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Budget Model

Background: Marginal Propensities to Consume in the 2021 Economy

Summary: PWBM projects that the broad distribution of relief payments in the Biden administration's proposed plan will flow largely into household savings and will produce only small stimulative effects, with 73 percent of the stimulus going directly into household savings. Sectors affected by the pandemic still face restrictions and are unlikely to grow from stimulus payments, while much of the rest of the economy is operating close to productive capacity.

Key Points

- Government spending in 2020 did not significantly increase consumption or investment relative to 2019, and, instead, accrued mostly to U.S. household savings which rose from $1.2 trillion in 2019 to $4.8 trillion (annualized and seasonally adjusted) in 2020 Q2.

- As the economy reallocated resources in response to the pandemic, many sectors saw production and consumption near capacity. The total consumption of durable goods did not decline in 2020 and in fact increased by 18 percent from 2019 Q1 to 2020 Q3. Though nondurable goods production decreased by 5.4 percent in 2020 Q2 relative to 2019 Q1, it had grown by 3 percent in 2020 Q3 relative to 2019 Q1. Imports of nondurable consumer goods except food grew by 3.5 percent and imports of foods, feeds, and beverages grew by 6.8 percent in 2020 Q3, implying demand in excess of domestic supply.

- Using the implied marginal propensities to consume by household in the PWBM dynamic model, we estimate that 73 percent of the proposed $1400 relief payments in Biden's COVID relief plan will be directed to household savings.

Introduction

This brief provides technical background to our macroeconomic analysis of the 2021 Biden relief plan.

The Biden administration has recently proposed a one-time $1400 per-person payment as part of Covid-19 recession relief. The rationale given for these payments is (1) to support struggling families and (2) to spur economic growth. Relief transfer payments, by definition, provide funds which a household can use to spend on consumption, and transfer payments are redistributive regardless of whether households spend or save.

However, the broad nature of the proposed policy implies that poorer and unemployed households do not receive more aid than many relatively well-off households.

The macroeconomic effects of the relief depend on (a) the propensity of recipients to consume rather than save and (b) the response of the production sector to any increases in consumption. Transfer payments during a recession can have the following effects:

1. **Stimulate the economy.** If the relief boosts aggregate demand which is, in turn, matched by domestic production increases. In this case, the transfer payments overcome institutional failures or frictions which prevent households from borrowing to temporarily finance consumption.

2. **Support domestic consumption without an impact on domestic production.** Aggregate demand increases are filled by foreign producers; the trade deficit increases as foreigners accept U.S. assets (future promises to pay) in return for providing current consumption. This case may occur when domestic production cannot expand in the short run, perhaps due to insufficient productive capacity or other restrictions.

3. **Reallocate resources into asset markets.** If a large portion of the relief is saved, then the policy produces a national portfolio reallocation: the government borrows to finance the transfers, but the borrowing proceeds are given to private portfolios which are allocated to private capital markets and government debt.[1] Government borrowing thus redirected to the capital markets can have the effect of increasing real capital formation and thus growing the economy. If, on the other hand, redirected relief money increases the price of capital assets (relative to wages) without generating new real investment, then the policy may produce unintended wealth redistribution in the economy.

In the Covid-19 recession, all three effects likely occur in some measure. Increased risk aversion may suppress some economic activity and this "output gap" can be ameliorated by (1). Slowness of investment and production to adjust to major shifts in consumption allocation may be described by (2). Transfers to a large portion of the population rather than relief to only the hard-hit households are likely generating (3), and the extent of recent speculative asset price increases has raised concerns about a financial bubble, especially as the financial industry has recently popularized zero-commission and fractional share trading which eases the purchase of capital assets in smaller amounts.

To understand the potential effect of proposed relief payments on short-run consumption and saving, we look at the marginal propensities of consumption for households in the PWBM dynamic overlapping generations model. From aggregate consumption and production data in relation to the relief payments provided in 2020, we find that the Covid-19 economic shock had very uneven impacts on the economy. We, therefore, implement a targeted shock in our model. Our full analysis focuses on long-run macroeconomic consequences, here we look only at the short-run effect. Relief payments given to households are projected to be spent and saved according to the propensities in the model. Our analysis suggests that effect (3) dominates in the current environment with 73 percent of the relief payments likely to be allocated to the asset markets.[2]

Production and Consumption in the Covid-19 recession

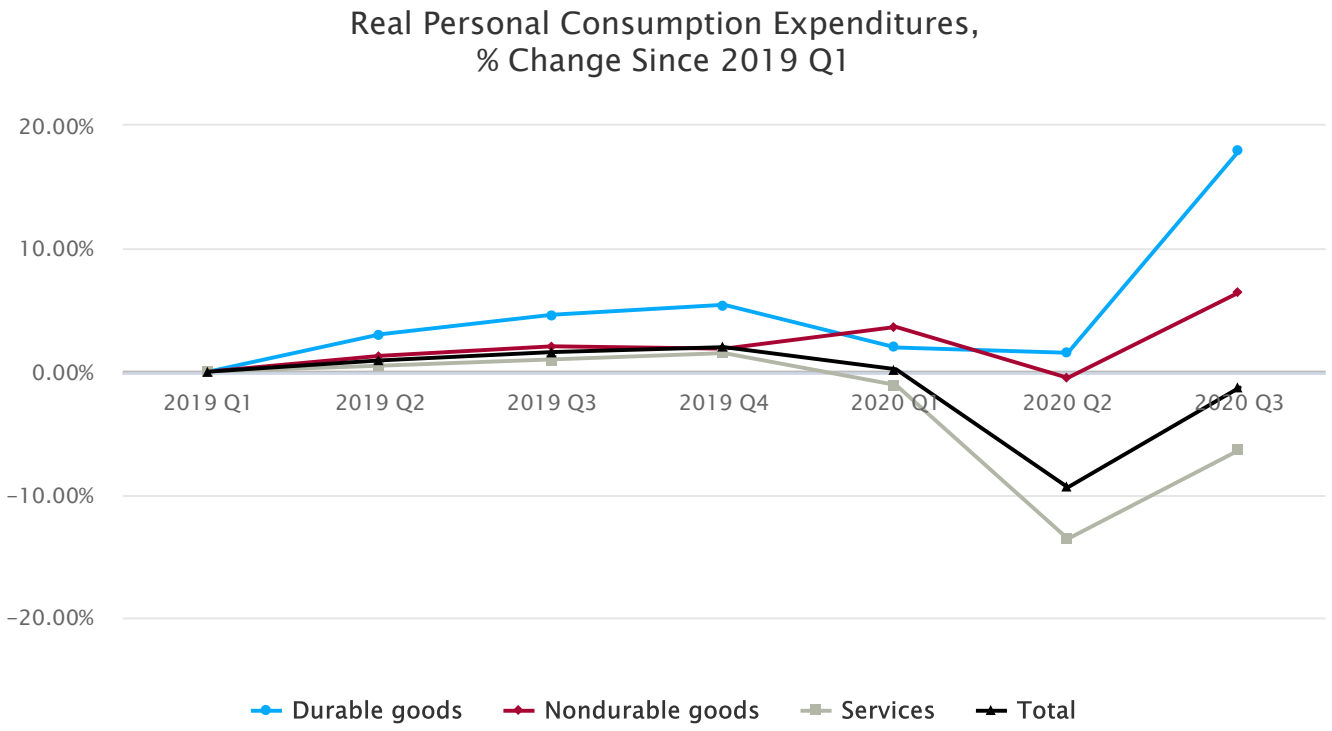
Using national aggregate data from the Bureau of Economic Analysis (BEA), we measure percent changes in sectoral production and consumption since the first quarter of 2019. The nominal amounts are deflated by BEA's sectoral price deflators in order to estimate real changes. We use this data to understand the nature of the recessionary shock and the potential consequences of broad transfer payments.

