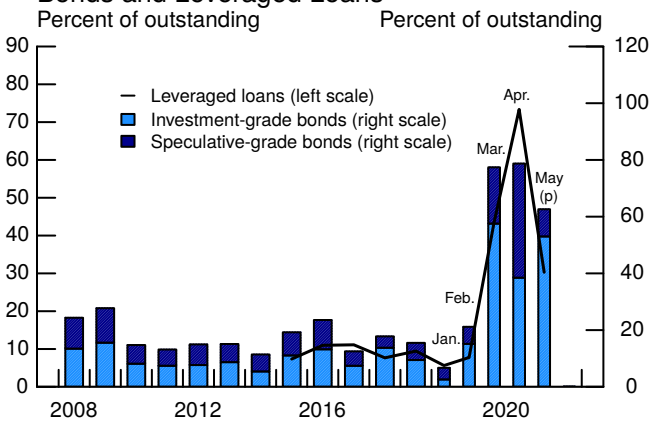
Source: Federal Reserve Board (FRB) staff calculations; FRB, Form FR 2644, Weekly Report of Selected Assets and Liabilities of Domestically Chartered Commercial Banks and U.S. Branches and Agencies of Foreign Banks.

Small Business Lending and Delinquencies



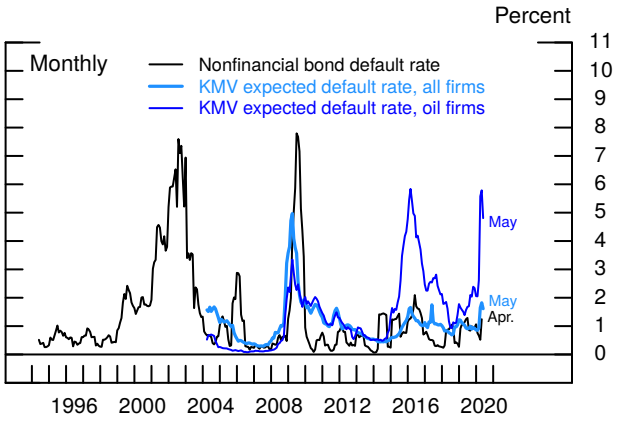
Note: Small business lending index is a 3-month rolling average.
Source: PayNet.

Downgrades of Nonfinancial Corporate Bonds and Leveraged Loans



Note: Monthly data are at an annual rate.
p Preliminary.
Source: For corporate bonds, Board staff calculations using composite ratings from Mergent Fixed Income Securities Database; for leveraged loans, S&P Leveraged Commentary & Data.

Realized and Expected Nonfinancial Bond Default Rates



Note: For realized default rate, 6-month trailing defaults divided by beginning-of-period outstanding, at an annual rate. For expected default rate, firm-level estimates of default weighted by firm liabilities as a percent of total liabilities, excluding defaulted firms.
Source: For realized default rate, Moody's Investors Service; for expected default rate, calculated using firm-level data from Moody's KMV.

Financing Conditions

notably in April and edged up further in May. Financing conditions for commercial real estate (CRE) recovered somewhat.

- Financing conditions for consumer credit appear to have tightened incrementally during the intermeeting period. Moreover, outstanding credit card balances contracted drastically, while outstanding auto loan balances declined only slightly through mid-May.

BUSINESS FINANCING CONDITIONS

Nonfinancial Business

Financing conditions for nonfinancial firms eased somewhat over the intermeeting period, though they remain moderately strained for lower-rated borrowers. Spreads of investment- and speculative-grade corporate bonds over comparable-maturity Treasury yields declined over the intermeeting period but continued to be elevated compared with pre-pandemic levels. Yields on corporate bonds remained historically low. Investment-grade corporate bond issuance soared to record levels in April and remained robust in May, as issuers took advantage of more favorable market conditions following a series of Federal Reserve announcements of the two facilities to support liquidity and functioning in corporate credit markets. Speculative-grade corporate bond issuance picked up considerably toward the end of April from very low levels, though it slowed in May. Gross institutional leveraged loan issuance ticked up in April and May but remained limited.

C&I loans on banks' books surged again in April, largely driven by lending through the Paycheck Protection Program (PPP), especially at smaller banks. In addition, credit-line drawdowns continued in April and May, though drawdowns by large firms have slowed considerably from record levels in March.

The credit quality of nonfinancial corporations continued to deteriorate sharply during the intermeeting period. The volume of nonfinancial corporate bond downgrades and leveraged loan downgrades remained very high in April and May. Defaults in corporate bonds and leveraged loans increased as well; market analysts project defaults to increase considerably over the remainder of 2020 and into 2021. The KMV expected year-ahead default rate for all firms, which had increased in March, declined modestly over the intermeeting period and remains well below financial crisis levels.

The earnings outlook for nonfinancial corporations also deteriorated during the intermeeting period. In April and May, market analysts drastically revised down earnings projections for the year ahead. A text analysis of earnings call transcripts for April and May revealed sharp increases in financing concerns as the proportion of firms mentioning drawing down on credit revolvers, cutting equity payouts, and cutting investments increased dramatically from typical levels.

Equity issuance markets remained open. Seasoned equity issuance rebounded in April and partial data for May suggest that issuance is on pace to reach a near-record monthly level. While the volume of initial public offerings (IPOs) improved only slightly in April and May, market commentary suggests that IPO issuance may pick up further in the coming months.

Small Businesses

Financing conditions for small businesses have tightened amid the widespread continued closures and reduced operations of small businesses. Lenders indicated that they have tightened loan standards on small business loans or discontinued that lending altogether (other than PPP loans). The PayNet Small Business Lending Index (SBLI) declined substantially in March and likely declined further in April and May. Although about $510 billion in PPP funds were approved through mid-May, survey results suggest that only about half of firms that reported seeking financial assistance since mid-March have received that assistance. Funding constraints on the part of financial institutions do not, however, appear to be a factor limiting most financial institutions' PPP lending, with only about 10 percent of PPP lenders having borrowed from the Paycheck Protection Program Liquidity Facility. (See the box "Paycheck Protection Program Liquidity Facility.")

Small business loan performance deteriorated. The 30-day delinquency rate on small business loans showed a noticeable uptick in March, consistent with around 10 percent of these businesses missing at least one loan payment since mid-March. In addition, many lenders have indicated that they have modified and extended terms for many of their small business borrowers; thus, the level of the delinquency rate may understate the degree of distress among small businesses.

Commercial Real Estate

Financing conditions for CRE recovered somewhat during the intermeeting period. Spreads on triple-A-rated and triple-B-rated non-agency CMBS declined in May but remained elevated relative to before the pandemic. Issuance of non-agency CMBS showed signs of recovery in late April and early May. Federal Reserve purchases of agency CMBS reportedly helped return spreads on these securities to their pre-pandemic levels, and issuance in that market continued to be strong. The growth in CRE loans on banks' books remained robust in April, and a recent survey of banks conducted by the Mortgage Bankers Association indicated that the share of banks reportedly willing to make new CRE loans increased in the first half of May.

Early signs of credit repayment difficulties have emerged in some CRE sectors. Borrowers in the lodging and retail sectors have reportedly increased forbearance requests substantially, but requests in other sectors have thus far been low. The multifamily sector overall has shown few signs of distress, with the share of renters of professionally managed apartments making their rental payments on time remaining about the same as one year earlier. Still, multifamily property types more affected by pandemic-related disruptions, such as student housing and senior housing, appeared to show more stress.

State and Local Government Financing Conditions

Financing conditions for municipal markets have generally improved moderately since several Federal Reserve announcements to support the market, but conditions remained somewhat strained for lower-rated states and municipalities. Gross issuance of municipal bonds in April was similar to that of one year earlier and has continued at a similar pace in May. Issuance of bonds rated A or triple-B—just above the investment-grade threshold—picked up in April and somewhat further in May to about the average level for April and May issuance over the past five years. The rebound in issuance has been supported by declines in rates, which have been more substantial for higher-rated issues.

Even as the primary market has recovered somewhat for municipal issuers, the credit quality of municipal debt deteriorated somewhat in April and May as the volume of downgrades for revenue bonds—backed by dedicated revenue streams from specific projects—greatly outpaced that of upgrades in April, and the volume of downgrades for general obligation bonds picked up moderately in May. Moreover, state-specific CDS

Paycheck Protection Program Liquidity Facility

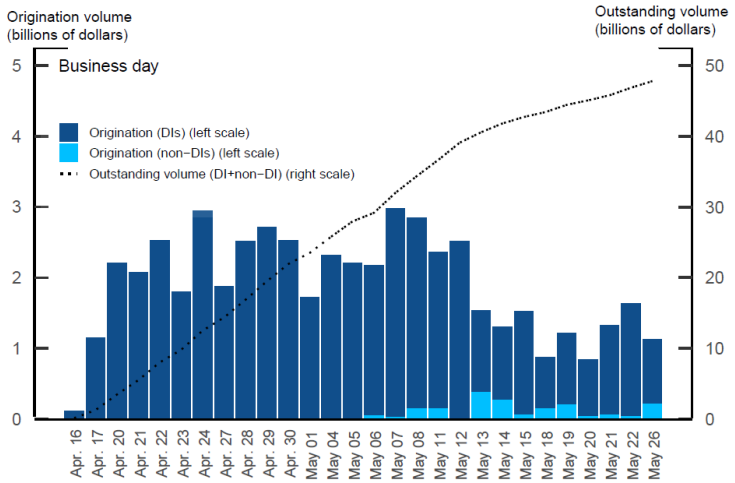
On April 9, the Federal Reserve announced the Paycheck Protection Program Liquidity Facility (PPPLF), a lending facility authorized under section 13(3) of the Federal Reserve Act. The objective of this facility is to bolster the effectiveness of the Small Business Administration's (SBA) Paycheck Protection Program (PPP) by supplying liquidity to participating financial institutions against PPP loans. Under the PPPLF, all 12 Reserve Banks make nonrecourse advances to eligible financial institutions that originate or purchase PPP loans using the PPP loans as collateral at face value ("PPPLF participants"); pledging PPP loans to the PPPLF allows the PPPLF participant to neutralize the effect of PPP loans on its leverage ratio. On April 16, lending commenced under the PPPLF.

There have been several enhancements to the PPPLF since the launch of the facility. While the PPPLF was originally available only to depository institutions (DIs), on April 30 it was expanded to allow all SBA-approved non-DIs to participate. In addition, while initially a PPPLF participant could pledge only those PPP loans it originated, the program was expanded to allow each PPPLF participant to also pledge PPP loans it purchased from another PPP lender. On May 5, the federal bank regulatory agencies announced an interim final rule that neutralizes the liquidity coverage ratio effect of PPP lending when using the PPPLF.

PPPLF credit outstanding has grown steadily since the launch of the facility and currently stands at $48 billion from 672 institutions, making it the largest section 13(3) facility in terms of both outstanding volume and number of participating institutions. A significant share of PPPLF participants, 95 percent, are community banks (defined as banks with less than $10 billion in assets), and 46 Minority Depository Institutions and Community Development Financial Institutions are currently borrowing under the facility. Nineteen non-DIs have accessed the facility and have about $2 billion in PPPLF balances outstanding. There is at least one PPPLF participant in each state.

Despite this broad take-up from the PPPLF, only about 10 percent of PPP lenders have borrowed from the facility. Moreover, 793 institutions that have been approved to utilize the PPPLF have not yet borrowed. Low money market rates and strong deposit inflows have allowed many banks to fund their PPP loans without accessing the PPPLF. In addition, some PPP lenders may be reluctant to turn to the PPPLF due to borrower attestations that are required for lending programs established under section 13(3) as well as public disclosure every 30 days of each PPPLF participant's borrowing from the facility. However, a number of financial institutions have indicated that although they are not participating in the PPPLF, the presence of the facility has incentivized their participation as a PPP lender.

PPPLF Lending Volumes: Origination and Outstanding



Note: PPPLF is Paycheck Protection Program Liquidity Facility, and DI is depository institution.
Source: Federal Reserve Banks.

Financing Conditions

spreads increased somewhat in April for lower-rated states. While defaults and impairments for all categories of state and local government bonds remained low, market commentary projects defaults and impairments to rise over the year.

HOUSEHOLD FINANCING CONDITIONS

Residential Real Estate

Financing conditions in the residential mortgage market were largely unchanged during the intermeeting period. Mortgage rates and agency MBS yields were stable, with mortgage rates edging down 9 basis points, on net, since the April FOMC meeting. The spread between the primary mortgage rate and the MBS yield remained quite wide, reflecting capacity constraints at loan originators amid elevated refinancing volumes, increased origination costs, and decreases in the value of servicing rights. The volume of mortgage rate locks for home-purchase loans picked up in mid-May following a material drop in April. This increase coincides with small improvements in household homebuying sentiment, Google searches for terms related to homebuying, and homebuying activity in multiple listing service data.

That said, financing conditions remained tight for borrowers with relatively low credit scores and for those seeking nonconforming mortgages. The securitization market for jumbo and nonqualified mortgages remained largely shuttered. In addition, options for equity extraction continued to be restricted, as credit for both HELOCs and cash-out refinances was limited.

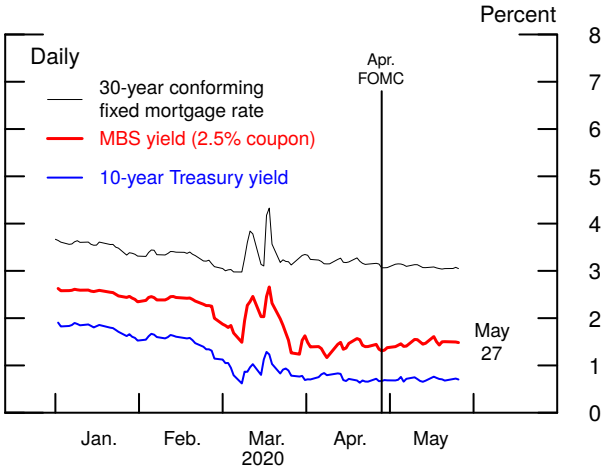
One strain in mortgage markets that has yet to materialize is liquidity difficulties at mortgage servicers. Although the fraction of mortgage borrowers in forbearance plans rose to nearly 8½ percent as of mid-May, some of these borrowers have continued to make their payments. Indeed, only about 3¼ percent of borrowers who were current on their mortgage in March failed to make a payment in April. Moreover, mortgage servicers have benefited from prepaid cash flows from refinance activity and policy interventions from FHFA and Ginnie Mae.

Consumer Credit

Financing conditions for consumer credit appear to have tightened incrementally during the intermeeting period. Credit card lenders reportedly cut lines of credit on existing accounts, and a recent Federal Reserve survey of finance companies found that consumer auto lending standards have tightened somewhat relative to before the

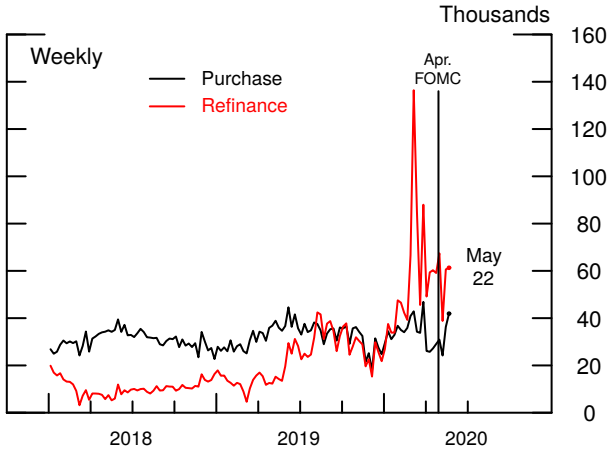
Household Finance

Mortgage Rate and MBS Yield



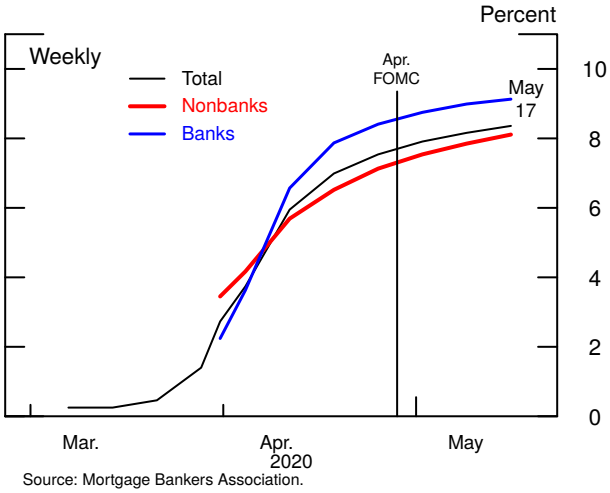
Source: For mortgage rate, Optimal Blue; for mortgage-backed securities (MBS) yield, Barclays.

Number of Rate Locks



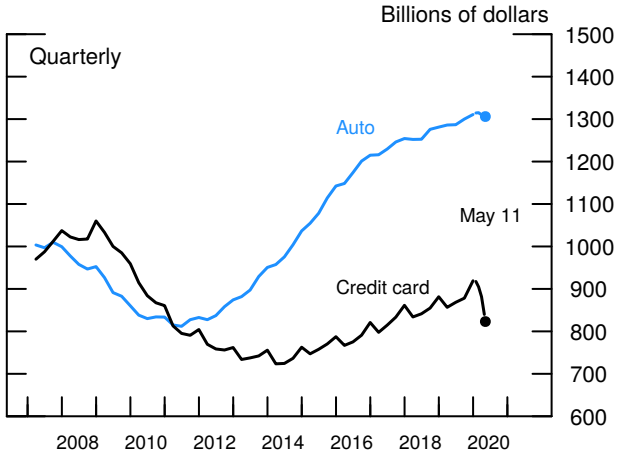
Note: Seasonally adjusted by Board staff.
Source: Optimal Blue.

Percent of Mortgages in Forbearance



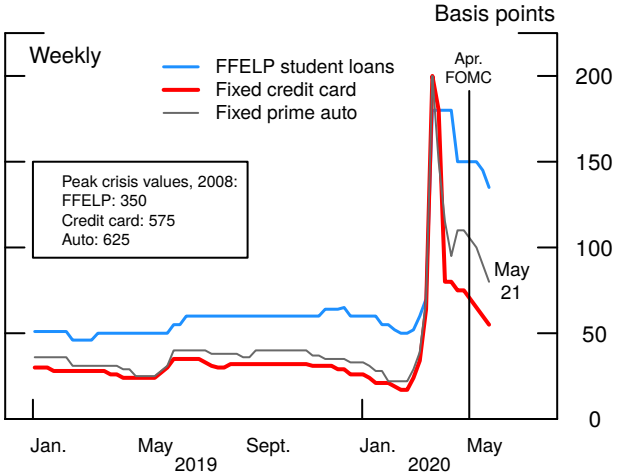
Source: Mortgage Bankers Association.

Consumer Credit Outstanding



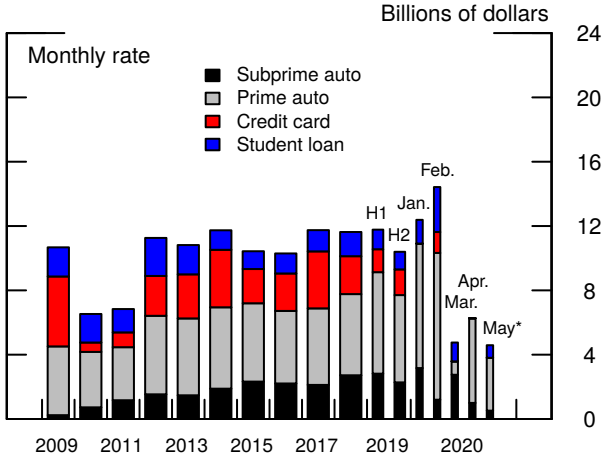
Note: For May 11 credit card balances and April and May 11 auto loan balances, staff estimates based on the Equifax Credit Trends Report. Adjusted for inflation using the CPI-U.
Source: Federal Reserve Bank of New York Consumer Credit Panel/Equifax.

Selected ABS Spreads (3-Year Triple-A)



Note: Spreads are to swap rate for credit card and auto asset-backed securities (ABS) and to 3-month LIBOR for student loans. FFELP is Federal Family Education Loan Program.
Source: JPMorgan Chase.

Gross Consumer ABS Issuance



Note: Before 2013, the black bar represents subprime auto issuance, and 2013 and after, it represents nonprime auto issuance.
* Month to date.
Source: For data before 2013, Merrill Lynch, Bloomberg; for data 2013 to present, JPMorgan Chase.

pandemic outbreak. In addition, a large marketplace lender announced a significant tightening of underwriting standards, further straining conditions for nonprime borrowers.

The massive decline in economic activity has also affected the demand for consumer credit. Outstanding credit card balances contracted more sharply through mid-May than during any period of comparable length in the Great Recession. In contrast, outstanding auto loan balances declined only slightly through mid-May, perhaps reflecting record-low interest rates on auto loans, an extension in loan maturity, and a higher share of credit-financed purchases.

ABS markets recovered somewhat further during the intermeeting period (see the box "The Term Asset-Backed Securities Loan Facility"). Spreads on ABS have retraced most of their March increase but remain well above their post–financial crisis averages. Auto and student loan ABS issuance resumed in mid-April and in early May, respectively, but issuance has remained significantly below pre-pandemic levels.

Financing and Financial Conditions Indexes

A staff index that provides a measure of financing conditions for nonfinancial corporations indicates that financing conditions have eased somewhat over the intermeeting period. As shown in the appendix to this Tealbook section, the average reading of other publicly available financial conditions indexes, which aggregate a large set of financial variables into a summary series, also points to somewhat easier financial conditions over the intermeeting period. However all indexes remain elevated with respect to the levels prevailing before the pandemic.

TALF: The Term Asset-Backed Securities Loan Facility

Asset-backed securities (ABS) markets began to show considerable strains in mid-March. Secondary-market spreads for even triple-A-rated ABS tranches shot upward, increasing by close to 200 basis points for some asset classes, although spreads remained well short of their Great Recession peaks. Market liquidity fell, with reports of many more sellers than buyers. Primary-market issuance slowed to a trickle before halting altogether for some market segments. ABS are especially important sources of funding for nonbank lenders, who often do not have good alternatives. Some banks also use securitizations to reduce risk or free up space on their balance sheets. Disruptions in ABS markets therefore have the potential to reduce lending or make it substantially more costly for households and businesses.

To address these problems, on March 23 the Federal Reserve established the Term Asset-Backed Securities Loan Facility (TALF) as part of an extensive set of measures to support the economy.[1] The TALF is intended to help meet the credit needs of households and businesses by facilitating the issuance of new ABS and supporting liquidity in secondary markets for existing ABS. The TALF makes loans available to investors (including asset managers, mutual funds, insurance companies, and hedge funds) to encourage them to purchase certain ABS. The initial announcement specified that eligible collateral would include ABS with underlying credit exposures of auto, student, and credit card loans as well as a number of smaller categories.[2]

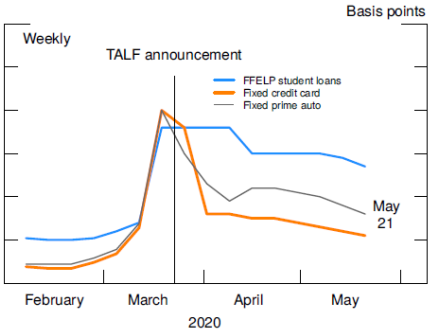
As shown in figure 1, secondary-market spreads on those ABS categories stopped rising shortly after the TALF announcement and subsequently fell substantially. Though spreads have not yet returned to pre-pandemic levels, market liquidity has improved. Similarly, as shown in figure 2, secondary-market spreads on collateralized loan obligations (CLOs) and non-agency commercial mortgage-backed securities (CMBS) fell even before an announcement on April 9 that they would be added to the set of eligible collateral in the TALF program.[3] As shown in figure 3, issuance, which halted for all TALF-eligible asset classes in late March, gradually resumed in April. On May 20, it was announced that the first subscription date for TALF loans would be June 17.

[1] The TALF was established under section 13(3) of the Federal Reserve Act, with approval of the Secretary of the Treasury. The Department of the Treasury, using funds appropriated to the Exchange Stabilization Fund under the Cares Act, will make an equity investment of $10 billion in the special purpose vehicle supporting the TALF. More details about the TALF are available on the Board's website at https://www.federalreserve.gov/monetarypolicy/talf.htm.

[2] The latter includes equipment loans and leases, floor-plan loans, premium finance loans for property and casualty insurance, and certain small business loans guaranteed by the Small Business Administration. Total ABS issuance in TALF-eligible asset classes was over $400 billion in 2019.

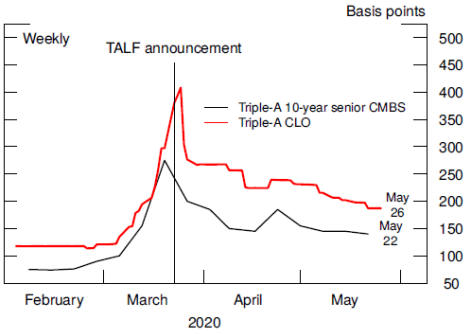
[3] Only new-issue static CLOs and legacy conduit CMBS were added as TALF-eligible collateral.

