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Preview of the 2021 Annual Update of the Regional Economic Accounts

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This fall, the Bureau of Economic Analysis (BEA) will release the results of the 2021 annual update of the Regional Economic Accounts. Updated statistics will be released for gross domestic product (GDP), personal consumption expenditures (PCE), personal income, and regional price parities (RPPs). Typically, for annual updates, BEA revises the estimates for the previous 5 years in order to incorporate the results of the annual update of the National Economic Accounts, to incorporate state source data that are more complete and more detailed than those previously available, and to update the seasonal factors used for the quarterly estimates.

This year's annual update of the National Economic Accounts will introduce several methodological improvements that will lead to revisions of national statistics for the years 2002 forward. Regional statistics, which are controlled to the National Economic Accounts, will likewise be revised for those years.

In addition, this year's annual update of the Regional Economic Accounts will introduce improved measures of housing services, of GDP for the rail transportation industry, and of the premium tax credit, and it will expand the published detail for personal consumption expenditures. These improvements will lead to revisions to the regional accounts beginning as early as 1997.

Lastly, this year's annual update will incorporate revised Census Bureau population estimates from 2010 forward, affecting per capita personal income. The revised population estimates will not reflect the results of the 2020 Census of Population.

This article will discuss the annual update of state-level regional accounts including the District of Columbia. It begins with an overview of the current methods and data, followed by a discussion of the new methods and data.

Housing Services

The housing stock provides a flow of services that are consumed by owner-occupants, renters, and residents of group housing. In the Regional Economic Accounts, owner-occupants are treated as owning unincorporated enterprises that produce the housing services consumed by themselves. Thus, PCE for housing services includes both the monetary rents paid by tenants and an imputed rental value for owner-occupied dwellings (measured as the amount the homeowner could have received if the house had been rented to a tenant). This treatment is designed to make PCE invariant to whether the house is rented by a landlord to a tenant or is lived in by the homeowner.

The imputed net rental income of owner-occupants is a receipt in the state personal income accounts, as is the net current-production income of persons from the rental of real property.

Housing services are produced by the real estate industry. In the GDP by state accounts, the GDP of the real estate sector is estimated by the income approach as the sum of compensation, taxes on production and imports, and gross operating surplus less subsidies. Gross operating surplus is the sum of corporate capital charges (which includes the rental income of persons with capital consumption allowances) and proprietors' income with inventory valuation and capital consumption allowances.

Current data sources and methods

Conceptually, state personal income and state personal consumption expenditures reflect the income and expenditures of the residents of a state, regardless of where the income was earned or where the consumption occurred. In contrast, state GDP reflects the production of goods and services from the labor and capital used in a state, regardless of where the workers and the owners of the capital lived. Because of this distinction, some of the state-level estimates require a residence adjustment when a housing unit is located in one state and the owner or renter in another state.

Currently, expenditures for housing services are used as weights in the estimation of RPPs. They are also components of PCE by state. However, the estimation methods used for the two sets of statistics differ. In addition, some components of state personal income and GDP by state are based on national estimates of housing services, which are based on different methods and data sources.

Regional price parities

The expenditures of tenants and owner-occupants for housing services are used as weights in the construction of RPPs. Expenditures for both groups are estimated from 5-year microdata samples of the Census Bureau's American Community Survey (ACS).

Tenant expenditures by county for seven structure types and bedroom combinations¹ are directly summed from monthly contract rent observations. Average tenant expenditures by structure type are calculated by dividing by the number of tenant-occupied units.

Average owner-occupant expenditures by county are estimated for the same seven structure types. First, national price levels by structure type are calculated for owner-occupants and for tenants from the Bureau of Labor Statistics Consumer Price Index (CPI) microdata. Then the estimates of average tenant expenditures by county and structure type are multiplied by the corresponding ratio of the owner-occupant-to-tenant price levels. Total owner-occupant expenditures are obtained by multiplying the average expenditures by the number of owned units. Total expenditures by county for tenants and for owner-occupants for all structure types are annualized and combined into a single rents estimate. This estimate is controlled to the national rents total from the CPI. Finally, state-level estimates of the combined expenditures of tenants and of owner-occupants for housing services are summations of the county-level rents estimates and used as weights in the estimation of state RPPs.

Personal consumption expenditures

Currently, housing PCE is estimated by state for five components. Both rental housing and owner-occupied housing services are estimated separately for the farm and nonfarm sectors. In addition, estimates are made for group housing services.² However, these components are not published separately; only aggregate housing and utilities expenditures are published.

