# Developing Experimental State Quarterly Personal Consumption Expenditures

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- AbstractBEA produces annual personal consumption expenditures (PCE) by state statistics, providing critical insights into households' consumption at the state<br/>level. These statistics, however, are produced with a 10-month lag. To address<br/>this issue, ongoing research by BEA's Regional Economics Directorate has<br/>focused on the development of quarterly PCE by state statistics. This paper<br/>outlines the methods and data sources used, along with preliminary statistics<br/>from this effort. We employ a variety of data sources, adjust them to align to<br/>BEA's concepts and framework, and use them as indicators to interpolate and<br/>benchmark the quarterly estimates to both annual PCE by state and national<br/>quarterly PCE statistics. In addition to being timelier, these statistics, were<br/>they to be produced on regular basis, would complement BEA's state quarterly<br/>gross domestic product and state quarterly personal income statistics to pro-<br/>vide a more comprehensive and timely view of the state economies.

**Keywords** Personal consumption expenditures, regional economics

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The views expressed in this paper are those of the authors and do not necessarily represent the U.S. Bureau of Economic Analysis, or the U.S. Department of Commerce.

# 1. Introduction

BEA publishes annual personal consumption expenditures (PCE) by state statistics. These statistics measure the value of goods and services purchased by, or on behalf of, households residing in each state and the District of Columbia. They show differences in the baskets of goods and services consumed across states and over time, offering insights into regional economic trends, preferences, and the influence of local factors on consumption such as changes in prices or income levels.

PCE is a broad-based, national economic accounts spending concept that contrasts with other, narrower measures of money-based consumer spending. Accounting for nearly 70 percent of the nation's gross domestic product (GDP), it plays a critical role in driving future economic growth and is closely monitored by businesses and policymakers. At the state level, PCE is an important indicator of state economic growth and of the well-being of households in each state.

PCE by state statistics have limitations, however, regarding timeliness and latency, being published only once a year with a 10-month lag from the reference period. For timelier and higher frequency information, data users turn to other sources, such as quarterly or monthly national PCE statistics, quarterly state wage or income statistics, or the U.S. Census Bureau's Monthly State Retail Sales statistics (e.g., Guren *et al.* 2021). However, such sources may not be adequate for many purposes, either because they do not capture state-specific consumption basket changes or because they do not adhere to PCE concepts.

To fill this data gap, BEA has been researching the feasibility of producing more timely and frequent statelevel PCE statistics. This paper outlines the concepts and methods involved and presents experimental quarterly PCE by state statistics from this effort.

To illustrate the importance of quarterly spending information, figure 1 compares the percent change in annual and quarterly PCE statistics in BEA's National Income and Product Accounts (NIPAs). This comparison is particularly insightful during the COVID–19 pandemic. While the annual PCE statistics indicate an overall drop in consumption in 2020, the quarterly statistics reveal a more nuanced narrative. They highlight a sharp decline in consumption during the second quarter of 2020, followed by a rapid recovery in the third quarter of the same year. This contrast demonstrates how quarterly data can capture short-term fluctuations and trends that are not evident in annual statistics.



#### Figure 1. Comparison of Annual and Quarterly NIPA PCE, 2019-2023

NIPA National Income and Product Accounts

PCE Personal consumption expenditures

Note. This figure compares the percent change in annual NIPA PCE with the percent change in quarterly NIPA PCE. Quarterly percent changes shown are annualized; they are a percent change from the preceding period at annual rates.

Sources. NIPA table 2.4.5. and authors' calculations

U.S. Bureau of Economic Analysis

The timeliness of the quarterly PCE statistics is important not only for understanding short-term shifts in consumption, but also for complementing other key BEA statistics such as state personal income and GDP by state, which are also published quarterly. Together, these statistics would offer a more comprehensive and timely view of state economies.

We estimate the quarterly PCE statistics in three general steps. First, we identify quarterly source data for each consumption category. Next, we adjust the source data to remove non-household and non-consumption expenditures. Finally, using the adjusted data for each category, we build indicators that we then use to interpolate the quarters from the annual PCE estimates using the Denton interpolation method (Denton 1971) and benchmark the quarters to both annual PCE by state totals and quarterly national PCE totals.

The rest of the paper is organized as follows. Section 2 provides an overview of the PCE concepts and framework. Section 3 discusses the source data and methods used to prepare the quarterly PCE by state statistics. Section 4 presents preliminary estimates. Section 5 outlines next steps.

## 2. Concepts and Framework

In the NIPAs, PCE is a measure of the consumption expenditures of U.S. residents. PCE includes expenditures by residents even when they occur abroad but excludes spending by nonresidents within the United States. The measurement of PCE aligns with the measurement of personal income in the national accounts, allowing for consistent measurement of personal saving.

While other spending measures exist, PCE is an important broad measure of consumption expenditures. It includes not only households' out-of-pocket spending, but also imputations for consumption of services that are not transacted in markets, consumption expenditures financed through in-kind and third-party payments, and the net costs incurred by nonprofit institutions serving households (NPISHs). PCE excludes services that are included in government consumption expenditures such as free public education and medical care in veterans' hospitals. The NIPA handbook provides a detailed discussion of expenditures that are included or excluded from PCE (see BEA 2023).

These concepts are directly extended to PCE by state. There are, however, minor differences in coverage between the national PCE statistics and PCE by state.<sup>1</sup> For example, national PCE includes purchases by government civilian and military personnel stationed abroad, regardless of the duration of their assignments, and by U.S. residents who are traveling or working abroad for 1 year or less. Such expenditures are excluded from PCE by state because they cannot be attributed to a particular state.

PCE by state measures the value of goods and services purchased by, or on behalf of, households and by NPISHs that are resident in each of the 50 states and in the District of Columbia, including their expenditures on activities outside of the state. Any out-of-state purchases are assigned to the state in which the consumer resides, allowing for geographic consistency in the reporting of income and spending.

PCE includes expenditures financed by third-party payers on behalf of households, such as employer-paid health insurance and medical care financed through government programs, and expenses associated with life insurance and with private and government employee pension plans. For PCE by state, these expenditures are allocated to the state in which the individual resides.

PCE includes imputations for consumption of certain services that are not associated with market transactions to keep PCE invariant to how certain services are provided. One important case is owner-occupied housing services. This imputation approximates the rent a homeowner would pay if renting an equivalent home, so that the measurement of consumption of housing services by owner-occupants is comparable to that of renters. No adjustment is made to PCE by state for the residency of the owner of a second home (for example, the housing services associated with a vacation home in Florida are attributed to Florida even if the owner lives in New York).

<sup>&</sup>lt;sup>1</sup> For a more detailed discussion on residency in the national and regional economic accounts, see Ledia Guci and Nicholas Wetzler, "<u>New and Updated Estimates of the Regional Economic Accounts, Results of the 2023</u> <u>Comprehensive Update</u>," *Survey of Current Business* (December 2023).

Imputations also occur in the measurement of financial services such as financial services furnished without explicit payment to banks or similar institutions, service charges of mutual funds or similar institutions, and net expenditures of pension plans, which are attributable to the state of residence of the individual borrower, depositor, investor, or plan beneficiary.

The net expenditures of NPISHs are also included in PCE. The NPISHs, however, can be resident in one state but benefit residents of other states—for example, an NPISH may operate out of the District of Columbia but serve individuals who reside in all the 50 states. The expenditures of NPISHs are attributed to the state in which the NPISH resides, and no attempt is made to allocate it to the states of eventual beneficiaries.

Finally, goods and services purchased by nonresidents are commingled in the source data used to estimate individual PCE category expenditures. In the NIPAs, these purchases are netted out in the aggregate as part of net foreign travel, but not from the individual PCE categories. PCE by state follows the same approach, netting out nonresident expenditures in the aggregate as part of the net foreign travel component for each state. These expenditures are particularly important in tourist destination states such as Hawaii and Nevada. More information on the concepts relevant to PCE by state including the measurement of net foreign travel is provided in the state PCE methodology (see BEA 2024).

# 3. Source Data and Methods

This section discusses the source data and methods used to prepare PCE by state estimates starting with the annual estimates followed by the quarterly estimates. BEA uses a variety of data sources to estimate annual PCE by state. The most comprehensive source is the Economic Census (EC) conducted by the U.S. Census Bureau every 5 years. The EC collects detailed information at the state level on sales and revenues (receipts) of retail trade and services industries. In addition, it collects product and service lines information and class-of-customer data that break down industry receipts by purchasing sector (including the household sector).

The EC provides benchmark expenditures that reflect the location of the sale to the consumer. To estimate these expenditures, class-of-customer ratios for households are first applied to the industry receipts to remove the purchases that are not made by the household sector. For each industry, the household portion of the receipts is then broken down into goods and services using information on the industry's product and service lines. Finally, the goods/services receipts are aggregated to detailed PCE categories.