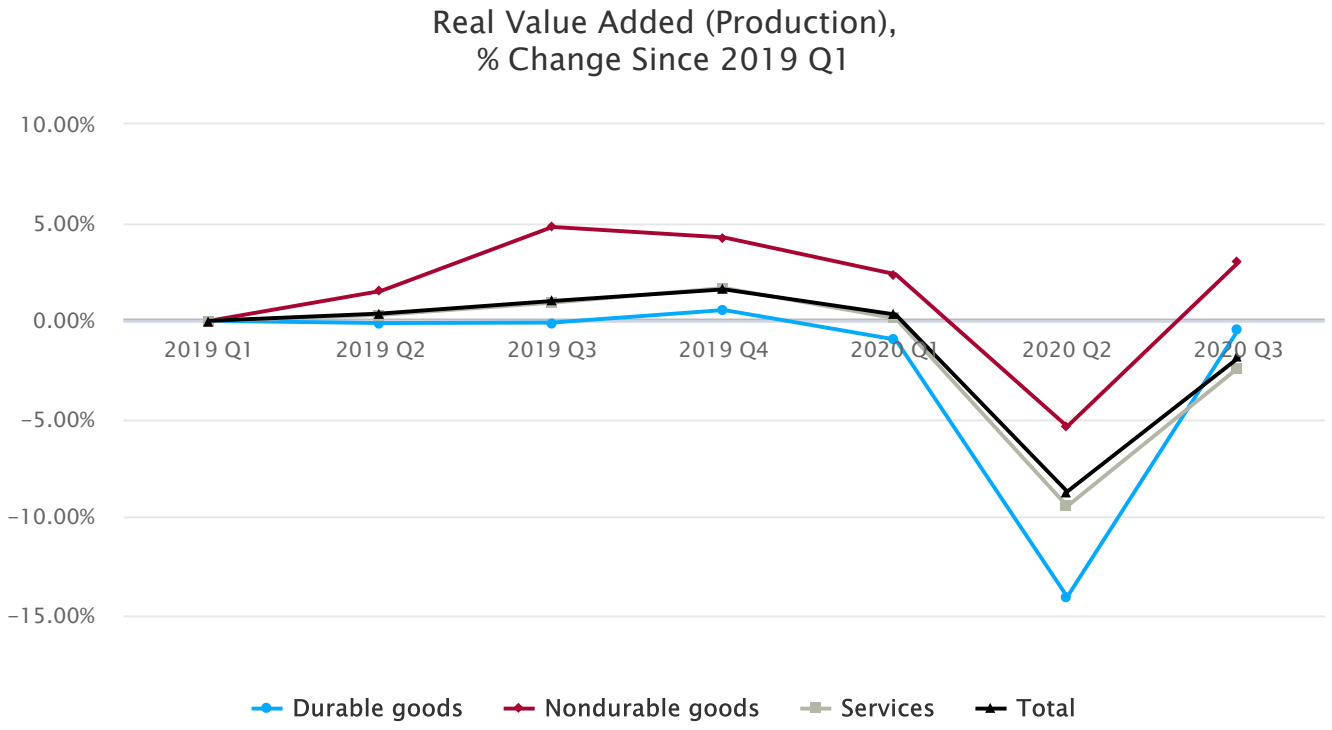
Figure 1 shows changes in aggregates—production ("value added"), consumption, price (both since 2019 Q1 and on an annualized quarter-on-quarter basis) and imports—for durable goods, nondurable goods, and services.

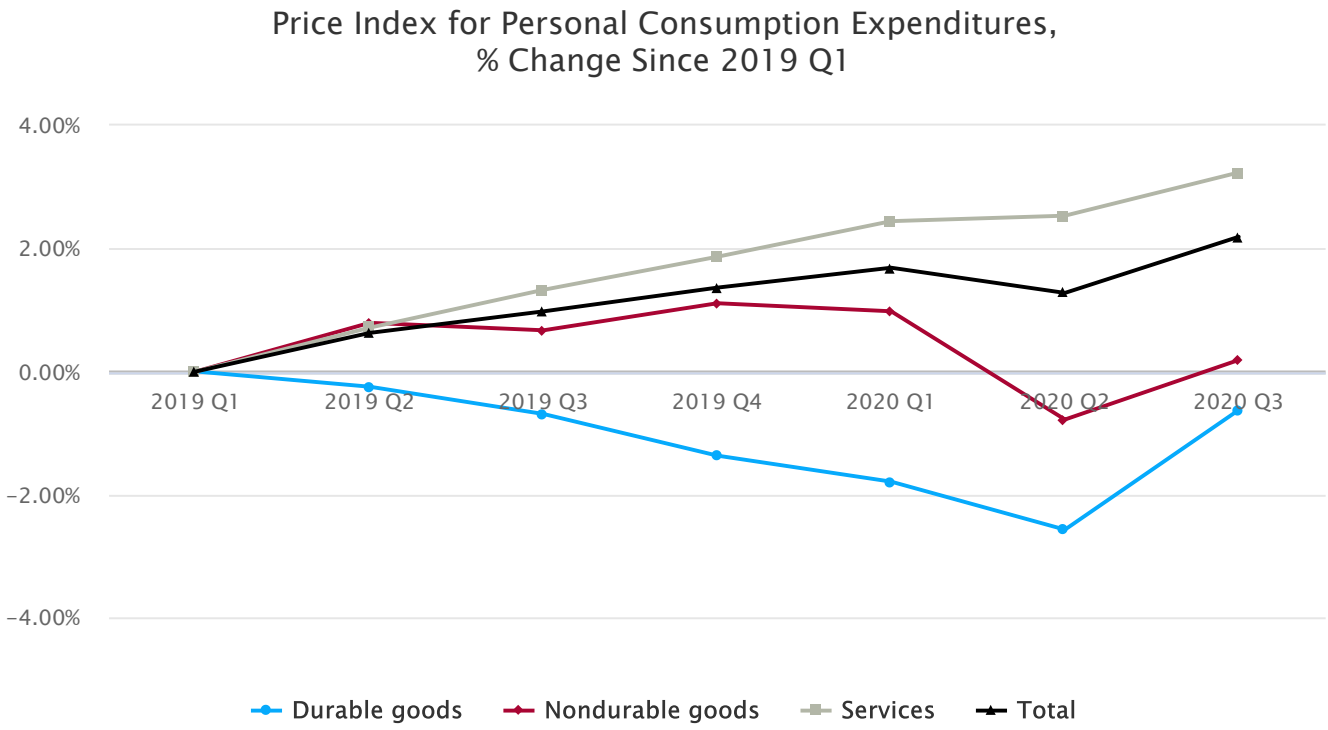
Figure 1. Changes in Aggregates for Durable Goods, Nondurable Goods, and Services

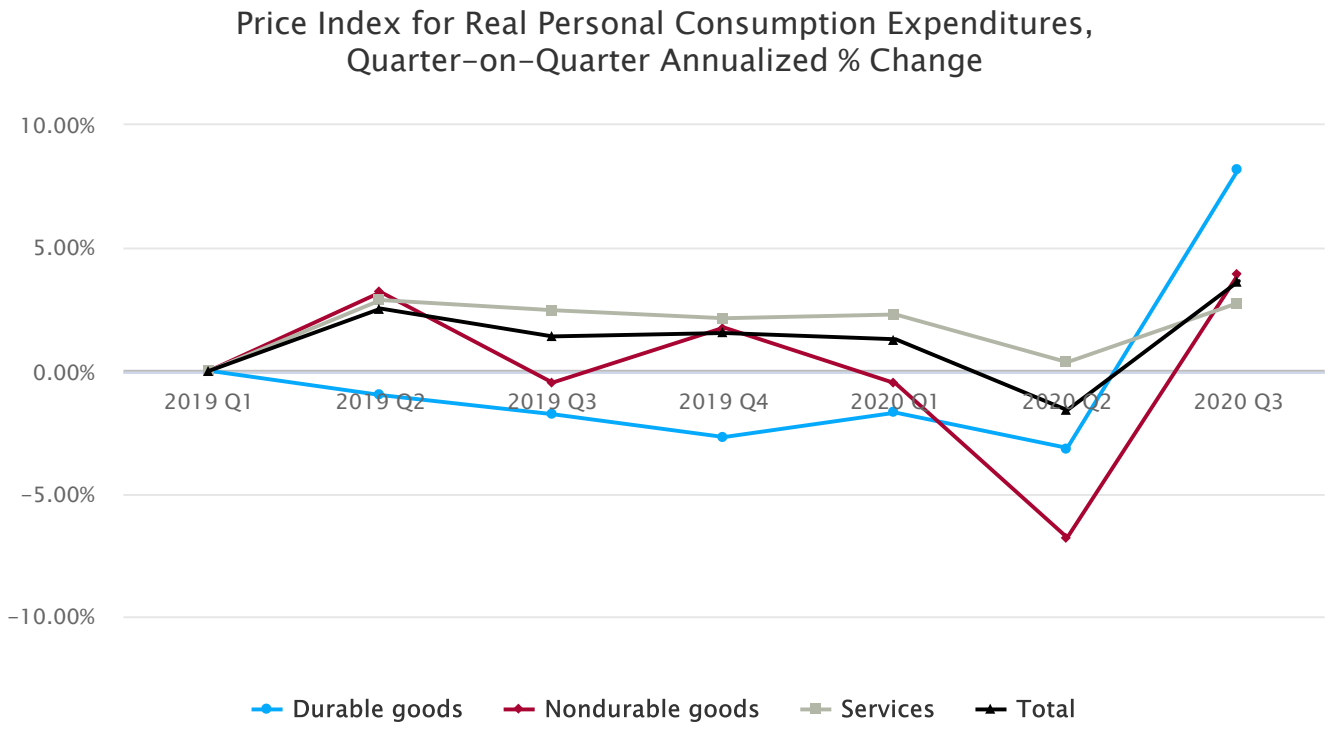
DOWNLOAD DATA

Real Personal Consumption Expenditures, % Change Since 2019 Q1 ▼









Total consumption and production in the U.S. economy declined by 1.3 percent and 1.9 percent, respectively, from 2019 Q1 to 2020 Q3. Declines in consumption occurred primarily for services (6.4 percent from 2019 Q1 to 2020 Q3) which were most affected by lockdowns and decreased in-person contact.

Figure 2 shows changes in aggregates—production ("value added"), consumption, price (both since 2019 Q1 and on an annualized quarter-on-quarter basis) and imports—for *durable goods*, broken down by sector.