Figure 1: Consumer ABS Spreads (3-Year Triple-A)



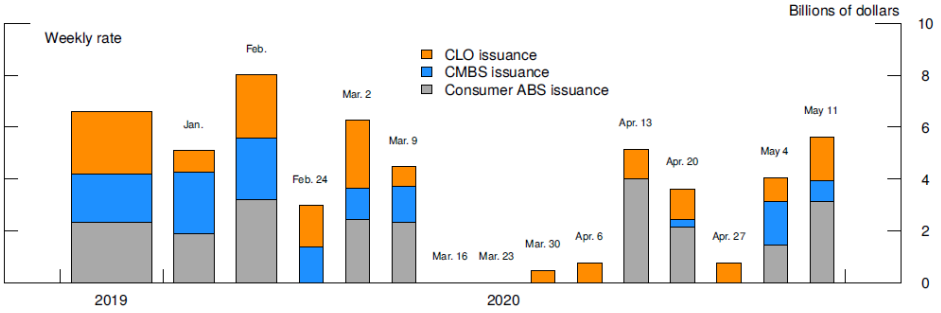
Note: TALF is the Term Asset-Backed Securities Loan Facility. Spreads are to swap rate for credit card and auto asset-backed securities (ABS) and to 3-month LIBOR (London interbank offered rate) for student loans. FFELP is Federal Family Education Loan Program.
Source: JPMorgan Chase.

Figure 2: Business ABS Spreads



Note: ABS is asset-backed securities. TALF is the Term Asset-Backed Securities Loan Facility. CMBS is commercial mortgage-backed securities. CLO is collateralized loan obligations. Spreads are with respect to swap rates for CMBS and 3-month LIBOR (London interbank offered rate) for CLOs.
Source: JPMorgan Chase.

Figure 3: ABS Issuance



Note: ABS is asset-backed securities. CMBS is commercial mortgage-backed securities. CLO is collateralized loan obligations. Beginning with the February 24 observation, issuance is weekly starting on the date specified. Values for the weeks of March 16 and March 23 are zero.
Source: Commercial Mortgage Alert; JPMorgan Chase; Thomson Reuters LPC LoanConnector.

Unlike the Federal Reserve's liquidity facilities for the commercial paper, corporate bond, and municipal bond markets, the TALF supports ABS markets by providing loans to private investors rather than by purchasing ABS outright. As a result, the TALF is designed to ensure that investors have incentives to remain involved in the price-discovery and risk-assessment processes. In particular, investors post collateral haircuts that are based on historical loss rates for triple-A securities.[4] Because investors forfeit these haircuts if they do not repay the TALF loan, they have an incentive to conduct due diligence on the credit risks associated with the ABS they purchase. The design of the other major loan term—the interest rate—is similar to that of some other facilities. The interest rates on TALF loans are set so that spreads are well above those on ABS under normal market conditions but below those during severely stressed conditions. As ABS markets recover and spreads fall, investors have an incentive to return to market sources of funding.

[4] Haircuts are set to be large enough to cover the worst credit losses observed historically or the worst cases in model-based estimates.

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Appendix

Technical Note on Financial Conditions Indexes

The table "Overview of Selected FCIs" provides a summary of various financial conditions indexes (FCIs) that have been developed at the Federal Reserve Board and elsewhere. The historical evolution of these indexes is reported in the exhibit "Selected Financial Conditions Indexes."

Overview of Selected FCIs

Index	Frequency	Sample start	Methodology	Components
Staff FCI for nonfinancial corporations	Daily	1973	Difference in equity returns between two portfolios of firms with credit ratings above and just below investment grade	Nonfinancial firms' stock returns and credit ratings; five Fama-French factors, plus momentum and quality minus junk factors
SLOOS Bank Lending Standards Index	Quarterly	1991	Weighted average of the net percentage of domestic banks tightening standards for 11 loan categories, with weights given by the size of each loan category on banks' balance sheets	Lending standards for 11 loan categories
Goldman Sachs Financial Conditions Index	Daily	1990	Weighted average of financial variables with weights pinned down by the contribution of each financial variable on real GDP growth over the following year using a VAR model	5 financial variables: the federal funds rate, the 10-year Treasury yield, the triple-B yield spreads to Treasury, the S&P price-to-earnings ratio, and the broad value of the U.S. dollar
Chicago Fed National Financial Conditions Index	Weekly	1971	Dynamic factor model	100 financial variables related to money markets (28 indicators), debt and equity markets (27 indicators), and the banking system (45 indicators)
St. Louis Fed Financial Stress Index	Weekly	1993	Principal component analysis	18 variables, including short- and long-term Treasury yields, corporate yields, money market and corporate bond spreads, bond and stock market volatility indicators, breakeven inflation rate, and the S&P 500 index
Kansas City Fed Financial Stress Index	Monthly	1990	Principal component analysis	11 financial variables, including short- and long-term interest rates, corporate and consumer yield spreads, the VIX, and the volatility of bank stock prices

Source: CRSP; Yahoo Finance; Moody's Bond Ratings; Ken French website; AQR Capital Management website; Federal Reserve Board, Senior Loan Officer Opinion Survey on Bank Lending Practices; Bloomberg; Federal Reserve Banks of Chicago, St. Louis, and Kansas City.

The first index in the table, the staff FCI for nonfinancial corporations, measures financing conditions for nonfinancial corporations.[1] This index is constructed as the difference in equity returns between two portfolios of firms with credit ratings above and just below investment grade. To the extent that speculative-grade firms are more sensitive to changes in financing conditions than investment-grade firms but have similar exposure to other shocks, movements in this index provide a measure of changes in financing conditions for nonfinancial corporations.

The second index in the table measures the net share of domestic banks reporting tighter lending standards across all core loan categories in the Senior Loan Officer Opinion Survey on Bank Lending Practices. Banks' responses for a given loan category are weighted by banks' holdings of those loans on their balance sheets.[2]

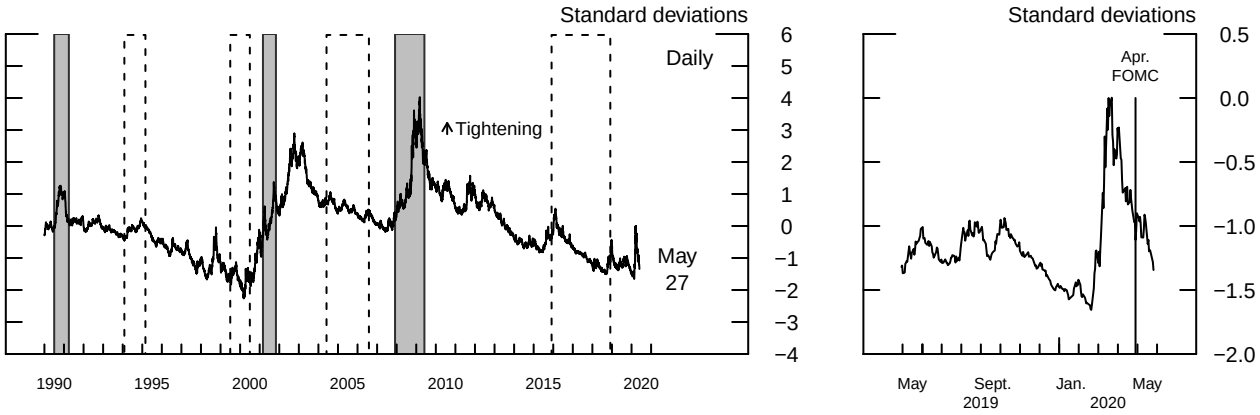
The other FCIs are constructed by aggregating a large set of financial variables into a summary series using various statistical methods. While these indexes provide a useful summary of broad financial market developments, the movements in these indexes may reflect both changes in financing conditions and other shocks to the economy.

[1] This index was first discussed in the box "Financial Conditions Indexes" in the Financing Conditions for Businesses and Households section of the September 2018 Tealbook A.

[2] This index is an updated version of the index developed in William F. Bassett, Mary Beth Chosak, John C. Driscoll, and Egon Zakrajsek (2014), "Changes in Bank Lending Standards and the Macroeconomy," *Journal of Monetary Economics,* vol. 62 (March), pp. 23–40. The current index uses a new weighting approach for each loan category.

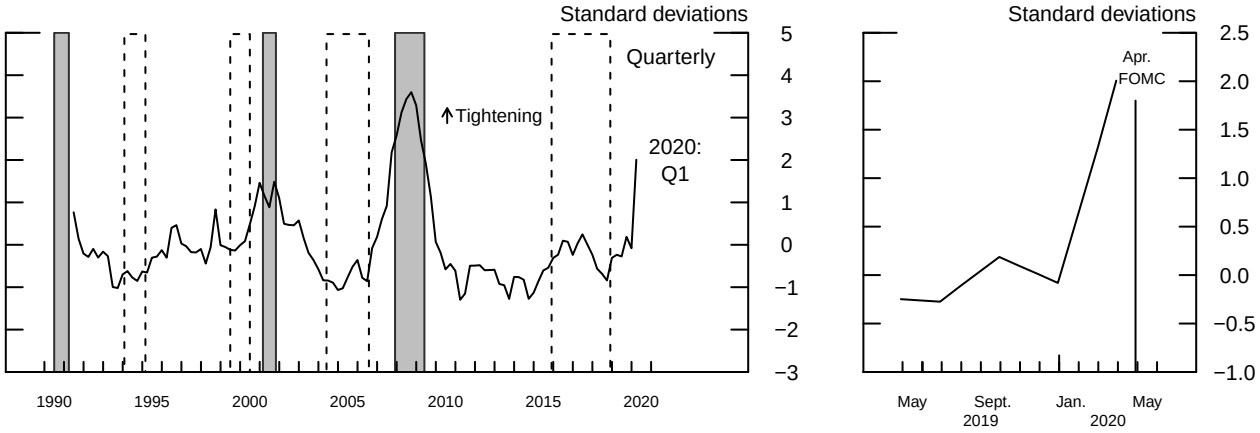
Selected Financial Conditions Indexes

Staff FCI for Nonfinancial Corporations



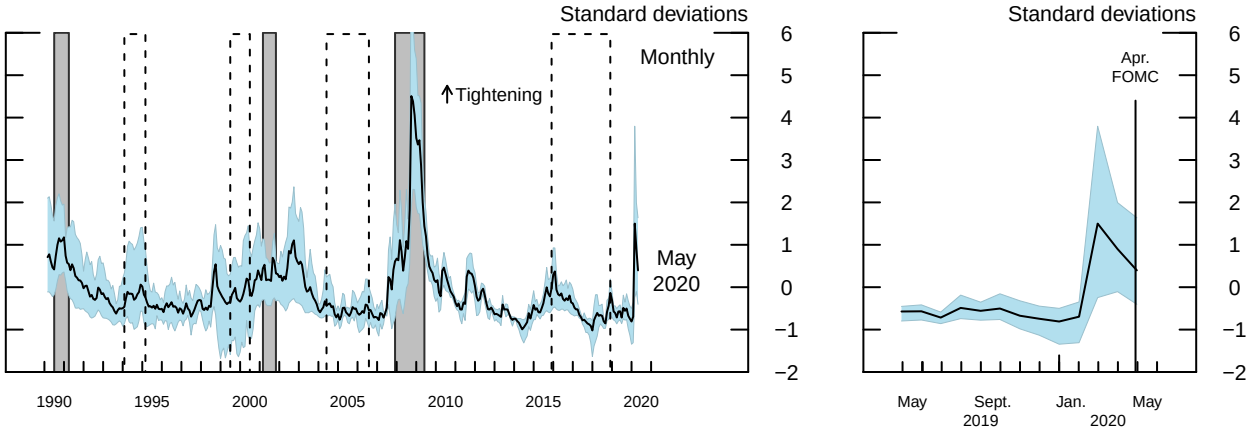
Note: The financial conditions index (FCI) is the deviation from the long−run relation between the systematic components of the cumulative log returns of 2 portfolios of firms with credit ratings above and just below investment grade. The systematic components are derived from the 5−factor Fama−French asset pricing model, augmented with the momentum and quality minus junk factors.
Source: CRSP; Yahoo Finance; Moody's Bond Ratings; Ken French website; AQR Capital Management website.

SLOOS Bank Lending Standards Index



Note: The index is a weighted average of the net percentage of domestic banks tightening standards for 11 loan categories, with weights given by the size of each loan category on banks' balance sheets.
Source: Federal Reserve Board, Senior Loan Officer Opinion Survey on Bank Lending Practices.

Mean and Range of External FCIs

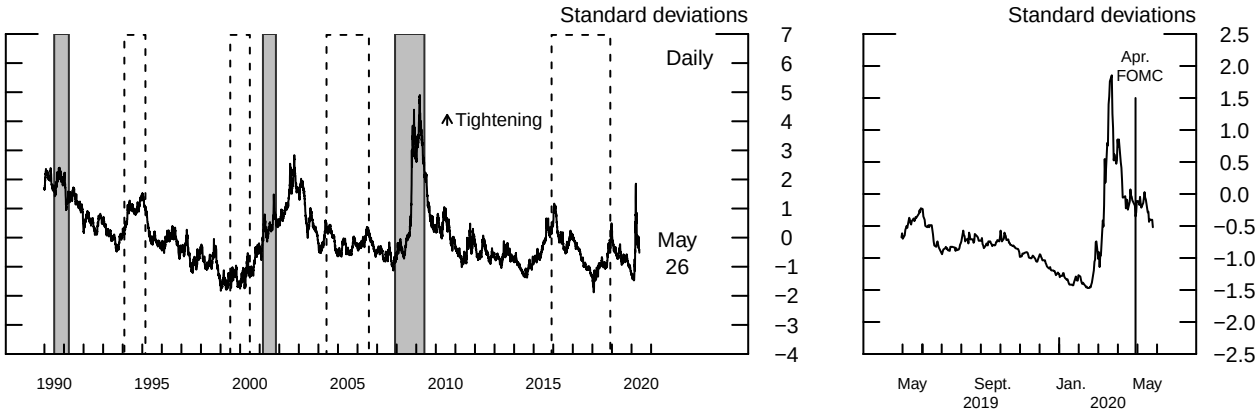


Note: Mean FCI represents the mean of FCIs developed by Goldman Sachs and the Federal Reserve Banks of Chicago, St. Louis, and Kansas City. The blue shaded region represents the range of these 4 standardized FCIs.
Source: Bloomberg; Federal Reserve Banks of Chicago, St. Louis, and Kansas City.

For all panels: Indexes are standardized. Values above (below) zero represent tighter (easier) than average financial conditions. The shaded bars indicate periods of business recession as defined by the National Bureau of Economic Research. The dashed boxes denote monetary policy tightening cycles.

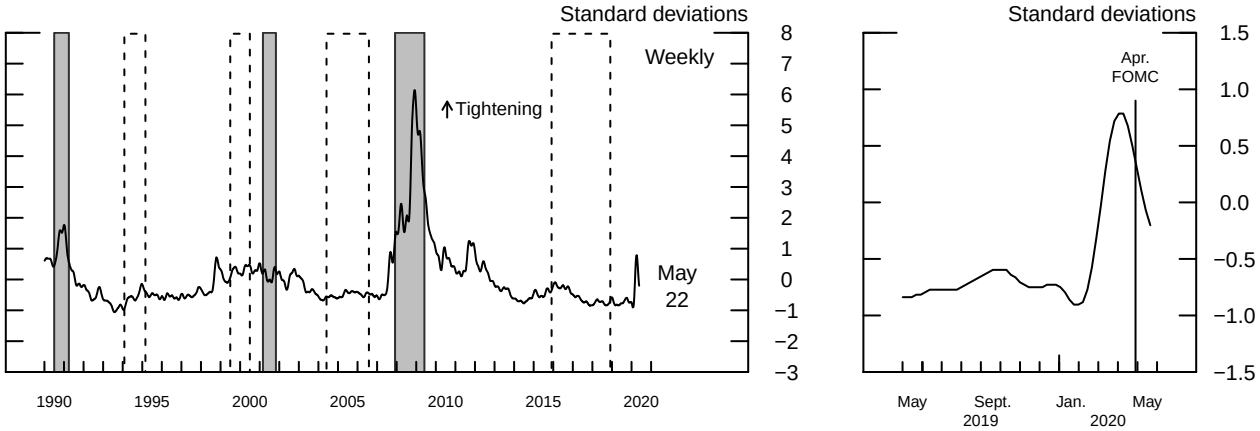
Selected Financial Conditions Indexes (continued)

Goldman Sachs FCI



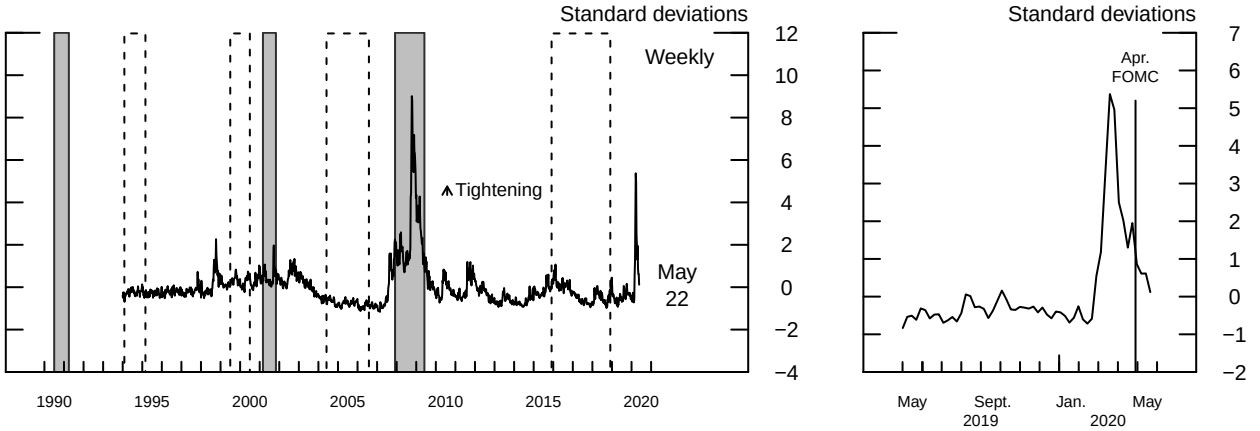
Note: The index is a weighted average of 5 financial variables: the federal funds rate, the 10−year Treasury yield, the triple−B yield spreads to Treasury, the S&P price−to−earnings ratio, and the broad value of the U.S. dollar. Weights are pinned down by the contribution of each financial variable on real gross domestic product growth over the following year using a vector autoregression model.
Source: Bloomberg.

Chicago Fed NFCI



Note: The index is based on 100 financial variables related to money markets (28 indicators), debt and equity markets (27 indicators), and the banking system (45 indicators). The index is weekly and is derived using a dynamic factor model.
Source: Federal Reserve Bank of Chicago.

St. Louis Fed Financial Stress Index

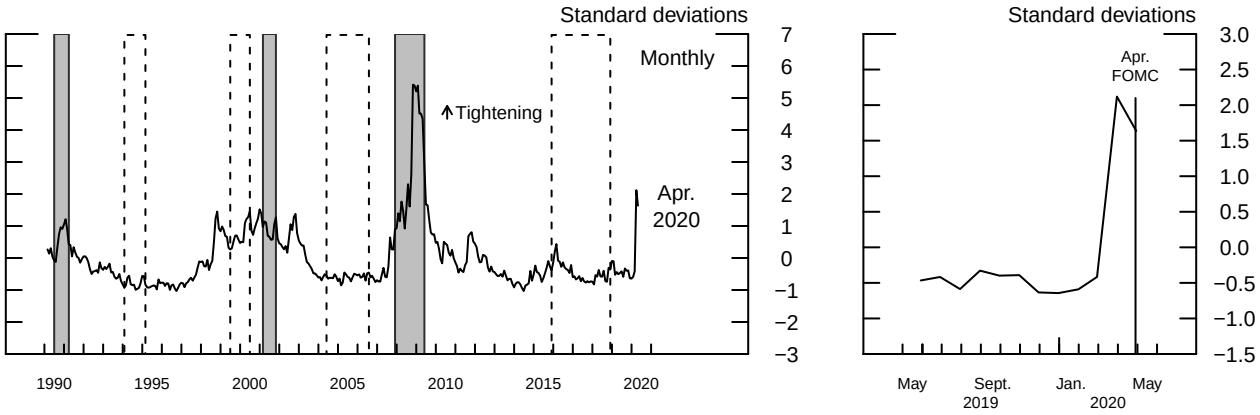


Note: The index is the principal component of 18 variables, including short− and long−term Treasury yields, corporate yields, money market and corporate bond spreads, bond and stock market volatility indicators, breakeven inflation rate, and the S&P 500 index.
Source: Federal Reserve Bank of St. Louis.

For all panels: Indexes are standardized. Values above (below) zero represent tighter (easier) than average financial conditions. The shaded bars indicate periods of business recession as defined by the National Bureau of Economic Research. The dashed boxes denote monetary policy tightening cycles.

Selected Financial Conditions Indexes (continued)

Kansas City Fed Financial Stress Index



Note: The index is the principal component of 11 financial variables, including short− and long−term interest rates, corporate and consumer yield spreads, the VIX, and the volatility of bank stock prices.
Source: Federal Reserve Bank of Kansas City.

For all panels: Indexes are standardized. Values above (below) zero represent tighter (easier) than average financial conditions. The shaded bars indicate periods of business recession as defined by the National Bureau of Economic Research. The dashed boxes denote monetary policy tightening cycles.

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Risks and Uncertainty

Assessment of Risks

The depth of the current recession and the length of the recovery will depend importantly on the evolution of the COVID-19 outbreak, the measures undertaken to contain it, and the responses of policymakers. The historical behavior of the United States and foreign economies in response to past shocks provides limited guidance about how the economy might evolve in the current unprecedented circumstances. Consequently, the staff judges that the uncertainty around the economic projection is extremely elevated.

There are upside and downside risks to the baseline assumptions about the containment of the COVID-19 outbreak, both domestically and abroad. On the upside, it is possible that the easing of social distancing that is currently underway will be successful. This outcome would be supported by earlier development of effective therapeutic medications that greatly limit deaths related to COVID-19, a vaccine being developed earlier than the fall of next year, or both. Overall, however, it currently appears that the balance of risks is skewed to the downside.

On the downside, the current strategies for reopening the United States and most foreign economies, even if very gradual, may prove misguided, and the COVID-19 spread and death count could rise again significantly. An outcome that the staff judges equally as plausible as the baseline is one in which there is a resurgence of the COVID-19 pandemic this fall.[1] In this case, government authorities may feel compelled to reintroduce strict social-distancing measures, the public could be inclined to step up voluntary social distancing, and the economy could experience another substantial contraction in activity late this year.

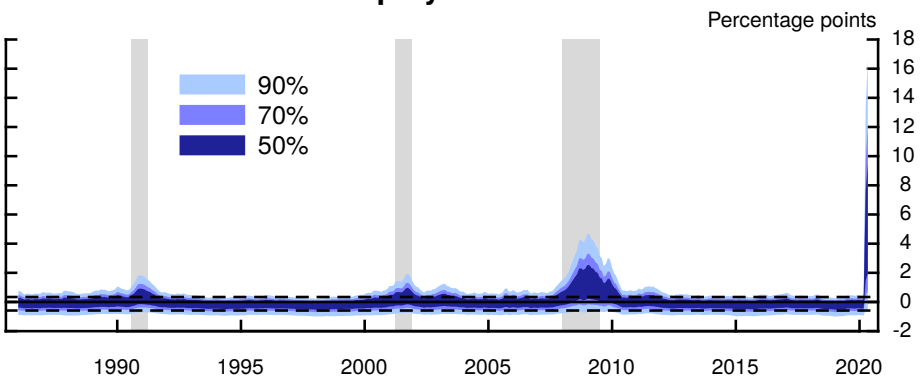
Beyond the uncertainty surrounding the progression of the pandemic, there are also considerable uncertainties about the evolution of the economy in the current circumstances. Even assuming the outbreak is managed about as envisioned in the baseline, it is very uncertain to what degree a temporary—but extremely acute—economic contraction may trigger protracted recessionary dynamics. For example, some businesses will fail or enter bankruptcy, which will destroy jobs, and the start-up of some new firms will likely be delayed. Whether such developments have larger and longer-lasting effects on activity and on potential output than

[1] Indeed, a second wave has occurred in each of the 10 influenza pandemics over the past couple of centuries, often about six months after the first wave.

