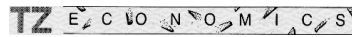


**Economic impacts of removing units in apartment-zoned
areas of Maui County from short-term rental use**

A White Paper

by Paul H. Brewbaker, Ph.D., CBE



June 2022, revised November 2022

for the Realtors Association of Maui

Economic impacts of removing units in apartment-zoned areas of Maui County from short-term rental use

by Paul H. Brewbaker, Ph.D., CBE
TZ Economics
June 2022, revised November 2022

Executive Summary

This study reports hypothetical economic impacts of removing units in apartment-zoned areas of Maui County from short-term rental use and requiring their dedication to long-term rental use. It was motivated by a 2022 Maui County Council legislative proposal for 6,749 of 7,306 condominium units, but the impacts are scalable to proposals of different size. Calibration was benchmarked to pre-pandemic tourism performance in 2019 and informed by previous, historic sudden decreases in tourism.

- Subject condominiums comprised about one-third of Maui County lodging units, corresponding to visitors intending to stay in condominiums or rental houses, about one-third of total visitors, associated with one-third of tourism receipts, a foregone annual amount of \$1.67 billion.
- Maui County output would decrease \$2.74 billion. An additional \$508.4 million in output would be foregone by Oahu, Hawaii, and Kauai through inter-county, interindustry effects. Statewide total Hawaii output would decline by \$3.25 billion.
- Maui County jobs would decrease by 14,126 (incorporating labor productivity growth). Job loss in three other counties of 2,555 would cumulate to 16,681 jobs lost statewide.
- Maui County earnings would decline by \$747.7 million, and earnings in other counties would decline by \$137.6 million, for an earnings loss of \$885.3 million statewide.
- State tax revenues from Maui County would decline \$137.3 million, and from other counties \$23.05 million, for a statewide total of \$160.35 million in foregone state tax receipts.
- Industry economic impacts in Maui County would be concentrated in accommodation, retail trade, real estate and rentals, food services, transportation, and business services.
- The economic impact estimates are scalable. A smaller change withdrawing one-sixth as many condominiums from short-term rental, 1,125 units, would decrease output by about \$540 million statewide, and Maui output would decrease by about \$460 million.

A. Introduction

There are two ways to create new housing. Both involve at least some capital formation, physical investment in the residential capital stock: build new housing units or adapt existing structures for residential use. This report estimates economic impacts of one subset of these two alternatives to new housing capital formation, adapting to longer-term rental housing use a subset of units comprising short-term rentals in apartment-zoned areas in Maui County. Typically, the duration of the long-term rental format would be one year. Often but not exclusively, the duration of the rental format would be measured in nights rather than months or years. Even these distinctions are “non-binary.” Some short-term rental units are occupied by their owners from time to time. Some owners reside in their units except when circumstances lead them to reside elsewhere, either temporarily or permanently, retaining ownership for the rental income.

This study reports hypothetical economic impacts of removing units in apartment-zoned areas of Maui County from short-term rental use and requiring their dedication to long-term rental use. Most of the affected units would be in and around resort areas. The implied reduction in Maui’s lodging inventory associated with this hypothetical policy change is used as a basis for calculating the decrease in tourism exports and the corresponding losses of jobs, incomes, tax revenues and Maui output.¹ These losses of economic activity provide a measure of the opportunity cost of mandatory reallocation of Maui units from short-term to long-term rental use: what is foregone from the zoning change.

The study is motivated by a 2022 Maui County Council legislative proposal, but the economic impacts are scalable to any similar proposal of different size. The specific proposal to which the model was calibrated would have withdrawn from Maui’s lodging inventory about 6,750 of 7,300 condominium units located in apartment-zoned areas.² The stated zoning objective was to restrict these units’ availability only to long-term occupancy.³ The targeted rental units were the equivalent of about one-third of Maui County’s 21,992 lodging units⁴ and about 9 percent of Maui County’s 72,086-unit housing stock in 2021.⁵ The proposal implied a substantial decrease in productive capacity for Maui tourism, the

¹ The estimates are from an inter-county input-output model of the Hawaii Department of Business, Economic Development, and Tourism (DBEDT) which provides estimates for Maui County and Hawaii’s other three counties.

² Maui County Council (August 2021) (<https://mauicounty.legistar.com/View.ashx?M=F&ID=9718863&GUID=E6B7CC3E-94F2-4BFA-A97A-D557AF010372>).

³ Separately, Maui County imposed a “moratorium on new transient accommodations on [sic] Maui” in January 2022 (<https://www.mauicounty.gov/DocumentCenter/View/131251/Ordinance-5316-eff-01072022>).

⁴ Hawaii Tourism Authority, *2021 Visitor Plant Inventory* (annual) (<https://files.hawaii.gov/dbedt/visitor/visitor-plant/2021VPI.pdf>).

⁵ The two habitation types, lodging and housing units, are not always mutually-exclusive. The former also is not completely nested in the latter. Multi-family and detached, single-family housing units are fungible, moving in and out of short-term and longer-term habitation. Lodging units are enumerated by the Hawaii Tourism Authority (<https://hawaiitourismauthority.org/research/visitor-plant-inventory/>). Housing units and characteristics are enumerated by the U.S. Bureau of the Census (<https://www.census.gov/quickfacts/mauicountyhawaii>).

county's largest export, comprising about 39 percent of Maui value-added or GDP.⁶ Analyzing and estimating tourism economic impacts of the exclusionary zoning proposal was the primary purpose for this report. What is the impact of switching nearly 7,000 units from transient occupancy to full-time residential use without replacement?

This paper proceeds by reporting estimated impact results in the next section. The following sections detail some of the assumptions made to generate the impact estimates using the State of Hawaii's input-output model. Several appendixes flesh out further details of Maui tourism and housing.

B. Economic impacts

A cohort of 6,749 condominium units, about one-third of Maui's visitor plant inventory, roughly corresponds with the proportion of Maui visitors intending to stay in a condo or rental house. Hypothetically withdrawing this number from short-term rental occupancy as once proposed (see footnote 2), for long-term rentals or for sale, outright,⁷ has economic impacts estimable using the State of Hawaii's intercounty inter-industry model.⁸ Intuitively, a one-third reduction in the visitor plant, a one-third decline in arrivals volume, and a one-third reduction in tourism receipts would go along with one another. Quantitatively, benchmarked to a full-potential tourism year (2019), Maui would forego about \$1.67 billion in tourism receipts, or 32.6 percent of Maui's annual total, because of such a hypothetical shift of units from short-term to long-term rentals. A decrease in tourism capacity, volume, and receipts by one-third would generate a Maui County economic decline with these elements:

1. Reduced tourism export receipts

- A net reduction in overall tourism receipts of \$1.56 billion after adjustment for the decrease in imports for re-export to tourists (\$110.5 million).

⁶ This is a pre-pandemic, steady-state estimate of tourism's share of Maui value-added or GDP. Tourism GDP comprised 80 percent of direct and indirect impacts of visitor expenditures during the late 2010s (Table 7.31, Hawaii DBEDT (2022) *State of Hawaii Data Book*) (<https://files.hawaii.gov/dbedt/economic/databook/2021-individual/07/073121.xls>). Maui visitor expenditures were \$5.15 billion in 2018 and 5.19 billion 2019, pre-pandemic, with direct and indirect impacts on GDP of \$4.12 billion (2018) and \$4.23 billion (2019) (Hawaii DBEDT (2021) *Monthly Economic Indicators*) (<https://dbedt.hawaii.gov/economic/mei>). Maui GDP was \$10.47 billion in 2018 and \$10.85 billion in 2019 (U.S. Bureau of Economic Analysis (<https://www.bea.gov/data/gdp/gdp-county-metro-and-other-areas>)). Tourism value-added comprised 39.4 percent of Maui GDP in 2018 and 39.0 percent of Maui GDP in 2019.

⁷ Many investors prefer the higher net incomes associated with short-term rentals than the lower net incomes associated with long-term rentals. They would reallocate their portfolios by selling their short-term rental assets to acquire higher-yielding assets. The pecuniary externalities of these asset sales are *not* included in the input-output model-based economic impact calculus.

⁸ Research and Economic Analysis Division, Hawaii Department of Business Economic Development and Tourism (DBEDT) (March 2022), *The 2017 Hawaii Inter-County Input-Output Study* (http://dbedt.hawaii.gov/economic/reports_studies/2017-inter-county-io/).

- About 84-86 of statewide economic impacts would be experienced by Maui County, higher proportions for state tax amounts.
- Hawaii's other counties would experience about 14-16 percent of economic impacts, lower for state tax amounts, using the state's intercounty input-output model for estimates.⁹

2. Lower aggregate output

- Maui County aggregate output would decrease \$2.74 billion.
- An additional \$508.4 million in output would be foregone by Honolulu (Oahu), Hawaii, and Kauai counties through direct, indirect, and induced impacts of the Maui tourism decrease.
- Statewide total output would decline by \$3.25 billion, including multiplier effects.

3. Decrease in employment and workers' earnings

- Maui County payroll employment would decrease by 14,126 jobs (incorporating labor productivity growth).
- An additional decline of 2,555 jobs would occur in the three other Hawaii counties.
- Workers' earnings in Maui County would decline by \$747.7 million
- Earnings in the other counties would decline by \$137.6 million.

4. Diminished state tax revenue collections

- State tax revenues associated with Maui County would decline \$137.3 million (\$26.2 million in individual income tax receipts, \$80.0 million in GET receipts, and \$13.5 million in TAT receipts).
- State tax revenues associated with impacts on the other three counties would decline an additional \$23.05 million (\$7.76 million in individual income tax receipts, \$10.71 million in GET receipts, and \$823,180 in TAT receipts).

In 2019 Maui County GDP was about \$10.9 billion, and tourism comprised just under 40 percent of pre-pandemic Maui County GDP. So, the effect of a hypothetical decrease in Maui County lodging capacity of about one-third, and an associated \$2.74 billion decrease in output, could exceed a 13 percent reduction in Maui GDP as a rough estimate after multiplier effects including leakages to imports (such as those from other counties). This is less than impacts of the COVID-19 pandemic on Maui County GDP in 2020, when real GDP declined by 20.4 percent, but is still worrisome.¹⁰

⁹ The state's model accounts for inter-industry interdependencies *across* county economies. For example, tourism receipts in Maui County give rise to economic activities in air transportation and other services in Honolulu County—Oahu—where many corporate headquarters are located, and to agricultural activity on the Big Island.

¹⁰ U.S. Bureau of Economic Analysis (<https://www.bea.gov/data/gdp/gdp-county-metro-and-other-areas>).

The COVID-19 pandemic only temporarily affected the economy adversely and was followed by economic recovery. A proposed zoning change which redeployed one-third of Maui’s lodging inventory to long-term rental use *permanently* would reduce Maui output by roughly one-eighth or more, without recovery.¹¹

Table 1. Intercounty economic impacts of eliminating 6,749 lodging units, as once proposed by Maui County through apartment zoning changes, relative to a full-potential tourism benchmark year (2019)

Direct and indirect (Type I) effects			
<i>Million \$ or as noted</i>	Maui County	Other counties	Statewide
Output	-1,972	-383	-2,355
Earnings	-549	-102	-650
State taxes	-102	-16	-119
Jobs (number)	-10,470	-1,878	-12,348

Direct, indirect, and induced (Type II) effects			
<i>Million \$ or as noted</i>	Maui County	Other counties	Statewide
Output	-2,737	-508	-3,246
Earnings	-748	-138	-885
State taxes	-137	-23	-160
Jobs (number)	-14,126	-2,555	-16,681

Note: Maui County nominal GDP was \$10.85 billion in 2019 and, after covid, \$8.70 billion in 2020. The \$2.74 billion decrease in Maui County output, including multiplier effects, is about 25-30 percent of 2019 GDP, before accounting for leakages to imports. It is a “clean” impact: by contrast, Maui’s 2020 GDP decrease also influenced by tourism decrease, but also by household consumption contraction and, subsequently, by effects of accommodative monetary policy and of federal fiscal stimuli, none of which countercyclical policy interventions occur in this hypothetical example to offset the tourism decline.

Sources: As listed elsewhere in this report (see footnote 8), using the state’s intercounty input-output model.