Preliminary state-level estimates of nonfarm tenant-occupied housing services are estimated using the state-level 1-year public-use microdata sample (1 percent) of the ACS. The ACS contract rent data are adjusted (using hedonic regressions) to remove expenditures on utilities, if any, annualized, and summed.

Preliminary estimates of nonfarm owner-occupied housing services are estimated as the product of the preliminary nonfarm tenant-occupied housing services estimates and a ratio of owner-occupied expenditures to tenant expenditures. The ratio is calculated from the estimates of expenditures for housing services used as weights for the RPPs (discussed above).

These preliminary state-level nonfarm estimates are controlled to the corresponding national estimates of housing services from the National Economic Accounts, that is, the state-level estimates are adjusted proportionally to sum to the national controls.

The estimates of both tenant-occupied and owner-occupied farm housing services from the National Economic Accounts are allocated to states in proportion to the gross imputed rental value of farm dwellings from the U. S. Department of Agriculture (USDA).³

Personal income

The rental income of persons with capital consumption adjustment consists of monetary rent and the imputed net rental income of owner-occupants.⁴ Currently, monetary rent is estimated for farms owned by nonoperator landlords, the royalties received by persons from patents, copyrights, and rights to natural resources and for other monetary rent (consisting of rent from tenants and from nonfarm nonresidential properties). Imputed net rental income is prepared for three categories: owner-occupied mobile homes; owner-occupied, nonfarm permanent-site homes; and owner-occupied, farm permanent-site homes.

The estimate of monetary rent of farms owned by nonoperator landlords from the National Income and Product Accounts (NIPAs) and the NIPA estimate of owner-occupied, farm permanent-site homes are allocated to states in proportion to the gross imputed rental value of farm dwellings from the USDA. The NIPA estimate of other monetary rent is allocated to states in

proportion to gross rents and royalties reported on Schedule E of Form 1040 from the Internal Revenue Service (IRS). The NIPA estimates of owner-occupied mobile homes and of owner-occupied, nonfarm permanent-site homes are allocated to states in proportion to aggregate values of each structure type from the ACS 1-year file.

Gross domestic product

GDP for the real estate industry is calculated for both housing services and other real estate. Estimates of housing services GDP consist of tenants' monetary rents for tenant-occupied housing and imputed rental value for owner-occupied housing, measured as the income the homeowner could have received if the owner had rented the house to a tenant. The current methodology estimates housing services for three categories; two for owner-occupied housing and one for tenant-occupied housing.

- Owner-occupied housing estimates for mobile homes are produced using the state personal income estimates of owner-occupied rental income from mobile homes to distribute to states the National Income and Product Accounts (NIPA) value for owner-occupied mobile homes.
- Estimates of owner-occupied housing for permanent site dwellings are produced using the state personal income estimates of imputed owner-occupied rental income from permanent site housing to distribute to states the NIPA value for owner-occupied permanent site housing.
- Tenant-occupied housing is estimated using a state-level indicator to distribute the NIPA value for tenant-occupied housing to states. The state-level indicator is constructed using cash rents from the 1990 and 2000 Decennial Census and the 2010 ACS; the intercensal years are interpolated or extrapolated using state estimates of nonfarm personal income.

For the other real estate portion of the GDP estimate for real estate, the NIPA values are allocated with state-level indicators created from commercial real estate expenditures in the Economic Census. State-level indicators are imputed with state estimates of QCEW wages and salaries for the commercial real estate industry between economic census years.

New data sources and methods

The new approach to estimating housing expenditures enhances the consistency in data sources and methods between the various regional accounts and between the regional and national accounts.⁵ The new methodology uses the annual public use microdata sample from the ACS for 2005–2019. The ACS data allow housing expenditure estimates to be made for individual housing units and then aggregated to the state and national levels.

Tenant housing expenditures for a state are the annualized sum of monthly contract rents for rented housing units in the state. Hedonic regressions are used to remove expenditures on utilities from the contract rent.

Imputed owner-occupied housing expenditures are estimated using an improved rental equivalence method with an owner premium. The owner premium adjusts for quality differences between owner-occupied housing units and tenant-occupied units and is especially important for high-valued homes that are not well represented in rental markets.

For each year and PUMA (public-use microdata area),⁶ the stratified rental equivalence for owner units is obtained from a regression of tenant contract rents, from which utilities have been excluded, on the characteristics of tenant housing units reported in the ACS. The characteristics include five structure types and bedroom combinations, number of rooms, and the age of the structure. The corresponding characteristics of the owner-occupied units in the ACS are then combined with the estimated parameters from the tenant regressions to calculate the rental equivalence values of the owner-occupied units.

