LUDWIG INSTITUTE FOR SHARED ECONOMIC PROSPERITY

MINIMAL QUALITY OF LIFE INDEX – METHODOLOGY

May 2025

Revised: February 2026

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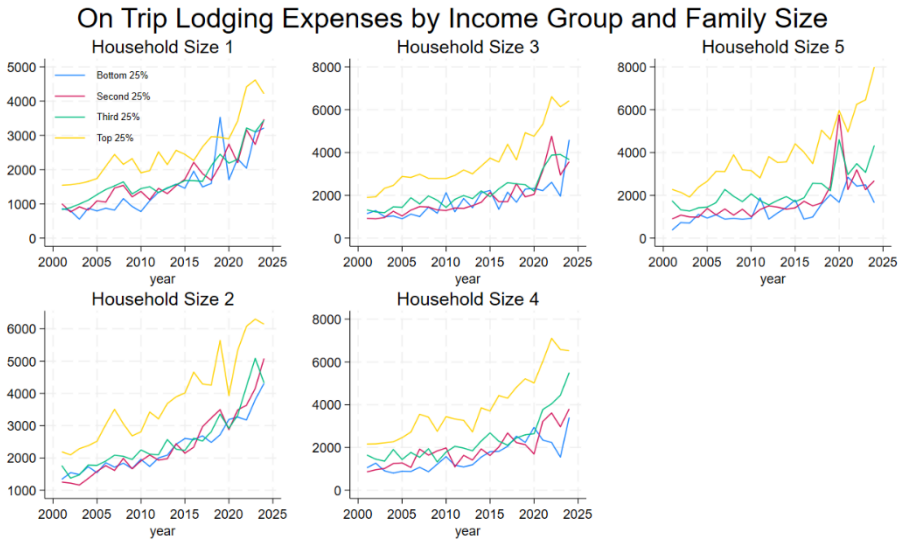
Table of Contents

D - Lodging Expenses By Household Size



Introduction

In our pursuit of quantifying a minimal quality of life in the United States, we delve into the complexities of the modern cost of living. The essence of our endeavor is to construct an index that captures not just the bare necessities for survival, but the broader expenses necessary to live even a minimally fulfilling life in contemporary America. This index aims to reflect the real expenses associated with achieving and maintaining a working or middle-class lifestyle, a cornerstone of the American Dream.

This paper presents a revamped and more accurate methodology for measuring the minimal quality of life, focusing more on empirical evidence, and basing our minimal quality of life on an extension of the survival necessities covered under the True Living Cost rather than its own separate basket of “Recreation.” Our index, therefore, is not a mere measure of survival, nor is it a measure of “leisure activities”; it is an expansive reflection of the costs associated with a dignified life in the United States, one providing a glimpse of the American Dream.

Our comprehensive approach delves into various dimensions of living costs, including healthcare, education, housing, and access to opportunities. We analyze these components not

just in terms of financial figures but as crucial elements that shape a family's capability to achieve a desirable standard of living. This nuanced analysis is particularly relevant in understanding how different family structures and geographical regions impact the cost of living in America.

The inspiration for the redefinition of the MQL comes from academic sources[1], in particular Nobel Laureate Amartya Sen. Sen's groundbreaking work[2] on capabilities and poverty challenges traditional economic measures, emphasizing that true well-being is not merely about income but about the ability to achieve one's potential in society. Sen's approach to understanding poverty goes beyond the simplistic notion of income thresholds. He argues that poverty is a deprivation of capabilities, a lack of opportunities to do or be what one values. Our index, therefore, is not just a measure of survival. Recognizing that the financial burden of an American family extends beyond basic needs, our approach integrates an array of factors that contribute to a holistic understanding of living costs. These include the essentials of health, education, and housing, as well as the often-overlooked aspects such as access to quality education and the ability to satisfy the upper portions of Maslow's pyramid of needs. It is a reflection of what is required to live a life that is both comfortable and conducive to pursuing the American Dream.

The method delves into the intricacies of educational expenses, understanding that a quality education is not just a pathway to employment, but a crucial steppingstone towards social mobility and the realization of the American Dream. We analyze the costs associated with education, realistic expectations of eating that include timesaving eating out, minimal travel expenses for rare family trips, being able to enjoy minimal outings like movies or sports, and even being able to give your children small gifts on special occasions. In essence, our work presents a detailed, nuanced picture of what it truly costs to live a life that aligns with the ideals of the American Dream.

But beyond mere cost analysis, this exploration aims to ignite a discussion on redefining economic well-being through the lens of the MQL. By examining essential expenses not just as burdens but as investments in personal and family growth, upward mobility, and generational economic empowerment we pave the way for a more accessible American Dream, where opportunity and fulfillment remain within reach for everyone. It is a tool for policymakers, economists, and the public to understand the economic hurdles and opportunities that lie in the path of achieving a comfortable, secure existence in the United States. Through this paper, we aim to reshape how economic well-being is defined and begin a conversation about how that standard can be supported, ensuring that the American Dream remains attainable for all.

[1] Brady, D. (2021). American Poverty Should Be Measured Relative to the Prevailing Standards of Our Time. *The Century Foundation.* tcf.org/content/report/american-poverty-measured-relative-prevailing-standards-time/.
[2] Sen, A. (1995). *Inequality reexamined*. Harvard university press.

Defining the Minimal Quality of Life Index

Headline MQL

The headline MQL metric is the annual percent change in the typical costs faced by a low- and moderate-income household living in the US who wants to maintain a basic quality of life.

While there are many ways to capture the notion of typical growth in the costs faced by a family mathematically, LISEP has opted for a conceptually straightforward option:

1) Estimate the national average cost of the entire basket of goods (described in the next section) included in the MQL that a given family of family type f faces in year *t*.
2) Compute the year-over-year growth in that total cost between years *t-1* and *t* (beginning with the second year in the series, $t_0 + 1$).
3) Estimate the average percentage change across family types, taking into account the relative size of each population of family types across the years of change. This is the headline metric.
4) To contextualize the headline metric, estimate the accumulated inflation over time by compounding the average percentage change across family types beginning with $t_0 + 1$ and ending with *T*.

It is difficult to interpret the average of costs, in dollar units, across family types, so LISEP computes the percent change for each family type (weighted appropriately) as an intuitive way of standardizing the inflationary burden and then reports the average across those percent changes. The drawback of this method is that the percent change function is not linear, so the final number may be mildly distorted by the aggregation, but the final estimate remains a robust and intuitive summary metric.

Estimating the cost of the basket at the national level

The input data for the MQL is the cost of each component *g* needed by a family of type *f* in year *t* and reported at either the state, regional-referring to the four Census Northeast, Midwest, South and West regions-, or national level. In the data, all states' population of the number of households corresponding to each family type sum to the encompassing regional population's corresponding number, and all regional populations sum to the national number of households of each family type. Let G^R be the set of goods whose prices are reported at the regional level and let G^S be the set of goods whose prices are observed at the state level. Goods reported at the national level require no geographic aggregation.

Consider a household in year t living in state s in region r. This household requires an appropriate purchase of MQL component good (or service) *g* depending on their family type *f*. A

superscript marks the geographic level at which the cost of g is reported: if the cost is reported by region, they face cost C^R_{ftgr}; if by state, C^S_{ftgs}. Let's also say that $n_{ftr}$is the number of households of family type f in year t living in region r (n_{fts} for the state analog), and n_{ft} is the number of households of family type f in year t nationally.

To get the total cost of all goods needed for minimal quality of life, LISEP aggregates to the national level the cost of any given good according to household-weighted average. In the case of goods whose prices are observed at the state level, this is:

$$C^{S^*}_{ftg} = \sum\nolimits_{s \in S} C^S_{ftgs} \times w_{fts}$$

where $w_{fts} = \frac{n_{fts}}{n_{ft}}$.

The regional analog is:

$$C^{R^*}_{ftg} = \sum\nolimits_{r \in R} C^R_{ftgr} \times w_{ftr}$$

where $w_{ftr} = \frac{n_{ftr}}{n_{ft}}$.

The total cost of goods necessary for minimal quality of life faced by a household of family type f in year t is therefore:

$$C_{ft} = \sum\nolimits_{g \in G^S} C^{S^*}_{ftg} + \sum\nolimits_{g \in G^R} C^{R^*}_{ftg}$$

Year-Over-Year Growth

This step follows the canonical definition:

$$YoY\left(C_{ft}\right) = \left(\frac{C_{ft}}{C_{f(t-1)}} - 1\right)$$

whenever both $C_{f(t-1)}$ and C_{ft} are available.

Estimating the average percentage change across family types

What remains is to aggregate some notion of the percent change in the total cost C_{ft} across the family types. To weight such an aggregation appropriately, LISEP takes into account the possibility of year-to-year shifts in the relative populations of family types by using the average of the population counts in years t and $t-1$:

$$w'_{ft} = \frac{n_{ft} + n_{f(t-1)}}{n_t + n_{t-1}}$$

And the year-over-year average change is given:

$$\sum\nolimits_{f\in\{1,2,\ldots,8\}} \left(YoY\left(C_{ft}\right)\right) w'_{ft}$$

Estimating inflation over time

LISEP's method for estimating inflation over time is an adaptation of the concept of compounding growth. Researchers were faced with the choice of calculating the cost of living change by family type for the entire period and weighting by some combination of family type proportions, or more simply aggregating the average percent change in the cost of living across family types over time given accumulations of the one year average changes as defined by:

$$\sum\nolimits_{f\in\{1,2,\ldots,8\}} \left(YoY\left(C_{ft}\right)\right) w'_{ft}$$

The main disadvantage to this method is that although intuitively it makes sense, if there are large changes in the household population composition over time, the final number may be unduly affected by the composition of the household population during years between the two endpoints of the time period. That said, although mathematically it's not possible to "cancel out" the proportion of family types from the first and the last year nor the compounding percentages in the intermediate years, this aggregation method does in fact reflect the change in the country as a whole over this time.

The alternative to this would be taking each family type's change over the entire time period and then aggregating this overall change. This would be defined between t_0 for the initial period and T for the final period by:

$$Total\ Change\left(C_{ft}\right) = \left(\frac{C_{fT}}{C_{ft_0}} - 1\right)$$

and the final output being:

$$\sum\nolimits_{f\in\{1,2,\ldots,8\}} \left(Total\ Change\left(C_{ft}\right)\right) \times w'_{ft}$$

There are many problems with this alternative, which outweigh the advantages for the purposes of this analysis. First, it is not obvious which years would be used to weight the population to obtain w'_{ft}. Using the first and last periods in the sample would make sense:

$$w'_{ft} = \frac{n_{ft_0} + n_{fT}}{n_{t_0} + n_T}$$

but because LISEP wants to report this statistic for every year in between as well, then w'_{ft} would have to change year by year. But then the final aggregation would be almost impossible to determine methodologically from the reported headline data because w'_{ft} is unobvious. Unless the family type proportions remain completely steady, each report would necessarily not aggregate into a coherent picture. For example, when there is a 3% change in one year and then a 3% change in the next, one would think that this would result in a 1.03^2 - 1 = 6.09% change. On the chosen method, this indeed would be the case. But if the family type weights are applied separately each year, and there was even a minute change in the composition of the US, then this would indeed never be the case.

If LISEP wanted to show the composition of family types throughout the sample, then another possible approach is aggregating each family type's cost increase through time using the compounding growth method and then combining these changes with some average proportion of the weights during the time period. Again though, given the end results of each year, this suffers from the same incomprehensibility to an observer as taking the family type changes over the entire time period. This also suffers from the mathematical problems as aggregating the average percent change in the cost of living across family types over time, and thus has both disadvantages.

LISEP chooses to present the headline full time-period change as the compounding aggregated growth of each year's previously published metrics. This shows the change that was experienced by the country's inhabitants over that time while also providing a series of year-over-year numbers that directly contribute to the entire period's change over time. The change in cost of living faced by each family type during the entire period is also reported.

Component- and Category-level Costs

In many cases, LISEP finds it useful to examine the price changes for individual components as well as the total basket of goods. For most goods and expense categories, this follows a procedure analogous to the above, bypassing only the step where the goods are summed together to create the cost of the total basket (using some combination of $C^{R^*}_{ftg}$, $C^{S^*}_{ftg}$ for the relevant goods g instead of C_{ft}).

However, for costs that are only relevant to families with children, i.e., childcare, youth sports equipment, college savings, and toys, the weights used to aggregate the percent changes across family types are recalculated to include only those households who have children when these components or expense categories have their costs reported separately. For example, when calculating the cost of childcare, observed at the state level, instead of:

$$\sum_{f\in\{1,2,\ldots,8\}} \left(YoY\left(C_{ft}\right)\right) w'_{ft}$$

it would be computed as:

$$\sum_{f\in\{1,2,\ldots,8\}} \left(YoY\left(C_{ftg}^{S^*}\right)\right) w_{ft}^{child'}$$

With:

$$w_{ft}^{child'} = \frac{n_{ft}^{child} + n_{f(t-1)}^{child}}{n_t^{child} + n_{t-1}^{child}}$$

where n_{ft}^{child} is the number of families of any type except 1 and 5 (and is undefined for families of type 1 and 5), and $n_t^{child} = \sum_{f\in 2,3,4,6,7,8} n_{ft}^{child}$.

Building the Minimal Quality of Life Basket

To accurately capture the cost of living and the resources required to achieve a minimal quality of life, the MQL basket of goods and services aims to reflect the day-to-day expenses necessary for low- and middle-income Americans to live decently and establish a foundation for future advancement. The MQL basket builds on the True Living Cost (TLC) basket of goods and services necessary for basic survival and additionally incorporates expenses important for well-being and potential for upward mobility.[3] Maintaining the structure of the TLC, LISEP determines the MQL basket for eight distinct family types varying based on the number of adults and children:

- Family types (FT) 1-4 consist of a single adult with no children (FT 1), and of a single adult with one, two or three children respectively (FT 2-4).
- Family types 5-8 consist of two adults with no children (FT 5), and of two adults with one, two or three children respectively (FT 6-8).

However, determining the level of a minimal quality of life for working- and middle-class households is not as straightforward as determining the basket of essentials for subsistence. Selecting the goods and services that ought to be included in the MQL basket is the first issue. While some degree of prescription is necessary for this, LISEP aimed to build the basket while avoiding making paternalistic assumptions, i.e., determining what is necessary at a "minimal" level to such a degree that the experiences and challenges faced by LMI Americans are obscured. Consequently, LISEP based the MQL basket of goods and services on the existing literature on the topic as well as empirical data on how budget- and time-constrained US households allocate their scarce resources.

The second issue is determining the minimally adequate level of consumption for the goods and services included in the basket. An adequate level of consumption entails an expense that satisfies the MQL goal of well-being and opportunity for advancement while a minimal level necessitates that the cost is as financially accessible as possible. For a given product, there usually is a range of consumption levels which most reasonable people would consider "minimally adequate." When defining the level of consumption for a specific good or service in the MQL basket, LISEP intends to set a level of consumption within the range of what's generally accepted as "minimally adequate" to continuously track it over time. Consistency in the level of "adequacy" is imperative since it allows LISEP to confidently assert that the price change of the true adequate basket is likely to move in parallel to the MQL Basket. Over time, the minimally adequate level for different components of the MQL basket might have changed based on evolving consumer preferences and expectations or because of the increasing availability of more affordable and comparable substitutes for example. Once again, LISEP determines the level of minimally adequate

[3] Cornell, P., Dayoub, D., Dassen, S., Meyer, S. (2026). True Living Cost (TLC) Index Methodology *Ludwig Institute for Shared Economic Prosperity*. Retrieved February 2026, from https://www.lisep.org/tlc.

consumption for various goods and services based on existing literature and the experience of US households inferred from data on consumer preferences and spending patterns.

Finally, data of sufficient and consistent quality is not always available to track each product since 2001 and make a reliable estimate of each product's cost and change in cost over time. In such situations, LISEP decided to preserve the accuracy and consistency of the MQL basket by excluding goods and services lacking data to compute reliable cost estimates. Similarly, when data does not allow for a minimal cost estimate, and it is reasonable that a more expensive estimate would substantially bias the result, LISEP excludes the product. The sections below provide additional details for instances where a cost could not be included in the MQL because of data issues.

Others' beliefs of what components ought to be included in the MQL basket and what level of consumption is minimally adequate will likely differ, but hopefully they will fluctuate within the range of what LISEP deems as the Minimal Quality of Life Basket. Likewise, others' expectations of the basket might differ based on localized and individual experience. Ultimately, LISEP believes that working households need to be able to afford the MQL Basket, or another of similar nature, to have a chance of pursuing the American Dream. The MQL Basket consists of:

- **Housing**: Adequate housing must ensure secure tenure, functional water and utilities, guarantee safety, and meet the family's needs. It must be located a reasonable distance from work and community resources. The MQL allocates the cost of shelter plus utilities in a decent housing unit as well as basic costs for furniture, appliances, and other household products which make the unit habitable and reasonably comfortable.
- **Healthcare**: The MQL includes premiums and out-of-pocket fees for employer-provided health insurance. Personal care expenses such as laundry, clothing storage, and hygiene or cosmetics products are included, as they're key to maintaining daily cleanliness and physical well-being.
- **Food**: In addition to nutritionally adequate groceries, the MQL includes occasional meals away from the home, recognizing the substantial investment of time required to consistently prepare meals at home. The MQL also tracks the cost of hosting five guests for a singular celebratory meal, e.g., a holiday gathering, during the year.
- **Transportation**: Budgeting for transportation covers daily commuting and modest annual travel. The MQL accounts for the expenses of car ownership, insurance, maintenance, fuel for 15,000 miles of everyday commuting and travel-related driving, and additional traveling costs such as meals and lodging.
- **Raising a Family**: The cost of raising a family is determined by a parent's ability to create a platform that allows children to have an opportunity to pursue the American Dream, including:
    - *Childcare*: The MQL includes adequate childcare costs as in the TLC, accounting for year-round care for four-year-olds and seasonal care for school-aged children.

  - *Education*: The MQL ensures families can save to cover a four-year college degree for their children at a public, in-state university, leveraging a typical financial aid package but avoiding the need for student loans.
  - *Toys*: The MQL incorporates a toy budget for households with children. This budget is not tied to the price of specific toys but rather reflects the amount a middle-income family, assumed to be budget-conscious, would likely spend on toys per child annually.
  - *Youth sports*: The MQL covers the expense of sports gear for a child playing one of the top five high school sports, excluding participation fees.
- **Technology:** Technology costs ensure households are digitally connected for work, education, and other activities basic to life in the 21st century. The MQL builds on the TLC, which tracks the cost of smartphones, a household computer, and internet and phone service, by including the cost of a TV.
- **Clothing**: The MQL expands the TLC's coverage of clothing costs to include essential fitness gear for adults. It accounts for an annual pair of new athletic shoes.
- **Basic Leisure**: The MQL includes a budget for common free-time activities. It covers costs associated with watching TV, factoring in both streaming services and conventional satellite or cable. MQL also accounts for outings by budgeting for each person to attend six movies and two MLB games in affordable seats each year.

CATEGORY	COMPONENTS
Raising a Family	Childcare, College Education Savings, Toys, Youth Sports Equipment
Housing	Rent, Household Items
Healthcare	Medical Premiums, Out-of-Pocket Expenses for Medical Care, Personal Care Items
Food	Groceries, Dining Out, Celebratory Meal
Transportation	Mileage (15K), Car Maintenance, Travel Lodging, Food and Other Expenses When Traveling
Technology	Phone, Computer, Internet, TV
Clothing	Apparel, Adult Fitness
Basic Leisure	TV Subscription Services, Weekend Outings

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Table 1: MQL components by category

Eating Out

Rationale

In the previous assessment of "eating out" LISEP treated dining out as a social activity. Because the new focus of the MQL is less on recreation and more on just providing a minimal quality of life in general, LISEP also considers dining out in the sense of comfort and ease. The TLC assumes that one has the time to prepare every single meal from scratch at home with food bought at the grocery store. This assumption, especially combined with the assumption that adults are working in full-time positions, is unrealistic in its time intensity. Largely because of the increase in women joining the labor force, the amount of time spent cooking meals has fallen steadily in the US since the 1960s.[4] The previous MQL iteration also picked an allotment of times that each family was allowed to eat out per month (2) and priced only dinners. This was an in between point between Gallup's two pegs of monthly and weekly; overall the decision of the amount that was "necessary" was both rather arbitrary and paternalistic.

Instead of allocating LMI households an amount per month that they can eat out, LISEP instead takes a different view of eating out, one that is supported by both the research done in the past MQL methodology, and additional research on why households might eat out. The biggest reason that households eat out is time constraints, especially for low-income households, who have recently increased their proportional spending on fast and convenient food compared to full-service restaurants.[5] Moreover, this should not be restricted to dinners, as time constraints impact the ability to eat throughout the day, especially if one is unable to return home because of a job. Therefore, LISEP aims to estimate the budget required for low- and middle-income households to eat out throughout the year.

Data

For the MQL's new iteration, LISEP turns to the Consumer Expenditure (CE) survey data to observe trends on how Americans are spending their money for food away from home. LISEP tracks the specific Universal Classification Codes (UCCs) for the relevant expenditures (Table 2).

Previously LISEP relied on the "per diem" reimbursements given to government employees that travelled on business. These are published by the U.S. General Services Administration (GSA).

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[4] Smith, L. P., Ng, S. W., & Popkin, B. M. (2013). Trends in US home food preparation and consumption: analysis of national nutrition surveys and time use studies from 1965–1966 to 2007–2008. *Nutrition journal*, *12*, 1-10. doi: 10.1186/1475-2891-12-45. PMID: 23577692; PMCID: PMC3639863.

[5] Rahkovsky, I., & Jo, Y. (2018). Higher incomes and greater time constraints lead to purchasing more convenience foods. *Amber Waves: The Economics of Food, Farming, Natural Resources, and Rural America*, *2018* (5). Accessed 5 Jan. 2024 on www.ers.usda.gov/amber-waves/2018/june/higher-incomes-and-greater-time-constraints-lead-to-purchasing-more-convenience-foods.

These rates were used for both meals and transportation. The data proved problematic for the following reasons.

- The rates changed relatively infrequently and thus led to periods of no price changes followed by sporadic jumps. This is because changing the rates was not tied to any measure of inflation, but rather a human approval process (approval by the GSA and the Office of Management and Budget).
- Some specific geographical areas were unable to be priced. Additionally, without information on to where people travelled, it was not possible to accurately weigh the data for travel expenditures based on the most frequented destinations.

The CE survey is a better source to measure household spending on meals away from home. To estimate the cost and quantity of meals, LISEP uses the EXPD files from the CE survey, identifies the UCC codes corresponding to breakfast, lunch, and dinner (reported separately prior to 2022 and within the same category after 2022). The EXPD files are not ideal for surveying quantities purchased, but they provide information on the number of purchases. Based on the way the survey is collected, each line item represents a separate meal purchase for an unspecified number of people, together with its total cost and larger classification. Variables tracking the total number and total cost of all the week's meals are generated, and calendar year cleaning is conducted directly on the expenditure file, removing all expenditures made by any household who did not make at least one purchase in the year in question.

To incorporate household characteristics into the calculation, LISEP uses the FMLD files, which provide information on income and household size.

New Approach

In short, LISEP defines the minimally adequate budget for eating out for each household size to be the average cost of a meal purchased by households in the middle of the income distribution times the typical number of meals purchased by the average middle income household in a year.

Crucially, LISEP investigates whether there appears to be a minimum reasonable spending level for all income levels across the distribution. This would suggest that these costs, although not strictly necessary for survival, are deemed important enough for all levels of income to spend on at a base level of expenditures at least.

Now, because there is evidence from both private and public sector sources that consumer behavior changes depending on the business cycle, specifically for dining out options and

frequency,[6] [7] LISEP takes average *j* over the 23 years in the sample.[8] In the aim of estimating a "minimum quality of life" lifestyle, the standard should not change regardless of whether a family has hit hard times. Moreover, no matter the place in the income distribution, households are forced to eat out (or choose to eat out for convenience) a significant number of times over the year (Figure 1). In the chart below, income levels 1-4 denote each household's size income quartile, ranging from the bottom quartile (1) to the top quartile (4). Income level 5 denotes households in the middle of the income distribution, which are households between the 25th and 75th percentile, or in the second (2) or third (3) income quartile. LISEP determines the income distribution for each household size rather than a unique income distribution for all households.

Figure 1: Average Meals by Income Quartiles

Calculation

Computing the cost and quantity of meals involves the UCCs described in table 2. For income groupings, we used two different variables throughout the period. Prior to 2004, the CE

[6] Hanson, W. (2022). Impact of a recession on foodservice: What does this mean for restaurants?. *Technomic*. https://www.technomic.com/newsroom/impact-recession-foodservice.
[7] Hamrick, K. (2015). Recession Had Greater Impact on Visits to Sit-Down Restaurants Than Fast Food Places. *USDA, Economic Research Service.* https://www.ers.usda.gov/amber-waves/2015/march/recession-had-greater-impact-on-visits-to-sit-down-restaurants-than-fast-food-places/.
[8] At the time of writing in February 2024. The years in the sample are 2001-2023.

survey only collected before tax income, whereas from 2004 onward they both collected the before tax data and imputed the data which they could not collect, but reported these under the same variable, so the imputation was indistinguishable. From 2006 onward, they report both the collected and the "collected plus imputed" values, and report both so that they are distinguishable. Unfortunately, because this is a diary expense, LISEP is unable to use after tax income, as that is not reported in the Diary survey during the entire time frame of interest.

UCC (or variable name)	UCC Description	Category	First Year Used	Last Year Used
FINCBEFX	Total amount of family income before taxes in the last 12 months (Collected data)	Income	2001	2003
FINCBEFM	Total amount of family income before taxes in the last 12 months (Imputed or Collected data)	Income	2004	
190321	Breakfast at fast food, take-out, delivery, concession stands, buffet and cafeteria (other than employer and school cafeteria)	Breakfast	2001	2021
190322	Breakfast at full service restaurants	Breakfast	2001	2021
190323	Breakfast at vending machines and mobile vendors	Breakfast	2001	2021
190324	Breakfast at employer and school cafeterias	Breakfast	2001	2021
190111	Lunch at fast food, take-out, delivery, concession stands, buffet and cafeteria (other than employer and school cafeteria)	Lunch	2001	2021
190112	Lunch at full service restaurants	Lunch	2001	2021

190113	Lunch at vending machines and mobile vendors	Lunch	2001	2021
190114	Lunch at employer and school cafeterias	Lunch	2001	2021
190211	Dinner at fast food, take-out, delivery, concession stands, buffet and cafeteria (other than employer and school cafeteria)	Dinner	2001	2021
190212	Dinner at full service restaurants	Dinner	2001	2021
190213	Dinner at vending machines and mobile vendors	Dinner	2001	2021
190214	Dinner at employer and school cafeterias	Dinner	2001	2021
190400	Food and nonalcoholic beverages at fast food	Food General	2022	
190500	Food and nonalcoholic beverages at full service restaurants	Food General	2022	
190600	Food and nonalcoholic beverages at vending machines and mobile vendors	Food General	2022	
190700	Food and nonalcoholic beverages at employer	Food General	2022	

Table 2: Universal Classification Codes used for Dining Out calculation

The CE Getting Started Guide[9] specifies the needed computation for the average expenditures $\bar{X}$ based on expenditures X on a good in question among households in sample H:

$$\bar{X} = \frac{\Sigma_{h \in H}[(X_h) \times (FINLWT21_h)]}{Pop}$$

[9] Consumer Expenditure Survey. (2024, November). *Consumer Expenditure Surveys Public Use Microdata Getting Started Guide*. Bureau of Labor Statistics. Retrieved February 20, 2021 from https://www.bls.gov/cex/pumd-getting-started-guide.htm.

Where $Pop = \Sigma_{h\in H}[popweight_h]$ and $popweight_h = \left[\frac{(FINLWT21_h)}{4} \times \frac{MOSCOPE_h}{3}\right]$. Because LISEP is making calendar year estimates, the denominator of 4 adjusts the annual weight *FINLWT21* in each quarterly file from annual to quarterly.

The details are explained further in Section 6.3.1 of the documentation.

Each line in the Diary files represents an expenditure made during the survey week where the household records its expenditures, and each calendar year is made up of four quarterly Diary files. Everything is computed within a single calendar year t which is dropped for brevity except for expressions that use quantities computed from different years.

LISEP starts with household h's recorded total spending on all UCCs listed in table 2 , and the recorded number of expenditures in the survey week. These are scaled by 13 to quarterly values: $mealcosts_h, nummeals_h$.

Then, households are subset by household size $hsize$ and assigned an income group IG within that subset. Choose a given subset $H^{hsize,IG}$. Let $H_{spend}^{hsize,IG}$ include only the households in set $H^{hsize,IG}$ who spent a nonzero amount on food away from home during the reference week. Then, let $H_{all}^{hsize,IG}$ include all households in set $H^{hsize,IG}$, whether or not they spent on food away from home.

The following quantities can be estimated from any subset, $H^{hsize,IG}$. Multiplying by 4 scales each sample's quarterly spending and number of meals to an annual amount for year t (ommited for clarity except in the next three expressions, which will be used with values from different years). In the specific case of the Diary files, multiplying the quarterly average by a factor of 4 is sufficient to achieve a calendar year average since expenses in all interview months correspond to the given calendar year, such that MOSCOPE always equals 3:

$4 \times (Pop) = 4 \times \left(\Sigma_{h\in H}\left[\frac{(FINLWT21_h)}{4} \times \frac{3}{3}\right]\right) = \Sigma_{h\in H}[(FINLWT21_h)]$); this equality does not hold for the Interview data.

$$Average(mealcosts)^{hsize,IG} =$$

$$4 \times \frac{\Sigma_{h\in H_{spend}^{hsize,IG}}(mealcosts_h \times popweight_h)}{\Sigma_{h\in H_{spend}^{hsize,IG}} popweight_h} = \frac{\Sigma_{h\in H_{spend}^{hsize,IG}}(mealcosts_h \times FINLWT21_h)}{\Sigma_{h\in H_{spend}^{hsize,IG}} popweight_h}$$

$$Average(NumMealsSpend)^{hsize,IG} =$$

$$4 \times \frac{\Sigma_{h\in H_{spend}^{hsize,IG}}(nummeals_h \times popweight_h)}{\Sigma_{h\in H_{spend}^{hsize,IG}} popweight_h} = \frac{\Sigma_{h\in H_{spend}^{hsize,IG}}(nummeals_h \times FINLWT21_h)}{\Sigma_{h\in H_{spend}^{hsize,IG}} popweight_h}$$

Thus, LISEP can estimate the cost per meal for a given subset $H_{spend}^{hsize,IG}$ in year t by dividing the average annual spending on meals by the average number of meals purchased:

$$CostPerMeal_t^{hsize,IG} = \frac{Average(mealcosts)_t^{hsize,IG}}{Average(NumMealsSpend)_t^{hsize,IG}}$$

LISEP also calculates the average number of meals purchased by all households in a given subset $H_{all}^{hsize,IG}$ that includes households that reported no expenditures on meals aways from home, which LISEP considers equivalent to purchasing zero meals away from home:

$$NumMealsAll_t^{hsize,IG} =$$

$$4 \times \frac{\Sigma_{h \in H_{all,t}^{hsize,IG}} \left(NumMealsSpend_{h,t} \times popweight_{h,t}\right)}{\Sigma_{h \in H_{all,t}^{hsize,IG}} popweight_{h,t}} = \frac{\Sigma_{h \in H_{all,t}^{hsize,IG}} \left(NumMealsSpend_{h,t} \times FINLWT21_{h,t}\right)}{\Sigma_{h \in H_{all,t}^{hsize,IG}} popweight_{h,t}}$$

To account for changes in consumer demand during the business cycle, $NumMealsAll_t^{hsize,IG}$ is stabilized by averaging across all years in the sample:

$$NumMealsAnnual^{hsize,IG} = \frac{1}{T} \Sigma_{t=1,2,\ldots,T} \left(NumMealsAll_t^{hsize,IG}\right)$$

The allocated budget for each family type f (which has $hsize(f)$ members) is based on the spending of income groups 2 and 3:

$$Allocation_{f,t} = \left(NumMealsAnnual^{hsize(f),IG=2,3}\right) \times \left(CostPerMeal_t^{hsize,(f),IG=2,3}\right)$$

Below, Figure 2 plots the cost per meal by year for household size 1. There is a clustering in the bottom 75% of the distribution, suggesting that the minimal cost standard for a meal is represented by this distribution, validating the method of taking the average among the middle 50%. All the cost per meal graphs for different household sizes are included in the appendix. Figure 3 shows the final allocated cost of eating out for each family type[10] based on their household size, taken from the middle 50% cost.