Risks & Uncertainty

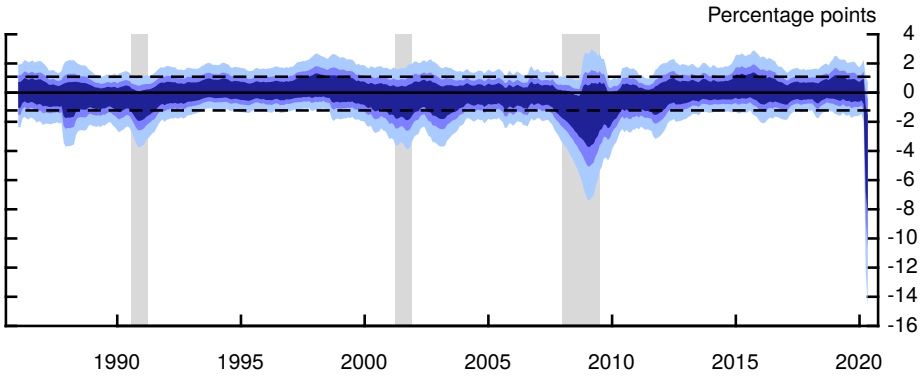
Conditional Distributions of Staff Forecast Errors 1 Year Ahead

Unemployment Rate



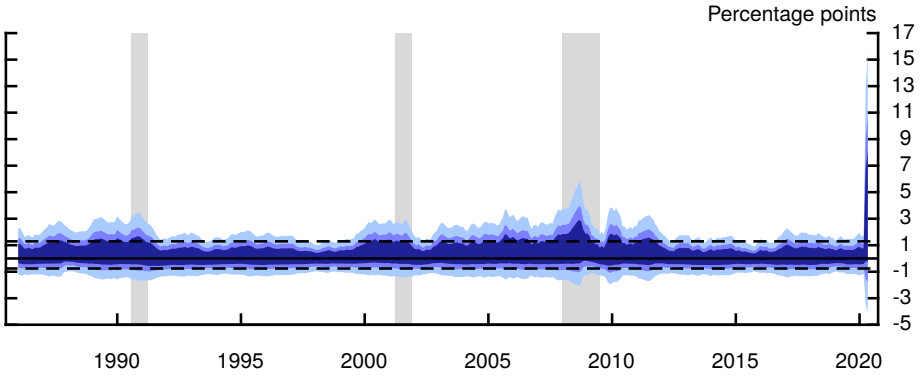
May 2020	
95th	16.6
85th	12.1
50th	5.2
15th	.7
5th	- .5

GDP Growth



May 2020	
95th	.7
85th	- .4
50th	-4.5
15th	-10.6
5th	-14.7

CPI Inflation

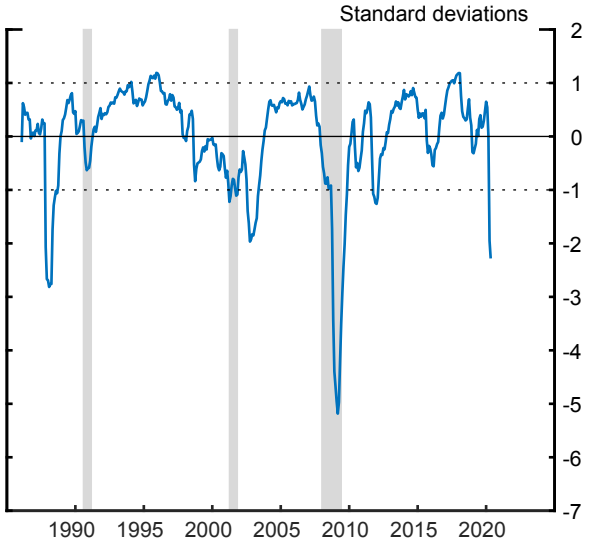


May 2020	
95th	15.6
85th	10.8
50th	3.5
15th	-1.8
5th	-4.1

Note: The exhibit shows estimates of quantiles of the distribution of errors for 4-quarter-ahead staff forecasts. The estimates are conditioned on indicators of real activity, inflation, financial market conditions, and the volatility of high-frequency macroeconomic indicators. The tables show selected quantiles of the predictive distributions for the respective variables as of the current Tealbook. Dashed lines denote the median 15th and 85th percentiles. Gray shaded bars indicate recession periods as defined by the National Bureau of Economic Research.

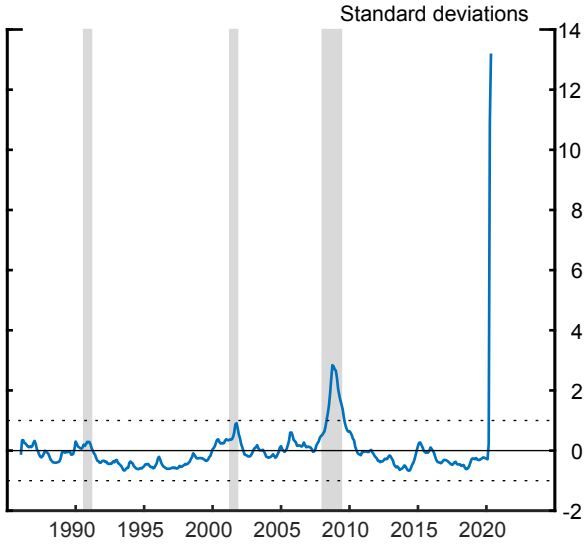
Macroeconomic Indexes Underlying the Time-Varying Macroeconomic Risk Exhibit

Financial Market Conditions



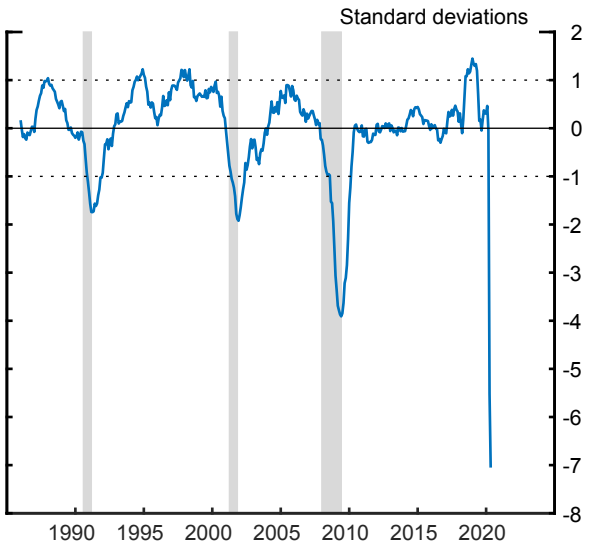
Source: Staff estimates.

Macroeconomic Uncertainty

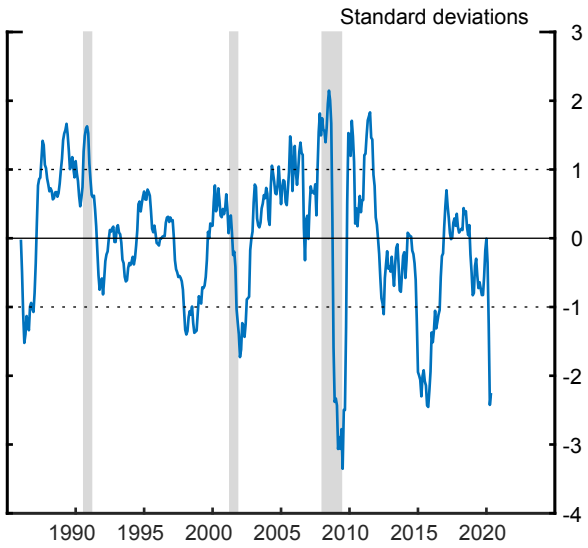


Source: Staff estimates; Sydney Ludvigson (2020), Uncertainty Data, https://www.sydneyludvigson.com/macro-and-financial-uncertainty-indexes.

Real Activity



Source: Staff estimates.



Source: Staff estimates.

Note: The gray shaded bars indicate a period of business recession as defined by the National Bureau of Economic Research.

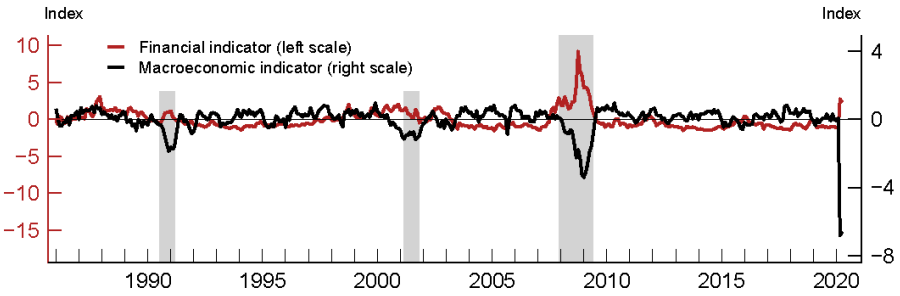
Risk Estimates for the U.S. and Foreign GDP Outlook

The ongoing public health crisis, the unprecedented measures adopted globally to address it, and the possibility of further virus outbreaks make assessments about the range of possible GDP outcomes over the next year exceptionally difficult. This discussion presents estimates of the risks around both the U.S. outlook and that of the aggregate foreign economy based on the "growth-at-risk" framework, which has become popular among academics, international organizations, and financial market analysts to quantify changes in the distribution of possible outcomes for GDP growth.[1] This analysis expands the suite of empirical models that inform the staff's risk assessment.[2]

We first construct two monthly real-time indicators that summarize current economic and financial conditions using weekly, monthly, and quarterly data.[3] Figure 1 shows the financial indicator and the macroeconomic indicator for the United States. Since the beginning of the year, financial conditions have tightened considerably—though less than in the Global Financial Crisis (GFC)—and macroeconomic conditions have collapsed, reaching historic lows in April. The corresponding chart for the foreign economy aggregate (not shown) portrays a very similar picture.

We next characterize the historical relationship between these macroeconomic and financial indicators and the range of possible future GDP outcomes by estimating linear regressions for the 10th, 25th, 75th, and 90th quantiles. These quantiles divide the range of future GDP

Figure 1: Financial and Macroeconomic Indicators for the United States



Note: The gray shaded bars indicate a period of business recession as defined by the National Bureau of Economic Research.
Source: Staff calculations.

[1] See Tobias Adrian, Nina Boyarchenko, and Domenico Giannone (2018), "Vulnerable Growth," *American Economic Review*, vol. 109 (April), pp. 1263–89.

[2] For instance, the exhibit "Conditional Distribution of Staff Forecast Errors 1 Year Ahead," which presents estimates of conditional distribution for *staff forecast errors* for unemployment, GDP growth and inflation 4 quarters ahead. These estimates are constructed using indicators of real activity, macroeconomic uncertainty, financial market conditions, and inflation. The staff also updates models of recession probability.

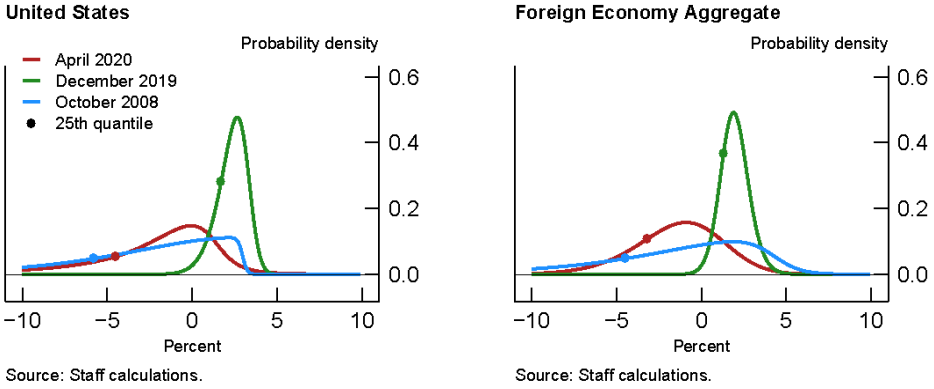
[3] Specifically, the financial indicator is obtained from the estimation of a dynamic factor model (DFM) that uses data on the VXO (a volatility index of the S&P 100), the excess bond premium, the TED spread (the difference between the 3-month LIBOR rate and the 3-month Treasury bill) and the CBILL spread (the difference between the 3-month financial commercial paper rate and the 3-month Treasury bill). The macroeconomic indicator is obtained from a DFM model that uses data on weekly initial unemployment insurance claims (for the United States only), monthly industrial production, retail sales, the new export orders component of the purchasing managers index, and quarterly GDP. This model produces estimates for monthly GDP in the United States and the foreign economy aggregate that conform with the quarterly values.

growth predicted by financial and macroeconomic conditions in ordered intervals. Thus, instead of focusing only on the average value of future GDP growth, this framework generates estimates of the *range* of GDP growth based on current conditions, and thus helps us to assess the risks and uncertainty around our forecast. For instance, when adverse macroeconomic conditions or severe financial stresses bring the estimated 25th quantile of future GDP growth—a quantile describing the lower portion of the GDP growth range—to negative values, downside risks are historically high. A widening spread between the lowest and highest intervals of GDP growth—defined by the 10th and 90th quantiles—points to increasing uncertainty.

With data through May 28, our estimates indicate that downside risks and uncertainty around the global outlook are unusually elevated. The red curves in figure 2 show the distribution of GDP growth rates over the next 12 months constructed from the estimated quantiles for the United States (left panel) and the foreign economy aggregate (right panel).[4] The model assigns a 25 percent probability to the event that growth will be below negative 4.4 percent in the United States and below negative 3.1 percent in the foreign economy aggregate. These numbers point to downside risks that are much larger than in December 2019 (in green) and comparable to the height of the GFC (in blue), although they reflect different sources—lower financial stresses, thanks in part to the aggressive policy response worldwide, but worse macroeconomic developments. The large range of estimated possible outcomes also points to elevated uncertainty around the forecast.

Several caveats are worth noting. First, the model estimates risks and uncertainty around the forecast using historical relationships. Given the unprecedented nature of the current health and economic crisis, those historical relationships may prove less informative at the current juncture. Second, estimates of tail risks are typically more sensitive than estimates for average effects because they rely on a relatively small number of highly influential events in the data. Finally, real-time indicators are timely but tend to exhibit large swings, resulting in a somewhat more volatile assessment of risk.

Figure 2: Distribution of GDP Growth over the Next 12 Months



Source: Staff calculations.

Source: Staff calculations.

[4] To better visualize the evolution of risks and uncertainty, we fit distributions through the estimated quintiles in order to span the entire range of future GDP values at a specific date.

assumed in the baseline projection remains to be seen. Likewise, it is conceivable that behavioral changes of consumers and businesses due to heightened uncertainty could provide a greater drag on economic growth throughout the medium term than assumed in the baseline. Moreover, a strained financial system could significantly limit firms' and households' access to credit. In these circumstances, it is possible that a severely adverse outcome associated with the course of the pandemic could resemble the worst economic outcomes of the past century. Broad public support for continued social distancing could collapse as the economy falls apart both domestically and abroad; indeed, we are already seeing these strains in some countries.

The dominant source of current uncertainty—the COVID-19 pandemic—is without parallel in the data used to estimate our quantitative risk models. The validity of these models relies on an assumption that forecast uncertainty remains related to the data in a way that is similar to what has occurred in the past. With that important caveat in mind, we show our usual exhibit that provides some perspective on the distribution of forecast errors one year ahead, conditional on measures of real economic activity, inflation, financial market conditions, and macroeconomic uncertainty.[2] Given the current data, the models judge the risks around the staff forecast as particularly wide, driven by the considerable deterioration in real activity and by an exceptionally high reading for the macroeconomic uncertainty variable. That uncertainty variable picks up the volatility in surprises for incoming data, such as industrial production, the unemployment rate, and inflation.[3] Considering the unprecedented declines in spending, production, and employment, it is not surprising that the model views macroeconomic uncertainty as much larger than even during the Great Recession and, in turn, translates this measure into unusually wide distributions for staff forecast errors over the next year. Moreover, the conditional distribution for forecast errors one year ahead is skewed adversely for GDP growth and the unemployment rate. A complementary perspective is described in the box "Risk Estimates for the U.S. and Foreign GDP Outlook." With regard to inflation, we view the risks to the projection as tilted to the downside, on balance, in large part because of the substantial downside risks to economic activity, which could lead to very subdued actual inflation and even some erosion in longer-run inflation expectations.

[2] This exhibit is based on a framework similar in spirit to quantile regressions using past forecast errors as the dependent variable, and the variables that the estimates are conditioned on are shown in the exhibit "Macroeconomic Indexes Underlying the Time-Varying Macro Risk Exhibits." We are not showing our usual 2-year-ahead exhibit in this Tealbook because the model mapped the exceptional configuration of available data into estimated distributions of outcomes that we do not find to be reliable in the current situation.

[3] Specifically, the measure of macroeconomic uncertainty is the conditional time-varying variance from a stochastic volatility model.

ALTERNATIVE SCENARIOS

This section describes several alternative scenarios focusing on the uncertainty and risks about the course of the COVID-19 pandemic and the associated macroeconomic disruptions both at home and abroad. These scenarios use simulations from the FRB/US and SIGMA models. In all scenarios, the federal funds rate follows a policy rule meant to be roughly consistent with the forward guidance provided in the March and April FOMC statements and departs from the effective lower bound (ELB) in the quarter after the unemployment rate falls below its assumed long-run natural rate of 4.3 percent.[4]

As noted, we think a more pessimistic "second waves" scenario in which a worldwide resurgence of the virus hits toward year-end—inducing a reintroduction of strict social-distancing measures—is equally as plausible as our baseline assumptions. Alternatively, a faster return to normalcy is certainly possible, but it is also conceivable that ineffective containment of the virus and delays in developing treatments could ultimately lead to an economic depression.

Second Waves (FRB/US, SIGMA)

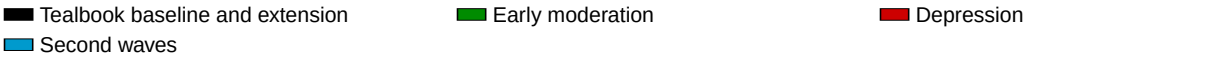
By the end of this year, the staff assumes that social-distancing measures both in the United States and in the foreign economies will have been relaxed materially. However, it is likely that COVID-19 immunity in many countries, including the United States, will be sufficiently low that widespread epidemic propagation could easily resume. In the absence of less disruptive—but still effective—methods for responding to new outbreaks, the reemergence of pervasive infections may necessitate the reinstatement of extensive mitigation measures. The reinstatement of these measures could be particularly damaging to the economy if the financial system is already strained by the effects of the first round of distancing measures and if firms' and households' access to financing is impaired.[5] A persistent drag could also result from damage to the supply side of the economy stemming from the destruction of employment relationships, a spike in firm exits, lower capacity utilization, and reduced investment.

[4] In addition, all scenarios assume that the Federal Reserve's balance sheet policies and federal fiscal policies are the same as in the baseline. The Monetary Policy Strategies section of this Tealbook considers the effects of alternative interest rate policies in the first two of the following scenarios.

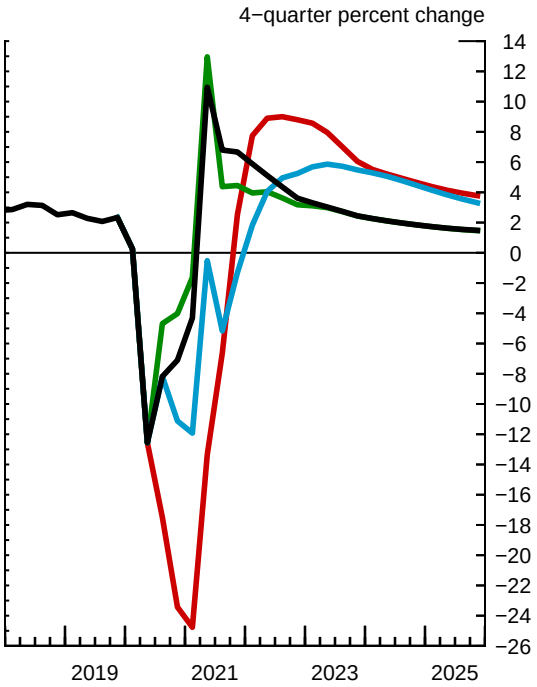
[5] A growing recognition that recurring cycles of relatively intense social distancing may be necessary for some indefinite time—and that a rapid return to normal levels of economic activity is not assured—may itself limit the willingness of financial intermediaries to provide financing as liberally as during the first episode of social distancing.

Risks & Uncertainty

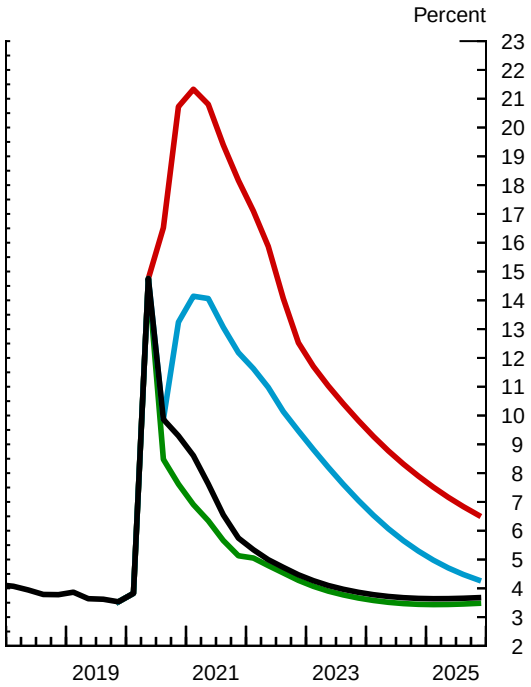
Alternative Scenarios



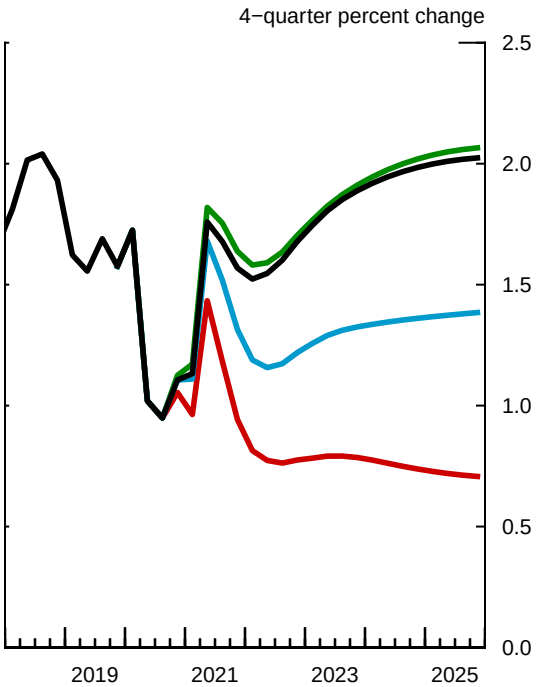
Real GDP



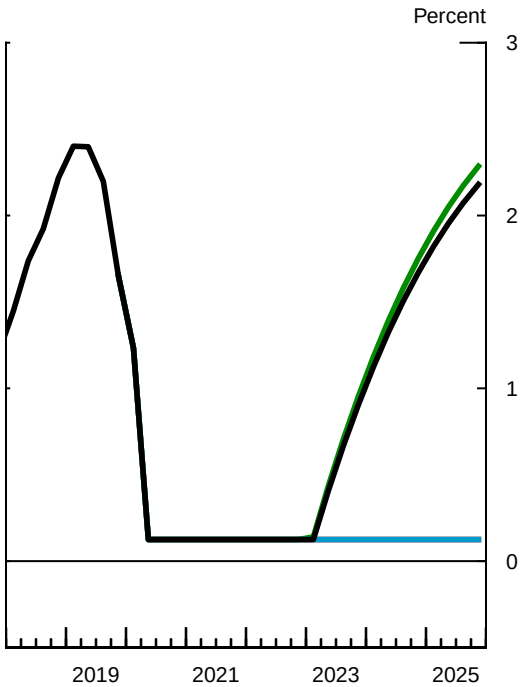
Unemployment Rate



PCE Prices excluding Food and Energy



Federal Funds Rate



Note: Events such as the COVID−19 pandemic are unprecedented in the data used to construct the confidence intervals usually shown in this exhibit. We judge that our usual methodology is not currently reliable, particularly for the near−term projections, and thus confidence intervals are not presented.

Alternative Scenarios

(Percent change, annual rate, from end of preceding period except as noted)

Measure and scenario	2020		2021	2022	2023	2024-25
	H1	H2				
Real GDP						
Tealbook baseline and extension	-25.1	15.3	6.7	3.6	2.4	1.7
Second waves	-25.1	5.5	-1.3	5.2	5.5	3.9
Early moderation	-25.1	23.0	4.5	3.2	2.4	1.7
Depression	-25.1	-21.7	2.5	8.8	6.0	4.2
Unemployment rate[1]						
Tealbook baseline and extension	14.8	9.3	5.7	4.5	3.9	3.7
Second waves	14.8	13.2	12.2	9.5	7.1	4.3
Early moderation	14.8	7.6	5.1	4.3	3.7	3.5
Depression	14.8	20.7	18.2	12.5	9.8	6.5
Total PCE prices						
Tealbook baseline and extension	-.2	1.8	1.6	1.7	1.9	2.0
Second waves	-.2	1.1	1.1	1.4	1.5	1.5
Early moderation	-.2	2.5	1.5	1.8	2.0	2.0
Depression	-.2	.0	.4	1.1	1.2	1.0
Core PCE prices						
Tealbook baseline and extension	.3	1.9	1.6	1.7	1.9	2.0
Second waves	.3	1.9	1.3	1.2	1.3	1.4
Early moderation	.3	1.9	1.6	1.7	1.9	2.0
Depression	.3	1.8	.9	.8	.8	.7
Federal funds rate[1]						
Tealbook baseline and extension	.1	.1	.1	.1	.9	2.2
Second waves	.1	.1	.1	.1	.1	.1
Early moderation	.1	.1	.1	.1	1.0	2.3
Depression	.1	.1	.1	.1	.1	.1

1. Percent, average for the final quarter of the period.

In this scenario, we illustrate the effects of a resurgent pandemic. Specifically, the remaining social distancing assumed in the baseline is not sufficient to prevent a widespread resurgence of the virus domestically, which results in a resumption of intense social distancing in the fourth quarter of 2020. Similar renewed outbreaks, albeit not necessarily synchronized with the United States, emerge in many foreign economies over the course of this year and the next, also necessitating a revival of strict social-distancing measures. In other foreign countries, initially containing the virus proves difficult, as illustrated by the current situation in Brazil, Mexico, and Peru; social-distancing measures remain in place despite growing social and political discontent; and government support programs prove less effective than anticipated. Foreign GDP contracts around 9 percent in 2020 and expands only 1.7 percent in 2021, about 4 percentage points below baseline in both years, while flight-to-safety flows to the United States lead to a 7 percent appreciation of the dollar.

In the United States, weaker demand both domestically and abroad, along with a resurgence in shutdowns, causes the unemployment rate to increase to 14 percent at the beginning of 2021 and to remain at that level for the first half of next year.[6] The unemployment rate rises to slightly below its peak this quarter, reflecting better preparations and more-efficient distancing strategies. The reinstatement of social distancing domestically causes both consumption and investment to weaken next year, and the slump in foreign demand leads to lower exports. By the end of 2021, the level of U.S. GDP is 12 percent below its previous peak, while the level of foreign GDP is 7.5 percent lower. The decline in aggregate demand and core import prices causes inflation to remain around 1¼ percent for several years.

Compared with the baseline, the disruption to economic activity is more protracted. Indeed, at the end of 2023, the unemployment rate is at 7.1 percent, 2½ percentage points above its assumed natural rate at that time. The persistent weakness of aggregate demand and a slight downward drift of long-term inflation expectations depress inflation, which averages 1¼ percent between 2021 and 2025. The stubbornly high unemployment rate also leads to the federal funds rate remaining at the ELB until 2026.