For non-EC years, state-level annual wages and salaries for the industries that sell the PCE product/service to households from the U.S. Bureau of Labor Statistics (BLS) Quarterly Census of Employment and Wages (QCEW) are used to interpolate and extrapolate corresponding PCE expenditures. Most categories of goods and several categories of services are estimated based on EC receipts and QCEW wages. Because these estimates reflect the location of sale, they are further adjusted to reflect the residency of the consumer.

The remaining categories use annual data from other federal sources. These include data from the Census Bureau's American Community Survey (ACS), U.S. Bureau of Transportation Statistics (BTS), Centers for

Medicare & Medicaid Services (CMS), Federal Deposit Insurance Corporation (FDIC), National Credit Union Administration (NCUA), National Association of Insurance Commissioners (NAIC), National Center for Education Statistics, International Trade Administration's Survey of International Air Travelers (SIAT), and Statistics of Income from the Internal Revenue Service. For detailed information on the source data and methods used for annual PCE by state, including the residency adjustment method, see BEA (2024).

To estimate quarterly PCE by state statistics, we align the source data as closely as possible with the data used for the annual statistics. Most categories of goods and many service categories rely on quarterly wage statistics from QCEW and card transaction data from Fiserv, a major card intermediary. Such data are adjusted with data that were used to construct annual statistics, specifically, EC product/service lines and class of customer data.

We supplement these primary sources with quarterly data from other federal agencies, including BLS's Current Employment Statistics (CES), the Census Bureau's Survey of Construction (SOC) and Building Permits Survey (BPS), FDIC, NCUA, BTS, the Energy Information Administration (EIA), and SIAT, and annual data from ACS. In addition, we use BEA's internal detailed annual PCE by state statistics and national quarterly PCE statistics to benchmark the quarterly PCE by state statistics. Note that the experimental quarterly PCE by state statistics presented in this paper are benchmarked to annual PCE by state before the 2024 annual update of these statistics.

Table 1 summarizes the data sources and specifies the PCE categories that rely on each source. For the rest of this section, we describe adjustments that are made to these data sources and how they are used to prepare experimental quarterly PCE by state estimates. In the discussion of the methodology, we divide the estimates into four main groups based on the data sources: (1) estimates based on EC/QCEW/CES data (2) estimates based on the Fiserv data, (3) estimates based on ACS/SOC/BPS/EIA data, and (4) all remaining categories.

The first two groups cover nearly all goods and many services categories. The third group covers housing and utilities expenditures. Finally, the last group covers financial services, air transportation, and net foreign travel that are based on FDIC, NCUA, BTS, and SIAT and a few smaller categories for which there are no quarterly data available at the state level, and corresponding national quarterly PCE patterns are used.

Source data	PCE by state categories	Data description					
EC/QCEW/CES	Most PCE goods categories and several services categories, including motor vehicles, recreational goods and services, health care, ground and water transportation, and insurance.	EC: class of customer, product lines QCEW: wages CES: employment					
ACS/SOC/BPS	Tenant- and owner-occupied housing	<u>ACS:</u> housing stocks and average rents <u>SOC:</u> housing completions, start/end dates <u>Permits:</u> residential building permits issued					
EIA	Electricity, gas	Monthly number of consumers					
FDIC/NCUA	Financial services	<u>FDIC:</u> loans, deposits, noninterest income, and service charges for commercial banks and depository institutions <u>NCUA:</u> loans, deposits, noninterest income, and service charges for credit unions					
SIAT	Net foreign travel	Travel expenditures					
BTS	Air transportation	Financial reports and customer reports					
Fiserv	Gasoline, food services, accommodations, and other categories with sizable card-based transactions (see also table 2).	Credit and debit card transactions					
State annual PCE	All categories	Annual state PCE expenditures					
NIPA PCE	All categories	Quarterly NIPA PCE expenditures					

#### Table 1. Principal Source Data for Quarterly PCE by State

ACS American Community Survey, U.S. Census Bureau

BTS Bureau of Transportation Statistics, U.S. Department of Transportation

BPS Building Permits Survey, U.S. Census Bureau

CES Current Employment Statistics, U.S. Bureau of Labor Statistics

EC Economic Census, U.S. Census Bureau

**EIA** Energy Information Administration

FDIC Federal Deposit Insurance Corporation

NCUA National Credit Union Administration

NIPA National Income and Product Accounts

PCE Personal consumption expenditures

QCEW Quarterly Census of Employment and Wages, U.S. Bureau of Labor Statistics

SIAT Survey of International Air Travelers, International Trade Administration

SOC Survey of Construction, U.S. Census Bureau

Figure 2 shows the relative contributions to total expenditures for the categories of spending that are estimated using each of these groups of data sources. The largest share of expenditures, about 55 percent, is made up of consumption categories estimated with QCEW data. Consumption categories for which expenditures are estimated with Fiserv data comprise about 17 percent. The ACS/SOC/BPS/EIA sources are used to estimate spending on housing and utilities categories that make up about 17 percent of the total. The other sources used for the remaining categories account for about 11 percent of total expenditures.



#### Figure 2. Source Data Contributions to Quarterly PCE by State

U.S. Bureau of Economic Analysis

#### 3.1 EC/QCEW/CES-Based Estimates

Limited availability of state-level expenditure data from official sources has been a common challenge in academic research and the development of annual and quarterly PCE statistics. To address this challenge, wages have, on many occasions, proxied for expenditures, enabling researchers to gain insights into consumer spending patterns. This is the approach currently used by BEA to prepare several categories of annual PCE by state statistics. More recently, a wage-based approach has been employed by Guren *et al.* (2021).

The concept behind wages as a proxy for spending is the link between sales in a particular retail or service sector and labor inputs associated with that sector. The use of wage data assumes that changes in wages for the industries that sell the PCE goods/services to households reasonably approximate the changes in receipts for these industries. BEA has studied this assumption extensively. For example, Awuku-Budu *et al.* (2013) extrapolated state-level expenditures for various PCE categories from a given EC year to the next, using annual QCEW wages by industry and state. By comparing these estimates to results derived from actual EC receipts for the latter, they find that wages provide reliable estimates for EC-based PCE expenditures. More recently, Dunn and Gholizadeh (2025) examined how well wages predict revenues in EC years. By regressing growth rates of EC revenues in EC years on QCEW wage growth rates over the same periods, they find that the QCEW growth rates are closely correlated with EC growth rates.

Quarterly wages from the QCEW have played a pivotal role in the development of the experimental quarterly PCE by state statistics. The advantage of using QCEW is that it provides comprehensive statelevel data for detailed industries classified using the North American Industry Classification System (NAICS) that cover a diverse range of PCE categories spanning both goods and services. One limitation of QCEW, however, relates to its processing time. QCEW is a census of all covered employers that is compiled by state unemployment insurance agencies and then provided to BLS to be processed and made available in a consistent format. As a result, the quarterly QCEW data become available with a lag of approximately 5 months from the reference quarter. The development of the quarterly spending statistics requires a data source with timelier information. To supplement the QCEW data, we incorporate employment data from the CES as an extrapolator, which is replaced with QCEW data once the QCEW data are published. This is consistent with what is done to estimate quarterly GDP and personal income by state.

To estimate quarterly personal income and GDP by state, QCEW wage data are seasonally adjusted at the 2-digit NAICS level using the Census Bureau's X-13 ARIMA software to remove seasonality.<sup>2</sup> For the experimental quarterly PCE by state estimates, the QCEW wage data were initially seasonally adjusted at the 3- and 4-digit NAICS level also using the X-13 ARIMA software. QCEW 3- and 4-digit NAICS level data were chosen because PCE is estimated by product line rather than by industry and product lines require a finer level of industry break-out. Unfortunately, for a significant number of state-industry QCEW wage series, there are irregular patterns that seasonal adjustment does not detect and adjust to make the data stable enough for use in estimating quarterly PCE by state estimates. Instead, a four-quarter moving average of the 3- and 4-digit NAICS QCEW wage data was used to temper the impact of sharp irregular and regular wage movements. These initial quarterly indicator series by industry and state are further adjusted using the EC household shares (used to remove business and government spending) and assigned to consumption categories using EC product/service line shares (used to assign retail and services industries to product categories).

$$PCE_{cgt} = \sum_{i=1}^{n} Wages_{igt} \times household \ share_{igt} \times product \ line \ share_{icgt}$$
(1)  
i: NAICS industry, c: PCE category, g: geography, t: time (year/quarter)

<sup>&</sup>lt;sup>2</sup> For more information, see "<u>Concepts and Methods of the U.S. National Income and Product Accounts (Chapter 5:</u> <u>Personal Consumption Expenditures)</u>" on BEA's website.

