

# Peer-to-Peer Home Rentals in Government Statistics

Kristin Sandusky,<sup>1</sup> Rachel Soloveichik,<sup>2</sup> James Spletzer<sup>3</sup>

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## Abstract

This paper presents evidence suggesting that the peer-to-peer home rental industry is partially tracked in the government statistics. On the one hand, published IRS data shows an increase in small business filings from the real estate sector that may reflect filings from peer-to-peer landlords. On the other hand, peer-to-peer landlords do not appear to report either their rental income or their property management activity in household surveys. This paper then discusses how fully tracking the peer-to-peer home rental industry might impact measured GDP, measured employment and other high profile economic statistics.

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<sup>1</sup> Kristin Sandusky, U.S. Census Bureau

<sup>2</sup> Rachel Soloveichik, U.S. Bureau of Economic Analysis (corresponding author).  
Rachel.Soloveichik@bea.gov

<sup>3</sup> James Spletzer, U.S. Census Bureau

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## Introduction

Over the past decade, digital platforms facilitating peer-to-peer home rentals have grown from almost nonexistent to mediating millions of transactions each day. Airbnb is the best-known platform—but there are many other platforms operating in the United States and around the world. A rich trove of economic literature studies optimal design for peer-to-peer platforms (Luca 2016 and Einav et al. 2015), how peer-to-peer properties impact home prices (Barron et al. 2018, Sheppard and Udall 2018, and Koster et al. 2018), and how peer-to-peer properties impact hotel prices (Farronato and Fradkin 2018, and Dell et al. 2017). This paper studies a different question: how is the peer-to-peer home rental industry tracked in high profile government statistics like GDP and employment?

We present evidence suggesting that the peer-to-peer home rental industry is partially tracked in the government statistics. First, we present published IRS data which shows an increase in filings by small businesses without any employees (nonemployers) from the real estate sector. However, the published IRS data is too aggregated to be sure that the observed increase is actually due to peer-to-peer landlords reporting their revenue to the IRS. As a result, we cannot state definitively that either aggregate GDP or the self-employment statistics derived from IRS tax filings capture the rental income earned by peer-to-peer landlords. Second, we present household survey data showing that peer-to-peer landlords do not self-report either their capital income nor property management activity. This underreporting suggests that aggregate earnings and aggregate employment counts from the American Community Survey (ACS) may not include the rental income or labor market activity of peer-to-peer landlords.

This paper is divided into three sections. Section 1 starts with a general discussion of the peer-to-peer home rental industry and then describes the recommended treatment of home rental income for tax purposes, labor force measurement, and Gross Domestic Product (GDP) accounting. Next, section 2 documents the recent growth in peer-to-peer home rentals and demonstrates that this recent growth is difficult to find in current government statistics. Finally, section 3 calculates how fully tracking the peer-to-peer home rental industry might impact selected high-profile statistics like GDP and employment.

# 1. Peer-to-Peer Home Rental

## General Definitions

The peer-to-peer home rental industry provides two distinct services: a) short-term rentals of residential properties—either the entire property or portions of the property; and b) long-term rentals. The exact line between short-term rentals and long-term rentals is sometimes vague, but short-term rentals tend to last less than a week and long-term rentals tend to last for months. In recent years, the Internet has made it much easier for a potential tenant to locate suitable properties and potential landlords to locate suitable tenants. This reduction in transaction costs has facilitated dramatic growth in short-term peer-to-peer home rental transactions over the past decade.

It is interesting to note that long-term peer-to-peer home rentals were very popular early in the 1900s and housed a substantial fraction of the population in some cities. Previous unpublished work used the decennial population Census and the U.S. Department of Agriculture farm accounts to get a qualitative idea of how the peer-to-peer industry has changed from 1920 to 2010. Figure 1 shows preliminary estimates from that research. That research used very different source data than the remainder of the research shown in this paper. As a result, we cannot determine how historical tax filing data and historical household surveys tracked the peer-to-peer home rental sector. We will not discuss the historical data any further in this paper. Nevertheless, readers should keep in mind that any adjustments for peer-to-peer income may have more impact on measured economic growth before 1950 than after 2010.

Readers should note that the peer-to-peer home rental industry excludes nonmarket relationships. For example, roommates are typically friends who share cash costs, cleaning labor, repair labor and other housing inputs. Accordingly, neither roommate is selling home rental services to the other. Similarly, home swappers generally trade equivalent properties. Hence, neither participant provides net cash or net rental services. But peer-to-peer home rental transactions are primarily a market transaction where the tenant is not expected to provide any cleaning labor, repair labor or other housing inputs. We do not know if the peer-to-peer industry growth represents a true increase in home rental services or simply a shift to the market sector from the nonmarket sector.

## **Federal Tax Treatment and Labor Force Implications of Home Rental Income**

The administrative data generated from reporting of peer-to-peer home rental income for tax purposes present one opportunity to measure the size of the peer-to-peer home rental industry and to track its potential growth over time. The traits of interest generated from tax reporting of peer-to-peer home rental income include the specific form filed by the property lessor or third-party facilitator, the amount of rental revenue reported, and the deducted operating expenses. One of our goals in this research paper is to ask whether persons who rent part or all of their residence are reporting their income on the appropriate tax forms. Closely related is the question of whether government statisticians should count heads of households who rent part, or all of their residence as employed persons.

The IRS-issued tax form used and the information supplied on this form will vary based on: (1) whether the form is supplied by a lessor who owns the rental property, a lessor who rents the property long-term, or by a third party facilitator (such as Airbnb), (2) the number of days per year a property (or portion of a property) is rented, and (3) the amount of time the lessor invests in providing rental services. Third party facilitators such as Airbnb may supply IRS 1099-Misc or IRS 1099-K earnings form to each lessor (and to the IRS on the lessor's behalf). A lessor who rents their property for fewer than 15 days per year is not required to report this rental revenue to the IRS. However, a lessor renting their property for 15 or more days per year must report revenue generated from this activity either on a 1040 Schedule C or Schedule E. To the best of our knowledge, lessors who own the property file similar forms as lessors who rent the property long-term. As a result, IRS data cannot be used to distinguish between those two categories of lessors. The views herein are those of the authors and not intended as tax advice. Peer-to-peer landlords should consult a tax accountant for specific tax recommendations based on their individual situation.

Employment is defined as contributing time to an activity that is intended to result in pay or profit. For example, many people have a 40-hour per week job from which they receive a regular paycheck. Self-employed persons spend time providing labor services and are paid on either an hourly basis or a project basis. Examples of self-employed persons include high skilled workers like accountants or dentists and low skilled workers like teenage babysitters. Gig workers, like Uber drivers or manual laborers hired for specific tasks, are all considered self-employed. If the peer-to-peer landlord spends substantial time engaged with property management activities either through routine cleaning, provision of meals and/or entertainment, transportation, etc., then the lessor is considered employed. In that scenario, the lessor

could treat rental income generated through their peer-to-peer home rental activity as self-employment labor income and report it on 1040 Schedule C.

In contrast to being paid for labor services, another way that persons earn income is by renting out their capital assets. The classic example is a business owner who does not spend time working in his or her own establishment yet receives profits from the establishment. Income received here would be defined as returns to capital rather than labor. Someone who owns a second residence and has a professional management agency handle all rental details would not spend time on a day-to-day or week-to-week basis working as a landlord. By earning rental income in this way, it is not considered to be labor income. Instead, it is treated as a return on the rental property.<sup>4</sup> In that scenario, the lessor should treat income generated through this activity as capital income and report it on 1040 Schedule E.