Early Moderation (FRB/US, SIGMA)

The baseline assumes that, globally, the share of economic activity directly disrupted by social-distancing measures will be diminishing over the summer and will be materially lower by

[6] This scenario assumes that the natural rate of unemployment is 1.4 percentage points, on average, above the baseline and the actual labor force participation rate is 0.7 percentage point, on average, below the baseline for much of the medium term before returning to their longer-run baseline values.

the end of the year. This moderation of social distancing is likely only possible if more efficient ways of containing the spread of the virus or mitigating its most severe effects are in place, such as large-scale testing and contact tracing, wearing masks, or therapeutics. In this scenario, we assume that medical alternatives become available more quickly than in the baseline and, combined with behavioral changes, help prevent large increases in infections and deaths as economic activity resumes. We also assume a vaccine becomes available in the middle of next year. Mandatory social distancing winds down faster near the end of the third quarter and is eliminated almost completely by the end of the year both in the United States and abroad. The level of foreign GDP increases to 4.3 percent above baseline by the end of the year, while a reversal of flight-to-safety flows contributes to a 5 percent depreciation of the dollar.

Stronger foreign demand, a weaker dollar, and the faster moderation of social distancing in the second half of the year do not fully make up for the massive decline in U.S. economic activity through May: GDP in the United States still drops 4.0 percent this year. The unemployment rate averages 8½ percent in the third quarter, almost 1½ percentage points below the average for that quarter in the baseline, reflecting both the direct effect of more moderate social-distancing measures and a reduction of some of the recessionary headwinds in the baseline. The unemployment rate rapidly declines toward the natural rate of unemployment, falling to 7.6 percent by the end of this year. Inflation averages around 1¼ percent in 2020, close to the baseline. After 2020, however, the outcomes in this scenario are similar to those in the baseline, and, as a result, the federal funds rate tracks the baseline path closely, exiting from the ELB in the first quarter of 2023.

Depression (FRB/US, SIGMA)

One severely adverse outcome associated with the course of the pandemic could resemble the worst economic outcomes of the 20th century. Testing and contact tracing may never scale up well enough to be applicable to large economies or within the reach of developing economies, while the search for a vaccine may drag on for a long time and therapies to alleviate the effects of the virus may not be developed. At the same time, both in the United States and abroad, public support for prolonged economy-wide social distancing may fade as the economy falls apart, and herd immunity may only be slowly achieved. Ensuing social and political unrest may exacerbate economic disruptions and trigger anti-globalization policies, which would further weigh on investment and productivity.

Under these circumstances, the start-and-stop approach to controlling the virus described earlier in the second waves scenario may become the only option for several years, with

policymakers repeatedly resorting to sporadic and uncoordinated bouts of intense—but brief—social distancing when local epidemics threaten to overwhelm health-care systems. With most people still susceptible to the virus, many will continue to shun activities that carry an appreciable risk of infection, even in periods without formal restrictions in place, exerting continuous downward pressure on aggregate demand. Moreover, given expectations of chronically depressed economic activity and huge risks to the downside, firms will defer investment and hiring, and both firms and households may find it extremely difficult to access financial resources that would permit them to ride out the resulting turbulence, amplifying and prolonging the downturn.

In the foreign economies, underlying financial and fiscal vulnerabilities may magnify the economic disruptions. In China, vulnerabilities in the banking and corporate sectors may come to the fore, triggering much more significant financial distress than seen so far. Many of the emerging market economies (EMEs) could plunge into a severe financial crisis amid renewed capital outflow pressures. With significant strains on their fiscal capacity, countries in the euro-area periphery could default, raising serious questions about the viability of the euro. The spread of the disease, financial stresses, and the economic downturn could interact to generate social and political instability in many of these regions.

In this scenario, the continued threat of infection and escalating pessimism about efforts to contain the pandemic at acceptable levels of social cost are assumed to lead to a broad economic collapse. The U.S. unemployment rate remains highly elevated and reaches about 20 percent in the second half of this year. Corporate borrowing spreads skyrocket by 500 basis points in the United States and in the advanced foreign economies (AFEs) and by 600 basis points in the EMEs, relative to baseline. Flight-to-safety flows lead the dollar to appreciate about 15 percent, and household and business sentiment drop around the world. At the trough of the depression, the level of GDP in the United States is more than 25 percent below its peak; the drop is about 15 percent in the AFEs and 20 percent in the EMEs—magnitudes not seen since the Great Depression.

A sluggish recovery from an extremely high unemployment rate leads to the unemployment rate remaining above 10 percent until the end of 2023 and above the assumed longer-run natural rate of unemployment until 2029. Correspondingly, core inflation drops to 1 percent in 2020 and remains roughly between ½ and 1 percent over the next decade, held down by persistently weak demand and a downward drift of long-term inflation expectations.[7] The federal funds rate rises from the ELB in 2029.

[7] Long-term inflation expectations end the decade around 1¼ percent—a sizable movement in what appears to have been a relatively stable series since the late 1990s.

Monetary Policy Strategies

This section discusses a range of strategies for setting the federal funds rate and compares the associated interest rate paths and macroeconomic outcomes with those in the Tealbook baseline projection. Most simple rules prescribe negative rates in the near term. These prescriptions are, in general, somewhat lower than those associated with the April Tealbook projection, reflecting the downward revisions to the output gap and inflation over the near term. The medium-term prescriptions derived from simple rule and optimal control simulations are little changed from the April Tealbook. In almost all of these simulations, the federal funds rate remains at the effective lower bound (ELB) for at least one year.

As emphasized elsewhere in this Tealbook, the economic outlook is extraordinarily uncertain. To explore the sensitivity of policy prescriptions and macroeconomic outcomes to alternative assumptions about the magnitude and duration of the downturn, an additional exhibit shows optimal control simulations under the "Early Moderation" and "Second Waves" alternative scenarios featured in the Risks and Uncertainty section of this Tealbook. A further exhibit provides updated estimates of the equilibrium real federal funds rate in the longer run and analyzes how time-series models would interpret, over time, the unusually steep decline and bounceback in economic activity that are projected by the staff.

NEAR-TERM PRESCRIPTIONS OF SELECTED SIMPLE POLICY RULES

The top panel of the first exhibit shows the near-term prescriptions for the federal funds rate from four simple policy rules: the inertial version of the Taylor (1999) rule, the Taylor (1993) rule, a first-difference rule, and a flexible price-level targeting (FPLT) rule.[1] The simple rule prescriptions in this panel are not subject to the ELB on the policy rate and take as given the Tealbook baseline projections for the output gap and core inflation, which are shown in the middle panels.[2] The middle-left panel provides the

[1] Except for the first-difference rule, which has no intercept term, the simple rules examined herein use intercept terms that are consistent with a real federal funds rate of 50 basis points in the longer run. The appendix in this Tealbook section provides technical details on these simple policy rules.

[2] The Tealbook baseline and dynamic simulations presented later in this section of the Tealbook embed the assumption that the federal funds rate is subject to an ELB of 12½ basis points, a value that corresponds to the midpoint of the current target range. In addition, all dynamic simulations incorporate

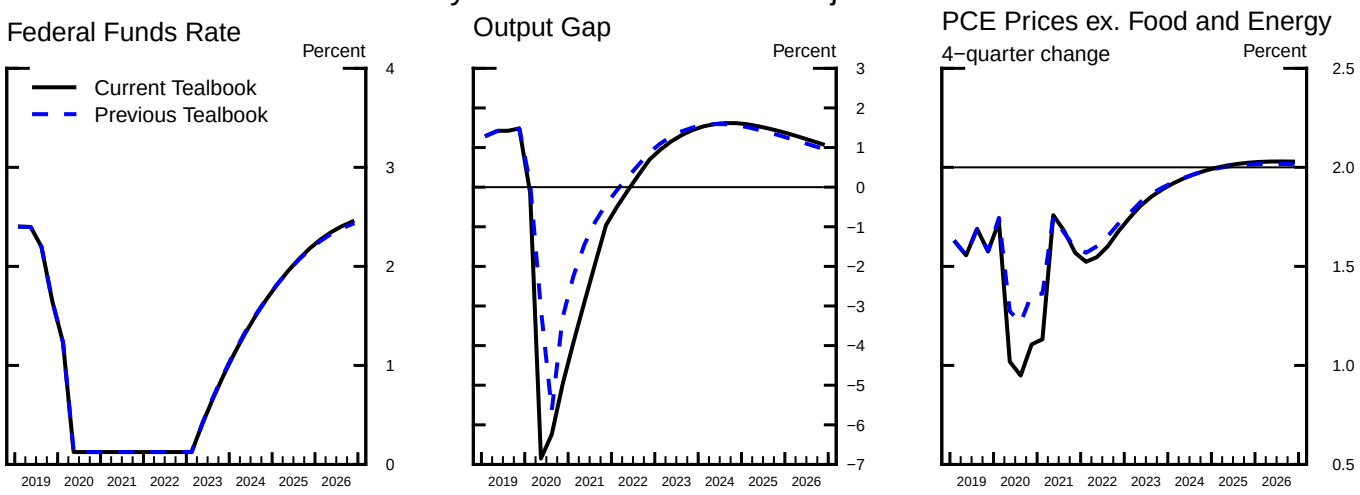
Policy Rules and the Staff Projection

Near−Term Prescriptions of Selected Simple Policy Rules[1]

(Percent)

	2020:Q3	2020:Q4
Inertial Taylor (1999) rule	**−.69**	**−1.16**
Previous Tealbook projection	*−.54*	*−.73*
Taylor (1993) rule	**−2.20**	**−1.33**
Previous Tealbook projection	*−1.50*	*−.12*
First−difference rule	**1.97**	**3.96**
Previous Tealbook projection	*.81*	*3.03*
Flexible price−level targeting rule	**−.71**	**−1.42**
Previous Tealbook projection	*−.70*	*−1.24*
Addendum:		
Tealbook baseline	**.13**	**.13**

Key Elements of the Staff Projection



A Medium−Term Notion of the Equilibrium Real Federal Funds Rate[2]

(Percent)

	Current Value	*Previous Tealbook*
Tealbook baseline		
FRB/US *r**	−0.69	*−.78*
Average projected real federal funds rate	−1.31	*−1.41*
SEP−consistent baseline		
FRB/US *r**	n.a.	
Average projected real federal funds rate	n.a.	

1. The lines denoted "Previous Tealbook projection" report prescriptions based on the previous Tealbook's staff outlook for inflation and resource slack.

2. The "FRB/US *r**" is the level of the real federal funds rate that, if maintained over a 12−quarter period (beginning in the current quarter) in the FRB/US model, sets the output gap equal to zero in the final quarter of that period given a baseline projection. The FRB/US *r** values for the SEP−consistent baseline cannot be computed because the Committee has not conducted an SEP since December 2019. The "Average projected real federal funds rate" is calculated under a baseline projection over the same 12−quarter period as FRB/US *r**. "n.a." is not applicable.

staff's baseline path for the federal funds rate. In the current Tealbook projection, the staff assumes that the federal funds rate departs from the ELB in the quarter after the unemployment rate falls below its assumed longer-run natural rate of 4.3 percent.

- All but one of the simple policy rules considered in this section prescribe negative values for the federal funds rate through the second half of this year. The exception is the first-difference rule, which responds to the projected rebound, rather than the level, of resource utilization.

- Most of the near-term prescriptions are lower than those made using the April Tealbook projection, especially for the fourth quarter of this year, primarily because of the downward revision to the projected output gap in the near term.

- The Taylor (1993) rule calls for the federal funds rate to average about negative 1¾ percent in the third and fourth quarters of this year, reflecting both the negative output gap and core inflation being below 2 percent. The inertial Taylor (1999) rule, reacting more slowly to these developments, prescribes a decrease in the policy rate from negative ¾ percent in the third quarter to negative 1 percent in the fourth quarter.

- The FPLT rule calls for negative values of the federal funds rate over the second half of the year. These prescriptions reflect the high level of the unemployment rate relative to its natural rate as well as the rule's effort to eliminate a cumulative shortfall in the core PCE price index of around 4 percent compared with its target path since the end of 2011.

A Medium-Term Notion of the Equilibrium Real Federal Funds Rate

The bottom panel of the first exhibit reports estimates of a medium-term concept of the equilibrium real federal funds rate generated under the Tealbook baseline.[3] This

the staff's baseline estimates of the macroeconomic effects of the Federal Reserve's balance sheet policies and federal fiscal policies.

Because the FPLT rule responds to the gap between the unemployment rate and the natural rate of unemployment, this rule takes as given the Tealbook baseline projections of these variables instead of the projection of the output gap.

[3] Until the March 2020 Tealbook, this exhibit included statistics under a projection consistent with the median responses to the Summary of Economic Projections (SEP). Because FOMC participants have

concept, labeled "FRB/US *r**," corresponds to the level of the real federal funds rate that, if maintained over a 12-quarter period starting in the current quarter, would bring the output gap to zero in the final quarter of that period, according to the FRB/US model. This measure is a summary of the projected underlying strength of the real economy but does not take into account considerations such as achieving the inflation objective or avoiding sharp changes in the federal funds rate.

- At negative 69 basis points, the current value of the Tealbook-consistent FRB/US *r** is similar to its value in the April Tealbook, reflecting the largely unchanged output gap in the medium term. It remains over ½ percentage point above the average projected real federal funds rate in the Tealbook baseline, in which output returns to potential within eight quarters.

SIMPLE POLICY RULE SIMULATIONS

The second exhibit reports the Tealbook baseline projection and results obtained from dynamic simulations of the FRB/US model under the inertial Taylor (1999) rule, the Taylor (1993) rule, the first-difference rule, and the FPLT rule. These simulations reflect the endogenous responses of resource utilization and inflation to the different federal funds rate paths implied by the policy rules, subject to the ELB constraint. The simulations for each rule are carried out under the assumptions that policymakers commit to following that rule in the future and that financial market participants, price setters, and wage setters correctly anticipate that monetary policy will follow through on this commitment and are aware of the implications for interest rates and the economy.

- Under the Tealbook baseline, the federal funds rate remains at the ELB through 2023:Q1, when the unemployment rate falls below 4.3 percent. Thereafter, the policy rate follows the prescriptions of the conditional attenuated policy rule, approaching 2½ percent at the end of 2026.

- The inertial Taylor (1999) rule calls for the federal funds rate to increase in mid-2022, about one year sooner than under the Tealbook baseline and at a time when the unemployment rate is over 5 percent. This higher path for the federal funds rate results in a higher unemployment rate, a lower output gap,

not made SEP submissions since December 2019, it is not possible to generate comparable statistics for an SEP-consistent projection that includes the pandemic's economic effects.

lower inflation, and a higher real 10-year Treasury yield than in the Tealbook baseline projection.

- The Taylor (1993) rule calls for the federal funds rate to depart from the ELB in mid-2021, when the unemployment rate is around 8 percent. The initial rise in the federal funds rate is more rapid than under the inertial Taylor (1999) rule, primarily because the Taylor (1993) rule does not feature inertia. The unemployment rate path is higher, and the path for inflation is lower, than the corresponding paths in the Tealbook baseline projection.

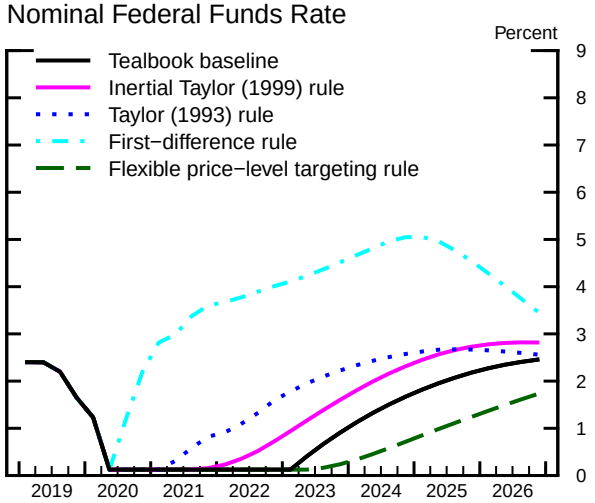
- The first-difference rule calls for a substantial increase in the federal funds rate in the near term. This rule ignores the current low level of resource utilization and instead reacts to the projected narrowing of the output gap as social-distancing measures are relaxed and household and business spending gradually return to normal levels. The federal funds rate continues to rise as the economy recovers, peaking at 5 percent in 2025. This relatively tight policy results in a prolonged period of high unemployment and low inflation.

- The FPLT rule responds to, and seeks to eliminate, the cumulative shortfall of the level of core PCE prices from a target path that is defined by the growth of that price level at an annual rate of 2 percent starting from the end of 2011. Eliminating the current shortfall of 4 percent requires inflation to run above 2 percent over the coming decade. The simulation embeds the assumptions that policymakers can credibly commit to closing this shortfall over time and that financial market participants, price setters, and wage setters correctly anticipate the ensuing long period of a low federal funds rate. Consequently, the path of the real 10-year Treasury rate slides to negative 1½ percent and remains below the corresponding Tealbook baseline path throughout the period shown.[4] The unemployment rate is lower under the FPLT rule than in the Tealbook baseline and all other simulations, leveling off below 3 percent in 2024. Inflation exceeds 2 percent by about 30 basis points, on average, from 2021 through the end of 2026.

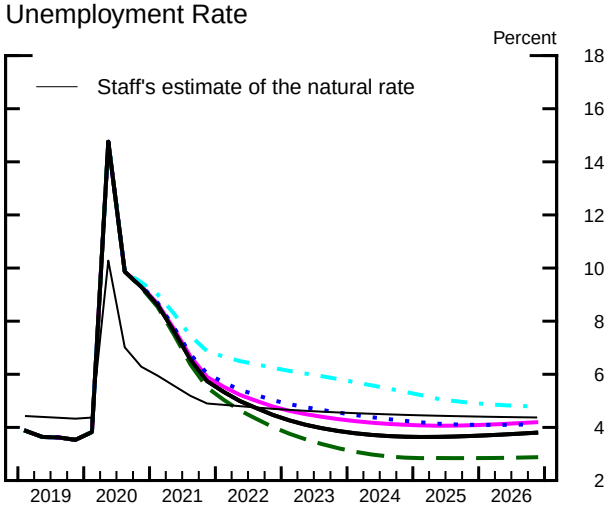
[4] Even though the real 10-year Treasury rate is sometimes negative in the period shown, the nominal 10-year Treasury rate remains positive and higher than the ELB imposed on short-term interest rates.

Simple Policy Rule Simulations

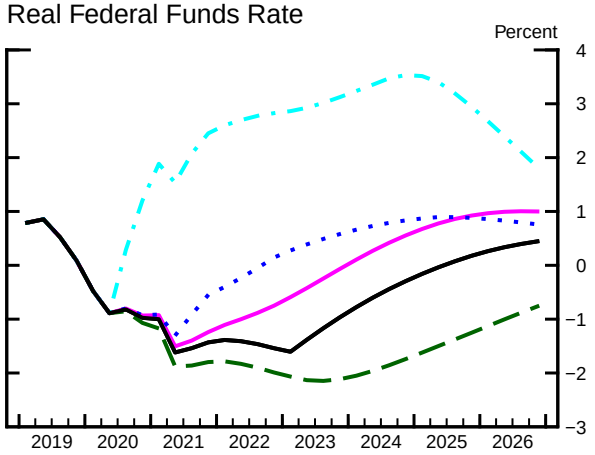
Nominal Federal Funds Rate



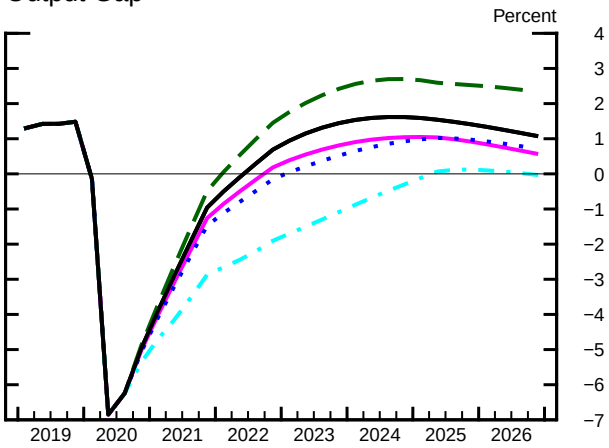
Unemployment Rate



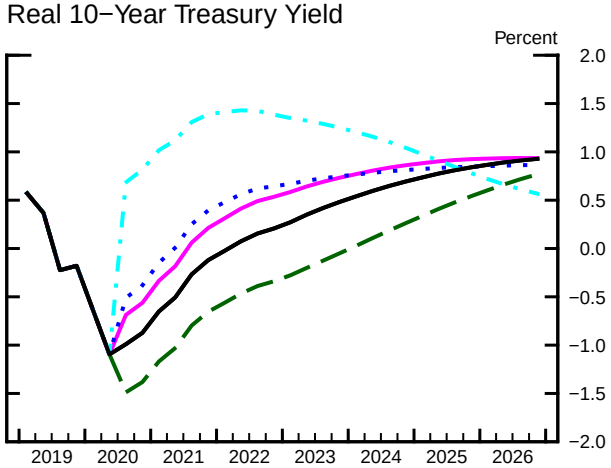
Real Federal Funds Rate



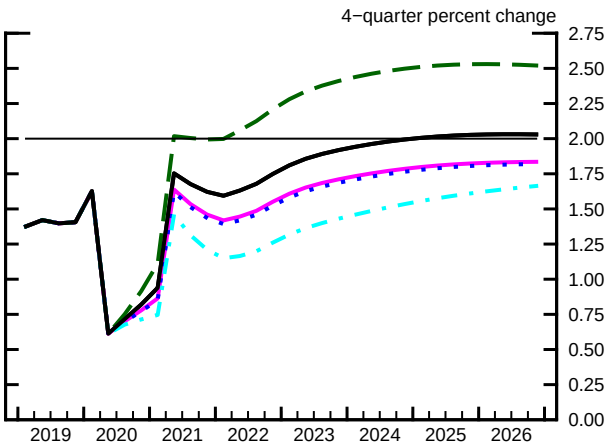
Output Gap



Real 10−Year Treasury Yield



PCE Inflation



Note: The policy rule simulations in this exhibit are based on rules that respond to core inflation rather than to headline inflation. This choice of rule specification was made in light of a tendency for current and near−term core inflation rates to outperform headline inflation rates as predictors of the medium−term behavior of headline inflation. All the rules with the exception of FPLT rule also respond to the output gap presented in the middle−right panel.

- Compared with the April Tealbook, the prescriptions of all but one simple policy rule are little changed beyond the first couple of years of the projection period. The exception is the first-difference rule, whose prescriptions are higher because of the more rapid projected narrowing of the output gap.

OPTIMAL CONTROL SIMULATIONS UNDER COMMITMENT

The third exhibit displays optimal control simulations conditional on the Tealbook baseline under two different assumptions about policymakers' preferences, as captured by alternative specifications of the loss function.[5] The concept of optimal control employed here is one in which current policymakers are able to commit future policymakers to their plans; such a commitment, when feasible, may lead to improved economic outcomes.[6]

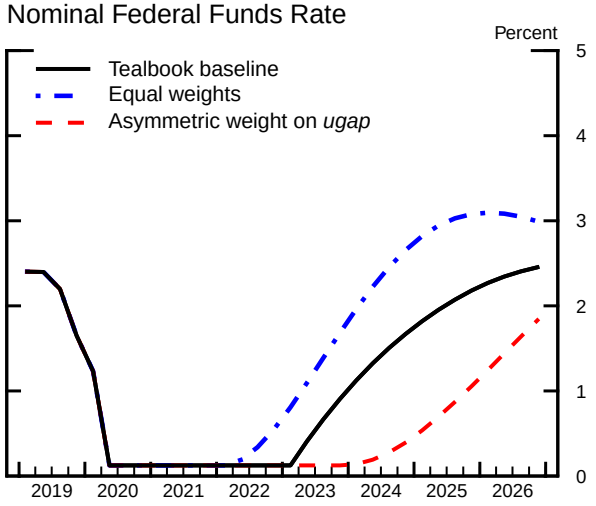
- The simulation labeled "Equal weights" presents the case in which policymakers are assumed to place equal weights on keeping headline PCE inflation close to the Committee's objective of 2 percent, on keeping the unemployment rate close to the staff's estimate of the natural rate of unemployment, and on keeping the federal funds rate close to its previous value. Under this strategy, the federal funds rate prescriptions are less accommodative than those in the baseline, with the federal funds rate departing from the ELB in mid-2022, almost a year earlier than in the baseline path. The equal-weights strategy seeks to counter both the high level of unemployment relative to its natural rate in the near term and the modest, but persistent, undershooting of the unemployment rate relative to the natural rate in the medium term in the Tealbook baseline. In the simulation, containing this undershooting over the medium term is the dominant consideration for policymakers because their ability to reduce the unemployment rate over the next couple of years is limited by the ELB constraint on the policy rate and by the sluggish response of economic activity to monetary policy in the FRB/US model. The more restrictive policy stance also helps undo the small but

[5] The box "Optimal Control and the Loss Function" in the Monetary Policy Strategies section of Tealbook B for June 2016 offers motivations for these specifications.