For example, general merchandise stores sell a variety of products including clothing and accessories, furniture and appliances, and food and beverages, so general merchandise store sales are distributed to these consumption categories. Purchases made by businesses and government are removed using the share of sales that are to households only. These adjustments ensure that the composition of the quarterly indicator series matches the composition of receipts in the annual PCE statistics.

Finally, the adjusted quarterly indicator series are used as a pattern series to interpolate quarterly estimates using the proportional Denton method. This method is widely used in BEA's national and regional accounts because it minimizes the changes in the relative growth rates of the interpolated series while maintaining consistency with the low-frequency statistics. The interpolation is an iterative process that scales the results to the national quarterly PCE and annual PCE by state statistics until both the four quarters of PCE by state average to the annual PCE by state statistics and the quarterly sum of states or each PCE category converges to the national quarterly PCE. The most current quarter is extrapolated using the most recent interpolated value as a base and is controlled to national totals.

#### 3.2 Fiserv Card Spending-Based Estimates

Fiserv is a card transaction intermediary that processes transactions for establishments around the world. It includes all types of card transactions (e.g., Visa, MasterCard, Discover, and others). The Fiserv dataset consists of billions of transactions from approximately 4.5 million firms within all states and the District of Columbia. The unit of observation is a single transaction at a firm. These data are adjusted to a constant-merchant sample, aggregated by state (of the merchant), month, 3- or 4-digit NAICS industry, and benchmarked to the 2012 EC. The data are available beginning with the first quarter of 2011. The aggregation method was originally developed by Aladangady *et al.* (2019).

Card transaction data have the notable advantage of timeliness, as they are generally available less than a week after the end of the reference period. In addition, they provide direct information on sales, which is more directly linked to household consumption than are other data such as wages. However, there are some limitations to these data. First, the data may not be representative of the population, and thus even with the adjustments described above, may incorporate some bias. This issue is mitigated by the fact that we benchmark all series to national quarterly PCE and annual PCE by state. Second, the data may be suppressed by the data provider based on disclosure concerns. This limitation is addressed by imputing missing observations.

Table 2 lists 12 3-digit NAICS industries and one 4-digit industry in the Fiserv dataset that are used to prepare the experimental quarterly PCE by state statistics. These industries were chosen based on the assumption that a substantial proportion of the transactions in these industries are card-based transactions, such as in restaurants, grocery stores, or gas stations. The first column in the table shows the industry and the associated NAICS code. The second column shows the percentage of observations that are missing across all quarters and states in the Fiserv data (due to disclosure considerations).

Industry (NAICS code)	Percent of observations missing
Automotive parts, accessories, and tire stores (4413)	4.0
Furniture and home furnishings stores (442)	9.3
Building material and garden equipment and supplies dealers (444)	4.8
Food and beverage stores (445)	1.7
Gasoline stations (447)	1.7
Clothing and clothing accessories stores (448)	3.0
Sporting goods, hobby, musical instrument, and book stores (451)	13.2
Professional, scientific, and technical services (541)	4.0
Amusement, gambling, and recreation industries (713)	8.0
Accommodation (721)	2.6
Food services and drinking places (722)	0.0
Repair and maintenance (811)	0.0
Personal and laundry services (812)	0.9

#### Table 2. Fiserv Data Used and Percent of Missing Observations Across All Quarters and States

NAICS North American Industry Classification System

Note. This table shows the industries in the Fiserv data that are used to prepare the experimental quarterly PCE by state statistics. The last column indicates the percent of missing observation across all quarters and states.

Sources. Fiserv and authors' calculations.

As table 2 shows, there are a limited number of missing values within the data for each NAICS industry, most of which are concentrated in smaller states. To address this issue, a systematic approach was developed to impute the missing observations. The algorithm has three main stages:

- Impute intermittent missing values. When there are missing values in the middle of the time series for a particular state, these are imputed using another Fiserv or QCEW series for that state. For industries categorized as retail or food services, we utilized Fiserv's year-over-year aggregate growth rates for retail and food services. If the industry falls under the services category (except food services), we rely on the year-over-year QCEW growth rates for the same industry.
- 2. If, after imputing intermittent missing values, we have fewer than 24 consecutive quarters of data available, the indicator series for that state is eliminated from the Fiserv-based calculation of PCE by state.
- 3. If, after imputing intermittent missing values, we have 24 or more consecutive quarters of data available, but there are still incomplete consecutive quarters of data (more than one or two quarters in a row) in the early part of the time series, the missing state/industry indicator values are filled in with the quarter-over-quarter growth rate of the QCEW indicator series (described above) on a best-change basis moving backward in time.

After imputing the missing observations, the first step in the estimation is to seasonally adjust the time series to remove the average effect of variations of about the same magnitude that normally occur at about the same time each year—for example, the effect of weather or holidays. We seasonally adjust the series using the Census Bureau's X-13 ARIMA software.

Like with the QCEW-based estimates, the next step is to assign the industry information to PCE categories. The quarterly Fiserv-based indicator series by industry and state are adjusted using the EC household share and assigned to consumption categories using the EC product/service line shares (equation 1). Finally, the adjusted quarterly indicator series by industry and state are used as a pattern series to interpolate quarterly estimates using the proportional Denton method described above.

Table 3 illustrates the share of expenditures in selected aggregated PCE categories estimated using Fiserv data. The first column lists the PCE categories where consumers are more likely to use cards for payment. The second column displays the expenditure share estimated with Fiserv data in each category.

PCE Category	Share of expenditures estimated using Fiserv data
Food services and accommodations	94.8%
Food and beverages purchased for off-premises consumption	14.7%
Gasoline and other energy goods	93.5%
Motor vehicles and parts	15.7%
Other services	25.9%
Recreational services	26.2%

### Table 3. Selected PCE Categories Generated Using Fiserv as Indicator Series

PCE Personal consumption expenditures

Note. This table shows the share of category expenditures estimated using Fiserv data. It is computed as the total of expenditures for detailed categories that use Fiserv data, even if the Fiserv data are imputed or replaced by QCEW for some states, divided by the total expenditures for the corresponding aggregate category.

Source. Authors' calculations.

The categories selected for estimation with the Fiserv data predominantly consist of components of larger categories where households tend to use cards to make those purchases and for which states have robust data quality. For example, for food services and accommodations, which have good data coverage, we use card transactions data to estimate around 95 percent of total consumption in that category. In contrast, for motor vehicles and parts we use Fiserv data for only around 16 percent of the total. Occasionally, for smaller states, Fiserv is replaced with QCEW.

#### 3.3 ACS/SOC/BPS/EIA-Based Estimates

The ACS/SOC/BPS/EIA data sources are used to estimate quarterly expenditures for housing and utilities. This category of spending is made up in large part of an imputation. Housing services are defined as the rents that tenants pay to landlords plus imputed rents for owner-occupied housing, which are defined as the rent that a homeowner would pay for an equivalent home. This treatment of owner-occupied housing ensures that changes over time or differences across states in homeownership rates do not result in spurious variation in housing services statistics.

The state methodology requires information on what kind of homes and how many homes are occupied by owners and tenants in each state and time period. This information is generally only collected on an annual basis in the ACS. Thus, quarterly statistics are estimated from data sources that can provide some information on quarter-to-quarter changes in the number of available housing units in an area.

The SOC provides information on construction starts for the nation and for regions and on completions of new single-family and multifamily housing units. In addition, it includes statistics on sales of new single-family homes in the United States. It covers new privately owned residential buildings currently authorized by a building permit or started in areas not requiring a building permit. At the national level, SOC's completion data are used in the creation of a quarterly tenant and owner-occupied housing indicator series.

The SOC is published monthly. Housing completions and housing start and end dates are available only for Census divisions and Census regions. Building permit data from BPS, however, are available monthly for each state. These data consist of information on the number of residential building permits issued. Thus, an allocator based on permit counts (lagged by 1 year) is used to distribute to states the housing completions reported for divisions or regions. These are further allocated proportionally to housing types (owner occupied, tenant occupied, and farm). Table 4 provides a summary of the data sources that are used for the experimental quarterly estimates of housing services.

Source data	Description
	Frequency: annual
ACS	Geography: state
	Data: housing stocks and average rents
	Frequency: monthly
SOC	Geography: Census division and region
	Data: housing completions, start/end dates
	Frequency: monthly
BPS	Geography: state
	Data: residential building permits issued

#### **Table 4. Source Data for Housing Services**

ACS American Community Survey, U.S. Census Bureau

**BPS** Building Permits Survey, U.S. Census Bureau **SOC** Survey of Construction, U.S. Census Bureau

Since completions are a flow variable (they represent a change in stock), we cumulate quarterly completions by state (after allocation to states via permit information) to estimate the stock of housing in each quarter. For a given year, the formula to compute the state housing stock indicator in each quarter is as follows:

$$N_{s,q} = N_{s,q-1} + C_{d,q} (P_{s,q-4}/P_{d,q-4})$$
(2)  
N: number of units, C: completions, P: permits, s: state, d: division, a: quarter

Quarterly cumulated completions are multiplied by annual average rents to match the scale (level) of the annual housing expenditures by category (owner occupied, tenant occupied, and farm) reported in the ACS. Finally, these series are used as state-level quarterly indicators in the Denton interpolation procedure which benchmarks the quarterly statistics to national quarterly and state annual controls, similar to the categories discussed above.