The value reported for rental revenue is relatively straightforward. However, the value reported for expenses (used to compute rental profit) on these forms will vary due to a large number of factors. Expenses that may be deducted from rental revenue include rent paid by a lessor who rents long-term, property management and other administrative fees, cleaning, repairs and maintenance, utilities, property taxes, mortgage interest and more. For properties that are used for rental purposes only, all associated expenses may be deducted. If the property is used for both personal and rental purposes, then expenses are scaled by the time the owner uses the property for personal purposes relative to the amount of time it is made available for rent. This rule prevents owners of vacation homes who rent them out occasionally from deducting all costs associated with those homes. Finally, there are several more complex paths through which losses may be expensed.

### **State and Local Tax Treatment of Home Rental Income**

State and local governments tax peer-to-peer home rentals in two separate ways: through income taxes and excise taxes. State and local governments typically model their income tax system on the federal tax system. Hence, the procedure to calculate peer-to-peer home rental income for state and local governments is likely to be similar to the procedures described earlier for the federal government. In

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<sup>4</sup> Many peer-to-peer rental hosts perform some but not all of the productive activities necessary to rent the property. For example, they might screen guests but not do cleaning. The classification of these individuals is ambiguous. A few peer-to-peer landlords neither own their rental properties nor perform any productive activities themselves. Their profits can be viewed as a return on the financial asset of a long-term lease on a desirable rental property.

contrast, excise taxes are often very heterogenous across localities. This paper will briefly discuss existing research on the city-level tax treatment of peer-to-peer home rentals.

Most cities require hotels to pay occupancy taxes on each room rented. In recent years, some city governments have made agreements with Airbnb to collect the occupancy tax when a room is booked. These agreements appear to raise average Airbnb prices, suggesting that not all peer-to-peer landlords were paying the taxes previously (Wilking 2016). To the best of our knowledge, city governments do not publicly track the occupancy taxes paid by peer-to-peer landlords separately from occupancy taxes paid by hotels. Instead, all such tax revenue is reported as a component of 'other selective sales taxes' in the U.S. Census Bureau State and Local Government Finances data and other sources.

### **GDP Treatment of Home Rental Income**

The GDP treatment of peer-to-peer home rentals is described in the official guidelines for national accounts, *System of National Accounts 2008* (hereafter referred to as *SNA 2008*). *SNA 2008* clearly recommends that small unofficial businesses should be tracked in GDP, and neither illegal tax evasion nor zoning violations prevent a business from being tracked in GDP (Sections 6.39-6.48). Accordingly, the peer-to-peer home rental sector is unambiguously in scope for GDP measurement. However, peer-to-peer landlords are generally classified as unincorporated household enterprises, and so their income is allocated to the household sector rather than the business sector (Section 4.155-4.162). This sector allocation has no impact on aggregate GDP but does change the specific tables that the Bureau of Economic Analysis (BEA) uses to track output. Similarly, Gross Domestic Income (GDI) includes both the rental income attributable to labor services and the rental income attributable to capital.

GDP already includes both actual rents paid on tenant occupied housing and imputed rents paid on owner-occupied housing (Sections 6.34-6.37). Hence, the peer-to-peer home rental industry would have no impact on measured GDP if landlords merely charged the standard market rent for their properties. Conceptually, this is similar to the zero impact on measured GDP from households reselling used goods at their standard market price. However, peer-to-peer landlords typically charge higher daily rents well than the standard market rent for a property. As a result, the peer-to-peer home rental industry raises GDP by the **difference** between the peer-to-peer home rental rate for a property and the standard market rental rate for a property.

Peer-to-peer home rental properties charge higher daily rates because peer-to-peer tenants require more services than ordinary tenants. Short-term tenants typically expect communication from the landlord or property manager before their rental starts. In addition, peer-to-peer home rental properties are typically cleaned between each tenant and sometimes more frequently. Even long-term tenants typically expect that the landlord will handle cleaning and repairs for the common areas of the property without their help. Peer-to-peer tenants may also be riskier for landlords than ordinary tenants. The industry literature suggests that peer-to-peer landlords earn approximately 67 percent more revenue per month than standard landlords (Wallace 2018). The industry literature also suggests that peer-to-peer landlords have similar expenditures on intermediate inputs as standard landlords. Accordingly, the additional business value-added associated with peer-to-peer home rental is approximately 40 percent ( $0.67/1.67$ ) of the gross revenue from peer-to-peer properties.

Peer-to-peer home rentals do not necessarily create problems in the published government statistics. Small informal businesses have always existed, and government statistical agencies have developed a number of methodologies to track them. For example, the Current Population Survey (CPS) has provided data on secondary jobs since the 1990s (Lale 2016). Similarly, the Internal Revenue Service (IRS) has studied underreporting and misreporting of income across a variety of industries (GAO 2017). It is possible that the peer-to-peer home rental industry can be adequately tracked with the general techniques used in the studies mentioned above. It is even possible that the new digital platforms might enable better tracking of peer-to-peer home rentals than was previously feasible (Ahmad and Schreyer 2016).

In practice, the peer-to-peer home rental industry has an ambiguous impact on measured GDP. If peer-to-peer landlords do not report either their revenue or their expenses to the IRS, then their business value-added may be entirely omitted from measured GDP. On the other hand, some peer-to-peer landlords might report their revenue but not their expenses to the IRS.<sup>5</sup> In that case, their business value added may be overestimated in measured GDP. Finally, the IRS's formulas to calculate business revenue and business expenses are often discrepant from BEA's formulas to calculate business output and intermediate input. The three issues mentioned earlier occur throughout the small business sector, and

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<sup>5</sup> It might seem that few taxpayers would intentionally underreport legitimate expenses. However, tax forms are sufficiently complex that landlords without access to skilled tax advice may miss some legitimate deductions. In addition, cities often regulate peer-to-peer landlords heavily. Some informal landlords might prefer to overreport profits rather than admit that they are earning income from rental transactions which are forbidden under local law.

BEA has developed careful procedures to adjust for all three of them. As a result, measured GDP will only be biased if the peer-to-peer home rental sector has different patterns of underreporting, misreporting and formula discrepancies than the overall small business sector.

The peer-to-peer home rental sector also has implications for other parts of the National Income and Product Accounts. Peer-to-peer properties rented to foreign tourists are considered an export of services rather than domestic consumption. Appliances purchased by peer-to-peer landlords are considered business investment rather than consumer durables. At the industry level, properties used for peer-to-peer home rental services are considered part of the accommodation sector rather than the real estate sector. Finally, inputs to the peer-to-peer home rental sector are tracked in the supply-use tables and the joint BEA/BLS production accounts. These implications are beyond the scope of this paper.

## 2. Measuring Peer-to-Peer Home Rental Transactions Over Time

### Data on Short-term Digital Rental Properties

Our data on digital rental properties is taken from the website AirDNA.co. That website collects a variety of data on Airbnb rental units, prices and occupancy rates. It is not affiliated with Airbnb, but it earns money from advising potential peer-to-peer landlords about local market conditions. We collected our data by hand downloading data on 290 metropolitan statistical areas (MSA's) in late 2018.<sup>6</sup> Since our downloading work was completed, AirDNA added information on HomeAway listings (Shatford 2019). Unfortunately, those HomeAway listings were only added retroactively back to 2017. As a result, the AirDNA data now shows a trend break in early 2017 (Milton 2019). We have not yet determined how to construct a consistent time series for the new AirDNA data, and therefore will use the older downloaded data in this paper.