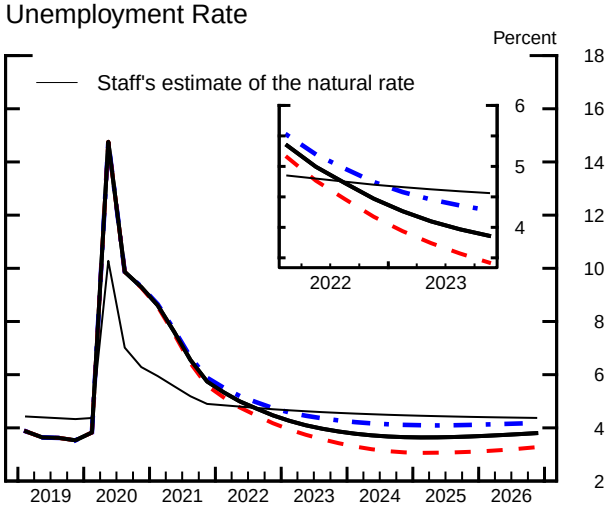
[6] Under the optimal control policies, policymakers achieve the displayed economic outcomes by making promises that bind future policymakers to take actions that may not be optimal from the perspective of those future policymakers (that is, the promises are time inconsistent). It is assumed that these promises are taken as credible by wage and price setters and by financial market participants.

Optimal Control Simulations under Commitment

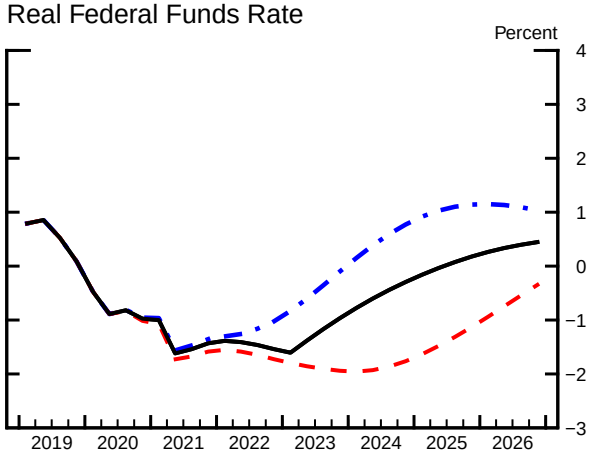
Nominal Federal Funds Rate



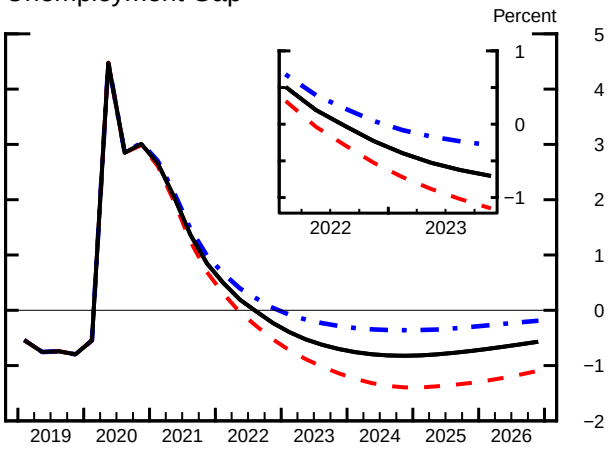
Unemployment Rate



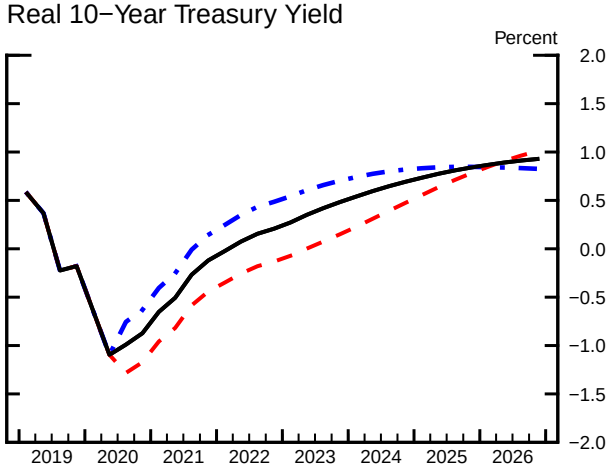
Real Federal Funds Rate



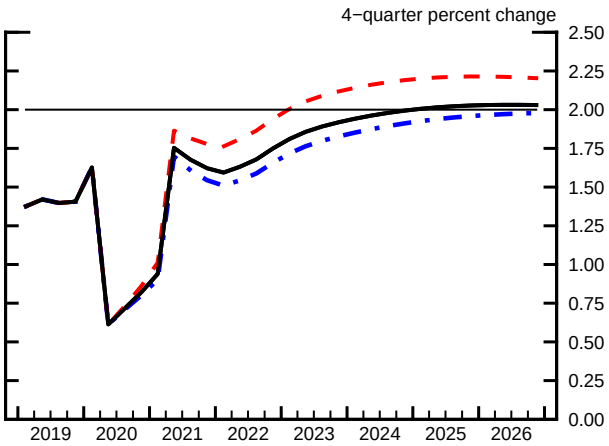
Unemployment Gap



Real 10−Year Treasury Yield



PCE Inflation



Note: Each set of lines corresponds to an optimal control policy under commitment in which policymakers minimize a discounted weighted sum of squared deviations of 4−quarter headline PCE inflation from the Committee's 2 percent objective, of squared deviations of the unemployment rate from the staff's estimate of the natural rate, and of squared changes in the federal funds rate. The weights vary across simulations. See the appendix for technical details and the box "Optimal Control and the Loss Function" in the June 2016 Tealbook B for a motivation.

persistent overshoot by inflation in the Tealbook baseline starting in 2025. Overall, this optimal control path for the federal funds rate leads to both a higher unemployment rate and a lower inflation rate than in the baseline.

- The simulation labeled "Asymmetric weight on *ugap*" uses a loss function that assigns no cost to deviations of the unemployment rate from the natural rate when the unemployment rate is below its natural value, but it is otherwise identical to the specification with equal weights. Under this strategy, policymakers' desire to hasten the labor market recovery and raise inflation to 2 percent does not have to be balanced against a preference to prevent the unemployment rate from eventually running below its natural rate. The federal funds rate remains at the ELB until mid-2024, about a year later than in the Tealbook baseline projection, at which point the unemployment rate runs more than 1 percentage point below its natural rate and inflation is about 2.2 percent. This more accommodative stance leads to a higher path of inflation and, eventually, a somewhat stronger labor market than in the Tealbook baseline.

- The federal funds rate prescriptions arising from both of these optimal control simulations are little changed from the corresponding prescriptions in the April Tealbook.

OPTIMAL CONTROL SIMULATIONS IN TWO ALTERNATIVE SCENARIOS

The economic outlook depends crucially on the course of the COVID-19 outbreak and the extent to which this outbreak inflicts lasting damage to the economy—factors about which there is considerable uncertainty. The next exhibit shows results of optimal control simulations under two alternative scenarios presented in the Risks and Uncertainty section of this Tealbook: the "Early Moderation" scenario and the "Second Waves" scenario.[7]

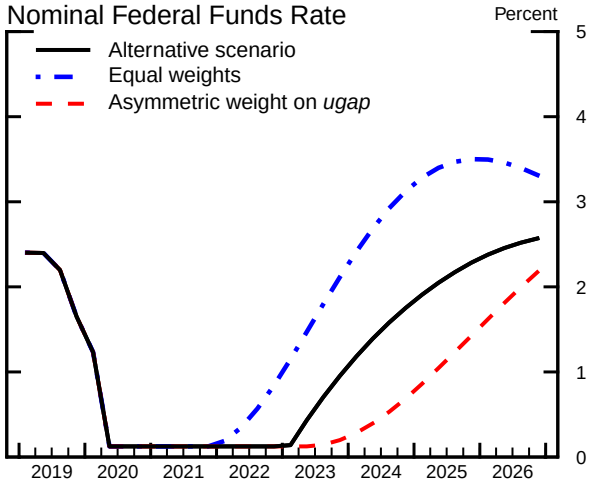
In the early moderation scenario, the economic recovery is faster than in the staff projection.

[7] See the Risks and Uncertainty section of this Tealbook for details concerning the construction of these alternative scenarios. As in the Tealbook baseline, these alternative scenarios embed the assumptions that the federal funds rate remains at the ELB until the unemployment rate falls below 4.3 percent and that it follows the conditional attenuated rule thereafter.

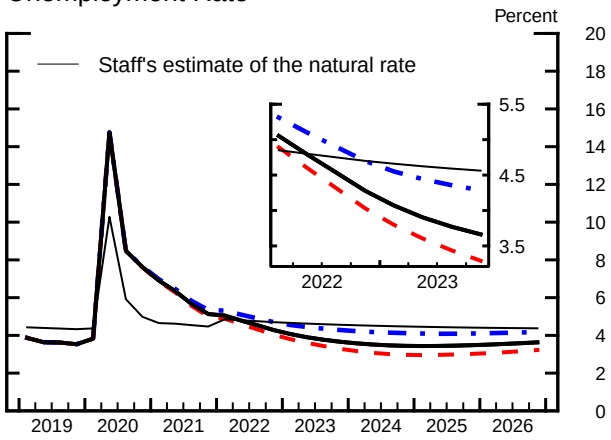
Optimal Control Simulations in Two Alternative Scenarios

Early Moderation Scenario

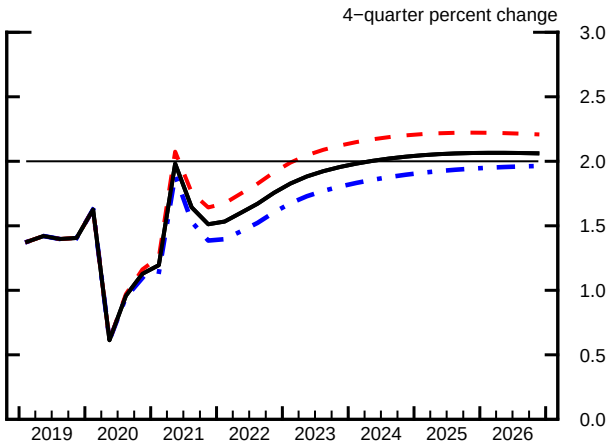
Nominal Federal Funds Rate



Unemployment Rate

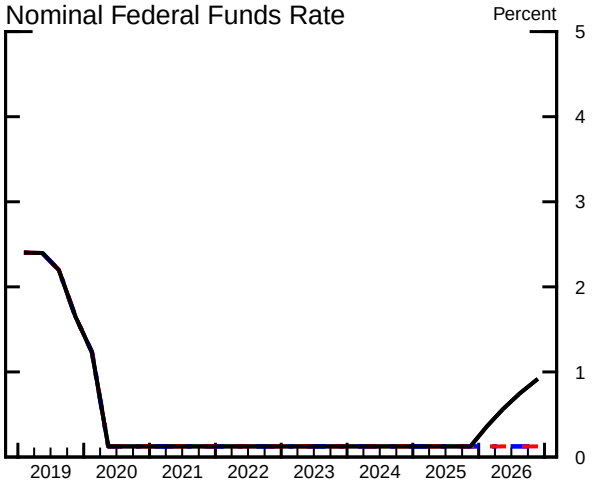


PCE Inflation

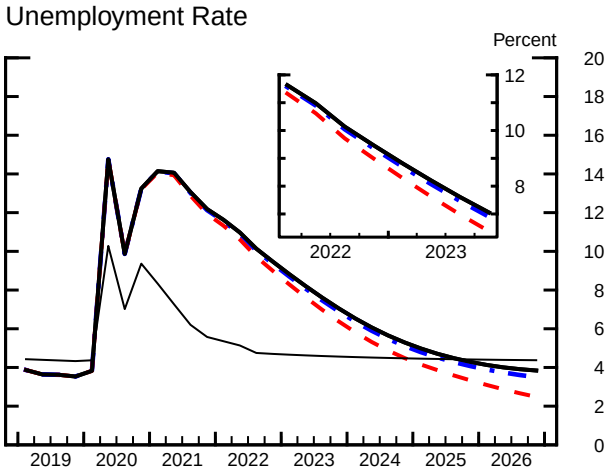


Second Waves Scenario

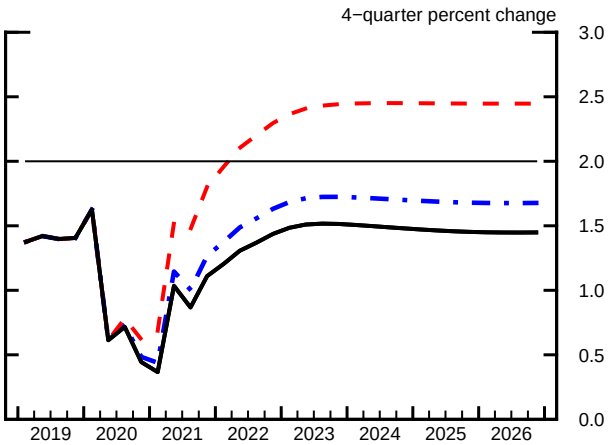
Nominal Federal Funds Rate



Unemployment Rate



PCE Inflation



- Under the equal-weights loss function, the federal funds rate departs from the ELB in mid-2022, about one year earlier than in the scenario itself. The policy aims to contain the persistent projected undershooting of the natural rate of unemployment from mid-2022 onward, leading to a slightly higher unemployment rate and lower inflation than in the scenario.

- Under the asymmetric-weight-on-*ugap* loss function, the federal funds rate remains at the ELB until the start of 2024, about one year later than in the scenario. The unemployment rate falls below 3 percent in 2024 and remains below the scenario's natural unemployment rate for the rest of the decade. Reflecting this period of tight resource utilization, the path of inflation is slightly higher than in the scenario itself, with inflation running a bit above 2 percent starting in 2023.

- The optimal policy rate paths under both loss functions in the early moderation scenario are similar to the corresponding paths associated with the Tealbook baseline. This similarity arises because the early moderation scenario primarily differs from the Tealbook baseline this year and next, a period when the policy rate is constrained at the ELB.

Under the second waves scenario—which the staff sees as being just as plausible as the Tealbook baseline—economic activity is depressed for a few more years.

- Under the equal-weights loss function, the federal funds rate remains at the ELB until the end of 2027, almost two years later than in the scenario. The unemployment rate falls below the natural rate in 2025 and remains there for a prolonged period. Due to the forward-looking nature of inflation in these simulations, the anticipation of this prolonged period of tight resource utilization boosts inflation somewhat, including in the initial years of the simulation. However, because of the low responsiveness of inflation to resource utilization in this model, policymakers find it undesirable to increase resource utilization further under an equal-weights loss function. As a result, inflation remains below 2 percent.

- Under the asymmetric-weights-on-*ugap* loss function, the federal funds rate remains at the ELB until 2030, generating a somewhat faster economic recovery. Fueled by the long period of policy accommodation, the

unemployment rate eventually falls to unprecedented lows, running below 2 percent for some years. The period of high resource utilization, which is not penalized under the asymmetric-weights-on-*ugap* loss function, is associated with a higher rate of inflation than in the scenario itself: Inflation increases to the 2 percent goal in 2022 and then runs near 2½ percent for the remainder of the decade.

- In these simulations, policymakers' ability to improve unemployment and inflation outcomes over those in the scenario hinge, in large part, on their assumed influence on inflation expectations and, thus, on the longer-term real interest rates that influence economic activity in the model.
    - The linkage in the FRB/US model between future resource utilization and current inflation is common to many economic models in which price and wage setters have model-consistent expectations that take into account developments forecast to occur in the far future. However, it is reasonable to question whether price and wage setters would heavily factor future developments into their current decisions, particularly in the present, highly unusual circumstances. The less they do so, the weaker the model's link between future resource utilization and current inflation.[8]
    - Furthermore, for the improvement in macroeconomic outcomes to be realized, agents in the model must believe that the central bank will follow through on its commitment to overheat the economy for a prolonged period.

ESTIMATES OF THE EQUILIBRIUM REAL FEDERAL FUNDS RATE IN THE LONGER RUN

The next exhibit updates selected estimates of the equilibrium real federal funds rate in the longer run, denoted r^{LR}. This concept is the rate consistent with the economy operating at its potential once the transitory effects of economic shocks have abated. This rate, along with the Committee's inflation objective, determines the longer-run level

[8] In a version of the model in which the expectations of wage and price setters are informed solely by the historical co-movement among data indicators (as captured by small-scale vector autoregressions), policymakers have essentially no influence on inflation in the near term in our simulations.

of the nominal federal funds rate and other interest rates in the staff's projection and economic models. In addition, r^{LR} is a parameter in many of the simple policy rules, including the staff's baseline policy rule, considered in this and other sections of Tealbook A.

- The top panel of the exhibit shows the range of historical values through 2020:Q1 from eight model-based time-series estimates of r^{LR}.[9] The values for 2020:Q1 range from minus ½ to 1¾ percent, with a mean of just below ½ percent. All eight models report declines in r^{LR} from their 2019:Q4 values, with the mean decrease being 26 basis points. This mean quarterly change is the largest observed since 2008.

- However, the estimates for 2020:Q1 primarily reflect pre-pandemic information. To give a sense of how these models will likely react to the forthcoming data, the middle panel shows projections of r^{LR} for a selection of models assuming that the economy contracts and rebounds as in the Tealbook projection in the coming quarters.

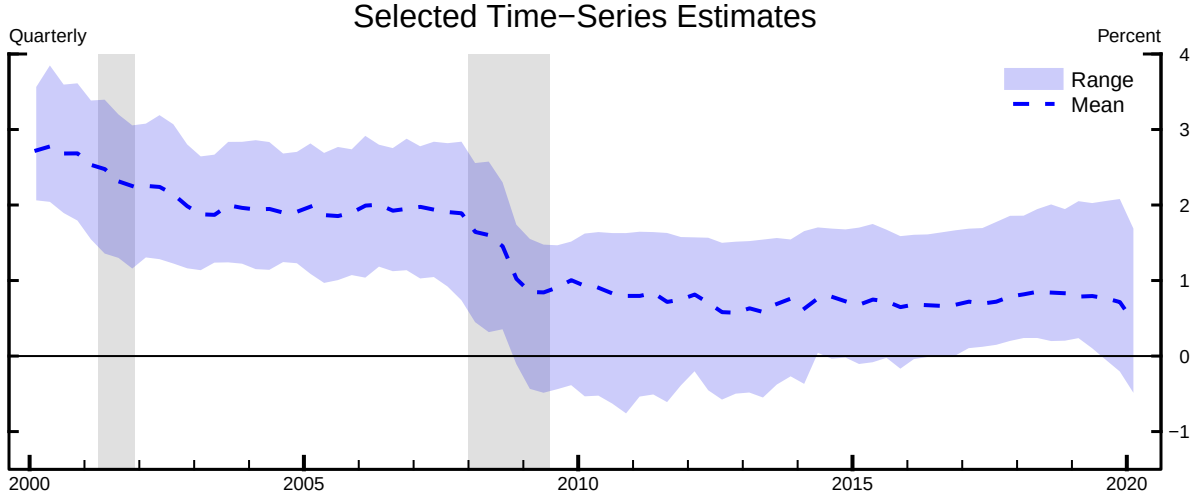
- Most models translate the projected near-term deterioration in the economic data as an indication that r^{LR} has declined, with some downward revisions being larger than 1 percentage point. However, these downward revisions are projected to reverse, to some degree, as soon as the economic recovery begins next quarter. These reversals show that if the staff view of a relatively strong bounceback in economic activity in the second half of the year comes to fruition, then the widespread declines in r^{LR} estimates shown here for 2020:Q2 will largely turn out to be short-lived.

- Time-series projections of r^{LR} and their associated uncertainty bands should be interpreted with particular caution because the magnitude, speed, and nature of the projected fall in economic activity is well outside the U.S. historical experience that informed the construction and estimation of these models. The uncertainty bands around the point estimates for these models have

[9] The top panel reports the range of "one sided" estimates—that is, the estimates for a particular date are conditioned only on data up to that date. Although the modeling approaches and econometric techniques differ across models, the studies have the common feature that they use time-series methods to infer r^{LR} on the basis of the co-movement of either macroeconomic series (like inflation, interest rates, and real GDP) or both macroeconomic and financial data (like TIPS yields). See the appendix to this section for sources and methodology.

Estimates of the Equilibrium Real Federal Funds Rate in the Longer Run

Selected Time−Series Estimates



Projections Conditional on the Tealbook Outlook

	Holston, Laubach, and Williams (2017)	Kiley (2015)	Johannsen and Mertens (2016)	Lewis and Vazquez−Grande (2019)
2020:Q1	0.93 [−1.35, 3.21]	0.49 [−0.42, 1.57]	0.32 [−0.60, 1.24]	1.78 [0.94, 2.57]
2020:Q2	−1.66 [−3.96, 0.63]	−1.42 [−4.33, 1.11]	0.50 [−0.46, 1.45]	−0.39 [−2.14, 0.78]
2020:Q3	−0.42 [−2.71, 1.87]	−0.86 [−3.24, 1.23]	0.46 [−0.45, 1.38]	0.50 [−0.74, 1.43]

Longer−Run Values from Selected Forecasters

	Release date	Percent
Tealbook baseline	May 2020	.50
Median SEP	Dec. 2019	.50
Median Survey of Primary Dealers	Apr. 2020	.19
Blue Chip consensus	Mar. 2020	.10
Congressional Budget Office	Jan. 2020	.65

Note: The latest time−series estimates in the top panel are from 2020:Q1. The shaded vertical areas in the top panel are NBER recessions. The numbers in brackets in the middle panel denote 68 percent confidence bands. See the appendix for the sources of the values reported in the bottom panel.

always been wide, but, with unprecedented changes projected over this and the next quarter, the intervals shown in the middle panel portray even greater uncertainty than in previous Tealbooks. As well as the uncertainty that exists within each model about the prevailing state of the economy and the model's parameter estimates, many sources of uncertainty, such as the choice of econometric approach and the possibility that historical economic relationships are not applicable to the current context, are not captured by the models' uncertainty bands.

- The lower panel of the exhibit reports longer-term estimates of the real federal funds rate from selected sources. The median in the April Survey of Primary Dealers stands at 19 basis points, a decline of 21 basis points since January. The Tealbook baseline assumption, at 50 basis points, is 31 basis points higher than this median. The other three estimates were released before the severity of the COVID-19 outbreak was widely understood.

The final four exhibits tabulate the simulation results under the Tealbook baseline for key variables under the policy rules shown in the exhibit "Simple Policy Rule Simulations" and the optimal control simulations shown in the exhibit "Optimal Control Simulations under Commitment."