For utilities, EIA data is used to estimate quarterly consumption of electricity and natural gas. The EIA data provide monthly series on the number of customers for electricity and million cubic feet for natural gas. These are converted to quarterly frequency, seasonally adjusted using the Census Bureau's X-13 ARIMA software and used to estimate quarterly household consumption of electricity and natural gas.

#### **3.4 All Other Categories**

This section covers all other categories—financial services, air transportation, net foreign travel, and some small miscellaneous categories—that are based on the remaining data sources (FDIC, NCUA, BTS, and SIAT) or there are no quarterly data available at the state level, and corresponding national quarterly patterns are used.

*Financial services furnished by Depository Institutions.* Depository institutions include commercial banks, savings institutions, and credit unions. Financial services of these institutions comprise two components: financial services for which explicit fees are charged and financial services furnished without explicit payment. The former component includes various account fees (overdraft charges, late fees, ATM fees, electronic transaction fees, money order fees, etc.), and trust and fiduciary services fees. The latter component, implicitly priced financial services, includes charges that are embedded in the interest rates that banks and other financial institutions pay or earn: If a checking account pays only 1% interest yet the market rate for bonds is 5%, BEA imputes a 4% (=5%-1%) implicit charge by the bank. A similar (reverse) imputation is made for loans. These implicit charges cover the activities of depository institutions for which no charges are explicitly levied: Safekeeping of funds, bookkeeping, teller transactions, electronic banking access, maintaining bank branches, ATM deposits and withdrawals, underwriting, correspondence, etc. For more details on this imputation, see Hood (2013).

Financial institution service charges and fees are allocated using total service charges and fee income by quarter for banks and credit unions. These data are derived from the FDIC call reports and the NCUA quarterly financial reports, both of which contain information on condition (balance sheet) and income (income statement) and are required by regulators quarterly from banks and credit unions. Service charges and fee income are reported on both forms and are aggregated to obtain state totals. The same statistics aggregated by year are used to allocate annual PCE by state. Implicit charges are allocated

separately for borrower and depositor services. Indicators are also derived from FDIC call report and NCUA quarterly financial report information on loan and deposit balances by aggregating the reported balances of loans and deposits by state.

*Air transportation.* To measure consumer expenditures on air transportation, we use BTS data. BTS provides rich data at the state level on origin and destination of air travel from passengers. To generate the quarterly indicator series, we aggregate passenger counts for each airline for every quarter by state, divide the quarterly state passenger counts by the quarterly passenger counts at the national level, and multiply the resulting state passenger shares by the airline revenue.

*Net foreign travel.* This PCE category offsets expenditures on foreign travel by U.S. residents against expenditures in the United States by nonresidents. Both components are estimated with quarterly data from SIAT. The quarterly series for expenditures on foreign travel by U.S. residents are constructed using quarterly passenger counts by state and main destination, which are multiplied by average expenditures per passenger by state of residence and main destination. The quarterly series for expenditures in the United States by nonresidents are constructed similarly using quarterly passenger counts by country of residence and main turn the multiplied by average expenditures in the United States by nonresidents are constructed similarly using quarterly passenger counts by country of residence and main U.S. destination state, which are multiplied by average expenditures per passenger by country of residence and main U.S. destination.

For a few smaller categories, for which there are no quarterly data available at the state level, we use the corresponding national quarterly PCE patterns. These include food produced and consumed on farms, water supply and sanitation, railway transportation, gambling, regulated investment companies, labor organization dues, elementary and secondary school lunches, and higher education school lunches.

The quarterly indicators for each of the categories described in this section are then used as pattern series to interpolate the quarterly estimates using the Denton interpolation procedure described above.

# 4. Experimental Results

This section presents tables and charts using the experimental quarterly PCE by state statistics from the first quarter of 2019 through the fourth quarter of 2023. While the estimates are prepared at a more detailed level, results are shown for 16 aggregated PCE categories, consistent with quarterly NIPA table 2.3.5 and annual BEA Regional table SAPCE1. We present level and percent changes for quarterly total PCE by state, followed by category contributions to total PCE growth in the last quarter of 2023. All quarterly percent changes are shown at annual rates. We compare the experimental quarterly PCE statistics with quarterly state personal income and quarterly GDP by state statistics going back to the first quarter of 2019. Finally, we provide a sample table for New York to show the possible level of category detail offered by these new statistics.

Nationally, total PCE increased 5.1 percent in the fourth quarter of 2023 (figure 3). The percent change in total PCE, however, varied widely across states. Wyoming had the largest percent increase at 13.6 percent, followed by Vermont at 7.5 percent. In contrast, New Hampshire has the smallest percent increase at 2.2 percent followed by Colorado at 3.1 percent. The percent change in the District of Columbia was 9.2 percent. The growth pattern does not appear to be geographically clustered; rather, it is widely dispersed

across the country. States such as South Carolina in the South, New York in the Northeast, and Washington and Oregon in the Northwest experienced larger PCE increases, whereas Mississippi in the South, Michigan in Midwest, and Colorado in the Rocky Mountain region experienced comparatively slower increases.



# Figure 3. Experimental Quarterly Total PCE by State: Percent Change at Annual Rate, 2023:Q3–2023:Q4

PCE Personal consumption expenditures

Note. The map shows the percent change in total PCE in the last quarter of 2023. The map shows a wide dispersion in percent changes across the country. Quarterly percent changes shown are annualized; they are a percent change from the preceding period at annual rates.

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Table 5 shows level and percent changes in total PCE for the United States and for each of the 50 states and District of Columbia, from the first quarter of 2022 to the fourth quarter of 2023. The table shows significant variation in growth rates among states indicating that states do not consistently grow at the same rate each quarter and may not always align with the national trend. For example, in New Hampshire, the slowest-growing state in the last quarter of 2023, a noticeable trend of sluggish growth emerges from the second quarter of 2023. Similarly, in Michigan, another relatively slow growing state in the last quarter of 2023, the new statistics suggest that growth began to decelerate around the fourth quarter of 2022. In contrast, Wyoming and the District of Columbia, which experienced faster growth rates, grew slowly in the third quarter of 2023.