[10] The codes for family types 1, 2, 3 and 4 refer to households with one adult and no children, one child, two and three children respectively while codes for family types 5, 6, 7, and 8 refer to households with two adults and no children, one child, two and three children respectively.

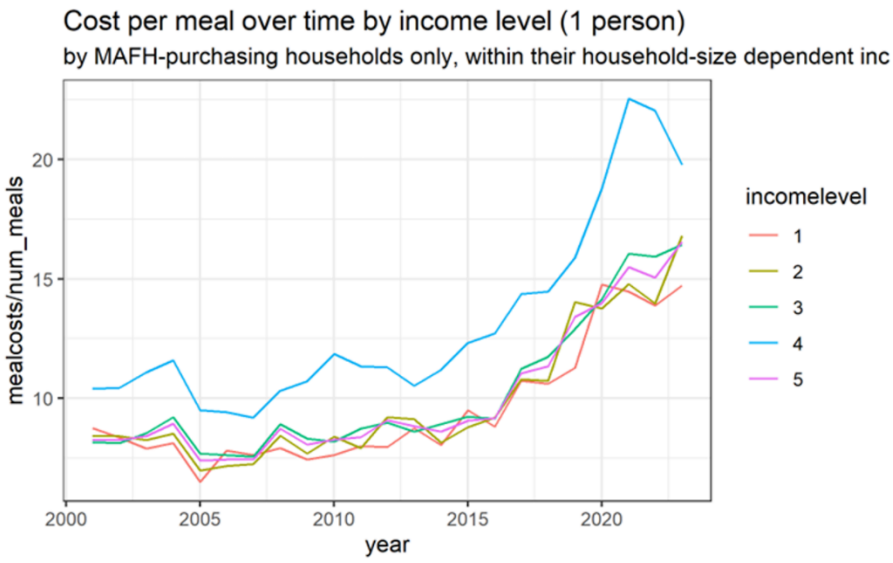

Figure 2: Cost per meal over time by income level for 1-person households

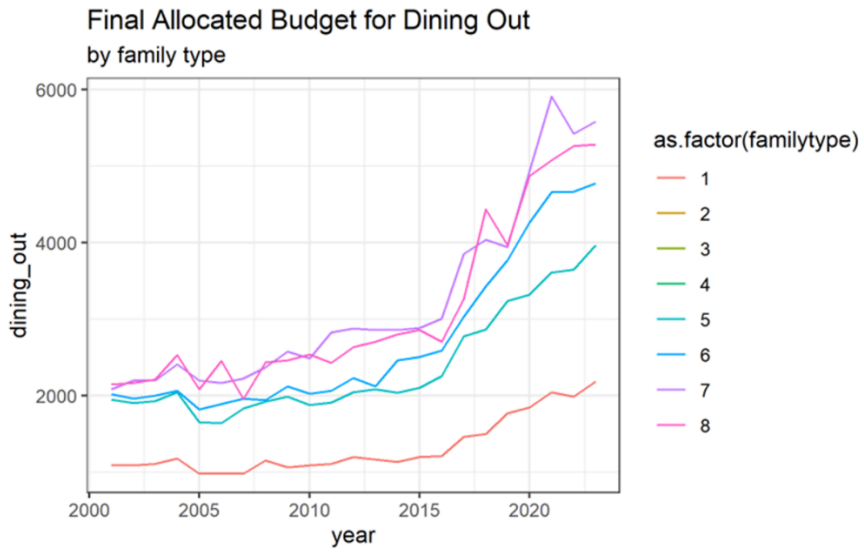

Figure 3: Final allocated cost for eating out by family type

Appendix

A - Cost per meal over time by income level for 2-5 person households:

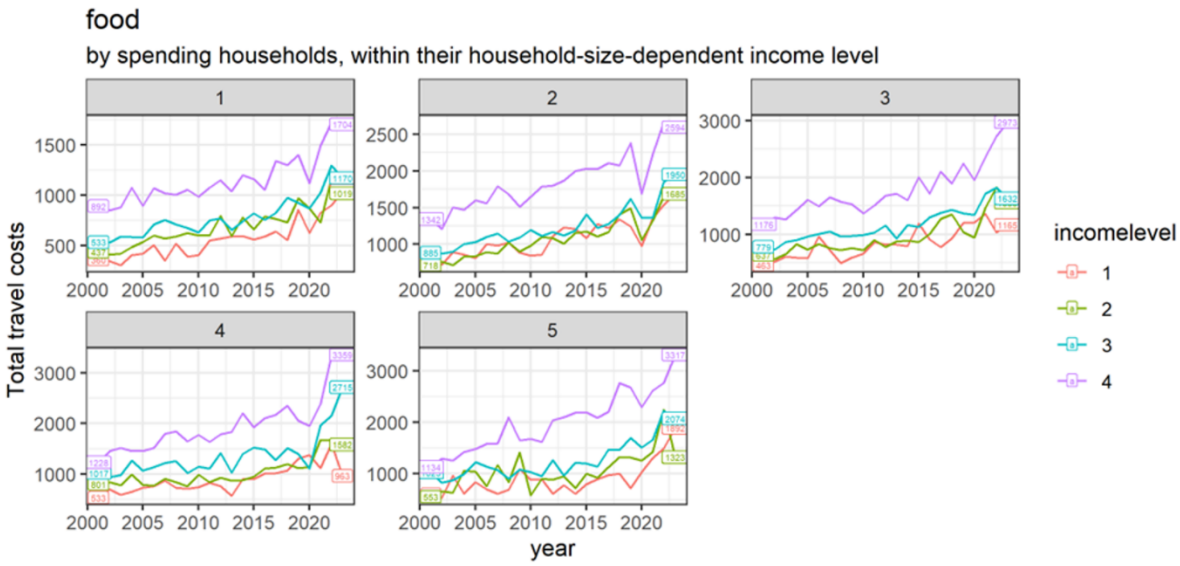

Figure 4: Cost per meal over time by income level and number of people in the household

Celebratory Dinner

Rationale

LISEP considers celebratory gatherings with family and friends a fundamental part of maintaining minimal quality of life. A celebratory dinner was included in the preceding MQL basket, but it only considered the cost for one's household, so it did not allow for families to invite close ones for dinner, unless they covered for their own costs. The new iteration of the MQL allocates the cost of groceries for hosting one Thanksgiving dinner for one's family and five guests to reflect the cost of a celebratory dinner.

LISEP only allocates one dinner because reciprocity in hosting among guests is assumed. LISEP does not allocate children a smaller meal portion given the intent of the celebratory meal to be more than sufficient.

Data

LISEP uses the estimated cost of a "Classic Thanksgiving Dinner" as reported by the American Farm Bureau Federation's (AFBF) Thanksgiving Dinner Cost Survey. The survey is conducted by volunteer shoppers, who measure the cost of a consistent grocery list for a dinner for 10 people, taking "the best possible prices without taking advantage of special promotional coupons or purchase deals." The grocery list is abundant and reflective of a traditional Thanksgiving dinner; it includes "turkey, stuffing, sweet potatoes, rolls with butter, peas, cranberries, a veggie tray, and pumpkin pie with whipped cream, all in quantities sufficient to serve a family of 10 with plenty of leftovers." [11] The AFBF does not provide details on the composition of the 10-person dinner group (either on the age or sex of the members).

For historical consistency, LISEP uses the national average price recorded for the "Classic Thanksgiving Dinner," which has data available since 1986.[12] While the regional averages are available for recent years, they do not appear to cover the entire series.

Calculation

To account for different numbers of total persons who need to be served, LISEP adjusts the estimated cost of a dinner for 10 people based on the United States Department of Agriculture's

[11] Farm Bureau Survey. (2023, November 15). Cost of Thanksgiving dinner down slightly from record high in 2022. *American Farm Bureau Federation*. Retrieved May 17, 2024, from https://www.fb.org/news-release/cost-of-thanksgiving-dinner-down-slightly-from-record-high-in-2022.
[12] Thanksgiving Dunner Cost Survey. (2023, November 16). Year-over-year price comparison. *American Farm Bureau Federation*. Retrieved May 17, 2024, from https://www.fb.org/imgz/Year-Over-Year-Price-Comparison_2023-11-16-163225_oyma.pdf https://www.fb.org/imgz/Year-Over-Year-Price-Comparison_2023-11-16-163225_oyma.pdf.

(USDA) Food Plans for cost of food at home, just as for groceries.[13] The weekly costs for USDA food plans are given for individuals in 4-person households and provide the following guidelines to adjust for different household sizes: "The costs given are for individuals in 4-person households. For individuals in other size households, the following adjustments are suggested: 1-person—add 20 percent; 2-person—add 10 percent; 3-person—add 5 percent; 4-person—no adjustment; 5- or 6-person—subtract 5 percent; 7- (or more) person—subtract 10 percent. To calculate total foods costs for a household, (1) sum the food costs for each individual in the household and then (2) apply the appropriate adjustment factor based on household size."[14]

While the USDA provides costs based on age and sex, details on the composition of the AFBF's "dinner for 10 group" are unspecified, and, given the intent of the meal to have "plenty of leftovers," LISEP assumes that the dinner is intended for adult portions. Further, given the lack of specificity of the AFBF's "family of ten" and the spirit of a plentiful meal, LISEP decided to not adjust the dinner cost for children in the family and guests. In essence, this assigns everyone an adult portion.

Because the celebratory dinner allocation assumes five guests, the adjustment for household size concerns groups ranging from 6 (for the single-person family type 1) to 10 (for the five-person family type 8) people. Since the USDA adjustment factor is the same for households of 7 or more people, the adjustment factor is 1 for family types 2 through 8. Finally, since the USDA adjustment factor for a 6-person household in relation to a 4-person household is 0.95, LISEP adjusts the cost of the 10-person Thanksgiving dinner by a factor of roughly 1.05556:

$$d_{n\,t} = \frac{d_{10\,t}}{10} \times \frac{k_n}{k_{10}} \times n$$

Where *d* denotes the cost of a Thanksgiving dinner for *n* people in year *t*, based on the cost per person of a dinner for 10 people in a given year adjusted using the USDA household size equivalence factor *k* for groups of size *n*. Since adjustment factor for 10 people k_{10} is the constant 0.9, the final equation is:

$$d_{n\,t} = \frac{d_{10\,t}}{10} \times \frac{k_n}{0.9} \times n$$

[13] Cornell, P., Dayoub, D., Dassen, S., Meyer, S. (2026). True Living Cost (TLC) Index Methodology. Section II Food. *Ludwig Institute for Shared Economic Prosperity.* Retrieved February 2026, from https://www.lisep.org/tlc.
[14] Food and Nutrition Service. (2024). Official USDA food plans: Cost of food at home at three levels, U.S. average, March 2024. *U.S. Department of Agriculture*. Retrieved May 21, 2024, from https://www.fns.usda.gov/cnpp/usda-food-plans-cost-food-monthly-reports.

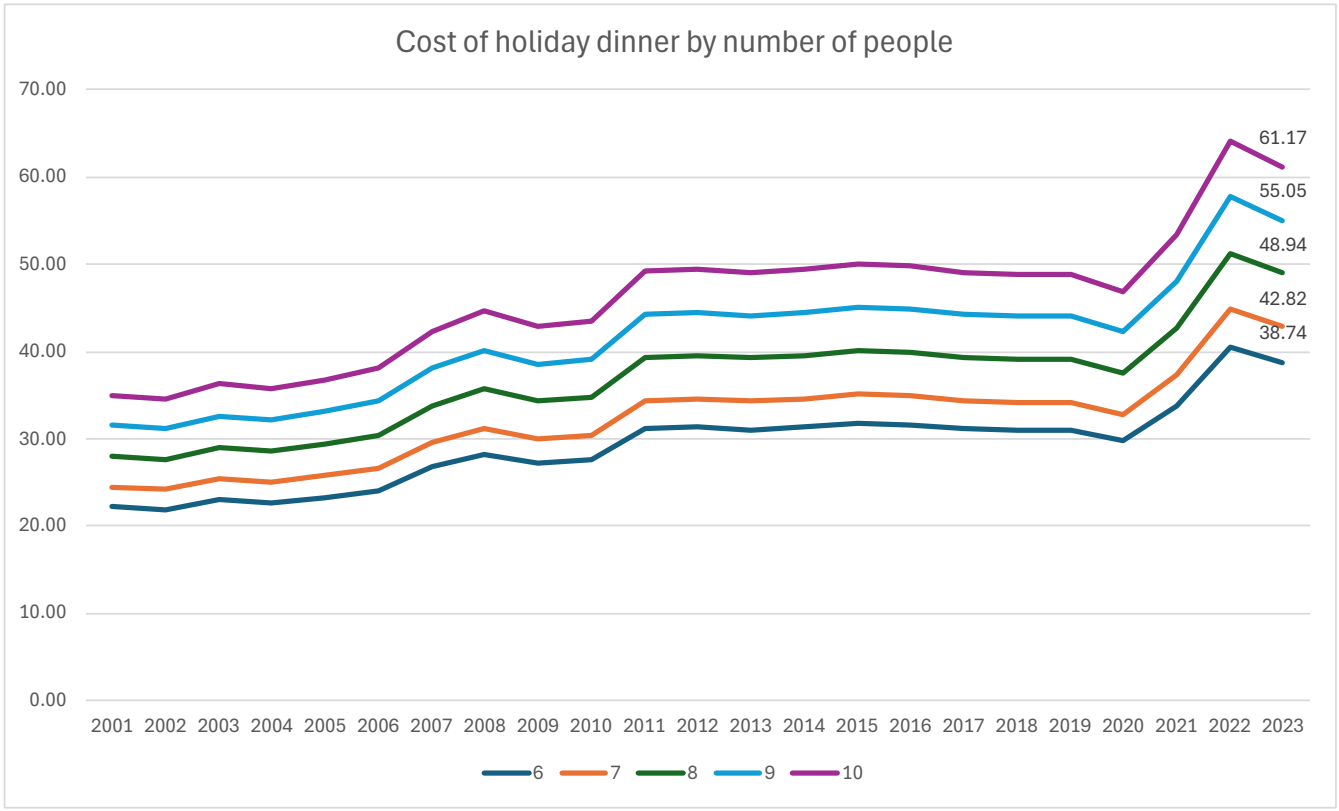

Figure 5: Cost of celebratory dinner by number of people

Travel

Rationale

The MQL allocates a budget for travel, which could be used either in traditional leisure (e.g., a road trip or a vacation), or for more routine expenses, such as family obligations. As a result, the updated method recognizes that motivations for travel extend beyond the desire to take a vacation. Travel experiences are notoriously variable, tend to bring unexpected expenditures, even for individuals who know the exact details of their trips ahead of time. Thus, instead of prescribing a hypothetical itinerary with predetermined expenses, LISEP instead turns to data on what LMI Americans spend on travel.

LISEP estimates spending on five key areas: transportation to and from the destination, then lodging, transportation, food, and recreation during the trip. Information on income level and travel frequency are used to calibrate these expenditures to reasonably estimate a budget for households of a given size. LISEP assumes that travel to and from the destination occurs by car.

Data

LISEP uses the CE Interview survey to investigate the yearly spending for on-trip total expenses as well as the prevalence of travel among different income groups.

Using the Consumer Expenditure detailed Interview data file that records trip data (TRV), LISEP calculates the likelihood that each income group goes on a vacation in a given year.[15] Information in the TRV file is supplemented with the FMLI files, which contain income, household size, and geographic information on the households interviewed. Data are restricted to expenditures that occurred within the calendar year in question.

Before-tax income is used to identify households that LISEP expects will spend modestly. The available before-tax income variables change throughout the course of the data. From 2001-2003, collected data is used (FINCBTAX), and any households which are incomplete income reporters (using the variable RESPSTAT) are deemed to have missing income. From 2004-onward, the CE reports both collected data from complete income reporters and imputed data from incomplete income reporters, and this data is taken as given (FINCBTXM).

To estimate the cost of travel to and from destinations, LISEP allocated an additional 5,000 miles' worth of driving expenses to the daily transportation budget allocated by the TLC. Annual data on the cost of car ownership is provided by the American Automobile Association and

[15] The specific question in the interview survey asks about the likelihood that the consumer unit took a trip in that given month. Each consumer unit answers the survey for a quarter. Using this, LISEP calculated the probability that the consumer would answer this four quarters in a row, and then used the CE weights to adjust the quarterly data to yearly data.

published by the Bureau of Transportation Statistics.[16] The data provides fixed costs and variable costs, assuming 15,000 vehicle-miles per year, for a mid-sized car.

New Approach

At a high level, LISEP estimated the travel budget as the average household spending (among households who reported traveling) on total on-trip expenses (lodging, transportation, food, and recreation) by households between the 25th and 50th percentile of the after-tax income distribution (including income relative to households that did not travel) and smoothed the series over time to handle noise related to data sparsity. As explained in the Calculation section, the reporting structure of the CE data requires careful treatment of aggregating spending to the household level. LISEP estimated spending needed to drive to and from the destination by expanding the TLC's daily transport allocation of 10,000 miles to 15,000.[17] LISEP assumes that the additional allocation can be used for trips throughout the year as well as for the additional travel for daily activities included in the MQL that are not considered by the TLC.

Although leisure is a big motivation for travel, there are often other reasons. Survey and spending data indicates that a majority of Americans, regardless of income level, deem these trips necessary.[18] One can see that even in the lowest income level, Americans spend on travel in a given quarter. Again, there's a dip in 2020 for COVID, but the frequency of travelling has already recovered to its pre-pandemic level (Figure 6). Since even the lowest income earners deem it necessary to spend on travel, LISEP can confidently say that a minimal quality of life should include travel expenditures.

[16] American Automobile Association, Newsroom, Your Driving Costs Fact Sheet. Available at https://newsroom.aaa.com/asset/your-driving-costs-fact-sheet-december-2020/ as of Mar. 22, 2024.
Bureau of Transportation Statistics. (n.d.). Average Cost of Owning and Operating an Automobile. Retrieved October 15, 2024 from https://www.bts.gov/content/average-cost-owning-and-operating-automobilea- assuming-15000-vehiclemiles-year.

[17] See the Transportation subsection under section II. "Expenses" in the TLC methodology for further specifics on how the annual mileage is allocated to the cost of transportation. Cornell, P., Dayoub, D., Dassen, S., Meyer, S. (2026). True Living Cost (TLC) Index Methodology. *Ludwig Institute for Shared Economic Prosperity.* Retrieved February, 2026 from https://www.lisep.org/tlc.

[18] Fleck, A. (February 17, 2025). How Often Do Americans Travel?. *Statista*. Retrieved March 21, 2025, from https://www.statista.com/chart/31152/share-of-us-respondents-who-have-taken-private-trips/.
Statista. (n.d.). Domestic Tourism in the U.S. – Statistics & Facts. Retrieved March 21, 2025, from https://www.statista.com/topics/2092/domestic-tourism-in-the-us/#topicOverview.

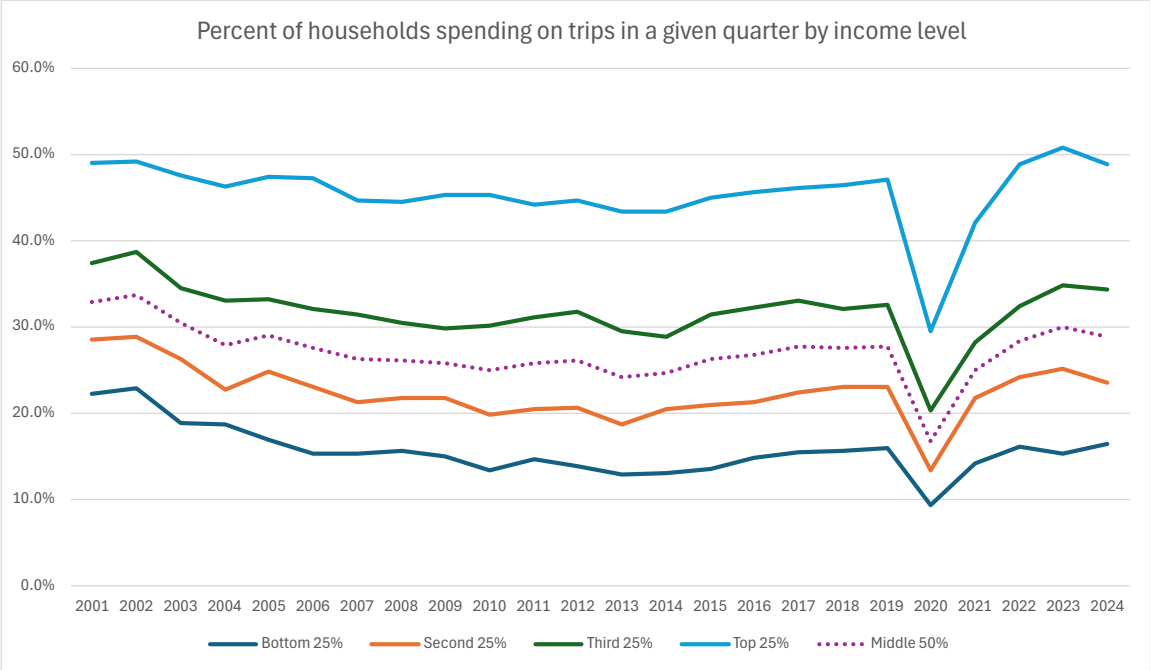

Figure 6: Percent of households spending on trips in a given quarter by income level over time

For pricing, LISEP again focused on the actual amount of money spent in the middle of the distribution rather than singling out specific items that were deemed "necessary" for the trips and attempting to price them. LISEP wants to compare these costs by the average in both the top and the bottom to see if there was any suggestion that there is a "minimal" spend for travel expenses for most Americans households.

To justify this, LISEP analyzed spending of the four income quartiles. LISEP constructs both an upper bound and a lower bound for the "minimal" expenses necessary with the lower bound being the 25th percentile and the upper bound being the 50th percentile, with the main estimate being the second income quartile average spending among households who travel. One can see in Figure 7 that the bottom 75% of the distribution is very clustered in their travel expenses, suggesting that there exists a floor for cash strapped Americans in what is a basic travel budget.

Calculation

In general, the expenses can be sorted into five categories: lodging while on the trip, transportation while on the trip, food while on the trip, recreation while on the trip, and transportation to and from the destination. The first four of these were calculated using the UCCs described in Table 3; the graphs in Figure 7 represent the simple sum of the first four expenses listed.[19] The only expense out of these five that was not calculated using UCCs is the amount spent

[19] An addition of the last expense to the other four would not change the groupings observed in the graphs above, as this is not calculated through the CE survey in the same way.

on travel to the destination. To account for this, LISEP expanded the Transportation allocation in the regular TLC to 15,000 miles of car travel per year rather than 10,000. This additional allocation served to present a minimal cost for travel on trips as well as other daily activities consistent with a Minimal Quality of Life. It also avoids the issue of subjecting the price research to the large fluctuations in pricing for other forms of travel throughout the year, such as airfares.

It's important to note that the MQL estimates the average total spending on on-trip expenses among households who travel to determine the travel budget allocation. This is a crucial distinction to computing the average spending on each category among households reporting spending on the specific category and allocating the sum of the averages. Considering spending across all categories, including no spending, among households who travel prevents unnecessarily inflating the travel budget. For example, consider that household A spends $1,000 on lodging and $300 on food during a trip and household B spends $400 on food and $200 on recreation during a day-trip trip that doesn't require lodging. The MQL would allocate $950 for the travel budget, the average of the total expenses of $1,300 and $600 respectively, rather than $1,550 if summing the average of lodging ($1,000), food ($350) and recreation ($200) among households spending in each category.

UCC	UCC Description	Category	First Year	Last Year
FINCBTAX	Total amount of family income before taxes in the last 12 months (Collected data)	Income	2001	2003
FINCBTXM	Total amount of family income before taxes in the last 12 months (Imputed or collected data)	Income	2004	2024
210210	Lodging on out-of-town trips	Lodging	2001	2024
620909	Rental of campers on out-of-town trips	Lodging	2001	2024
190903	Food on out-of-town trips	Food	2001	2024
190904	Food prepared by consumer unit on out-of-town trips	Food	2001	2024
470113	Gasoline on out-of-town trips	On-Trip Transportation	2001	2024

470212	Motor oil on out-of-town trips	On-Trip Transportation	2001	2024
520512	Auto rental, out-of-town trips	On-Trip Transportation	2001	2013
520517	Auto/truck rental, out-of-town trips	On-Trip Transportation	2014	2024
520522	Truck rental, out-of-town trips	On-Trip Transportation	2001	2013
520532	Parking fees, out-of-town trips	On-Trip Transportation	2001	2024
520542	Tolls on out-of-town trips	On-Trip Transportation	2001	2024
530312	Local trans. on out-of-town trips	On-Trip Transportation	2001	2024
530411	Taxi fares and limousine services on trips	On-Trip Transportation	2001	2024
610900	Recreation expenses, out-of-town trips	Recreation	2001	2024
620122	Participant sports, out-of-town trips	Recreation	2001	2024
620222	Admission to sports events, out-of-town trips	Recreation	2001	2024
620212	Movie, other admissions, out-of-town trips	Recreation	2001	2024

Table 3: Universal Classification Codes used for Travel calculation

The treatment of the Interview data for this computation is slightly different than the treatment of the Diary data. First, we adjust the population weights to correct for calendar year overlap as described in the CE Getting Started Guide. Households are interviewed on spending from the prior three months in a rolling fashion, so hypothetical Household A interviewed in March of 2005 is only relevant for two-thirds of the 2005 Quarter 1 sample (expenditures occurring in January and February of 2005) and relevant for one-third of the 2004 Quarter 4 sample (expenditures occurring in December 2004). Failing to adjust for this would result in too-large population denominators being applied to the spending average. To avoid artificially deflating the average, we follow the CE's instructions and reassign each household h's weight based on the numbers of months in a given calendar year that the household expenses are in scope $MOSCOPE_h$:

$$popweight_h = \left[\frac{(FINLWT21_h)}{4} \times \frac{MOSCOPE_h}{3}\right]$$

It should be noted that the CE's average expenditure equation uses $FINLWT21_h$ in its numerator; this is because the dollar amount of the expenditure does not change due to the time of year, only the household's impact on the population.

Beginning with each household's quarterly spending on all on-trip travel categories, we apply the CE formula for average expenditures by household size and income group.

Specifically, let $H_t^{hsize,IG}$ represent all households of specific size and income group within that household size in calendar year t who spent a nonzero amount on on-trip travel expenses $X_{h,t}$ [20] The ratio between FINLWT21 and popweight properly rescales the quarterly totals to produce a full calendar year average estimate: `

$$Average(X_t)^{hsize,IG} = \frac{\Sigma_{h \in H_t^{hsize,IG}}\left(X_{h,t} \times FINLWT21_{h,t}\right)}{\Sigma_{h \in H_t^{hsize,IG}}\left(popweight_{h,t}\right)}$$

Then, the total budget is calculated as the average spending on all categories for the second quartile, income group 2, among households spending on travel:

$$Travel\ Allocation_{f,t} = Average(X_t)^{hsize(f),IG=2}$$

[20] It's important to note that only expenses incurred in the calendar year are considered. For example, consider household A in the example above that is interviewed in March 2005 and assume that it reports spending on travel in each of the three previous months. If estimating travel costs for the calendar year 2005, $X_{h=A,,2005}$only includes the expenses incurred in January and February 2005 while $X_{h=A,,2004}$ would include the expenses incurred in December 2004.

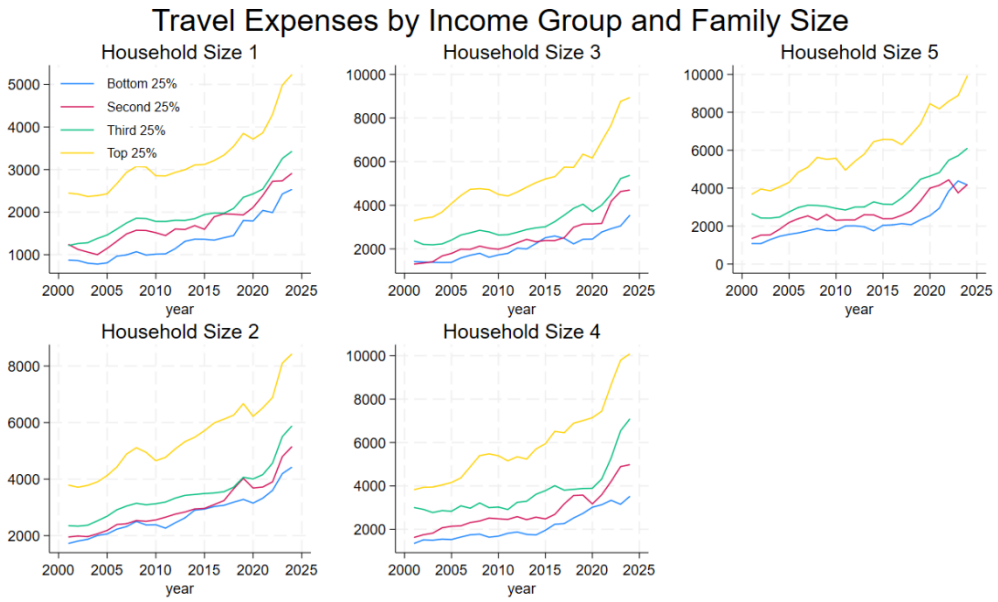

Figure 7: Total travel expenses by income and household size (three-year moving average)

Figure 7 shows that there is a large clustering for amount spent on out-of-town trips in the bottom ¾ of the income distribution. But, this also largely holds true for each specific type of spending in the allocated output of the CE Survey. The appendix includes the different elements of the travel budget by the income groups of interest.

In the final calculation, shown in Figure 8, LISEP takes the three-year moving average of the total travel costs by family size in order to clarify the overall trends.