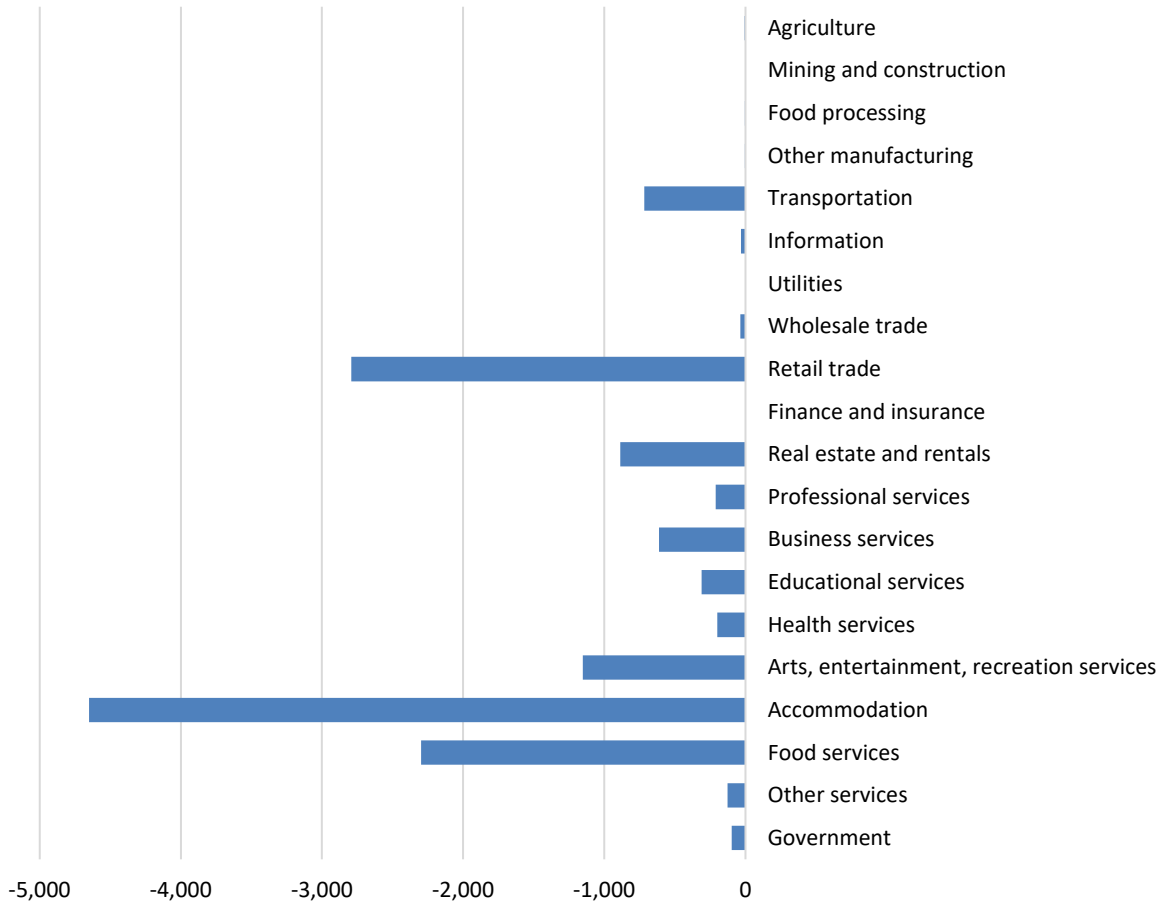
¹¹ The units already were providing housing services, just those of shorter tenure. They have a higher market value in those short-term uses because transient occupants are willing to pay more than residents over a similar interval to acquire (rent) housing services. Had transient occupants not had a higher willingness to pay, occupants seeking residential use could outbid them and a proposed zoning change would be moot.

Table 2. Maui County-*only* economic impacts of eliminating 6,749 lodging units, relative to a tourism benchmark year (2019), with line-item industry detail

Million \$, or <i>jobs</i>	Output	Earnings	State taxes	Jobs
Agriculture	-0.5	-0.1	0.0	-5
Mining and construction	0.0	0.0	0.0	0
Food processing	-0.6	-0.1	0.0	-4
Other manufacturing	-0.5	-0.2	0.0	-4
Transportation	-138.3	-32.6	-5.3	-715
Information	-9.5	-2.0	-0.4	-30
Utilities	0.0	0.0	0.0	0
Wholesale trade	-7.5	-2.1	-0.2	-34
Retail trade	-416.7	-118.3	-19.5	-2,793
Finance and insurance	0.0	0.0	0.0	0
Real estate and rentals	-312.7	-41.0	-11.0	-887
Professional services	-28.9	-10.1	-1.5	-211
Business services	-69.3	-26.6	-3.5	-613
Educational services	-30.3	-11.5	-1.5	-311
Health services	-34.5	-10.8	-1.6	-199
Arts, entert., recreation	-107.1	-40.5	-5.2	-1,151
Accommodation	-1,239.3	-325.0	-71.0	-4,650
Food services	-304.4	-114.3	-15.4	-2,297
Other services	-20.5	-6.1	-0.8	-126
Government	-16.7	-6.4	-0.5	-96
Maui County totals	-2,737	-748	-137	-14,126

Sources: As listed elsewhere in this report (see footnote 8), using the state’s intercounty input-output model.

Figure 1: Distribution of Maui County payroll employment (job) changes associated with hypothetical mandatory transfer of 6,749 short-rental units in the visitor plant inventory to long-term rental use



Sources: As listed elsewhere in this report (see footnote 8), using the state’s intercounty input-output model.

Discussion

The channels through which a one-third reduction in the visitor plant, hypothetically mandated by a change in zoning policy to require short-term rentals in apartment zoned areas to be dedicated solely to long-term rentals, affects Maui County’s economy are the customary channels of transmission for *any* large change in tourism performance. Essentially, reducing tourism productive capacity by one third reduces tourism export activity by one third. The distribution of Maui lodging choices illustrated in Figure 2 shows that travelers’ lodging preferences for the units proposed for withdrawal in the hypothetical example comprise one-third of all Maui County lodging units, condominiums, and rental houses. Just as the production model used in this report admits no substitution possibilities across inputs, no substitution across lodging choices is admitted. People who would have rented a house or condominium are assumed unlikely to accept a hotel room as a substitute. Figure 3 illustrates how hypothetically withdrawing one-third of the visitor plant inventory would have a material adverse impact on Maui tourism.

Figure 2. Shares of Maui County visitor arrivals by unique planned lodging preference, 2019

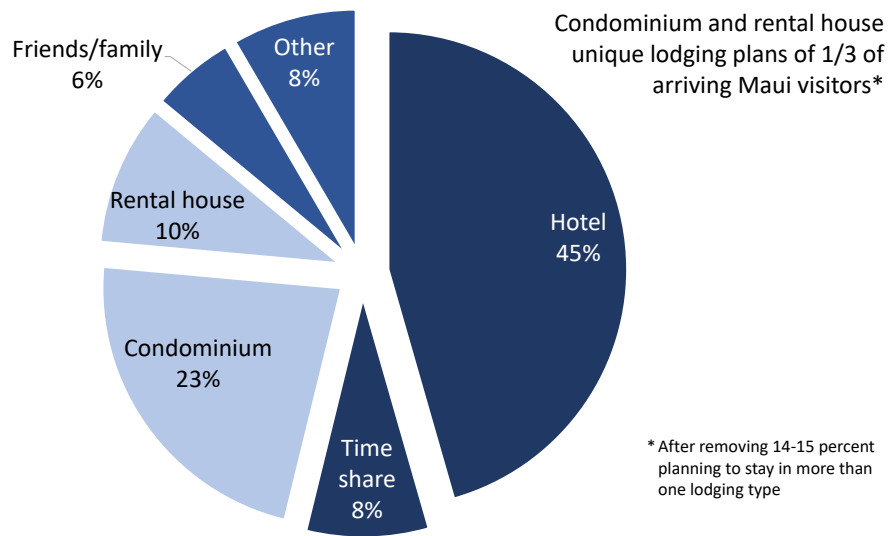
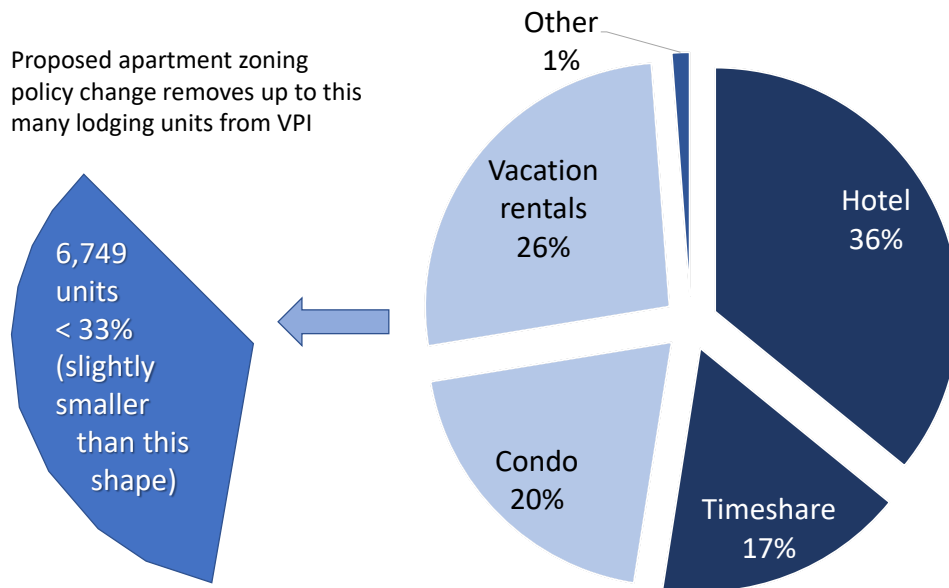


Figure 3. Share of Maui County visitor plant inventory and proportion hypothetically withdrawn by proposed Maui County zoning change



Source: Hawaii Tourism Authority, Hawaii DBEDT (<http://files.hawaii.gov/dbedt/visitor/visitor-research/2019-annual-visitor.xls>, (<https://hawaiitourismauthority.org/research/monthly-visitor-statistics/>).

The structure of the economy dictates that tourism-oriented industries such as accommodation and food services, retail trade, arts, entertainment, and recreational services, and transportation services would express the largest shares of the decrease in tourism associated with the withdrawal of productive capacity. These are associated indirectly with other industries and induce a decrease in consumption of workers whose earnings are reduced. Thus, in addition to the large economic impact of the hypothetical withdrawal of short-term rental units, one-third of tourism receipts and one-quarter of Maui County output, the *pattern* of impacts would be highly focused in industries where one would expect adverse consequences to arise from a loss of tourism.

Not all the adverse hypothetical adverse impacts of withdrawing short-term rental units would be experienced by Maui County. About 85 percent of the loss in jobs, earnings, state taxes, and output would be experienced by Maui County. The other 15 percent of the losses would be experienced by Hawaii, Oahu, and Kauai Island economies. Of course, the other counties “don’t get a vote” in Maui County policy decision-making, even if one can imagine a higher level of governance where such concerns might be voiced and receive consideration. All the islands’ outcomes are tied to Maui outcomes because the county economies are interdependent for the same reasons that industries are interrelated *within* a single county: outsourcing from other counties’ industries. For this reason, an inter-industry, intercounty input-output model was used to make the economic impact estimates.¹²

This hypothetical exercise was calibrated to an actual policy proposal (footnote 2), but alternatives also can be analyzed in this framework. The state’s input-output model is linear (footnotes 7 and 12). This analysis further has assumed that lodging preferences have zero substitution elasticities. Therefore, estimated results arising from this hypothetical exercise simply can be scaled up and down to provide insight on alternatives with larger or smaller redeployments of short-term rental units.

For example, a mandatory reallocation under an algorithm such as “units in West Maui only,” or “South Maui only,” *etc.* comprising, say, only *one-third* as many as contemplated in this report’s hypothetical would have one-third the adverse economic impacts.¹³ Including direct, indirect, and induced effects, if “only” 2,250 units were withdrawn from Maui’s visitor plant inventory (instead of 6,749) for use as long-term rental units rather than short-term rental units, then statewide output would decline by about \$1 billion, and 5,560 Hawaii jobs would be lost. Maui output would decline by a little over \$900 million with more than 4,700 jobs lost. Less than 9 percent of Maui output would disappear.¹⁴ Rescale to 1,125 short-term rental units subject to mandatory reallocation, one-sixth of the original hypothetical, and 5 percent of Maui output would be foregone, about \$460 million. The signs are the same—negative—but magnitudes can be rescaled linearly for a rough impact estimate.

¹² Input-output models are *fixed-price* models, so second-order impacts on housing prices from a sudden increase or on lodging prices from a sudden supply decrease are not present in the model.

¹³ That is, at least as a first pass estimate. Destination resorts differ in character from one locale to another. Additional nuances in terms of daily expenditure patterns for these varying areas, and how lodging preferences vary from area to area, might have to be considered. The hypothetical in this report was challenging enough using Maui County or Maui Island data in the aggregate; regional specificity would introduce additional complication.

¹⁴ Federal military value-added in Hawaii in 2019, pre-pandemic, was \$4.8 billion, or 5.2 percent of Hawaii GDP (\$92 billion). Almost all that economic activity was on Oahu. If true, then 9 percent of Maui output disappearing would be *larger* than the military disappearing suddenly from Oahu (7 percent of Oahu GDP (\$67 billion in 2019)).

C. Economic impact modeling limitations

The impacts to Maui County tourism and the broader economy detailed in prior sections of this report focused on shifts on the demand side of the market for travel and tourism while holding the supply side of the housing and lodging markets fixed. In a full-potential, pre-pandemic tourism year like 2019, lodging supply was a binding constraint on capacity: Maui County lodging effectively was sold out during seasonal peak months (for example, 88 percent occupancy at Wailea in 2019). Without the ability to expand the lodging stock instantaneously to respond to the reallocation from short-term to long-term rentals, tourism impacts essentially would have nothing but downside from a risk-management standpoint.¹⁵

An estimate of Maui County tourism receipts foregone by elimination of about one-third of its lodging inventory was built up using statewide average stay length patterns to calculate numbers of visitor days in Maui County associated with domestic, Japanese, and other foreign travelers across five lodging types, excluding visitors staying in more than one lodging type. Each category's visitor day totals were multiplied by *statewide* average daily expenditure, in the absence of Maui-specific data, to generate the estimate of \$1.67 billion in foregone tourism receipts because of the hypothetical apartment zoning change.