Outcomes of Simple Policy Rule Simulations

(Percent change, annual rate, from end of preceding period, except as noted)

Outcome and strategy	2020	2021	2022	2023	2024	2025	2026
Nominal federal funds rate[1]							
Inertial Taylor (1999)	.1	.2	.7	1.6	2.3	2.7	2.8
Taylor (1993)	.1	.8	1.6	2.2	2.6	2.7	2.6
First-difference	2.2	3.6	4.0	4.5	5.0	4.5	3.5
Flexible price-level targeting	.1	.1	.1	.2	.7	1.2	1.7
Extended Tealbook baseline	.1	.1	.1	.9	1.7	2.2	2.5
Real GDP							
Inertial Taylor (1999)	-7.2	6.4	3.4	2.3	1.8	1.5	1.3
Taylor (1993)	-7.2	6.2	3.2	2.3	2.0	1.7	1.4
First-difference	-7.5	4.9	2.7	2.3	2.3	2.0	1.5
Flexible price-level targeting	-7.0	7.1	4.0	2.7	2.1	1.6	1.6
Extended Tealbook baseline	-7.1	6.7	3.6	2.4	1.8	1.5	1.4
Unemployment rate[1]							
Inertial Taylor (1999)	9.3	5.9	4.8	4.3	4.1	4.1	4.2
Taylor (1993)	9.3	6.0	5.0	4.6	4.2	4.1	4.1
First-difference	9.5	6.9	6.2	5.8	5.3	4.9	4.8
Flexible price-level targeting	9.3	5.5	4.0	3.2	2.9	2.8	2.9
Extended Tealbook baseline	9.3	5.7	4.5	3.9	3.6	3.7	3.8
Total PCE prices							
Inertial Taylor (1999)	.8	1.5	1.6	1.7	1.8	1.8	1.8
Taylor (1993)	.8	1.4	1.5	1.7	1.8	1.8	1.8
First-difference	.7	1.2	1.3	1.4	1.5	1.6	1.7
Flexible price-level targeting	.9	2.0	2.2	2.4	2.5	2.5	2.5
Extended Tealbook baseline	.8	1.6	1.7	1.9	2.0	2.0	2.0
Core PCE prices							
Inertial Taylor (1999)	1.1	1.4	1.5	1.7	1.8	1.8	1.8
Taylor (1993)	1.1	1.4	1.5	1.7	1.8	1.8	1.8
First-difference	1.0	1.2	1.2	1.4	1.5	1.6	1.7
Flexible price-level targeting	1.2	1.9	2.1	2.4	2.5	2.5	2.5
Extended Tealbook baseline	1.1	1.6	1.7	1.9	2.0	2.0	2.0

1. Percent, average for the final quarter of the period.

Outcomes of Simple Policy Rule Simulations, Quarterly

(4-quarter percent change, except as noted)

Outcome and strategy	2020				2021			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Nominal federal funds rate[1]								
Inertial Taylor (1999)	1.2	.1	.1	.1	.1	.1	.1	.2
Taylor (1993)	1.2	.1	.1	.1	.1	.3	.6	.8
First-difference	1.2	.1	1.2	2.2	2.8	3.0	3.4	3.6
Flexible price-level targeting	1.2	.1	.1	.1	.1	.1	.1	.1
Extended Tealbook baseline	1.2	.1	.1	.1	.1	.1	.1	.1
Real GDP								
Inertial Taylor (1999)	.3	-12.6	-8.2	-7.2	-4.4	10.7	6.5	6.4
Taylor (1993)	.3	-12.6	-8.2	-7.2	-4.5	10.6	6.3	6.2
First-difference	.3	-12.6	-8.2	-7.5	-5.1	9.5	5.0	4.9
Flexible price-level targeting	.3	-12.6	-8.2	-7.0	-4.1	11.3	7.2	7.1
Extended Tealbook baseline	.3	-12.6	-8.2	-7.1	-4.3	10.9	6.8	6.7
Unemployment rate[1]								
Inertial Taylor (1999)	3.8	14.8	9.9	9.3	8.7	7.7	6.7	5.9
Taylor (1993)	3.8	14.8	9.9	9.3	8.7	7.8	6.8	6.0
First-difference	3.8	14.8	9.9	9.5	9.0	8.3	7.4	6.9
Flexible price-level targeting	3.8	14.8	9.9	9.3	8.5	7.5	6.4	5.5
Extended Tealbook baseline	3.8	14.8	9.9	9.3	8.6	7.6	6.6	5.7
Total PCE prices								
Inertial Taylor (1999)	1.6	.6	.7	.8	.9	1.6	1.5	1.5
Taylor (1993)	1.6	.6	.7	.8	.9	1.6	1.5	1.4
First-difference	1.6	.6	.7	.7	.7	1.5	1.3	1.2
Flexible price-level targeting	1.6	.6	.8	.9	1.1	2.0	2.0	2.0
Extended Tealbook baseline	1.6	.6	.7	.8	.9	1.8	1.7	1.6
Core PCE prices								
Inertial Taylor (1999)	1.7	1.0	.9	1.1	1.1	1.6	1.5	1.4
Taylor (1993)	1.7	1.0	.9	1.1	1.0	1.6	1.5	1.4
First-difference	1.7	1.0	.9	1.0	.9	1.5	1.3	1.2
Flexible price-level targeting	1.7	1.0	1.0	1.2	1.3	2.0	2.0	1.9
Extended Tealbook baseline	1.7	1.0	.9	1.1	1.1	1.8	1.7	1.6

1. Percent, average for the quarter.

Outcomes of Optimal Control Simulations under Commitment

(Percent change, annual rate, from end of preceding period, except as noted)

Outcome and strategy	2020	2021	2022	2023	2024	2025	2026
Nominal federal funds rate[1]							
Equal weights	.1	.1	.6	1.7	2.7	3.1	3.0
Asymmetric weight on *ugap*	.1	.1	.1	.1	.4	1.1	1.8
Extended Tealbook baseline	.1	.1	.1	.9	1.7	2.2	2.5
Real GDP							
Equal weights	-7.2	6.4	3.4	2.2	1.8	1.5	1.4
Asymmetric weight on *ugap*	-7.0	6.9	3.8	2.7	2.0	1.5	1.3
Extended Tealbook baseline	-7.1	6.7	3.6	2.4	1.8	1.5	1.4
Unemployment rate[1]							
Equal weights	9.3	5.9	4.7	4.3	4.1	4.1	4.2
Asymmetric weight on *ugap*	9.3	5.6	4.2	3.4	3.1	3.1	3.3
Extended Tealbook baseline	9.3	5.7	4.5	3.9	3.6	3.7	3.8
Total PCE prices							
Equal weights	.8	1.5	1.7	1.8	1.9	2.0	2.0
Asymmetric weight on *ugap*	.9	1.8	1.9	2.1	2.2	2.2	2.2
Extended Tealbook baseline	.8	1.6	1.7	1.9	2.0	2.0	2.0
Core PCE prices							
Equal weights	1.1	1.5	1.6	1.8	1.9	2.0	2.0
Asymmetric weight on *ugap*	1.1	1.7	1.9	2.1	2.2	2.2	2.2
Extended Tealbook baseline	1.1	1.6	1.7	1.9	2.0	2.0	2.0

1. Percent, average for the final quarter of the period.

Outcomes of Optimal Control Simulations under Commitment, Quarterly

(4-quarter percent change, except as noted)

Outcome and strategy	2020				2021			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Nominal federal funds rate[1]								
Equal weights	1.2	.1	.1	.1	.1	.1	.1	.1
Asymmetric weight on *ugap*	1.2	.1	.1	.1	.1	.1	.1	.1
Extended Tealbook baseline	1.2	.1	.1	.1	.1	.1	.1	.1
Real GDP								
Equal weights	.3	-12.6	-8.2	-7.2	-4.4	10.8	6.5	6.4
Asymmetric weight on *ugap*	.3	-12.6	-8.2	-7.0	-4.2	11.2	7.1	6.9
Extended Tealbook baseline	.3	-12.6	-8.2	-7.1	-4.3	10.9	6.8	6.7
Unemployment rate[1]								
Equal weights	3.8	14.8	9.9	9.3	8.7	7.7	6.7	5.9
Asymmetric weight on *ugap*	3.8	14.8	9.9	9.3	8.6	7.5	6.4	5.6
Extended Tealbook baseline	3.8	14.8	9.9	9.3	8.6	7.6	6.6	5.7
Total PCE prices								
Equal weights	1.6	.6	.7	.8	.9	1.7	1.6	1.5
Asymmetric weight on *ugap*	1.6	.6	.7	.9	1.0	1.9	1.8	1.8
Extended Tealbook baseline	1.6	.6	.7	.8	.9	1.8	1.7	1.6
Core PCE prices								
Equal weights	1.7	1.0	.9	1.1	1.1	1.7	1.6	1.5
Asymmetric weight on *ugap*	1.7	1.0	1.0	1.1	1.2	1.9	1.8	1.7
Extended Tealbook baseline	1.7	1.0	.9	1.1	1.1	1.8	1.7	1.6

1. Percent, average for the quarter.

Appendix

Implementation of the Simple Rules and Optimal Control Simulations

The monetary policy strategies considered in this section of Tealbook A typically fall into one of two categories. Under simple policy rules, policymakers set the federal funds rate according to a reaction function that includes a small number of macroeconomic factors. Under optimal control policies, policymakers compute a path for the federal funds rate that minimizes a loss function meant to capture policymakers' preferences over macroeconomic outcomes. Both approaches recognize the Federal Reserve's dual mandate. Unless otherwise noted, the simulations embed the assumption that policymakers will adhere to the policy strategy in the future and that financial market participants, price setters, and wage setters not only believe that policymakers will follow through with their strategy, but also fully understand the macroeconomic implications of policymakers doing so. Such policy strategies are described as commitment strategies.

The two approaches have different merits and limitations. The parsimony of simple rules makes them relatively easy to communicate to the public, and, because they respond only to variables that are central to a range of models, proponents argue that they may be more robust to uncertainty about the structure of the economy. However, simple rules omit, by construction, other potential influences on policy decisions; thus, strict adherence to such rules may, at times, lead to unsatisfactory outcomes. By comparison, optimal control policies respond to a broader set of economic factors; their prescriptions optimally balance various policy objectives. And, although this section focuses on policies under commitment, optimal control policies can more generally be derived under various assumptions about the degree to which policymakers can commit. That said, optimal control policies assume substantial knowledge on the part of policymakers and are sensitive to the assumed loss function and the specifics of the particular model.

Given the different strengths and weaknesses of the two approaches, they are probably best considered together as a means to assess the various tradeoffs policymakers may face when pursuing their mandated objectives.

POLICY RULES USED IN THE MONETARY POLICY STRATEGIES SECTION

The table "Simple Rules" that follows gives expressions for four simple policy rules reported in the first two exhibits of the Monetary Policy Strategies section. It also reports the expression for the conditional attenuated rule that the staff uses in the construction of the Tealbook baseline projection.[1] R_t denotes the nominal federal funds rate prescribed by a strategy for quarter *t*. The right-hand-side variables of the first four rules include the staff's projection of trailing four-quarter core PCE price inflation for the current quarter and three quarters ahead (π_t

[1] In the staff's construction of the baseline projection, the federal funds rate remains at the effective lower bound until the unemployment rate falls below 4.3 percent. Thereafter, the policy rate follows the prescriptions of the conditional attenuated policy rule.

and $\pi_{t+3|t}$), the output gap estimate for the current period ($ygap_t$), and the forecast of the three-quarter-ahead annual change in the output gap ($ygap_{t+3|t} - ygap_{t-1}$). The value of policymakers' longer-run inflation objective, denoted π^{LR}, is 2 percent. In the case of the flexible price-level targeting rule, the right-hand-side variables include an unemployment rate gap and a price-level gap. The unemployment gap is defined as the difference between the unemployment rate, u_t, and the staff's estimate of its natural rate, u_t^*, which currently stands at 4.3 percent. The price gap is defined as 100 times the difference between the log of the core PCE price level, p_t, and the log of the target price-level path, p_t^*. The 2011:Q4 value of p_t^* is set to the 2011:Q4 value of the core PCE price index, and, subsequently, p_t^* is assumed to grow at a 2 percent annual rate.

Simple Rules

Taylor (1993) rule	$R_t = r^{LR} + \pi_t + 0.5(\pi_t - \pi^{LR}) + 0.5ygap_t$
Inertial Taylor (1999) rule	$R_t = 0.85R_{t-1} + 0.15(r^{LR} + \pi_t + 0.5(\pi_t - \pi^{LR}) + ygap_t)$
Conditional attenuated rule	$R_t = 0.85R_{t-1} + 0.15(r_t^* + \pi_t + 0.5(\pi_t - \pi^{LR}) + 0.2ygap_t)$
First-difference rule	$R_t = R_{t-1} + 0.5(\pi_{t+3\|t} - \pi^{LR}) + 0.5\Delta^4 ygap_{t+3\|t}$
Flexible price-level targeting rule	$R_t = 0.85R_{t-1} + 0.15(r^{LR} + \pi_t + (p_t - p_t^*) - (u_t - u_t^*))$

The first rule in the table was studied by Taylor (1993). The inertial Taylor (1999) rule features more inertia and a stronger response to resource slack over time compared with the Taylor (1993) rule. The inertial Taylor (1999) rule and rules that depend on a price gap, like the FPLT rule, have been featured prominently in analysis by Board staff.[2] The conditional attenuated rule has the same form as the inertial Taylor (1999) rule but responds less strongly to the output gap. The intercepts of the Taylor (1993), inertial Taylor (1999) and FPLT rules, denoted r^{LR}, are constant and chosen so that they are consistent with a 2 percent longer-run inflation objective and an equilibrium real federal funds rate in the longer run of 0.5 percent. The intercept of the conditional attenuated rule, denoted r_t^*, is zero over the next few years and then rises to 0.5 percent over time. The prescriptions of the first-difference rule do not depend on the level of the output gap or the longer-run real interest rate; see Orphanides (2003).

NEAR-TERM PRESCRIPTIONS OF SELECTED POLICY RULES

The "Near-Term Prescriptions of Selected Policy Rules" reported in the first exhibit are calculated taking as given the Tealbook projections for inflation and the output and unemployment gaps. When the Tealbook is published early in a quarter, the prescriptions are shown for the current and next quarters. When the Tealbook is published late in a quarter, the prescriptions are shown for the next two quarters. In both cases, rules that include a lagged policy rate as a right-hand-side variable use the midpoint of the current target range of the federal

[2] For applications, see, for example, Erceg and others (2012). An FPLT rule similar to the one above is also analyzed by Chung and others (2015).

funds rate as that value in the first quarter shown and then condition on their simulated lagged federal funds rate for the second quarter shown.

A Medium-Term Notion of the Equilibrium Real Federal Funds Rate

The bottom panel of the exhibit "Policy Rules and the Staff Projection" provides estimates of one notion of the equilibrium real federal funds rate that uses alternative baselines: the Tealbook baseline and another one consistent with median responses to the latest Summary of Economic Projections (SEP).[3] The simulations are conducted using the FRB/US model, the staff's large-scale econometric model of the U.S. economy. "FRB/US *r**" is the real federal funds rate that, if maintained over a 12-quarter period (beginning in the current quarter), makes the output gap equal to zero in the final quarter of that period, given either the Tealbook or the SEP-consistent economic projection. This measure depends on a broad array of economic factors, some of which take the form of projected values of the model's exogenous variables.[4] The measure is derived under the assumption that agents in the model form VAR-based expectations—that is, agents use small-scale statistical models so that their expectations of future variables are determined solely by historical relationships.

The "Average projected real federal funds rate" for the Tealbook baseline and the SEP-consistent baseline reported in the panel are the corresponding averages of the real federal funds rate under the Tealbook baseline projection and SEP-consistent projection, respectively, calculated over the same 12-quarter period as the Tealbook-consistent and SEP-consistent FRB/US *r**. For a given economic projection, the average projected real federal funds rates and the FRB/US *r** may be associated with somewhat different macroeconomic outcomes even when their values are identical. The reason is that, in the FRB/US *r** simulation, the real federal funds rate is held constant over the entire 12-quarter period, whereas, in the economic projection, the real federal funds rate can vary over time.

FRB/US Model Simulations

The results presented in the exhibits "Simple Policy Rule Simulations" and "Optimal Control Simulations under Commitment" are derived from dynamic simulations of the FRB/US model. Each simulated policy strategy is assumed to be in force over the whole period covered by the simulation; this period extends several decades beyond the time horizon shown in the exhibits. The simulations are conducted under the assumption that market participants as well as price and wage setters form model-consistent expectations and are predicated on the staff's extended Tealbook projection, which includes the macroeconomic effects of the Committee's large-scale asset purchase programs. When the Tealbook is published early in a quarter, all of the simulations begin in that quarter; when the Tealbook is published late in a quarter, all of the simulations begin in the subsequent quarter.

[3] The statistics associated with the SEP are unavailable in the current Tealbook because the FOMC has not conducted an SEP since December 2019.

[4] For a discussion of the equilibrium real federal funds rates in the longer run and other concepts of equilibrium interest rates, see Gust and others (2016).

COMPUTATION OF OPTIMAL CONTROL POLICIES UNDER COMMITMENT

The optimal control simulations posit that policymakers choose a path for the federal funds rate to minimize a discounted weighted sum of squared inflation gaps (measured as the difference between four-quarter headline PCE price inflation, π_t^{PCE}, and the Committee's 2 percent objective), squared unemployment gaps ($ugap_t$, measured as the difference between the unemployment rate and the staff's estimate of the natural rate), and squared changes in the federal funds rate R_t. In the following equation, the resulting loss function embeds the assumption that policymakers discount the future using a quarterly discount factor, $\beta = 0.9963$:

$$\boldsymbol{L_t} = \sum_{\boldsymbol{\tau=0}}^{T} \boldsymbol{\beta^{\tau}} \left\{ \lambda_{\pi} \left(\pi_{t+\tau}^{PCE} - \pi^{LR}\right)^{\mathbf{2}} + \lambda_{u,t+\tau} (ugap_{t+\tau})^{\mathbf{2}} + \lambda_R (R_{t+\boldsymbol{\tau}} - R_{t+\boldsymbol{\tau-1}})^{\mathbf{2}} \right\}.$$

The exhibit "Optimal Control Simulations under Commitment" considers two specifications of the weights on the inflation gap, the unemployment gap, and the rate change components of the loss function. The box "Optimal Control and the Loss Function" in the Monetary Policy Strategies section of the June 2016 Tealbook B provides motivations for the specifications of the loss function. The table "Loss Functions" shows the weights used in the two specifications.

Loss Functions

	λ_{π}	$\lambda_{u,t+\tau}$		λ_R
		$ugap_{t+\tau} < 0$	$ugap_{t+\tau} \geq 0$	
Equal weights	1	1	1	1
Asymmetric weight on *ugap*	1	0	1	1

The first specification, "Equal weights," assigns equal weights to all three components at all times. The second specification, "Asymmetric weight on *ugap,*" uses the same weights as the equal-weights specification whenever the unemployment rate is above the staff's estimate of the natural rate, but it assigns no penalty to the unemployment rate falling below the natural rate. The optimal control policy and associated outcomes depend on the relative (rather than the absolute) values of the weights.

For each of these specifications of the loss function, the optimal control policy is subject to the effective lower bound constraint on nominal interest rates. Policy tools other than the federal funds rate are taken as given and subsumed within the Tealbook baseline. The path chosen by policymakers today is assumed to be credible, meaning that the public sees this path as a binding commitment on policymakers' future decisions; the optimal control policy takes as given the initial lagged value of the federal funds rate but is otherwise unconstrained by policy decisions made before the simulation period.

ESTIMATES OF THE EQUILIBRIUM REAL FEDERAL FUNDS RATE IN THE LONGER RUN

The top panel of the exhibit "Estimates of the Equilibrium Real Federal Funds Rate in the Longer Run" shows a range of estimates of r^{LR} from eight time-series models based on the following studies: Christensen and Rudebusch (2019); Del Negro, Giannone, Giannoni, and Tambalotti (2017); Holston, Laubach, and Williams (2017); Johannsen and Mertens (2016); Kiley (2015); Laubach and Williams (2003); Lewis and Vazquez-Grande (2019); and Lubik and Matthes (2015). For comparability, all computations use the latest vintage of historical data through the quarter preceding this Tealbook. Moreover, the estimates are one sided in the sense that, at each point, they make use of historical data only up to that point in time. As a result, their historical movements can differ from the two-sided estimates reported in some of those studies.

The middle panel reports, for a selection of models, the point estimates and associated 68 percent uncertainty bands for 2020:Q1, 2020:Q2, and 2020:Q3, where the historical time series have been extended by two quarters using the Tealbook forecast. The computation and interpretation of these bands are specific to each study.[5]

The bottom panel shows r^{LR} values from selected forecasters. These values were obtained as follows:

- "Tealbook baseline" is the staff's assumption about the level of the equilibrium real federal funds rate in the longer run.
- "Median SEP" is the median of FOMC participants' projections of the federal funds rate in the longer run minus the corresponding projection of PCE inflation.
- "Median Survey of Primary Dealers" equals the long-run median dealer forecast for the target rate minus the longer-run median dealer forecast of PCE inflation.
- "Blue Chip consensus" equals the five-year-forward, five-year average consensus forecast for the three-month Treasury bill rate minus the corresponding average forecast for the annual change in the GDP chained price index. The horizon covers the five-year period that begins with the first quarter of the seventh year after the survey year.
- "Congressional Budget Office" equals the projected federal funds rate minus the projected annualized quarterly change in the core PCE index, for the last quarter of the tenth year after the release year.

[5] For consistency, the pre-2020:Q2 data used in these projection exercises correspond to the historical data in the Tealbook baseline. The ranges in the table represent both parameter and state uncertainty. For the Holston, Laubach, and Williams (2017) model, the state uncertainty is computed using the smoothed estimates; for all other models, the state uncertainty is computed using the filtered estimates.

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Changes in GDP, Prices, and Unemployment
(Percent, annual rate except as noted)

	Nominal GDP		Real GDP		PCE price index		Core PCE price index		Unemployment rate[1]	
Interval	04/17/20	05/29/20	04/17/20	05/29/20	04/17/20	05/29/20	04/17/20	05/29/20	04/17/20	05/29/20
Quarterly										
2019:Q1	3.9	3.9	3.1	3.1	.4	.4	1.1	1.1	3.9	3.9
Q2	4.7	4.7	2.0	2.0	2.4	2.4	1.9	1.9	3.6	3.6
Q3	3.8	3.8	2.1	2.1	1.5	1.5	2.1	2.1	3.6	3.6
Q4	3.5	3.5	2.1	2.1	1.4	1.4	1.3	1.3	3.5	3.5
2020:Q1	-4.6	-3.9	-5.9	-5.0	1.3	1.3	1.7	1.6	3.8	3.8
Q2	-37.2	-41.5	-37.4	-41.0	-2.5	-1.6	.0	-.9	16.0	14.8
Q3	31.1	25.8	28.9	24.1	2.2	1.9	1.9	1.8	11.1	9.9
Q4	12.2	8.9	10.4	7.0	1.9	1.8	1.9	1.9	7.9	9.3
2021:Q1	7.7	8.7	6.1	6.9	1.8	1.7	1.7	1.8	6.8	8.6
Q2	6.5	8.5	4.7	6.7	1.6	1.6	1.5	1.5	6.2	7.6
Q3	5.6	8.3	3.8	6.6	1.7	1.6	1.5	1.5	5.8	6.6
Q4	4.9	8.2	3.2	6.5	1.7	1.6	1.6	1.5	5.4	5.7
Two-quarter[2]										
2019:Q2	4.3	4.3	2.6	2.6	1.4	1.4	1.5	1.5	-.2	-.2
Q4	3.7	3.7	2.1	2.1	1.4	1.4	1.7	1.7	-.1	-.1
2020:Q2	-22.6	-25.0	-23.3	-25.1	-.6	-.2	.9	.3	12.5	11.3
Q4	21.2	17.1	19.3	15.3	2.0	1.8	1.9	1.9	-8.1	-5.5
2021:Q2	7.1	8.6	5.4	6.8	1.7	1.7	1.6	1.6	-1.7	-1.7
Q4	5.2	8.3	3.5	6.5	1.7	1.6	1.5	1.5	-.8	-1.9
Four-quarter[3]										
2018:Q4	4.9	4.9	2.5	2.5	1.9	1.9	1.9	1.9	-.3	-.3
2019:Q4	4.0	4.0	2.3	2.3	1.4	1.4	1.6	1.6	-.3	-.3
2020:Q4	-3.2	-6.3	-4.3	-7.1	.7	.8	1.4	1.1	4.4	5.8
2021:Q4	6.2	8.4	4.4	6.7	1.7	1.6	1.6	1.6	-2.5	-3.6
2022:Q4	4.7	5.5	2.8	3.6	1.8	1.7	1.7	1.7	-.7	-1.2
Annual										
2018	5.4	5.4	2.9	2.9	2.1	2.1	1.9	1.9	3.9	3.9
2019	4.1	4.1	2.3	2.3	1.4	1.4	1.6	1.6	3.7	3.7
2020	-4.2	-6.0	-5.5	-6.9	.8	.9	1.4	1.2	9.7	9.4
2021	6.8	6.3	5.1	4.8	1.5	1.5	1.6	1.5	6.0	7.1
2022	5.0	6.5	3.2	4.7	1.7	1.7	1.6	1.6	4.9	4.9

1. Level, except for two-quarter and four-quarter intervals.
2. Percent change from two quarters earlier; for unemployment rate, change is in percentage points.
3. Percent change from four quarters earlier; for unemployment rate, change is in percentage points.

Changes in Real Gross Domestic Product and Related Items
(Percent, annual rate except as noted)

Item	2019 Q2	2019 Q3	2019 Q4	2020 Q1	2020 Q2	2020 Q3	2020 Q4	2021 Q1	2021 Q2	2021 Q3	2021 Q4	2019[1]	2020[1]	2021[1]	2022[1]
Real GDP	2.0	2.1	2.1	-5.0	-41.0	24.1	7.0	6.9	6.7	6.6	6.5	2.3	-7.1	6.7	3.6
Previous Tealbook	*2.0*	*2.1*	*2.1*	*-5.9*	*-37.4*	*28.9*	*10.4*	*6.1*	*4.7*	*3.8*	*3.2*	*2.3*	*-4.3*	*4.4*	*2.8*
Final sales	3.0	2.1	3.1	-3.6	-37.7	25.3	5.5	6.0	5.4	5.0	4.6	2.7	-5.6	5.2	2.6
Previous Tealbook	*3.0*	*2.1*	*3.1*	*-3.9*	*-34.7*	*28.0*	*10.0*	*5.4*	*4.4*	*3.2*	*2.9*	*2.7*	*-3.0*	*4.0*	*1.9*
Priv. dom. final purch.	3.3	2.3	1.3	-5.9	-45.3	31.1	6.7	7.5	7.4	6.9	6.7	2.1	-7.9	7.1	3.8
Previous Tealbook	*3.3*	*2.3*	*1.3*	*-4.5*	*-44.9*	*36.0*	*13.4*	*6.8*	*5.8*	*4.9*	*4.2*	*2.1*	*-5.1*	*5.4*	*3.0*
Personal cons. expend.	4.6	3.1	1.8	-6.8	-45.2	46.4	4.6	5.2	5.3	5.0	5.1	2.7	-5.9	5.1	3.1
Previous Tealbook	*4.6*	*3.1*	*1.8*	*-4.9*	*-41.5*	*47.8*	*9.8*	*3.9*	*3.5*	*3.1*	*2.9*	*2.7*	*-2.5*	*3.3*	*2.8*
Durables	13.0	8.1	2.8	-13.2	-45.6	37.3	7.3	7.9	8.0	7.8	7.8	5.9	-8.7	7.9	5.9
Nondurables	6.5	3.9	-.6	7.7	-26.6	8.2	4.9	5.3	5.2	5.3	5.2	3.0	-2.7	5.2	3.3
Services	2.8	2.2	2.4	-9.7	-50.0	62.5	4.2	4.8	4.9	4.6	4.6	2.1	-6.5	4.7	2.7
Residential investment	-3.0	4.6	6.5	18.5	-62.2	-23.8	36.9	33.4	23.4	11.8	12.8	1.7	-17.3	20.0	8.3
Previous Tealbook	*-3.0*	*4.6*	*6.5*	*17.6*	*-66.0*	*-9.1*	*44.1*	*35.7*	*20.8*	*10.0*	*8.5*	*1.7*	*-14.9*	*18.3*	*1.5*
Nonres. priv. fixed invest.	-1.0	-2.3	-2.4	-7.8	-39.8	-16.4	11.6	13.7	15.6	15.8	14.1	-.4	-15.2	14.8	6.1
Previous Tealbook	*-1.0*	*-2.3*	*-2.4*	*-7.8*	*-54.2*	*-5.8*	*28.3*	*16.9*	*15.2*	*14.2*	*10.5*	*-.4*	*-15.5*	*14.2*	*4.1*
Equipment & intangibles	2.1	-.1	-1.1	-8.9	-35.3	-20.9	14.9	14.2	17.2	15.5	15.1	1.3	-14.5	15.5	5.8
Previous Tealbook	*2.1*	*-.1*	*-1.1*	*-5.6*	*-48.3*	*-9.7*	*25.1*	*15.8*	*15.3*	*11.7*	*10.0*	*1.3*	*-13.8*	*13.2*	*4.3*
Nonres. structures	-11.1	-9.9	-7.2	-3.9	-54.5	3.8	.2	11.8	9.7	17.0	10.0	-6.2	-17.9	12.1	7.3
Previous Tealbook	*-11.1*	*-9.9*	*-7.2*	*-15.7*	*-72.2*	*12.8*	*42.4*	*21.0*	*15.2*	*24.2*	*12.5*	*-6.2*	*-21.7*	*18.1*	*3.3*
Net exports[2]	-981	-990	-901	-816	-623	-671	-660	-675	-716	-769	-803	-954	-692	-740	-863
Previous Tealbook[2]	*-981*	*-990*	*-901*	*-886*	*-476*	*-647*	*-721*	*-758*	*-790*	*-824*	*-830*	*-954*	*-683*	*-801*	*-869*
Exports	-5.7	1.0	2.1	-8.7	-63.2	57.6	31.3	17.3	8.7	7.9	7.5	.3	-8.7	10.3	4.8
Imports	.0	1.8	-8.4	-15.5	-63.9	51.9	21.4	15.5	12.5	13.2	10.2	-2.1	-13.4	12.8	6.6
Gov't. cons. & invest.	4.8	1.7	2.5	.8	1.8	3.7	-2.4	-.1	-.9	.5	-2.9	3.0	1.0	-.9	-1.7
Previous Tealbook	*4.8*	*1.7*	*2.5*	*-1.1*	*3.4*	*10.9*	*.4*	*1.3*	*.4*	*-1.9*	*-3.3*	*3.0*	*3.3*	*-.9*	*-2.2*
Federal	8.3	3.3	3.4	1.9	26.9	8.2	-3.5	-.4	-1.8	4.7	-4.1	4.3	7.8	-.5	-2.3
Defense	3.3	2.2	4.4	1.0	2.1	2.1	2.1	.8	.8	.8	.1	4.4	1.8	.6	.7
Nondefense	16.1	5.0	1.9	3.1	70.5	16.5	-10.1	-2.0	-5.0	9.8	-9.2	4.1	16.5	-1.8	-6.1
State & local	2.7	.7	2.0	.2	-11.6	.6	-1.6	.1	-.2	-2.3	-2.1	2.2	-3.2	-1.1	-1.3
Change in priv. inventories[2]	69	69	13	-67	-313	-377	-313	-275	-215	-139	-41	67	-267	-167	90
Previous Tealbook[2]	*69*	*69*	*13*	*-100*	*-292*	*-276*	*-265*	*-232*	*-221*	*-193*	*-179*	*67*	*-233*	*-206*	*-42*

1. Change from fourth quarter of previous year to fourth quarter of year indicated.
2. Billions of chained (2012) dollars; annual values show annual averages.