Figure 2 shows the total number of Airbnb rental properties from 2012 onward. The most important result is the dramatic growth rate early on. Airbnb was almost nonexistent in 2012 and now mediates millions of rentals each day (millions of transactions worldwide, whereas the data we present in figure 2 refers to only 290 MSA's, in the US). Since 2014, the growth rate of Airbnb rental properties has slowed. Readers should note that we were not able to get data on the number of rental transactions per Airbnb

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<sup>6</sup> Our data collection technique was simple. We used our best judgement to match the ACS area codes with the AirDNA area codes, and then hand downloaded historical data for every MSA tracked in the ACS.



property, data on short-term rental transactions mediated through other digital platforms, or data on short-term rental transactions arranged non-digitally. It is likely that a portion of the post-2014 growth slowdown shown in figure 2 can be explained by the entry of competing digital platforms like VRBO.com. A recent report by Phocuswright studied the domestic private accommodations industry (Quinby 2018). They estimate that it grew from \$22 billion in 2012 to \$37 billion in 2018. This is a rapid growth rate, but much lower than the growth rate of Airbnb (Gallagher 2017).

### **Data on Long-term Rental Properties**

Our primary data on long-term rentals is the ACS. Every year, the ACS contacts approximately 2 million households and asks a variety of questions about each household member. We focus on the question “relationship to head of household”. The most common answers to this question are family relationships like “head of household”, “spouse” or “child”. But approximately 0.7 percent of individuals are reported as “roomer”.<sup>7</sup> To be clear, the ACS code for “roomer” is a different code than the one for “roommate”. Roommates are typically similar demographically to the heads of households and are jointly responsible for the mortgage or lease on the housing unit. In contrast, “roomers” often come from very different demographics than the head of household and have no direct responsibility for the mortgage or lease. We use only the relationship code “roomer” to proxy for long-term peer-to-peer home rental services over time. We note that going forward, it will be more difficult to measure the population share of roomers since the ACS simplified their relationship question in 2019 and the category “roomer” was dropped from the list of options (Lee 2019).

Figure 3 shows the population share of roomers from 2006 to 2017. There appears to be a clear trend break around 2014, the year that Airbnb started facilitating a significant number of rental transactions. Of course, the ACS does not ask individuals how they found their peer-to-peer home rental. It is likely that many of the roomers found their landlords through word-of-mouth, social media, and other general communication methods. Nevertheless, it is possible that Airbnb and other digital platforms contributed to the recent growth in roomers. But unfortunately, this story appears to be more complicated—we find

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<sup>7</sup> The survey form combines roomers and boarders in one checkbox. At one time, the distinction between roomers and boarders was important. Boarders not only purchased home rental services, but also ate meals prepared by the household—so they paid a higher monthly rent to cover the additional cost of raw food and cooking labor. Boarding is rare nowadays, so we will refer to those individuals as roomers only.

no city-level correlation between growth in the population share of roomers and growth in the Airbnb market. This is an unusual finding and we continue to try to understand it.

We experimented with using the same ACS data described earlier to estimate long-term rental revenue. The ACS reports housing characteristics for all households in the sample and monthly rent for tenant households. We use that information and the industry literature to impute rents for every roomer studied. Across the entire time period studied, the imputed revenue share has consistently been higher than the population share. However, the difference between the two series is not large and the revenue share displays similar trends to the population share. For simplicity, this paper will focus on the population share because it is easier to measure.

### **Peer-to-Peer Home Rental Income in Tax Statistics**

The data in figure 2 shows that there has been substantial growth in the number of short-term peer-to-peer home rental properties since 2012. We now turn to the question of whether income received from providing peer-to-peer home rental services is reported as either labor income or capital income in published tax statistics. If persons who own rental properties are managing the properties themselves, then we should see an increase in the number of self-employed in either the real estate sector (NAICS 531) or the accommodation sector (NAICS 721). If persons who own the rental properties are letting professional property managers completely manage the rental property, then we should see an increase in the number of persons claiming passive rental income. We will examine both possibilities by looking at published statistics from the IRS.

We begin with an analysis of labor income, and specifically, self-employment income. Self-employed peer-to-peer landlords typically manage only a few properties and rarely hire any employees to help them. Nonemployers are businesses that have no paid employment or payroll, are required to file a federal income tax return, and have business receipts of \$1,000 or more (\$1 or more for the Construction sector). Most nonemployers are self-employed individuals operating as unincorporated sole proprietors. Nonemployer statistics originate from Schedule C (for unincorporated sole proprietors) and similar tax forms that are filed with the Internal Revenue Service. As a result, peer-to-peer landlords who are filing

the correct tax forms are likely to be captured in the nonemployer statistics<sup>8</sup> from the U.S. Census Bureau rather than the employer statistics tracked by the Quarterly Census of Employment and Wages (QCEW).<sup>9</sup>

The nonemployer statistics are published for approximately 450 industries categorized according to the North American Industry Classification System (NAICS). The NAICS systematically divides all economic activity into thousands of possible industry classifications. This paper will focus on two potentially relevant industries: NAICS industry 721 (Accommodation) and NAICS industry 531 (Real Estate). More information on the NAICS is available at <https://www.census.gov/eos/www/naics/>.

In figure 4, we present the number of nonemployers in NAICS industry 721 (Accommodation) and industry 531 (Real Estate) on the same graph as the AirDNA data in figure 2. We would like to present these data for finer industries, such as 53111 (Lessors of Residential Buildings and Dwellings) or 72119 (Other Traveler Accommodations), but this more granular data is not published on the Census Bureau's website. We analyze these two industries because we believe these are the two industries that Airbnb hosts may choose when recording their self-employment income on their Schedule C forms.

As seen in figure 4, the number of self-employed persons in NAICS industry 721 (Accommodation) with greater than \$1,000 in gross receipts has increased by only 19,000 from 2010 to 2016 (from 54,000 to 73,000 persons). This is nowhere near the growth of 240,000 recorded in the AirDNA data. On the other hand, the number of self-employed persons in industry 531 (Real Estate) with greater than \$1,000 in gross receipts has increased by 333,000. This is a similar order of magnitude to the increase in the number of Airbnb listings in 290 U.S. MSA's, but we advise readers not interpret this as a one-to-one correspondence—the published industry 531 is very broad. Thus, we don't know whether the growth in self-employed persons is in 53111 (Lessors) or in 5312 (Real estate agents). Nevertheless, the data in figure 4 suggest that it is plausible that individuals earning money from Airbnb and other property rental sites are recording their income as self-employment real estate earnings on Schedule C.

Although we express caution about not having detailed industry tabulations available, it is worth noting that the growth in nonemployers appears in the real-estate industry category 531 rather than the accommodations industry category 721. According to NAICS definitions, businesses in industry 531 (Real estate) are primarily engaged in renting or leasing real estate to others; managing real estate for others;

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<sup>8</sup> Available at <https://www.census.gov/programs-surveys/nonemployer-statistics/about.html>

<sup>9</sup> Available at <https://www.bls.gov/cew/>

selling, buying, or renting real estate for others; and providing other real estate related services, such as appraisal services. Businesses in industry 721 (Accommodations) provide lodging or short-term accommodations for travelers, vacationers, and others. For individuals who rent part or all of their property to short-term renters, it strikes us that there is not much difference between these two definitions.

We also consider the possibility that individuals earning income from short-term rentals could record their income on Schedule E, “Supplemental Income and Loss,” of their 1040 tax returns. Schedule E is used to report income or loss from rental real estate, royalties, partnerships, S corporations, estates, trusts, and residual interests in real estate mortgage investment conduits. The Statistics of Income (SOI) division of the IRS estimates the number of tax forms filed each year by specific line items on various schedules. We have downloaded the “number of rentals” filed on Schedule E from 2006 to 2016.<sup>10</sup>

Figure 5 shows little consistent growth in passive capital income after 2013. The SOI data do show a substantial 22.8 percent rise between 2009 and 2011, which may be due to the housing crash forcing homeowners to rent out vacant properties that they could not sell. It is also possible that the 22.8 percent rise was due to changing reporting rates or other measurement issues.<sup>11</sup> Given the dramatic growth in Airbnb listings seen in figure 2 and the minimal growth in figure 5, our interpretation is that very little of the growth in peer-to-peer home rentals since 2013 appears to be reported as passive capital income.