# Table 5. Experimental Quarterly Total Personal Consumption Expenditures (PCE) by State,

2022:Q1-2023:Q4

				Current-o	dollar PCE				n	orconto	hongo f	rom pro	codina	noriad	
			1	(billions o	of dollars)				(annualized)						
Geography			Seasona	lly adjust	ed at annu	al rates					(an	nualized	1)		
		20	)22			202	3			2022			20	23	
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q2	Q3	Q4	Q1	Q2	Q3	Q4
United States	17,019	17,404	17,673	17,905	18,258	18,407	18,667	18,903	9.3	6.3	5.4	8.1	3.3	5.8	5.1
Alabama	210	213	217	220	224	225	230	232	6.4	7.2	5.3	8.6	1.2	8.3	4.9
Alaska	42	43	44	45	45	46	46	47	6.3	11.2	5.5	7.1	1.5	5.8	6.1
Arizona	358	366	372	380	388	390	395	401	8.8	6.6	8.8	8.9	2.6	4.6	6.2
Arkansas	125	128	130	132	134	135	137	139	7.7	6.2	5.8	6.5	2.7	7.9	4.4
California	2,297	2,347	2,373	2,393	2,427	2,452	2,483	2,511	9.1	4.4	3.3	5.9	4.2	5.1	4.6
Colorado	337	343	350	356	365	368	373	376	8.0	8.5	6.7	10.2	2.8	6.1	3.1
Connecticut	215	218	221	223	227	229	232	235	5.7	5.4	3.4	7.7	3.8	5.5	5.0
Delaware	54	55	56	57	58	58	59	60	9.7	6.9	6.5	7.7	3.0	4.8	5.3
District of Columbia	56	58	58	59	60	62	62	63	17.0	3.7	4.0	7.7	11.4	0.2	9.2
Florida	1,201	1,225	1,243	1,2/1	1,305	1,315	1,336	1,355	8.3	6.0	9.2	11.3	3.2	6.3	6.0
Georgia	500	514	524	531	544	549	559	567	11.6	7.7	5.8	9.6	3.9	7.7	5.7
Hawaii	//	/8	80	80	82	83	84	85	9.2	1.2	3.2	8.5	4.1	5.0	4.3
Idano	82	83	85	87	89	89	91	92	8.5	10.5	7.8	6.8	2.7	6.5	4.6
Illinois	663	681	692	699	/13	/16	723	732	10.7	7.0	3.8	8.4	1.9	4.1	4.5
Indiana	308	316	322	326	330	331	335	338	10.2	8.3	5.0	5.1	0.6	4.7	4.4
lowa	142	144	147	148	142	142	154	100	0.1	7.0	4.1	0.1	0.9	5.2	4.7
Kansas	132	134	201	204	142	200	212	216	7.9	7.0	0.3	9.2	1./	7.2	5.3
Louisiana	195	190	201	204	200	209	215	210	7.5	0.9	4.5	9.5	2.0	6.7	4.0
Maine	203	207	208	210	210	210	220	222	4.2	5.2	4.9	11.2	1.5	7.0	4.0
Maryland	315	322	378	332	340	340	345	3/18	0.4	5.5 7.8	5.0 / 9	9.3	4.0	7.9	2.5
Massachusetts	/38	117	451	457	467	469	476	/82	8.1	1.0		8.7	2.4	5.5	5.2
Michigan	486	494	501	505	513	515	520	525	73	5.3	3.5	6.0	2.4	4.0	3.4
Minnesota	295	299	306	309	315	318	322	327	6.4	8.7	3.7	8.9	33	5.9	6.1
Mississippi	114	116	118	119	121	121	123	124	6.8	5.5	5.2	6.0	0.1	6.5	3.3
Missouri	292	299	304	307	313	315	321	325	9.8	7.4	4.5	7.7	2.7	7.4	5.2
Montana	57	58	59	60	61	62	63	64	7.4	8.2	7.0	9.3	3.1	8.2	5.7
Nebraska	95	97	98	100	102	103	104	106	9.3	6.8	5.7	8.2	4.0	6.4	4.4
Nevada	156	161	164	167	170	170	172	174	12.6	7.7	8.2	7.3	1.3	3.0	5.9
New Hampshire	83	84	86	87	89	89	90	90	8.2	6.9	6.9	8.8	-0.3	4.1	2.2
New Jersey	542	555	562	566	579	586	591	599	9.6	5.0	3.2	9.4	4.6	3.7	5.4
New Mexico	90	91	92	93	95	96	97	98	5.5	6.8	5.0	6.9	3.2	5.6	5.2
New York	1,111	1,148	1,168	1,182	1,198	1,216	1,231	1,250	13.9	7.1	5.0	5.4	6.0	5.2	6.4
North Carolina	496	509	517	525	538	544	555	563	10.2	6.6	6.5	9.9	4.7	8.7	5.4
North Dakota	40	41	42	42	43	43	44	45	4.8	9.9	3.4	9.8	2.9	6.8	6.9
Ohio	546	558	567	575	585	588	595	601	9.0	6.7	5.5	7.5	1.6	5.2	4.2
Oklahoma	165	168	170	173	176	177	181	183	8.3	5.4	5.3	9.1	2.4	7.8	4.3
Oregon	216	219	223	226	230	232	235	238	6.0	7.0	4.5	8.3	2.7	5.5	6.2
Pennsylvania	671	692	706	717	727	732	738	748	13.5	8.3	6.0	5.8	2.9	3.2	5.3
Rhode Island	56	57	58	59	60	60	61	62	7.3	8.0	3.7	8.8	1.6	5.0	7.3
South Carolina	238	242	246	251	258	259	266	270	7.5	7.5	7.7	11.1	2.2	10.6	6.7
South Dakota	44	44	45	46	47	47	48	49	5.6	8.3	6.5	8.9	4.7	6.2	5.9
Tennessee	318	324	329	335	343	346	353	358	8.0	7.0	7.2	10.1	3.3	9.0	5.1
Texas	1,431	1,470	1,486	1,508	1,541	1,557	1,583	1,601	11.4	4.3	6.0	9.1	4.1	6.9	4.7
Utah	158	161	165	168	171	173	176	178	9.4	8.4	7.3	8.5	4.1	7.1	4.4
Vermont	35	36	36	37	38	38	38	39	6.3	7.3	5.8	9.0	1.8	5.4	7.5
Virginia	439	449	457	463	473	476	482	488	9.3	7.2	5.2	8.9	2.8	5.3	4.6
Washington	429	436	445	452	463	468	476	484	6.4	9.3	5.6	10.6	4.6	6.8	6.9
West Virginia	77	78	79	81	82	83	84	85	5.9	4.9	5.9	6.2	4.6	4.1	6.2
Wisconsin	283	288	293	297	301	303	307	310	7.6	6.7	6.1	5.5	2.1	5.0	4.5
Wyoming	30	30	31	31	32	33	33	34	-8.0	19.1	-2.9	12.5	11.5	0.0	13.6

PCE Personal consumption expenditures

1. Quarterly percent changes shown are annualized—that is, they are a percent change from the preceding period at annual rates.

Figure 4 shows category contributions to the percent change in total PCE in the fourth quarter of 2023 for the two fastest- and two slowest-growing states and compares it to the United States. Category contributions for all 16 PCE categories and states are shown in table 6.

Nationally, health care, all other services, and housing and utilities were the largest contributors to total PCE growth. In contrast, durable goods—specifically, motor vehicles and parts, and furnishings and durable household equipment—subtracted from growth. Gasoline and other energy goods within nondurable goods also subtracted from growth nationally (table 6).



# Figure 4. Contributions to Percent Change in Total PCE by State, Selected States, 2023:Q3–2023:Q4

#### PCE Personal consumption expenditures

Note. The sum of the contributions across all categories equals the percent change in total PCE shown in the "all categories" bar. Quarterly percent changes shown are annualized; they are a percent change from the preceding period at annual rates. All other services includes all services not specifically listed as categories, such as transportation services and recreation services.

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Housing and utilities, health care, and food services and accommodations made positive and sizable contributions to growth in both the two fastest growing and the two slowest growing states. In Wyoming, nondurable goods—specifically, gasoline and other energy goods—was the largest contributor to PCE growth, followed by financial services and insurance within the all other services category. In Vermont, all other services—led by growth in the "other services" category, which includes education, communication, and personal care services—and health care were the largest contributors to growth.

In New Hampshire, health care was the largest contributor to total PCE growth. Several goods and services categories, however, subtracted from growth. The largest negative contributions were in the durable goods category, which includes motor vehicles and parts and recreational goods and vehicles. In Colorado, housing and utilities and health care were the two largest contributors to growth, whereas the largest negative contributions were in durable goods, specifically furnishings and durable household equipment, and motor vehicles and parts, and in nondurable goods, specifically gasoline and other energy goods.