Changes in Real Gross Domestic Product and Related Items
(Change from fourth quarter of previous year to fourth quarter of year indicated, unless otherwise noted)

Item	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Real GDP	2.6	2.9	1.9	2.0	2.8	2.5	2.3	-7.1	6.7	3.6
Previous Tealbook	*2.6*	*2.9*	*1.9*	*2.0*	*2.8*	*2.5*	*2.3*	*-4.3*	*4.4*	*2.8*
Final sales	2.0	3.2	1.8	2.2	2.9	2.2	2.7	-5.6	5.2	2.6
Previous Tealbook	*2.0*	*3.2*	*1.8*	*2.2*	*2.9*	*2.2*	*2.7*	*-3.0*	*4.0*	*1.9*
Priv. dom. final purch.	2.6	4.5	2.5	2.8	3.4	2.8	2.1	-7.9	7.1	3.8
Previous Tealbook	*2.6*	*4.5*	*2.5*	*2.8*	*3.4*	*2.8*	*2.1*	*-5.1*	*5.4*	*3.0*
Personal cons. expend.	1.9	3.8	2.9	2.8	2.9	2.6	2.7	-5.9	5.1	3.1
Previous Tealbook	*1.9*	*3.8*	*2.9*	*2.8*	*2.9*	*2.6*	*2.7*	*-2.5*	*3.3*	*2.8*
Durables	5.0	9.2	5.8	7.3	7.7	3.8	5.9	-8.7	7.9	5.9
Nondurables	2.8	3.2	2.8	1.8	3.7	2.5	3.0	-2.7	5.2	3.3
Services	1.1	3.2	2.5	2.4	2.0	2.5	2.1	-6.5	4.7	2.7
Residential investment	7.1	7.7	9.1	3.9	4.2	-4.4	1.7	-17.3	20.0	8.3
Previous Tealbook	*7.1*	*7.7*	*9.1*	*3.9*	*4.2*	*-4.4*	*1.7*	*-14.9*	*18.3*	*1.5*
Nonres. priv. fixed invest.	5.4	6.9	-.9	2.4	5.4	5.9	-.4	-15.2	14.8	6.1
Previous Tealbook	*5.4*	*6.9*	*-.9*	*2.4*	*5.4*	*5.9*	*-.4*	*-15.5*	*14.2*	*4.1*
Equipment & intangibles	5.1	6.1	2.3	1.9	6.6	6.8	1.3	-14.5	15.5	5.8
Previous Tealbook	5.1	6.1	2.3	1.9	6.6	6.8	1.3	-13.8	13.2	4.3
Nonres. structures	6.7	9.3	-10.9	4.3	1.5	2.6	-6.2	-17.9	12.1	7.3
Previous Tealbook	*6.7*	*9.3*	*-10.9*	*4.3*	*1.5*	*2.6*	*-6.2*	*-21.7*	*18.1*	*3.3*
Net exports[1]	-533	-577	-722	-784	-850	-920	-954	-692	-740	-863
Previous Tealbook[1]	*-533*	*-577*	*-722*	*-784*	*-850*	*-920*	*-954*	*-683*	*-801*	*-869*
Exports	6.0	2.9	-1.5	1.1	5.5	.4	.3	-8.7	10.3	4.8
Imports	3.0	6.5	3.2	3.4	5.6	3.2	-2.1	-13.4	12.8	6.6
Gov't. cons. & invest.	-2.4	.3	2.3	1.5	.8	1.5	3.0	1.0	-.9	-1.7
Previous Tealbook	*-2.4*	*.3*	*2.3*	*1.5*	*.8*	*1.5*	*3.0*	*3.3*	*-.9*	*-2.2*
Federal	-6.1	-1.1	1.1	.1	1.7	2.7	4.3	7.8	-.5	-2.3
Defense	-6.5	-3.4	-.4	-.8	1.9	4.0	4.4	1.8	.6	.7
Nondefense	-5.5	2.7	3.4	1.5	1.4	.7	4.1	16.5	-1.8	-6.1
State & local	.2	1.2	3.0	2.3	.4	.9	2.2	-3.2	-1.1	-1.3
Change in priv. inventories[1]	109	86	132	23	32	48	67	-267	-167	90
Previous Tealbook[1]	*109*	*86*	*132*	*23*	*32*	*48*	*67*	*-233*	*-206*	*-42*

1. Billions of chained (2012) dollars; annual values show annual averages.

Contributions to Changes in Real Gross Domestic Product
(Percentage points, annual rate except as noted)

Item	2019			2020				2021				2019[1]	2020[1]	2021[1]	2022[1]
	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4				
Real GDP	2.0	2.1	2.1	-5.0	-41.0	24.1	7.0	6.9	6.7	6.6	6.5	2.3	-7.1	6.7	3.6
Previous Tealbook	*2.0*	*2.1*	*2.1*	*-5.9*	*-37.4*	*28.9*	*10.4*	*6.1*	*4.7*	*3.8*	*3.2*	*2.3*	*-4.3*	*4.4*	*2.8*
Final sales	2.9	2.1	3.1	-3.6	-36.3	25.6	5.7	6.2	5.5	5.1	4.7	2.7	-5.6	5.3	2.6
Previous Tealbook	*2.9*	*2.1*	*3.1*	*-3.9*	*-33.7*	*28.6*	*10.2*	*5.5*	*4.5*	*3.3*	*2.9*	*2.7*	*-3.0*	*4.0*	*1.9*
Priv. dom. final purch.	2.8	2.0	1.2	-5.1	-40.5	25.0	5.7	6.3	6.2	5.8	5.7	1.8	-6.7	6.0	3.2
Previous Tealbook	*2.8*	*2.0*	*1.2*	*-3.7*	*-41.7*	*28.6*	*11.0*	*5.7*	*4.8*	*4.1*	*3.6*	*1.8*	*-4.3*	*4.6*	*2.5*
Personal cons. expend.	3.0	2.1	1.2	-4.7	-32.2	27.9	3.3	3.7	3.6	3.5	3.5	1.8	-4.0	3.5	2.1
Previous Tealbook	*3.0*	*2.1*	*1.2*	*-3.3*	*-29.7*	*29.2*	*6.8*	*2.8*	*2.4*	*2.1*	*2.0*	*1.8*	*-1.7*	*2.3*	*1.9*
Durables	.9	.6	.2	-1.0	-3.3	2.4	.5	.5	.5	.5	.5	.4	-.6	.5	.4
Nondurables	.9	.5	-.1	1.0	-3.0	1.5	.7	.8	.8	.8	.7	.4	-.4	.8	.5
Services	1.3	1.0	1.1	-4.7	-25.9	24.1	2.1	2.4	2.4	2.2	2.2	1.0	-3.1	2.3	1.3
Residential investment	-.1	.2	.2	.7	-3.1	-.9	1.0	1.0	.8	.4	.5	.1	-.7	.7	.3
Previous Tealbook	*-.1*	*.2*	*.2*	*.6*	*-3.5*	*-.2*	*1.2*	*1.1*	*.7*	*.4*	*.3*	*.1*	*-.6*	*.6*	*.1*
Nonres. priv. fixed invest.	-.1	-.3	-.3	-1.1	-5.1	-2.1	1.3	1.6	1.8	1.9	1.7	.0	-2.0	1.8	.8
Previous Tealbook	*-.1*	*-.3*	*-.3*	*-1.0*	*-8.5*	*-.4*	*2.9*	*1.9*	*1.7*	*1.6*	*1.3*	*.0*	*-2.0*	*1.6*	*.5*
Equipment & intangibles	.2	.0	-.1	-.9	-3.3	-2.2	1.3	1.3	1.6	1.5	1.5	.1	-1.5	1.5	.6
Previous Tealbook	*.2*	*.0*	*-.1*	*-.6*	*-5.6*	*-.8*	*2.1*	*1.4*	*1.4*	*1.1*	*.9*	*.1*	*-1.4*	*1.2*	*.4*
Nonres. structures	-.4	-.3	-.2	-.1	-1.8	.1	.0	.3	.2	.4	.3	-.2	-.5	.3	.2
Previous Tealbook	*-.4*	*-.3*	*-.2*	*-.5*	*-2.8*	*.3*	*.8*	*.5*	*.3*	*.5*	*.3*	*-.2*	*-.6*	*.4*	*.1*
Net exports	-.7	-.1	1.5	1.3	2.4	-.4	.5	-.1	-.6	-.8	-.5	.4	.9	-.5	-.3
Previous Tealbook	*-.7*	*-.1*	*1.5*	*.0*	*5.9*	*-2.5*	*-.9*	*-.5*	*-.4*	*-.5*	*.0*	*.4*	*.7*	*-.4*	*-.2*
Exports	-.7	.1	.2	-1.0	-9.1	4.8	2.9	1.8	.9	.9	.8	.0	-1.0	1.1	.5
Imports	.0	-.3	1.3	2.3	11.6	-5.2	-2.4	-1.9	-1.5	-1.6	-1.3	.3	1.9	-1.6	-.9
Gov't. cons. & invest.	.8	.3	.4	.2	2.0	1.1	-.4	.0	-.1	.1	-.5	.5	.2	-.2	-.3
Previous Tealbook	*.8*	*.3*	*.4*	*-.2*	*2.0*	*2.7*	*.1*	*.3*	*.1*	*-.3*	*-.6*	*.5*	*.6*	*-.2*	*-.4*
Federal	.5	.2	.2	.1	2.4	.8	-.3	.0	-.1	.4	-.3	.3	.5	.0	-.2
Defense	.1	.1	.2	.0	.5	.2	.1	.0	.0	.0	.0	.2	.1	.0	.0
Nondefense	.4	.1	.1	.1	1.9	.6	-.4	-.1	-.2	.3	-.3	.1	.4	-.1	-.2
State & local	.3	.1	.2	.0	-.3	.3	-.2	.0	.0	-.2	-.2	.2	-.3	-.1	-.1
Change in priv. inventories	-.9	.0	-1.0	-1.4	-4.7	-1.4	1.3	.7	1.2	1.4	1.8	-.4	-1.5	1.3	1.0
Previous Tealbook	*-.9*	*.0*	*-1.0*	*-2.1*	*-3.7*	*.3*	*.2*	*.6*	*.2*	*.5*	*.3*	*-.4*	*-1.3*	*.4*	*.9*

1. Change from fourth quarter of previous year to fourth quarter of year indicated.

Changes in Prices and Costs
(Percent, annual rate except as noted)

Item	2019 Q2	2019 Q3	2019 Q4	2020 Q1	2020 Q2	2020 Q3	2020 Q4	2021 Q1	2021 Q2	2021 Q3	2021 Q4	2019[1]	2020[1]	2021[1]	2022[1]
GDP chain-wt. price index	2.4	1.8	1.3	1.4	-.8	1.3	1.8	1.6	1.7	1.7	1.6	1.6	.9	1.6	1.8
Previous Tealbook	*2.4*	*1.8*	*1.3*	*1.5*	*.3*	*1.7*	*1.6*	*1.5*	*1.7*	*1.7*	*1.7*	*1.6*	*1.2*	*1.7*	*1.8*
PCE chain-wt. price index	2.4	1.5	1.4	1.3	-1.6	1.9	1.8	1.7	1.6	1.6	1.6	1.4	.8	1.6	1.7
Previous Tealbook	*2.4*	*1.5*	*1.4*	*1.3*	*-2.5*	*2.2*	*1.9*	*1.8*	*1.6*	*1.7*	*1.7*	*1.4*	*.7*	*1.7*	*1.8*
Energy	18.4	-8.2	4.9	-10.1	-42.2	7.0	1.5	4.4	4.3	3.6	2.8	-1.3	-13.3	3.8	2.9
Previous Tealbook	*18.4*	*-8.2*	*4.9*	*-10.9*	*-52.4*	*13.7*	*5.4*	*5.3*	*4.2*	*3.4*	*3.0*	*-1.3*	*-15.6*	*4.0*	*2.8*
Food	.6	-.5	.5	3.1	14.4	1.2	.3	.5	.7	1.9	2.0	.9	4.6	1.3	2.0
Previous Tealbook	*.6*	*-.5*	*.5*	*3.0*	*2.8*	*1.0*	*.3*	*.5*	*.9*	*2.4*	*2.4*	*.9*	*1.8*	*1.5*	*2.0*
Ex. food & energy	1.9	2.1	1.3	1.6	-.9	1.8	1.9	1.8	1.5	1.5	1.5	1.6	1.1	1.6	1.7
Previous Tealbook	*1.9*	*2.1*	*1.3*	*1.7*	*.0*	*1.9*	*1.9*	*1.7*	*1.5*	*1.5*	*1.6*	*1.6*	*1.4*	*1.6*	*1.7*
Ex. food & energy, market based	1.4	1.8	1.1	1.7	-.1	1.7	1.7	1.6	1.4	1.4	1.3	1.5	1.2	1.4	1.5
Previous Tealbook	*1.4*	*1.8*	*1.1*	*1.7*	*.0*	*1.9*	*1.7*	*1.6*	*1.4*	*1.4*	*1.4*	*1.5*	*1.3*	*1.5*	*1.6*
CPI	3.0	1.8	2.4	1.2	-3.4	2.5	2.2	1.8	1.7	1.7	1.7	2.0	.6	1.7	2.0
Previous Tealbook	*3.0*	*1.8*	*2.4*	*1.2*	*-3.2*	*2.6*	*2.0*	*1.9*	*1.7*	*1.8*	*1.8*	*2.0*	*.6*	*1.8*	*2.1*
Ex. food & energy	2.2	2.8	2.0	2.0	-1.4	2.4	2.4	1.7	1.6	1.5	1.5	2.3	1.3	1.6	1.9
Previous Tealbook	*2.2*	*2.8*	*2.0*	*2.0*	*.6*	*2.3*	*1.9*	*1.8*	*1.6*	*1.6*	*1.6*	*2.3*	*1.7*	*1.6*	*2.0*
ECI, hourly compensation[2]	2.4	3.0	2.6	3.2	1.0	1.2	1.3	1.7	1.7	1.8	1.8	2.7	1.7	1.8	2.2
Previous Tealbook[2]	*2.1*	*3.3*	*2.6*	*2.6*	*-2.8*	*2.9*	*1.0*	*3.6*	*1.9*	*1.9*	*3.5*	*2.7*	*.9*	*2.7*	*2.2*
Business sector															
Output per hour	3.0	-.4	1.0	-5.5	8.0	.1	-.6	.8	.1	.2	1.9	1.9	.4	.7	1.1
Previous Tealbook	*2.9*	*-.4*	*.9*	*-7.7*	*24.9*	*-2.8*	*-9.7*	*-1.0*	*1.6*	*1.0*	*.6*	*1.8*	*.3*	*.5*	*1.2*
Compensation per hour	3.0	.0	3.2	2.3	15.0	-11.5	1.0	1.5	1.5	1.5	1.5	4.0	1.3	1.5	3.2
Previous Tealbook	*2.9*	*-.1*	*1.9*	*2.7*	*6.3*	*-5.0*	*1.0*	*1.9*	*1.9*	*1.9*	*1.9*	*3.6*	*1.2*	*1.9*	*3.2*
Unit labor costs	.1	.3	2.2	8.2	6.5	-11.6	1.6	.7	1.4	1.3	-.4	2.0	.8	.7	2.1
Previous Tealbook	*.1*	*.3*	*.9*	*11.3*	*-14.9*	*-2.2*	*11.9*	*3.0*	*.4*	*.9*	*1.3*	*1.7*	*.9*	*1.4*	*2.0*
Core goods imports chain-wt. price index[3]	-.6	-1.0	-1.2	1.9	-3.4	-3.2	.9	1.0	1.3	1.2	1.2	-1.1	-1.0	1.2	1.0
Previous Tealbook[3]	*-.6*	*-1.0*	*-1.2*	*1.7*	*-3.5*	*-2.9*	*.5*	*1.2*	*1.4*	*1.2*	*1.2*	*-1.1*	*-1.1*	*1.2*	*1.0*

1. Change from fourth quarter of previous year to fourth quarter of year indicated.
2. Private-industry workers.
3. Core goods imports exclude computers, semiconductors, oil, and natural gas.

Changes in Prices and Costs

(Change from fourth quarter of previous year to fourth quarter of year indicated, unless otherwise noted)

Item	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
GDP chain-wt. price index	1.8	1.5	.9	1.5	2.0	2.3	1.6	.9	1.6	1.8
Previous Tealbook	*1.8*	*1.5*	*.9*	*1.5*	*2.0*	*2.3*	*1.6*	*1.2*	*1.7*	*1.8*
PCE chain-wt. price index	1.2	1.1	.3	1.5	1.8	1.9	1.4	.8	1.6	1.7
Previous Tealbook	*1.2*	*1.1*	*.3*	*1.5*	*1.8*	*1.9*	*1.4*	*.7*	*1.7*	*1.8*
Energy	-2.9	-7.1	-16.4	2.0	8.0	3.9	-1.3	-13.3	3.8	2.9
Previous Tealbook	*-2.9*	*-7.1*	*-16.4*	*2.0*	*8.0*	*3.9*	*-1.3*	*-15.6*	*4.0*	*2.8*
Food	.7	2.8	.3	-1.8	.7	.5	.9	4.6	1.3	2.0
Previous Tealbook	*.7*	*2.8*	*.3*	*-1.8*	*.7*	*.5*	*.9*	*1.8*	*1.5*	*2.0*
Ex. food & energy	1.6	1.5	1.2	1.8	1.7	1.9	1.6	1.1	1.6	1.7
Previous Tealbook	*1.6*	*1.5*	*1.2*	*1.8*	*1.7*	*1.9*	*1.6*	*1.4*	*1.6*	*1.7*
Ex. food & energy, market based	1.1	1.1	1.1	1.4	1.2	1.7	1.5	1.2	1.4	1.5
Previous Tealbook	*1.1*	*1.1*	*1.1*	*1.4*	*1.2*	*1.7*	*1.5*	*1.3*	*1.5*	*1.6*
CPI	1.2	1.2	.4	1.8	2.1	2.2	2.0	.6	1.7	2.0
Previous Tealbook	*1.2*	*1.2*	*.4*	*1.8*	*2.1*	*2.2*	*2.0*	*.6*	*1.8*	*2.1*
Ex. food & energy	1.7	1.7	2.0	2.2	1.8	2.2	2.3	1.3	1.6	1.9
Previous Tealbook	*1.7*	*1.7*	*2.0*	*2.2*	*1.8*	*2.2*	*2.3*	*1.7*	*1.6*	*2.0*
ECI, hourly compensation[1]	2.0	2.3	1.9	2.2	2.6	3.0	2.7	1.7	1.8	2.2
Previous Tealbook[1]	*2.0*	*2.3*	*1.9*	*2.2*	*2.6*	*3.0*	*2.7*	*.9*	*2.7*	*2.2*
Business sector										
Output per hour	1.8	.3	.7	1.3	1.1	1.4	1.9	.4	.7	1.1
Previous Tealbook	*1.8*	*.3*	*.7*	*1.3*	*1.1*	*1.4*	*1.8*	*.3*	*.5*	*1.2*
Compensation per hour	-.3	3.0	2.4	2.0	3.8	2.4	4.0	1.3	1.5	3.2
Previous Tealbook	*-.3*	*3.0*	*2.4*	*2.0*	*3.8*	*2.4*	*3.6*	*1.2*	*1.9*	*3.2*
Unit labor costs	-2.0	2.7	1.7	.8	2.6	1.0	2.0	.8	.7	2.1
Previous Tealbook	*-2.0*	*2.7*	*1.7*	*.8*	*2.6*	*1.0*	*1.7*	*.9*	*1.4*	*2.0*
Core goods imports chain-wt. price index[2]	-2.2	-.4	-4.3	-.9	.9	.2	-1.1	-1.0	1.2	1.0
Previous Tealbook[2]	*-2.2*	*-.4*	*-4.3*	*-.9*	*.9*	*.2*	*-1.1*	*-1.1*	*1.2*	*1.0*

1. Private-industry workers.
2. Core goods imports exclude computers, semiconductors, oil, and natural gas.

Other Macroeconomic Indicators

Item	2019 Q2	2019 Q3	2019 Q4	2020 Q1	2020 Q2	2020 Q3	2020 Q4	2021 Q1	2021 Q2	2021 Q3	2021 Q4	2019[1]	2020[1]	2021[1]	2022[1]
Employment and production															
Nonfarm payroll employment[2]	159	203	210	-139	-5,296	1,764	475	601	640	648	398	178	-799	572	380
Unemployment rate[3]	3.6	3.6	3.5	3.8	14.8	9.9	9.3	8.6	7.6	6.6	5.7	3.5	9.3	5.7	4.5
Previous Tealbook[3]	*3.6*	*3.6*	*3.5*	*3.8*	*16.0*	*11.1*	*7.9*	*6.8*	*6.2*	*5.8*	*5.4*	*3.5*	*7.9*	*5.4*	*4.7*
Natural rate of unemployment[3]	4.4	4.4	4.3	4.4	10.3	7.0	6.3	5.9	5.6	5.2	4.9	4.3	6.3	4.9	4.7
Previous Tealbook[3]	*4.4*	*4.4*	*4.3*	*4.4*	*13.8*	*7.6*	*5.4*	*5.1*	*5.1*	*5.1*	*5.0*	*4.3*	*5.4*	*5.0*	*5.0*
Employment-to-Population Ratio[3]	60.6	60.8	61.0	60.8	51.4	55.2	56.2	56.7	57.4	58.1	58.6	61.0	56.2	58.6	59.7
Employment-to-Population Trend[3]	60.2	60.3	60.3	60.1	55.0	57.7	58.3	58.6	58.9	59.3	59.5	60.3	58.3	59.5	59.7
Output gap[4]	1.4	1.4	1.5	-.1	-6.9	-6.2	-5.0	-3.9	-2.9	-1.9	-1.0	1.5	-5.0	-1.0	.7
Previous Tealbook[4]	*1.4*	*1.4*	*1.5*	*.1*	*-3.1*	*-5.6*	*-3.3*	*-2.2*	*-1.5*	*-.9*	*-.4*	*1.5*	*-3.3*	*-.4*	*.9*
Industrial production[5]	-2.3	1.1	.4	-7.1	-47.8	14.3	6.9	7.4	8.7	8.3	7.4	-.7	-12.2	7.9	4.9
Previous Tealbook[5]	*-2.3*	*1.1*	*.3*	*-7.5*	*-41.9*	*9.1*	*7.3*	*9.9*	*8.7*	*6.6*	*5.6*	*-.7*	*-11.0*	*7.7*	*4.7*
Manufacturing industr. prod.[5]	-3.3	.7	-.5	-6.2	-53.2	23.5	10.5	9.6	9.9	9.9	8.5	-1.2	-12.0	9.5	5.6
Previous Tealbook[5]	*-3.3*	*.7*	*-.5*	*-7.1*	*-48.7*	*16.1*	*10.9*	*13.1*	*10.0*	*8.1*	*7.1*	*-1.2*	*-11.5*	*9.5*	*5.7*
Capacity utilization rate - mfg.[3]	75.5	75.4	75.0	73.6	60.8	64.0	65.5	67.1	68.7	70.4	71.9	75.0	65.5	71.9	76.0
Previous Tealbook[3]	*75.5*	*75.4*	*75.0*	*73.5*	*62.1*	*64.3*	*65.9*	*68.0*	*69.6*	*71.0*	*72.3*	*75.0*	*65.9*	*72.3*	*76.4*
Housing starts[6]	1.3	1.3	1.4	1.5	.9	1.0	1.1	1.2	1.2	1.3	1.3	1.3	1.1	1.3	1.4
Light motor vehicle sales[6]	17.0	17.0	16.7	15.0	11.0	12.8	13.8	14.2	14.6	15.0	15.4	17.0	13.1	14.8	16.4
Income and saving															
Nominal GDP[5]	4.7	3.8	3.5	-3.9	-41.5	25.8	8.9	8.7	8.5	8.3	8.2	4.0	-6.3	8.4	5.5
Real disposable pers. income[5]	1.5	2.1	2.1	.8	75.1	-40.2	-12.6	2.2	-.7	3.5	-.3	2.6	-2.0	1.2	2.8
Previous Tealbook[5]	*1.5*	*2.1*	*1.6*	*6.3*	*39.0*	*-19.2*	*5.1*	*-8.2*	*-8.6*	*1.7*	*-1.0*	*2.4*	*5.8*	*-4.1*	*2.5*
Personal saving rate[3]	7.8	7.7	7.7	9.6	31.9	15.2	11.3	10.7	9.4	9.1	8.0	7.7	11.3	8.0	7.7
Previous Tealbook[3]	*7.8*	*7.7*	*7.6*	*10.1*	*27.2*	*15.6*	*14.8*	*12.1*	*9.3*	*9.0*	*8.1*	*7.6*	*14.8*	*8.1*	*7.7*
Corporate profits[7]	16.0	-.9	10.6	-44.9	9.3	-62.6	95.0	7.5	18.0	25.9	26.7	2.2	-18.6	19.3	10.1
Profit share of GNP[3]	9.6	9.5	9.7	8.4	9.9	7.3	8.4	8.4	8.6	8.9	9.3	9.7	8.4	9.3	9.7
Gross national saving rate[3]	17.9	17.5	17.7	17.7	9.9	10.5	14.6	15.2	15.8	16.2	16.7	17.7	14.6	16.7	17.7
Net national saving rate[3]	2.3	1.9	2.1	2.0	-10.2	-8.3	-3.2	-2.1	-1.0	-.3	.3	2.1	-3.2	.3	1.9

1. Change from fourth quarter of previous year to fourth quarter of year indicated, unless otherwise indicated.
2. Average monthly change, thousands.
3. Percent; annual values are for the fourth quarter of the year indicated.
4. Percent difference between actual and potential output; a negative number indicates that the economy is operating below potential. Annual values are for the fourth quarter of the year indicated.
5. Percent change, annual rate.
6. Level, millions; annual values are annual averages.
7. Percent change, annual rate, with inventory valuation and capital consumption adjustments.