### 3. Impact of Peer-to-Peer Home Rentals on Economic Statistics

#### Potential Impact on Aggregate GDP

This paper focuses on the question of whether peer-to-peer home rental income is tracked and does not make precise estimates about its level. Nevertheless, it is interesting to discuss how fully tracking peer-to-peer home rental income might impact measured GDP. For that discussion, we need estimates of aggregate peer-to-peer home rental revenue. Our estimates of short-term rental revenue are based on a Phocuswright report (Quinby 2018) and our estimates of long-term rental revenue are based on the ACS

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<sup>10</sup> Available at <https://www.irs.gov/statistics/soi-tax-stats-individual-income-tax-returns-line-item-estimates>

<sup>11</sup> We have asked SOI about this increase, and SOI’s public affairs office emailed back “our individual lead analyst ... had no input to explain the reason for these increases.”

data described earlier. Both revenue series are somewhat speculative but likely to provide the right order of magnitude. In 2017, we estimate that the short-term peer-to-peer home rental industry produced \$36 billion of output and the long-term peer-to-peer home rental industry produced \$18 billion of output. Based on the industry literature, we calculate that total value-added was \$21 billion in 2017.

As discussed earlier, the revision to GDP from tracking peer-to-peer home rental income is theoretically ambiguous. For illustrative purposes only, we will consider two separate possibilities. First, peer-to-peer landlords may not report either income or expenses. In that case, measured GDP will be underestimated. Second, peer-to-peer landlords may fully report their income but not report their expenses. In that case, measured GDP will be overestimated. These two separate possibilities can be seen as upper and lower bounds on the revision to GDP from tracking peer-to-peer home rental income.<sup>12</sup>

Figure 6 shows our best estimate of how tracking the peer-to-peer home rental industry might impact overall GDP. The most important result is that the potential revision to measured GDP is relatively close to zero. Therefore, measured GDP growth would not change significantly if peer-to-peer home rental revenue was fully tracked. Intuitively, the peer-to-peer home rental industry is still very small. As a result, its rapid growth has little impact on the aggregate economy. However, the peer-to-peer home rental industry is growing rapidly and may somebody surpass the traditional accommodations sector (Hughes 2018). If that happens, then potential mismeasurement of the peer-to-peer home rental industry may have more impact on measured GDP growth. As shown in figure 1, the peer-to-peer home rental industry may have an impact on pre-1950 GDP growth as well.

### **Peer-to-Peer Property Management Activity in Labor Statistics**

Peer-to-peer landlords are a large population. In 2017, the ACS showed 1.5 million heads of households<sup>13</sup> who had roomers or boarders living in their household. We were not able to find data on the number of short-term peer-to-peer landlords. But we calculated earlier that short-term rentals accounted for approximately two thirds of the total peer-to-peer home rental income. Assuming that the short-term home rental sector has the same ratio of landlords to rental income, we calculate that there were slightly

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<sup>12</sup> The discussion above only applies to the direct effect of inaccurate reporting by peer-to-peer landlords. As discussed earlier in the paper, BEA has developed formulas to adjust the reported IRS data for underreporting and misreporting. BEA's formulas which adjust reported IRS data may potentially interact with the inaccurate reporting.

<sup>13</sup> We treat the head and spouse as co-heads. We use the CPS relationship codes to identify heads and spouses.

more than 3 million short-term peer-to-peer landlords in 2017. In total, we estimate that 4.7 million people earned some income from peer-to-peer home rentals in 2017.

Managing peer-to-peer home rental properties is a labor-intensive activity, and we should expect to see it reflected in the employment statistics. If persons who own rental properties are managing the properties themselves, then we would expect to see an increase in the number of self-employed property managers. If persons who own rental properties are letting professional property managers completely manage their rental property, then we would expect to see an increase in the total property management workforce. However, the professional property managers could be either self-employed or employees. We examine all these possibilities by looking at a variety of household surveys.

The American Time Use Survey (ATUS) provides some suggestive evidence regarding how much time peer-to-peer landlords spend in activities related to their rental properties. The ATUS does not specifically study the peer-to-peer home rental sector, but it does ask how each household member is related to the head and how one selected respondent spent their time in a sample day. Heads of households with roomers are assumed to be peer-to-peer landlords and heads of households without roomers are assumed not to be peer-to-peer landlords. One difference in time use is readily apparent. Peer-to-peer landlords average 4.5 minutes per day on ‘income-generating services’ (ATUS activity code 50303), more than ten-fold the 0.3 minutes per day spent by non-landlords. Across the entire sample, heads of households with roomers spent 15 minutes **less** per day on cleaning or repairs and 5 minutes **less** per day working at home than heads of households without roomers. These differences become statistically insignificant, but do not reverse sign, when we include controls for household demographics. The most likely explanation for these null results is that peer-to-peer landlords do not spend much time providing services to their tenants.<sup>14</sup>

Next, we test how known landlords report their rental income and occupation. The ACS does not specifically track peer-to-peer home rental income or property management work, but it does ask general questions about capital income<sup>15</sup> and occupation. To be clear, not every head of a household with a

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<sup>14</sup> It is also possible that peer-to-peer landlords do provide substantial cleaning and repair services to tenants but compensate by hiring outside service firms to provide cleaning and repair services for their own family. For example, individuals who are comfortable matching with tenants on Airbnb may also be comfortable using TaskRabbit. Consistent with that hypothesis, peer-to-peer landlords with children spend less time on childcare than non-landlords.

<sup>15</sup>The exact description is “Interest, dividends, net rental income, royalty income, or income from estates and trusts”.

roomer should report capital income. Some roomers may have started renting between the time frame for the income question and the time frame for the household composition question. Other roomers might pay rent to an individual other than the head of household.<sup>16</sup> Similarly, many peer-to-peer landlords earn a majority of their income from other sources. Hence, the ACS would consider property management to be a secondary occupation that is outside the scope of the survey (since the ACS only asks about occupation for a respondent's main job). Nevertheless, landlords who follow the ACS's official instructions should report positive capital income in the vast majority of cases, and landlords whose main job is managing their property should report being self-employed with a property management occupation.

Figure 7 shows that approximately only 15 percent of the heads of households with roomers report any capital income, making it obvious that 85 percent are simply not reporting their home rental income. Furthermore, heads of households which rent rooms report similar levels of capital income as the heads of households who do not rent rooms. Based on that similarity, we calculate that even the 15 percent of households which report capital income are probably reporting income from other capital assets rather than income from peer-to-peer home rental. In other words, almost all of peer-to-peer home rental revenue appears to be omitted from reported income in the ACS.

One might argue that unclear survey instructions cause the low reporting rate shown in figure 7. To test that hypothesis, we also examined data from the Current Population Survey (CPS). The CPS has far more questions on income, and the instructions on the rental income instructions explicitly mention possible rent from roomers or boarders. Nevertheless, only 11 percent of heads of household with roomers or boarders report any rental income, barely more than the 6 percent of heads of household without roomers or boarders. The sample size is too small to determine if the difference between 11 percent and 6 percent is statistically significant. But even if the additional 5 percent reporting rate is statistically significant, it is clearly much lower than it should be. In other words, clearer survey instructions are not by themselves sufficient to elicit accurate self-reports from peer-to-peer landlords.