In principle the estimated losses from foregone Maui tourism could be compared to the potential gains from an alternative strategy for residential capital formation, building additional long-term rental housing units. However, the latter comparison goes beyond the scope of this analysis and is not undertaken in this report. Only the impacts of tourism losses are estimated in this report.

And, as noted above, in a flexible-price model additional *general* equilibrium impacts could be revealed: the instantaneous increase in the housing stock would reduce its relative price, while the instantaneous decrease in the lodging stock would increase its relative price. Employment losses would reduce the relative prices of labor to *travel and lodging* capital, but unless skills were homogeneous across industries re-absorption of lost workers would be limited, and would be incomplete in any event (*i.e.* even if skills were perfectly transferable across all industries. The “income effect” of a one-third reduction in Maui's principal export revenue stream would be larger than the “substitution effect” of the relative price changes. Again, fixed-price input-output models do not admit these second-order changes.

Input-output models are the workhorse of economic impact analysis in public policy discussions, but the limitations imposed by fixed-price assumptions invite more sophisticated analysis. In this report use of an off-the-shelf input-output model published by the State of Hawaii facilitates comparison to other applications of the model in tourism, and in lodging and housing development. Its limitations do not undermine the power of understanding, through interindustry relationships, how hypothetical a

¹⁵ Maui County's tourism implosion in 2020 is a perfect example. Maui travel and tourism in the late-2010s were peaking at the end of the longest economic expansion in U.S. history. This was followed in 2020 by a once-in-a-century viral pandemic. Hotel occupancy, a only measure of lodging capacity utilization, plummeted from 77.7 percent in 2019 to 33.9 percent in 2020. Maui County average daily room rates increased 3.3 percent in 2020 but *yields* on hotel rooms—revenues per available room—fell by more than half from \$312 (2019) to \$140 (2020) per available room night. Eighty percent hotel occupancy is customary for a high-performing year. Obviously, declining room yields are a negative signal for lodging investors. Hawaii Tourism Authority (<https://hawaiitourismauthority.org/media/6336/hawaii-hotel-performance-12-2020.xlsx>).

hypothetical reduction in productive capacity, by constraining the potential of tourism exports, could lead to a decrease in final demand with the impacts enumerated in tables 1 and 2.

D. Maui pre-pandemic tourism performance as benchmark

The “full potential” Maui County tourism scenario was calibrated to year 2019 tourism performance, prior to the onset of the SARS-CoV-2 pandemic in 2020. Late-2010s performance is relevant because the early-2020s lodging inventory is essentially unchanged from that time. The period was a high watermark for lodging capacity utilization as well as various measures of tourism volumes.¹⁶ This section of the report details calibration from 2019 monthly *flows* of Maui County tourist arrivals, and from related data published in official statistical reports.¹⁷ It establishes the parameterization of hypothetical economic impact estimation using the state’s input-output model. In the appendix, an examination of prior shocks helps place the pandemic event and subsequent, uneven progress towards Maui tourism recovery in a context of both normal and stressed Maui tourism precedents. More generally: full utilization of Maui lodging capacity, typically at or above 80 percent hotel occupancy, establishes a “potential tourism” benchmark against which can be compared stresses which reduce tourism demand or tourism supply. A pandemic reduces demand. Hypothetically withdrawing one-third of the lodging inventory reduces supply.

Maui County visitor expenditure data are not available prior to 2004 at monthly frequency, but official visitor *arrivals* data have a longer history of public availability. Hotel and lodging performance indicators also have a long history; less is available for timeshare, condo, and vacation rental units. Recent data publication has been consolidated by the Hawaii Tourism Authority. Further details are contained in footnotes and in the appendixes.

¹⁶ The annual peaks for Maui tourism volumes and tourist exports are not easily jointly computed. Reliable monthly visitor expenditure estimates for Maui are unavailable prior to 2004. An official export price index has never been published, and debates among economists in Hawaii about the appropriate tourism deflator never have been resolved. The Urban Hawaii consumer price index for all urban consumers (CPI-U) is frequently employed as deflator, but prior to the 2010s it excluded the Kahului-Wailuku-Lahaina Metropolitan Statistical Area (MSA). A representative price index for Honolulu only captures the CPI-U’s intended urban character. Applying the CPI-U to Hawaii statewide visitor expenditure reveals 1989 as the all-time high for Hawaii tourism. In 2019, total Hawaii real visitor expenditure was \$18.71 billion, down slightly from \$18.76 billion in 2018, both lower than in 1989 at \$19.31 billion, all in constant 2021 dollars. Visitor arrivals and visitor days, which *do* have a longer history of publication, were higher during the late-2010s than they were thirty years earlier. Average daily visitor spending declines, over time, reconcile the flatter trend in real visitor expenditure over the three decades during which tourism volumes kept growing. Though reliable Maui visitor expenditure estimates for the statewide 1980s peak period are elusive, for the Maui data extant *since* 2004, the late-2010s were a peak for Maui tourism exports.

¹⁷ All of the data in this report are drawn from monthly publication of *Island Highlights* from the Hawaii Tourism Authority’s Monthly Visitor Statistics (<https://hawaii tourism authority.org/research/monthly-visitor-statistics/>), through February 2022 (as of April 21, 2022), and compiled by the Research and Economic Analysis Division of the Hawaii Department of Business, Economic Development and Tourism in their Monthly Economic Indicators (<http://dbedt.hawaii.gov/economic/mei/>), also through February 2022. Certain follow-up work used more recently published versions of the same data.

1. *Real visitor expenditure: tourism's economic contribution and a late-2010s full-potential benchmark*

- Maui real tourism exports in 2019 peaked at \$5.58 billion in constant, 2021 dollars, and in 2018 were \$5.52 billion (in 2021 dollars); these were among Maui's best recent years for tourism export receipts, up from \$4.74 billion to \$5.26 billion in 2014-2017 (in 2021 dollars).
- In 2021, real visitor expenditure reached \$4.13 billion (2021\$) during the first full recovery year for Maui tourism since the start of the pandemic.
- Covid disrupted Maui visitor expenditure collection in 2020: official data are unavailable but an unofficial estimate for this report would be \$1.65 billion (2021\$), down 70 percent from 2019.
- The last time real Maui tourism receipts were at a low ebb was in 2009 at the trough of the Great Recession, at \$3.32 billion (2021\$), down from \$4.95 billion (2021\$) in 2006.

2. *Visitor arrivals and days, peaks, and troughs*

- Pre-covid peak Maui County visitor arrivals were 3.11 million in 2019, up from 2.12 million in 2010 (following the Great Recession); arrivals in the 2009 trough totaled 1.93 million.
- Pre-covid peak Maui visitor days were 24.78 million in (2019), up from 17.26 million in 2010; the trough in 2009 was 15.65 million visitor days.

3. *Three-fourths of Maui full-potential tourism performance was registered in 2021*

- During the first full year of post-covid Maui tourism recovery, 2021, visitor arrivals were 2.34 million and visitor days were 20.39 million, generating \$5 billion in tourism export receipts. Each 2021 measure of Maui tourism performance was about 75-80 percent of the 2019 peak:
 - 73.6 percent (visitor arrivals)
 - 82.2 percent (visitor days)
 - 74.1 percent (real visitor expenditure in constant, 2021 dollars).
- Other things equal, benchmarking against the pre-covid 2019 peak in Maui tourism performance, the first full year of post-covid tourism recovery in 2021 can be characterized as having attained about three-fourths of Maui's previously demonstrated tourism potential.

4. Proposition: A hypothetical one-third loss of real Maui County tourism volume, (*e.g.*, total visitor days), from withdrawing one-third of Maui's short-term rental inventory, could have around half the macroeconomic impact of the two-thirds loss of Maui total visitor days in 2020, from the 2019 peak (-68.8 percent, from 24.8 million visitor days (2019) to 7.7 million visitor days (2020)).¹⁸

¹⁸ Hawaii Tourism Authority, Hawaii Department of Business, Economic Development, and Tourism (DBEDT) (<http://files.hawaii.gov/dbedt/visitor/tourism/2021/Dec21.xls>, <http://files.hawaii.gov/dbedt/visitor/tourism/2019/Dec19.xls>, <http://files.hawaii.gov/dbedt/visitor/tourism/2020/Dec20.xls>).

Table 3. Economic impact calculation assumptions (calibrated to 2019 as “full potential” tourism year)

<i>PPPD by accommodation (\$)</i>	U.S. West	U.S. East	Japan	Other	Maui
Hotel	\$215	249	262	NA	NA
Timeshare	171	155	134	NA	NA
Condo	176	209	185	NA	NA
Rental House	170	202	184	NA	NA
Friends / family / other	84	81	96	NA	NA
<i>Weighting elements</i>	U.S. West	U.S. East	Japan	Other	Maui
Visitor arrivals (Maui)	1,643,069	844,580	47,778	671,616	3,207,043
Hotel					1,464,547
Timeshare					266,021
Condo					725,453
Rental House					254,453
Friends/family/other					496,569
Stay length (statewide)	8.65	9.68	5.90	3.14	8.78
Visitor days (Maui)	14,212,547	8,175,534	281,890	2,107,921	24,777,892
Visitor expenditure (Maui)					\$5,128,019,114
<i>Distributed tourism receipts</i>	U.S. West	U.S. East	Japan	Other	Maui
Maui arrivals share	0.51	0.26	0.01	0.21	1.00
Same stay lengths as statewide	8.65	9.68	5.90	3.14	8.78
Estimated receipts					
Hotel	1,397,357,289	931,406,494	33,674,184	693,513,164	3,055,951,131
Timeshare	201,189,888	105,218,192	3,142,360	90,871,087	400,421,527
Condo	567,407,342	385,591,795	11,825,186	283,232,144	1,248,056,467
Rental House	192,178,548	131,162,577	4,119,960	96,128,904	423,589,988
Friends/family/other	184,723,473	102,656,731	4,184,218	85,591,143	377,155,565
Total spending	2,358,133,066	1,553,379,059	52,761,690	1,163,745,299	\$5,128,019,114
At-risk tourism receipts (≤)					
Condo plus rental house	759,585,889	516,754,372	15,945,146	379,361,048	\$1,671,646,455
Percent share in each group	32.2%	33.3%	30.2%	32.6%	32.6%

Shaded areas are residuals

Sources: as in Figures 1-2 and noted elsewhere, including in the Appendixes.

APPENDIXES

Appendix 1. Maui and the 2020 Covid Recession

Macroeconomic consequences of the exogenous pandemic shock reflected several simultaneous influences. During the shelter-in-place phase of Hawaii pandemic response in spring 2020, virtually no travel took place after 14-day quarantines were imposed upon arriving passengers in March. Travel collapsed. In mid-October 2020, the quarantine regime was replaced by pre-flight, polymerase chain reaction (PCR) testing protocol for passengers flying to Hawaii.¹⁹ Other concurrent positive *and* negative forces interacted to influence Maui economic outcomes in 2020.

- (–) Annual Maui County visitor days declined 68.7 percent from 24.8 million in 2019 to 7.8 million in 2020, and visitor arrivals declined 74.3 percent from 3.2 million in 2019 to 0.8 million in 2020.²⁰
- (–) Resident household consumption pulled back sharply in spring 2020, boosting savings rates.
- (+) U.S. monetary policy adopted accommodative posture, with lower interest rates and increases in long-term asset purchases by the Federal Reserve.²¹
- (+) Federal government spending increases: federal fiscal relief supported businesses and households.²²

Federal policy stimuli helped offset some negative pressures from the sharp decline in tourism exports and the temporary decline in resident consumption. Not all of Hawaii's economic recession in 2020 originated in large tourism decreases: other industries went into temporary lockdown.

The 70-75 percent 2020 tourism decline contributed to a 10.8 percent decline in 2020 Hawaii real GDP, and a 20.4 percent decline in 2020 Maui real GDP.²³ Temporary tourism collapse and initially weak household spending both began recovery in second half 2020. Stimuli from government spending increases and relief payments, and support for investment from low interest rates, restored economic growth, but from a deep hole. By mid-2022 real statewide GDP was still 93 percent of the 2019 level.

¹⁹ The Hawaii Safe Travels program codified pre-flight testing protocols as part of a series of gubernatorial COVID-19 emergency proclamations (<https://governor.hawaii.gov/covid-19/covid-19-emergency-proclamations/>).

²⁰ Hawaii Tourism Authority, Hawaii Department of Business, Economic Development, and Tourism (<http://files.hawaii.gov/dbedt/visitor/tourism/2021/Dec21.xls> and <http://files.hawaii.gov/dbedt/visitor/tourism/2019/Dec19.xls>).