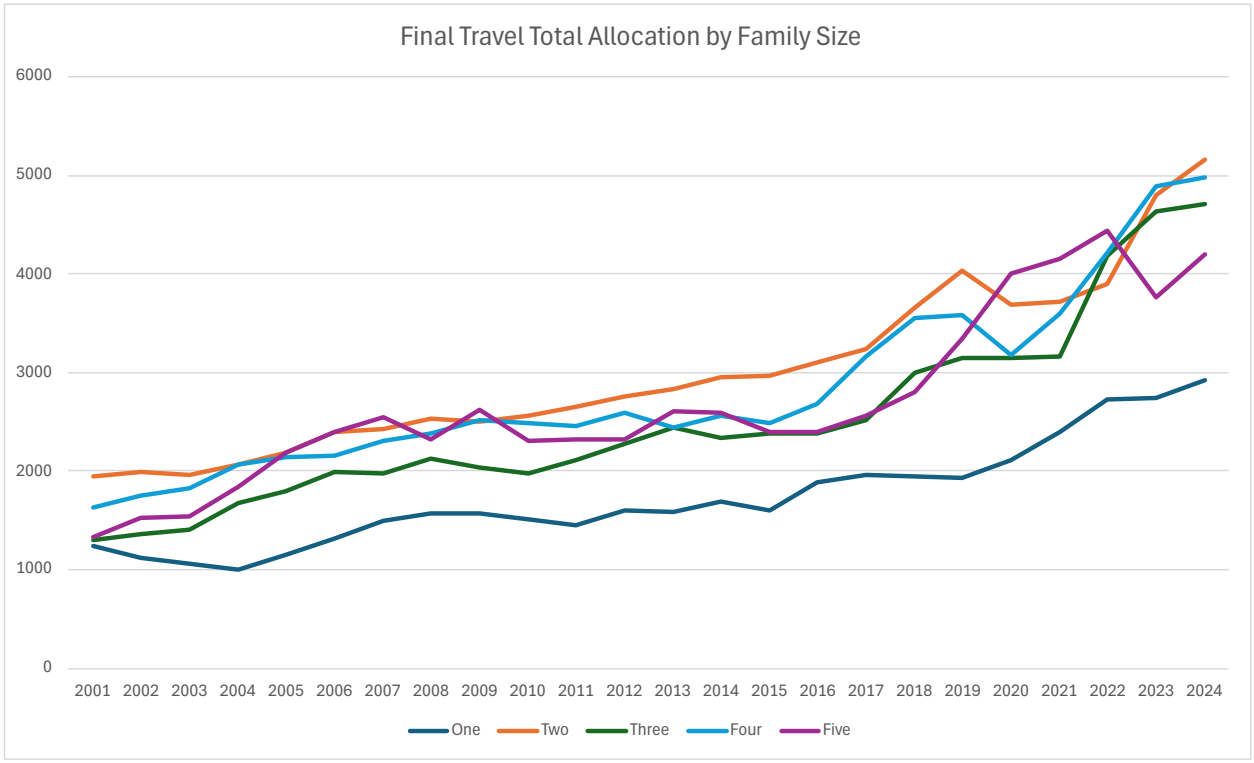

Figure 8: Final allocation for travel by family size

Appendix

A - On Trip Food Expenses by Household Size

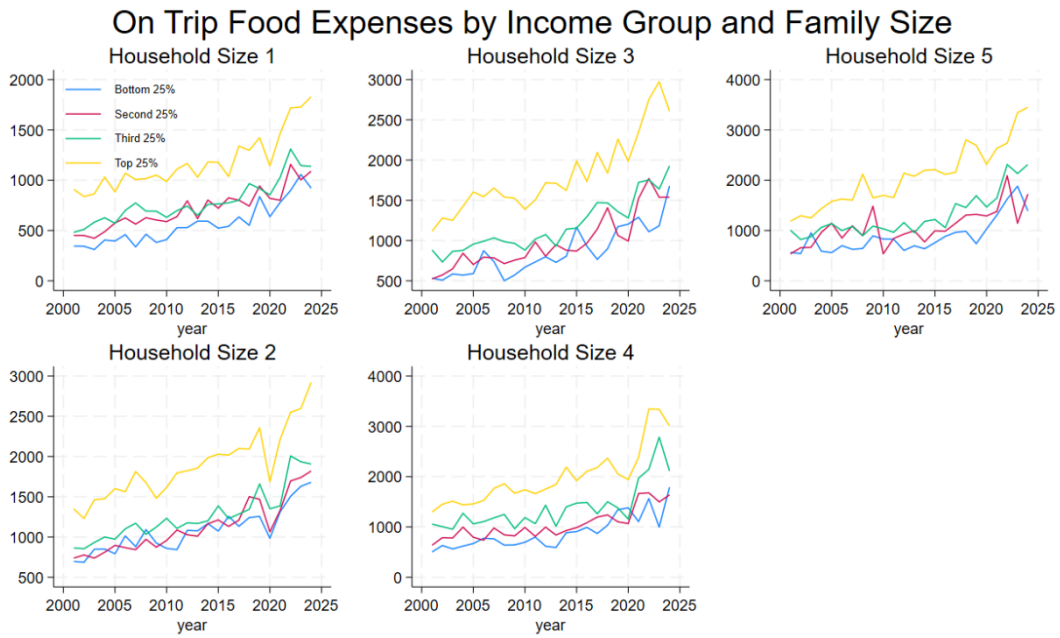

Figure 9: On trip food costs by income quartile and household size

B - On Trip Transportation Spending by Household Size

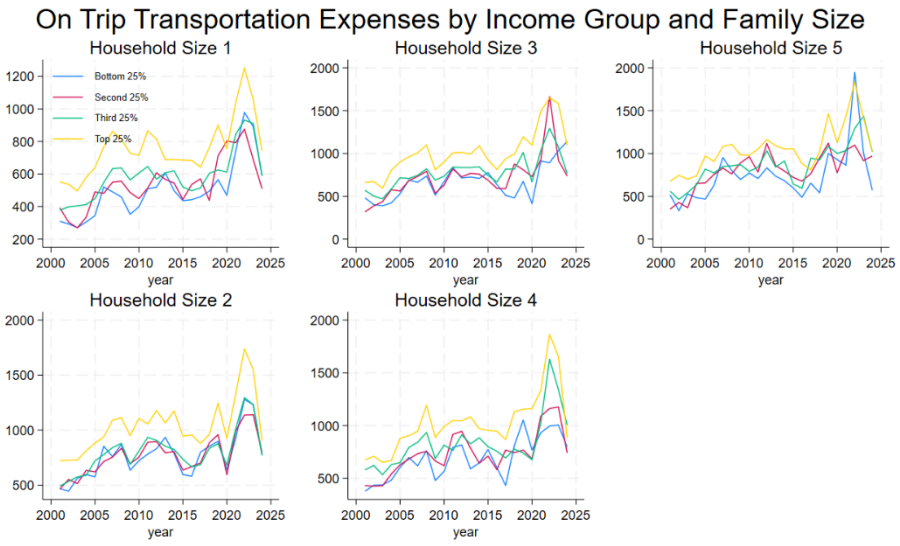

Figure 10: On trip transportation costs by income quartile and household size

C – On Trip Recreation Spending by Household Size

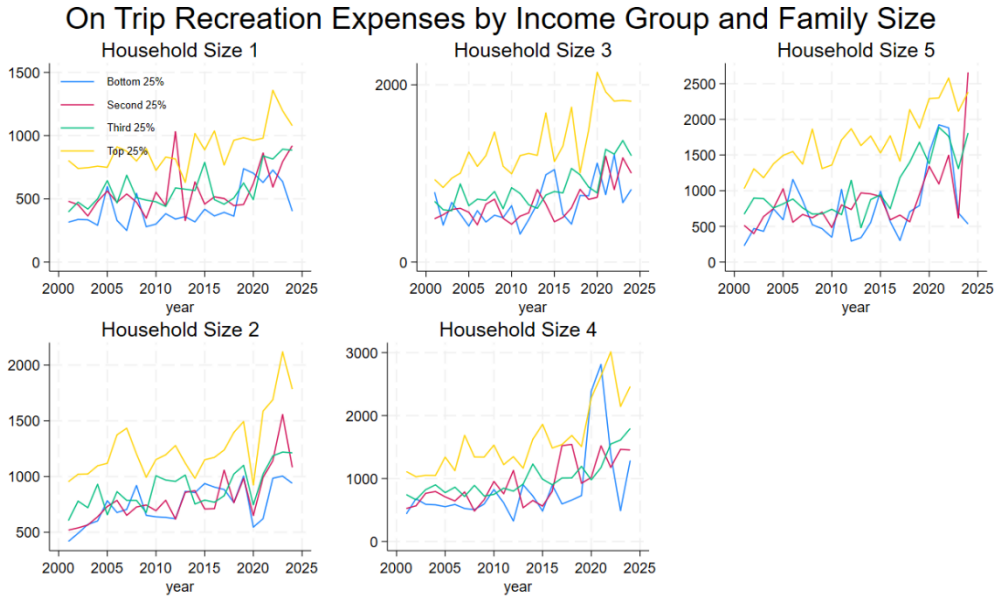

Figure 11: On trip recreation costs by income quartile and household size

D - Lodging Expenses By Household Size

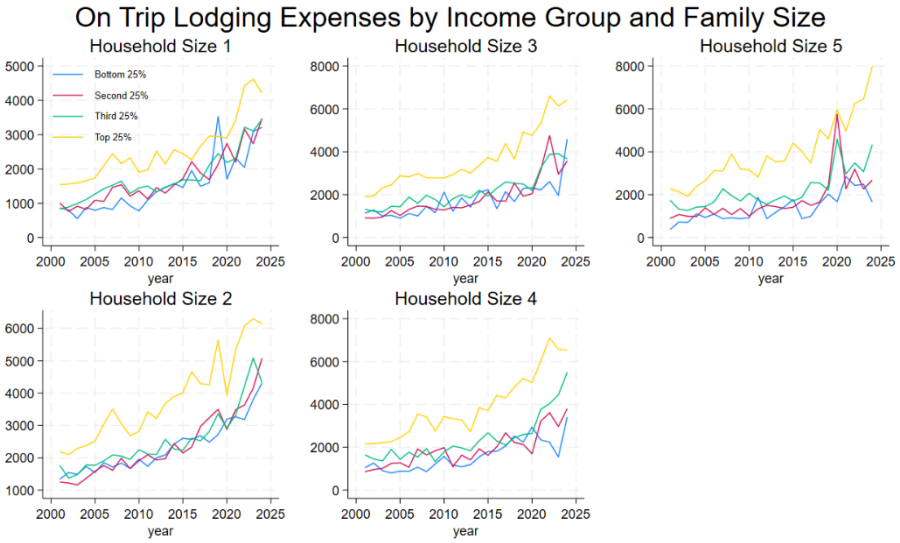

Figure 12: On trip lodging costs by income quartile and household size

Television Subscription

Rationale

Watching TV is an immensely popular activity for Americans, providing an opportunity to destress and connect with others. The American Time Use Survey (ATUS) offers consistent evidence that TV has been widely popular among American adults for the past two decades: on an average day, 79% of American adults watch TV; those who watch TV have an average daily viewing time of about 3.5 hours.[21] [22] The rationale for including TV subscriptions in the MQL remains the same as in the previous iteration, but LISEP has update its method to better reflect the quality and availability of alternatives available to LMI Americans. For more details on the changes, see Appendix C.

New Approach

Television content is a competitive market that has seen tremendous technological advancement over the past two decades. LISEP's task has been to track the price of a reasonable selection of television programs that are both available and desirable to a substantial number of American households to maintain a standard of living consistent with minimal quality of life over time. There are two principles LISEP considers when pricing the minimally adequate level of TV access over time:

1) *Variety*: The MQL should guarantee the audience access to a robust source of news, live sports, and non-sports TV shows.
2) *Cost efficiency*: When a new development in the TV market offers a substantially lower cost alternative to the current set of the selected products without sacrificing content significantly, the selection of products should reflect the availability of the cheaper option.

Both criteria are subjective, and the resulting content selection is not universally representative of every American's media consumption preferences. Nonetheless, LISEP believes the MQL captures a reasonable progression of purchasing decisions for a typical, albeit budget conscious, American television consumer.

The products available to help meet this need, satisfying both variety and efficiency, have substantially changed over time. LISEP tracks representative products from two broad families of goods. Multichannel Video Programming Distributors, including cable and satellite TV, were the popular established television providers during the earlier years in the sample. A strong, if more expensive, player throughout the advent of streaming, cable gradually lost market share to satellite

[21] Bureau of Labor Statistics. (2024). *American Time Use Survey*: "Percent participating on an avg day – Watching TV", Series ID TUU30105AA01014236. Retrieved on 05/10/2024 from https://www.bls.gov/tus/database.htm.
[22] Bureau of Labor Statistics. (2024). *American Time Use Survey*: "Avg hrs per day for participants - Watching TV", Series ID TUU20101AA01014236. Retrieved on 05/10/2024 from https://www.bls.gov/tus/database.htm.

and telephone TV between 2001 and 2015 (Figure 14 in Appendix A).[23] Subscription Video On Demand (SVOD) services, more commonly known as streaming services, gained market share throughout the period.[24] LISEP considers SVODs fully competitive with cable after the addition of a major live sports streaming service, ESPN Plus, in 2018. For pre-recorded content, LISEP tracks the cost of Netflix and Amazon Prime subscriptions given their popularity.[25]

LISEP identified five television products[26] as both widespread and minimal enough to include in the MQL's Television Subscription component:

- Cable (Expanded Basic Service) monthly subscription
- Satellite Television (DBS) monthly subscription
- Netflix annual subscription
- Amazon Prime annual subscription
- ESPN Plus annual subscription

The following timeline was established for each product:

Time period	**Products that are both widespread and minimally adequate during time period**
2001-2005	Cable only
2006-2017	Cable or satellite
2018 onward	ESPN Plus, with either Netflix or Amazon Prime

Table 4: Timeline for MQL TV Subscription allocation

Although streaming services were widespread in the years before 2018, Netflix and Amazon, which specialize in pre-recorded content rather than sports or news, alone do not satisfy the "variety" requirement – a conclusion supported by the market data. The data shows high, albeit falling, retention of cable from 2015 onward[27] even with high adoption rates of Netflix and Amazon, suggesting that Amazon and Netflix by themselves were not adequate substitutes for these two types of programs.

[23] Federal Communications Commission (n.d.) Video Competition Reports. Retrieved from https://www.fcc.gov/reportsresearch/reports/video-competition-reports.
[24] 83% of U.S. Households Have an SVOD Service. (2023, August 9). Leichtman Research Group. Retrieved February 21, 2024, from https://leichtmanresearch.com/83-of-u-s-households-have-an-svod-service/.
[25] JustWatch. (2023, July 6). JustWatch: Prime Video edges Netflix in Q2 U.S. market share. *MediaPlayNews*. Retrieved May 15, 2024, from https://www.statista.com/statistics/496011/usa-svod-to-tv-streaming-usage/.
[26] LISEP does not track prices for telephone TV since cable and satellite TV together hold a more substantial market share (Figure 7).
[27] Rainie, Lee. (March 17, 2021). Cable and satellite TV use has dropped dramatically in the U.S. since 2015. Pew Research Center. Retrieved February 21, 2024, from https://pewrsr.ch/3vAc7Yz.

Data

Data for cable and satellite prices are taken from the Federal Communications Commission (FCC)'s *Cable Industry Prices Reports*, which reports the results of the FCC's own survey of cable operators combined with the results of other public data.[28] LISEP tracks the price of a monthly subscription to Expanded Basic Service Cable and to a DBS satellite subscription for the applicable years. The FCC reports have the advantage of being a national survey, consistently collected over the period of interest, with an eye towards pricing of products that are available and intended to be substitutable in the eyes of consumers.

Data on the annual number of Cable and Satellite subscribers comes from the FCC's *Annual Assessment of the Status of Competition in the Market for the Delivery of Video Programming*. The reporting frequency changes substantially over time, as does the structure and web location of the report. For years without reports between 2006 and 2015 (the year of the last available report), market shares are linearly interpolated. For 2016 and 2017, the 2015 market share estimate is used to prevent "overshooting" what appeared to be a softening trend, and because the transition to streaming occurs in 2018, which lessens the consequences of conservatively assuming a constant market share. The section appendix includes the table number taken from the report along with the last effective URL found by LISEP's team at the time of publication.

Data for Netflix, Amazon Prime, and ESPN Plus prices are manually compiled by LISEP from a combination of current pricing listed on official websites as well as historical pricing reported in news articles announcing price changes (Table 7 in Appendix B). When possible, LISEP chooses the minimal cost plan unless it includes advertisements, which streamers have started to roll out recently as lower-price ad-supported plans. Streaming service price hikes are not always consistently timed. ESPN Plus, in particular, has announced at least two price hikes mid-year. To select an annual price, it is assumed that a customer begins their subscription in April of each year.

Calculation

The next question is how to reasonably determine the price given the market penetration at each point in time. In the first period (2001-2005), LISEP does not consider market penetration. In the second period (2006-2017), the optimal choice of cable or satellite frequently comes down to geographic area, so LISEP uses a market-share weighted average of the two prices to reflect the *typical price* that a substantial portion of potential consumers are constrained to pay. By contrast, in the third period (2018 onwards), consumers have more freedom in choosing between Netflix and Amazon Prime, so the average is weighted evenly.

In the notation below, in year *t*:

[28] Federal Communications Commission. (n.d.). Cable Industry Prices Reports. Retrieved from https://www.fcc.gov/reports-research/reports/cable-industry-prices-reports.

- $p_{cable,t}$ and $p_{DBS,t}$ are the respective prices of a monthly subscription of Cable and Satellite television,
- $p_{Netflix,t}$, $p_{Amazon,t}$, and $p_{ESPN\ Plus,t}$ are the respective prices of an annual subscription to Netflix, Amazon Prime, and ESPN Plus
- $n_{cable,t}$ and $n_{DBS,t}$ are the respective annual numbers of Cable and Satellite subscribers
- $m_{cable,t}$ refers to the market share of Cable subscriptions, calculated as $\frac{n_{cable,t}}{n_{cable,t}+n_{DBS,t}}$. The market share of Satellite subscriptions is $m_{DBS,t} = 1 - m_{cable,t}$

Years	Price of TV Content
2001-2005	$12 \times p_{cable,t}$
2006-2017	$m_{cable,t} \times (12 \times p_{cable,t}) + (m_{DBS,t}) \times (12 \times p_{DBS,t})$
2018 onward	$\left(\frac{p_{Netflix,t} + p_{Amazon,t}}{2}\right) + p_{ESPN\ Plus,t}$

Table 5: Formulas for pricing TV Subscriptions in MQL

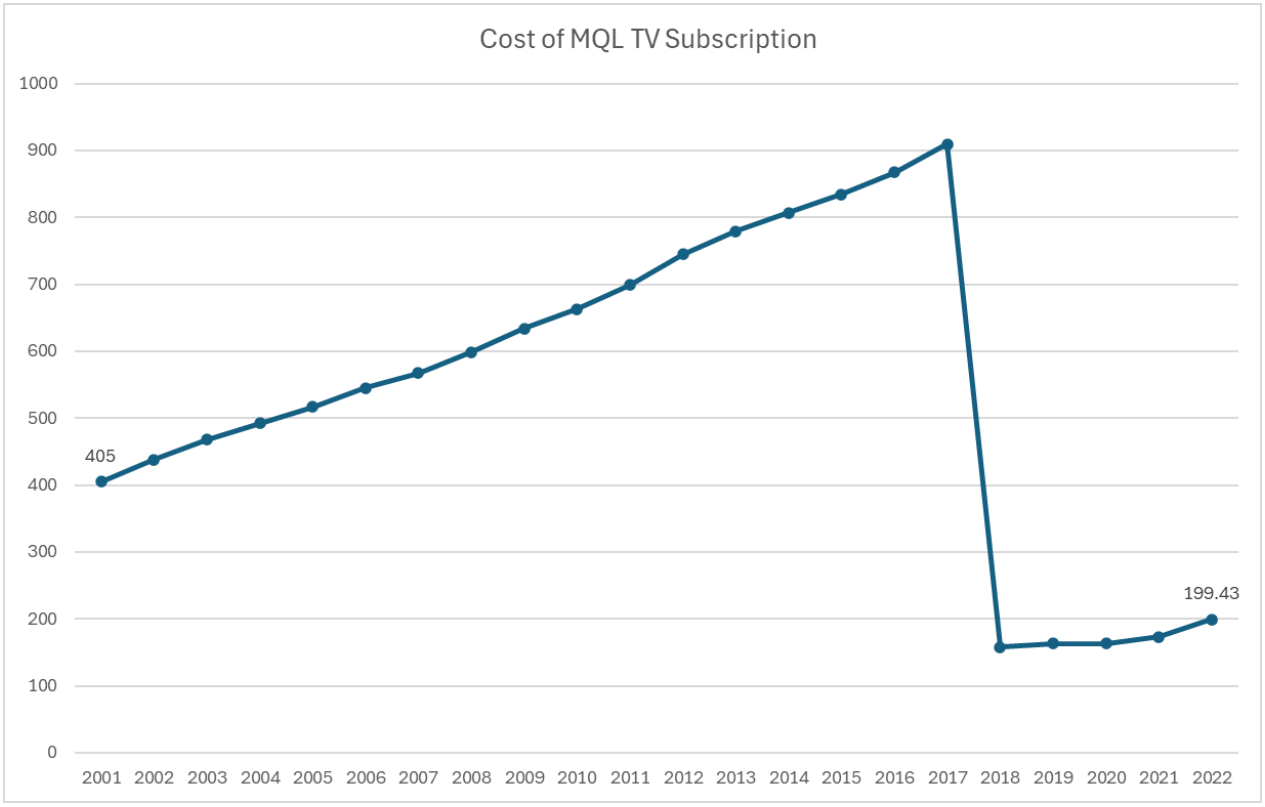

Figure 13: Cost of MQL TV Subscription

Appendix

A - Data for Cable DBS Competition

Cable-DBS Competition: Directory for Annual Assessment of the Status of Competition in the Market for the Delivery of Video Programming Reports

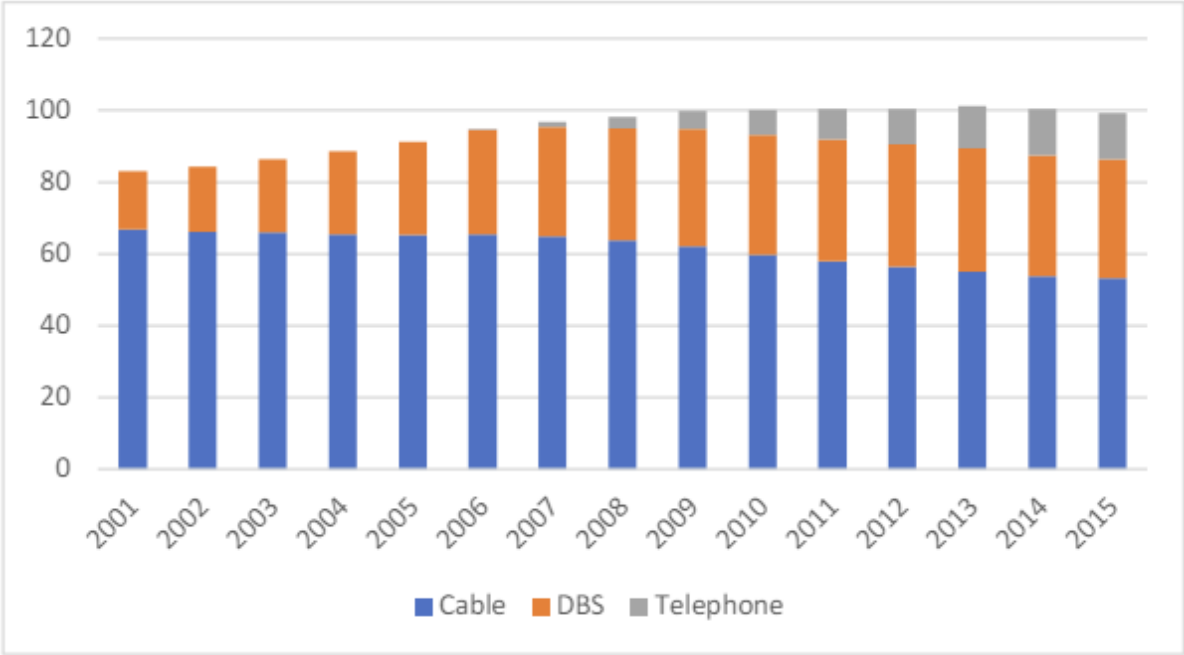

Figure 14: Number of Pay TV Subscribers (million) 2001-2015

For the reader's convenience, URLs (working as of the time of writing) are reported as the FCC's reports are not in a consistent database. The table in which the quantities of interest are reported shift considerably across the reports and it is likely they will shift again in future. When two tables report a different price for the same year, the value in the most recent report is used.

Years	**URL**	**Table Title**
2000-2002	https://docs.fcc.gov/public/attachments/FCC-04-5A1.pdf	Table 1: Cable Television Industry Growth: 1994-June 2003 (in millions)
2003-2005	https://docs.fcc.gov/public/attachments/FCC-07-206A1.pdf	Table 1: Cable Television Industry Growth: 2003-June 2006 (in millions)
2006-2010	https://docs.fcc.gov/public/attachments/FCC-12-81A1.pdf	Table 5: MVPD Video Subscribers (in millions)
2011	https://docs.fcc.gov/public/attachments/FCC-13-99A1.pdf	Table 7: MVPD Video Subscribers (in millions)
2012-2013	https://docs.fcc.gov/public/attachments/FCC-15-41A1.pdf	Table 7: MVPD Video Subscribers (in millions)
2013-2014	https://docs.fcc.gov/public/attachments/DA-16-510A1.pdf	Table III.A.5 MVPD Video Subscribers (in millions)
2014-2015	https://docs.fcc.gov/public/attachments/DA-17-71A1.pdf	Table III.A.5 MVPD Video Subscribers (in thousands)

Table 6: FCC Video Competition Reports

Source: Video Competition Reports. (n.d.). Federal Communications Commission. https://www.fcc.gov/reportsresearch/reports/video-competition-reports.

B - Data for Streaming Subscription Costs

Below are the recorded price changes over time as reported by LISEP. Sources are generally news publications reporting price increases.

Note: for ESPN Plus prices, LISEP found articles reporting the $69.99 to $99.99 increase and subsequent articles reporting a new price of $109.99, but no articles reporting that the price immediately before $109.99 was $99.99. LISEP assumes that this is the true price jump.

Streaming Service	URL	Author Publisher Date	Title
Netflix	https://www.theverge.com/2022/1/14/22884263/netflix-price-increases-2021-us-canada-all-plans-hd-4k	Jacob Kastrenakes The Verge 1/14/2022	Netflix raises prices on all plans in US
Amazon Prime	https://money.cnn.com/2018/04/28/technology/amazon-prime-timeline/index.html	Kaya Yurieff CNN Business 4/28/2018	Everything Amazon has added to Prime over the years
	https://www.npr.org/2022/02/03/1077088524/amazon-raises-price-of-annual-prime-membership-to-139#:~:text=For%20new%20members%2C%20the%20price,globally%2C%20Amazon%20said%20last%20April.	Alina Selyukh National Public Radio 2/3/2022	Amazon raises price of annual Prime membership to $139
ESPN Plus	https://www.theverge.com/2018/4/2/17188752/espn-plus-launching-april-12th-pricing-features-content	Chris Welch The Verge 4/2/2018	ESPN+ will launch on April 12th for $4.99 per month
	https://www.theverge.com/2020/12/30/22207151/espn-plus-annual-	Ian Carlos Campbell The Verge 12/30/2020	ESPN Plus is raising its annual subscription price to $59.99 in 2021

	subscription-price-hike-disney-ufc		
	https://variety.com/2021/tv/news/espn-plus-cost-increases-1235017870/	Brian Steinberg Variety 7/12/2021	Disney Plans to Raise ESPN Plus' Monthly and Annual Subscription Costs
	ESPN+ Monthly Subscription to Rise $3 as Disney Strives for Streaming Profits	Brian Steinberg Variety 7/15/2022	ESPN+ Monthly Subscription to Rise $3 as Disney Strives for Streaming Profits
	Disney+, Hulu, ESPN+ price increases coming this fall	Fred Topel UPI 8/9/2023	Disney+, Hulu, ESPN+ price increases coming this fall
	ESPN Plus Price Increase 2023: Why & When Is It Raising Prices?)	Mack Ashworth Comingsoon.net 8/10/2023	ESPN Plus Price Increase 2023: Why & When Is It Raising Prices?

Table 7: Streaming Subscription Costs Data Sources

C - Previous Methodology and Reasons for Adjustment

The previous method used the data described in the "Data" section, excluding ESPN Plus and incorporating $m_{SVOD,t}$, year t's proportion of households with either a Netflix or Amazon subscription as measured by Leichtman Research Group. It combined them with the following calculation:

- From 2001-2005, track only the annualized cost of a monthly cable subscription
- From 2006-2012, track the unweighted average of the annualized costs of a monthly cable and DBS subscription
- From 2013 onward, assign the market share of streaming services ($m_{SVOD,t}$) the unweighted average of the annual cost of Netflix and Amazon Prime, and the remainder of the market the unweighted average cost of an annualized monthly cable and DBS subscription.

This method makes three main changes:

- Delays the switch to streaming services until ESPN Plus is released (2018), which LISEP considers necessary to access to live sports via streaming. In 2018, LISEP assumes that the

consumer completely switches away from cable and satellite entirely for the purpose of saving money from 2018 onward.

- Computes a weighted average of cable and satellite prices when estimating the typical price for the markets combining cable and satellite. This reflects that availability of cable and satellite frequently depends more on geography than consumer preferences.
- Abandons the use of the Leichtman streaming services market share estimate in the actual calculation, as Netflix or Amazon Prime by themselves are not considered a suitable alternative for cable or satellite since they did not offer sports content at the time. Additionally, the publicly available press releases reporting the data are not well-maintained.

The previous method used the same data as above, excluding ESPN Plus and incorporating , year *t*'s proportion of households with either a Netflix or Amazon subscription as measured by Leichtman Research Group. It combined them with the following calculation:

Time period	**Products under old method**	**Price under old method**
2001-2005	Cable only	$12 \times p_{cable,t}$
2006-2012	Cable or satellite	$\frac{1}{2}\left(12 \times p_{cable,t} + 12 \times p_{DBS,t}\right)$
2013 onward	Cable, satellite, Netflix, Amazon Prime	$m_{SVOD,t} \times \frac{1}{2}\left(p_{Netflix,t} + p_{Amazon,t}\right) + \left(1 - m_{SVOD,t}\right) \times \frac{1}{2}\left(12 \times p_{cable,t} + 12 \times p_{DBS,t}\right)$

Table 8: TV Subscriptions pricing under previous MQL method

Physical Television

Rationale

LISEP includes physical televisions to the MQL as a medium to watch cable and streaming. This addition is a correction of an impossible scenario where cable or streaming are allocated without any vehicle in which to watch TV. In making the following basket selection, LISEP assumes that consumers must upgrade their technology whenever the existing model becomes obsolete relative to the mechanisms for accessing television content and the maintenance services offered.

In general, families do not need to purchase a new TV every year, but they always face the risk that their current television will break and will need to be replaced. Therefore, LISEP allocates the expected cost of replacing a television with an affordable model in that year based on the lifespan of that television. For example, earlier models of televisions tended to last about 15 years. Assuming linear depreciation and assuming that families purchased their existing televisions randomly and uniformly during the previous time period, about 1 in 15 families will, on average, need to replace their televisions in a given year. For families that do not need replacement televisions, LISEP assumes that it is reasonable to set aside as savings about a fifteenth of the current cost of a television to offset the cost of future replacements.[29]

Approach

Market Description

The typical television found in American homes has changed significantly in the past 22 years. Selecting which television's price to track is a non-obvious decision for a few reasons. First, unlike the market for television content, which is naturally monopolistic and therefore dominated by a few key players, the market for physical televisions is highly competitive and offers many varied products. Second, technology and expectations have evolved substantially: over time, not only did cheaper televisions become less ubiquitous and desirable, but it also became more difficult to find technical support for them.

The first change is the type of television and its technological capability: from cathode-ray tube (CRT) to liquid crystal display (LCD) to a Smart TV (commonly built on LCD technology). At the beginning of the millennium, CRTs dominated the market. Thus, for the first 7 years, 2001-2007, LISEP allocates a CRT, and then in 2008 the MQL switches to an LCD television as those overtook CRTs in market popularity.[30] As cable became much more expensive than streaming services, it

[29] This is a slight underestimation of the eventual cost they would need to pay, LISEP considers it a reasonable approximation.

[30] Duncan, G. (2009, February 18). Flat panel TV sales dropped in Q4 2008. *Digital Trends*. Retrieved from www.digitaltrends.com/home-theater/flat-panel-tv-sales-dropped-in-q4-2008/.

became necessary for the TV to be able to connect with the internet to access the streaming services that the MQL prescribes for cost efficiency. Thus, LISEP switches from a simple LCD to one able to connect to the internet (Smart TV) in 2018.

The second change is the size of the television and applies only to later years. CRT technology limits the size of the screen, so the screen size remains steady during the first 7 years of the estimate. By contrast, the average screen size of an LCD TV increased from a 26 inch screen diagonal to a 50 inch screen diagonal during this time period.[31] Again, this applies only to LCDs, which were less popular than the CRT from 2001-2007.