Figure 8 shows that the average share of peer-to-peer landlords who report being property managers is approximately 1 percent, very similar to the share of property managers in the general population. In other words, almost all peer-to-peer landlord work appears to be omitted from the ACS occupations. This

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It is possible that some peer-to-peer landlords might report their revenue as self-employment income or other income. We tried including those income sources as well and found similar reporting patterns.

<sup>16</sup> It is also possible that roomers pay rent exactly equal to permitted deductions, so the net income is precisely zero.

should not be surprising if individuals doing peer-to-peer landlord work also have other jobs, since the ACS only asks about the occupation for the individual's main job. However, it is harder to explain for individuals who report being unemployed or outside the workforce. Perhaps those individuals do not regard their peer-to-peer property management activities as labor. For some individuals, their self-reported income and occupation in the ACS may not be consistent with the self-employment earnings reported to the IRS. We hope to investigate this further in future drafts.

Finally, we test whether the large growth of peer-to-peer home rental properties during 2013 to 2016 has been associated with an increase in the number of professional property managers. We use two complimentary datasets to track professional property managers. First, we use the Quarterly Census of Employment and Wages program at BLS ([www.bls.gov/cew](http://www.bls.gov/cew)) to count the number of employees in the industry 'Residential property management' (NAICS 531311). Next, we use self-reported occupation in the ACS to count the number of people who report their occupation as 'Property, real estate, and community association managers' (occupation code 0410). Neither dataset is a perfect proxy for individuals who specialize in administering peer-to-peer home rentals on behalf of absentee owners. But, they can provide some clues on whether professional property managers are an important factor.

Figure 9 shows some evidence of growth in property management services after 2013. QCEW employment in the residential property management industry grew at 4 percent per year from 2013 to 2017, which is somewhat higher than its growth of 3 percent per year from 2006 to 2013 (we have not done a test of statistical significance). As measured in the ACS, the property management occupation grew at 4 percent per year from 2013 to 2017, which is higher than its growth of 0 percent per year from 2006 to 2013. Results are similar when we start our analysis in 2011, after the trough of the Great Recession. In other words, the industry data displays no clear trend break but the occupation data does. This a puzzle we hope to explain in a future draft of this paper.

To be clear, the professional property owners shown in figure 9 are not necessarily employees of large peer-to-peer property management firms. Many individuals own second homes that they rent for additional income. These individuals may identify as self-employed property managers in the ACS. In addition, some property managers in the ACS may be managing non-residential property. In the next draft of this paper, we hope to use the Occupational Employment Survey<sup>17</sup> and other government

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<sup>17</sup> <https://www.bls.gov/oes/home.htm>



statistics to determine the factors driving the ACS results. We also hope to study how measured employment might change if peer-to-peer landlords are included in the workforce.

## Conclusion

We presented evidence that suggests that the peer-to-peer home rental industry may be partially tracked in the government statistics. We presented a level of IRS data that is consistent with peer-to-peer landlords reporting their rental income to the IRS. But the published data is too aggregated to be sure that the increasing number of nonemployer filings in the real estate sector is actually due to peer-to-peer landlords reporting their rental income. As a result, we cannot state definitively that either aggregate GDP or the self-employment statistics derived from IRS tax filings capture the peer-to-peer home rental sector. On the other hand, peer-to-peer landlords do not appear to report their either their rental income or their property management activity in household surveys, so aggregate earnings and aggregate employment counts from these sources may not be correct.

Regarding future iterations of the work presented here, it would be interesting to link the ACS microdata to nonemployer microdata. This is possible using the confidential data in the Research Data Centers of the U.S. Census Bureau. This linkage would tell us more definitively that individuals who report self-employment income from rental properties on their IRS Schedule C forms do not report this to the ACS. This linkage could also help us understand why there is no city-level correlation between the AirDNA data in figure 2 and the ACS data in figure 3.

The paper also demonstrates that although the growth of the peer-to-peer home rental industry during the past decade is incredibly large due to technology, the industry is still very small in terms of its contribution to the U.S. economy. As a result, the potential biases discussed above are still small. But this reassuring finding may not hold if the peer-to-peer home rental industry continues to grow rapidly.

## Bibliography

- Ahmad, N. and Schreyer, P. (2016) "Measuring GDP in a Digitalized Economy," *OECD Statistics Working Papers* 2016/07
- Barron, K., Kung, E., and Proserpio, D. (2018) "The Sharing Economy and Housing Affordability: Evidence from Airbnb," *SSRN Working Paper*
- Dell, J., Doby, D., Tillipman, J. and Zhuplev, A. (2017) "The Impacts of the Peer-to-Peer Platform on the Traditional Lodging Industry: Emerging Trends and Implications for Greater Los Angeles (U.S.A.) and Barcelona (Spain)," *Journal of Applied Business and Economics* 19(7), 130-158
- Farronato, C., and Fradkin, A. (2018) "The Welfare Effects of Peer Entry in the Accommodation Market: The Case of Airbnb," *NBER Working Paper* 24361
- Einav, L., Farronato, C. and Levin, J. (2015) "Peer-to-Peer Markets," *NBER Working Paper* 21496
- Gallagher, L. (2017) "Airbnb's Profits to Top \$3 Billion by 2020," *Fortune Magazine*, February 15th
- GAO (2017) "Tax Gap: Goals and Strategies for Improving Compliance," Report 18-39
- Hughes, S. (2018) "How the Airbnb and Hotel Industry War Will Look in 2018," *Medium*, February 21st
- Koster, H., Ommeren, J. and Volhausen, N. (2018) "Short-term rentals and the housing market: Quasi-experimental evidence from Airbnb in Los Angeles," *Voxeu*, December 20th
- Lale, E. (2016) "The Evolution of Multiple Jobholding in the U.S. Labor Market: The Complete Picture of Gross Worker Flows," *IZA Discussion Paper*, 10355
- Lee, A. (2019) "The 2019 American Community Survey Includes Changes to Several Questions," *Population Reference Bureau*, January 16<sup>th</sup>
- Luca, M. (2016) "Designing Online Marketplaces: Trust and Reputation Mechanisms," *NBER Working Paper* 22616
- Milton, C. (2019) "Airbnb Data + HomeAway Data Together on One Platform," *AirDNA Blog*, March 12th
- Quinby, D. (2018) "U.S. Private Accommodation Market to Reach \$36.6B by 2018," *Phocuswright*
- Shatford, S. (2019) "The Short-Term Rental Market Is Evolving. So is AirDNA" *AirDNA Blog*, March 4th

Shatford, 2019, <https://www.airdna.co/blog/short-term-rental-market-evolving-homeaway>