Other Macroeconomic Indicators

(Change from fourth quarter of previous year to fourth quarter of year indicated, unless otherwise noted)

Item	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Employment and production										
Nonfarm payroll employment[1]	192	250	227	195	176	193	178	-799	572	380
Unemployment rate[2]	7.0	5.7	5.0	4.8	4.1	3.8	3.5	9.3	5.7	4.5
Previous Tealbook[2]	*7.0*	*5.7*	*5.0*	*4.8*	*4.1*	*3.8*	*3.5*	*7.9*	*5.4*	*4.7*
Natural rate of unemployment[2]	5.4	5.1	4.9	4.8	4.6	4.5	4.3	6.3	4.9	4.7
Previous Tealbook[2]	*5.4*	*5.1*	*4.9*	*4.8*	*4.6*	*4.5*	*4.3*	*5.4*	*5.0*	*5.0*
Employment-to-Population Ratio[2]	58.5	59.3	59.4	59.7	60.1	60.6	61.0	56.2	58.6	59.7
Employment-to-Population Trend[2]	60.4	60.3	60.2	60.2	60.2	60.2	60.3	58.3	59.5	59.7
Output gap[3]	-3.0	-1.0	-.5	-.3	.6	1.3	1.5	-5.0	-1.0	.7
Previous Tealbook[3]	*-3.0*	*-1.0*	*-.5*	*-.3*	*.6*	*1.3*	*1.5*	*-3.3*	*-.4*	*.9*
Industrial production	2.3	3.4	-3.4	-.3	3.6	4.0	-.7	-12.2	7.9	4.9
Previous Tealbook	*2.3*	*3.4*	*-3.4*	*-.3*	*3.6*	*4.0*	*-.7*	*-11.0*	*7.7*	*4.7*
Manufacturing industr. prod.	1.1	1.4	-1.7	.3	2.5	2.2	-1.2	-12.0	9.5	5.6
Previous Tealbook	*1.1*	*1.4*	*-1.7*	*.3*	*2.5*	*2.2*	*-1.2*	*-11.5*	*9.5*	*5.7*
Capacity utilization rate - mfg.[2]	74.5	75.8	74.9	74.2	75.8	77.0	75.0	65.5	71.9	76.0
Previous Tealbook[2]	*74.5*	*75.8*	*74.9*	*74.2*	*75.8*	*77.0*	*75.0*	*65.9*	*72.3*	*76.4*
Housing starts[4]	.9	1.0	1.1	1.2	1.2	1.2	1.3	1.1	1.3	1.4
Light motor vehicle sales[4]	15.5	16.5	17.4	17.5	17.1	17.2	17.0	13.1	14.8	16.4
Income and saving										
Nominal GDP	4.4	4.5	2.8	3.5	4.9	4.9	4.0	-6.3	8.4	5.5
Real disposable pers. income	-2.5	5.3	3.0	1.6	3.4	3.9	2.6	-2.0	1.2	2.8
Previous Tealbook	*-2.5*	*5.3*	*3.0*	*1.6*	*3.4*	*3.9*	*2.4*	*5.8*	*-4.1*	*2.5*
Personal saving rate[2]	6.3	7.5	7.5	6.5	6.8	7.8	7.7	11.3	8.0	7.7
Previous Tealbook[2]	*6.3*	*7.5*	*7.5*	*6.5*	*6.8*	*7.8*	*7.6*	*14.8*	*8.1*	*7.7*
Corporate profits[5]	3.9	6.7	-10.8	3.3	-.6	4.2	2.2	-18.6	19.3	10.1
Profit share of GNP[2]	11.8	12.1	10.5	10.5	9.9	9.9	9.7	8.4	9.3	9.7
Gross national saving rate[2]	19.2	20.3	19.6	18.1	18.0	17.9	17.7	14.6	16.7	17.7
Net national saving rate[2]	4.0	5.3	4.5	2.7	2.7	2.4	2.1	-3.2	.3	1.9

1. Average monthly change, thousands.
2. Percent; values are for the fourth quarter of the year indicated.
3. Percent difference between actual and potential output; a negative number indicates that the economy is operating below potential. Values are for the fourth quarter of the year indicated.
4. Level, millions; values are annual averages.
5. Percent change, with inventory valuation and capital consumption adjustments.

Staff Projections of Government-Sector Accounts and Related Items

Item	2017	2018	2019	2020	2021	2022	2020 Q1	2020 Q2	2020 Q3	2020 Q4
Unified federal budget[1]				Nominal dollars, billions						
Receipts	3,316	3,330	3,462	2,755	2,367	3,793	797	435	717	610
Outlays	3,982	4,109	4,447	6,265	5,032	5,035	1,184	2,235	1,683	1,354
Surplus/deficit	-665	-779	-984	-3,510	-2,665	-1,242	-387	-1,800	-966	-744
				Percent of GDP						
Surplus/deficit	-3.5	-3.8	-4.6	-17.1	-12.7	-5.5	-7.2	-34.5	-18.9	-14.8
Previous Tealbook	*-3.5*	*-3.8*	*-4.6*	*-17.0*	*-10.8*	*-5.1*	*-7.2*	*-38.8*	*-14.8*	*-20.7*
Primary surplus/deficit	-2.1	-2.2	-2.9	-15.5	-11.2	-4.0	-5.3	-32.9	-17.8	-12.9
Net interest	1.4	1.6	1.8	1.6	1.5	1.5	1.9	1.6	1.0	1.9
Cyclically adjusted surplus/deficit	-3.5	-4.2	-5.2	-16.1	-10.7	-5.0	-7.6	-32.6	-15.7	-12.9
Federal debt held by public	76.0	77.5	79.2	100.2	111.1	109.7	82.0	93.1	100.2	105.6
Government in the NIPA[2]				Real percent change, annual rate						
Purchases	.8	1.5	3.0	1.0	-.9	-1.7	.8	1.8	3.7	-2.4
Consumption	.6	1.6	2.3	1.3	-.8	-1.8	.7	5.5	2.8	-3.5
Investment	2.0	1.5	6.0	-.5	-.8	-.8	1.1	-12.1	7.2	2.9
State and local construction	-1.8	-1.5	7.2	-.4	-5.0	-5.0	8.5	-25.0	15.0	5.0
Real disposable personal income	3.5	3.9	2.6	-2.0	1.1	2.8	.7	75.4	-40.3	-12.7
Contribution from transfers[3]	.2	.4	1.1	3.2	-1.9	.6	1.6	49.9	-18.1	-17.6
Contribution from taxes[3]	-.9	.4	-.9	2.8	-1.9	-1.1	-.4	8.9	7.5	-6.1
Government employment				Average net change in monthly payrolls, thousands						
Federal	-2	1	3	1	1	1	13	64	-17	-58
State and local	8	8	12	-48	-5	-13	-0	-394	183	20
Fiscal indicators[2]				Percentage point contribution to change in real GDP, annual rate						
Fiscal effect (FE)[4]	.2	.4	1.0	4.9	-2.7	-.7	.7	17.3	4.3	-3.0
Discretionary policy actions (FI)	.3	.6	.8	3.6	-2.8	-.6	.6	14.1	2.3	-2.6
Previous Tealbook	*.3*	*.6*	*.8*	*4.2*	*-2.6*	*-.9*	*.2*	*7.6*	*7.5*	*1.5*
Federal purchases	.1	.2	.3	.5	.0	-.2	.1	2.3	.8	-.3
State and local purchases	.0	.1	.2	-.3	-.1	-.1	.0	-.3	.3	-.2
Taxes and transfers	.1	.3	.3	3.4	-2.6	-.3	.5	13.6	1.5	-2.2
Cyclical	-.1	-.1	-.1	1.4	-.5	-.5	.1	3.3	2.1	.1
Other	.0	-.1	.3	-.1	.5	.4	.0	-.1	.0	-.5

1. Annual values stated on a fiscal year basis. Quarterly values not seasonally adjusted.
2. Annual values refer to the change from fourth quarter of previous year to fourth quarter of year indicated.
3. Percentage point contribution to change in real disposable personal income, annual basis.
4. The FE measure captures the total contribution of the government sector to the growth of aggregate demand (excluding any multiplier effects and financial offsets). It equals the sum of the direct contributions to aggregate demand growth from all changes in federal purchases and state and local purchases, plus the estimated contribution to real household consumption and business investment that is induced by changes in transfer and tax policies. FI (fiscal impetus) is the portion of FE attributable to discretionary fiscal policy actions (for example, a legislated change in tax revenues).

Foreign Real GDP and Consumer Prices: Selected Countries
(Quarterly percent changes at an annual rate)

Measure and country	2019 Q1	2019 Q2	2019 Q3	2019 Q4	Projected 2020 Q1	2020 Q2	2020 Q3	2020 Q4	2021 Q1	2021 Q2	2021 Q3	2021 Q4
***Real GDP*[1]**												
Total foreign	1.9	1.9	1.1	.3	-10.9	-31.3	16.4	13.5	8.2	6.2	4.4	3.6
Previous Tealbook	*1.5*	*2.1*	*1.2*	*.7*	*-11.1*	*-23.0*	*10.6*	*10.0*	*6.5*	*5.5*	*3.9*	*3.4*
Advanced foreign economies	1.7	1.8	1.2	-.3	-9.5	-40.4	18.5	16.8	9.7	7.0	4.7	3.5
Canada	1.2	3.2	1.1	.6	-8.2	-49.0	22.4	23.7	12.0	8.7	6.1	4.1
Japan	2.6	2.1	.0	-7.3	-3.4	-19.0	5.8	5.7	5.3	3.9	2.0	1.7
United Kingdom	2.7	-.6	2.1	.1	-7.7	-42.2	19.5	12.7	9.2	5.8	3.4	2.9
Euro area	1.9	.6	1.2	.4	-14.2	-35.5	18.7	14.3	8.9	6.5	4.2	3.4
Germany	1.9	-1.0	1.1	-.4	-8.6	-30.0	15.2	13.5	7.6	4.5	3.8	3.2
Emerging market economies	2.0	2.1	1.0	.9	-12.3	-20.8	14.4	10.4	6.7	5.5	4.2	3.8
Asia	3.3	4.1	2.0	3.7	-19.1	1.2	13.1	9.0	6.8	6.1	5.4	5.0
Korea	-1.5	4.2	1.7	5.1	-5.5	-15.0	12.2	7.8	4.0	4.0	3.5	3.0
China	6.5	5.9	5.5	5.9	-36.3	42.0	17.1	11.2	7.3	6.7	6.2	5.9
Latin America	.7	.0	-.1	-2.3	-4.8	-38.8	15.8	12.0	6.6	4.8	2.8	2.4
Mexico	.6	-.6	-.9	-2.3	-4.9	-40.6	16.2	13.7	7.1	4.9	2.5	2.2
Brazil	1.0	2.2	1.9	1.5	-6.0	-32.0	15.0	4.0	4.1	4.0	3.8	3.2
Addendum												
Emerging market economies ex. China	1.1	1.3	.1	-.1	-6.3	-29.9	13.9	10.2	6.5	5.2	3.8	3.3
***Consumer prices*[2]**												
Total foreign	1.1	3.3	2.1	3.4	2.4	-1.0	2.2	1.9	2.0	2.1	2.1	2.1
Previous Tealbook	*1.0*	*3.2*	*2.1*	*3.4*	*2.4*	*.6*	*2.0*	*2.2*	*2.2*	*2.2*	*2.2*	*2.2*
Advanced foreign economies	.7	2.1	.9	1.1	.6	-1.2	.7	1.3	1.2	1.2	1.2	1.2
Canada	1.7	3.3	1.6	1.7	.5	-1.0	.9	2.3	1.8	1.7	1.6	1.6
Japan	.3	.5	.4	.8	.3	-1.1	-.1	.1	.2	.3	.4	.4
United Kingdom	1.1	2.5	1.7	.4	2.1	-1.4	1.7	1.5	1.6	1.6	1.6	1.6
Euro area	.3	2.0	.7	1.1	.7	-1.6	.9	1.3	1.2	1.2	1.2	1.2
Germany	.2	2.4	.3	1.9	1.8	-1.3	1.3	1.6	1.6	1.6	1.6	1.6
Emerging market economies	1.3	4.0	2.9	4.9	3.6	-.9	3.1	2.3	2.6	2.8	2.8	2.8
Asia	1.0	3.8	3.0	5.6	3.6	-1.3	2.8	2.0	2.4	2.5	2.6	2.6
Korea	-2.0	1.9	-.5	1.7	1.6	1.4	2.8	1.2	1.8	2.1	2.1	2.1
China	1.3	4.3	4.2	7.2	4.2	-.3	2.0	2.1	2.5	2.5	2.5	2.5
Latin America	2.0	4.9	3.0	3.7	3.8	.1	3.8	3.3	3.4	3.3	3.3	3.3
Mexico	1.5	4.5	2.6	3.2	3.3	-.2	3.6	2.9	3.2	3.2	3.2	3.2
Brazil	2.9	5.2	2.2	3.2	4.9	-.8	2.3	3.6	3.7	3.7	3.7	3.7
Addendum												
Emerging market economies ex. China	1.3	3.8	2.0	3.4	3.1	-1.3	4.0	2.5	2.7	2.9	2.9	2.9

1. Foreign GDP aggregates calculated using shares of U.S. exports.
2. Foreign CPI aggregates calculated using shares of U.S. non-oil imports.

Foreign Real GDP and Consumer Prices: Selected Countries
(Percent change, Q4 to Q4)

Measure and country	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
								----------Projected----------		
***Real GDP*[1]**										
Total foreign	3.0	3.0	2.1	2.8	3.2	2.1	1.3	-5.2	5.6	2.8
Previous Tealbook	*3.0*	*3.0*	*2.1*	*2.9*	*3.2*	*2.2*	*1.4*	*-4.5*	*4.8*	*2.8*
Advanced foreign economies	2.4	2.0	.9	1.8	2.9	1.4	1.1	-7.1	6.2	2.3
Canada	3.4	2.8	-.4	1.7	3.2	1.8	1.5	-8.2	7.7	2.6
Japan	2.8	-.4	1.0	1.2	2.6	-.3	-.7	-3.3	3.2	1.1
United Kingdom	2.7	2.5	2.4	1.8	1.6	1.4	1.1	-7.9	5.3	2.2
Euro area	.7	1.6	2.1	2.1	3.0	1.2	1.0	-6.9	5.7	2.4
Germany	1.5	2.3	1.3	1.9	3.4	.6	.4	-4.4	4.7	2.2
Emerging market economies	3.7	3.9	3.2	3.8	3.6	2.9	1.5	-3.2	5.0	3.4
Asia	5.5	5.2	4.7	5.3	5.4	4.4	3.3	.2	5.8	4.3
Korea	3.7	2.6	3.4	2.7	2.8	3.0	2.3	-.7	3.6	2.3
China	7.6	7.3	6.9	6.9	6.9	6.5	5.9	4.2	6.5	5.6
Latin America	1.7	2.7	1.8	2.3	1.9	1.1	-.4	-6.8	4.1	2.3
Mexico	1.2	3.4	2.7	3.1	1.8	1.2	-.8	-7.0	4.2	2.2
Brazil	2.6	-.1	-5.5	-2.2	2.4	1.2	1.6	-6.5	3.8	2.8
Addendum										
Emerging market economies ex. China	2.7	3.1	2.4	3.1	2.8	2.1	.6	-4.7	4.7	2.9
***Consumer prices*[2]**										
Total foreign	2.4	2.0	1.4	1.9	2.5	2.4	2.4	1.4	2.1	2.1
Previous Tealbook	*2.4*	*2.0*	*1.4*	*1.9*	*2.5*	*2.4*	*2.4*	*1.8*	*2.2*	*2.2*
Advanced foreign economies	1.0	1.2	.5	.9	1.5	1.8	1.2	.4	1.2	1.2
Canada	1.0	2.0	1.3	1.4	1.8	2.1	2.1	.7	1.7	1.6
Japan	1.4	2.5	.1	.3	.6	.8	.5	-.2	.3	.5
United Kingdom	2.1	.9	.1	1.2	3.0	2.3	1.4	1.0	1.6	1.4
Euro area	.8	.2	.3	.7	1.4	1.9	1.0	.3	1.2	1.2
Germany	1.4	.4	.5	1.0	1.6	2.1	1.2	.8	1.6	1.6
Emerging market economies	3.4	2.6	2.0	2.6	3.2	2.9	3.3	2.0	2.7	2.8
Asia	3.2	1.8	1.5	2.1	2.0	2.0	3.3	1.8	2.5	2.6
Korea	1.1	1.0	.9	1.4	1.4	1.7	.3	1.8	2.0	2.1
China	2.9	1.5	1.4	2.1	1.7	2.1	4.2	2.0	2.5	2.5
Latin America	4.0	4.7	3.2	4.0	6.3	5.0	3.3	2.7	3.3	3.2
Mexico	3.6	4.2	2.3	3.2	6.6	4.8	2.9	2.4	3.2	3.2
Brazil	5.8	6.5	10.4	7.1	2.8	4.1	3.4	2.5	3.7	3.5
Addendum										
Emerging market economies ex. China	3.8	3.5	2.3	3.0	4.2	3.4	2.6	2.1	2.9	2.9

1. Foreign GDP aggregates calculated using shares of U.S. exports.
2. Foreign CPI aggregates calculated using shares of U.S. non-oil imports.

U.S. Current Account

Quarterly Data

	2019				Projected 2020				Projected 2021			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
	Billions of dollars, s.a.a.r.											
U.S. current account balance	**-547.6**	**-505.0**	**-501.5**	**-439.3**	**-483.0**	**-343.9**	**-288.7**	**-346.9**	**-334.4**	**-344.5**	**-406.1**	**-456.3**
Previous Tealbook	*-547.6*	*-505.0*	*-501.5*	*-439.3*	*-429.3*	*-204.7*	*-238.0*	*-251.7*	*-260.9*	*-259.7*	*-290.5*	*-303.7*
Current account as percent of GDP	-2.6	-2.4	-2.3	-2.0	-2.2	-1.8	-1.4	-1.7	-1.6	-1.6	-1.9	-2.1
Previous Tealbook	*-2.6*	*-2.4*	*-2.3*	*-2.0*	*-2.0*	*-1.1*	*-1.2*	*-1.2*	*-1.2*	*-1.2*	*-1.3*	*-1.4*
Net goods & services	-631.0	-641.6	-633.7	-559.4	-518.8	-359.5	-370.8	-346.8	-354.1	-381.6	-423.8	-454.2
Investment income, net	241.2	280.3	277.3	283.1	208.5	170.9	242.0	166.8	192.4	192.4	177.6	165.0
Direct, net	313.7	344.2	337.1	341.9	282.2	195.4	260.5	177.1	201.8	202.6	191.7	183.9
Portfolio, net	-72.4	-63.9	-59.8	-58.8	-73.8	-24.5	-18.4	-10.3	-9.4	-10.3	-14.1	-19.0
Other income and transfers, net	-157.8	-143.7	-145.2	-162.9	-172.6	-155.3	-159.9	-167.0	-172.6	-155.3	-159.9	-167.0

Annual Data

	2013	2014	2015	2016	2017	2018	2019	Projected 2020	Projected 2021	Projected 2022
	Billions of dollars									
U.S. current account balance	**-348.8**	**-365.2**	**-407.8**	**-428.3**	**-439.6**	**-491.0**	**-498.3**	**-365.6**	**-385.3**	**-506.3**
Previous Tealbook	*-348.8*	*-365.2*	*-407.8*	*-428.3*	*-439.6*	*-491.0*	*-498.3*	*-280.9*	*-278.7*	*-335.5*
Current account as percent of GDP	-2.1	-2.1	-2.2	-2.3	-2.3	-2.4	-2.3	-1.8	-1.8	-2.2
Previous Tealbook	*-2.1*	*-2.1*	*-2.2*	*-2.3*	*-2.3*	*-2.4*	*-2.3*	*-1.4*	*-1.3*	*-1.5*
Net goods & services	-461.1	-489.6	-498.5	-503.0	-550.1	-627.7	-616.4	-399.0	-403.4	-503.5
Investment income, net	215.4	228.9	214.7	211.1	238.7	266.9	270.5	197.1	181.8	161.0
Direct, net	283.3	284.2	284.6	278.0	304.0	330.3	334.2	228.8	195.0	194.0
Portfolio, net	-67.9	-55.3	-70.0	-66.9	-65.3	-63.4	-63.7	-31.7	-13.2	-33.1
Other income and transfers, net	-103.1	-104.6	-123.9	-136.4	-128.2	-130.2	-152.4	-163.7	-163.7	-163.7

Abbreviations

ABS	asset-backed securities
AFE	advanced foreign economy
BLS	Bureau of Labor Statistics
BOJ	Bank of Japan
Cares Act	Coronavirus Aid, Relief, and Economic Security Act
CCF LLC	Corporate Credit Facilities LLC
CDS	credit default swaps
C&I	commercial and industrial
CMBS	commercial mortgage-backed securities
COVID-19	coronavirus disease 2019
CP	commercial paper
CPI	consumer price index
CRE	commercial real estate
DFM	dynamic factor model
DI	depository institution
ECB	European Central Bank
ELB	effective lower bound
EMBI	emerging markets bond index
EME	emerging market economy
EPOP	employment-to-population ratio
ETF	exchange-traded fund
EU	European Union
FCI	financial conditions index
FHFA	Federal Housing Finance Agency
FIMA	foreign and international monetary authorities

FOMC	Federal Open Market Committee; also, the Committee
FPLT	flexible price-level targeting
FRB/US	A large-scale macroeconometric model of the U.S. economy
GDP	gross domestic product
GFC	Global Financial Crisis
GPS	Global Positioning System
HIV	human immunodeficiency virus
IMF	International Monetary Fund
IPO	initial public offering
LFPR	labor force participation rate
LIBOR	London interbank offered rate
MBS	mortgage-backed securities
MERS	Middle East respiratory syndrome
MLF	Municipal Liquidity Facility
MMF	money market fund
NCD	negotiable certificate of deposit
NIE	newly industrialized economies
OECD	Organisation for Economic Co-operation and Development
OIS	overnight index swap
OSI	Oxford Stringency Index
PCE	personal consumption expenditures
PEPP	Pandemic Emergency Purchase Programme
PMCCF	Primary Market Corporate Credit Facility
PMI	purchasing managers index
PPP	Paycheck Protection Program
PPPLF	Paycheck Protection Program Liquidity Facility
PUA	Pandemic Unemployment Assistance

repo	repurchase agreement
SARS	severe acute respiratory syndrome
SBA	Small Business Administration
SBLI	Small Business Lending Index
SEP	Summary of Economic Projections
SIFMA	Securities Industry and Financial Markets Association
SIGMA	A calibrated multicountry DSGE model
SMCCF	Secondary Market Corporate Credit Facility
SME	small and medium-sized enterprise
SOMA	System Open Market Account
S&P	Standard & Poor's
SPV	special purpose vehicle
TALF	Term Asset-Backed Securities Loan Facility
TIPS	Treasury Inflation-Protected Securities
UI	unemployment insurance
VAR	vector autoregression
VIX	one-month-ahead option-implied volatility on the S&P 500 index
VXO	A volatility index of the S&P 100

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