Figure 2. Changes in Aggregates for Durable Goods, by Sector

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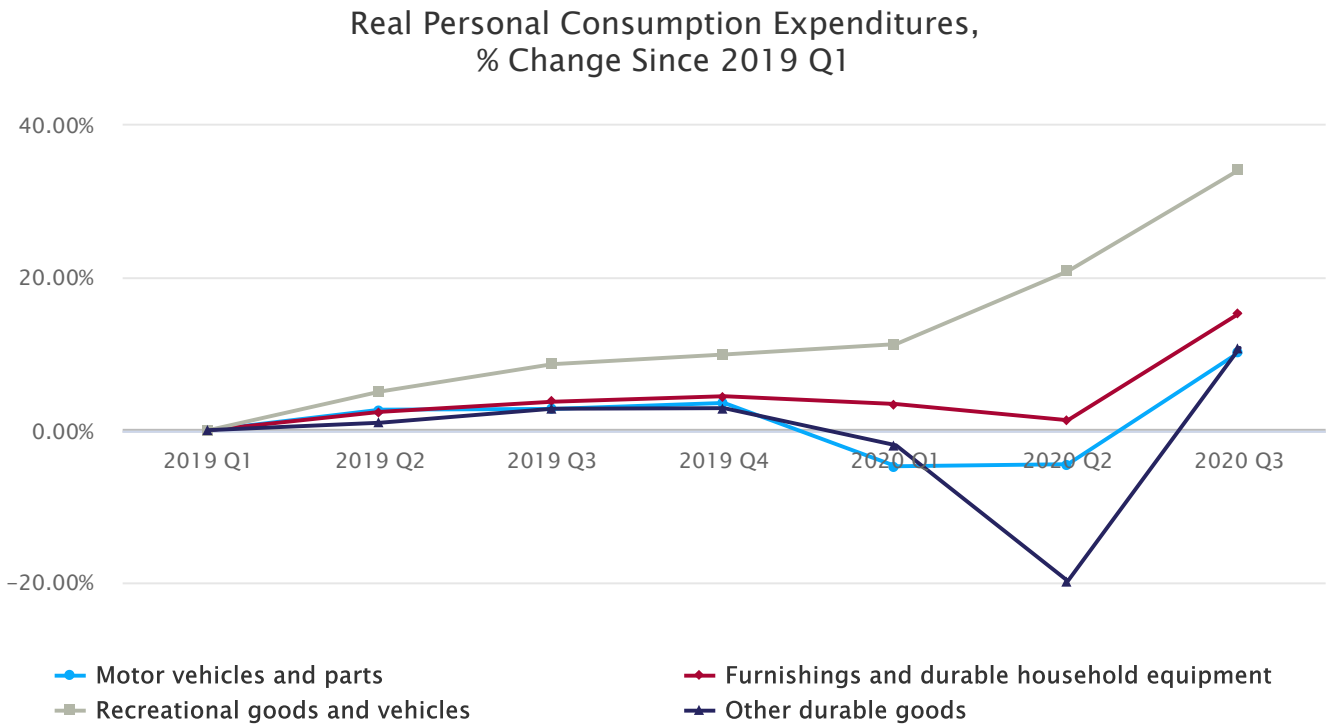
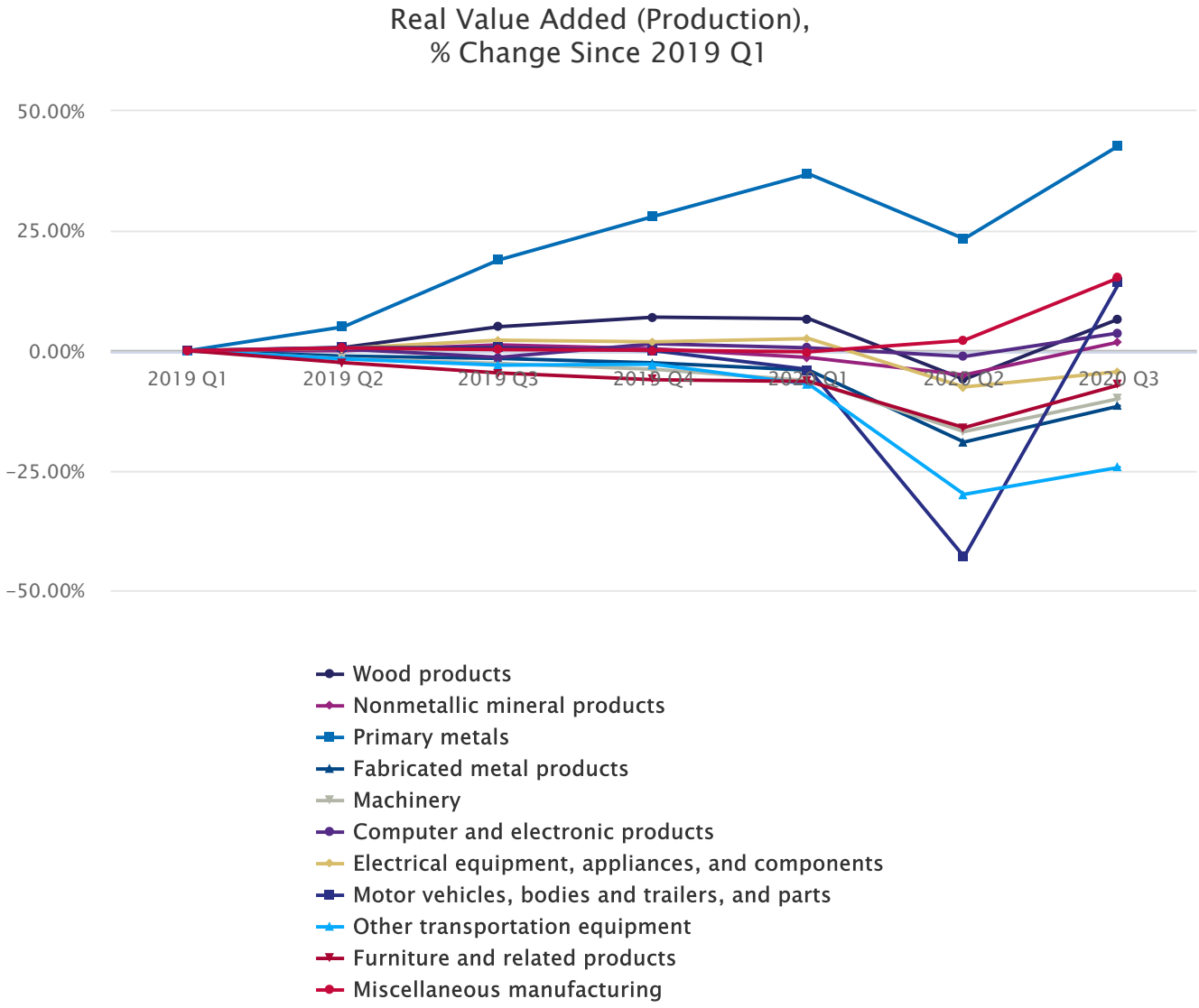
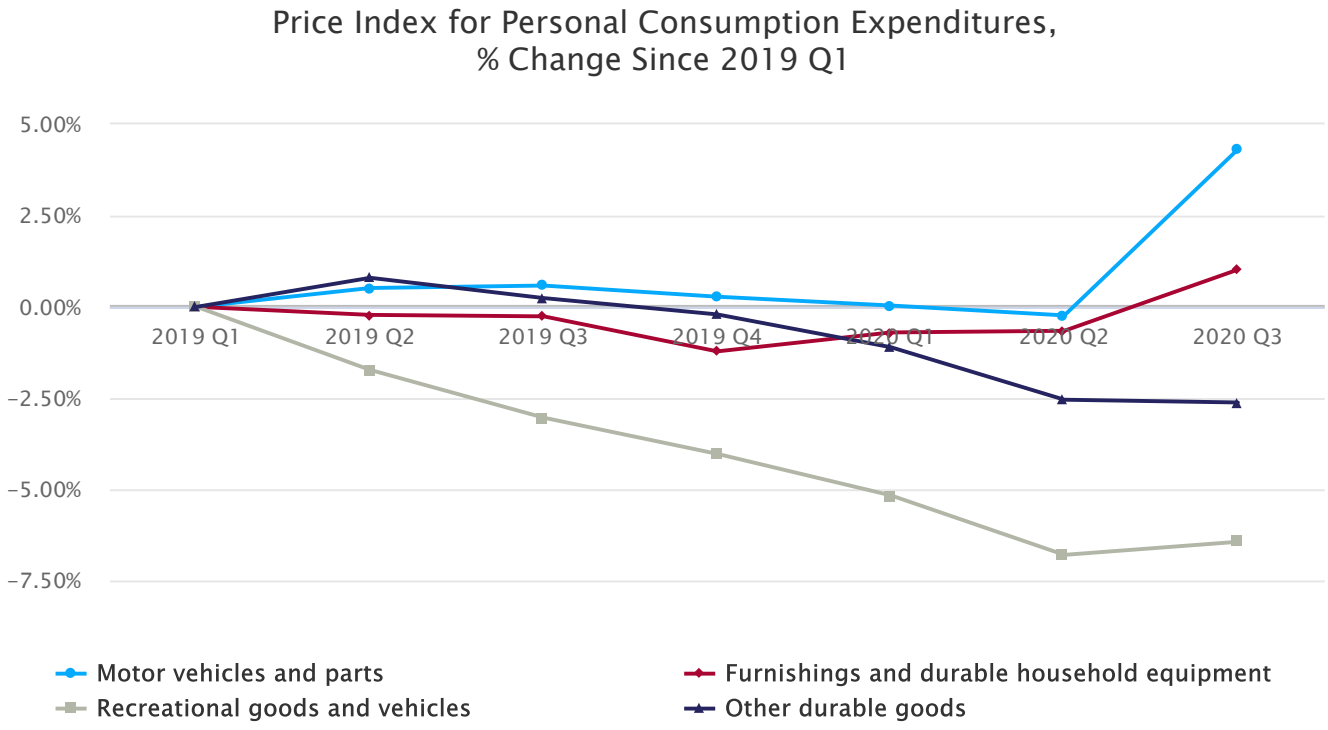
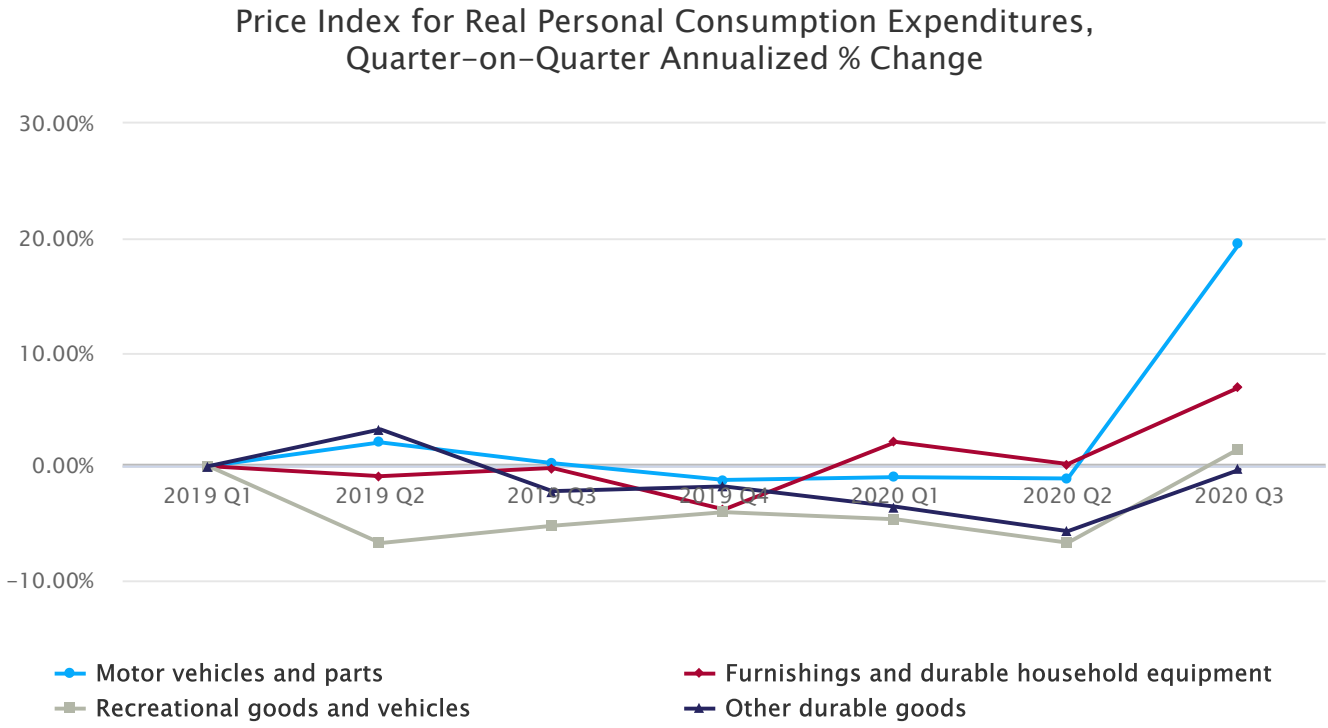
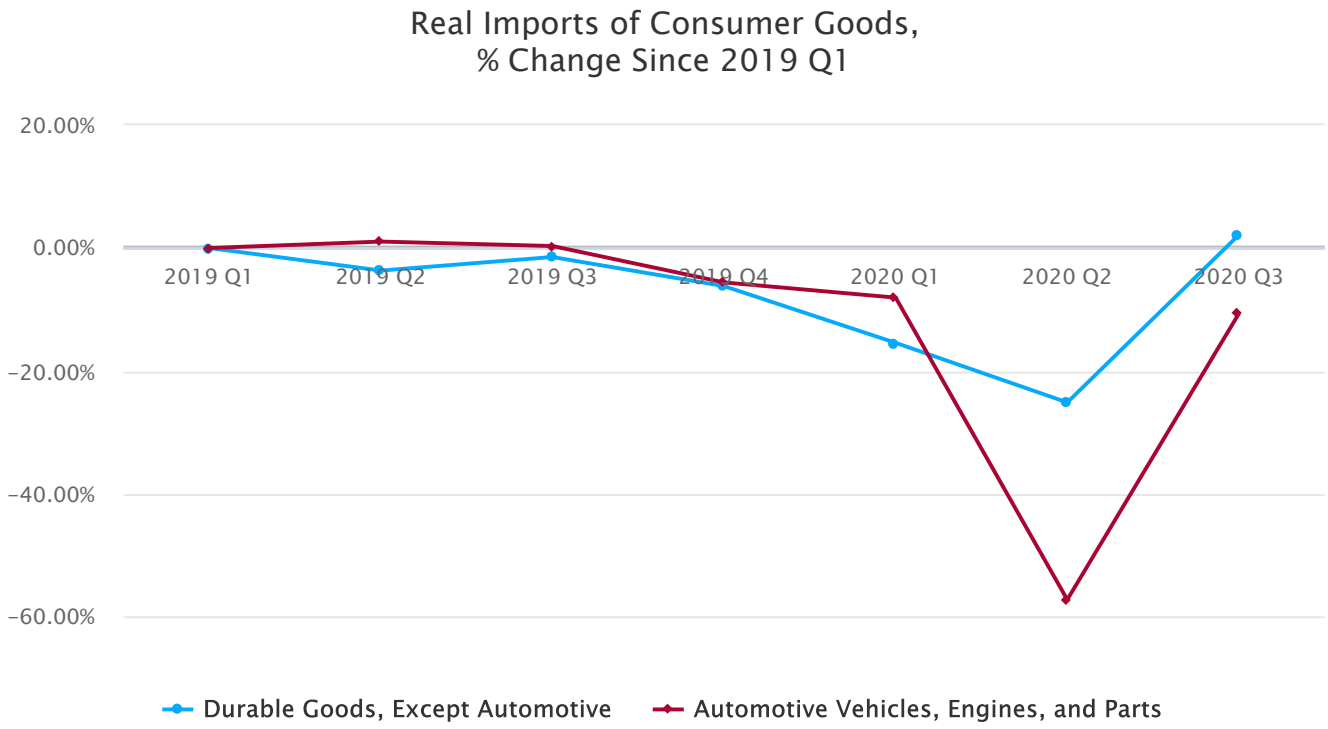
Real Personal Consumption Expenditures, % Change Since 2019 Q1