²¹ Federal Reserve Board, minutes of the unscheduled March 15, 2020 FOMC meeting (<https://www.federalreserve.gov/monetarypolicy/fomcminutes20200315.htm>), and of the April 28-29, 2020 FOMC meeting (<https://www.federalreserve.gov/monetarypolicy/fomcminutes20200429.htm>).

²² Congress passed the CARES Act in March 2020, and additional federal stimulus came in December 2020 and March 2021. (<https://home.treasury.gov/policy-issues/coronavirus/about-the-cares-act>).

²³ Maui county nominal GDP decreased 19.8 percent in 2020. Maui county real GDP decreased 20.4 percent in 2020. See U.S. Bureau of Economic Analysis (<https://www.bea.gov/data/gdp/gdp-county-metro-and-other-areas>).

Figure A1-1. Framing a hypothetical *one-third* decrease in Maui tourism with 2020 reality

When Maui tourism (visitor days) declined by *two-thirds* in 2020 (-68.2 percent), by how much did Maui GDP by industry respond (relative to 2019 benchmarks)?

Maui County GDP by NAICS industry groupings (2019 = 100)

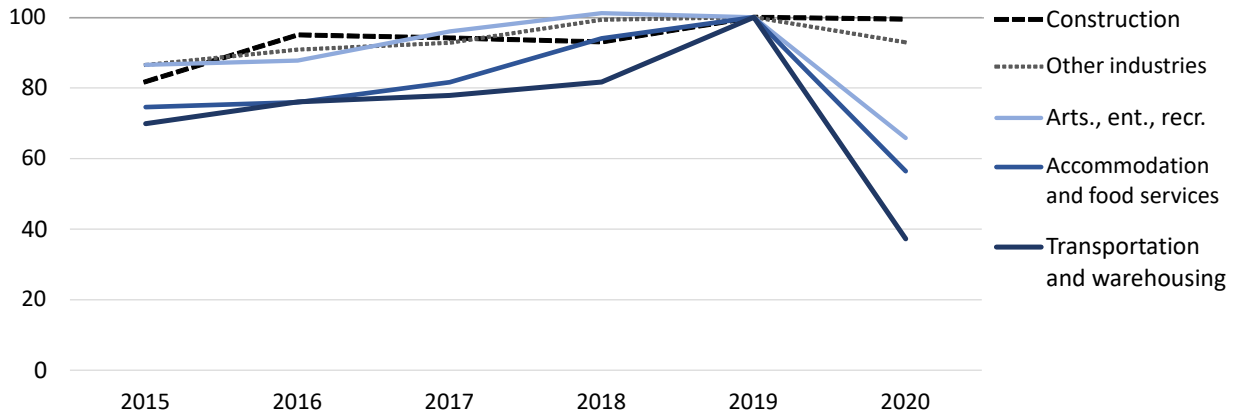
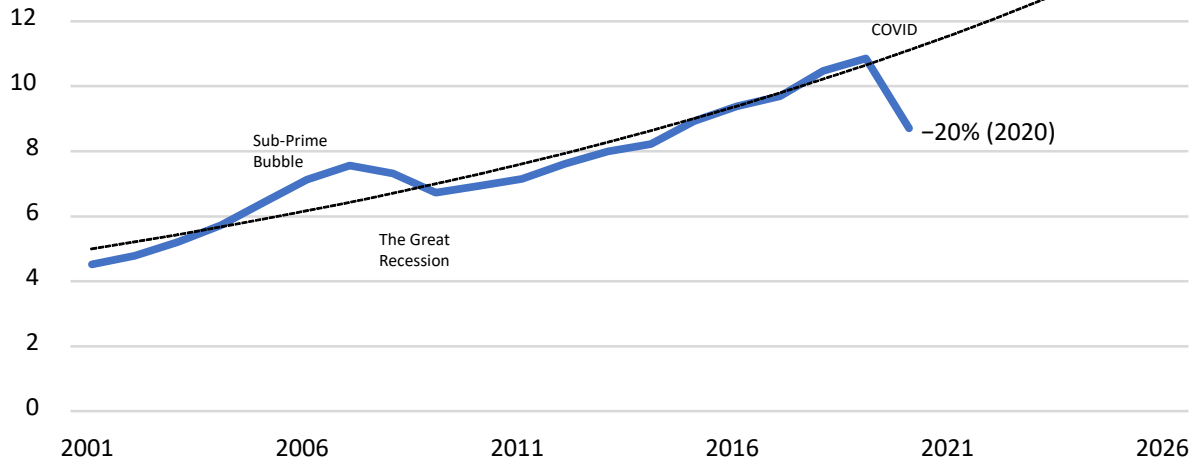


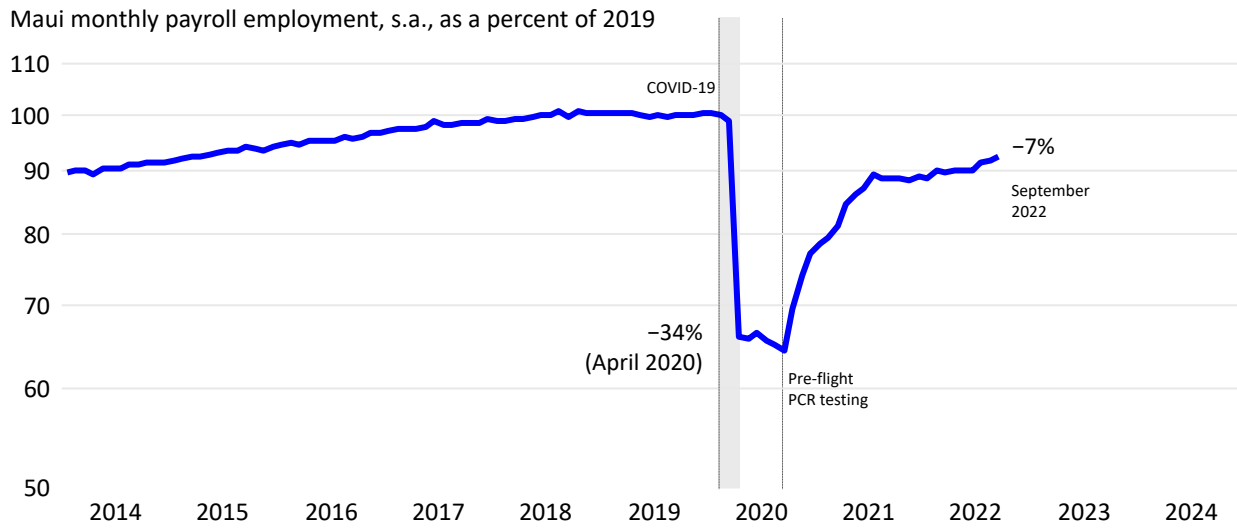
Figure A1-2. Output impacts of TVR exclusion would be the equivalent of the Covid Recession

Annual nominal Maui County GDP and trend through 2019 (billion current dollars)



Sources: U.S. Bureau of Economic Analysis (<https://www.bea.gov/data/gdp/gdp-county-metro-and-other-areas>).

Figure A1-3. Maui employment changes in and after the Covid Recession (2020)



Sources: U.S. Bureau of Economic Analysis (<https://www.bea.gov/data/gdp/gdp-county-metro-and-other-areas>), Hawaii DLIR, Hawaii DBEDT (https://files.hawaii.gov/dbedt/economic/data_reports/DLIR/LFR_LAUS_SADJ.xls).

Appendix 2. Condo lodging segment performance: (“condo + VR”)

Maui County lodging *inventory* data are classified by types of units. Maui County visitor arrivals are classified in terms of intended lodging choice. The two classifications don’t align precisely but overlap. Specifically, combined “condo hotel” and “vacation rental unit” inventories are about 10,000 of about 21,000 units Maui County lodging units. Condo and rental units combined were 46 percent of the pre-covid total lodging inventory in 2019, and 47 percent of the late-covid total in 2021.

Visitor arrivals appear in varying proportions for several reasons. First, some vacation rentals are in multifamily structures, under condominium property regime or privately-owned, rather than in detached dwellings. Second, average length of stay tends to be shortest for visitors staying in hotel rooms, which are among the costlier lodging units in terms of daily room rates. Non-hotel lodging types often can accommodate larger travel parties at lower cost for longer stays. Third, over 15 percent of *pre-covid* travelers to Maui County in the late-2010s intended to stay in more than one type of lodging unit. For example, some visitors combine a stay in a vacation rental with a hotel stay. About 83-84 percent of Maui visitors stayed in only *one* lodging type, pre-covid.²⁴

By combining Maui visitors intending to stay in a condo and Maui visitors intending to stay in a rental house, the definition of a condo visitor used here is an *overcount* to the extent that many vacation rentals are detached dwellings which are not under condominium property regimes. This definition still has the advantage of *excluding* visitors who intend to stay in a hotel, timeshare, with friends and family, or in a B&B, hostel, rooms in houses, camping, or other lodging alternatives, as well as *to the exclusion* of Maui County visitors intending to stay in more than one type of lodging format. Combining Maui County visitors intending to stay in a condominium *plus* visitors intending to stay in a vacation rental, recognizes that behavioral similarities of these two groups of visitors (excluding those who stay in *both* unit types) make them *dissimilar* to visitors who stay in a hotel or who go camping. All the classifications are drawn come from the Hawaii Tourism Authority and Hawaii DBEDT’s monthly and annual reports on arrivals and inventories.

The main performance characteristics of Maui County condo visitors of relevance to calibration of the economic impact estimates were:

- Condo visitors comprised about one-third of pre-covid arrivals (32.2 percent in 2019), but higher proportions in the post- covid recovery years 2020, 2021, and in first quarter 2022, when condo visitors were almost two-fifths of arrivals (35 percent in 2020, 39 percent in 2021 and 2022Q2).

⇒ *The implication is that condo visitors are a more resilient class of Maui County visitors than hotel visitors (whose shares decreased from 46 percent in 2019 to 40-41 percent post-covid; timeshare visitor shares rose from 8 to 9-10 percent of Maui’s totals, pre- vs. post-covid.*

²⁴ Visitor in-flight surveys are collected prior to arrival, but people sometimes change plans upon arrival.

- Maui County average stay lengths gravitate towards about 8 days. Stays are longer on Maui Island (10 days), than on Molokai (7.4 days) and Lanai (2.9 days). The weighted average of 8 days is consistent with other counties' experiences.²⁵
- Maui County average visitor expenditure was just under \$225 in 2019, the last pre-covid year of "full potential" tourism performance.
 - Maui County visitors spent an estimated \$223.71 per person per day (PPPD) in 2019.
 - Lodging expenses were an estimated \$112.22 (PPPD), half the daily total
 - Shopping (\$18.36), transportation (\$22.58), and entertainment and recreation (\$18.15) dominated non-lodging visitor expenditure shares.
- It is difficult to evaluate spending for Maui County visitors because official data are published with idiosyncratic geographic distinctions. (Visitors to Hawaii in 2020-2021 were almost exclusively U.S. domestic travelers.) In official Hawaii tourism data, Pacific states and Mountain states together segregate as U.S. West states from U.S. East states.²⁶ Daily visitor expenditure is published accordingly. In 2019, statewide PPPD spending was:
 - \$175 U.S. West visitors
 - \$213 U.S. East
 - \$165 Canadians
 - \$242 Japan
 - \$294 Other Asia
 - \$262 Oceania
- Pre-covid 2019 PPD data also provide some insight on spending by accommodation preference. Lodging preferences revealed by arriving passengers may not conform exactly to inventory designations (for example a rental house can be a multi-family *or* single-family dwelling).²⁷ In addition, Maui County PPPD spending data are not available for foreign visitors other than Japanese.

²⁵ Average Maui County length of stay in 2019 was 7.96 days, a weighted average of the 8.08 days for 2019 domestic visitor days (86.4 percent), and the 7.31 days for 2019 international visitor days (13.6 percent) Hawaii, but we don't know Maui average stay length by particular lodging choice, although there is a general tendency for hotel stays to be at the shorter end of the spectrum, and condominium and rental houses to have longer average stay lengths. See DBEDT (<http://files.hawaii.gov/dbedt/visitor/visitor-research/2019-annual-visitor.xls>).

²⁶ For example, in Hawaii Tourism Authority enumerations Wyoming, Colorado, and New Mexico are U.S. West states; Nebraska, Kansas, Oklahoma, and Texas are U.S. East states. Yup, Texas and Nebraska are in the East.

²⁷ The PPPD expenditure data reported here are from a variety of sources including the *State of Hawaii Data Book* (2020) published by Hawaii DBEDT (<https://dbedt.hawaii.gov/economic/databook/2020-individual/>), and the Hawaii Tourism Authority *2020 Annual Visitor Research Report* (<http://dbedt.hawaii.gov/visitor/visitor-research/>).

Table A2-1. Maui visitor expenditure per person per day (PPPD), by lodging type (dollars)

<i>PPPD by accommodation</i>	U.S. West	U.S. East	Japan
Hotel	\$215	249	262
Timeshare	171	155	134
Condo	176	209	185
Rental House	170	202	184
Friends / family / other	84	81	96

Source: State of Hawaii *Data Book* (annual), Table 7.27 (<http://files.hawaii.gov/dbedt/economic/databook/2019-individual/07/072719.xls>).