Product Selection

Based on the above, LISEP uses the following timeline for our product allocation:

- 2001-2007: CRT (27-inch screen, the average in the US)[32] [33] [34]
- 2008-2017: LCD (screen size in range 30-40" as US average in 2008 was 36")
- 2018 onward: Smart TV

Data

As publicly available price data is not easy to source, the price estimation strategy is to identify representative goods at key points in the MQL timeline and use a sensible interpolation strategy to estimate prices in the intervening years. LISEP uses the Internet Archive to find these prices retrospectively.[35]

LISEP selected the budget-friendly "Sharp" brand TV for 2001, 2008 and 2018 – the three years in which different models are introduced. Although undoubtedly there were more options, televisions are a competitive market, and so sticking to one brand throughout the time period gives us confidence that this brand (a low cost brand available at Best Buy) would effectively represent the price change shown to typical consumers.

[31] Laricchia, F. (2022, February 10). LCD TV: Average screen size U.S. 1997-2022. *Statista*. Retrieved from https://www.statista.com/statistics/961283/united-states-average-tv-screen-size/.
[32] Katzmaier, D. (2020, July 26). Remember when TVs weighed 200 pounds? A look back at TV trends over the years. *CNET*. Retrieved from https://www.cnet.com/tech/home-entertainment/remember-when-tvs-weighed-200-pounds-a-look-back-at-tv-trends-over-the-years/.
[33] Muroki, D. (2023, October 6). The 7 best reasons to avoid a CRT (Cathode Ray Tube) TV today. *History*. Retrieved from history-computer.com/the-best-reasons-to-avoid-a-crt-cathode-ray-tube-tv-today/
[34] The evidence that 27 inches was the average size is mainly gleaned from the internet archive listings of the CRT televisions available at the time. That said, there is ample evidence in the above two sources that support this claim is in the very least approaching accuracy. The more important assumption is that the size of the CRT did not change drastically. This is also supported by the above sources, as expanding the size of CRT televisions becomes physically unwieldy, unprofitable for the manufacturer, and also reduces the quality of the image.
[35] Internet Archive Wayback Machine. https://web.archive.org/.

- For 2001, LISEP uses the price of a "Sharp 27-inch Stereo TC with Picture-in-Picture 27NS300". This was the cheapest 27-inch Sharp TV (among the cheapest of that size available on Best Buy's website in August 2001)[36], priced at $289.50.
- For 2008, LISEP uses the price of a "Sharp 32-inch 720 p Flat Panel LCD HDTV"[37], priced at $647.99. That was the cheapest option for Sharp LCDs in our acceptable size range. It also happened to be the 7th cheapest option (out of 42 TVs) out of all brands.
- For 2018, LISEP uses the price of a Sharp – "43" Class (42.6" Diag.) - LED - 1080p - Smart - HDTV Roku TV - Black" [38] which is the cheapest Sharp brand (and cheapest overall) during the time on the Best Buy site.

For all three peg prices, LISEP records prices during the month of August to avoid catching any specific deals for holidays or new model releases which would fluctuate prices. LISEP uses August 2001, August 2008 and then August 2018. [39]

The interpolation strategy uses the CPI for televisions, with ELI RA01, with corresponding BLS Handbook description "All non-portable, electronic video displays with television tuners. Televisions with built-in DVD or other media players are included. Televisions included in component systems are eligible as long as there is an individual price for the TV. Televisions including separate speakers or stands are also included." [40]

Calculation

In summary, the cost of a television is the expected cost of needing to replace a television with a model at the CPI-adjusted (adjusting via price per square inch) price of a TV with appropriate technology for the period. To calculate the square inch size, LISEP uses the 4:3 aspect ratio for CRTs and the 16:9 aspect ratio for the LCD and SmartTV, which are the respective standards.[41] According

[36] Internet Archive Wayback Machine. Retrieved March 29, 2024, from https://web.archive.org/web/20010811143843/http://www.bestbuy.com/HomeAudioVideo/Televisions/MidsizeTVs2129.asp?m=1&cat=24&scat=27.

[37] Internet Archive Wayback Machine. Retrieved March 29, 2024, from https://web.archive.org/web/20080912182824/http://www.bestbuy.com/site/olspage.jsp?st=processingtime%3A%3E1900-01-01&qp=crootcategoryid%23%23-1%23%23-1~~q70726f63657373696e6774696d653a3e313930302d30312d3031~~cabcat0100000%23%230%23%23wv~~cabcat0101000%23%230%23%236e~~nf330%7C%7C33302671756f743b202d2033392671756f743b&usc=abcat0100000&nrp=15&type=page&sp=%2Bcurrentprice+skuid&sc=TVVideoSP&id=pcat17080.

[38] Internet Archive Wayback Machine. Retrieved March 29, 2024, from Sharp 43" Class 42.6" Diag. LED 1080p Smart HDTV Roku TV Black LC-43LB371U - Best Buy (archive.org).

[39] Babcock, A. (2021, April 19). When to Buy a TV. *RTINGS.com*. Retrieved from www.rtings.com/tv/learn/when-to-buy.

[40] U.S. Bureau of Labor Statistics. (2023). CPI Handbook of Methods Appendix 2: Content of CPI Entry Level Items." Retrieved February 14, 2024, from www.bls.gov/cpi/additional-resources/entry-level-item-descriptions.htm

[41] Berger, J. (n.d.). A brief history of the widescreen format. *Widescreen.org*. Retrieved March 29, 2024, from www.widescreen.org/widescreen_history.shtml.

to research, the lifespan of a CRT is more than double the lifespan of a LCD TV, 15 years to 6 years.[42] LISEP allocates 1/15th of the TV cost from 2001 to 2007 and 1/6 of the TV cost from 2007-2022.

CPI Adjustment

Using the CPI for Televisions between the peg years, LISEP adjusts specifically the cost per square inch of television. Given the absence of better price data, LISEP uses the CPI ELI for televisions to track the change in price per square inch of each television set, changing total square inch size to match the consumer average in the US.

The CPI price change method for a specific television type is validated with the Desroches and Ganeshalingam paper which says that for a similar product, the price change of a television (both CLT and LCD respectively) when holding the major features constant (size and capabilities) declined about 17% per year from 2001 to 2014.[43] This closely aligns with the CPI change.

The calculation is detailed below. It refers to the CPI for Televisions as *RA01* to not confuse this CPI with the CPI overall. Let a television be characterized by the pegged year listed screen size *V*, aspect ratio *x:y*, and the peg price *m*. Thus, the price per square inch of the screen (ν) would be:

$$\nu_p = \frac{m_p}{\sqrt{((V_p{}^2/(x_p{}^2 + y_p{}^2)) * x_p{}^2)} \times \sqrt{((V_p{}^2/(x_p{}^2 + y_p{}^2)) * y_p{}^2)}}$$

Where each term in the denominator uses the hypotenuse of the right triangle created by the length and width and diagonal (*V*) of the TV to solve for each the length (*x*) and the width (y*)* of the television in peg year *p* (for the peg years of 2001, 2008 and 2018). The length and width are determined by the aspect ratios 4:3 for CRTs and 16:9 for LCDs and Smart TVs.

For years after the peg price (until the next peg), LISEP would compute the price per square inch η_t in year *t* to be:

$$\eta_t = \nu_p * {RA01_t}/{RA01_p}$$

Note that the price per square inch η_t is equal to ν_p when *t* = *p*, i.e. when *t* corresponds to one of the peg years.

[42] Kalmykova, Y., Patrício, J., Rosado, L., & Berg, P. (2015). Out with the old, out with the new – The effect of transitions in TVs and monitors technology on consumption and WEEE generation in Sweden 1996–2014. *Waste Management, 29*, 10.1016/j.wasman.2015.08.034.

[43] Desroches, L.-B., & Ganeshalingam, M. (2015). The dynamics of incremental costs of efficient television display technologies. *Technological Forecasting and Social Change, Volume 90.* (Part B), 562-574. ISSN 0040-1625, https://doi.org/10.1016/j.techfore.2014.02.016.

LISEP can determine the allocated screen size *Z*. The screen size for CRTs does not change from 2001 to 2007, and for 2008-2022 LISEP bases its estimate from the average LCD screen size data. Thus, the allocated screen size in square inches each year is Z_t:

$$Z_t = \sqrt{((\mathrm{V}_t{}^2/(x_t{}^2 + y_t{}^2)) * x_t{}^2)} \times \sqrt{((\mathrm{V}_t{}^2/(x_t{}^2 + y_t{}^2)) * y_t{}^2)}$$

$$Z_t = x_t \times y_t$$

Finally to account for the lifespan of a TV, the final allocated cost C_t is:

$$C_t = \eta_t \times Z_t \,/15$$

when *t = 2001-2007*

and

$$C_t = \eta_t \times Z_t/6$$

when *t = 2008-2022*

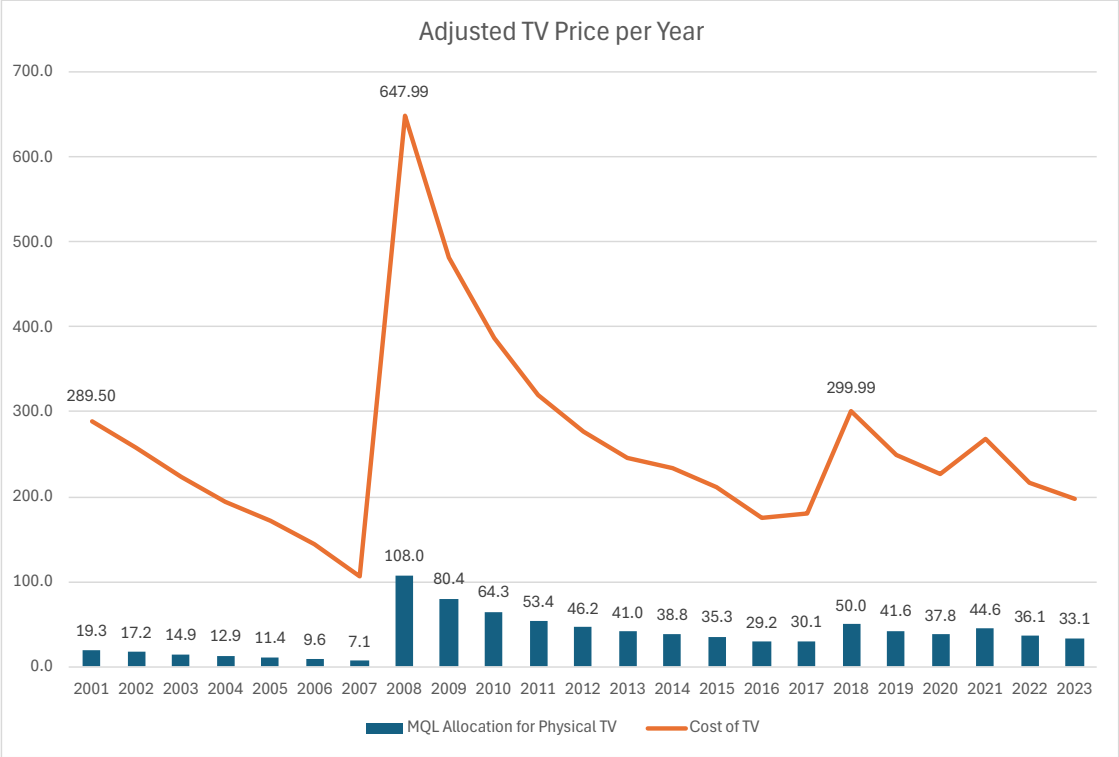

Figure 15: Adjusted TV price per year

Weekend Leisure Activities

Rationale

Since sports and entertainment are a popular pastime in the US, the previous iteration of the MQL aimed to account for a minimal level of this form of recreation by assigning tickets to one Minor League Baseball game a year. This only considers a specific league for spectator sports to serve as a proxy for all the costs of affordable spectator sports entertainment, and it does not account for non-sporting events as a form of entertainment.

Including spectator sports in the MQL is important since enjoying leisure time is a prime characteristic of the American Dream, but prescribing attending a single ball game in a year falls short in representing both the diversity and frequency of leisure outings Americans should enjoy. Consequently, LISEP is updating the MQL by incorporating the cost of the most popular entertainment activities during weekends. After determining both the nature and frequency of weekend leisure from reported time use data, the price of each activity is estimated annually from consumer expenditure data relevant to LMI Americans. Finally, the MQL incorporates the annual allocated spending of weekend leisure for each family type based on family size, price data and frequency of activity.

Data

For the new iteration, LISEP draws from two different areas of data. First, data dealing with time use and second dealing with price determination. For time use, LISEP uses the American Time Use Survey (ATUS) from the Census' Bureau of Labor Statistics to determine the most frequent weekend leisure activities. The ATUS provides annual time-use data from 2003 onwards representative of the US population. It surveys respondents about every activity they engaged in the previous 24 hours and how much time they spent on each activity. The ATUS also specifies the specific day of the week during which the activity took place as well as the type of activity it was.[44]

For price determination, LISEP uses two different data sources to estimate the total cost of weekend leisure activities. Our first data source comes from the Motion Picture Association (MPAA)[45] annual report in which they report average ticket prices for movies in the North American Market (the market is not sorted or reported by nation). These stats were compiled and reported by The Numbers.com in their Market report on Domestic Theater.[46] The data for the pricing of sports admissions comes from the Team Marketing Report, a private data collection agency for sports

[44] Bureau of Labor Statistics. (2021) Handbook of Methods: American Time Use Survey: Concepts. Retrieved from https://www.bls.gov/opub/hom/atus/concepts.htm.
[45] To explain the acronym, it was formerly known as the Motion Picture Association of America.
[46] (n.d.). Movie market summary 1995 to 2024." *The Numbers*. Accessed January 23 2024 on www.the-numbers.com/market/.

business and statistics. Specifically, the prices come from the Fan Cost Index for the MLB in 2023.[47] The MQL uses MLB average ticket price for the 2001 season, when there was less proclivity for box and luxury seating. LISEP selected the MLB for two reasons. First, it is the most attended professional sports league in the United States and the world. With 2,430 games from April through October, the MLB had an annual attendance of over 64 million during the regular season of last year.[48] Second, it is the cheapest of all professional sports (including semiprofessional football leagues) in the US according to the Team Marketing Report.

New Approach

The ATUS allows LISEP to estimate what percent of the population participates in a specific activity on an average weekend day. The ATUS users guide explains how to estimate the number of participants on an average day for a given activity.[49] LISEP determined its weekend sample as those who reported about a Saturday, a Saturday or a Holiday, including "New Year's Day, Easter, Memorial Day, the Fourth of July, Labor Day, Thanksgiving Day, and Christmas Day." [50] The design of the ATUS means that half of respondents are selected to report about their Saturday or Sunday to ensure a robust sample size to produce estimates about time use on weekends. Finally, LISEP considers the time between 2003 to 2022 (the latest year available at the time of writing) which coincides with the period contemplated by the MQL. However, it excludes the 2020 data from the sample given both data collection issues during the pandemic for the ATUS, which make population estimates less reliable, and abnormal time use behavior regarding weekend leisure due to the pandemic.[51]

After determining the weekend sample, LISEP first determines the entertainment activities to track. The categories of "Arts and Entertainment (other than sports)" (4-digit code 1204) and "Attending Sports/Recreational Events" (4-digit code 1302) include time use on:

- Attending performing arts (6-digit code 120401), museums (120402), movies (120403) and other miscellaneous (120499)
    - It excludes attending gambling establishments.

[47] Hartweg, C. (2023, August 24). 2023 MLB Fan Cost Index®. *Team Marketing Report*. Retrieved December 19, 2023, from https://teammarketing.com/fci/2023-mlb-fan-cost-index/.
[48] (n.d.). 2023 Major League Baseball attendance & team age. *Baseball*. Retrieved January 23, 2024, from www.baseball-reference.com/leagues/majors/2023-misc.shtml.
[49] Bureau of Labor Statistics. (2022). American Time Use Survey user's guide: understanding ATUS 2003 to 2021. *U.S. Department of Labor.* Chapter 7: Weights, linking, and estimation. pp. 35-43. Retrieved February 15, 2023, from https://www.bls.gov/tus/atususersguide.pdf.
[50] Bureau of Labor Statistics. (2023). American Time Use Survey – 2022 Results. *U.S. Department of Labor.* Retrieved from p.6 https://www.bls.gov/news.release/pdf/atus.pdf.
[51] Bureau of Labor Statistics. (2021). Impact of the coronavirus (COVID-19) pandemic on the American Time Use Survey for 2020. *U.S. Department of Labor.* Retrieved from https://www.bls.gov/tus/notices/2021/covid19.htm.

- Attending sports events watching over 32 different sports including baseball (130202), basketball (130202) and American football (130213).

Overall, 5.26% of Americans attended an "Arts and Entertainment" event on an average weekend day between 2003 and 2022 while 1.59% attended a "Sports/Recreational Event." Another way to interpret this information is that the average American went to an "Arts and Entertainment" event on 5.26% of their weekend days and to a "Sports/Recreational Event" on 1.59% of weekend days. Consequently, since there are 110 weekend or holiday days in an average year (52 weeks * 2 days + 6 holidays), these estimates suggest that the average American goes to "Arts and Entertainment" events on weekends 5.79 times a year (5.26% * 110) and to sporting event 1.75 (1.59% * 110) times a year. When also including Friday in the weekend sample, LISEP finds that 5.02% of Americans attended an "Art and Entertainment" event on an average day and 1.58% attended a sporting event on an average event. This results, in the average American going to an "Arts and Entertainment" event on weekends, including Fridays, 8.13 times a year (5.02% * (110 + 52)) and to a sports event 2.55 times a year. Consequently, considering a weekend sample of only Saturdays and Sundays is consistent with a minimal level of weekend leisure.

Since the goal of this analysis is to determine a reasonable amount of leisure weekend activities in a year, LISEP decided to assign families six "Arts and Entertainment Events" and two "Sporting Events" in a year based on these estimates. However, LISEP also acknowledges that this prescription of minimal recreation serves as a guidance to track the cost of these activities and is neither a prescription of how families should spend their weekends nor how often families in the US should be able to engage in these activities. LISEP also understands that depending on one's preferences or beliefs, one might consider this allocation as either too generous or too meager for minimal "leisure," but it is still useful for the purpose of tracking the price of these activities.

In general, the most popular activities included unspecified arts and entertainment (2.1% of Americans went to an unspecified arts and entertainment event on an average weekend day between 2003 and 2022) going to the movies (1.9%), attending performing arts (0.9%), an American football game (0.3%) and baseball game (0.2%). While the percentages might appear small, they represent a large population (e.g. 1.9% represent 1.4 million moviegoers on an average weekend day through the sample).

Calculation

For the cost of admission to the sports game, LISEP uses the MLB as a proxy for ticket prices in one year and then adjusts that with the relevant CPI elementary level index to capture price changes across all sports. LISEP doesn't want to reflect the fact that the average ticket has gotten more expensive given the prevalence of luxury seating, serving as an upward outlier in ballpark seating prices, even though there are still affordable options. Consequently, LISEP uses the 2001 price for tickets instead of the 2022 prices as earlier years had less luxury ticket options. Aiming to track general sports admission throughout time, and not just the price of one league,

LISEP tracks these prices through the period using the CPI entry-level item for "Admission to Sporting Events" (RF022). This allows the MQL to better measure the admission of all sports and not have calculations swayed by seasonal changes of MLB specific variations. Moreover, as the ELI for RF022 is a matched model ELI, it holds constant price adjustment factors like quantity and quality of seating.[52] Thus, if the MLB has more or less luxury seating in their stadiums, this would affect the average price of the MLB ticket, but it would not affect the CPI for admissions as long as the other (cheaper) seats remain available. Because the CPI for admissions to sporting events was unavailable for the second half of 2020 due to professional sports being played behind closed doors during the Covid-19 pandemic, the admission price is taken through linear interpolation of the 2019 and 2021 prices.

As reported in the *Data* section, LISEP allocates the price of a movie ticket in the MQL based on the MPAA annual report's average ticket prices for movies in the North American Market. Finally, the MQL considers the cost of 2 sporting events per year (1.75 rounded up) and 6 movies per year (5.79 rounded up) using these cost series.

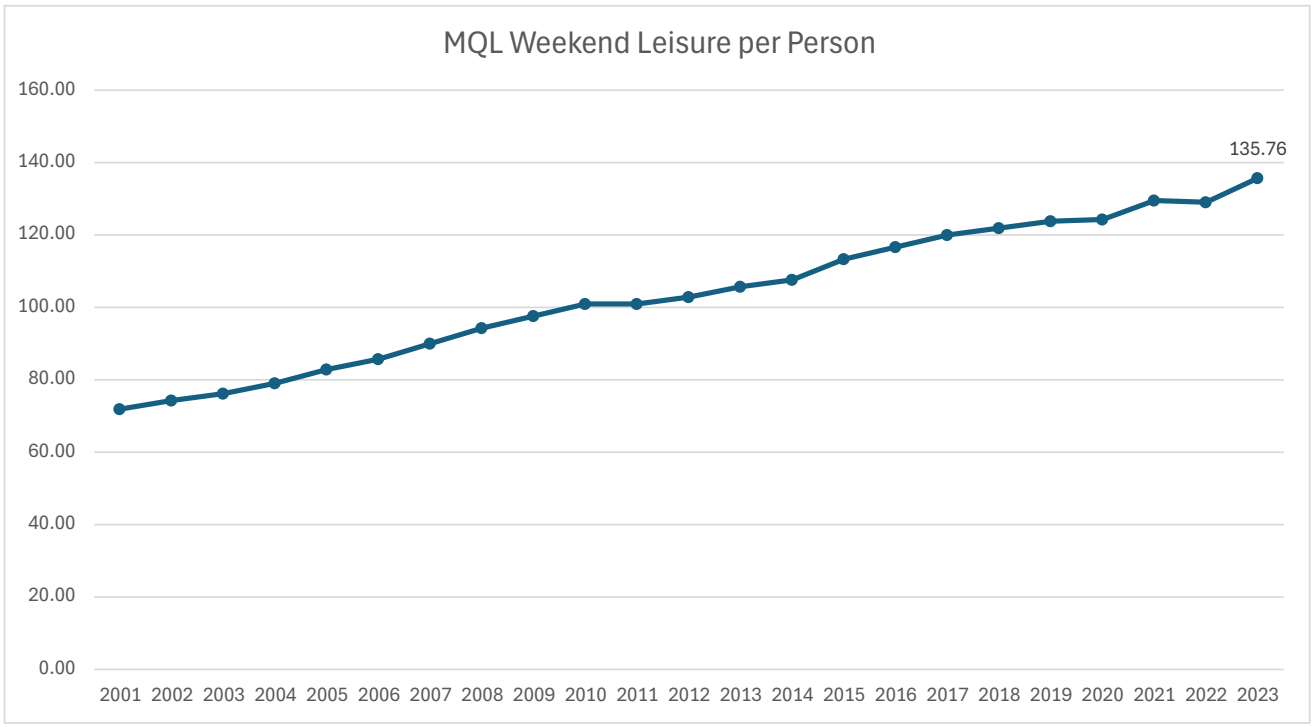

Figure 16: Annual cost of weekend leisure per person allocated by MQL

[52] Bureau of Labor Statistics. (2020, January 28). You paid how much for a ticket to the game? *U.S. Department of Labor*. Retrieved from www.bls.gov/blog/2020/you-paid-how-much-for-a-ticket-to-the-game.htm.

Appendix

A – Average Ticket Price per Year

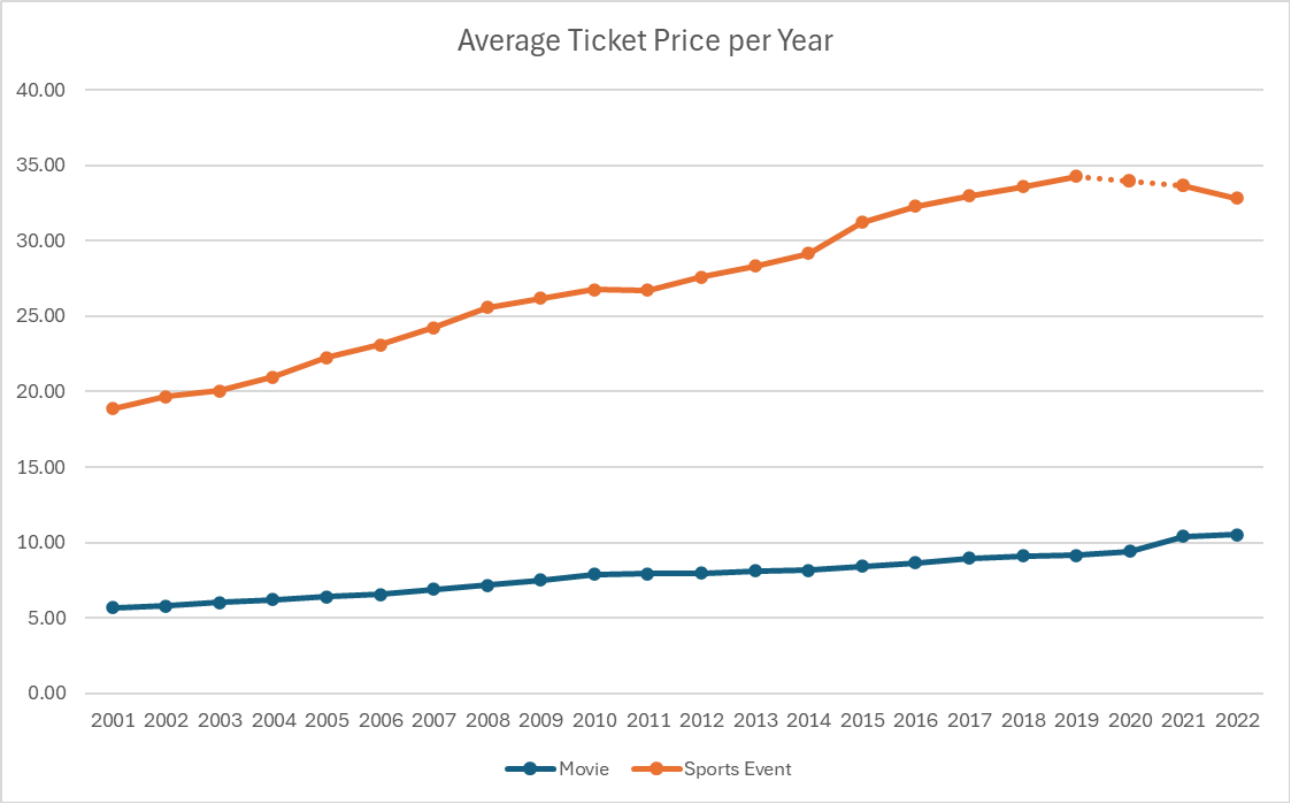

Figure 17: Average ticket price per year for movies and admission to sports events considered in MQL[53]

B – ATUS Estimates of Frequency of Leisure Activities on Weekends

Activity	6-digit code	Weekend Sample Rate[54]	Category
Arts and entertainment, n.e.c.*	120499	2.107%	Arts and Entertainment
Attending movies/film	120403	1.899%	Arts and Entertainment
Attending performing arts	120401	0.886%	Arts and Entertainment

[53] The Sports Event series line is dashed between 2019 and 2021 since the 2020 price was determined using linear interpolation between those years given data unavailability in 2020.

[54] Because some respondents might have reporting engaging in multiple activities within the same category (e.g. "attending a museum" and "security procedures related to arts & entertainment"), the sum of the activities' rates is slightly larger than the rate at which an average American attends a *type* of event (e.g. "Arts and Entertainment") on an average weekend day as described under New Approach.

Attending museums	120402	0.422%	Arts and Entertainment
Security procedures rel. to arts & entertainment	120405	0.003%	Arts and Entertainment
Watching football	130213	0.283%	Sports Event
Watching baseball	130202	0.245%	Sports Event
Watching soccer	130224	0.233%	Sports Event
Watching basketball	130203	0.227%	Sports Event
Attending sporting events, n.e.c.*	130299	0.118%	Sports Event
Watching vehicle touring/racing	130226	0.085%	Sports Event
Watching hockey	130216	0.082%	Sports Event
Watching softball	130225	0.057%	Sports Event
Watching running	130222	0.035%	Sports Event
Watching volleyball	130227	0.032%	Sports Event
Watching equestrian sports	130210	0.028%	Sports Event
Watching water sports	130229	0.027%	Sports Event
Watching rodeo competitions	130219	0.025%	Sports Event
Watching wrestling	130232	0.024%	Sports Event
Watching racquet sports	130218	0.023%	Sports Event
Watching bowling	130207	0.017%	Sports Event
Watching dancing	130209	0.013%	Sports Event
Watching golfing	130214	0.012%	Sports Event
Watching skiing, ice skating, snowboarding	130223	0.011%	Sports Event
Watching boating	130206	0.007%	Sports Event
Watching biking	130204	0.007%	Sports Event
Watching rollerblading	130220	0.006%	Sports Event
Watching fishing	130212	0.006%	Sports Event
Watching gymnastics	130215	0.005%	Sports Event
Watching billiards	130205	0.005%	Sports Event
Watching people working out, unspecified	130231	0.004%	Sports Event
Watching martial arts	130217	0.003%	Sports Event
Watching rugby	130221	0.002%	Sports Event

Table 9: Percent of ATUS respondents engaging in leisure activity during average weekend day (2003-2022)

Adult Fitness

Rationale

The previous iteration of the MQL assigned sports equipment to allow adults to be physically active without gym memberships by engaging in outdoor recreation. Based on this assumption, the MQL included an average of the cost of running and hiking biking as well since these were among the four most popular outdoor recreation activities based on reports from the Outdoor Foundation. As a result, LISEP assigned each adult the choice of running shoes for two years or owning and maintaining a bicycle for over 20 years.

Unfortunately, the durability or "lifespan" of this equipment rests on unrealistic or paternalistic assumptions to ensure the "minimal" component of recreation. It assumes that running shoes will last two years because users will only run five miles on a weekly basis since that's the minimum required for certain health benefits of exercise.[55] For biking, it assumes a lifetime of 20 years since it assumes ridership of 520 miles per year for a lifespan of around 10,000 miles for a "high mileage" bicycle as well as exceptional care. It also assumes that cyclists are beginners to ensure the low mileage accumulated in a year as well as constant maintenance and repair costs even though they make up the bulk of the annual biking costs given the 20-year amortization. Moreover, albeit the aim was to provide a proxy for adult fitness, not an exact representation, the three options are overly and unnecessarily restrictive.

Defining both the minimally adequate type and level of adult fitness proves difficult since the right activity and amount of exercise varies so significantly from person to person, depending on income, age, and geography among other factors. Consequently, LISEP sought to determine how often Americans exercise and what fitness activities they prefer using the American Time Use Survey to inform the MQL's allocation for adult fitness in this iteration.

Overall, between 2003 and 2022 18.5% of Americans exercised on an average day, with that value rising to 1 in 5 Americans in recent years (Figure 19, in Appendix). The most popular activities include walking, working out (including weightlifting and cardio), running and aquatic sports. For many, these activities represent a more accessible or preferable daily fitness activity than other outdoor recreation like hiking, fishing, and, to a lesser extent, biking (Table 10). Given this, LISEP found that the MQL should include athletic footwear (i.e. running shoes) and a low-cost gym membership to account for a minimal level of adult fitness. Unfortunately, given the lack of robust data on low-cost gym memberships (and gym memberships in general) throughout time and geographies, LISEP decided to exclude this item from the MQL and only include one pair of running shoes per adult each year to track the cost of exercising. Even though this choice results in

[55] Lavie, C. J., Lee, D. C., Sui, X., Arena, R., O'Keefe, J. H., Church, T. S., Milani, R. V., & Blair, S. N. (2015). Effects of Running on Chronic Diseases and Cardiovascular and All-Cause Mortality. Mayo Clinic Proceedings, 90(11), 1541–1552. https://doi.org/10.1016/j.mayocp.2015.08.001.

underestimating the annual cost of staying fit for adults by excluding gym memberships as well as other sports equipment and participation fees, reporting reliable and consistent data over the examined period is more important. Moreover, while this omission is particularly relevant for this component of the MQL, it has a limited incidence on the MQL or the broader True Living Cost umbrella.

Data

Previously, LISEP tracked the cost of sports equipment from 2001 to 2018 using prices from the National Sporting Goods Association (NSGA).