Real Value Added (Production),
% Change Since 2019 Q1
50.00%
25.00%
0.00%
-25.00%
-50.00%
2019 Q1
2019 Q2
2019 Q3
2019 Q4
2020 Q1
2020 Q2
2020 Q3
Wood products
Nonmetallic mineral products
Primary metals
Fabricated metal products
Machinery
Computer and electronic products
Electrical equipment, appliances, and components
Motor vehicles, bodies and trailers, and parts
Other transportation equipment
Furniture and related products
Miscellaneous manufacturing


Price Index for Personal Consumption Expenditures,
% Change Since 2019 Q1
5.00%
2.50%
0.00%
-2.50%
-5.00%
-7.50%
2019 Q1
2019 Q2
2019 Q3
2019 Q4
2020 Q1
2020 Q2
2020 Q3
Motor vehicles and parts
Furnishings and durable household equipment
Recreational goods and vehicles
Other durable goods





The total consumption of *durable goods* did not decline in 2020 and increased considerably in 2020 Q3 by 18 percent compared to 2019 Q1. It was most notably driven by an increase in demand for recreational goods and vehicles as people sought entertainment which was less restricted by stay-at-home orders and lockdowns. In the meantime, real value added by durable goods-producing manufacturing industries declined by 14 percent in 2020 Q2 and did not recover fully in the third quarter. Imports of consumer durable goods except automotives increased by 2.1 percent in the third quarter relative to 2019 Q1 while imports of automotive vehicles, engines and parts decreased by 10.7 percent. Since demand for durable goods went up, the mismatch between supply and demand was reflected in an annualized 8.2 percent increase in the price index for durable goods in 2020 Q3 from the previous quarter. We can suppose that U.S. manufacturers are