- As a rule of thumb, visitors who travel the farthest spend that most per day. They have shorter stay lengths, which may also be why they spend more per day. Changing currency values affect foreign spending. Certain foreign groups (Canadians, Europeans) spend less than other foreigners. In Maui’s case having Japan PPPD visitors spending estimates may be less helpful than having Canadian PPPD visitor spending estimates, which are not available. Estimation workarounds are designed to be as representative as possible, given such limitations.

Table A2-2. Maui visitor arrivals by origin

<i>Maui arrivals 2019</i>	Maui County	Maui	Molokaʻi	Lānaʻi
U.S.Total	2,551,537	2,449,124	42,603	59,810
U.S. West	1,673,708	1,616,213	25,823	31,672
U.S. East	877,829	832,911	16,780	28,138
Japan	50,926	46,684	1,941	2,300
Canada	287,365	276,825	4,840	5,700
Other foreign	317,214	287,272	13,650	16,293

Source: Hawaii Tourism Authority, Hawaii DBEDT (<http://files.hawaii.gov/dbedt/visitor/visitor-research/2019-annual-visitor.xls>).

- Maui visitor arrivals by unique lodging preference, excluding the 15-16 percent of visitors planning to use more than one lodging type, in 2021 during the covid recovery, can be contrasted with pre-covid 2019 visitor arrivals by unique lodging preference for a “full potential” comparison. Timeshare, condo, and rental house lodging types for which 2021 arrivals were a high proportion of 2019 arrivals recovered more quickly or more substantially after the covid recession in 2020, proving to be more resilient than those with other lodging preferences.

Table A2-3. Resilience: Maui visitor arrivals by unique lodging choice in 2021 as percent of 2019

<i>Visitor arrivals by lodging</i>	2019	2021	2021 as percent of 2019
Hotel	1,735.8	1,094.8	63%
Timeshare	315.3	280.3	89%
Condo	859.8	756.2	88%
Rental House	301.6	263.6	87%
Guests of friends and relatives	211.9	162.9	77%
Other	376.7	125.6	33%

Source: Hawaii Tourism Authority (monthly) (<https://hawaiitourismauthority.org/research/monthly-visitor-statistics/>).

Table A-3 illustrates that Maui County visitors intending to stay in a condominium, and visitors intending to stay in a rental house, comprise about one-third of arrivals by air, after subtracting from the total the 14-15 percent intending to stay in more than one lodging type. Why combine the two classifications, condo, and rental? Because visitor lodging categories, visitor inventory categories, and definitions under the condominium property regime are not perfectly aligned. The “demand” side of the market combining condo and rental visitor arrivals, about one-third of all arrivals (times 8 days of average stay length, divided by average party size), is like the proportion of the Maui County Visitor Plant Inventory faced with hypothetical apartment zoning changes in proposed legislation during 2022. Those changes would have withdrawn approximately 6,750 lodging units from Maui County’s lodging inventory, the “supply side” of the market (times 365.25 nights per year at a utilization rate around 80 percent in a full-potential year like pre-covid 2019). The condo and rental categories for Maui arrivals’ enumerations comprised one-third of total demand, and the condos hypothetically subject to withdrawal from Maui lodging inventory under the proposed ordinance were one-third of total supply.

This analysis assumed that Maui County visitors staying in condos and vacation rentals:

- Comprised about 1/3 of the Maui County visitor arrivals total
- Were among resilient travel segments (least likely to cancel, quickest to return, etc.)
- Spent approximately \$200 per day.
- Had at least an 8-day average stay length.

Appendix 3: Additional details on the Maui condo visitor profile and the market’s supply side

A3-1. Nominal vs. real values

To calibrate the economic impact analysis of withdrawing up to 6,749 condo units from the total of 7,306 Maui County condominiums potentially subject to apartment zoning changes, we first established a representative profile for the visitors who prefer rental condominium lodging among the alternatives. A variety of sources, primarily associated with data collection by the Hawaii Tourism Authority (HTA),²⁸ in conjunction with the Tourism Research Branch of the Hawaii Department of Business, Economic Development and Tourism (DBEDT), were used to construct calibration assumptions. The framework relied on constant, 2021 dollar estimates of visitor expenditure and presented corresponding economic impacts of changes in constant, 2021 dollars. Inflation was measured by the Urban Hawaii CPI-U from the U.S. Bureau of Labor Statistics.²⁹

From 2020 through mid-2022, the COVID-19 pandemic complicated measurement of Hawaii tourism performance. The pandemic reduced travel demand. It shifted the composition of travel towards domestic travelers and away from foreign travelers and placed on temporary hiatus some avenues for data gathering. In constructing a representative Maui County condominium visitor profile data from 2019, pre-covid, were used as a benchmark for a full-employment scenario. Subsequent data were scaled up to reflect inflation. Acceleration of Hawaii inflation beginning in 2021, a global phenomenon, also was a complicating factor.³⁰

²⁸ See <https://hawaiiauthority.org/research/>

²⁹ Hawaii and other U.S. Western urban inflation data at <https://data.bls.gov/cgi-bin/surveymost?r9>.

³⁰ The last representative annual tourism report of the HTA was from 2019 (tables at <https://hawaiiauthority.org/media/7829/2020-annual-visitor-research-report.xlsx>). Certain lodging data are produced for the HTA by STR Inc. The corresponding 2020 report suffered from the inability to field certain surveys. For example, because of covid restrictions, departure surveys were not conducted from April-October 2020. A 14-day quarantine requirement for arriving passengers from March 25, 2020 through October 14, 2020 limited 2020 travel. Beginning on October 15, 2020, pre-flight departure protocols from the U.S. mainland to Hawaii required PCR testing and, later, proof of covid vaccination. Some versions of these requirements were in place throughout 2021 until after the Omicron wave, lifted in March 2022. Air travel to Hawaii remained largely domestic and the cruise industry remained shut down. The year 2021 annual tourism report had not yet been published at the time this analysis was initiated, although year-to-date preliminary monthly data through December 2021 were available for calibration. In any event, 2021 was not a full employment year. Because 2019 was the last, pre-pandemic “normal” year upon which to base comparisons, most performance characteristics from that year were adopted. Where available 2021 nuances were introduced, and expenditure estimates were adjusted for inflation to be reported in constant, 2021 dollars where possible.

A3-2. More on the supply side

Annual enumerations by the HTA of the Hawaii Visitor Plant Inventory (VPI) defined Maui lodging capacity. In the late 2010s Maui County averaged 21,988 lodging units, plus or minus one percent. Proposed Maui County apartment zoning ordinance changes hypothetically would have affected up to one-third of those units, or 7,306 units. The condominiums in question frequently were in short-term rental tenure, both as condotels as well as other vacation rental (pooled and individually). Independent surveys by the Maui Vacation Rental association identified the following breakdown of the 7,306 units in question:

7,306	100.0 percent	Total units
5,929	81.2%	Short-term rental units
214	2.9%	Timeshare units
238	3.3%	Long-term rental units
260	3.7%	Owner-occupied units
656	9.0%	Not identified

Assuming that of the 7,306 total units subject to zoning changes, 6,650 units *had* identified uses—7.6 percent owner-occupied or long-term rental, and 92.4 percent timeshare or short-term rental—the *same* proportions could be applied to the 656 units *without* identified uses. Then the total could be broken down into 557 units in residential use (owner-occupied units plus long-term rentals), and 6,749 units hypothetically subject to withdrawal under proposed apartment zoning changes.

Total Maui County short-term rental inventory outside hotel and timeshare units comprised about 10,188 available units during the late-2010s pre-covid benchmark period, out of the combined 21,765 units in 2019, and 21,992 units in 2021.³¹ In the VPI these units were condos or vacation rentals. Otherwise, they were owner-occupied or were vacant when unoccupied by owner (not rented when unoccupied by owner). Dividing 6,749 units subject to hypothetical withdrawal through apartment zoning changes by 10,188 units in Maui’s short-term rental VPI yields a ratio $(6,749/10,188) = 0.662$. Up to 66 percent of the condos in the combined, pre-covid “condo plus vacation rental” portion of the Maui County VPI hypothetically would have been subject to proposed zoning changes, just under two-thirds of units. Including hotel, timeshare, and other units with condo and vacation rental units, the 6,749 units subject to withdrawal from proposed zoning changes comprised 30.7 percent of the total VPI. Just under one-third of Maui County VPI hypothetically would have been subject to withdrawal from the lodging stock under proposed apartment zoning changes.³²

³¹ Hawaii Tourism Authority, *Visitor Plant Inventory* (annual) (<https://hawaii tourism authority.org/media/8606/2021-visitor-plant-inventory-report-final.pdf>).

³² Of an average 21,871 units in the Maui County visitor plant inventory (VPI) during the years 2016-2019, pre-covid, 7,589 comprised hotel units. Timeshares numbered 3,650 on average. Another 280 units fell into an Other category. Together, Maui County VPI condominium units (4,169) and vacation rental units (6,194) comprised the 10,363 units distinguished as short-term rental units from hotel and timeshare and other units numbering 11,522 on average 2016-2019.

Post-covid Maui County VPI was the same as average pre-covid VPI. The 2021 enumeration tallied 21,992 units. The average VPI from 2016-2019 was 21,991 units. The roughly 6,749 units hypothetically subject to withdrawal by proposed apartment zoning policy changes would have decreased the supply side of the lodging endowment, Maui County's VPI, to 15,239.

Supply would "shift to the left," at all prices.

Travel demand, if unchanged after removing 6,749 units from the Maui County VPI, would "intersect" with travel supply at a higher equilibrium lodging price. Other things equal, assuming no changes in air fares, for instance, the hypothetical decrease in lodging supply would result in a higher equilibrium travel cost total. Travel demand "slopes downward." A travel price increase normally will be associated with a lower quantity of travel demanded. If oil prices increased and aviation fuel prices and air fares followed, for example, tourism quantities would decrease, other things equal. Demand slopes downward.

So, when lodging capacity decreases, travel supply *decreases* and for a given travel demand the equilibrium travel "price" is higher. A hypothetical Maui apartment zoning policy change which decreases lodging capacity may not affect air fares and other travel costs, but in equilibrium a reduction lodging supply would raise lodging costs and reduce the quantities of tourism demanded. Tourism would decrease. This was the logic underlying the hypothetical calculation of quantitative impacts of foregone tourism using the state's input-output model, except that *no price changes* were incorporated. A decrease in lodging supply *does* result in higher equilibrium travel costs, but these second-round impacts were *not* incorporated in the analysis, only economic impacts of the first-round reductions in travel volumes and, therefore in Maui County tourism receipts.

A3-3. *Pecuniary valuation externalities in the housing market also outside scope of this analysis*

There are two opposing forces working on Maui house prices as a spillover or pecuniary externality in the hypothetical impact exercise. Recall that the premise is that instantaneously there could be up to 7,306 fewer lodging units that were neither hotel rooms nor timeshares.

1. If 6,749 condominiums were removed from short-term rentals (lodging) and switched simultaneously into long-term habitation (housing), those new housing units would compete and augment a Maui County market with 3,693 sales of existing home during 2021. Similarly, in the rental market, and increase in condominiums available for long-term rental could be of similar relative magnitude to the periodic, annual flow of rental turnover or velocity. The *stock* effect of a hypothetical increase in the housing inventory would tend to put downward pressure on prices and rents.³³

³³ Because of higher Urban Hawaii inflation in 2021 (Bureau of Labor Statistics (<https://data.bls.gov/cgi-bin/surveymost?r9>)) and higher target U.S. interest rates in 2022 (Federal Reserve Board (<https://www.federalreserve.gov/newsevents/pressreleases/monetary20220504a.htm>)), Maui home sales in 2022 seem likely to be no higher than in 2021. In 2021, mortgage interest rates were around 3 percent. Mortgage rates approaching mid-2022 are already around 5 percent. Maui existing home sales in 2020 totaled 2,420, about two-thirds of the 2021 volume in a year of high transactions velocity, partly in behavioral response to the covid pandemic (distancing and isolation), and partly subsequent outcomes like the resulting and tentatively persistent increase in telework (Bureau of Labor Statistics (<https://www.bls.gov/cps/effects-of-the-coronavirus-covid-19-pandemic.htm>)).

2. Hypothetically withdrawing 6,749-unit from the lodging inventory, decreasing lodging supply and increasing lodging prices, would give investors a greater incentive to acquire higher yields by reallocating real estate portfolios towards short-term uses and away from long-term uses (a substitution response). Think of this as a *yield* effect on asset demand, putting upward pressure on prices and rents.

In practice the stock effect on the supply side of the existing housing market—6,749 more housing units, instantaneously—and the yield effect on the demand side of the housing market (investors chasing yield) would probably net out negative. The stock effect would swamp the yield effect. This study left housing valuation side-effects, pecuniary externalities, to the periphery but clearly there can be impacts. Their quantification would depend on other flexibilities not inherently incorporated in the fixed-price nature of input output models.

Other considerations also were not incorporated in this report’s analysis.