For the updated MQL iteration, LISEP uses data from the American Time Use Survey (ATUS) from 2003 to 2022 to determine the types of fitness activities and frequency of exercise in the US. For the price of running shoes, LISEP takes the 2018 price of athletic sneakers from the NSGA data[56] as a reference and extends it through the period using the CPI's Entry Level Items (ELI) for Men's footwear (ELI AE011) and for women's footwear (AE031).

New Approach

The ATUS allows LISEP to estimate what percent of the population participates in a specific activity on an average day and to estimate the number of participants on an average day for a given activity.[57] Consequently, LISEP determined that between 2003 and 2022, 18.5% of Americans exercised on an average day. Since 2003 is the first available year of ATUS data, LISEP reasoned that the frequency of exercise and the choice of activities in the years immediately preceding 2003 (2001 and 2002) were not significantly different to the rest of the period (2003-2022).

This estimate was based on the broader "Participating in Sports, Exercise, or Recreation" category (4-digit code *trtier2p* 1301) which also identifies 36 specific and diverse sport activities such as running (6-digit code *trcodep* 130124), martial arts (6-digit code 130119) or volleyball (6-digit code 130130).[58] For the broader exercise category as well as for specific activities, LISEP calculated the annual participation rate as well as the total sample rate (for the total period) with data from 2003 to 2022 with the exception of 2020 using the same recommended formula as for Weekend Leisure Activities.[59] The Covid-19 pandemic caused a gap in data collection for the ATUS between March 18 and May 9, so the 2020 dataset has only 10 months of data, a smaller sample

[56] National Sporting Goods Association. (2020). The Sporting Goods Market: 2019 Edition.
[57] Bureau of Labor Statistics. (2022). "American Time Use Survey User's Guide: Understanding ATUS 2003 to 2021." U.S. Department of Labor Chapter 7: Weights, linking, and estimation. pp. 35-43. Retrieved February 15, 2023, from https://www.bls.gov/tus/atususersguide.pdf.
[58] Bureau of Labor Statistics. (2023). American Time Use Survey activity lexicon 2022 . *U.S. Department of Labor*. Retrieved from https://www.bls.gov/tus/lexicons/lexiconwex2022.pdf.
[59] See Appendix B under the Weekend Leisure Activities section.

size, and special weights representative only of the surveyed period.[60] Additionally, the consequences of the pandemic such as social distancing, closures of establishments, and lockdowns likely had an effect on how Americans exercise, which might bias the participation rate estimates to determine the most popular activities.[61]

As shown in Table 10 in the Appendix, walking is the most common exercise activity (5.9%), followed by working out (3.7%), weightlifting (2.2%), running (1.5%), exercising with cardiovascular equipment (1.4%), and participating in water sports (1.4%). This indicates that a gym membership and a pair of running or training shoes are consistent with a minimal level of exercise.

Fitness Centers

The popularity of working out and of activities using equipment suggests that this option should be available in the MQL. Since weights and other gym equipment is expensive, and since it's unreasonable to expect all Americans to live in areas where working out outdoors year-round with no or minimal equipment (such as in some public parks) is feasible, LISEP believes that a minimally adequate level of adult fitness would include a low-cost gym membership.

Standard gym memberships are usually expensive and differ widely depending on location, even within a same brand in the same city, so it's not surprising that higher-income Americans make up the majority of members.[62] The average monthly gym membership ranged from $38 per month in Wyoming and $75.32 per month in New York across 51 states in 2021, but that represents between $456 and $903.84 a year before considering annual fees.[63] However, the growing popularity of gyms and fitness centers over the last twenty years has been driven by more low-cost and boutiques options.[64] [65] [66] For example, Planet Fitness which offers $10 monthly memberships

[60] Bureau of Labor Statistics. (2021, July 22). American Time Use Survey – May to December 2019 and 2020 results. *U.S. Department of Labor*. Retrieved from https://www.bls.gov/news.release/archives/atus_07222021.htm.
[61] Watson, K. B., Whitfield, G. P., Huntzicker, G., Omura, J. D., Ussery, E., Chen, T. J., & Fanfair, R. N. (2021). Cross-sectional study of changes in physical activity behavior during the COVID-19 pandemic among US adults. *International journal of behavioral nutrition and physical activity*, *18*, 1-10. https://doi.org/10.1186/s12966-021-01161-4.
[62] Health & Fitness Association. (2021). 2021 IHRSA media report: Health and fitness consumer data & industry trends before and during the Covid-19 pandemic. P.12. Retrieved May 13, 2024, from https://www.statista.com/statistics/1244820/gym-members-income/.
[63] Davidson, B. (2021, July 26). The price of a gym membership around the world. *CashNetUSA*. Retrieved May 13, 2024, from https://www.statista.com/statistics/1360459/cost-monthly-gym-membership-usa-state/.
[64] Among the four health clubs with the largest facilities are the low-cost Planet Fitness, and three "luxury" boutique centers. Additionally, while gym memberships in the US rose by 10.7M between 2010 and 2017, memberships at boutique and low-cost gym grew by 8.2M, accounting for most of the growth.
Kufahl, P. (2022). U.S. health club financial review: 2019-2021. *Club Industry*. Retrieved May 13, 2024, from https://www.statista.com/statistics/257816/health-und-fitness-club-companies-ranked-by-number-of-facilities/.
[65] Health & Fitness Association. (2022). The IHRSA global report 2020. Retrieved May 13, 2024, from https://www.statista.com/statistics/236123/us-fitness-center--health-club-memberships/.
[66] Piper Jaffray. (2018). Fitness industry update January 2018. Retrieved May 13, 2024, from https://www.statista.com/statistics/922884/boutique-and-hvlp-gym-membership-us/.

for very basic equipment expanded from 100 clubs in 2006 to over 2000 in 2019,[67] and 17 million members in 2022.[68] Despite the emergence of Planet Fitness and other low-cost options which would allow to estimate the cost of a low-cost membership for recent years,[69] it's difficult to determine when these options became widely available throughout the US. Even if LISEP could define when this took place, tracking the cost of a standard gym membership back to 2001 presents similar challenges regarding the availability of robust and nationally representative cost data. One possibility would be to backtrack costs using the "Club dues and fees for participant sports/group exercises" ELI (RF01), but this includes luxury fitness centers and country clubs as well as other fraternal and civic organizations, so it's not necessarily reflective of standard gym memberships.[70]

In reality, the cost of exercising at a "minimally adequate" fitness center likely rose from 2001 until a point in time when low-cost options were widely available and provided decent enough equipment and services. This would have had a similar impact on the cost of adult fitness as the inclusion of streaming services in the cost of watching TV, with costs increasing again from the time the lower-cost substitute was introduced. However, many Americans stay fit without a gym membership and a majority prefers to work out elsewhere,[71] so this might not be indicative of general trends in the cost of working out whereas most Americans use streaming services and cord-cutting is increasingly popular. Excluding gym memberships and other sports equipment from the MQL results in underestimating the cost of adult fitness, but reporting accurate and representative data is a more important goal. While some might have qualms on whether a gym membership and additional equipment is necessary to access a minimal level of exercise, assigning a pair of athletic shoes each year represents the bare minimum someone needs to stay fit.

Athletic Footwear

The previous iteration of the MQL assigned one pair of running shoes every two years based on the assumptions that they would last 500 miles while running 5 miles a week. This resulted in running 260 miles a year with a pair of shoes that last on average 300 to 500 miles at most, and this

[67] Planet Fitness, Inc.. (n.d.). The Planet Fitness evolution. Retrieved May 13, 2024, from https://www.planetfitness.com/franchising/franchising-about-planet-fitness.
[68] Planet Fitness, Inc.. (2023, January 9). Planet Fitness announces key year-end metrics. Retrieved from https://investor.planetfitness.com/investors/press-releases/press-release-details/2023/Planet-Fitness-Announces-Key-Year-End-Metrics/default.aspx.
[69] Rizzo, N. (2023, November 2) Average gym membership cost 2021. *RunRepeat*. Retrieved May 13, 2024, from https://runrepeat.com/gym-membership-cost.
[70] Bureau of Labor Statistics. (2023). CPI handbook of methods appendix 2: Content of CPI Entry Level Items. *U.S. Department of Labor*. Retrieved May 13, 2024, from https://www.bls.gov/cpi/additional-resources/entry-level-item-descriptions.htm.
[71] Gymless. (2023, September 28). New survey finds 52.6% of people prefer working out OUTSIDE the gym. *PR Newswire*. Retrieved May 13, 2024, from https://www.prnewswire.com/news-releases/new-survey-finds-52-6-of-people-prefer-working-out-outside-the-gym-301941292.html.

also varies depending on the person, the quality of the shoe and on the terrain surface for running. Consequently, for the pair of shoes to last two years, they need to last longer than the typical pair, be used exclusively for running and limit the number of miles per run.

So, the previous assumption that a pair of shoes might last two years is too restrictive, overoptimistic, and in practice might lead to physical injury from running with worn out shoes. Switching running shoes after one year makes more sense under the assumption that runners should run at least 5 miles per week and ensures that runners will have adequate equipment. Additionally, because shoe materials also deteriorate over time, general guidelines recommend replacing athletic shoes every 6 to 12 months[72] (and preferably six), so assigning one pair of shoes for exercise in a year seems minimal and conservative.

Calculation

The MQL tracks the cost of athletic footwear throughout time and includes one pair of shoes each year for adult fitness. To extend the cost from 2001 and onwards, LISEP takes the NSGA estimate of the price of an athletic sneaker from their 2018 survey and uses the ELI for men's footwear (AE01) and for women's footwear (AE03) from the CPI for footwear to extend that price through the period. The CPI for footwear includes the ELIs for men and women's footwear along with footwear for boys and girls (AE021 and AE022), so LISEP extends the prices of athletic sneakers for adults by indexing the men's ELI and the women's ELI to 2001 and averaging their inflation over time. Consequently, the price of an athletic sneaker in Year *t* can be expressed as:

$$Price_t = Price_{2018} \times \frac{(ELI_{Men'st} + ELI_{Women'st})/2}{(ELI_{Men's2018} + ELI_{Women's2018})/2}$$

Where, *ELI* describes the prices of men's or women's footwear indexed to 2001. For example, by 2022 prices for men's footwear were 18.9% higher than in 2001 and prices for women's footwear were 8% higher than in 2001, so the $ELI_{Men's}$ for 2022 was 118.9 and the $ELI_{Women's}$ was 108.0, meaning that the average increase in athletic footwear for adults since 2001 was 13.5% since 2022. This amounted to an average price of $72.83 (Figure 18).

[72] Deering, S. (2023, July 7). Here's exactly when you should replace your running shoes, according to experts. *Shape*. Retrieved May 13, 2024, from https://www.shape.com/when-to-replace-running-shoes-7550022.

Figure 18: Cost of Running Shoes in MQL

Appendix

A – ATUS Estimates of Frequency of Physical Activities

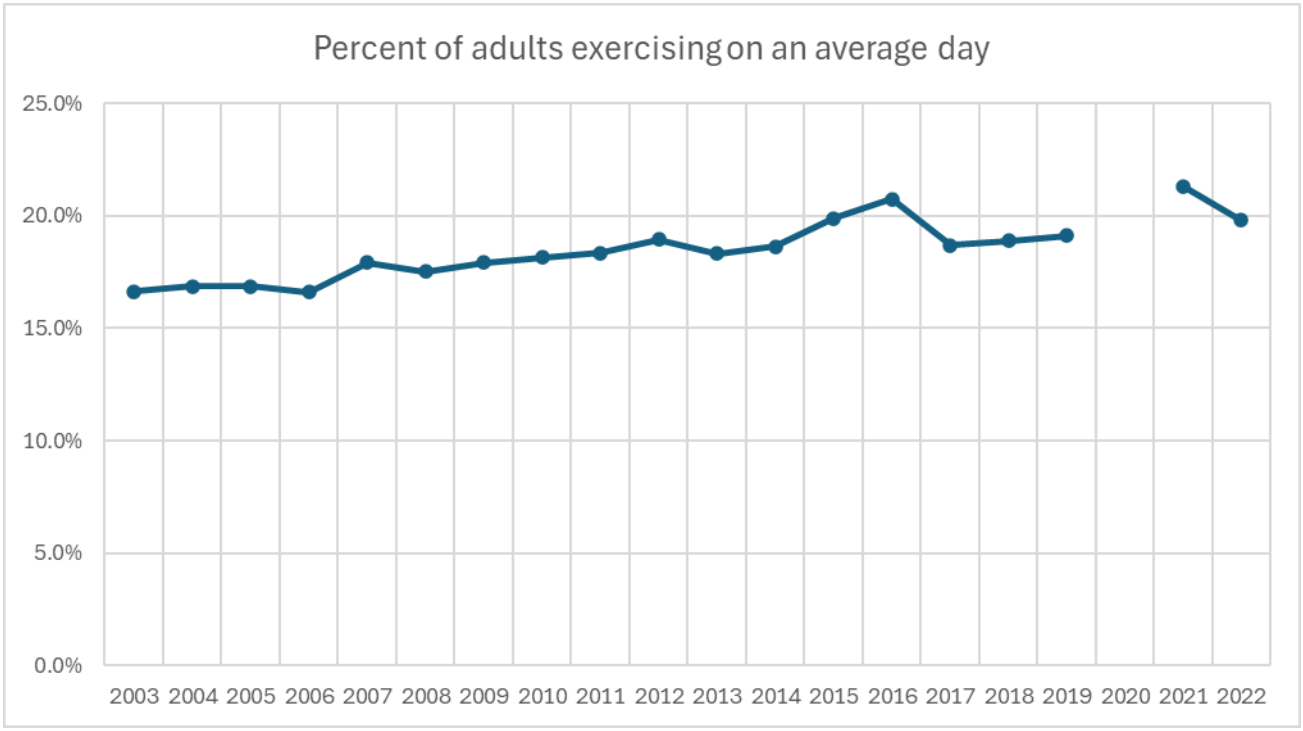

Figure 19: Percent of adults exercising on an average day 2003-2022

Activity	6-digit code	Sample rate
Walking	130131	5.890%
Working out, unspecified	130134	3.691%
Weightlifting/strength training	130133	2.187%
Running	130124	1.507%
Using cardiovascular equipment	130128	1.506%
Participating in water sports	130132	1.357%
Playing sports n.e.c.*	130199	0.753%
Biking	130104	0.726%
Playing basketball	130103	0.624%
Golfing	130114	0.558%
Doing yoga	130136	0.474%
Fishing	130112	0.406%
Doing aerobics	130101	0.331%

Playing soccer	130126	0.253%
Dancing	130109	0.244%
Playing racquet sports	130120	0.239%
Hunting	130118	0.208%
Hiking	130116	0.199%
Playing football	130113	0.194%
Boating	130106	0.173%
Vehicle touring/racing	130129	0.129%
Playing volleyball	130130	0.127%
Playing baseball	130102	0.112%
Softball	130127	0.102%
Skiing, ice skating, snowboarding	130125	0.096%
Rollerblading	130122	0.086%
Participating in martial arts	130119	0.073%
Participating in equestrian sports	130110	0.070%
Playing hockey	130117	0.031%
Climbing, spelunking, caving	130108	0.023%
Wrestling	130135	0.016%
Doing gymnastics	130115	0.009%
Playing rugby	130123	0.005%
Participating in rodeo competitions	130121	0.003%
Fencing	130111	0.001%

Table 10: Percent of people exercising on an average day by activity

Youth Sports Equipment

Rationale

Youth sports are widely recognized as an important source of exercise, social engagement, and leisure for children. LISEP is aware that the cost of a sport varies heavily based on the nature of the sport itself, the equipment and setting required, and the expected coaching and training resources. While LISEP is not positioned to mandate a "minimal" sport, in general, the benefits of physical exercise, competitive experience, social inclusion, and disciplined training can frequently be met without enrolling in programs with the highest sticker prices. LISEP recognizes that these higher cost sports programs may be desirable for important reasons, for example, for athletes with unique talent or enthusiasm in a specific sport, or the perception that additional training is advantageous for being selected into future sports programs or for college admissions.

In the previous iteration, the MQL computed the cost of youth sports based on the cost of sports equipment and registration fees. Aiming to remain minimal, the estimate for sports equipment cost was overly conservative, and not applicable to a sizeable portion of LMI Americans, since it assumed that all equipment (e.g. uniforms, protective gear) except for shoes would be provided by schools' programs at no additional cost for families. The updated method makes two major changes regarding youth sports. First, because of a lack of good available data, LISEP decided to exclude participation fees from its estimate and only include sports equipment. Second, LISEP has decided to track the cost of all equipment for the selected sports throughout the time period. As a result, the MQL tracks the typical cost of sports equipment for the most popular sports.

Data

LISEP used the Aspen Institute Project Play 2019 National Youth Sports Survey, a collaboration between Aspen and Utah State University, for detailed youth sports costs.[73] The question put to families was "Please estimate your family's spending on [SPORT] over the last 12 months?". Aspen confirmed that this number should be interpreted as spending per child, per sport, per year. Averages were reported per sport across the following categories of spending: Registration, Equipment, Travel, Lessons, Camps, and Other. LISEP does not consider many of the costs associated with highly competitive private sports leagues, such as extensive travel or off-season lessons, to be minimal (analogous costs for public teams, such as travel, are likely to be overwhelmed by much higher costs associated with highly competitive programs). LISEP takes the conservative approach of dropping costs associated with Travel, Lessons, Camps, and Other.

[73] The Aspen Institute & Dorsch, T. et al. (2019). Project Play 2019 National Youth Sport Survey. Retrieved March 29, 2024, from https://www.aspeninstitute.org/wp-content/uploads/2022/10/FINAL-Utah-State-Parent-Survey-Report-1.pdf.

Selection of the most popular sports over time is given by the archive of participation data collected by the National Federation of State High School Associations.[74] LISEP assumes that the most popular sports among high schoolers reflect general popularity for youth sports, though obviously this assumption is imperfect. Because the sports popularity data is not available in the 2019-2020 or 2020-2021 school years, the sports' popularity is assumed to be the same for those years as in 2018-2019. The sports rankings over time are remarkably consistent, and the top five sports for boys and for girls are the same through every academic year 2001-2002 through 2018-2019 and again after academic year 2021-2022, though the order within that top five does shift.[75]

New Approach

LISEP focuses on estimating the cost of equipment for the 5 most popular high school sports for girls and for boys, whether in public or private sports programs. In an ideal world, the MQL would track the typical cost of registration fees and equipment costs required by a public school sports program or a low-cost community team for the five most popular sports nationally, but LISEP has been unable to find a consistent survey that tracks participation fees in public schools. Unfortunately, LISEP's best available source for sports equipment prices does not distinguish between public and private programs, which tend to cost multiples of the fees associated with public programs[76], and thus do not allow to extract estimates given the aggregated data. Likewise, there is no reliable way to use the CPI's Entry Level Items (ELI) to extrapolate participation fees for public school or low-cost sports programs.

When unable to reliably estimate the spending or cost of a component, LISEP has no choice but to drop it from the MQL metric to maintain accuracy and consistency. Consequently, the MQL's allocation for Youth Sports excludes sports participation fees. This understates the cost of youth sports for most families, as participation costs have been rising in both magnitude and prevalence (Appendix A). The typical cost of sports equipment is determined to be the average of the equipment costs associated with the most popular sports in that year among high school students.

Finally, LISEP estimates the price of equipment over time by using Aspen's data for 2019 and extending it over time using the specific CPI ELI "General sports equipment excluding water". While Aspen's Project Play survey consistently reports data for all sports, data in years other than 2019 is not consistently disaggregated by sport to a level that can be used for estimating minimal adequate needs.

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[74] National Federation of State High School Associations. (n.d.). High School Participation Survey Archive. Retrieved June 14, 2022, from https://www.nfhs.org/sports-resource-content/high-school-participation-survey-archive/.

[75] The top 5 most popular girls sports were track & field, basketball, volleyball, soccer, and softball in all years measured. For boys, the top five were football, track, basketball, baseball, and soccer in all years measured.

[76] Stubbs, R. (2022, December 12). In youth sports, talent helps but money rules. *The Washington Post*. Retrieved June 13, 2024, from https://www.washingtonpost.com/sports/2022/12/12/youth-sports-rising-costs/.

Calculation

To estimate the cost of each sport's equipment over time, LISEP takes the average equipment spending per child per year per sport as reported by Aspen. To extrapolate the cost beyond 2019, LISEP uses the ELI for sports equipment from the CPI for "General sports equipment excluding water" (RC021) to extend that price through the period (aquatic sports are never in the top 5 for boys or for girls). Consequently, the price of a sport's equipment in year *t* can be expressed as:

$$P_{s\,t} = P_{s\,2019} \times \frac{(ELI\ RC021)_t}{(ELI\ RC021)_{2019}}$$

Where *ELI RC021* describes the inflation of general sports equipment indexed to 2001 and $P_{s\,t}$ is the average cost of equipment for sport *s* in year *t*.

Then, letting the top 5 most popular sports for girls in year *t* be the set G_t (analogously for boys B_t), the typical price of sports is given as the unweighted average in equipment costs:

$$P_t = \frac{1}{10} \times \left(\sum_{s \in G_t} P_{st} + \sum_{s \in B_t} P_{st} \right)$$

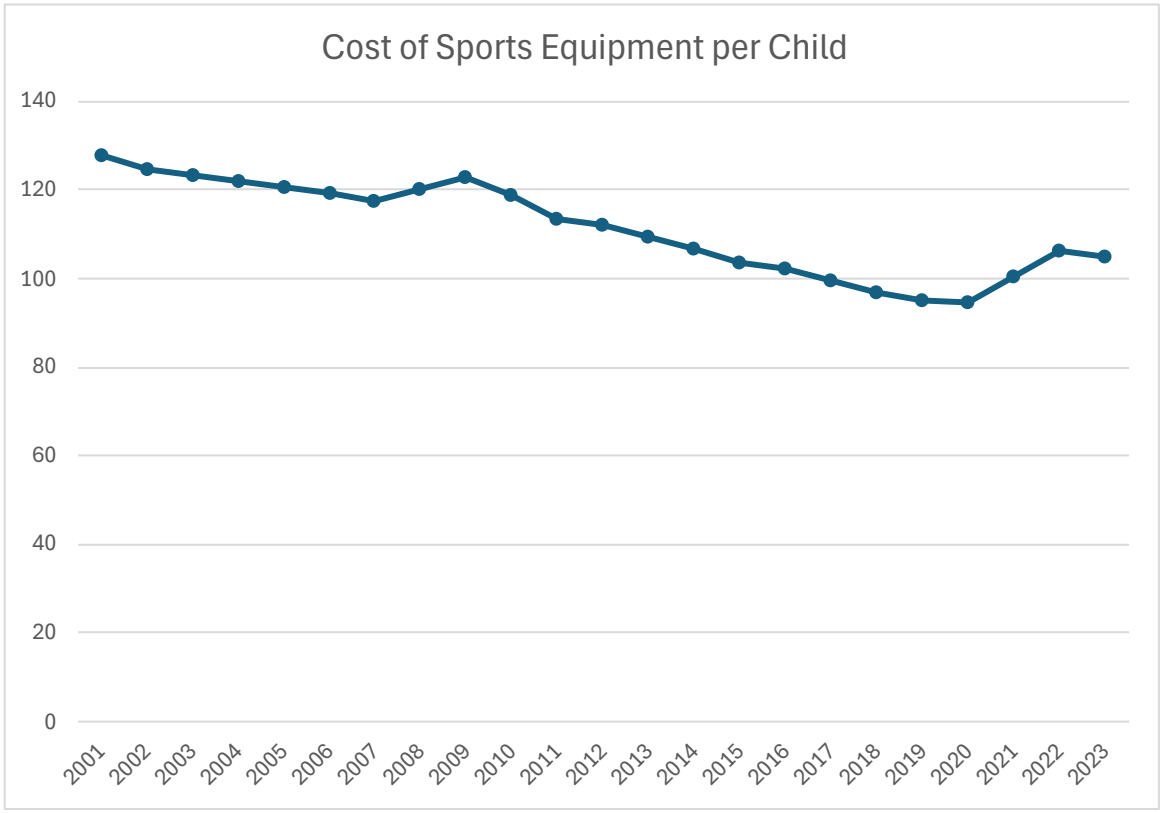


Figure 20: MQL cost of sports equipment per child

Appendix

Previous Method

Previously, LISEP's method involved estimating the cost of shoes from the National Sporting Goods Association (NGSA) as sports equipment and the sports participation fees from the CS Mott Children's Hospital. LISEP has transitioned away from this strategy for two reasons: inadequate assumptions and data scarcity.

In the prior method, LISEP assumed that all sports equipment apart from shoes would be provided by a child's school sports program. LISEP no longer considers this a valid assumption. Additionally, LISEP has been unable to find NGSA data following 2018. The CPI for general sports equipment has substantially fallen over time. However, the average cost of participation fees has risen dramatically.

The prior method relied on a survey from the CS Mott Children's Hospital to estimate the average participation fees paid, but data is not available after the year 2018, and it is uncertain whether the survey will continue to investigate that question. There are two major barriers that prevent us from using the existing data in the MQL, so, unfortunately, LISEP has been forced to drop participation fees from the MQL basket until better data can be collected.

First is recency: without an appropriate entry level item to match to in the CPI and no guarantee that the C.S. Mott survey will be able to report this metric in future, there is no reliable way to project the rise in fees further into the future. Possible candidates for entry level item categories included RF031 (Fees for lessons or instructions), RF011 (Club dues and fees for participant sports/group exercises), but both were deemed too broad and included categories that one could reasonably suspect move very differently from participation fees for public or community sports. Even the UCC code 620121 (Fees For Participant Sports)[77] would likely be dominated by the movement of the extremely high fees charged for private club sports, meaning our method would no longer be conservative; additionally, data at the UCC levels tends to be very sparse for a single code.

Second is the short nature of the existing span of data; even if it were reasonable to use a forecast indefinitely, four observations are simply not enough historical data to infer typical movement.

School year	**CS Mott reported average pay-to-play fee**
2011-2012	$93 [78]
2013-2014	$126 [79]
2015-2016	$139[80]
2018-2019	$161[81]

Table 11: C.S. Mott reported average pay-to-play fee used in previous MQL iteration

[77] Bureau of Labor Statistics. (2024, May 7). Appendix 5. Consumer Expenditure survey item name (universal classification codes-UCC) to Consumer Price Index item titles (entry level item-ELI) concordance. *U.S. Department of Labor*, Retrieved May 13, 2024, from https://www.bls.gov/cpi/additional-resources/ce-cpi-concordance.htm.
[78] C.S. Mott Children's Hospital. (2012, May 14). Pay-to-play sports keeping lower-income kids out of the game. National Poll on Children's Health. Retrieved March 29, 2024, from https://mottpoll.org/reports-surveys/pay-play-sports-keeping-lower-income-kids-out-game.
[79] C.S. Mott Children's Hospital. (2015, January 20). Pay-to-play sports keeping some kids on the sidelines. National Poll on Children's Health. Retrieved March 29, 2022, from https://mottpoll.org/reports-surveys/pay-play-sports-keeping-some-kids-sidelines.
[80] C.S. Mott Children's Hospital. (2016, October 17). *Pay-to-participate limiting school activities for lower-income students*. National Poll on Children's Health. Retrieved May 3, 2022, from https://mottpoll.org/reports-surveys/pay-participate-limiting-school-activities-lower-income-students.
[81] C.S. Mott Children's Hospital. (2019, March 18). Pay-to-participate: Impact on school activities. National Poll on Children's Health. Retrieved March 29, 2024, from https://mottpoll.org/reports/pay-participate-impact-school-activities.

Toys

Rationale

LISEP considers the financial means to purchase toys for children as minimal quality of life. Apart from the traditional role of toys as gifts in celebrations of birthdays and holidays, playtime is necessary for childhood development and social inclusion.

The previous version of the MQL allocated in the holiday gifts budget $10 on a toy per child in 2020 and 2021– an overly conservative estimate based on acceptable donations for toy charities- and extended it using the specific CPI for Toys for the preceding years. Conceptually, this budget could also be divided into gifts for birthdays and holidays, or any way the family chooses to segment it. While tracking the price of a single toy, such as a box of crayons, might be feasible, the needs and interests of children as well as their interpretation of social expectations faced by different families vary widely, and LISEP is not positioned to prescribe an "adequate" basket of toys in each year. At the same time, minimally adequate suggests that the purchases of toys should not be extravagant.

To strike this balance, LISEP attempts to price a minimally adequate toy by estimating what parent households earning annual income in the 25th to 75th income percentile range actually spend on toys. The explicit assumption is that, as these households are likely to be carefully watching their budgets, any "excess" spending reflects a good faith attempt to meet external expectations. LISEP acknowledges that this method is vulnerable to bias if, in reality, families at this income level could have achieved equivalent utility at a lower level of expenditure.

Data

LISEP turns to data from the CE Diary survey from the EXPD files, which estimate spending by household. LISEP records the spending for toys using the UCC code 610110 for toys, arts and crafts, and tricycles. To incorporate household characteristics into the calculation, LISEP uses the FMLD files, which provide information on income, household size and composition.

New Approach

Unlike with the methods for other MQL components that use the CE survey (Travel and Dining Out), LISEP uses the number of children in the household rather than the household's size as the sorting metric when processing data for the Toys calculation. Households are sorted into having 1, 2, or 3 children based on the PERSLT18 variable from the FMLD files, detailing the number of members of age below 18 in the consumer unit. Again, households are grouped by the number of children rather than the specific family type because of the small sample size if looking at spending by specific family types. Further, the minimally adequate level of toy spending for families should

not vary based on the number of adults present. For each household stratification, LISEP calculates the average amount of toy spending per child in a given year. After the calculation, LISEP assigns the costs for each family type based on the corresponding number of children.

LISEP calculates the income distribution by household size, then, after determining the income distribution, restricts the sample to families between the 25th and the 75th percentile by income. Since the Diary survey provides information on expenses in a given week while toy spending may be more sporadic, parent households that don't report any spending on toys in a given week are included when computing the average toy expenditure to prevent misleadingly inflating the annual budget for toys.[82] Additionally, this addresses the issue of determining the frequency or quantity of toy purchases in a given year consistent with a Minimal Quality of Life. LISEP assumes that some level of toy spending is a necessity, so the MQL attempts to pinpoint the level of necessary spending by using the expenditures of households in the middle 50%.

Calculation

The MQL seeks the average amount of spending on toys per child per year for a given family with 1, 2 or 3 children. LISEP estimates this average in three steps.

First, LISEP restricts the data to households with 1,2, or 3 children and computes the proportions of households h based on the number of children present $k \in \{1,\ 2,\ 3\}$. For simplicity, let H_t be the set of all households with 1, 2 or 3 children in calendar year t and H_t^k the subset of households with k children. The household proportions are calculated based on the Diary survey's FINLWT21 consumer unit weight:

$$NumKidsWt_t^k = \frac{\Sigma_{h \in H_t^k} FINLWT21_h}{\Sigma_{h \in H_t} FINLWT21_h}$$

[82] Computing the average spending among those who spend on toys only would only yield an accurate estimate of annual spending on toys if households split their annual spending evenly across all weeks, which is not the case. For example, consider households A and B that spend each $20 a month on toys, corresponding to $240 a year each. Household A spends all $20 in a single week while household B splits it evenly each week. If the Diary Survey reference week falls when household A makes the purchase, then average toy spending comes out at $640 a year per household (20*52 weeks = $1,040 for household A and $240 for household B). If it falls on a week when household A doesn't make the purchase, then the average spending would be $240 if it only considered households that spend on toys and $120 if it considers all households' spending. However, one would expect these disparities in spending to balance out when considering a larger sample of households and weeks. To illustrate, the probability that the reference week falls on a week when household A makes a purchase is 12/52 and the probability that it falls on a week when it doesn't make a purchase is 40/52. Under the chosen method for the MQL, the expected annual average expenditure is $240 whereas it would be $332.3 if only spending by households purchasing toys were considered.