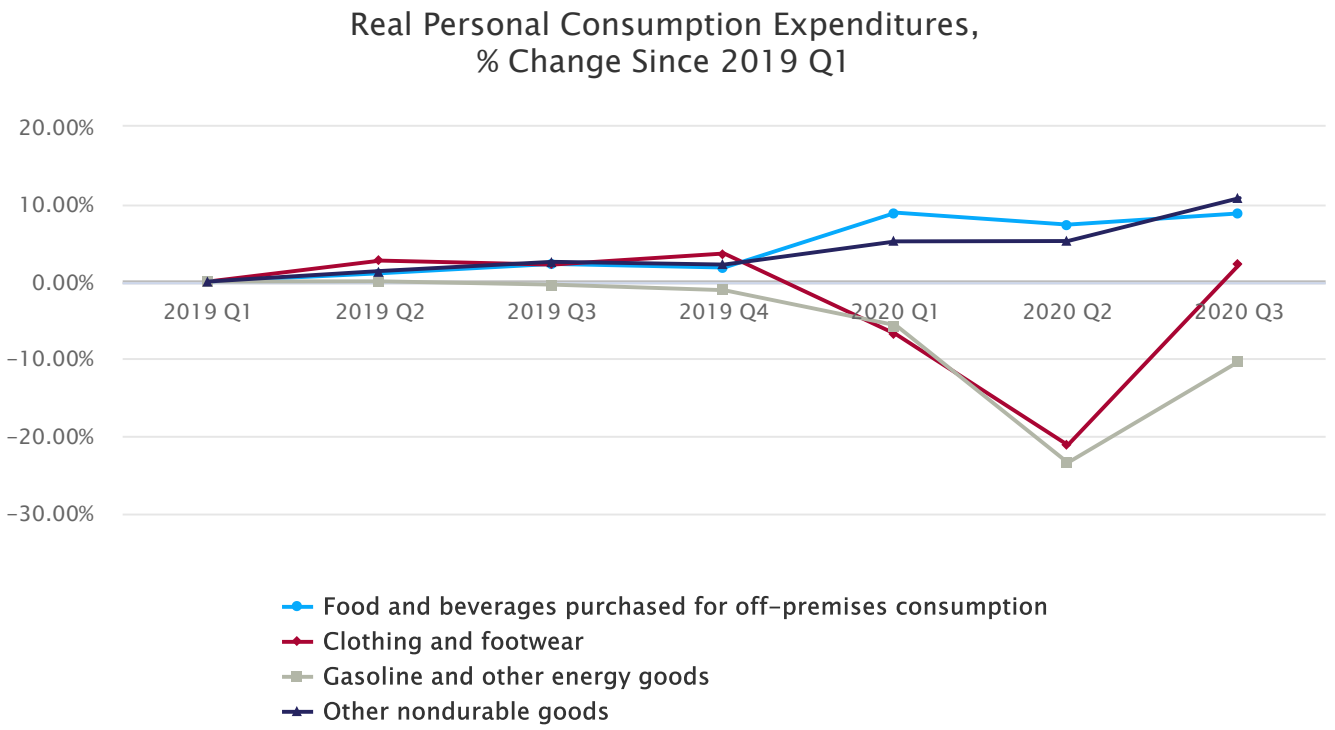
still adjusting to demand shifts, supply chain disruptions, and Covid-19 related production restrictions. These observations suggest that durable goods production is near full capacity and that further increases in aggregate demand would primarily increase price inflation and imports.

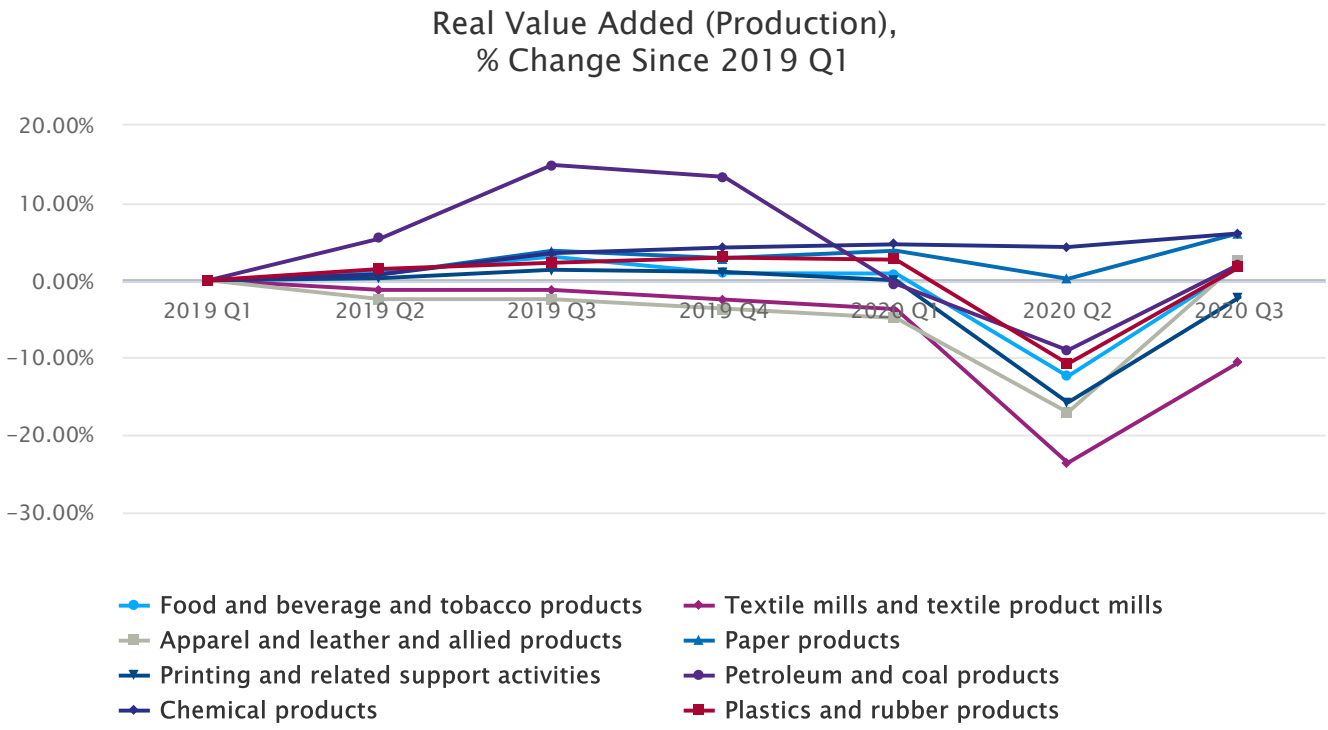
Figure 3 shows changes in aggregates—production, consumption, price changes, and imports—for *nondurable goods*, broken down by sector.

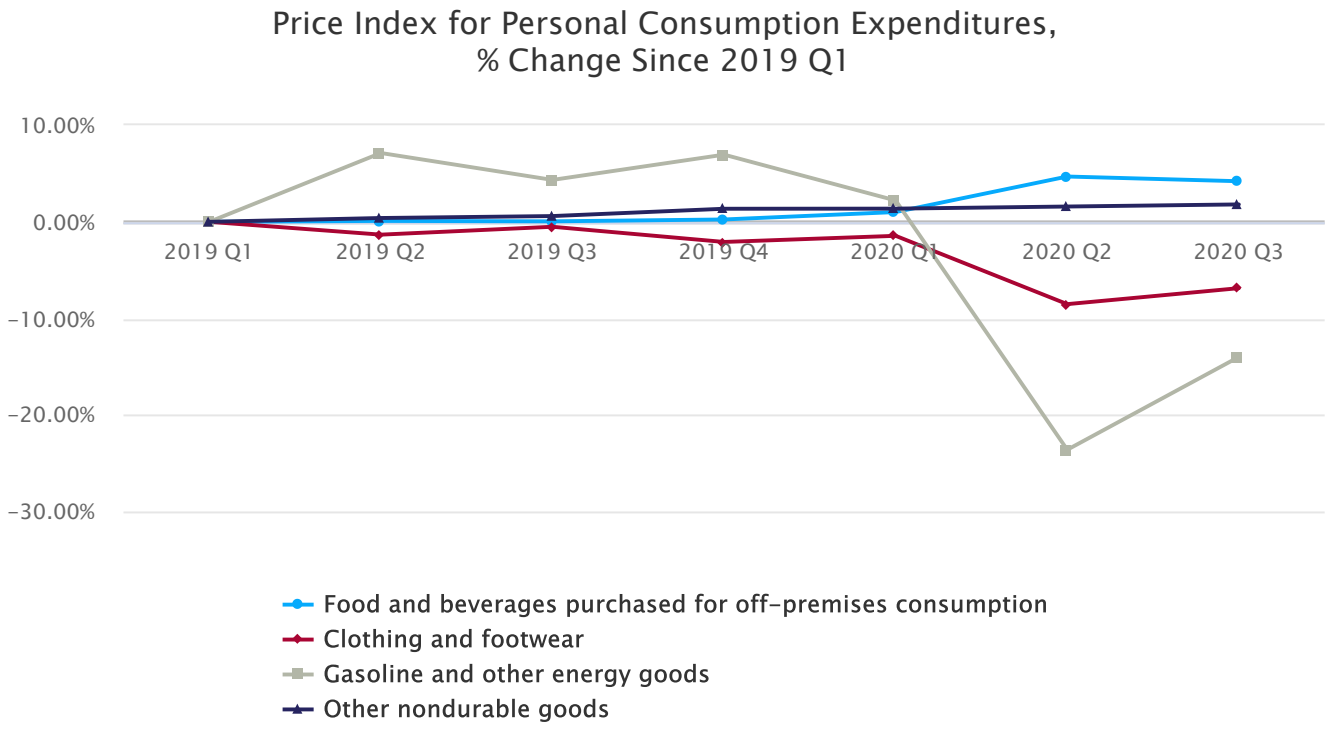
Figure 3. Changes in Aggregates for Nondurable Goods, by Sector