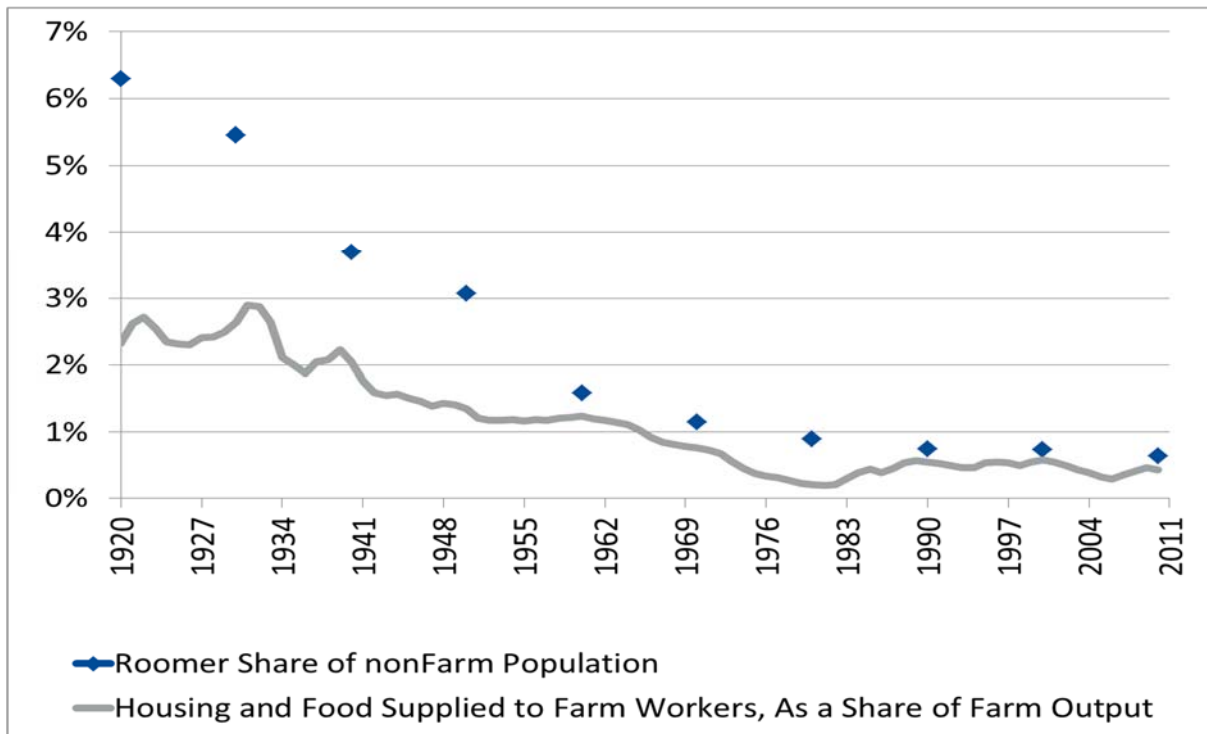
Sheppard, S. and Udell, A. (2018) "Do Airbnb properties affect house prices" Working Paper

United Nations Statistics Division. (2008). *Updated System of National Accounts 2008*. Accessed May 20, 2013. <http://unstats.un.org/unsd/nationalaccount/sna2008.asp>

Wallace, N. (2018) "Where Do Airbnb Hosts Make the Most Money?" *Smart Asset*, February 20th

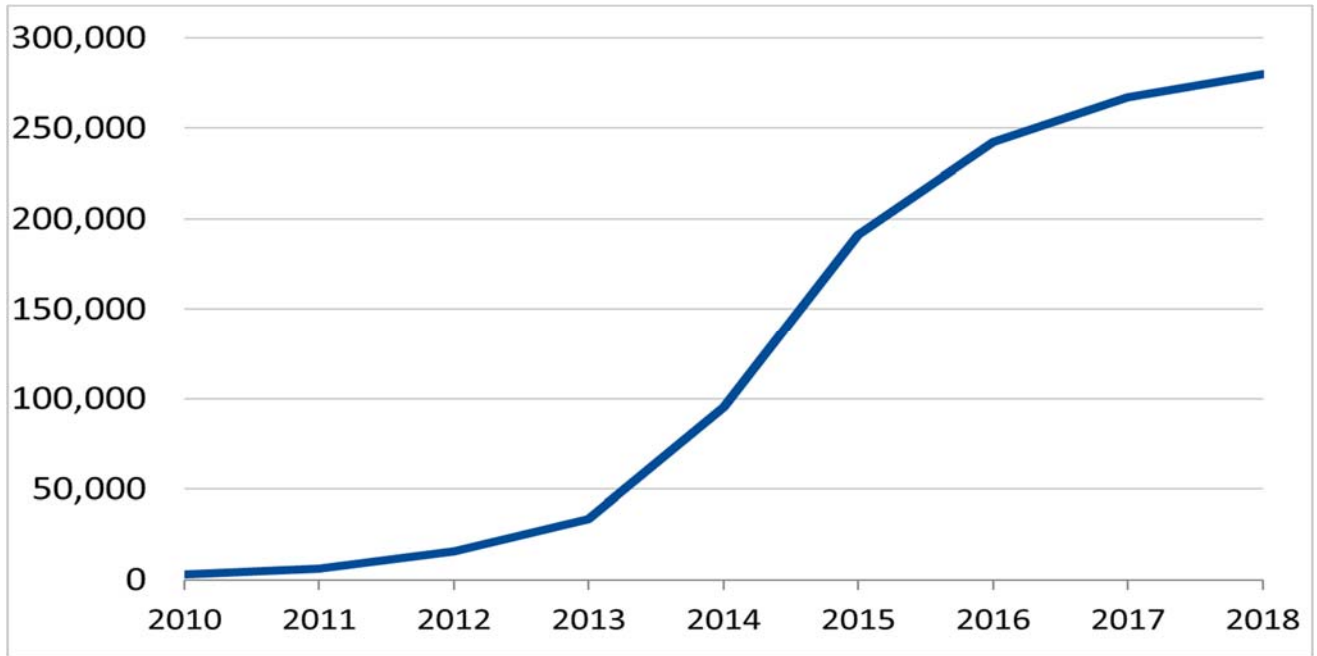
Wilking, E. (2016) "Hotel Tax Incidence with Heterogenous Firm Evasion: Evidence from Airbnb Remittance Agreements" Working Paper