- Is reducing the lodging inventory a form of “insurance,” ensuring that the prices of homes in will not rise, or rise less than they would have otherwise (and might fall)? This would keep housing affordable by impoverishing homeowners whose investment decisions previously were predicated on expectations of higher rates of house price appreciation.
- Would hypothetically reducing the lodging inventory generate a “contagion,” inducing speculators to swarm from the old lodging market and into the housing market, bidding up existing home prices? The stock effect need not dominate over the yield effect.

If the stock effect and the yield effect net out like a fire sale externality, with a net negative impact on valuations, there still might be static and dynamic effects that are complex and nuanced. Again, no price changes were incorporated in this analysis, but from a modeling standpoint, this avenue of consideration of potential outcomes may be the most important.

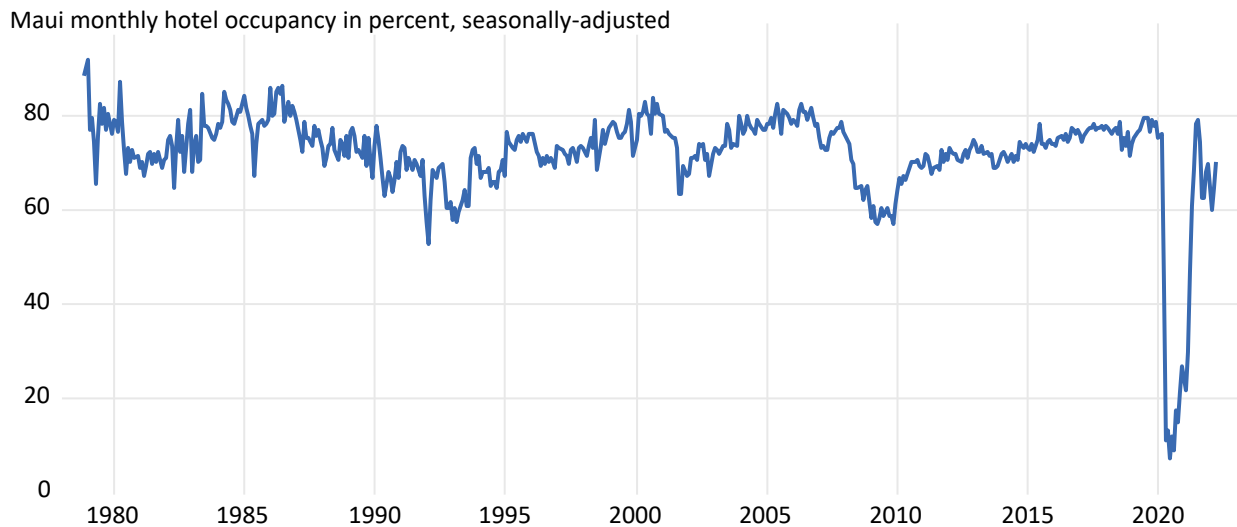
If lower house prices are the net outcome of a hypothetical zoning change that withdraws lodging units and turns them into housing units, lowering housing valuations, there also could be a disincentive to new home construction. Why build more housing when 6,749 housing units miraculously appear after a zoning change? *Forget about the incentive to in-migration.) Maui homebuilding peaked in 2004-2006 at 1,500 new housing unit authorizations *per annum*. During the recovery period in 2009-2011 from the Great Recession, new housing unit authorizations in Maui County ebbed to fewer than 300 new units/year. Subsequently, Maui County averaged 595 new housing units/year from 2012-2021 (including the pandemic interval). That’s twice Great Recession and recovery volumes, but only 40 percent of the previous housing cycle’s peak. Dropping *ten times* as much existing condominium inventory into the existing housing stock as is newly built annually, more than one decade’s worth of construction, can be imagined—hypothetically—as potentially disruptive for Maui County housing valuations, potentially invoking the Law of Unintended Consequences.³⁴

³⁴ This would be true at least momentarily if not in the long run. One could observe an instantaneous jump *downward* in valuations, a discontinuity before and after the rezoning. But if arbitrage dictates that price appreciation is the same before and after the discontinuity, then there would be a “smooth pasting” problem: the derivatives (of the natural logarithms of home prices) before and after should be the same.

Appendix 4: Notes on lodging capacity utilization: 80 percent hotel occupancy as benchmark

Hotel occupancy tends to peak in good tourism periods at around 80 percent: in 2019 it averaged 77.7 percent in Maui County. Timeshare tends to have higher utilization rates, making it appealing for lodging services providers as an alternative to hotel operations. In 2019, Maui County timeshare occupancy averaged 94 percent.³⁵ Also during 2019, vacation rental unit occupancy was 78.7 percent in Maui County, suggesting that its performance attributes are more like those of hotel units than timeshare units. No utilization data for condominiums available for short-term rental are available. This study gravitated towards 80 percent as a full-potential lodging utilization rate to apply to the mix of vacation rentals and condominiums in the VPI which corresponded with the 6,749 Maui County condominium units hypothetically affected by potential apartment zoning changes.

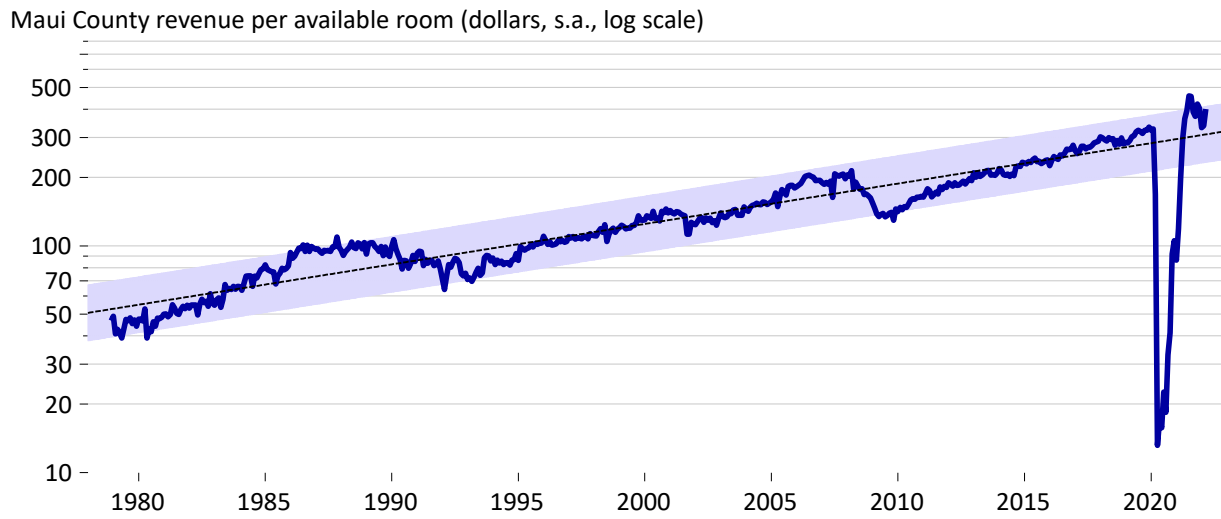
Figure A4-1. Hotel occupancy tends to seek out 80 percent as “full potential”



Sources: Pannell Kerr Forster, Smith Travel Research, Hospitality Advisors LLC, University of Hawaii Economic Research Organization (UHERO) (https://data.uhero.hawaii.edu/#/category?sa=true&id=36&data_list_id=38&start=2012-01-01), Hawaii Tourism Authority (<https://hawaii-tourism-authority.org/research/infrastructure-research/>); seasonal adjustment by TZE.

³⁵ See Hawaii Tourism Authority for timeshare performance data, 2014-2021 (<https://hawaii-tourism-authority.org/media/4483/hawaii-timeshare-quarterly-survey-year-end-2019.pdf>), for vacation rental performance data, 2019-2022 (<https://hawaii-tourism-authority.org/media/4113/hawaii-vacation-rental-performance-12-2019.xlsx>), and for hotel performance data 2020-2022, along with other infrastructure data (<https://hawaii-tourism-authority.org/research/infrastructure-research/>). Earlier hotel occupancy data are from a variety of historical sources, including Pannell Kerr Forster, Smith Travel Research, Hospitality Advisors, LLC, and UHERO. Seasonal adjustment of illustrated Maui hotel occupancy is by TZ Economics.

Figure A4-2. Maui revenue per available room appreciates at about 4 percent *per annum*



Sources: Pannell Kerr Forster, Smith Travel Research, Hospitality Advisors LLC, University of Hawaii Economic Research Organization (UHERO) (https://data.uhero.hawaii.edu/#/category?sa=true&id=36&data_list_id=38&start=2012-01-01), Hawaii Tourism Authority (<https://hawaii tourism authority.org/research/infrastructure-research/>); seasonal adjustment and trend regression by TZE.

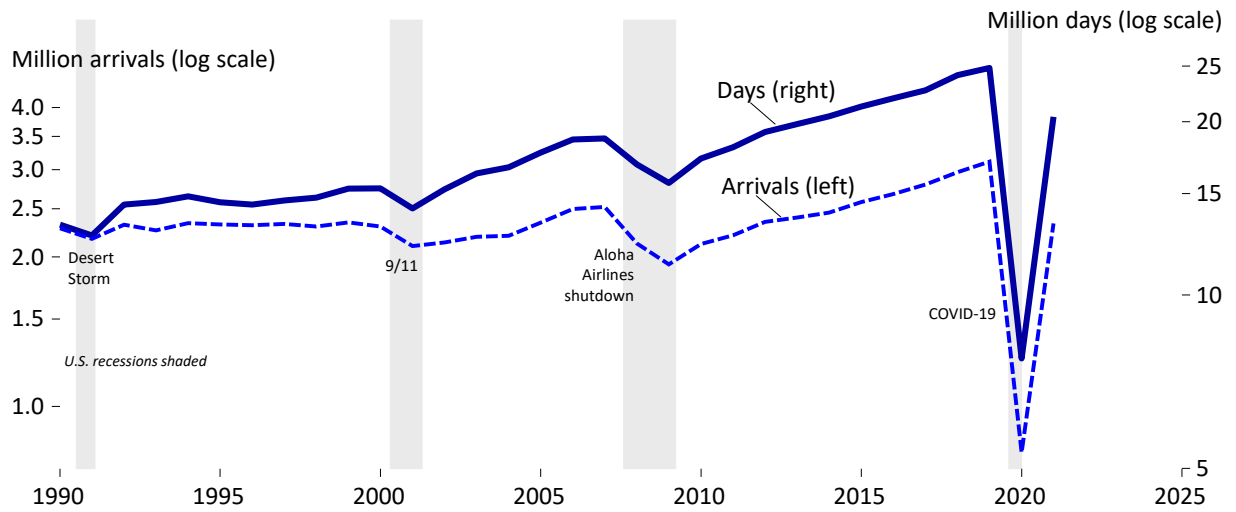
Appendix A-5. Longer-term Maui tourism dynamics

Annual data provide insight into longer-term Maui tourism trends and information about interruptions known as Sudden Stops. Reversals of upward trends often are related to the business cycle generally. Maui tourism performance decreases since the 1980s often reflected economy-wide recession. Performance declines sometimes were precipitated by exogenous shocks. Sometimes such shocks occurred *during* ongoing recessions. In Figure A5-1, events like Operation Desert Storm (January 1991), the 9/11 terror attacks (September 2001), and the shutdown of Aloha Airlines (after March 2008), occurred *during* ongoing U.S. economic recessions which were correlated with Maui tourism declines. Those Sudden Stops aggravated ongoing recession effects on travel and tourism. Similarly, Hawaii arrival of the novel coronavirus SARS-CoV-2 (first quarter 2020), precipitated onset of a contemporaneous U.S. recession.³⁶

Rising trends in Maui tourism volumes, using annual visitor days or visitor arrivals, are instructive about infrastructure carrying-capacity. Lodging and scheduled air seats are travel *supply* constraints. Visitor arrivals and visitor day increases over time, as well as shorter-term decreases associated with recessions and sudden events, are instructive about travel and tourism *demand*. For example, increasing travel demand in the 2010s unfolded if lodging capacity was not constrained. Even in 2019, with 90 percent load factors on commercial air carriers flying to Hawaii (“filled seats”), and almost 80 percent hotel occupancy in Maui County, supply constraints technically were not binding. *Technically* there was room to grow. But load factors of 90-95 percent, and hotel occupancy of 80-85 percent, historically have proven to be *de facto* upper bounds in historical Hawaii experience. Maui in 2019 was close to its limits to tourism growth, if momentarily. Sustaining growth of tourism in the short run becomes more challenging approaching such thresholds, exhausting potential productive capacity. Maui tourism had room to grow from rising travel demand over the decade of the 2010s, beginning with recovery from the Great Recession of December 2007 – June 2009, but Maui tourism’s headroom was running out by 2019.

³⁶ Short but precipitous and intense, the 2021 Covid Recession lasted only three months from February – April 2020 as dated by the National Bureau for Economic Research (<https://www.nber.org/news/business-cycle-dating-committee-announcement-july-19-2021>). Hawaii’s first confirmed covid case was identified on March 4, 2020 and announced on March 6, 2020 (the author was at the media release), but only because the Hawaii Department of Health did not have polymerase chain-reaction (PCR) covid testing capability prior to that date. Earlier, in February 2020, foreign visitors were identified upon return to Japan as having acquired COVID-19 prior to their return, and a Hawaii resident disembarked from a cruise ship in Ensenada, Mexico to return to the Hawaiian Islands with covid symptoms just after embarking in Oakland prior his return. Almost certainly the novel coronavirus was present in Hawaii prior to March 2020. In contrast, the three events identified—Desert Storm, 9/11, and Aloha Airlines’ shutdown—each occurred *during* ongoing recessions (which they could not have precipitated) although, as is not uncommon, because of lags in determination those recessions were not known to have been underway at the time (<https://www.nber.org/research/data/us-business-cycle-expansions-and-contractions>).