Second, LISEP computes the average spending on toys by households within a given income group for households based on the number of children present.[83] Both within the income groups and within the average spending estimate, households who do not spend on toys are included. The subgroups are identified as $H_t^{k.IG(k)}$. Because the Diary expenditure data is weekly, weekly toy spending data is multiplied by 13 to represent quarterly spending (*toyspend*). Further, each quarterly file is intended to be representative of the entire population, so the population weight FINLWT21 is divided by 4 to assign all consumer units a representative weight for the calendar year of *popweight*. With the subscript *t* for the calendar year omitted for brevity, average annual toy spending for each household stratum is calculated for each year:

$$\left(\overline{toyspend}\right)_k^{IG(k)} = 4 \times \frac{\Sigma_{h \in H^{k,IG(k)}}(toyspend_h \times popweight_h)}{\Sigma_{h \in H^{k,IG(k)}} popweight_h} = \frac{\Sigma_{h \in H^{k,IG(k)}}(toyspend_h \times FINLWT21_h)}{\Sigma_{h \in H^{k,IG(k)}} popweight_h}$$

Theoretically, this number should represent the toy budget for a child living in a household with *k* children. However, the data is noisy due to small sample sizes (see Figure 21). To remedy this, LISEP pools the data across all families in the subset, regardless of the number of children, and then smooths the resulting values with a 3-year moving average to get a less volatile estimate of the cost of toys per child. While this somewhat contradicts the practice of considering costs for each family type, LISEP considers it reasonable to assume that the minimally adequate level of spending for toys should not depend heavily on the number of siblings a child has. Within each year, this yields an average toy spending per child:

$$ToySpendPerChild^{IG} = \Sigma_{k=1}^{3}\left[\frac{1}{k} \times \left(\overline{toyspend}\right)_k^{IG(k)} \times (NumKidsWt_k)\right]$$

Finally, the toy spending per child is smoothed using a three-year moving average.[84] No longer omitting the calendar year subscript, each family type is allocated a toy spending budget depending on the number of children present:

$$ToyBudgetAllocation_{k,t} = k \times \frac{\Sigma_{s=t-2}^{t} ToySpendPerChild_s^{IG}}{3}$$

[83] While average spending is allocated based on the middle 50% of households, the household proportions used to compute the average toy spending per child are based on the entire population of households with children. Since the middle 50% is based for each household stratification by number of children, the relative weights of each household type within the middle 50% should be proportional to the relative weights indicated by the proportions of household types out of the entire population. However, in practice there are small differences given how the Stata program computes the middle 50% of the distribution. LISEP opted to use proportions for the entire population as the MQL standard should apply to all households.

[84] The first point of the series (2001) is left unsmoothed while the second point (2002) is the average of the first two years.

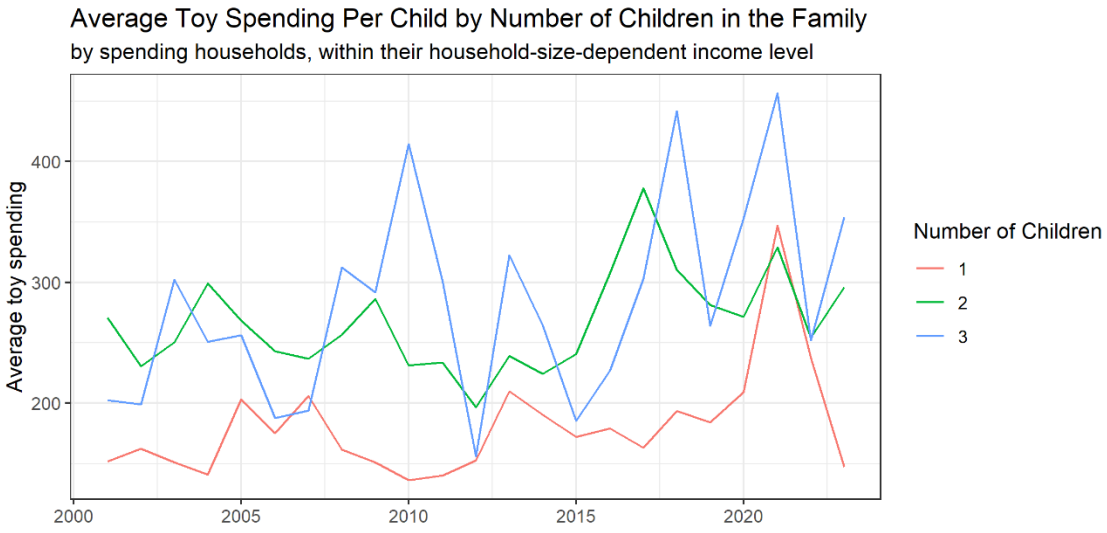


Figure 21: Toy spending per child by number of children in the household

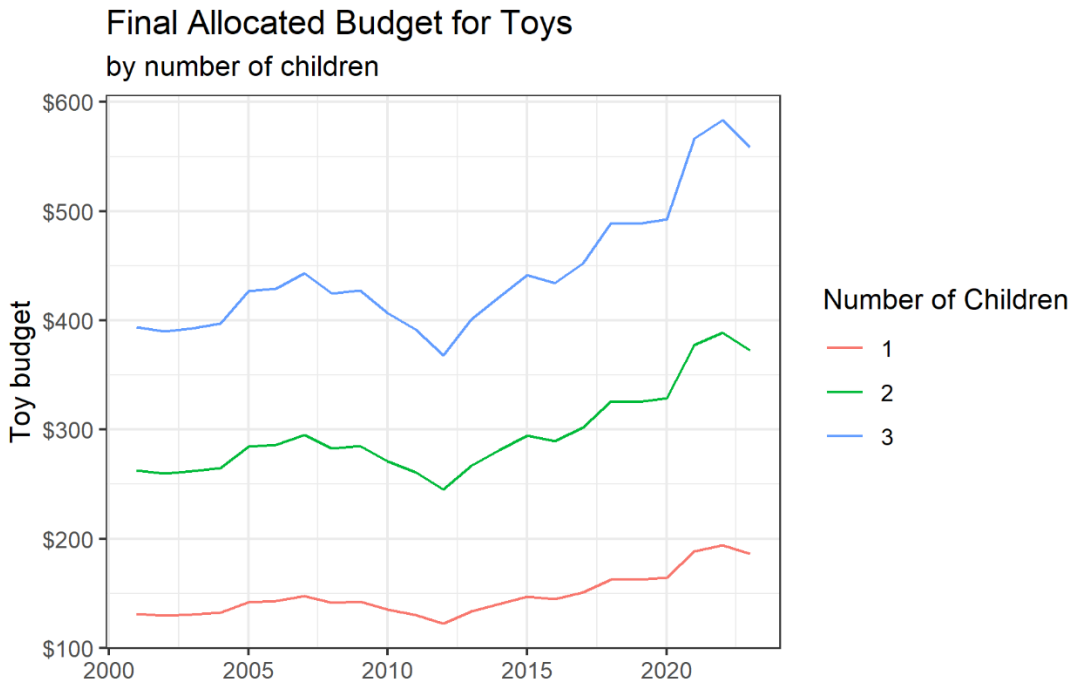


Figure 22: MQL allocated toy spending by number of children in family

Education

Rationale

Since the MQL extends beyond TLC to include the costs of the basic tenets of a middle-class lifestyle, it aims to understand the ability of families to reach the first rung up the ladder to achieving the American Dream. This entails not only that hardworking families can afford basic levels of leisure and wellness, but also that they are able to amass the necessary resources to provide their children a fair shot at maintaining a middle-class lifestyle and climbing the socio-economic ladder.

A proven path for upward social mobility is education, and today, a 4-year's bachelor's degree seems necessary to maintain a middle-class lifestyle from one generation to the next. While 2-year college degrees also provide a significant earnings boost, the net benefits of a 4-year degree are higher in the long term despite the higher cost of attendance.[85] The benefits of a college education extend beyond economic well-being although they are often related to economic factors. College graduates could expect to live for eight years more than non-college graduates in 2021, whose life expectancy has been declining since 2010. This reflects better health for college graduates due to both increased access to healthcare and better behaviors, such as better diets and more frequent exercise.[86] [87]

As a result, the MQL will include the cost of pursuing a minimally adequate 4-year bachelor's degree program. A minimally adequate 4-year bachelor's program entails both a relatively low net cost of attendance as well as a high rate of completion. Attending a 2-year or 4-year higher education institution without graduating is often more damaging from a financial perspective than not attending at all. Given the selectivity and higher costs of private non-profit colleges as well as out-of-state public colleges, LISEP considers attending a public college while paying in-state tuition as an affordable option for higher education in the United States. However, both the quality of education and student outcomes are not necessarily comparable across public institutions within a certain state, so the MQL will focus on the net cost of attending the flagship state school as well as other qualified public universities or campuses. LISEP defines the annual net cost of an institution as the price for the average student paying in-state tuition to attend the

[85] Carnevale, A. P., Rose, S.J., & Cheah, B. (2021). The college payoff: Education, occupations, lifetime earnings. *The Georgetown University Center on Education and the Workforce.* Retrieved from https://cew.georgetown.edu/wp-content/uploads/collegepayoff-completed.pdf.
[86] Case, A., & Deaton, A. (2023, October 3). Without a college degree life in America is staggeringly shorter. *The New York Times*. Retrieved May 14, 2024, from https://www.nytimes.com/2023/10/03/opinion/life-expectancy-college-degree.html.
[87] Trostel, P. A. (2015). It's not just the money the benefits of college education to individuals and to society. *Lumina* Foundation. Retrieved May 14, 2024, from https://www.luminafoundation.org/files/resources/its-not-just-the-money.pdf.

institution, including room and board as well as other necessary expenses, after considering grant and scholarship aid.[88]

LISEP also understands that the traditional 4-year bachelor's degree might not be the desired or best path for everyone for a variety of reasons, and that the value of education extends beyond monetary measures. Even then, families should be able to save up enough so that finances don't become a hurdle for their children to build their careers after high school, whether that be pursuing a bachelor's degree, a 2-year degree, a business venture or anything else. Consequently, the Education portion of the MQL tracks how much each household needs to save annually to afford an adequate 4-year bachelor's degree education for their children at an in-state public college.

Data

To estimate the net cost of education, LISEP uses the Integrated Postsecondary Education Data System (IPEDS) data from the National Center for Education Statistics (NCES). LISEP relies on four data sets. Institutional information and cost data tracks tuition and the additional costs associated with both on- and off-campus resources by institution and year. The Student Financial Aid (SFA) dataset tracks at the institutional level the total amount of grant aid disbursed to undergraduate students, the number of full-time first-time (FTFT) students paying in-state and out-of-state tuition, and, starting in the 2008-2009 school year release, the amount of aid which is disbursed to FTFT in-state students by form of aid and school year. Graduation rates data tracks the percent of students who graduated within 100%, 150% and 200% of normal time to completion for different degree programs by year, institution, and student cohort. Enrollment Data tracks total enrollment for different student groups, including the number of students enrolled by state at each institution. Enrollment Data is used to correct implausible values for in-state student enrollment in the SFA data as detailed in Appendix C.

As described in the aggregation section of this paper, LISEP uses the American Community Survey 1-Year Data files to aggregate the expected necessary annual savings for a 4-year bachelor's degree at a public in-state university to the national level by family type.

Determining the List of Qualified Institutions

To determine the list of qualified institutions, LISEP intended to ensure that the included universities were relatively financially accessible to LMI students, and that the institution had a track record of supporting on-time graduation for its student body. Not earning a degree after paying for higher education usually harms students and their families, in financial terms, more than if they had not pursued a post-secondary degree at all. Finally, the list of qualified institutions needs to be

[88]As a result, financial aid in the form of loans or work-study opportunities is not considered.

nationally representative, so it must include at least one public university from each state and the District of Columbia, and it should provide students with different options when possible.

a) Flagship universities

Since the list of qualified institutions must include a public institution from each state and the District of Columbia, LISEP decided to track the flagship university from each state. Albeit not an officially designated school (e.g. a land-grant university), a flagship institution is usually the most renowned public university in a state and often also the largest, the oldest, or even the "best" academically. Consequently, it makes sense for a family to consider the net cost of their state's flagship school when deciding how much to save for education for their children. While there is no officially recognized list of flagship universities, there is general agreement on what universities are considered flagships for each state. LISEP determined the list of flagship universities from the list of flagship institutions published by the College Board (see Appendix A).[89] For the states where determining the flagship is more debatable (such as Auburn and University of Alabama), often the other contentious institutions are also included in the list because they either meet minimal adequacy at the national or state level. LISEP tracks the net cost at the flagship universities for every year since 2001. Finally, including simply the largest two public universities in each state based on undergraduate in-state student population does not significantly alter the results as shown in Robustness Check C.

b) Universities meeting minimal adequacy at the national level

The second step in determining the list of colleges that families should consider is including the public universities that tend to have better outcomes for students. Obviously, the outcome of pursuing a college education and after graduating depends not only on the specific university but also on many factors within and outside a student's control, and the overall outcome or value of an education cannot be limited to a financial scope. However, the financial component of an education often plays a key role in an LMI student's decision to attend a specific university, and earning a degree is almost necessary to earn a return on the financial investment. In this regard, it makes sense for a student to consider the quality of education and the likelihood of graduating when considering institutions. As a result, LISEP determined that schools meet the minimal adequacy standard at the national level if they rank among the top 15 percent of public schools in terms of 4-year and 6-year graduation rates consistently throughout the considered period. The "nationally adequate" schools are listed in Table 13 in Appendix A and tracked for all years in the sample.

Graduation rates can be a proxy for the relative quality of an institution and the probability that an enrolled, hard-working student will graduate in a reasonable amount of time if the student is diligent. Graduation rates might not necessarily reflect academic quality though.

[89] Ma, J., Pender, M. (2023). Trends in college pricing and student aid 2023. *College Board.* P.16. Retrieved May 14, 2024, from https://research.collegeboard.org/trends/college-pricing/highlights.

They reflect income inequalities as LMI students have lower rates of graduating and on average take longer to complete a degree (for a variety of reasons related to having less income). While imperfect, graduation rates remain helpful for comparing across institutions since all Title IV universities must report annually and since prospective students refer to them both directly or indirectly such as when looking at university rankings, so graduation rates still factor in the decision to apply or attend a school. Likewise, since the MQL assumes that students should have enough means to afford a public 4-year education while living on-campus, some but not all of the negative effects on graduation rates for low-income students would be mitigated. For example, low-income students are more likely to drop out of college or enroll part-time, delaying their graduation, due to difficulties financing their education, but income-related inequalities on college preparedness resulting from gaps in education quality during the K-12 school years would not be erased.[90] [91] Finally, since the financial outcome of an education depends so much on completion, and since education is a large investment for student households, it makes sense for students to consider schools where the likelihood of graduating within four years, and at worst within six years, is higher.

Consequently, LISEP used 4-year and 6-year graduation rates for each institution's Bachelor's subcohort from 2001 to determine the list of public universities that show strong outcomes consistently at a national level.[92] Since all institutions must report graduation rates for students graduating in 150% of the normal time, data for 4-year programs is published with a two-year lag. For example, the latest available data at the time of writing for four-year degrees concerns the cohort that started their post-secondary education in the 2016-2017 school year, so the 4-year graduation rates refer to students earning their degree in 2020 and 6-year rates to students earning their degree in 2022. As new data becomes available, new institutions might get into or out of the list of minimally adequate public universities at the national level. To qualify as minimally adequate, a university must have a strong 4-year and 6-year graduation rate compared to its peers. Because the MQL assumes four years of attending university, the selected universities must have strong 4-year graduation rates along with a strong 6-year rate. While this might mean that schools with strong programs in 4-year degrees that require more credits to graduate than a normal bachelor's degree might be excluded, ensuring that a families

[90] Sawhill, I. (2013, October 8). Higher education and the opportunity gap. *Brookings Institution*. Retrieved May 14, 2024, from https://www.brookings.edu/articles/higher-education-and-the-opportunity-gap/#:~:text=Almost%20half%20of%20all%20college,before%20they%20complete%20a%20degree.
[91] Voss, K., Hout, M., & George, K. (2024). Persistent inequalities in college completion, 1980–2010. *Social Problems*, *71*(2), 480-508. Retrieved from https://academic.oup.com/socpro/article/71/2/480/6550377.
[92] IPEDS defines the "Bachelor's or equivalent subcohort adjusted cohort" as the group of full-time first-time degree seeking students who enrolled in a 4-year degree program at a given year. The "adjusted cohort" refers to the fact that some students are excluded from the final graduation rate calculation because they left the institution for any of the following reasons: death, permanent disability, serving in the armed forces, serving in foreign aid service of the Federal Government or to serve on official church missions. Importantly, this still includes students who transferred out or dropped out of the institution. Retrieved May14, 2024, from https://nces.ed.gov/ipeds/survey-components/9.

in the MQL target schools with good 4-year graduation rates is more important for this research to limit the total expected cost of attendance.[93] Additionally, since four-year graduation rates are significantly lower than 6-year rates (even though the gap has narrowed in recent years) (see Figure 26 in Appendix B), it's important that a school also has a good 6-year graduation rate to ensure a good chance of completion.[94]

LISEP decided to include institutions that consistently ranked among the top 15% of public universities nationally in terms of both 4- and 6-year graduation rates. Since graduation rates, and especially 4-year rates, have improved considerably over the last two decades, setting an absolute floor would have been too restrictive. For example, a 4-year graduation rate of 40% would not rank in the top 15% today but it would have for the 2001 cohort.[95] Additionally, using the 85th percentile as a threshold results in three quarters of students at selected institutions completing their degree in 6 years today compared to 70% for the 80th percentile, and in at least half of students completing their bachelor's within 4 years starting with the 2011 cohort. By contrast, setting the 80th percentiles as the threshold would mean that this only happens starting with the 2015 cohort (see Figure 27 in Appendix B). Consequently, LISEP believes that using the 85th percentile as a threshold for public schools with minimally adequate graduation rates is the best for balancing selectivity while providing a greater number of adequate options when possible.

Finally, LISEP determines that a school is minimally adequate at the national level if they meet the 85th percentile threshold for 4-year *and* 6-year graduation rates in at least half of the tracked years. As new years' graduation rates data emerges, LISEP might need to update its method since strong schools in present time might not have been strong in the early 2000s, and vice versa.

c) Universities meeting minimal adequacy at the state level

Finally, the list must account for public universities that might be just as desirable or qualified as the state flagship since the MQL assumes that a student will attend an in-state school. An institution must meet the following three conditions to be considered minimally adequate at the state level:

[93] In practice, this meant that some schools with strong STEM programs like Purdue University or Georgia Tech were excluded from the list.

[94] For the 2016 cohort graduating in 2020-2022, the 4-year graduation rate for public institutions was 58% at the 85th percentile and the 6-year rate was 75%.

[95] To calculate the percentile of graduation rates, LISEP used weights based on the institution size category to ensure that the percentiles were not overly influenced by small institutions (if unweighted) or by very large institutions (if weighting by enrollment). The institution size category in IPEDS is defined as "Under 1000" for 1, "1,000 -4,999" for 2, "5,000 – 9,999" for 3, "10,000 – 19,999" for 4, and finally "20,000 and above" for 5. Consequently, a university with 60,000 will have 5 times the weight as a university with 999 students and the same weight as one with 20,000 students rather than 60 times and 3 times more if weighted by enrollment.

1) **Comparable Quality:** The institution's 4-year graduation rate must be at least equal to 90% of the state's flagship university's graduation rate.
2) **Cost Competitive:** The institution's expected net cost of failing to graduate in four years must be lower or equal to the flagship university's (see equation at the end of the section)
3) **Consistency**: The institution must meet the conditions of Comparable Quality and Cost Competitiveness in at least three of the preceding 5 years.

If a state's flagship has a low graduation rate or is expensive, then the MQL should consider better available alternatives. If another public university has a better graduation rate than the flagship at a comparable cost, the student should also consider the non-flagship school even if it does not meet the national minimal adequacy level. Similarly, if a public 4-year college in a state has a lower net cost than and a comparable graduation rate to the flagship institution, then that school should also be considered. This reasoning likely also reflects how families make decisions on what university to attend when factoring in the cost and the quality of the university. Consequently, LISEP introduced comparable schools at the state-level in years where there were adequate alternatives based on graduation rates and net cost estimates from 2006 onwards.

The condition of comparable quality ensures that selected institutions provide at least a comparable quality of education to the flagship. Some 4-year public institutions can have a lower net cost despite also having a significantly lower graduation rate than the flagship because they have a much lower attendance cost. However, this lower cost is also accompanied by a significantly lower chance of graduating in 4 years than at the flagship, which suggests that the provided service is of lower quality and less prestigious than at the state's flagship. The comparison at the state level focuses on the 4-year graduation rate published in the given year rather than the freshman cohort to which that rate applies. So, in 2022 families will consider the 4-year graduation rate published in 2022 (as well as those from 2018-2021) which applies to the freshman cohort starting university in 2016.[96]

The cost competitive condition ensures that selected institutions don't inflate the minimal cost of education in each state while also incorporating more affordable alternatives of comparable quality when possible. It can be expressed as:

$$ENC_{i\,t} = 4 \times NC_{i\,t} \times \left(1 - GR^{4}_{i\,t}\right)$$

Where *ENC* denotes the Expected Net Cost of not graduating in 4 years, *NC* the observed net cost of attendance in year *t* at institution *i*. GR^4 refers to the 4-year graduation rate published in year *t* at institution *i*, so $\left(1 - GR^{4}_{i\,t}\right)$ describes proportion of bachelor's FTFT students who did not

[96] Since institutions report graduation rates based on completing the degree in 150% of normal time, the 4-year graduation rates are published for cohorts that began college 6 years prior.

graduate within 4 years from the published year's initial cohort. Consequently, *ENC* can be interpreted as the expected expenditure borne by a student after four years of attending that institution without graduating. For example, if the net cost of the school flagship *F* in state *S* in year *t* is $10,000 and their graduation rate is 50%, then the expected net cost of *F* would be $20,000 in year *t*. If school *C* in state *S* has a net cost of $9,000 and a graduation rate of 48%, then their expected net cost for year *t* would be $18,720. Since *C*'s expected net cost is lower than the flagship F's, then *C* meets the cost competitive condition for year *t*. However, if *C*'s graduation rate was 44% instead of 48%, then their expected net cost of $20,160 would be larger than *F*'s, so *C* would not meet the cost competitive condition. Opportunity costs of going to college are not accounted for since they are assumed to be the same for the student regardless of the institution they choose to attend.

Finally, the consistency condition serves both purposes of preventing institutions from joining and dropping from the list continuously because of yearly changes in the data or outliers and of modelling how a family might think of the reputation of a university. Likely, students and their families look at longer time horizons when making assessments on different schools' cost, quality, and their expected value of attending and graduating from that school.

Regarding data, LISEP used the same data sources and methodology as detailed in the following Calculation section to compute the flagships' and each 4-year public institution's net cost. Since financial aid data before the 2006-2007 school year isn't great, LISEP only calculated the expected net cost for comparable institutions from 2006 to 2021, the latest available year. LISEP assumes that if an institution was comparable in the latest available year, it will also be comparable in the following year until new data is published. LISEP also assumes that if a university was comparable from 2006 to 2010, then it's also comparable from 2001 to 2005, which also mitigates jumps in the final state-level cost that might arise from wrongly excluding institutions. To meet the consistency condition from 2006 through 2009, the MQL considers the 4-year graduation rates published in the preceding 5 years (so 2007 considers graduation rates from 2003-2007), but it considers the expected net cost from 2006 through 2010 rather than the preceding 5 years given data unavailability. Consequently, an institution must meet the cost competitive condition in 3 of the 5 years between 2006 and 2010 to be considered in those years. Finally, the list of state-level comparable institutions that the MQL tracks is available in Table 14 in Appendix A, as well as the years in which they are included.

Calculation

1. Determining the on-campus sticker cost

To determine the average cost of attending a 4-year in-state college, LISEP must track both the sticker price of attendance as well as the financial aid received by first-time, full-time (FTFT) in-state students in the form of grants to compute the net cost of attendance for each year. LISEP defines the sticker cost of attendance as the on-campus sticker price. LISEP decided to consider

the on-campus cost of attendance for a variety of reasons, including the fact that most first-year full-time students living on their own live in on-campus housing across most colleges, better quality of the institution's reported data than of their off-campus room & board cost data, and guaranteeing that the assigned housing meets the TLC's adequacy standards.[97] Using institutional-level data from IPEDS' Institutional Characteristics data files on "Student Charges for Full Academic Year" (IC2001_AY through IC2022_AY), LISEP can determine the on-campus sticker cost for in-state students for the academic year as the total of published in-state tuition and fees, room and board expenses when living on-campus, cost of books and other supplies, and other on-campus expenses as reported in the data (see Appendix E for specific variables). LISEP takes the most recently available data for each year, which entails using "Final Release" data that includes final revisions by institutions for most years, and "Provisional" data, which has undergone NCES data quality control procedures and is the best data available for recent school years. Consequently, LISEP computes the on-campus cost as:

$$OnC_t = TF_t + RB_t + BS_t + OE_t$$

Where *t* denotes the year of each expense. *OnC* denotes total in-state on-campus sticker price; *TF* denotes published in-state tuition and fees; *RB* denotes the reported room and board expenses for living on-campus; *BS* the cost of books and supplies and *OE* the reported cost of other expenses for living on-campus.

2. Determining the average aid received by a first-time full-time student paying in-state tuition

The other component needed to calculate the yearly net cost of attendance at selected institutions is the average financial aid received by in-state first-time, full-time degree-seeking students. LISEP only accounts for the average financial aid received by students in the form of grants, so this excludes all forms of loans as well as work-study grants that are compensation for and contingent on a student working a part-time job. LISEP uses financial data from the Student Financial Aid (SFA) component of the IPEDS to estimate the average grant aid received by FTFT degree-seeking students paying in-state tuition.

a) 2006 and beyond

Starting in the SFA release for the 2008-2009 school year, the SFA data provides more specific information on the type and amount of financial aid received by FTFT degree-seeking students receiving grant and scholarship aid (group 1) and receiving Title IV federal student aid (group 2). For public institutions, group 1 and group 2 data only include students paying in-state or in-district tuition, so LISEP can estimate the average aid allocated to in-state students by using group 1

[97] Reference Section 3.d.iii regarding the special case of the school year Fall 2020-Spring 2021 to also include off-campus students living without their family for stats showing that most first-time full-time students live on-campus. Similarly, given that the IPEDS cost data is reported by the institutions themselves, the sticker cost of room and board is reflective of the prices charged to students for on-campus housing and on meal plans.

financial aid data. The 2008-2009 SFA release reports data starting in the 2006-2007 school year through the 2008-2009 school year. At the time of writing, the latest available SFA release is for the 2021-2022 school year, so LISEP can track the average grant aid received for group 1 students paying in-state tuition from the 2006-2007 school year to the most recently released school year. Finally, since the SFA data also provides population counts for group 1 students as well as for the total number of in-state FTFT degree-seeking students, LISEP can compute the average aid received by FTFT degree-seeking student going to their state school (see Appendix for specific variables):

$$A_{T\,t} = A_{1\,t} \times WT_{1\,t} + A_{0\,t} \times WT_{0\,t}$$

Where *A* denotes the average grant or scholarship aid from federal, state or local governments, and institutional sources received by a certain group (in dollars) and *WT* the population weight of that certain group in year *t*. *T* denotes all in-state FTFT degree-seeking students, *1* denotes group 1 students (i.e. the FTFT degree-seeking students receiving grant or scholarship aid) and *0* denotes FTFT degree-seeking students paying in-state tuition who are not receiving grant or scholarship aid. Since the SFA data reports the number of group 1 students ($SPop_1$) and the total number of in-state FTFT degree-seeking students ($SPop_T$), LISEP can determine:

$$WT_{1\,t} = \frac{SPop_{1\,t}}{SPop_{T\,t}} \quad \text{and} \quad WT_{0\,t} = 1 - WT_{1\,t}$$

Finally, since students who are not in group 1 do not receive grant or scholarship aid from government or institutional sources, $A_{0\,t}$ equals 0. Consequently:

$$A_{T\,t} = A_{1\,t} \times WT_{1\,t}$$

b) 2001-2005

i) Data available

Even though the financial aid data for the school years 2001-2002 through 2005-2006 is not as granular as the data starting from 2006-2007 (available in the 2008-2009 release), LISEP can still impute the average aid received by FTFT degree-seeking students paying in-state tuition at the tracked institutions. The SFA data reports the total dollar amount of aid reported in the form of grants from federal, state, or local governments, and institutional sources to all FTFT degree-seeking undergraduates at each institution. It also provides FTFT student counts that allow to track the number of in-state FTFT degree-seeking population as well as the total FTFT student undergraduate population. To determine the average grant aid received by an in-state student for the years 2001 through 2005, the missing data is how much of the total disbursed grant aid in-state students received. Using SFA data starting in 2008, LISEP can find how much grant aid was disbursed to in-state students ($A_{T\,t} \times SPop_{T\,t}$), how much grant aid was disbursed to all FTFT students, and the FTFT student count by in-state or out-of-state status. Consequently, LISEP was able to model how much of the observed total grant aid went to in-state students at each institution

from 2001 through 2005 based on the share of in-state students at each school and the total amount of grant aid going to in-state students as a percent of total amount of grant aid disbursed to all students from 2008 through 2021. In this LISEP controlled for institution and time fixed effects. The institutions tracked in the model are the state flagship schools, the minimally adequate universities at the national level, and the minimally adequate universities at the state level for which data for 2001-2005 is needed.

ii) Imputing average aid by institution

The model is set up with the percent of FTFT degree-seeking students paying in-state at each institution from 2001 through 2021 and with the share of grant aid these students received out of all grant aid disbursed from 2008 through 2021.[98] With this data, LISEP runs the following two-way fixed effects panel regression to model the share of aid going to in-state students between 2001 and 2007:

$$Y_{t\,i} = \beta_1 \times X_{1\,t\,i} + \tau_t + \varphi_i + \varepsilon_{t\,i}$$

Where *Y* is the dependent variable referring to the share of grant aid going to in-state students, and X_1 the independent variable of the percent of FTFT degree-seeking students paying in-state tuition at institution *i* in year *t*. β denotes the coefficient of the independent variable X_1. τ_t is the time-specific effects of year *t*, ϕ_i is an institution-specific constant that captures heterogeneities across institutions (i.e. the fixed effect of institution *i*), and $\varepsilon_{t\,i}$ is the error term for institution *i* at time *t*.

The fixed effect model found the overall R-squared to be 0.6813, the within institution R-squared to be 0.3581 and the between institution R-squared to be 0.7377. The coefficient β_1 for the percent of FTFT degree-seeking students paying in-state tuition at an institution was 0.6764. This suggests that the share of students who pay in-state tuition at a university, together with variables for fixed year- and institution-specific effects, explains variation in the share of grant aid disbursed to in-state students across institutions, but it explains a lesser – but still substantial - fraction of variation at a given institution over time. The summary results of the regression are in Appendix D. It is worth noting that the goal here is not to prove causation; however, this association is strong enough that we believe it reasonable to use the percent of FTFT degree-seeking students paying in-state tuition as a component in our model for imputing the share of financial aid disbursed to in-state students prior to 2008.

Finally, LISEP determines the average aid received by in-state students between 2001 and 2007 at each institution by applying the trends of the forecasted series to the observed series of the percent of aid disbursed to in-state students starting in 2008. Consequently, the final percent of aid disbursed to in-state students from 2001 to 2007 can be formulated as:

[98] Reference Appendix C for the method LISEP used to impute the rate of FTFT in-state students at each institution for instances where data quality was an issue.

$$\theta_{t\,i} = \gamma_{2008\,i} + (Y_{t\,i} - Y_{2008\,i})$$

Where *Y* is the dependent variable from the panel regression referring to the share of grant aid going to in-state students in year *t* and institution *i* and γ refers to the observed share of grant aid going to in-state students. θ denotes the estimated share of grant aid disbursed to in-state students from 2001 through 2007. This allows to estimate the average aid received by a FTFT degree-seeking student paying in-state tuition as:

$$A'_{T\,t\,i} = \frac{\theta_{t\,i} \times \alpha_{t\,i}}{SPop_{T\,t\,i}}$$

Where A'_T refers to the estimated average aid received by FTFT degree-seeking students paying in-state tuition in year *t* at institution *i*. θ denotes the estimated share of grant aid disbursed to in-state students from 2001 through 2007 while α refers to the total grant aid disbursed by the institution each year. Finally, $SPop_T$ denotes the total FTFT degree-seeking student population paying in-state tuition.