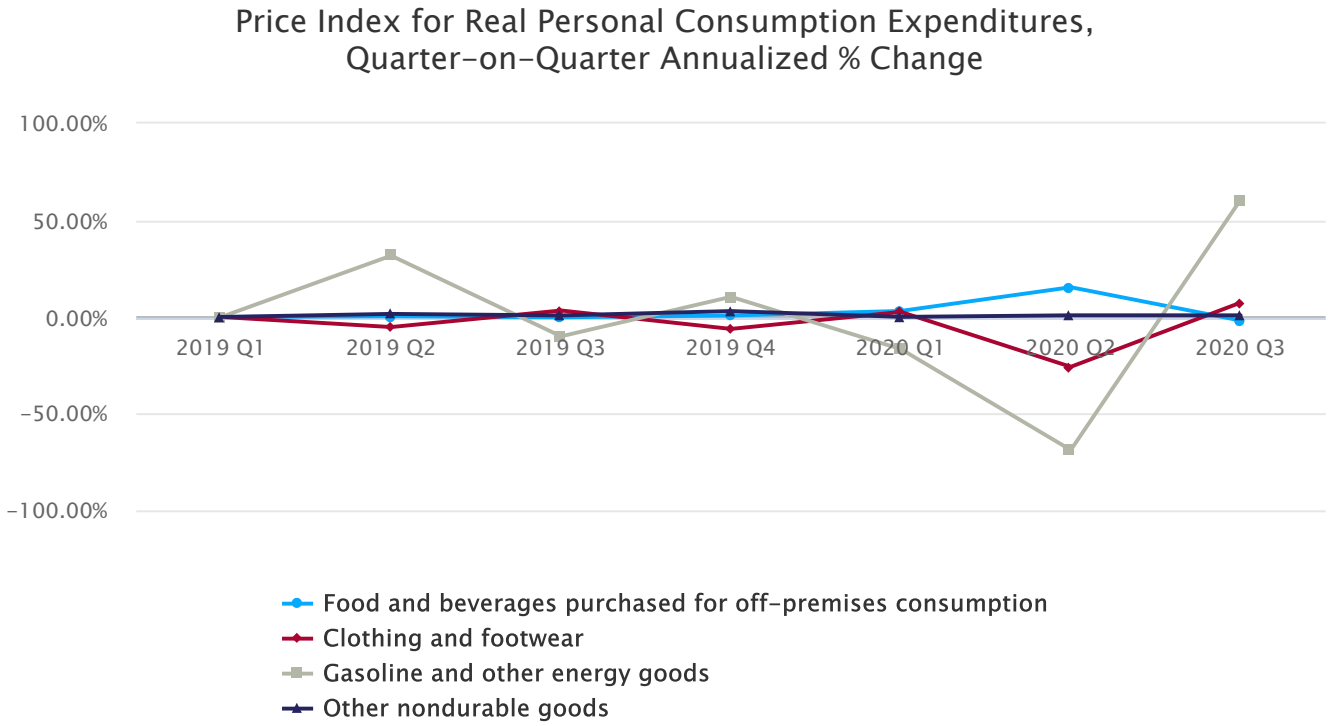
DOWNLOAD DATA

Real Personal Consumption Expenditures, % Change Since 2019 Q1 ▼




Real Value Added (Production),
% Change Since 2019 Q1
20.00%
10.00%
0.00%
-10.00%
-20.00%
-30.00%
2019 Q1
2019 Q2
2019 Q3
2019 Q4
2020 Q1
2020 Q2
2020 Q3
Food and beverage and tobacco products
Textile mills and textile product mills
Apparel and leather and allied products
Paper products
Printing and related support activities
Petroleum and coal products
Chemical products
Plastics and rubber products


Price Index for Personal Consumption Expenditures,
% Change Since 2019 Q1
10.00%
0.00%
-10.00%
-20.00%
-30.00%
2019 Q1
2019 Q2
2019 Q3
2019 Q4
2020 Q1
2020 Q2
2020 Q3
Food and beverages purchased for off-premises consumption
Clothing and footwear
Gasoline and other energy goods
Other nondurable goods



The change in *nondurable goods* consumption was more uneven, with a decline of over 20 percent from 2019 Q1 to 2020 Q2 in expenditures on clothing and footwear as well as gasoline. The former recovered in the third quarter while the latter was still down by 10 percent in 2020 Q3 as many people traveled less and worked from home. Compared to durable goods, nondurable goods manufacturing industries experienced a modest drop in production in 2020 Q2 except for textile product industries—total value added decreased by 5.4 percent during the second quarter followed by an increase of 3 percent in the third quarter relative to 2019 Q1. Imports of nondurable goods except food grew by 3.5 percent in 2020 Q3 and imports of foods, feeds and beverages grew by 6.8 percent. The modest rise in the aggregate price index for nondurable goods reflects less of a mismatch in supply and demand. Since consumption of nondurable goods is fairly stable and

has mostly recovered to pre-pandemic levels, we do not expect transfer payments to further stimulate demand for these goods.

Figure 4 shows changes in aggregates—production, consumption, price changes, and imports—for *services*, broken down by sector.