**Figure 1: Qualitative Trends in the Peer-to-Peer Sector Over Time**

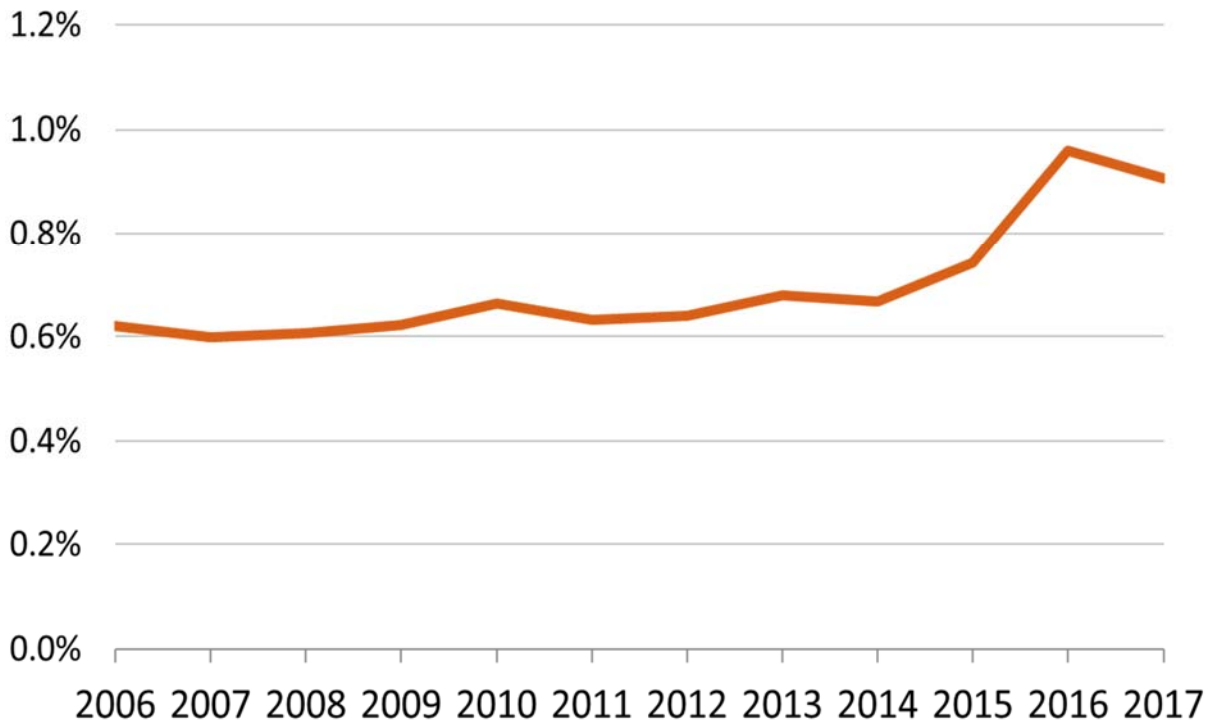


**Figure 2: Number of Airbnb Rental Units Available,**

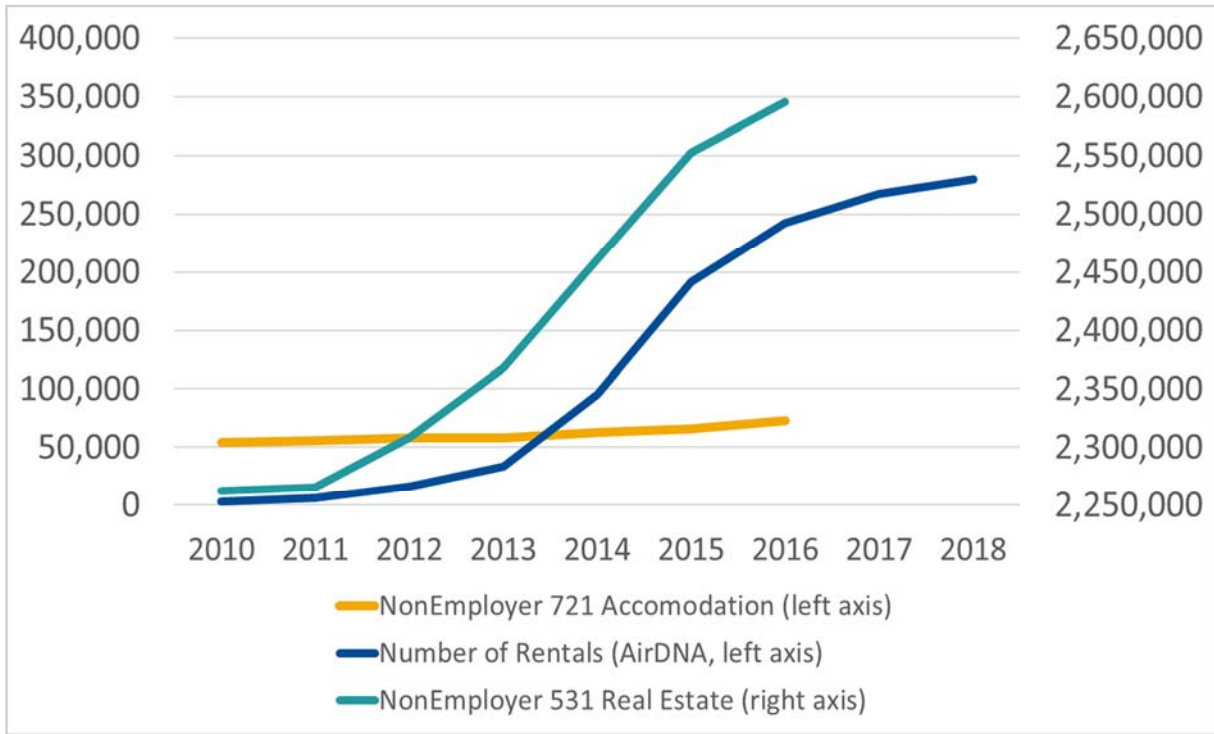
Hand Downloaded from AirDNA for 290 MSA's



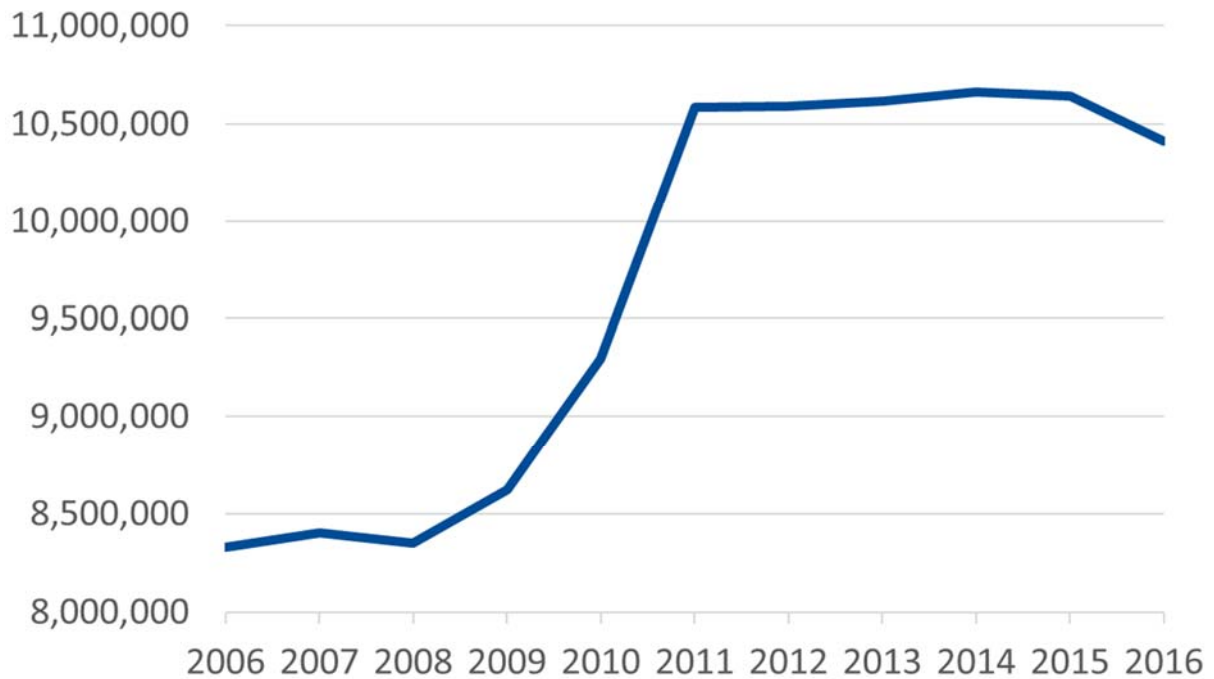
**Figure 3: Roomers as a Share of Total Adults**