The owner premium (β) is also estimated using data from the ACS. The owner premium is calculated for each owner-occupied unit as the ratio of the self-reported value of the owner-occupied unit divided by the median self-reported value of owner-occupied units in the same stratum. A stratum for the purpose of calculating the owner premium includes the PUMA, structure type, and number of bedrooms. The rental equivalence value of each unit is then multiplied by the owner premium to obtain its imputed rental value. The estimates of the owner premiums are constrained to be at least 1 and no more than 10, so that the owner-imputed rental values are never less than the rental equivalence values.

The housing expenditure estimates by tenure are tabulated separately for mobile housing units (including manufactured trailer houses, houseboats, and recreational vehicles) and for all other housing units (permanent-site homes).

The new methodology imputes a rental value to vacant housing units, including units “for sale” and units “for rent,” using the rental equivalence methodology. The imputed value of vacant housing units will be combined with imputed owner-occupied housing expenditures since there are no tenants. The imputation for vacant units will not include the owner premium, because the information on housing values that is required for the owner premium is not available for all categories of vacant units.

Farm housing expenditures by tenure are estimated separately from nonfarm housing expenditures using the same methodology but restricting the farm data to those housing units identified in the ACS as having agricultural sales greater than \$1,000. All other housing units are used to estimate nonfarm housing expenditures.

In summary, estimates of expenditures for housing services will be made for the following categories, though not all of the categories will be published:

- Tenant-occupied, nonfarm permanent-site homes
- Tenant-occupied, farm permanent-site homes
- Tenant-occupied, nonfarm mobile homes
- Tenant-occupied, farm mobile homes
- Owner-occupied, nonfarm permanent-site homes
- Owner-occupied, farm permanent-site homes
- Owner-occupied, nonfarm mobile homes
- Owner-occupied, farm mobile homes
- Vacant, nonfarm permanent-site homes
- Vacant, nonfarm mobile homes

Personal consumption expenditures

The new estimates of expenditures for housing services described above will be published in the expanded personal consumption expenditures by state tables. The estimates will be aggregated into three components: (1) rental of tenant-occupied, nonfarm housing, (2) imputed rental of owner-occupied, nonfarm housing, and (3) rental value of farm dwellings. The estimates, which reflect the location of the housing unit, include mobile housing units. The imputed owner-occupied housing expenditures include an imputation for vacant units. The new estimates are from 2005 forward.

To avoid a break in the time series, the state estimates for 2005 will be extrapolated back to 1997 (the first year for which PCE by state is available) using 1-year state ACS data and state population growth rates.

Regional price parities

The new estimates of PCE housing services by state will be used as weights in the construction of RPPs beginning with 2008, the first year for which RPPs are available.

Personal income

In state personal income, the two components of monetary rental income of persons—rental income from farms owned by nonoperator landlords and other monetary rental income—will no longer be estimated separately. The combined NIPA estimates of rental income of persons from farms owned by nonoperator landlords, from tenants, and from nonfarm nonresidential properties will be allocated to states in proportion to gross rents and royalties reported on Schedule E of Form 1040 from the IRS. The IRS data reflect the place of residence of the property owner and includes both farm and nonfarm properties.

The NIPA estimates of the imputed net rental income of owner-occupants of mobile homes, owner-occupants of nonfarm, permanent-site homes, and of owner-occupants of farm, permanent-site homes will be allocated to states using the corresponding new estimates of imputed owner-occupied housing expenditures.

The discrepancy between the new state-level estimates for 2002 and the existing estimates will be wedged between 2002 and 1998 to avoid a break in the time series.⁷

Gross domestic product

Only the housing services part of the real estate industry in the GDP estimates is impacted by the proposed change in methodology. There are no changes to the other real estate portion.

The first change impacts three subcategories of owner-occupied housing: (1) nonfarm permanent site homes, (2) nonfarm and farm mobile homes, and (3) farm permanent site homes.

- Owner-occupied nonfarm permanent site housing is estimated by allocating the NIPA value to states using the state personal income estimates of imputed owner-occupied rental income from nonfarm permanent site housing.

- Owner-occupied mobile homes housing, both farm and nonfarm, are estimated by allocating the NIPA value to states using the state personal income estimates of imputed owner-occupied rental income from mobile homes.
- Owner-occupied farm permanent site housing is estimated by allocating the NIPA value to states using the state personal income estimates of imputed owner-occupied rental income of permanent site farm homes.

The second change, to tenant-occupied housing, has three parts as well: (1) nonfarm permanent site homes, (2) nonfarm mobile homes, and (3) farm permanent site and mobile homes.