Figure 4. Changes in Aggregates for Services, by Sector

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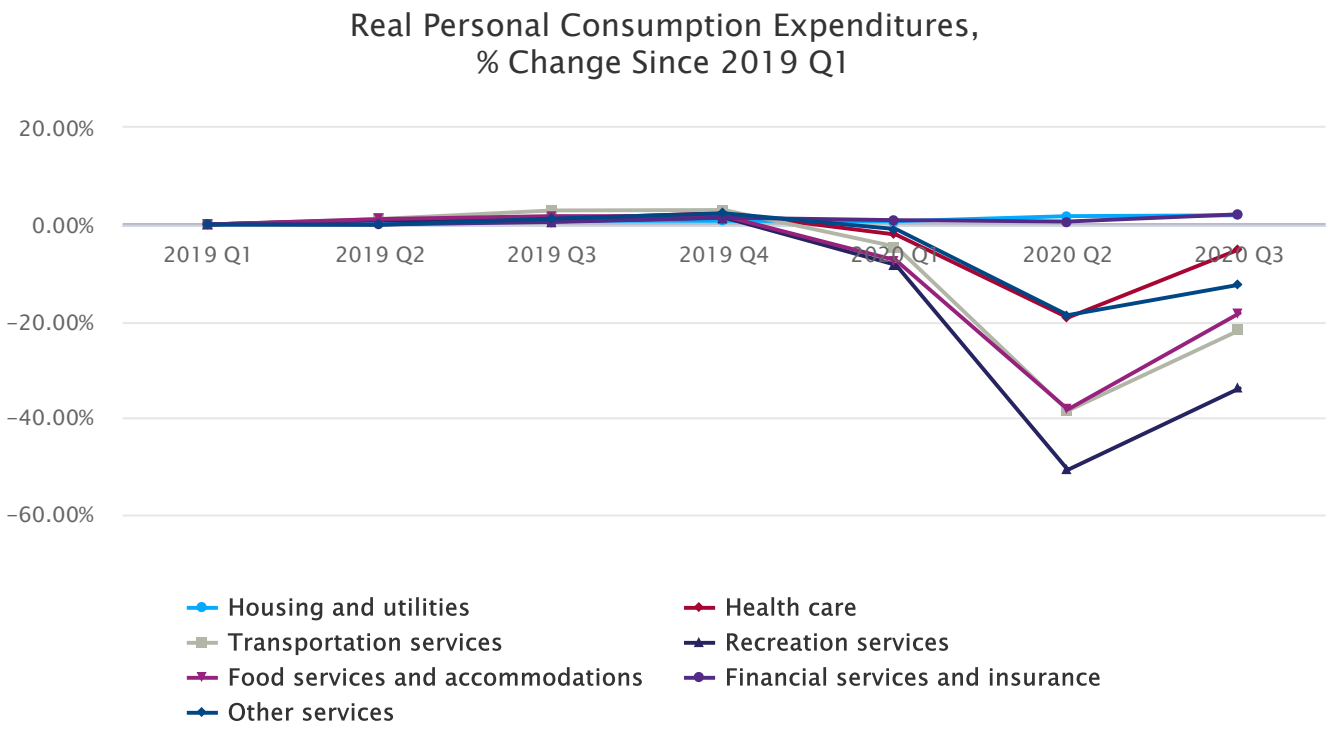
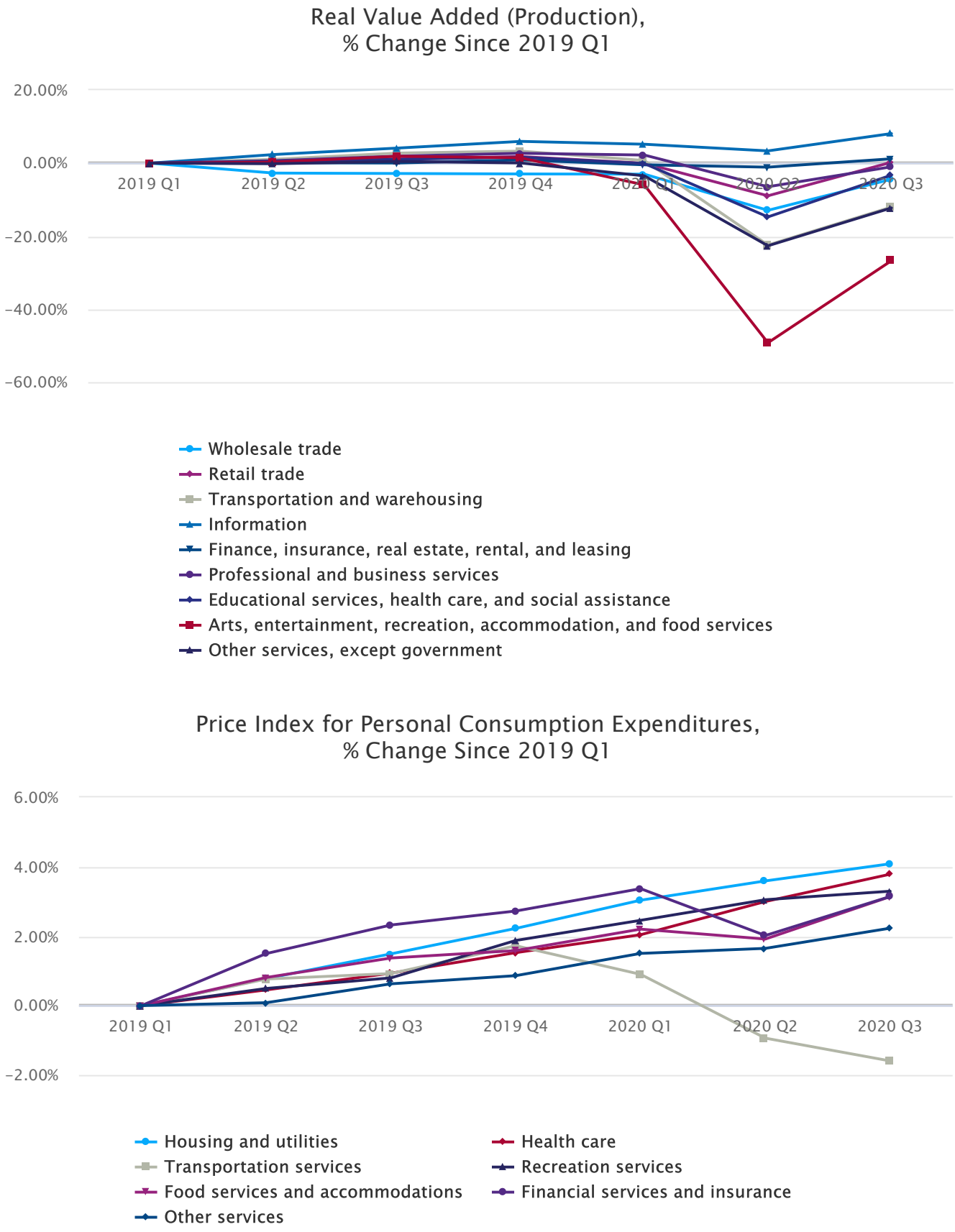
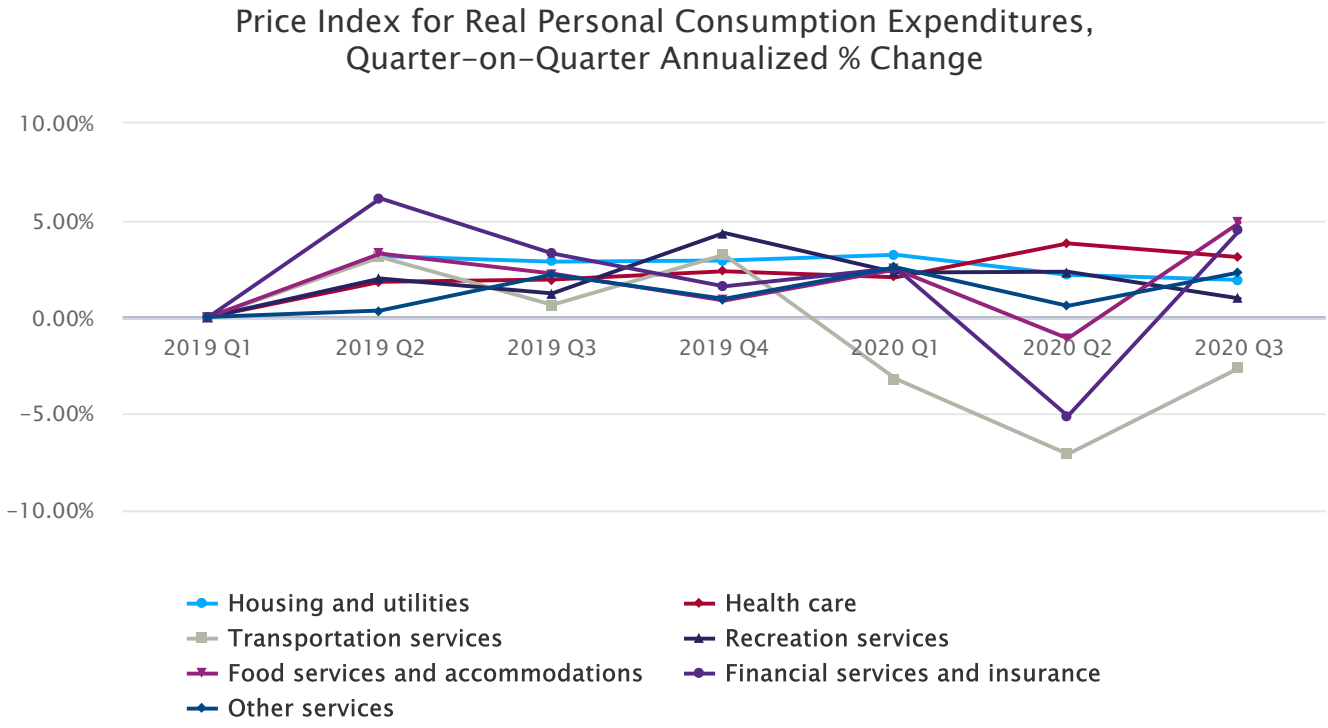
Real Personal Consumption Expenditures, % Change Since 2019 Q1




Real Value Added (Production),
% Change Since 2019 Q1
20.00%
0.00%
-20.00%
-40.00%
-60.00%
2019 Q1
2019 Q2
2019 Q3
2019 Q4
2020 Q1
2020 Q2
2020 Q3
Wholesale trade
Retail trade
Transportation and warehousing
Information
Finance, insurance, real estate, rental, and leasing
Professional and business services
Educational services, health care, and social assistance
Arts, entertainment, recreation, accommodation, and food services
Other services, except government
Price Index for Personal Consumption Expenditures,
% Change Since 2019 Q1
6.00%
4.00%
2.00%
0.00%
-2.00%
2019 Q1
2019 Q2
2019 Q3
2019 Q4
2020 Q1
2020 Q2
2020 Q3
Housing and utilities
Health care
Transportation services
Recreation services
Food services and accommodations
Financial services and insurance
Other services



The overall increase in goods consumption contrasts with a significant reduction in expenditures on most *service* industries apart from financial services and insurance, which do not require in-person contact, and housing and utilities, which were not disrupted by the pandemic.[3] Most service sectors saw a sharp decline in the second quarter of 2020, for example, by 19.3 percent for health care, 38.5 percent for transportation services, 38.3 percent for food services and accommodations, and more than 50 percent for recreation services. Expenditures on affected sectors were still noticeably below their pre-pandemic levels in the third quarter. Production declines in these sectors track consumption since consumers cannot spend their transfer payments on these sectors due to the shutdowns of restaurants, bars, movie theaters and gyms, and other types of businesses where services were provided. We observe a modest increase in the production of retail and information service industries in 2020 Q3, perhaps fueled by shifted consumer demand towards online services. Overall, expenditures on services were still 6.4 percent below their 2019 Q1 level while production was lower by 2.4 percent.[4] Since the decline in consumption and production of these affected industries was due to pandemic-related restrictions, we do not expect transfer payments to increase demand and stimulate production until the pandemic is under control and restrictions are lifted.

From the above analysis alone, we cannot rule out the possibility that some portion of stimulus payments in 2020 restored aggregate demand and therefore production. However, neither can we rule out that the recovery was caused by other policies implemented at the time or by declines in risk-aversion as households acquired more information about the pandemic. Nevertheless, the recovery in consumption and production in 2020 Q3 (and assuming the trend continues into 2021) implies that those sectors of the economy have little "output gap" to restore through additional stimulus.

Figure 5 shows net saving by sector as well as aggregate domestic investment.