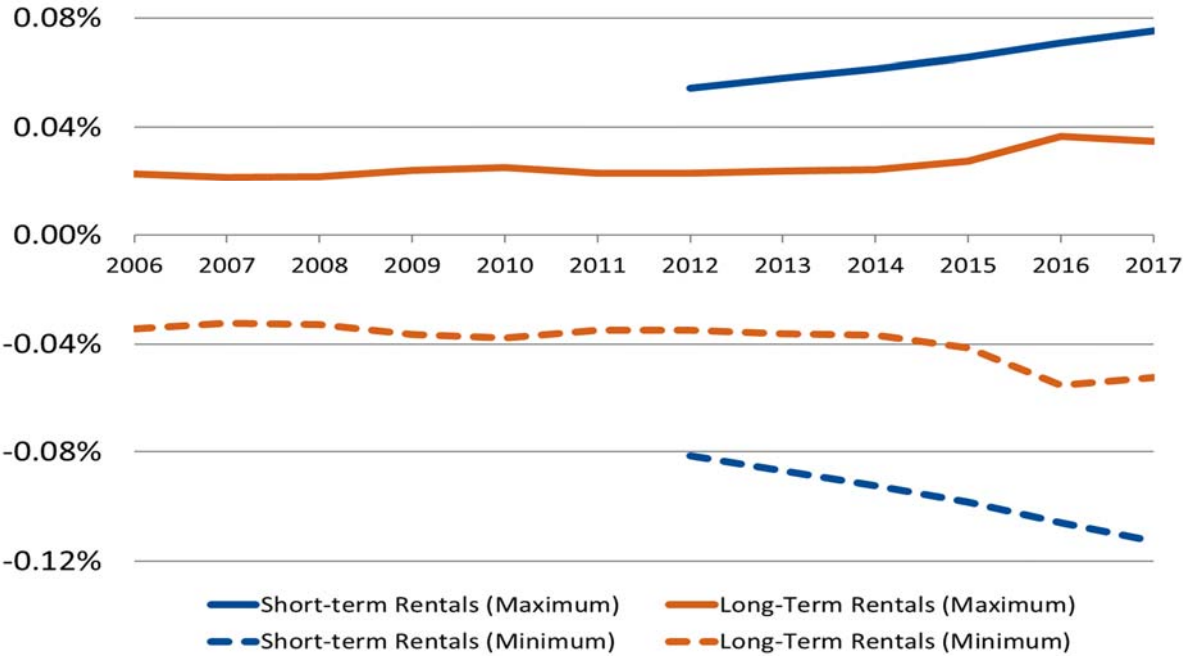
**Figure 4: Non-Employer from Tax Filings**



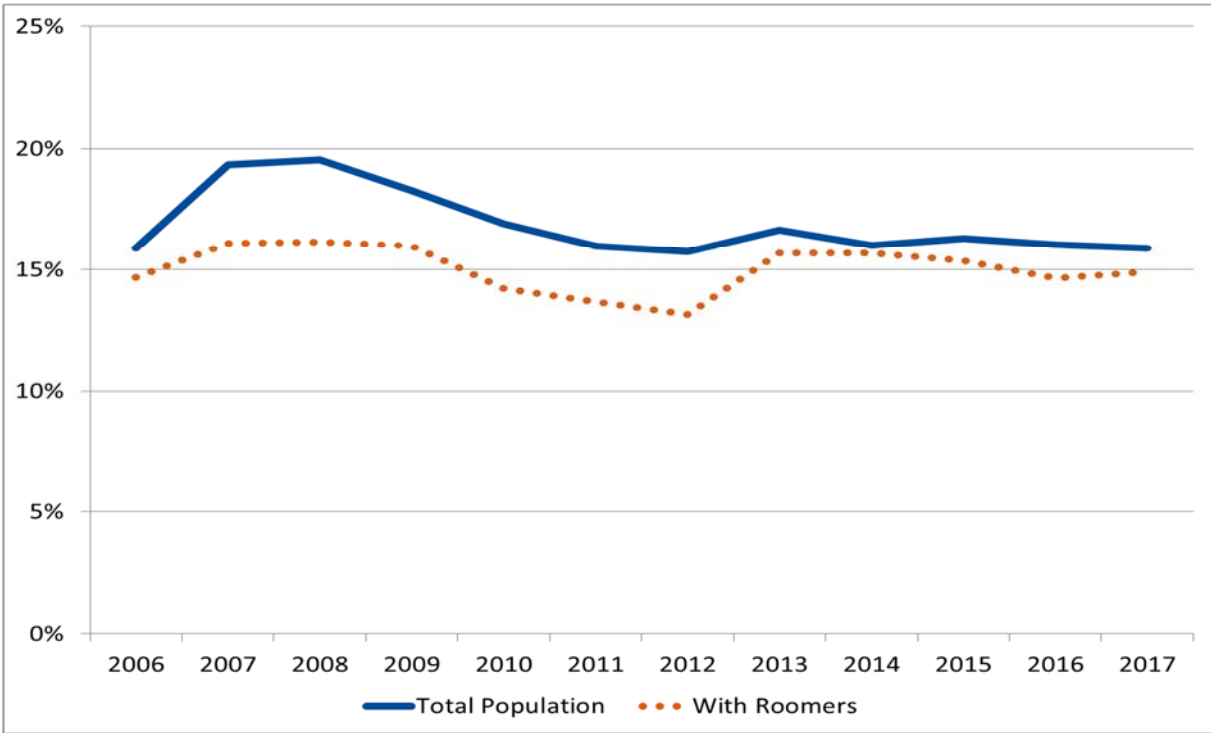
**Figure 5: Number of Schedule E Businesses Reporting Rental Income**



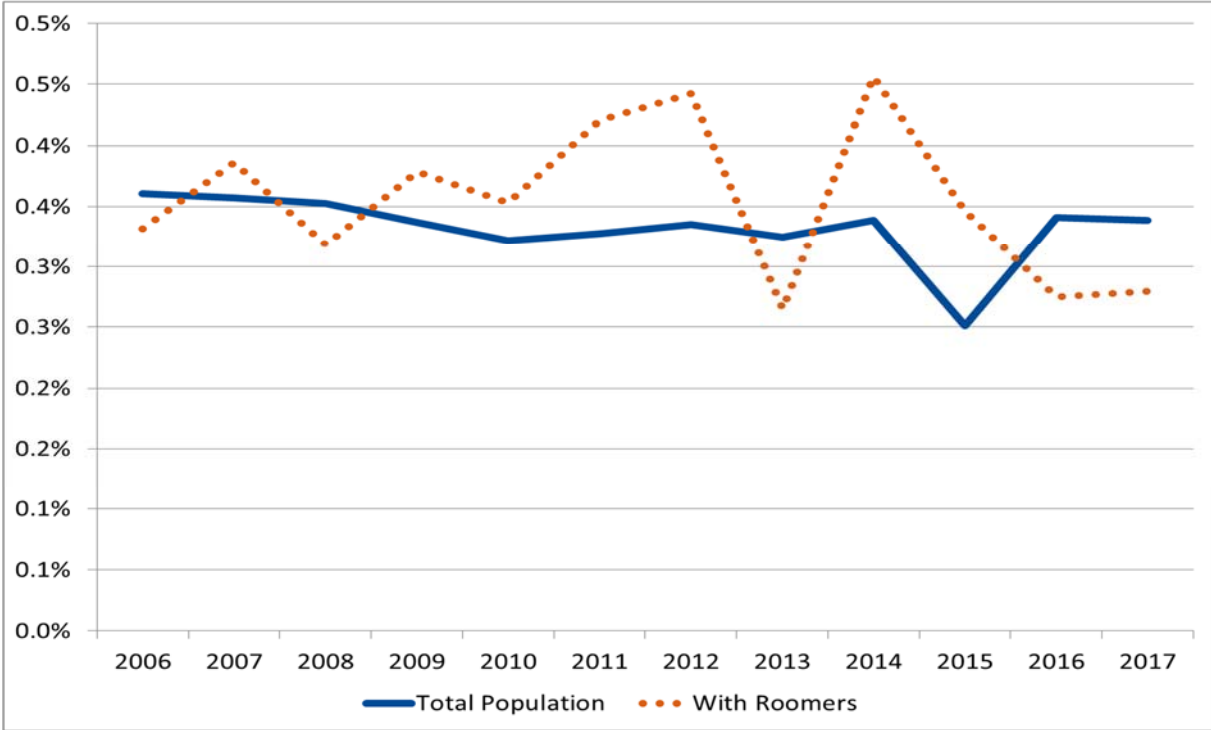
**Figure 6: Potential Revisions to Measured GDP**



**Figure 7: Share of Heads of Household who Report Capital Income**



**Figure 8: Share of Heads Who Report “Property Manager” Occupation**



**Figure 9: Number of People Employed in Property Management**