3. Determining net cost of attendance by institution

LISEP defines the annual net cost of attendance at an institution as the amount a student must pay to attend college at that institution while paying in-state tuition and living on-campus. So, the annual net cost of attendance (*NC*) is the difference between the sticker price of living on campus (*OnC*) and the average aid received by an in-state student (A_T):

$$NC_{T\,t} = OnC_t - A_{T\,t}$$

a) 2001-2005

From 2001 through 2005, the net cost of attendance at each institution is derived from the sticker-cost of living on-campus taken from reported institutional data and from the estimated average grant aid received by in-state students estimated based on the model in Section 2b.

b) 2006 and beyond

From 2006 through 2021, or the year with the latest SFA data release, the net cost of attendance at each institution is derived from the sticker-cost of living on-campus taken from reported institutional data and from the estimated average grant aid received by in-state students which LISEP estimated based on reported SFA data as in Section 2a). The only exception is the year 2020, or the school year 2020-2021, where LISEP also accounted for off-campus living costs given consequences of the Covid-19 pandemic (see point iii) on Section 3d)).

c) New years with available cost data but without student financial aid data

Because the SFA data collection lags one year (meaning data for the 2021-2022 school year is collected in the 2022-2023 period and first released at the end of 2023) while the Institutional

Characteristics data does not (meaning the cost data for 2021-2022 is first released in 2022),[99] LISEP must also impute the average aid estimate for new years even if it has the reported sticker price data of living on-campus for in-state students. LISEP decided to compute the temporary estimate based on the assumption that the ratio of on-campus sticker price and the average grant aid received stays constant from one year to the next. In other words, if the sticker cost of living on-campus and paying in-state tuition increased 3% from one year to the next, then the average aid received by in-state students at each institution also increased 3%. Overall:

$$NC'_{T\,j} = OnC_j - A'_{T\,j}$$

Where *j* denotes the year with the most recently available cost data, *NC'* the provisional estimate of net cost of attendance and *A'* denotes the provisional estimate of average grant aid received by FTFT in-state students such as:

$$A'_{T\,j} = \frac{OnC_j}{OnC_{j-1}} \times A_{T\,j-1}$$

Unfortunately, the amount of aid disbursed by public institutions to in-state students can vary year-on-year based on characteristics from the composition of the new freshman class, financial support from state and federal governments, financial goals and health at the institutional level, and likely other factors.[100] Given the difficulty to make a robust prediction of disbursed grants to FTFT in-state students and the inconsistent trends in the change of the percent of sticker costs covered by grant aid across, LISEP finds keeping the ratio of average aid and on-campus sticker price constant more appropriate for a temporary estimate. This might also be more reflective on how families plan to save for college - assuming income stays constant - since changes in the sticker cost of attendance are usually reported first.

d) Special Cases

i) University of the District of Columbia

The University of the District of Columbia, the flagship university of DC, had two issues. First, the SFA data did not report the more granular estimates for group 1 students for the years 2006-2007 and 2007-2008, so LISEP estimated the average aid for those two years with the same method as for the years 2001-2005. Since the model produces estimates for the share of aid disbursed to in-state students for the years 2001 through 2021, it was possible to impute the average aid received by in-state FTFT UDC students in 2006 and 2007 as well. Second, UDC only reports room & board costs and other expenses for students living off-campus. The reason for this

[99] National Center for Education Statistics. (n.d.). Timing of IPEDS data collection, coverage, and release cycle. Retrieved May 14, 2024, from https://nces.ed.gov/ipeds/use-the-data/timing-of-ipeds-data-collection

[100] For example, state funding of financial aid and in-state student enrollment usually go together. When funding is cut, less financial aid is available for in-state students and in-state enrollment at public institutions is lower. Monarrez, T., Hernandez, F., & Rainer, M. (2021). Impact of state higher education finance on attainment. *Urban Institute*. Retrieved from https://www.urban.org/research/publication/impact-state-higher-education-finance-attainment.

is that most UDC students do not live in university-provided student housing. Until 2010, only student athletes lived in "official" student housing while attending UDC, and since then only a minority of UDC undergraduate students live on-campus, so off-campus living costs are more relevant for this student population.[101] Thus, LISEP takes the reported sticker price of living off-campus without family while paying in-state tuition for UDC instead of the on-campus sticker cost to compute the net cost of attendance.

ii) University of South Carolina - Columbia

For the years 2006 and 2007, LISEP was unable to calculate the net cost at the University of South Carolina – Columbia using the SFA data from 2008 since the reported number of group 1 students for the school years 2006 and 2007 was over 30% larger than the total in-state full-time first-time student count from the 2006 and 2007 SFA datasets. This is likely due to data entry inconsistencies across time from the institution. To avoid inflating the amount of grant aid received by the average student in 2006 and 2007, LISEP decided to estimate the average aid received by an in-state student using only SFA data from 2006 and 2007 for those years and conducted the same calculation as for the years 2001-2005. If the 2006 and 2007 SFA reports underestimated the number of in-state students compared to other years because of inconsistency in reporting, the model predicting the share of all aid that would be disbursed to in-state students suggests that if the in-state student count was indeed lower, then those students would have received a proportionally lower share of all aid. Consequently, this mitigates how the undercount of all in-state

[101] University of the District of Columbia. (n.d.). Student housing at UDC Past. Present. Future. Retrieved April 2, 2024, from http://files-do-not-link.udc.edu/docs/Housing_Past_Present_Future_Format_2_2.pdf.

students might artificially inflate the estimate of average aid received by an in-state student.

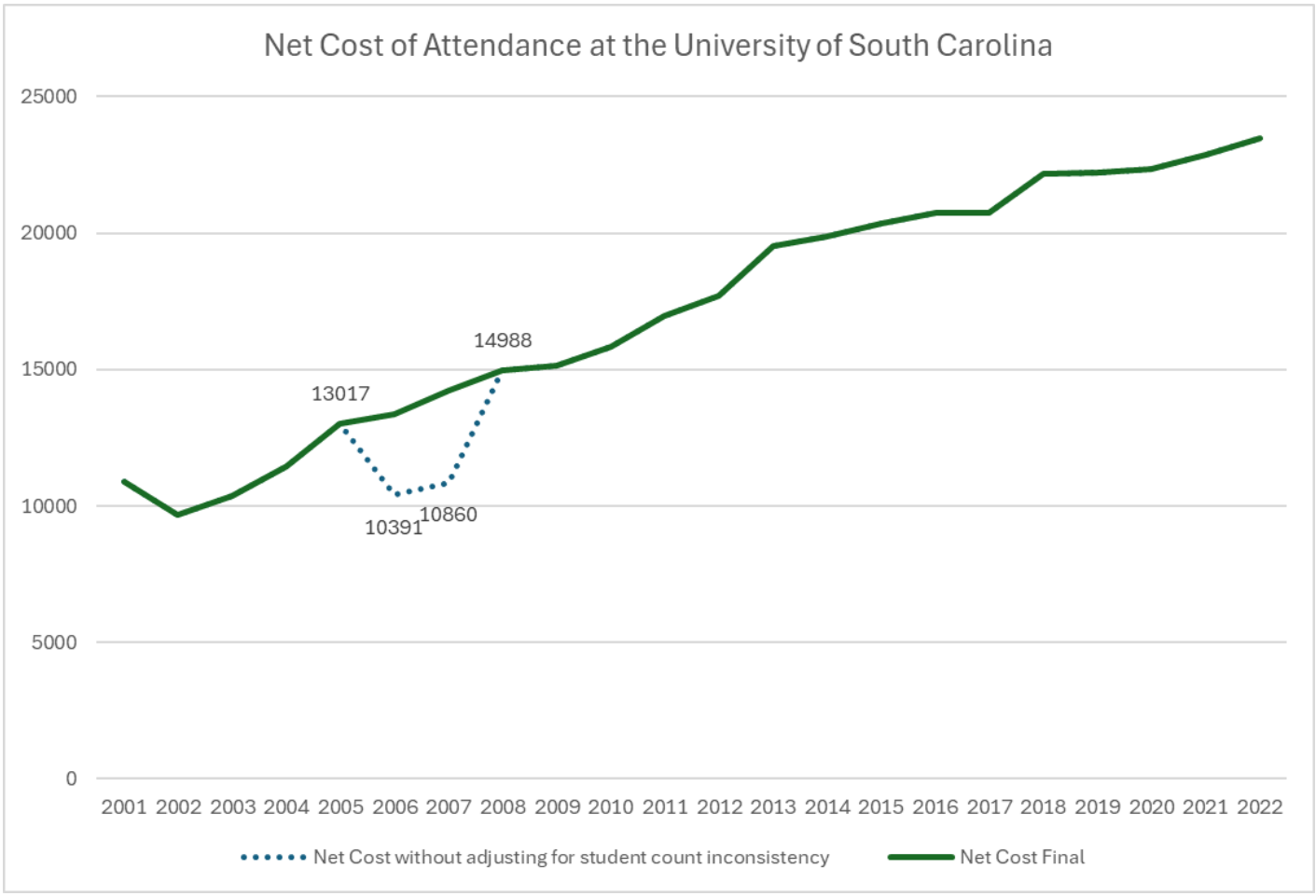


Figure 23: Net cost of attendance at the University of South Carolina

iii) Fall 2020-Spring 2021 School Year

Because of the Covid-19 pandemic, fewer FTFT degree-seeking students lived on-campus relative to other years. Among group 1 students, the median rate of students living on-campus was 78.4% in Fall 2020 compared to 87.8% in 2019 and 84.3% in 2021. Overall rates of on-campus living ranged from 32.4% at the 10th percentile, 51.0% at the 25th, 88.8% at the 75th and to 96.9% at 90th percentile in 2020 while in 2019 they ranged from 62.7% at the 10th percentile to 93.3% at the 75th percentile. Consequently, a significantly different number of in-state students lived off-campus in 2020-2021 school year, most likely because of a mix of online or hybrid learning, fewer spots in on-campus housing to maintain social distancing and provide a space for students to safely quarantine, and worries related to contracting Covid-19 if living in on-campus housing. Depending on the institution, this difference is more or less incidental.

As a result, LISEP decided to also account for the cost of living off-campus without a family for 2020 in the sticker cost. This excludes the costs perceived by students living off-campus with their

family for multiple reasons. First, the IPEDS IC cost survey does not provide data on room and board expenses for students living with their families. Second, even if this information were provided, this option is not viable for all students because they live far from campus and are unable to commute to classes. Since living with one's family is significantly less expensive than having to rent housing and buy one's own groceries, including this option in the sticker cost calculation would result in lowering the average sticker cost by adding an option that is not accessible or minimally adequate for all students. Finally, the sticker cost for 2020 and the net cost is computed as:

$$StC_{2020\,i} = OnC_{2020\,i} * WT_{OnC\ 2020\,i} + OfC_{2020\,i} * WT_{OfC\ 2020\,i}$$

Where

$$OnC_{2020\,i} = TF_{2020\,i} + RB_{OnC\ 2020\,i} + BS_{2020\,i} + OE_{OnC\ 2020\,i}$$

$$OfC_{2020\,i} = TF_{2020\,i} + RB_{OfC\ 2020\,i} + BS_{2020\,i} + OE_{OfC\ 2020\,i}$$

And: $$WT_{k\ 2020\,i} = \frac{SPop_{k\ 2020\,i}}{SPop_{OnC\ 2020\,i} + SPop_{OfC\ 2020\,i}}$$

StC refers to the average sticker cost for the year 2020 at institution *i*. *OnC* denotes the sticker cost for on-campus students and *OfC* the sticker cost for off-campus students living without family. The sticker cost is composed of in-state tuition and fees (*TF*), room and board (RB), books and supplies (*BS*), and other expenses (*OE*). *WT* refers to the relative weight of on-campus students ($SPop_{OnC}$) and off-campus students living without family ($SPop_{OfC}$). The term *k* denotes whether the considered group is students living on-campus (*OnC)* or off-campus without family (*OfC)*. Consequently, the annual net cost of attendance (*NC*) is the difference between the average sticker cost and the average aid received by an in-state student (A_T):

$$NC_{T\ 2020\,i} = StC_{2020\,i} - A_{T\ 2020\,i}$$

4. Determining the minimal savings for education by family type

The MQL indicates how much a family should budget annually to be on track for minimal education savings for its eight different family types (single or dual-headed households with one to three children). Since the MQL assumes that a minimally adequate level of education involves attending an in-state school, LISEP needs to aggregate the net cost data from the institutional to the state level to determine the savings target of each family type in every state. Finally, LISEP can estimate the national average savings needed by family type and the pace at which necessary savings increased using population weights from the American Community Survey (ACS), consistent with aggregation method for the MQL.

Determining the average net cost of attendance by state

LISEP estimates the average net cost of attendance at the state level based on the net cost of attendance of that states' qualified institutions. For states with only one qualified institution, the

annual net cost of attendance for that institution is the state's average net cost of attendance for one student. For states with multiple qualified institutions, the average net cost of attendance is the average of each university's annual net cost weighted by their respective in-state student population, so larger schools will have a larger incidence on that state's cost. The annual in-state student population at each institution is determined from the SFA's count of total number of FTFT degree-seeking students paying in-state tuition since the tracked net costs are relevant for this population. For the institutions where adjustments or imputations to the SFA in-state rate had to be made for the model on Section 2, the same changes apply for the total in-state student count. Finally:

$$\mu_{t\,s} = \sum_{i=1}^{n} NC_{t\,i} \times WT_{t\,i}$$

Where $\mu_{t\,s}$ denotes the average net cost at each state (*s*) in each year (*t*). *NC* denotes the net cost at each institution (*i*), *n* the number of institutions in the state and *WT* the annual weight of each institution relative to the other qualified universities in the state. The weight is the total FTFT degree-seeking student population paying in-state tuition ($SPop_T$)'s proportion to the sum of all FTFT degree-seeking in-state students at qualified institutions in the state:

$$WT_{t\,i} = \frac{SPop_{T\,t\,\,i}}{\sum_{i=1}^{n} SPop_{T\,t\,\,i}}$$

See Table 16 and 17 in Appendix A for the net cost of attendance at each institution in 2008 and 2021 as well as the average net cost of attendance at each state.

Determining minimal savings by family type at state-level

Having the average annual net cost of attendance at a four-year public in-state college, it's possible to determine how much each family type should save yearly at each state. Families should target the total net cost of attending an in-state four-year institution for the current year, which means that their target must amalgamate enough savings for a minimum of four years of attendance for each child by the start of their freshman year. Since total net costs change year-to-year, LISEP assumes that families adjust their savings target accordingly. Different financial tools and plans to save for and finance an undergraduate education can vary significantly from one family to another depending on contingent household finances and expected financial aid, risk tolerance, perceived value of education, accessible savings instruments, and other factors. To facilitate analysis of necessary savings over time, LISEP makes the following assumptions:

i) **Compound rate**: Assume that families set money aside on a savings account with a relatively low-risk interest rate that stays constant over time. LISEP sets this value at 4%, but also conducts robustness checks to assess how changing this level might affect the final output (see Robustness Checks A), based on the average yield on Treasury

securities at 20-year constant maturities between 2001 and 2022.[102] Treasury securities are "considered a safe and secure investment option because the full faith and credit of the U.S. government guarantees that interest and principal payments will be paid on time."[103]

ii) **Target:** Assume that families aim to build up enough savings to finance four years of college based on that year's net cost without having to take on debt. Increases in tuition, room & board or other necessary expenses once the child is already enrolled in college can be covered by the continued accrued interest on the savings plan and by the student taking on a part-time or summer job if needed.
Building up assets to finance a child's education will likely reduce the family's need-based aid received since they can contribute more to their child's education, so using the average net cost as a target might slightly underestimate the necessary savings. However, a parent's annual income plays a larger role than assets in determining aid level and eligibility, so the overall negative impact is limited on a family's experienced net cost.

iii) **Smoothed Savings:** LISEP assumes that each family plans to set aside the same amount of money each year for each child when making their savings decision. Their savings decision is based on how much money they would need to set aside each year over 18 periods (from age 0 to 18), earning the same annual interest rate from i), to reach the target savings for that year of two. This makes the implicit assumption that each year a family is "on track" with their college savings for each child, so the family sets aside the same amount for their four-year old child as for their twelve-year-old child. See example A for how this assumption influences the final output.

To determine the target level of savings for each family type, the average net cost of each state is multiplied for each the number of children in each family type and by each year of college attendance, which is assumed to be 4:

$$Target\ Total\ Savings_{t\,s\,f} = \mu_{t\,s} \times N_f \times 4$$

Target Total Savings refers to the savings amount a family type (*f*) residing in state *s* should target in year *t* to send their children to college. $\mu_{t\,s}$ denotes the average net cost at each state (*s*) in each year (*t*) to attend college at a qualified 4-year institution paying in-state tuition and being a FTFT student. *N* denotes the number of children in each family type *f*. LISEP's eight different family types include single (family types1-4) and dual-headed households (family types 5-8) with 0 to three

[102] Board of Governors of the Federal Reserve System (US). (2024). Market yield on U.S. Treasury securities at 20-year constant maturity, quoted on an investment basis [DGS20]. Retrieved May 14, 2024, from FRED, Federal Reserve Bank of St. Louis: https://fred.stlouisfed.org/series/DGS20.
[103] Treasury Direct. (n.d.). FAQs about Treasury marketable securities Why should I buy a Treasury security. Retrieved May 14, 2024, from https://www.treasurydirect.gov/help-center/marketable-faqs/#:~:text=Treasury%20securities%20are%20considered%20a,will%20be%20paid%20on%20time.

children (e.g. a family type 5 is a couple household with no children while a family type7 is a couple household with 2 children).

Because LISEP assumes a constant 4% compounding rate over 18 periods where families plan to set aside the same amount each period, it's possible to determine the yearly savings needed to meet the total savings target.

$$Target\ Total\ Savings_{t\,s\,f} = \sum_{p=1}^{18} Yearly\ Savings_{p} \times (1+r)^{(19-p)}$$

Target Total Savings refers to the savings amount a family type (*f*) residing in state *s* should target in year *t* to send their children to college. The interest rate *r* of 4% is compounded over 18 periods (*p*), with families planning to set aside the same *Yearly Savings* each period. Because *Yearly Savings* is constant, it's possible to rewrite the formula and solve the equation to determine the needed level of *Yearly Savings*:

$$Target\ Total\ Savings_{t\,s\,f} = Yearly\ Savings_{t\,s\,f} \times \sum_{p=1}^{18} (1+r)^{(19-p)}$$

$$Yearly\ Savings_{t\,s\,f} = \frac{Target\ Total\ Savings_{t\,s\,f}}{\sum_{p=1}^{18}(1+r)^{(19-p)}}$$

And since the interest rate r is 4%, the final formula is:

$$Yearly\ Savings_{t\,s\,f} = \frac{Target\ Total\ Savings_{t\,s\,f}}{26.67123}$$

Aggregating to the national level by family type

Finally, LISEP aggregates the needed savings from the state to the national level by family type to produce a nationally representative average.

For each family type, LISEP determines the weight of each state based on their population of the number of households corresponding to the family type for each year. For example, if Texas has 10% of national population and is made up of 26% family type 6 (FT6) households in 2021, then FT6 households in Texas represent 2.6% of the national population in 2021. Additionally, if 20% of all households nationally are FT6, then Texas resides 13% of FT6 households, so when calculating the national needed annual savings for education, Texas will have a weight of 13%.[104] Consequently, the national needed savings for each family type each year can be expressed as:

[104] Note: these are not actual numbers but rather an example of how the aggregation works.

$$National\ Savings_{t\,f} = \sum_{s=1}^{51} Yearly\ Savings_{t\,s\,f} \times WT_{t\,s\,f}$$

$$\text{Where: } WT_{t\,s\,f} = \frac{Pop_{t\,s\,f}}{\sum_{s=1}^{51} Pop_{t\,s\,f}}$$

Where *Pop* denotes the number of households of a family type *f* in state *s* for a given year *t*. Since there are 51 states including the District of Columbia, the denominator is the sum all households of a family type *f* in the nation in a given year *t*.

Results

Overall, LISEP estimates that the necessary annual savings to send a child to college have risen from almost $1,600 per child in 2001 to over $3,500 per child in 2023 (Figure 24). Nationally, households hoping to send their children to a decent public in-state college must save 121.7% more per year in 2023 than they did in 2001 (Figure 25). The cost of higher education increased significantly throughout the 2010s, with necessary savings increasing by 75% between 2001 and 2012, or 5.2% annually, while the level of needed savings increased by 26.7% between 2012 and 2023, or 2.2% annually.

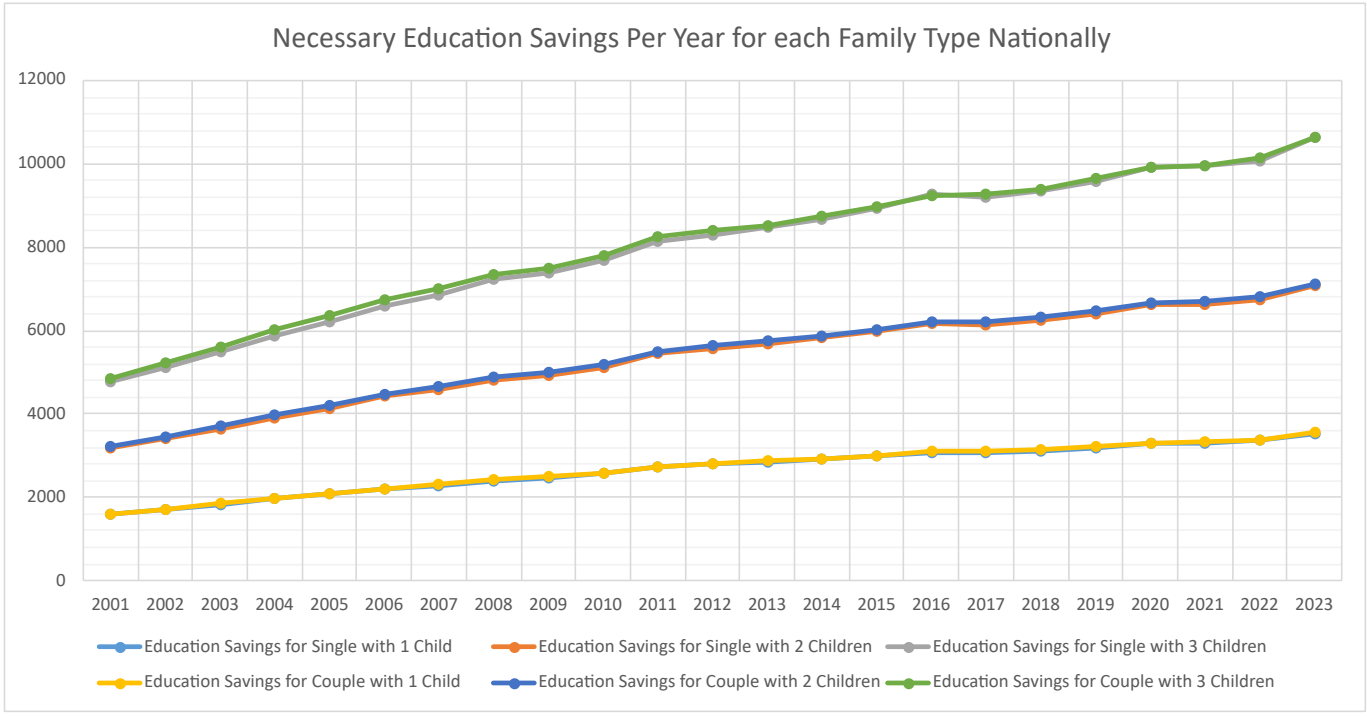


Figure 24: MQL necessary savings per year for each family type

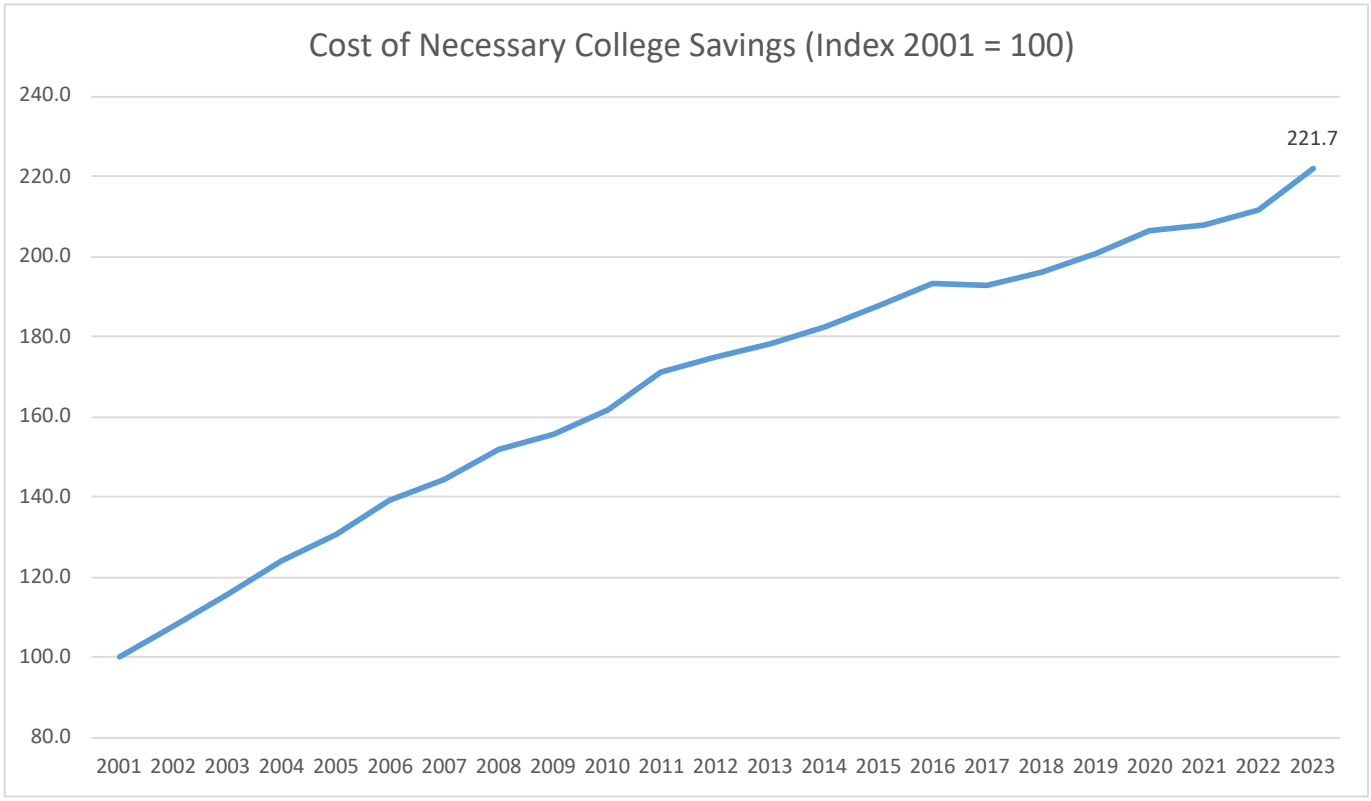


Figure 25: MQL cost of necessary college savings (index 2001 = 100)

Robustness Checks

A - Changing interest rates

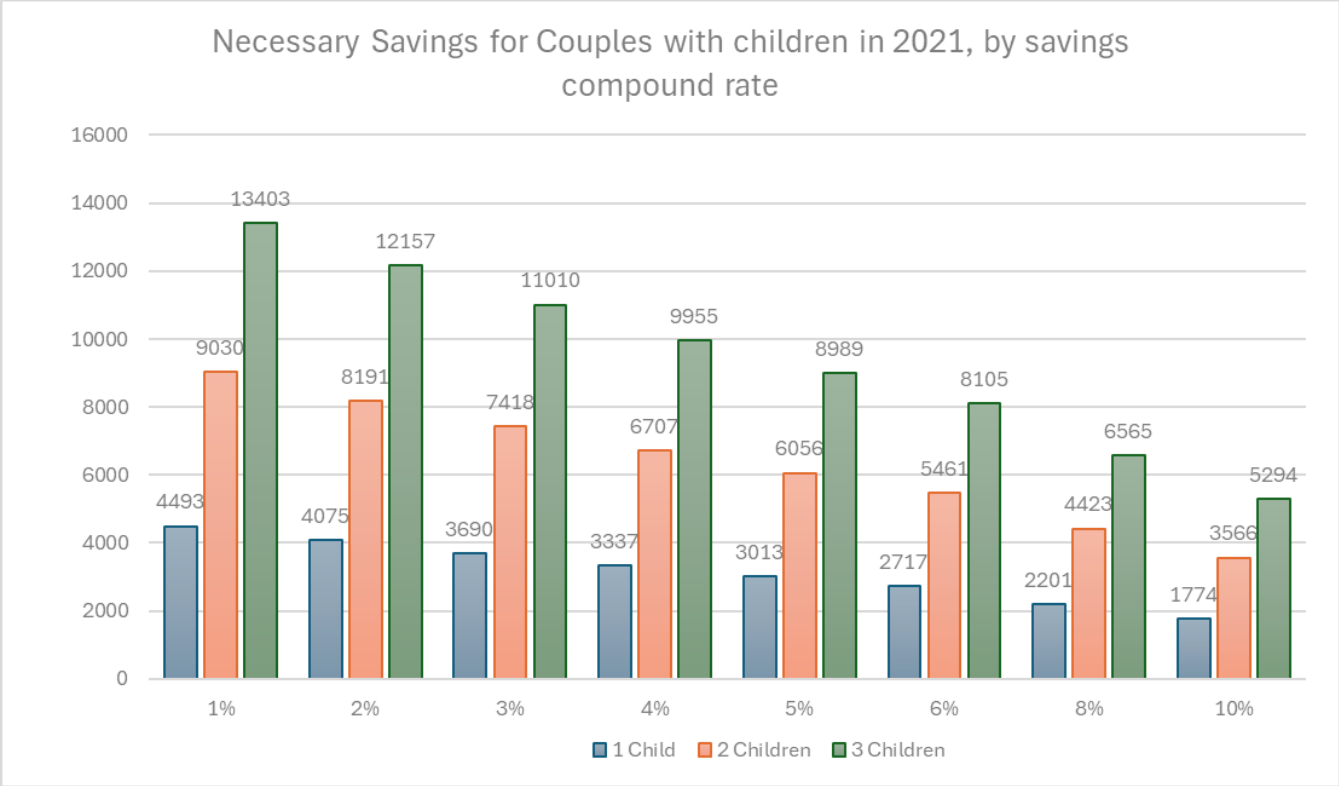


Figure 26: Necessary savings for couples with children in 2021, by savings compound rate

In 2021, the yearly necessary savings were about $3,337 per child over 18 years to meet a family's savings target to send their children to a decent in-state university under the assumption that they're earning 4% compounding interest on their savings. If the rate was 3%, a family would need to save $3,690 per child,11% more, or roughly $350 more. If the rate was 5%, the family would need to save $3,013 per child, 10% less, or roughly $330. Even if the return on savings each year was twice as much as the selected 4% rate, families would still need to set aside $2,201 per child in 2021.[105]

[105] Data under the Robustness Check and Appendix sections, including the charts and tables, differs slightly from the reported in the results since the data was computed before the 2023 iteration of the MQL, which incorporated newly released IPEDS microdata, in particular new SFA microdata for the 2022-2023 school year. This resulted in a revision of the 2001-2022 results reported in these sections, but the differences are slight: the annual rate of increase from 2001 to 2022 was 3.68% a year in the previous iteration compared to 3.63% in the latest one at the time of writing, with the bulk of the difference due to revisions in the 2022 cost. Per child, the needed annual college savings were roughly $35 lower in the revised iteration for the year 2022.