- Tenant-occupied nonfarm permanent site housing is estimated by allocating the NIPA value to states using the corresponding new estimates of tenant-occupied nonfarm housing expenditures.
- Tenant-occupied nonfarm mobile home housing is estimated by allocating the NIPA value to states using the corresponding new estimates of tenant-occupied nonfarm mobile home housing expenditures.
- Farm tenant-occupied housing, including farm permanent site homes and farm mobile homes, is estimated by allocating the NIPA value to states using the corresponding new estimates of tenant-occupied farm housing expenditures.

Due to a break in the time series for some states from 2001-2002, it was necessary to “wedge” these changes back to 1998. The NIPA values, however, only changed beginning in 2002.

Premium Tax Credit

The premium tax credit is a refundable tax credit for eligible individuals and families who purchase health insurance through the Affordable Care Act Health Insurance Marketplace. The tax credit is an unpublished component of personal income.⁸ The size of the credit is based on a sliding scale. Those who have a lower income get a larger credit to help cover the cost of their health insurance. The credit is generally received monthly throughout the tax year as the advance premium tax credit, and taxpayers reconcile the amount paid in advance with the actual credit when they file their income tax return. This method of distribution during the tax year is different from other refundable tax credits (such as the earned income tax credit). With most other refundable tax credits, the refundable portion of the credit is received in the following year, when the taxpayer files a tax return.

Currently, BEA uses data from the Centers for Medicare & Medicaid Services (CMS) to prepare state-level estimates of the premium tax credit. Effectuated enrollments are multiplied by the average monthly advance premium tax credit. The result is used to allocate a national control from the NIPAs to the states. The NIPA control is based on data published in the U.S. Department of the Treasury’s Monthly Treasury Statement.

A shortcoming of the CMS data is that they cover only the first 6 months of the calendar year and therefore do not fully capture events such as the termination of health plan coverage that can occur throughout the entire year. Beginning with the estimates for 2014 (the year the tax credit was introduced), BEA will use instead advance premium tax credit data from the IRS to prepare state-level estimates of the premium tax credit. This more comprehensive IRS administrative data cover the entire calendar year. The timelier CMS data will continue to be used to extrapolate forward the IRS data, which become available with a longer lag.

GDP for the Rail Transportation Industry

The rail transportation industry consists of two distinct parts: passenger rail, which is entirely the National Railroad Passenger Corporation (Amtrak), and freight rail. Amtrak usually runs deficits and is heavily subsidized, while freight rail normally runs profits and is seldom subsidized.

This contrasting mix poses unique challenges to allocating the national estimates of rail transportation GDP to individual states and the District of Columbia. The current methodology does not account for the stark geographical differences in the profitability of the Amtrak rail network, nor does it allocate to states the subsidies that are implicitly included in Amtrak's corporate profits consistently with the allocation of the subsidies component of GDP.

BEA will eliminate these shortcomings by allocating to states the more profitable passenger rail segment separately from the rest of the Amtrak system and by coordinating the allocation of subsidies and corporate profits to states. The new method will make use of more detailed Amtrak financial and ridership data.

Amtrak has profitable rail routes between Boston and Washington, DC (the “Northeast Corridor”), while the rest of its routes (the “National Network”) are responsible for its continued operating loss. Allocating the total Amtrak loss to states based on ridership shares (as is currently done) leads to overstated losses in states in the Northeast Corridor that have higher passenger traffic, despite the fact that more ridership is likely to be a loss-mitigating factor (that is, a positive contribution to value added). Likewise, the time-series consequence is that higher passenger shares lead to lower rail surpluses and lower value added.

Subsidies are not conceptually a part of GDP. However, since the state GDP methodology for rail transportation uses the income approach to estimation, subsidies must be explicitly deducted to offset their implicit inclusion in corporate profits. This means the portion of rail transportation gross operating surplus (GOS) that is assigned to passenger rail must account for the subsidies Amtrak receives. Currently, federal grants (\$2 billion in 2019 and \$3 billion in 2020) are not being included in the rail GOS apportioned to passenger rail.

In order to address these issues, BEA will make the following changes:

- Split the Amtrak operating revenue and expense into Northeast Corridor and National Network segments and separately allocate each based on the ridership shares pertaining to the respective segments.
- Account for Amtrak federal grants in passenger-freight GOS apportionment and ensure that state-level subsidies are offset across income components (that is, between subsidies and GOS).

Currently, a national estimate of subsidies for freight rail (which has been zero in recent years) is obtained from the National Economic Accounts and subtracted from subsidies for the rail transportation industry to obtain the national control for subsidies to passenger rail. The national control is allocated to states in proportion to passenger boardings and alightings from the Rail Passengers Association. An estimate of Amtrak's gross operating earnings (operating revenue less expenses) is obtained from its financial statements and subtracted from the corporate profits with inventory valuation adjustment and capital consumption allowance for the

rail transportation industry from the National Economic Accounts to obtain the national control for the corporate profits of freight rail. The estimate of Amtrak's gross operating earnings is allocated to states on the basis of passenger boardings and alightings.