Figure A5-1. Two annual Maui tourism volume data sets exhibiting long-run performance trends: visitor arrivals and visitor days (arrivals times average stay length)



Sources: Hawaii Tourism Authority, Hawaii DBEDT, seasonal adjustment by TZE

Appendix 6. The covid pandemic, economic Sudden Stops, and deindustrialization

At higher data frequencies, with monthly visitor arrivals data or daily passenger arrivals data, a more nuanced view of both year-to-year as well as within-year tourism performance unfolds. Performance of Maui tourism from summer 2021 through winter 2022 was adversely affected by *two* mutant waves of covid variant morbidity and mortality. These variants and later sub-variants were continuing to have material tourism impacts as this report was prepared in 2022. Even though tourism recovery emerges as the trend in 2021 Maui tourism data, the recovery trajectory was “non-monotonic.” Tourism was not steadily increasing even after considering seasonal variation in performance. So, while interpreting the annual trends during the 2010s as culminating in peak or near-peak potential performance in 2019, given Maui’s infrastructure, intervening events complicate simple projection forward.³⁷

The Delta wave reduced Maui tourism from July through September 2021. The Omicron wave reduced tourism from December 2021 through February 2022. On a high-frequency basis (monthly or weekly), Maui’s tourism recovery—defined as a return to the previous peak (2019)—was almost virtually complete by July 2021. Maui visitor days in July 2021 were 107.4 percent of the July 2019 benchmark. Maui visitor arrivals in July 2021 were 91.7 percent of the July 2019 benchmark. Maui real visitor expenditure (in 2021\$) was 91.2 percent of the July 2019 benchmark. Slightly fewer visitors spending slightly less month but staying longer made July 2021 an “almost peak” month compared to July 2019. After July 2021 the two covid variant waves, cumulatively, decreased seasonally adjusted monthly Maui visitor arrivals by 20 percentage points over the next seven months, from August 2021 through February 2022.

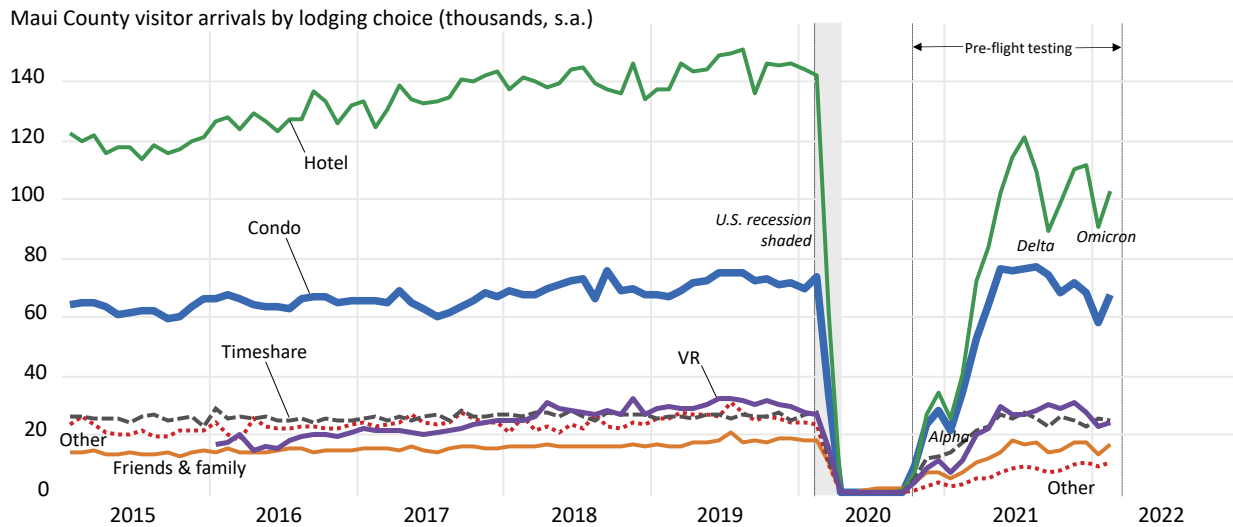
The key point here is that 2020s Maui tourism recovery remains vulnerable to *unanticipated* adverse shocks.³⁸ Some can be anticipated. Entirely predictable adverse shocks have entirely predictable adverse impacts. Reducing Maui’s lodging inventory will probably reduce Maui tourism exports and, through multiplier effects, depress Maui output, employment, income, and tax revenues. Even unpredictable adverse shocks can have entirely predictable adverse impacts. The 15-20 percent reduction in scheduled air seats to Hawaii accompanying the shutdown of Aloha Airlines after March 2008 had predictably adverse impacts.³⁹

³⁷ Declining global petroleum prices after 2014 reduced air fares and increased travel demand, but not Maui lodging capacity. Normalization of U.S. monetary policy after 2015 raised domestic interest rates and the foreign currency value of the U.S. dollar, eroding the purchasing power of tourists from Canada, Japan, and Australia with influence on Maui visitor expenditure. Flooding on Kauai and volcanism on the Big Island in 2018 each induced short-term tourism volatility as travelers confronted information asymmetry (*e.g.* “is the volcano on Maui?”).

³⁸ Though beyond the scope of this report, covid variant waves were not universally *unanticipated*. Ignoring risk is not the same as not anticipating risky events. The Delta and Omicron variants in second half 2021 and associated adverse tourism and economic impacts, and evolving forms such as the BA.2, BA.5 and BQ sub-variants in 2022 may not be predictable in terms of *timing* or magnitudes of adversity but once identified may have qualitatively predictable epidemiological impacts. A tourism recovery proceeding in fits and starts—two steps forward, one step back—inevitably is associated with biological and other risk exposures.

³⁹ In first quarter 2008 there were 2,636,838 scheduled transpacific air seats flown to Hawaii, and in first quarter 2009 there 2,162,101 scheduled seats, a decrease of –18.0 percent. In first quarter 2009 there were 512,115 scheduled transpacific air seats flown to Hawaii, and in first quarter 2009 there 380,317 scheduled seats, a

Figure A6-1. Maui visitor arrivals staying in condos, timeshares recover faster, more completely



Sources: Hawaii Tourism Authority, Hawaii DBEDT, seasonal adjustment by TZE

The covid pandemic emerging early in 2020 produced a Sudden Stop in Maui tourism and economic activity unique for the modern era. Each of the prior tourism Sudden Stops were associated with exogenous geopolitical, geophysical, or biological events. Operation Desert Storm in winter 1991 produced a decline in Maui visitor arrivals which left many hotel operators in the position of having to lay-off workers as a consequence, coming towards the end of a U.S. economic recession and unwinding of the Japan Bubble in Maui housing, construction, and real estate investment.⁴⁰ The 9/11 terror attacks came a decade later in September 2001 during the U.S. economic recession which followed the late-1990s technology stock bubble, the Dot.Com Bubble. Almost another decade later the shutdown of

decrease of -25.7 percent. (See the monthly visitor statistics data archives at Hawaii DBEDT (<http://dbedt.hawaii.gov/visitor/tourism/>.) You didn't have to know in advance that Aloha Airlines would shut down after first quarter 2008 to know immediately thereafter that—at 90 percent load factors—elimination of its scheduled seats could not be offset by rival carriers' capacity, and that Maui tourism and Hawaii tourism unambiguously would be reduced by the decrease in commercial air passenger carriage capacity.

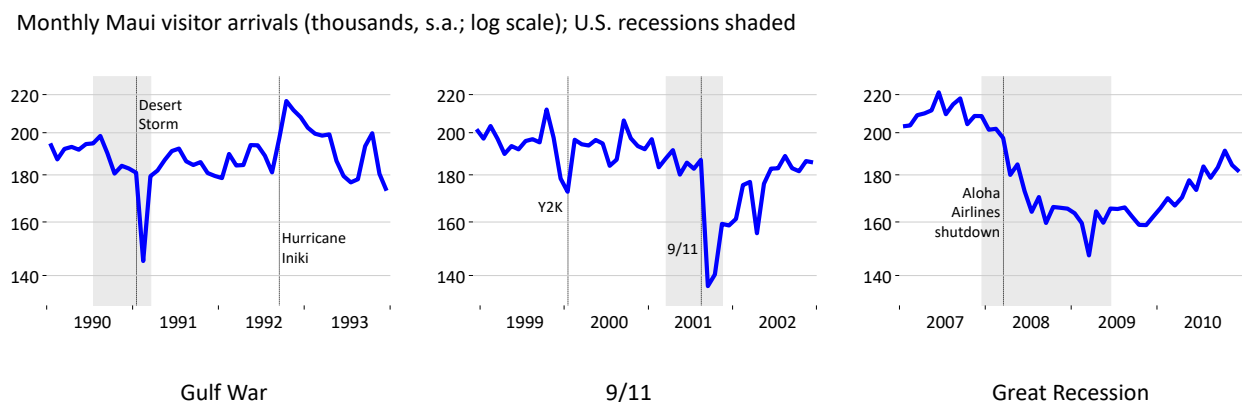
⁴⁰ The contemporaneous U.S. economic recession from July 1990 – March 1991 coincided with Operation Desert Shield, the mobilization of a coalition military response in second half 1990 to Iraq's unprovoked invasion of Kuwait earlier that year, and with Operation Desert Storm from January – March 1991 during which armed conflict expelled the Iraqi invasion. See National Bureau of Economic Research (NBER) for recession dates (<https://www.nber.org/research/business-cycle-dating>). The tourism downturn in 1991 also was emblematic of the end phase of the so-called Japan Bubble in Maui real estate investment, with Maui quarterly mean and median existing home sales prices peaking in third quarter 1990, and a Federal Housing Finance Administration index of Maui housing valuations peaking in third quarter 1992. The tourism shock in 1991 was followed by an extended stagnation of Maui visitor arrivals, influenced strongly by persistence of California's recession in that time frame, along with the bursting of the housing bubble.

Aloha Airlines during the Great Recession (December 2007 – June 2009) aggravated financial systemic volatility in the wake of the Sub-Prime Bubble, another housing-related extreme event.

These events were not as catastrophic for Maui tourism as was Hurricane Iniki for Kauai in 1992, damage from which was county specific. (Iniki *increased* Maui tourism, displaced from Kauai.) But each of these prior Black Swan events inform the vulnerability of Maui prior to the arrival of SARS-Cov-2 in winter 2020. Black Swans are inevitable but unpredictable, high-loss events with unknown arrival times. A tropical cyclonic event is certain to occur, but when and with what intensity cannot be known. A Russian invasion of Ukraine, or terrorist obliteration of New York City’s World Trade Center, and events like them sadly are inevitable but are unknowable in terms of when or how bad they will affect places as remote as Maui. Despite Hawaii’s travel precautions—including a rigorous pre-flight testing protocol for almost a year and a half—by late-2021 and early-2022 per capita covid morbidity and mortality in Hawaii were indistinguishable from Florida, a state notorious for cavalier dismissal of pandemic non-pharmaceutical interventions (NPI).

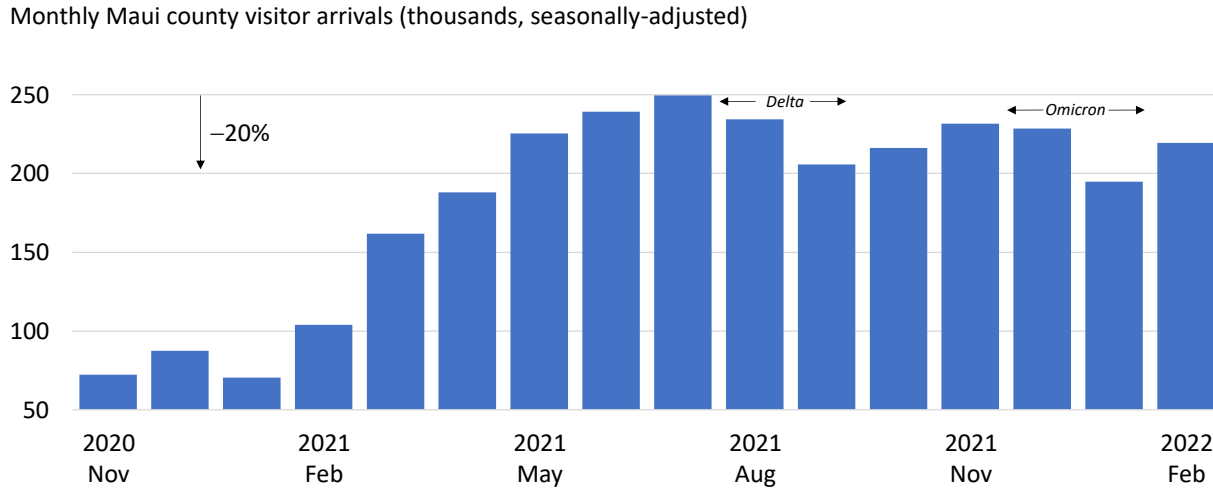
This report was prepared as Maui entered its third pandemic year and a transition away from covid. Omicron sub-variants of the novel SARS-CoV-2 coronavirus were ascendent. Delta and Omicron morbidity waves depressed Maui visitor arrivals almost as much as the 9/11 event did in 2001, the tourism equivalents of *two* 9/11-style events during the eight months from July 2021 through February 2022! Covid tourism risk persisted at low levels in 2022.