## Table 6. Category Contributions to Percent Change in Quarterly Total PCE by State, 2023:Q3–2023:Q4—Continues

		Percentage points										
	Percent		Durable	goods			Nondurab	le goods				
	change in		Furnishings			Food and						
Geography	total PCE by	Motor	and durable	Recreational	Other	beverages for	Clothing	Gasoline and	Other			
	state	vehicles	household	goods and	durable	off-premises	and	other energy	nondurable			
	(annualized)	and parts	equipment	vehicles	goods	consumption	footwear	goods	goods			
United States	5.1	-0.13	-0.07	0.08	0.07	0.19	0.00	-0.14	0.52			
Alabama	4.9	-0.09	-0.23	-0.03	0.06	0.34	0.01	-0.34	0.53			
Alaska	6.1	-0.10	-0.03	0.73	0.12	0.29	0.14	0.04	0.37			
Arizona	6.2	-0.20	-0.09	0.22	0.09	0.23	0.04	-0.41	0.62			
Arkansas	4.4	0.08	-0.22	0.15	0.06	0.41	0.04	-0.50	0.53			
California	4.6	-0.18	-0.03	0.17	0.06	0.24	-0.04	0.32	0.50			
Colorado	3.1	-0.10	-0.23	0.11	0.13	0.22	0.09	-0.49	0.43			
Connecticut	5.0	0.03	0.10	0.10	0.09	0.23	0.06	0.03	0.70			
Delaware	5.3	-0.20	-0.48	0.04	0.08	0.41	0.05	-0.10	0.43			
District of Columbia	9.2	-0.08	-0.15	0.48	0.07	0.26	-0.05	0.12	0.48			
Florida	6.0	-0.25	-0.27	0.06	0.12	0.25	0.04	-0.28	0.57			
Georgia	5.7	-0.28	0.10	-0.07	0.11	0.34	0.04	-0.49	0.87			
Hawaii	4.3	-0.09	0.10	0.16	0.05	0.32	0.02	0.13	0.51			
Idaho	4.6	-0.50	-0.20	-0.28	0.02	0.25	-0.08	0.59	0.44			
Illinois	4.5	-0.11	0.01	0.08	0.06	0.11	0.03	-0.22	0.15			
Indiana	4.4	-0.20	-0.15	0.02	0.06	0.15	0.00	-0.35	0.50			
lowa	4.7	-0.17	0.02	0.05	0.07	0.02	0.03	-0.73	0.43			
Kansas	5.3	-0.16	-0.05	-0.12	0.06	0.30	0.03	-0.21	0.31			
Kentucky	6.0	0.03	0.08	0.04	0.09	0.23	0.03	-0.21	0.93			
Louisiana	4.0	-0.24	-0.15	-0.17	0.03	-0.07	-0.10	-0.82	0.51			
Maine	5.5	-0.03	0.18	0.39	0.02	0.30	0.03	-0.12	0.23			
Maryland	4.5	-0.10	-0.22	0.12	0.06	0.06	0.01	-0.16	0.26			
Massachusetts	5.2	0.03	-0.18	0.09	0.06	0.30	0.00	-0.09	0.37			
Minneseta	5.4	-0.03	-0.07	-0.03	0.05	0.25	0.02	0.08	0.51			
Mississippi	0.1	-0.04	0.00	0.01	-0.05	0.33	-0.24	-0.12	0.34			
Missouri	5.5	-0.04	-0.01	0.00	0.05	0.21	-0.24	-0.31	0.43			
Montana	5.2	0.13	0.01	0.19	0.13	0.10	0.03	0.07	0.55			
Nebraska	4 4	0.02	0.04	0.13	0.05	0.22	0.13	-0.06	0.50			
Nevada	5.9	-0.29	-0.04	0.20	0.03	0.34	-0.02	0.21	0.62			
New Hampshire	2.2	-0.77	0.14	-0.28	-0.01	0.52	-0.05	-0.07	0.26			
New Jersey	5.4	-0.04	-0.20	0.11	0.12	0.31	0.09	-0.07	0.71			
New Mexico	5.2	-0.08	-0.41	-0.24	0.03	0.13	-0.03	-0.35	0.41			
New York	6.4	-0.07	0.00	-0.08	0.07	0.16	0.04	0.02	0.55			
North Carolina	5.4	-0.21	0.01	0.29	0.08	-0.11	0.01	-0.10	0.75			
North Dakota	6.9	0.31	0.06	0.01	0.07	0.51	0.03	-0.06	0.77			
Ohio	4.2	-0.10	-0.07	0.04	-0.05	0.04	-0.26	-0.31	0.43			
Oklahoma	4.3	0.05	0.00	0.07	0.08	0.24	0.07	-0.56	0.51			
Oregon	6.2	-0.52	-0.14	-0.02	0.06	0.29	-0.08	0.26	0.40			
Pennsylvania	5.3	-0.08	-0.03	0.14	0.06	0.06	-0.04	-0.02	0.73			
Rhode Island	7.3	-0.07	0.01	0.09	0.04	0.32	-0.03	-0.05	0.42			
South Carolina	6.7	-0.06	-0.11	0.34	0.17	0.27	0.10	-0.54	0.68			
South Dakota	5.9	-0.43	0.02	0.14	0.09	0.20	0.07	-0.25	0.49			
Tennessee	5.1	-0.24	0.10	0.04	0.04	0.24	0.04	-0.12	0.58			
Texas	4.7	-0.15	-0.10	0.06	0.08	0.06	0.00	-0.48	0.47			
Utah	4.4	-0.14	-0.01	0.31	0.07	0.41	-0.01	0.00	0.61			
Vermont	7.5	0.32	-0.03	0.33	0.04	0.34	-0.02	0.07	0.70			
Virginia	4.6	-0.01	-0.08	0.16	0.08	0.21	-0.02	-0.07	0.62			
Washington	6.9	-0.26	-0.10	0.12	0.06	0.17	-0.02	-0.04	0.36			
West Virginia	6.2	-0.27	0.02	0.01	0.04	0.21	0.02	-0.08	0.54			
Wisconsin	4.5	0.04	0.04	0.02	0.06	0.02	0.04	-0.61	0.29			
Wyoming	13.6	-0.22	0 34	0.07	0.03	0.56	-0.07	3 2 2	1 03			

NPISHs Nonprofit institutions serving households

PCE Personal consumption expenditures

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## Table 6. Category Contributions to Percent Change in Quarterly Total PCE by State, 2023:Q3–2023:Q4—Table Ends

	Percentage points												
					Services								
Geography	Housing and utilities	Health care	Transportation services	Recreation services	Food services and accommodations	Financial services and insurance	Other services	Final consumption expenditures of NPISHs					
United States	1.03	1.70	0.34	0.19	0.73	0.02	0.55	0.06					
Alabama	0.97	1.39	0.53	0.16	0.78	0.32	0.60	-0.08					
Alaska	-0.03	1.82	0.85	0.26	0.32	0.28	0.76	0.27					
Arizona	1.49	1.81	1.56	0.10	0.46	-0.28	0.57	0.04					
Arkansas	0.72	1.59	0.08	0.19	0.48	0.38	0.41	0.01					
California	0.98	1.85	0.24	0.44	0.16	-0.43	0.31	0.00					
Colorado	1.33	1.28	-0.12	-0.23	0.63	-0.43	0.42	0.05					
Connecticut	0.70	1.33	-0.19	0.05	1.06	-0.02	0.80	-0.09					
Delaware	1.24	1.92	0.10	0.20	1.09	0.34	0.23	-0.03					
District of Columbia	2.51	1.30	0.03	0.16	0.71	-0.09	3.40	0.02					
Florida	1.74	1.71	1.21	0.16	0.28	0.01	0.71	-0.08					
Georgia	1.32	2.42	-0.02	0.12	0.44	0.41	0.54	-0.10					
Hawaii	1.67	1.83	-0.44	-0.21	-0.78	0.33	0.52	0.20					
Idaho	1.23	1.53	0.11	0.46	0.80	-0.07	0.39	-0.03					
Illinois	0.44	1.42	0.42	-0.08	1.28	0.06	0.71	0.16					
Indiana	0.72	1.51	0.29	0.01	0.65	0.49	0.57	0.11					
lowa	0.77	0.85	0.75	0.87	0.56	0.45	0.67	0.07					
Kansas	0.44	1.65	1.25	0.18	0.47	0.51	0.56	0.04					
кептиску	0.96	2.27	0.03	0.24	0.64	-0.03	0.58	0.09					
Louisiana	0.71	1.87	0.20	0.18	1.12	0.30	0.60	0.02					
Maine	0.56	1./1	0.37	0.07	0.92	0.23	0.35	0.30					
Macsashusotts	0.89	1.35	0.43	0.21	0.89	-0.02	0.64	0.11					
Michigan	1.03	1.00	0.34	0.20	0.64	-0.01	0.07	-0.23					
Minnesota	0.27	1.13	-0.05	0.03	1 12	-0.11	0.50	0.13					
Mississinni	0.62	1.50	-0.01	-0.09	0.56	0.32	0.07	-0.02					
Missouri	0.49	2 40	0.01	0.03	0.55	0.01	0.44	0.02					
Montana	1 14	1 47	0.20	-0.50	0.85	0.02	0.45	0.13					
Nebraska	0.95	1.55	-0.27	-0.41	0.59	0.46	0.62	-0.03					
Nevada	1.01	1.21	0.74	0.38	1.67	-0.70	0.28	0.22					
New Hampshire	0.66	1.26	-0.81	-0.61	0.49	0.34	0.62	0.54					
New Jersey	1.54	1.35	0.16	0.23	0.70	-0.03	0.37	0.08					
New Mexico	1.39	1.90	0.16	0.33	1.38	-0.17	0.54	0.19					
New York	0.72	1.95	0.28	0.18	1.96	-0.32	0.73	0.18					
North Carolina	1.32	1.48	0.28	0.24	0.84	0.45	0.21	-0.15					
North Dakota	0.66	1.17	0.44	0.32	1.24	0.51	0.77	0.14					
Ohio	0.72	1.85	0.04	-0.04	0.85	0.37	0.53	0.17					
Oklahoma	0.71	2.05	0.21	0.00	0.61	0.38	0.04	-0.17					
Oregon	1.02	1.92	0.39	0.24	1.02	0.45	0.73	0.14					
Pennsylvania	0.69	1.58	0.17	0.28	0.98	0.21	0.48	0.11					
Rhode Island	0.39	2.35	-0.01	0.20	1.90	-0.10	1.52	0.36					
South Carolina	1.48	2.05	0.25	0.24	0.87	0.28	0.61	0.05					
South Dakota	0.72	1.65	0.31	0.79	1.32	-0.30	0.89	0.20					
Tennessee	0.23	2.32	0.45	0.02	0.51	0.41	0.49	-0.04					
Texas	1.59	1.51	0.05	0.26	0.45	0.26	0.59	0.08					
Utah	1.13	1.44	-0.19	0.02	-0.26	-0.01	0.86	0.12					
Vermont	0.79	1.64	0.11	0.42	1.41	0.17	0.99	0.24					
Virginia	1.06	1.85	0.07	-0.15	1.08	-0.63	0.48	-0.02					
Washington	1.29	1.46	1.53	0.29	0.80	-0.07	0.73	0.60					
West Virginia	-0.05	3.68	0.19	0.16	0.68	0.04	0.69	0.34					
Wisconsin	0.64	1.72	0.30	0.38	0.94	0.04	0.44	0.14					
www.oming	1.17	158	0.09	1.31	1 81	2.25	0.50	-0.06					