Figure 5. Net Saving by Sector and Gross Domestic Investment

Billions of dollars, Seasonally Adjusted at Annual Rates

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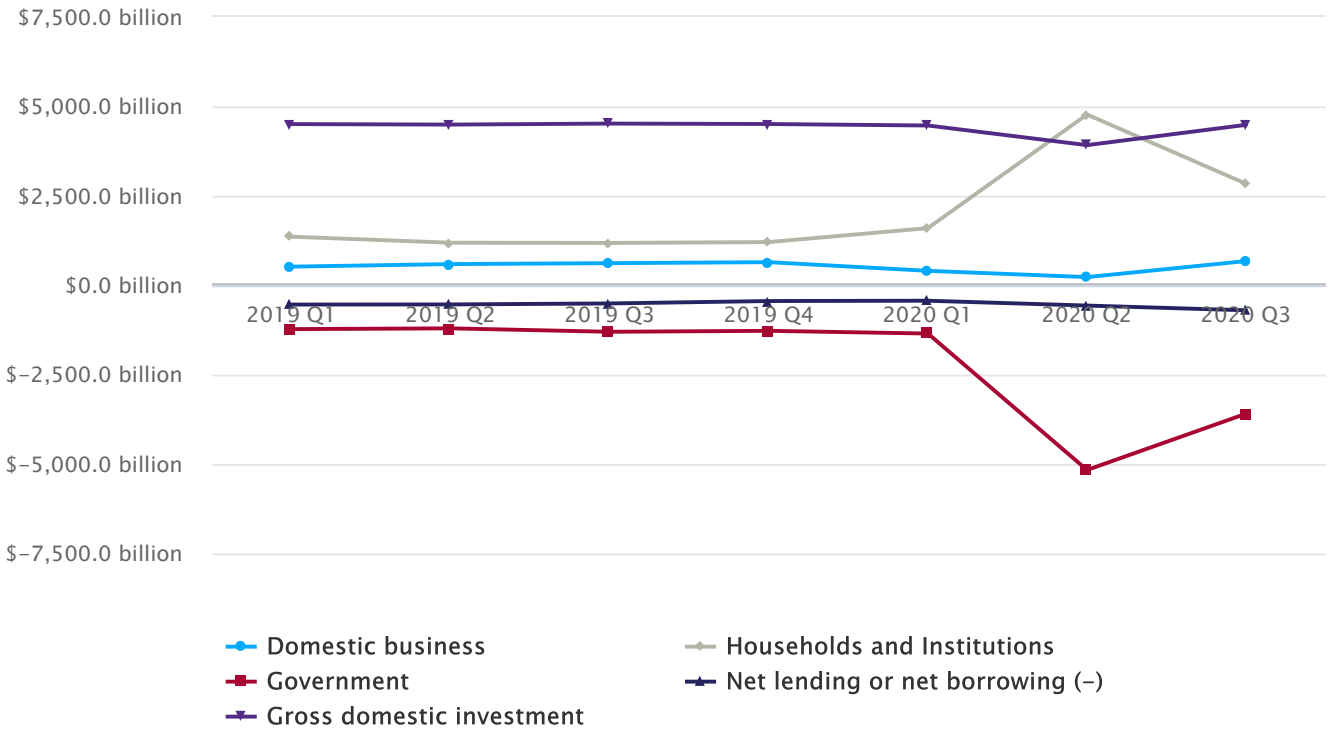

Household net saving went up significantly in the second and third quarters of 2020. This large flow results directly from national account identities because the deficit of one sector (the government in this case) must be the surplus of at least one other sector. After looking at production, consumption, investment, and trade flows, private sector savings remains as the source of government borrowing. In 2019, private household savings was $1.2 trillion while the government had a budget deficit of $1.3 trillion. On a seasonally adjusted annualized basis, the first quarter of 2020 began with household savings of $1.6 trillion and a budget deficit of $1.4 trillion. Because of its policy response to the pandemic, the government budget deficit jumped to $5.2 trillion in 2020 Q2 and $3.6 trillion in Q3 (seasonally adjusted and annualized). These monies increased household savings to $4.8 trillion in 2020 Q2 and $2.8 trillion in Q3 (seasonally adjusted and annualized). Some of the government's deficit was matched by increased lending from foreigners and the business sector, but these surpluses are small compared to U.S. household savings.[5] The large increase in savings did not manifest in increased real investment: gross investment was $4.5 trillion in 2019, dropped to $3.9 trillion in 2020 Q2, and recovered to $4.5 trillion in 2020 Q3 (seasonally adjusted and annualized).

Once the pandemic ends and restricted sectors recover, households will be able to spend on consumption in those sectors. This increased consumption is referred to as 'pent-up demand' or as deferred consumption. However, it is not clear that significant amounts of recessionary savings are used toward consumption recovery. A 2021 study finds that post-recession recoveries of nondurables and services tend to be muted and that it is primarily durable goods which follow a "pent-up demand" cycle.[6] This effect is consistent with a permanent-income theory of household finances where households smooth consumption through time, based on expected long-run income. Buying durables, as a household asset, is then a form of portfolio reallocation. Since the Covid-19 recession is primarily in service sectors, we do not expect to see significant flows from household savings into consumption of recovering sectors. Rather, the likely outcome is the resumption of pre-recession spending patterns from current income (with some temporary increase from near-term deferral).[7]

Marginal propensity to consume

The portion of the relief payment which is spent on consumption rather than put into savings depends on a variety of factors affecting the household. If income earners in the household are employed in a sector of the economy which is hard-hit by the recession and suffer significant income loss, then it is likely the transfer payment would be spent to compensate for the income loss. Lifecycle income planning by the household determines how the current shock affects saving. Wealth and age determine the degree to which transfers are spent on consumption with older and poorer households more likely to spend rather than save. Other factors may also influence the consumption-savings decision, including perceived returns in the asset markets.

Empirical estimates of the aggregate marginal propensity to consume (MPC) in the U.S. range from 0.05 to 0.9 depending on the event and sample of the study.[8] A study using recent data at the household level estimates the MPC by wealth quintile; they measure 0.218 for the first quintile, and 0.166, 0.002, 0.002, 0.015, for the subsequent wealth quintiles.[9] Another work surveying households on their spending of the 2020 relief payments finds limited effects on consumption.[10]

The consumption propensities of households in the PWBM dynamic overlapping generations model arise from the realized responses of model agents' optimizing behavior. After calibrating for the current economic environment, the values for the MPC by income quintile are 0.55, 0.40, 0.22, 0.13, and 0.12 respectively. These values are higher than the empirical estimates reported above since we include the effect of the ongoing recession in our analysis. During recessions, people use extra income to smooth out consumption and therefore MPCs tend to be higher than in normal times.

Using these values, we calculate the short-run effect on allocations between spending and saving in the model which result from the proposed relief payments. The model projects that, in aggregate, 27 percent of the relief transfer goes toward increased consumption and 73 percent goes to household savings.

Conclusion

Poorer households exposed to severe income shocks, due to their employment in hard-hit sectors, are supported by relief payments. Transfer payments, as redistribution, can reallocate economic activity by increasing consumption relative to savings and this demand growth, and in turn, could produce additional investment in order to increase production capacity. However, in a recession, firms understand that once a recovery occurs, the transfer payments will stop and there is no need to increase production capacity beyond pre-recession levels. As such, transfer payments serve to support production sector income (and reduce risk of owning productive assets) but do not stimulate additional investment. When provided to affected households, relief transfer payments support their consumption and restore income to production sectors which serve them.

Transfer payments to non-affected households, on the other hand, may produce consumption and savings beyond pre-recession levels. According to PWBM's analysis, the Biden administration's proposed $1400 relief payments, due to their distribution to a large section of the U.S. population, are projected to result mostly in additional savings and thereby cause a $348 billion allocation from government borrowing to household portfolios. National accounts data appear to indicate that most economic sectors are operating near pre-recession levels, with notable exceptions for service sectors reliant on in person interaction and transportation. Since production and consumption in these underperforming sectors are limited while the pandemic continues, stimulus payments are unlikely to expand economic activity in those sectors.

This analysis was conducted by Marcos Dinerstein, Zheli He, and Xiaoyue Sun and directed by Efraim Berkovich. Prepared for the website by Mariko Paulson.

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1. If households save into government bonds, then the net effect of that portion of the transfer payment superficially appears to be neutral—that is, like borrowing a dollar from yourself. However, the distribution effects may not be neutral since government debt is repaid by all taxpayers while only some acquire government bonds from the transfer payment. ↩
2. Paying down household debt is equivalent to savings when one considers liability as a 'negative' asset. ↩
3. Rent forbearance and moratoriums reduced evictions of households experiencing income shocks. ↩
4. As most of the services consumed by households are produced domestically, trade in services does not play an important role. ↩
5. On a seasonally adjusted annualized basis, net lending from foreigners increased from $0.43 billion in 2020 Q1 to $0.57 billion and $0.7 billion in the second and third quarters of 2020, while net private saving by domestic business decreased from $0.4 billion in 2020 Q1 to $0.2 billion in the second quarter and went back up to $0.67 billion in the third quarter. ↩
6. Martin Beraja and Christian K. Wolf. (2021) "Demand Composition and the Strength of Recoveries", *NBER Working Paper* ↩
7. By 'near-term' deferral, we mean, for example, taking a vacation in autumn 2021 which was scheduled for spring 2021. Vacations not taken in 2020 are lost consumption. ↩
8. Carroll, C., Slacalek, J., Tokuoka, K. and White, M.N. (2017), The distribution of wealth and the marginal propensity to consume. Quantitative Economics, 8: 977-1020. ↩
9. Fisher, Jonathan, David Johnson, Timothy Smeeding, and Jeffrey P. Thompson. 2019. "Estimating the Marginal Propensity to Consume Using the Distributions of Income, Consumption, and Wealth." Federal Reserve Bank of Boston Research Department Working Papers No. 19-4. ↩
10. "HOW DID U.S. CONSUMERS USE THEIR STIMULUS PAYMENTS?" by Olivier Coibion, Yuriy Gorodnichenko, and Michael Weber, 2020 ↩