Figure A6-2. Large, unexpected, sudden monthly Maui tourism declines approaching –20 percent



Sources: Hawaii Tourism Authority, Hawaii DBEDT, seasonal adjustment by TZE

Figure A6-3. Seasonally-adjusted Maui visitor counts recovered to one-quarter million per month by July 2021, but covid variants—Delta and Omicron—knocked back volumes by up to 20 percent



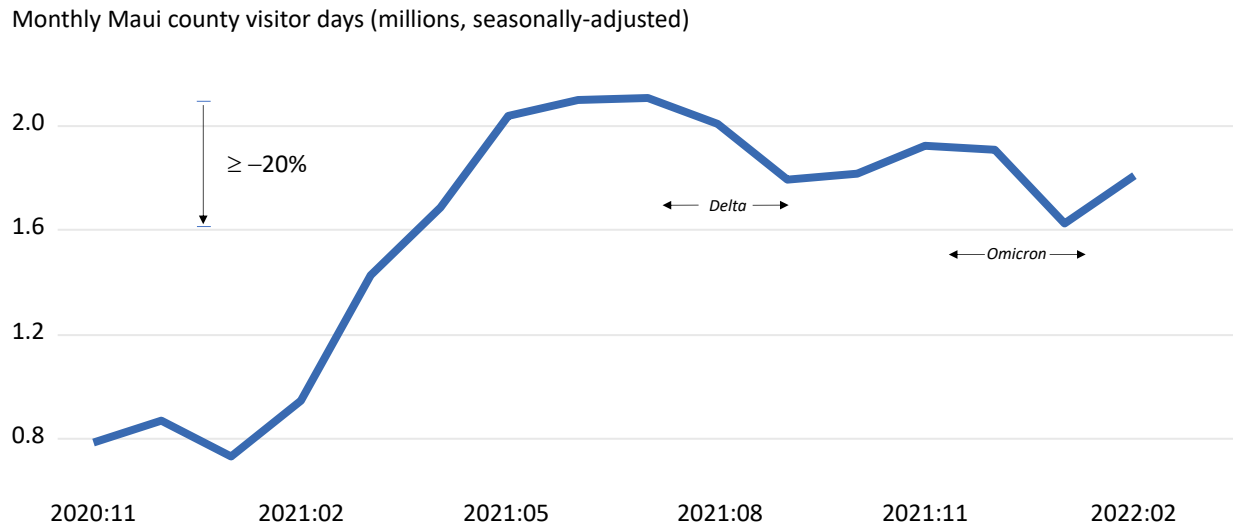
Sources: Hawaii Tourism Authority, Hawaii DBEDT, seasonal adjustment by TZE

Exogenous tourism risk, events transmitted into Maui from overseas either directly, like infectious pandemic disease, or indirectly through travel demand, have been capable of decreasing Maui tourism by 20 percent. The memorable shocks highlighted here—Desert Storm, 9/11, Aloha Airlines shutting down at the start of the Great Recession, multiple covid-variant waves *after* Maui’s 2021 tourism recovery essentially concluded—each had profound impacts on Maui jobs, incomes, and business activity. In each instance businesses shut down and people lost their jobs and livelihoods.

Adverse impacts of exogenous tourism shocks can persist. Though Maui employment generally trended upward for thirty years, from just under 55,000 employed persons in 1990 to 87,000 persons in 2019, each tourism shock had lingering echoes in subsequent Maui employment data. Comingled with contemporaneous recession, such shocks amplify job loss. Two years after the Dot.com Recession there were 400 fewer persons employed in Maui than immediately after the 9/11 event. Two years after the Great Recession there were 3,450 fewer persons employed in Maui than immediately after the shutdown of Aloha Airlines. Two years after the Covid Recession there were 8,000 fewer persons employed in Maui, and two-and-one-half years later still 6,000 fewer jobs in Maui County.⁴¹

⁴¹ Difficulty disentangling the impacts of singular events from their business cycle context typically requires econometric analysis. The three similar examples—shocks which occurred during U.S. recessions—are illustrated with monthly employment estimates officially seasonally adjusted by the U.S. Bureau of Labor Statistics for the Kahului-Wailuku-Lahaina Metropolitan Statistical Area (MSA), although pairwise for like months separated by two years: February 2022 vs. February 2020, April 2010 vs. April 2008, October 2003 vs. October 2001. See Hawaii DBEDT (<https://dbedt.hawaii.gov/economic/unemployment-statistics/>, https://files.hawaii.gov/dbedt/economic/data_reports/DLIR/LFR_LAUS_SADJ.xls).

Figure A6-4. Maui visitor days declined by at least 20 percent from the Delta through Omicron waves



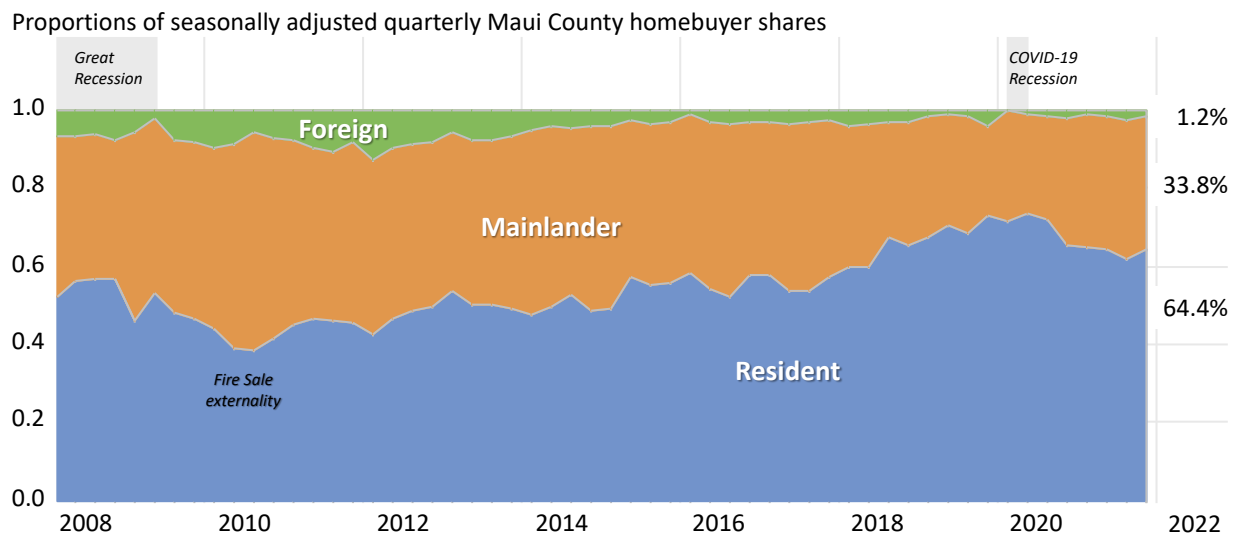
Sources: Hawaii Tourism Authority, Hawaii DBEDT, seasonal adjustment by TZE

Historically, such tourism shocks have several things in common. They almost always are unpredictable (although even small shocks, including spurious events like Y2K, may yield material economic loss). They are asymmetric: they are almost always negative and, when positive, only at the expense of another destination. Maui’s gain was Kauai’s loss following Hurricane Iniki. They are generally exogenous, determined outside Maui. No one deliberately sought to decrease Maui tourism by 20 percent in any of these events. Permanently removing one-third of Maui lodging would deindustrialize tourism. It would shrink the Maui economy. Jobs and incomes would decrease. Unlike transitory 20 percent tourism decreases associated with previous tourism shocks, a hypothetical reduction in Maui lodging of 6,749 units *permanently* would decrease tourism by 20 percent. It would be a Desert Storm, 9/11, Great Recession, or Delta and Omicron coronavirus waves without recoveries.

Appendix 7. Maui homebuyer shares

It is suggested that offshore investors in Maui County housing markets cause home prices to be higher than otherwise would be the case, reducing Maui housing affordability. Non-resident housing investor data should include those from other Hawaiian Islands such as Oahu, but in practice comprise U.S. mainland and foreign investors. A potential new class of Maui housing investors comprise remote workers whose increasing prevalence coincides with slightly higher offshore Maui homebuying since 2020. There is some evidence for post-covid causality from remote work to home prices in national data,⁴² but post-covid Maui data remain open to interpretation. The idea that offshore investors worsened Maui affordability *during the 2010s* is contradicted by *decreasing* shares of offshore Maui home buyers in that decade. Offshore and resident buyer proportions in the late-2010s and early-2020s were the *opposites* of proportions following the Great Recession, when distressed property “fire sales” peaked. (At the time many sellers also were offshore investors.) Residents in 2020 comprised 70 percent of Maui County homebuyers and nearly two-thirds in 2021, but only 40 percent in 2010.

Figure A7-1. Offshore investor shares of Maui home purchases had been declining, pre-covid



Sources: Bureau of Conveyances, Hawaii DLNR, as compiled by Title Guaranty and provided to Hawaii DBEDT (http://files.hawaii.gov/dbedt/economic/data_reports/qser/E_construction-tables.xls). Seasonally-adjusted by TZE using a Census X-13 ARIMA filter.

⁴² In “The Donut Effect of COVID-19 on Cities,” authors Arjun Ramani and Nicholas Bloom observe a pattern of spatial reorientation of housing preferences towards detached dwellings in suburban and exurban locales, and away from multi-family dwellings in urban cores. See *NBER Working Paper 28876* (May 2021) (<https://www.nber.org/papers/w28876>). Authors John A. Mondragon and Johannes Wieland (May 2022), in “Housing Demand and Remote Work,” *NBER Working Paper 30041* (<https://www.nber.org/papers/w30041>), “show that the shift to remote work explains over one half of the 23.8 percent national house price increase” since 2019, providing “a fundamentals-based explanation for the recent increases in housing costs over speculation or financial factors.” The authors conjecture that “evolution of remote work is likely to have large effects on the future path of house prices and inflation.”

Appendix 8: Housing and lodging as a continuum, not binary

It is commonplace to dichotomize habitation into two, binary extremes: housing for residents, and lodging for visitors. In a tourism-oriented economy like Maui this distinction seems natural, but it is an over-simplification of housing and lodging nuances in Maui's context. Some investors own the housing units in which they reside (homeowners are *investors* in housing the same way stockholders are investors in corporations). Census Bureau estimates place homeownership at 62.5 percent of Maui County's housing stock.⁴³ Some investors own rental housing units rented out to tenants of varying durations from overnight to a year or more. Some investors own housing units they occupy for portions of the year which remain vacant for the remainder of the year. Some investors own housing units they occupy for portions of the year which are rented out for the remainder of the year.

The 28.5 percent of Maui County's 72,000 housing units which are not owner-occupied, according to the U.S. Census comprise about 22,000 units.⁴⁴ Maui County's 22,000 lodging units enumerated in the Hawaii Visitors Bureau *Visitor Plant Inventory* reports include substantial portions of the lodging inventory potentially fungible as housing: 20 percent comprised condos, 27 percent comprised vacation rentals (together an annual average total of more than 10,000 units, 2016-2020).⁴⁵

The sheer size of tourism in Maui's economy means that the continuum between housing and lodging imply a use duration gradient which is quantitatively material to policy. The numbers occupying the "middle ground" between strict residential use and strict lodging use are a significant portion of Maui's habitation inventory—housing and lodging combined—*because* of tourism (and, more generally, because of modern mobility (consider remote work)). Tourism is a larger share of Maui economic activity than is found in almost all economies outside Hong Kong and Singapore, which are trade-oriented entrepôt economies. Maui is what is known as a small, open economy. Tourism value-added (direct and indirect) comprised about 38 percent of Maui County GDP during the pre-pandemic late-2010s. The housing and lodging stocks, when lodging supports nearly two-fifths of economic activity in Maui, Molokai, and Lanai, inevitably loom large both as productive capital for Maui County's principal export activity, and as contributor to the fungible continuum *between* two extremes, housing and lodging, rather than to the endpoints.

⁴³ U.S. Bureau of the Census, 2016-2020 estimate (<https://www.census.gov/quickfacts/mauicountyhawaii>).

⁴⁴ *Op cit.*, 72,086 (2021).

⁴⁵ Hawaii Tourism Authority, *2021 Visitor Plant Inventory* (annual) (<https://files.hawaii.gov/dbedt/visitor/visitor-plant/2021VPI.pdf>) and prior issues. An additional 17 percent comprised timeshare units, and an additional 36 percent comprised hotel units, all of which are potentially available for short-term rental, if not customarily longer.