 $\ensuremath{\textbf{NPISHs}}$  Nonprofit institutions serving households

PCE Personal consumption expenditures

Figure 5 presents the percent change in per capita quarterly PCE by state in the last quarter of 2023. Per capita PCE reflects the average spending by individuals in a specific region over a given period. The figure shows that in Wyoming and Vermont, the two fastest growing states in the last quarter of 2023, per capita PCE increased by 13.0 percent and 7.4 percent, respectively. In contrast, in New Hampshire and Colorado, the two slowest growing states, per capita PCE increased by 1.9 percent and 2.4 percent, respectively. No specific regional patterns are evident across the country; however, states in the West Coast seem to have in general larger increases in per capita PCE compared to the states in the South and Midwest.



# Figure 5. Experimental Quarterly Per Capita Total PCE: Percent Change at Annual Rate, 2023:Q3–2023:Q4

PCE Personal consumption expenditures

Note. The map shows percent change in per capita quarterly total PCE by state for 50 states and the District of Columbia in the last quarter of 2023. Quarterly percent changes shown are annualized; they are a percent change from the preceding period at annual rates.

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Table 7 presents per capita quarterly PCE by state for the United States and for each of the 50 states and District of Columbia, from the first quarter of 2022 to the fourth quarter of 2023. There are large variations in per capita PCE across states. Such variations stem from factors like income levels, cost of living, and demographic compositions, among others. Per capita consumption grew faster nationwide during 2022, especially earlier in the year, as household consumption was recovering from the COVID–19 pandemic. The rate of increase has slowed as seen in the comparison with corresponding quarters in 2023.

	Current-dollar PCE per capita (dollars)							Perce	Percent change from preceding period						
Geography			Seasona	uste ville	ed at annua	Irates					(ann	lualize	d)		
Geography		201	30000		eu at annua	201	22			2022			- 20	22	
	01	202		01	01						01	01	-02	25	04
United States	QI 51.192	Q2	Q3	Q4	QI F4 GEO	Q2	Q3	Q4	Q2	U3	Q4		QZ 2 °	Q3	Q4
United States	51,105	52,207	53,024	53,051 42,222	54,050	55,055	55,725	30,347 45 260	0.9 E 0	5.0	4.0	7.7	2.0	5.2	4.5
Alabama	41,402	42,001	42,740	43,223	44,055	44,113	62 967	45,505	5.5	11.2	4.5	7.9	0.5	/.5	4.1
Alaska	10 060	58,451	50,000	50,805 E1 264	52 261	52,102	52,907	5,091 52,727	0.5	11.Z	5.4	7.2	1.5	5./	5.0
Arizona	48,005	49,750	50,405 42 EEE	51,504 42.079	12 600	52,592	53,000	23,/37	7.5	5.5	7.0	δ.U Ε 0	1.0	3.0	5.4 2.6
Arkansas	41,287	41,995	42,555	43,078	43,099	43,918	44,070	45,072	7.0	5.4	5.0	5.9	2.0	7.1	3.0
California	58,//1	60,113	60,790	61,310	62,238	62,917	63,721	64,459	9.4	4.0	3.5 6.1	6.2	4.4	5.2	4./
Colorado	57,797	58,834	59,943	60,831	62,238	62,580	63,397	63,775	7.4	/.8	0.1	9.0	2.2	5.3	2.4
Connecticut	59,596	60,403	61,159	61,637	62,/6/	63,323	64,124	64,857	5.5	5.1	3.Z	/.5	3.0	5.2	4.6
Delaware	53,174	54,218	54,930	55,623	56,505	56,/63	57,244	57,798	8.1	5.4	5.1	6.5	1.8	3.4	3.9
District of Columbia	82,851	86,097	86,714	87,308	88,688	90,855	90,626	92,380	16.6	2.9	2.8	6.5	10.1	-1.0	8.0
Florida	54,376	55,212	55,/57	56,751	58,064	58,293	58,931	59,531	6.3	4.0	7.3	9.6	1.6	4.5	4.1
Georgia	46,043	47,189	47,926	48,474	49,480	49,829	50,617	51,183	10.3	6.4	4.7	8.6	2.9	6.5	4.5
Hawaii	53,110	54,371	55,360	55,826	57,030	57,664	58,394	59,044	9.8	7.5	3.4	8.9	4.5	5.2	4.5
Idaho	42,399	43,076	43,985	44,669	45,271	45,427	45,984	46,346	6.5	8.7	6.4	5.5	1.4	5.0	3.2
Illinois	52,571	54,037	55,023	55,575	56,750	57,053	57,655	58,322	11.6	7.5	4.1	8.7	2.1	4.3	4.7
Indiana	45,197	46,276	47,152	47,677	48,228	48,242	48,738	49,197	9.9	7.8	4.5	4.7	0.1	4.2	3.8
Iowa	44,493	45,141	45,886	46,318	47,213	47,293	47,849	48,360	6.0	6.8	3.8	8.0	0.7	4.8	4.3
Kansas	44,832	45,695	46,524	47,218	48,258	48,447	49,265	49,872	7.9	7.5	6.1	9.1	1.6	6.9	5.0
Kentucky	43,153	43,924	44,625	45,059	46,045	46,299	47,115	47,757	7.3	6.5	4.0	9.0	2.2	7.2	5.6
Louisiana	44,508	45,056	45,272	45,848	47,121	47,315	48,111	48,606	5.0	1.9	5.2	11.6	1.7	6.9	4.2
Maine	54,486	55,480	56,106	56,538	57,550	58,055	59,085	59,799	7.5	4.6	3.1	7.4	3.6	7.3	4.9
Maryland	51,081	52,293	53,266	53,869	55,051	55,059	55,733	56,302	9.8	7.7	4.6	9.1	0.1	5.0	4.1
Massachusetts	62,745	63,993	64,595	65,375	66,721	67,082	67,930	68,734	8.2	3.8	4.9	8.5	2.2	5.1	4.8
Michigan	48,416	49,279	49,905	50,334	51,078	51,327	51,818	52,236	7.3	5.2	3.5	6.0	2.0	3.9	3.3
Minnesota	51,598	52,409	53,478	53,905	55,021	55,409	56,138	56,915	6.4	8.4	3.2	8.5	2.8	5.4	5.7
Mississippi	38,774	39,448	39,987	40,489	41,089	41,097	41,732	42,061	7.1	5.6	5.1	6.1	0.1	6.3	3.2
Missouri	47,244	48,345	49,175	49,676	50,572	50,871	51,737	52,346	9.7	7.0	4.1	7.4	2.4	7.0	4.8
Montana	50,797	51.508	52,360	53,137	54.219	54,516	55,460	56.096	5.7	6.8	6.1	8.4	2.2	7.1	4.7
Nebraska	48.174	49.227	49,984	50.612	51.562	52,007	52,743	53,229	9.0	6.3	5.1	7.7	3.5	5.8	3.7
Nevada	49.271	50.634	51,478	52,425	53,293	53,400	53,719	54,405	11.5	6.8	7.6	6.8	0.8	2.4	5.2
New Hampshire	59,225	60,266	61,183	62,178	63,479	63,388	63,982	64,288	7.2	6.2	6.7	8.6	-0.6	3.8	1.9
New Jersev	58,570	59.941	60.646	61,069	62,417	63,078	63,580	64,356	9.7	4.8	2.8	9.1	4.3	3.2	5.0
New Mevico	42 388	42 982	43 692	44,213	44 961	45 318	45 922	46 487	5.7	6.8	49	6.9	3.2	54	5.0
New York	56 310	58 308	59 401	60,205	61 094	62 082	62 937	63 984	15.0	77	55	6.0	6.6	5.6	6.8
North Carolina	46 637	47 634	18 242	18 845	19 864	50 270	51 164	51 657	20.0	5.2	5.5	8.6	3.0	7.2	3.0
Not un Caronna	40,037	47,034	40,245	40,045	49,004 F 1 926	50,275	51,104	51,057	0.0	0.4	2.1	0.0	3.4	1.2	5.5
	51,501	52,087	53,271	53,025	54,020	55,125	55,942	50,705	4.0	9.4	2./	9.2	2.2	0.0	0.2
Ohio	46,445	47,459	48,217	48,839	49,708	49,884	50,485	50,975	9.0	0.5	5.5	/.3	1.4	4.9	3.9
Oklanoma	41,135	41,888	42,347	42,799	43,000	43,823	44,544	44,907	7.5	4.5	4.5	8.2	1.0	6.ð	3.3
Oregon	50,955	51,749	52,656	53,256	54,365	54,752	55,493	56,335	6.4	1.2	4.6	8.6	2.9	5.5	6.2
Pennsylvania	51,670	53,366	54,456	55,264	56,068	56,486	56,932	57,671	13.8	8.4	6.1	5.9	3.0	3.2	5.3
Rhode Island	51,453	52,403	53,409	53,871	55,006	55,205	55,840	56,788	7.6	7.9	3.5	8.7	1.5	4.7	7.0
South Carolina	45,261	45,886	46,519	47,186	48,246	48,309	49,318	49,893	5.6	5.6	5.9	9.3	0.5	8.6	4.7
South Dakota	48,107	48,573	49,379	50,036	50,988	51,448	52,078	52,685	3.9	6.8	5.4	7.8	3.7	5.0	4.7
Tennessee	45,264	45,994	46,635	47,316	48,340	48,597	49,503	49,973	6.6	5.7	6.0	8.9	2.1	7.7	3.9
Texas	47,943	49,067	49,385	49,910	50,822	51,141	51,781	52,162	9.7	2.6	4.3	7.5	2.5	5.1	3.0
Utah	46,919	47,827	48,647	49,373	50,265	50,636	51,366	51,775	8.0	7.0	6.1	7.4	3.0	5.9	3.2
Vermont	54,431	55,265	56,232	57,027	58,277	58,531	59,287	60,350	6.3	7.2	5.8	9.1	1.8	5.3	7.4
Virginia	50,673	51,773	52,620	53,225	54,328	54,656	55,301	55,857	9.0	6.7	4.7	8.6	2.4	4.8	4.1
Washington	55,238	56,014	57,192	57,919	59,360	59,983	60,907	61,865	5.7	8.7	5.2	10.3	4.3	6.3	6.4
West Virginia	43,499	44,192	44,758	45,429	46,157	46,708	47,193	47,925	6.5	5.2	6.1	6.6	4.9	4.2	6.4
Wisconsin	48,093	48,957	49,715	50,409	51,054	51,279	51,849	52,368	7.4	6.3	5.7	5.2	1.8	4.5	4.1
Wvoming	52.229	51,102	53,316	52.866	54,404	55,850	55,784	57,518	-8.4	18.5	-3.3	12.2	11.1	-0.5	13.0