Beginning in 2012, Amtrak began reporting its financial results for the Northeast Corridor separately from the National Network.⁹ BEA will obtain Amtrak operating revenue, federal grants, and expenses for each segment and allocate them to the states in the segments using ridership statistics by route by station from the Rail Passengers Association.¹⁰ Specifically, operating revenue for each route will be allocated according to state shares of current-year ridership for the segments, while operating expense and federal grants will be allocated according to state shares of 2-year ridership's weighted average.¹¹ The national control for passenger rail subsidies will be allocated to states in proportion to these state-level estimates of federal grants. The new national estimate of passenger rail corporate profits will be the sum of state estimate of gross operating earnings plus federal grants. The national control for freight rail will equal the estimate of corporate profits for the rail transportation industry from the National Economic Accounts less the new national estimate of passenger rail corporate profits. The new segment-level allocation method for the Amtrak surplus or deficit will be used beginning with the estimates for 2012, while the change to the treatment of Amtrak federal grants will be used beginning with the estimates for 1997.

1. Apartment, studio and one bedroom; apartment, two bedrooms or more; attached, two bedrooms or fewer; attached, three bedrooms or more; detached, two bedrooms or fewer; detached, three bedrooms or more; and mobile, zero bedrooms or more.
2. Since no changes will be made to the data sources or estimation methods for group housing services, it will not be mentioned further.
3. For owner-occupied units, the USDA multiplies rent-to-value ratios from the 2001 Residential Finance Survey by values reported for individual farm dwellings in the Agricultural Resource Management Survey. These calculations are done at the unit level and then aggregated.
4. Monetary rent is the net current-production income of persons (except those primarily engaged in the real estate business) from the rental of real property.
5. See Dylan G. Rassier, Bettina H. Aten, Eric B. Figueroa, Solomon Kublashvili, Brian J. Smith, and Jack York, “Improved Measures of Housing Services for the U.S. Economic Accounts,” *Survey of Current Business* 101 (May 2021).
6. Estimates are made for PUMAs, the most detailed geography available in the ACS public-use microdata sample, a 1 percent sample of the ACS. PUMAs have a population of at least 100,000, cover the entirety of the United States, and do not span more than one state. PUMA results can be directly summed to the state and national levels or allocated to the county level.
7. For the purposes of estimating state-level rental income of persons, the imputed owner-occupied housing expenditure estimates for 2005–2019 (based on PUMA-level ACS data) will be extended back to 2002 using state-level ACS data since reliable PUMA-level ACS data are not available.
8. It is combined with other tax credits and miscellaneous transfer receipts in “other transfer receipts of individuals from governments” (line 2700) and in “other refundable tax credits” (line 5300) in table SAINC35—“Personal Current Transfer Receipts.”
9. Financial statements by segment are reported in Amtrak’s Monthly Performance Report.
10. States in the Northeast Corridor are Connecticut, Delaware, Maryland, Massachusetts, New Jersey, New York, Pennsylvania, and Rhode Island. The District of Columbia is also in the Northeast Corridor. All continental U.S. states except South Dakota and Wyoming are in the National Network. The District of Columbia is also in the National Network. Northeast Corridor and National Network passengers are not distinguished by where their trip began or ended but by which routes they rode, so Northeast Corridor states also have National Network passengers who take State-Supported or Long-Distance train routes.
11. The rationale for the different revenue and expense allocators is (1) operating expense has been much more stable year over year than operating revenue and (2) the state distribution of operating expense would theoretically align best with ridership when trains operate with 100 percent passenger loads, and the alignment is likely worse with a lower load factor. For example, if Northeast Corridor operating earnings abruptly turn negative in 2020 with a much lower route-level load factor, a plausible outcome for a state with a greater decline in Northeast Corridor ridership is a faster decline in allocated operating income, but the revenue share would need to decline faster than the expense share in order for that to occur. Otherwise, the deficit (revenue-expense) share in 2020 would be smaller in absolute terms than the surplus share in 2019, implying a slower decline than in other states. To ensure time-series consistency, the year t operating expense share for a particular route will be based on (1) state ridership count of year t if the route-level load factor in year $t >$ load factor in $t-1$ and (2) state ridership count of year $t \times$ (route load factor in year t) + state ridership count of year $t-1 \times$ (1-route load factor in year t).