# Table 7. Experimental Quarterly Per Capita Total PCE by State, 2022:Q1–2023:Q4

PCE Personal consumption expenditures

Figure 6 compares the experimental quarterly PCE by state statistics with two other key state-level statistics that BEA currently publishes on a quarterly basis: state personal income and GDP by state. The figure presents levels from the first quarter of 2019 to the fourth quarter of 2023, indexed to the first quarter of 2019. This figure highlights the importance of the new quarterly PCE statistics by illustrating that the quarterly patterns across various statistics do not always align.

The figure shows a divergence between income, consumption, and GDP trends during and after the COVID–19 pandemic. This divergence reflects both changes in production and consumption patterns associated with shutdowns and stay-at-home orders as well as the impact of various federal pandemic response programs such as the economic impact payments, the Paycheck Protection Program, and unemployment compensation and assistance, among others.



# Figure 6. Quarterly Measures of PCE, Personal Income, and GDP, Selected States, 2019:Q1–2023:Q4

GDP Gross domestic product

PCE Personal consumption expenditures

PI Personal income

Note. Graphs illustrate the importance of incorporating additional quarterly state-level statistics by comparing quarterly PCE, GDP, and PI statistics for New York, Utah, Texas, and North Carolina. The graphs show that the quarterly patterns across various statistics do not always align. Additionally, they illustrate variations in the quarterly PCE trends. While PCE in Utah recovered fast after the pandemic, PCE recovery to pre-pandemic levels took longer in New York.

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The figure shows that while the decline in consumption in New York was more pronounced, Texas experienced a more substantial drop in GDP. A comparison across states also highlights the distinct timing of the PCE decline and subsequent recovery. New York experienced a sharp decline in both PCE and GDP, while Utah experienced only a mild decline and quickly recovered. Post-recovery, PCE exhibited faster growth in Utah, while in Texas GDP growth surpassed that of PCE. This analysis demonstrates the regional differences in economic impact and recovery trajectories during and after the pandemic.

Finally, table 8 presents experimental quarterly PCE statistics for the state of New York, covering total PCE and 16 underlying consumption categories. The level of category detail in this table corresponds to quarterly NIPA table 2.3.5 and annual BEA regional table SAPCE1. This table shows the quarterly consumption levels for New York residents across various categories of goods and services.

	Current-dollar PCE (billions of dollars)											
Category	Seasonally adjusted at annual rates											
		202	22		2023							
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4				
Total PCE	1,111.4	1,148.2	1,168.0	1,182.4	1,198.1	1,215.7	1,231.2	1,250.3				
Goods	335.4	343.7	347.2	346.2	351.2	352.8	357.0	359.0				
Durable goods	104.6	106.1	107.5	106.3	109.0	108.9	109.2	109.0				
Motor vehicles and parts	30.9	30.6	30.7	30.7	32.7	32.5	32.0	31.8				
Furnishings and durable household equipment	26.6	27.6	27.8	27.9	27.5	27.6	27.9	27.9				
Recreational goods and vehicles	31.2	31.8	32.7	31.9	32.5	32.6	33.0	32.8				
Other durable goods	15.9	16.1	16.2	15.9	16.2	16.2	16.4	16.6				
Nondurable goods	230.8	237.6	239.7	239.9	242.2	243.9	247.7	250.1				
Food and beverages purchased for off-premises consumption	78.8	80.5	82.1	82.9	83.0	83.4	84.0	84.5				
Clothing and footwear	33.1	33.7	33.7	33.3	34.1	33.8	34.6	34.7				
Gasoline and other energy goods	17.7	20.2	18.6	17.6	16.6	16.5	17.5	17.5				
Other nondurable goods	101.1	103.2	105.3	106.1	108.5	110.1	111.7	113.3				
Services												
Household consumption expenditures (for services)	732.6	758.9	774.2	789.8	800.9	816.9	826.8	843.4				
Housing and utilities	203.4	208.0	211.9	216.2	218.8	221.0	225.1	227.2				
Health care	195.6	196.1	200.1	204.9	211.8	213.7	218.4	224.2				
Transportation services	36.8	39.9	40.7	40.2	40.1	40.8	40.8	41.6				
Recreation services	36.8	37.5	38.3	39.1	41.0	41.2	41.6	42.2				
Food services and accommodations	68.5	83.5	84.9	88.6	85.6	93.2	93.8	99.6				
Financial services and insurance	88.4	87.4	87.8	88.7	89.1	90.9	92.1	91.1				
Other services	103.1	106.5	110.6	112.0	114.5	116.1	115.2	117.4				
Final consumption expenditures of nonprofit institutions serving households (NPISHs)	43.4	45.6	46.5	46.4	45.9	46.0	47.4	47.9				

Table 8. Experimental Quarterly PCE by State, New York, 2022:Q1–2023:Q4

PCE Personal consumption expenditures

Housing and utilities and health care are the largest spending categories in New York. According to the most recent statistics in the table, these two categories accounted for over a third of New York's total PCE in the last quarter of 2023. Food services and accommodations was the fastest growing category, followed by health care. Together, these two categories accounted for more than half of the total PCE growth in the last quarter of 2023 (table 6). In contrast, durable goods and financial services and insurance contributed negatively to growth.

# 5. Conclusion

The experimental statistics presented here represent only a first step. Budget and resources permitting, BEA hopes to continue the work to develop official quarterly PCE by state statistics. The results so far demonstrate the valuable insights these new state statistics can offer. Quarterly statistics reveal patterns that may not be apparent from the annual PCE by state statistics. They allow for timelier identification of changes in consumer spending and the specific consumer spending categories driving the change. When combined with quarterly GDP and personal income measures, these statistics can be used to better understand state economic conditions, assess the impact of policy, and make informed decisions.

BEA is actively seeking input from data users and subject matter experts regarding the data sources, methods, and the experimental results presented here. Feedback is essential to improve and refine the methods outlined and provide enhancements to the statistics that would be most beneficial to data users. All feedback should be sent to <u>PCEbyState@bea.gov.</u>

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