B - Fixed Effects Regression Check for 2001-2008

Basing the share of aid going to in-state students from 2001 through 2005 for all schools, and from 2001 to 2008 for a few schools, using the fixed effects (FE) model does not provide significantly different costs estimates than simply taking the 1-year, 3-year, or 5-year moving average (MA) of the share of aid going to in-state students in 2008, 2008-2010, and 2008-2012 respectively. Overall, because the 2001net cost estimate using fixed effects is slightly lower ($1,592 annually vs $1,603 using the 5-year moving average), the aggregate inflation by 2022 in the national needed savings for college using the fixed effects models is slightly higher at 113.6% compared to 112.2% using the 5-year moving average. From 2001 through 2008, the aggregate inflation is very similar as well, with the only discrepancy happening in 2006 where the fixed effects estimate increased 6.1% year-over-year compared to 5.1% for the 5-year moving average estimate. This is because from 2001-2005, the fixed effects model tended to estimate the share of aid going to in-state students as slightly higher than the moving averages from 2008-2012 on average, but as one can see on figures 27-30 the difference is minimal. Since in 2008 the majority of schools reported good student financial aid data for 2006-2008, the differences in cost for those years is minimal as the method to estimate net cost changes for the most part from using the share of total aid going to in-state students to using SFA data on average aid received by an in-state student receiving financial aid. Consequently, when tracking the same schools, the final net cost and inflation estimate on aggregate is very close regardless of whether one uses the fixed effects estimate or a moving average to determine the share of aid going to in-state students.

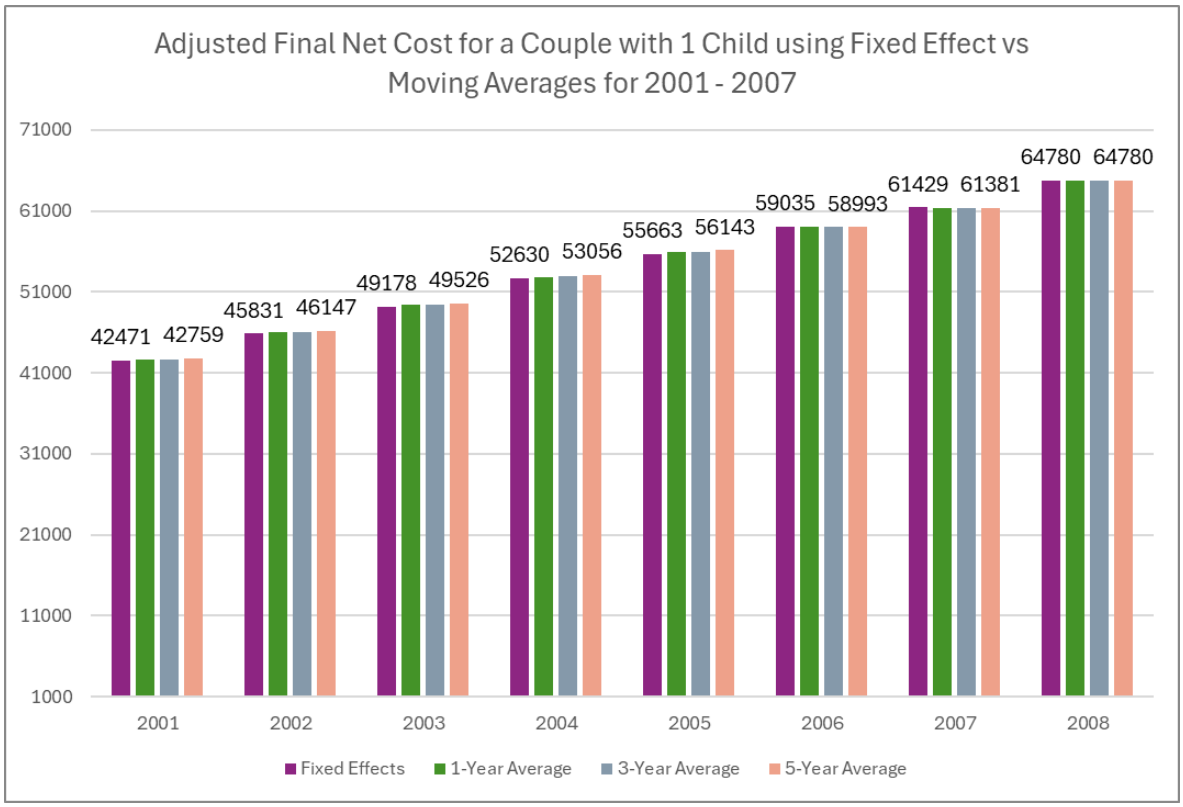


Figure 27: Adjusted final net cost for a couple with 1 child using fixed effects regression vs. moving averages for 2001-2007

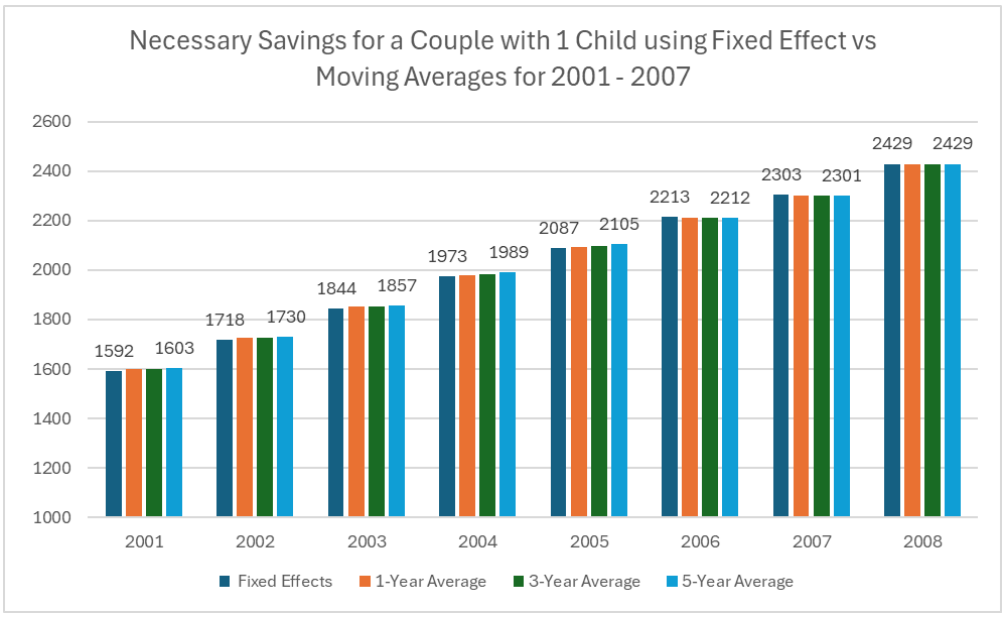


Figure 28: Necessary savings for couple with one child using FE vs MA for 2001-2007

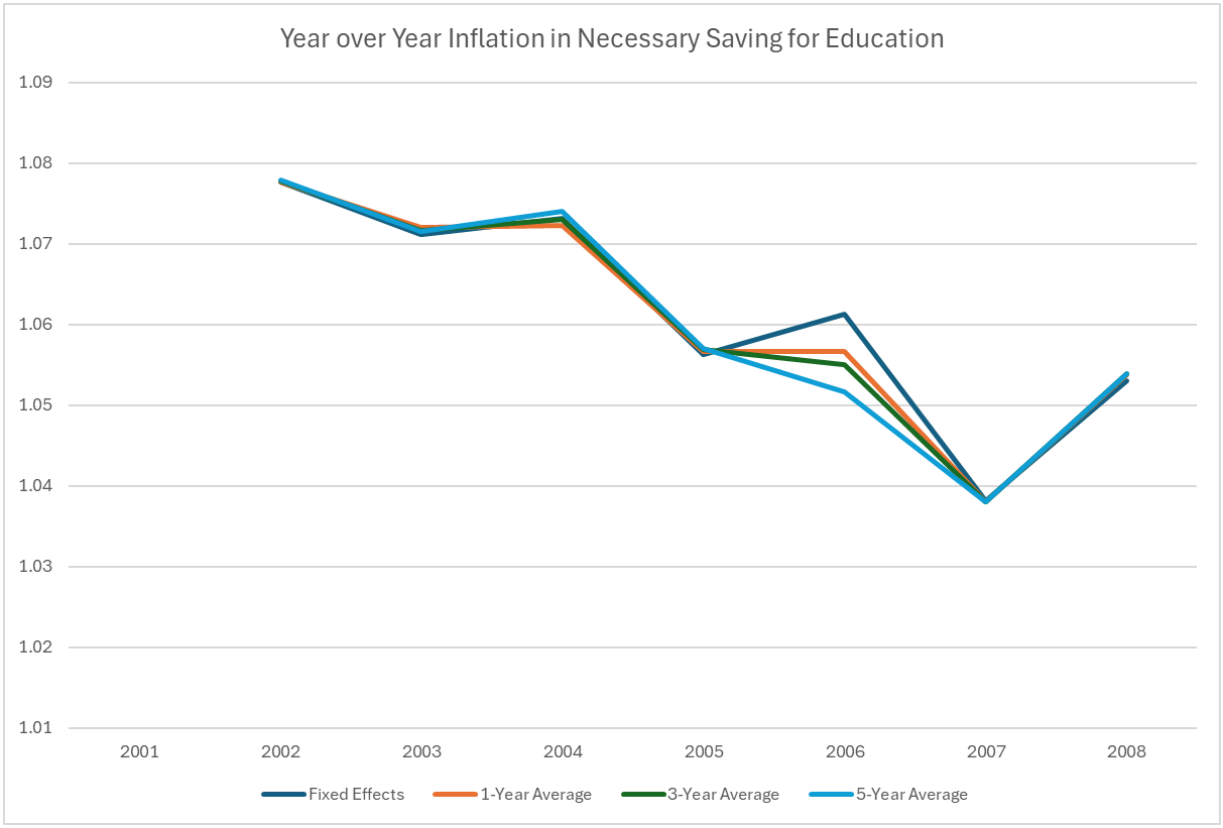


Figure 29: Year-over-year change in necessary savings for education

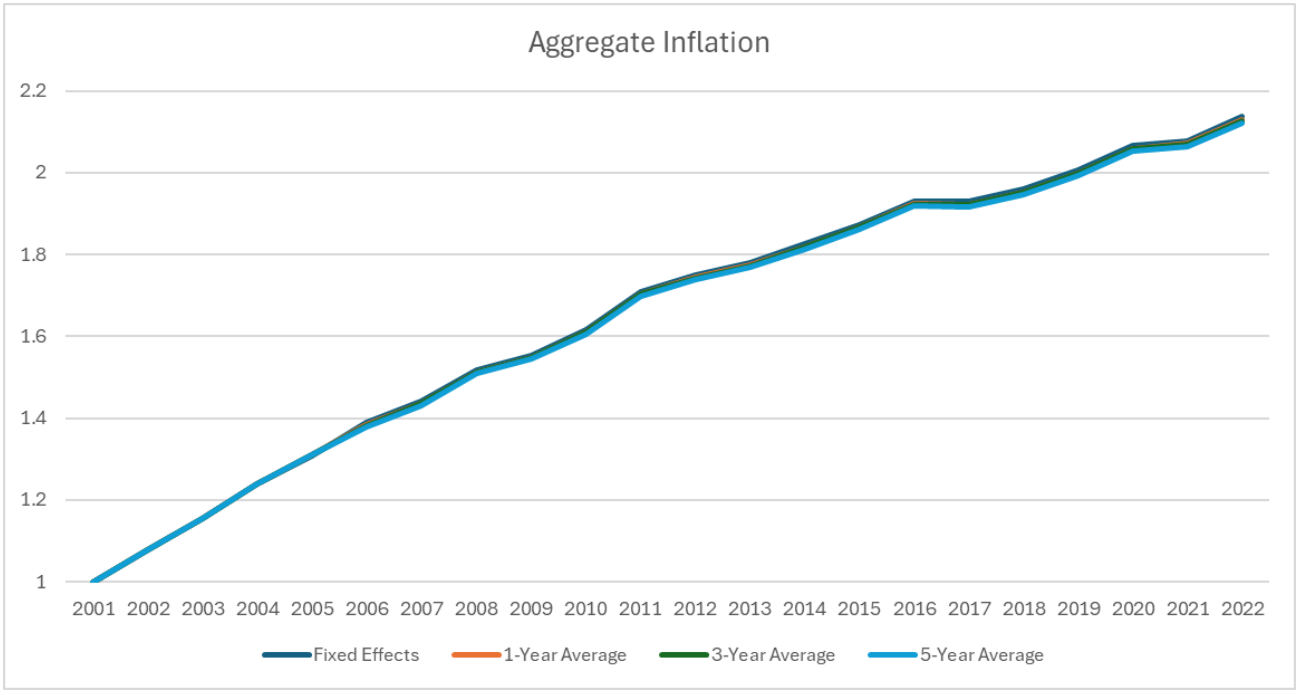


Figure 30: MQL Education savings increase from 2001 to 2022 using FE vs MA

C - Taking the Two Largest Institutions in Each State

LISEP conducted a robustness check where it tracked the net cost of the two largest public universities in each state ("Largest Institutions Sample", table 18 in Appendix A) from the years 2006 to 2021 instead of considering the flagship university of each state and the other schools with comparable performance and strong graduation rates ("Flagship+ Sample"). In part since the flagship is usually the largest school, the national estimate of necessary savings per child is not significantly different. In 2006, a couple household with one child should have saved $2,213 based on the Flagship+ Sample compared to $2,131 based on the Largest Institution Sample, or 3.7% less. In 2021, the difference was only 0.7% less, with necessary savings in the Flagship+ sample being $3,337 compared to $3,314 for the same household. Overall, the necessary savings for the Largest Institutions Sample inflated more quickly, by 54.8% between 2006 and 2021 compared to 49.7% for the Flagship+ Sample. This is likely due to the lower cost in 2006 of the Largest Institutions Sample, but again the difference remains small despite failing to account for the quality of the schools.

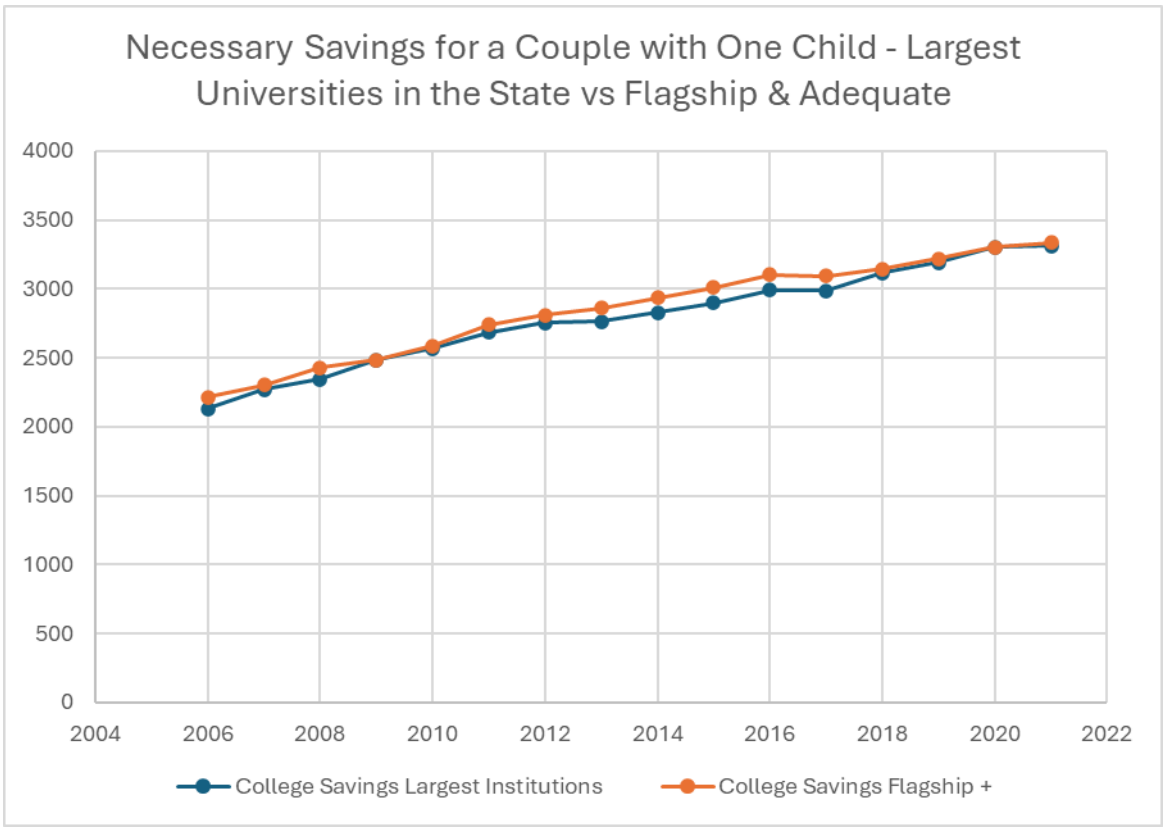


Figure 31: Necessary education savings for couple with one child - Largest universities vs Flagship+ samples

To select the Largest Institutions Sample, LISEP used Fall Enrollment Data from IPEDS to identify the two schools in each state each year with the largest number of full-time degree-seeking undergraduates. All states had at least one school that remained in the sample from 2006 through 2021 while some states had some fluctuations in the second largest school each year. The only two states without two schools in a given year in the sample were the District of Columbia and Wyoming since there is only one 4-year degree-granting public institution in those states. LISEP focused only on the years 2006 through 2021 to make an apples-to-apples comparison to the net cost calculated in the Flagship+ sample since comparing the college cost in 2001-2005 implicates running a different model to estimate the share of total aid allocated to in-state students. Since SFA data for 2022 is not available at the time of writing, LISEP limited the robustness check to 2021. Finally, the net cost at each school was computed using the same method as in the Flagship+ sample. For a list of the selected schools, reference Appendix A.

Appendix

A – List of institutions in Education sample

IPEDS Unit ID	State	University
102614	AK	University of Alaska Fairbanks
100751	AL	The University of Alabama
106397	AR	University of Arkansas
104179	AZ	University of Arizona
110635	CA	University of California-Berkeley
126614	CO	University of Colorado at Boulder
129020	CT	University of Connecticut
131399	DC	University of the District of Columbia
130943	DE	University of Delaware
134130	FL	University of Florida
139959	GA	University of Georgia
141574	HI	University of Hawaii at Manoa
153658	IA	University of Iowa
142285	ID	University of Idaho
145637	IL	University of Illinois at Urbana-Champaign
151351	IN	Indiana University-Bloomington
155317	KS	University of Kansas
157085	KY	University of Kentucky
159391	LA	Louisiana State University and Agricultural & Mechanical College
166629	MA	University of Massachusetts Amherst
163286	MD	University of Maryland-College Park
161253	ME	University of Maine
170976	MI	University of Michigan-Ann Arbor
174066	MN	University of Minnesota-Twin Cities

178396	MO	University of Missouri-Columbia
176017	MS	University of Mississippi
180489	MT	The University of Montana
199120	NC	University of North Carolina at Chapel Hill
200280	ND	University of North Dakota
181464	NE	University of Nebraska-Lincoln
183044	NH	University of New Hampshire-Main Campus
186380	NJ	Rutgers University-New Brunswick
187985	NM	University of New Mexico-Main Campus
182290	NV	University of Nevada-Reno
196088	NY	SUNY at Buffalo
204796	OH	Ohio State University-Main Campus
207500	OK	University of Oklahoma-Norman Campus
209551	OR	University of Oregon
214777	PA	The Pennsylvania State University
217484	RI	University of Rhode Island
218663	SC	University of South Carolina-Columbia
219471	SD	University of South Dakota
221759	TN	The University of Tennessee-Knoxville
228778	TX	The University of Texas at Austin
230764	UT	University of Utah
234076	VA	University of Virginia-Main Campus
231174	VT	University of Vermont
236948	WA	University of Washington-Seattle Campus
240444	WI	University of Wisconsin-Madison
238032	WV	West Virginia University
240727	WY	University of Wyoming

Table 12: List of Flagship Institutions

IPEDS Unit ID	State	University
110644	CA	University of California-Davis
110653	CA	University of California-Irvine
110662	CA	University of California-Los Angeles
110680	CA	University of California-San Diego
110705	CA	University of California-Santa Barbara
110714	CA	University of California-Santa Cruz
126775	CO	Colorado School of Mines
134097	FL	Florida State University
163912	MD	St. Mary's College of Maryland
171100	MI	Michigan State University
178615	MO	Truman State University

186201	NJ	Ramapo College of New Jersey
186876	NJ	Stockton University
187134	NJ	The College of New Jersey
196079	NY	Binghamton University
196097	NY	Stony Brook University
196103	NY	SUNY College of Environmental Science and Forestry
196167	NY	SUNY College at Geneseo
196176	NY	SUNY at New Paltz
196185	NY	SUNY Oneonta
199218	NC	University of North Carolina Wilmington
204024	OH	Miami University-Oxford
215293	PA	University of Pittsburgh-Pittsburgh Campus
217882	SC	Clemson University
228723	TX	Texas A & M University-College Station
231624	VA	College of William and Mary
232423	VA	James Madison University
232681	VA	University of Mary Washington
233921	VA	Virginia Polytechnic Institute and State University

Table 13: List of Minimally Adequate Institutions at the National Level

IPEDS Unit ID	State	University	Years in Sample
100858	AL	Auburn University	2001-2014
104151	AZ	Arizona State University	2001-2022
105330	AZ	Northern Arizona University	2017-2022
126818	CO	Colorado State University - Fort Collins	2001-2022
262129	FL	New College of Florida	2014-2016
153603	IA	Iowa State University	2020-2022
157401	KY	Murray State University	2001-2016
159647	LA	Louisiana Tech University	2001-2022
161226	ME	University of Maine at Farmington	2001-2022
174251	MN	University of Minnesota-Morris	2001-2018
200332	ND	North Dakota State University-Main Campus	2013-2022
200572	ND	Valley City State University	2001-2022
181783	NE	Wayne State College	2001-2013
187648	NM	New Mexico State University-Main Campus	2011-2020
187967	NM	New Mexico Institute of Mining and Technology	2001-2022
196060	NY	SUNY at Albany	2001-2022
196121	NY	SUNY College at Brockport	2001-2015
196158	NY	SUNY at Fredonia	2001-2012
196194	NY	SUNY at Oswego	2019-2022
204857	OH	Ohio University-Main Campus	2001-2011

207388	OK	Oklahoma State University-Main Campus	2001-2022
217819	SC	College of Charleston	2001-2019
219356	SD	South Dakota State University	2001-2014
219356	UT	Southern Utah University	2001-2014
230728	UT	Utah State University	2001-2016

Table 14: List of Minimally Adequate Institutions at the State Level

Unit ID	Institution	Adjustment Type	Year(s)
104179	University of Arizona	Fall Enrollment Trend	2002
131399	University of the District of Columbia	Linear Interpolation	2003
134130	University of Florida	Fall Enrollment Trend	2002-2007
142285	University of Idaho	Fall Enrollment Trend	2002
161253	University of Maine	Fall Enrollment - SFA Ratio	2009
163286	University of Maryland - College Park	Linear Interpolation	2005
174251	University of Minnesota-Morris	Linear Interpolation	2012-2015
176017	University of Mississippi Main Campus	Fall Enrollment Trend	2004, 2006, 2007
176017	University of Mississippi Main Campus	Linear Interpolation	2005
181464	University of Nebraska at Lincoln	Fall Enrollment Trend	2003
186201	Ramapo College of New Jersey	Fall Enrollment - SFA Ratio	2008, 2014
186201	Ramapo College of New Jersey	Linear Interpolation	2009
186380	Rutgers University-New Brunswick	Fall Enrollment - SFA Ratio	2009-2016, 2019
186876	Stockton University	Fall Enrollment - SFA Ratio	2002, 2005
186876	Stockton University	Fall Enrollment Trend	2017
187967	New Mexico Institute of Mining and Technology	Linear Interpolation	2002
196088	SUNY at Buffalo	Fall Enrollment - SFA Ratio	2008-2010, 2014
196103	SUNY College of Environmental Science and Forestry	Special Case - Fall Enrollment Trend	2020
196103	SUNY College of Environmental Science and Forestry	Special Case - End Year*	2021
196167	SUNY College at Geneseo	Fall Enrollment - SFA Ratio	2012-2014
196167	SUNY College at Geneseo	Fall Enrollment - SFA Ratio	2012-2014
200280	University of North Dakota	Special Case - Fall Enrollment Rate	2001, 2003, 2005-2007
217882	Clemson University	Fall Enrollment Trend	2003-2007
219471	University of South Dakota	Linear Interpolation	2002
228723	Texas A & M University	Fall Enrollment - SFA Ratio	2002

228723	Texas A & M University	Fall Enrollment Trend	2004
228723	Texas A & M University	Linear Interpolation	2001, 2003
228778	The University of Texas at Austin	Fall Enrollment Trend	2002, 2004, 2006
228778	The University of Texas at Austin	Linear Interpolation	2001, 2003, 2005
240727	University of Wyoming	Fall Enrollment - SFA Ratio	2015

Table 15: List of Institutions and years with imputation of share of full-time first-time students

Unit ID	IPEDS Institution Name	State	Annual Net Cost 2008-2009	Annual Net Cost 2021-2022
100751	The University of Alabama	AL	17457.58	21742.48
100858	Auburn University	AL	14140.19	
102614	University of Alaska Fairbanks	AK	13826.3	14337.65
104151	Arizona State University Campus Immersion	AZ		18630.07
104179	University of Arizona	AZ	13528.64	19778.73
106397	University of Arkansas	AR	14215.29	18989.35
110635	University of California-Berkeley	CA	20051.07	28662.79
110644	University of California-Davis	CA	18321.71	24316.93
110653	University of California-Irvine	CA	18751.48	20567.32
110662	University of California-Los Angeles	CA	18384.84	25274.33
110680	University of California-San Diego	CA	17472.2	23397.3
110705	University of California-Santa Barbara	CA	19650.29	25549.3
110714	University of California-Santa Cruz	CA	20568.73	25092.41
126614	University of Colorado Boulder	CO	20607.19	25717.78
126775	Colorado School of Mines	CO	18331.57	30568.26
129020	University of Connecticut	CT	17693.12	26454.19
130943	University of Delaware	DE	17478.31	23168.23
131399	University of the District of Columbia	DC	15259	24677.5
134097	Florida State University	FL	12571.7	14166
134130	University of Florida	FL	10024.33	12009.3
139959	University of Georgia	GA	9316.419	17346.42
141574	University of Hawaii at Manoa	HI	14712.44	23006.9
142285	University of Idaho	ID	13485.14	15550.78
145637	University of Illinois Urbana-Champaign	IL		21204.59
145637	University of Illinois at Urbana-Champaign	IL	19716.87	
151351	Indiana University-Bloomington	IN	13796.04	19193.51

153658	University of Iowa	IA	15157.42	21069.7
155317	University of Kansas	KS	16474.11	20537.98
157085	University of Kentucky	KY	14011.49	20014.02
159391	Louisiana State University and Agricultural & Mechanical College	LA	10939.34	22251.91
159647	Louisiana Tech University	LA	9567.753	13419.35
161226	University of Maine at Farmington	ME	15292.32	14882.58
161253	University of Maine	ME	16146.21	19273.38
163286	University of Maryland-College Park	MD	17085.29	22393.94
163912	St Mary's College of Maryland	MD	21002.12	
163912	St. Mary's College of Maryland	MD		22294.99
166629	University of Massachusetts-Amherst	MA		24837.63
166629	University of Massachusetts Amherst	MA	16772.08	
170976	University of Michigan-Ann Arbor	MI	17460.98	24065.49
171100	Michigan State University	MI	15418.69	23804.12
174066	University of Minnesota-Twin Cities	MN	16015.68	21464.55
174251	University of Minnesota-Morris	MN	13369.44	
176017	University of Mississippi	MS		15114.15
176017	University of Mississippi Main Campus	MS	13220.69	
178396	University of Missouri-Columbia	MO	16789.99	21567.75
178615	Truman State University	MO	11188.53	14516.39
180489	The University of Montana	MT	13812.32	18429.42
181464	University of Nebraska-Lincoln	NE	14837.39	19318.88
182290	University of Nevada-Reno	NV	16583.66	20158.65
183044	University of New Hampshire-Main Campus	NH	20541.38	26093.27
186201	Ramapo College of New Jersey	NJ	21444.75	27395.55
186380	Rutgers University-New Brunswick	NJ	20208.8	27657.58
186876	The Richard Stockton College of New Jersey	NJ	19407.27	
186876	Stockton University	NJ		22690.33
187134	The College of New Jersey	NJ	20581.56	28714.81
187967	New Mexico Institute of Mining and Technology	NM	7934.504	10930.53
187985	University of New Mexico-Main Campus	NM	11561.1	15083.79
196060	SUNY at Albany	NY	15432.12	19202.66
196079	SUNY at Binghamton	NY	15458.71	
196079	Binghamton University	NY		23917.41
196088	University at Buffalo	NY	14174.23	23734.64
196097	Stony Brook University	NY	13944.92	21390.23

196103	SUNY College of Environmental Science and Forestry	NY	15592.63	21528.13
196158	SUNY at Fredonia	NY	14338.5	
196167	SUNY at Geneseo	NY	15710.58	
196167	SUNY College at Geneseo	NY		20788.27
196176	State University of New York at New Paltz	NY	15511.54	21130.08
196185	SUNY College at Oneonta	NY	14297.43	
196185	SUNY Oneonta	NY		20499.14
199120	University of North Carolina at Chapel Hill	NC	12970.84	19109.85
199218	University of North Carolina at Wilmington	NC	12704.78	
199218	University of North Carolina Wilmington	NC		22203.29
200280	University of North Dakota	ND	14087.33	19323.05
200332	North Dakota State University-Main Campus	ND		17895.44
200572	Valley City State University	ND	11898.66	
204024	Miami University-Oxford	OH	20696.93	24222.35
204796	Ohio State University-Main Campus	OH	18341.81	22377.91
207388	Oklahoma State University-Main Campus	OK	14694.78	16950.23
207500	University of Oklahoma-Norman Campus	OK		23001.07
207500	University of Oklahoma Norman Campus	OK	14301.38	
209551	University of Oregon	OR	15110.35	24603.51
214777	Pennsylvania State University-Main Campus	PA	23502.15	33820.1
215293	University of Pittsburgh-Pittsburgh Campus	PA	23367.02	30610.86
217484	University of Rhode Island	RI	17224.43	22231.24
217819	College of Charleston	SC	14676.46	
217882	Clemson University	SC	16025	24882.72
218663	University of South Carolina-Columbia	SC	14988.46	22852.25
219356	South Dakota State University	SD	12908.7	
219471	University of South Dakota	SD	13012.27	19801.98
221759	The University of Tennessee	TN	13276.24	
221759	The University of Tennessee-Knoxville	TN		23004.02
228723	Texas A & M University-College Station	TX	15530.46	25757.49
228778	The University of Texas at Austin	TX	18013.71	23742.63

230728	Utah State University	UT	11291.84	
230764	University of Utah	UT	15618.8	16917.32
231174	University of Vermont	VT	14746.29	23342.4
231624	William & Mary	VA		30122.78
231624	College of William and Mary	VA	18013.31	
232423	James Madison University	VA	17185.16	25962.73
232681	University of Mary Washington	VA	16316.68	23650.82
233921	Virginia Polytechnic Institute and State University	VA	19871.01	24006.54
234076	University of Virginia-Main Campus	VA	18219.18	30654.8
236948	University of Washington-Seattle Campus	WA	15512.31	22439.75
238032	West Virginia University	WV	9446.198	13984.04
240444	University of Wisconsin-Madison	WI	16926.16	20205.48
240727	University of Wyoming	WY	10103.92	13510.09

Table 16: Annual Net Cost for selected institutions for school years 2008-2009 and 2021-2022

State	Average Annual Net Cost 2008-2009	Average Annual Net Cost 2021-2022	State	Average Annual Net Cost 2008-2009	Average Annual Net Cost 2021-2022
AK	13826.3	14337.65	MT	13812.32	18429.42
AL	16066.92	21742.48	NC	12876.83	20183.9
AR	14215.29	18989.35	ND	13793.49	18533.45
AZ	13528.64	18946.08	NE	14837.39	19318.88
CA	18982.33	24638.61	NH	20541.38	26093.27
CO	20242.17	26653.69	NJ	20310.3	27119.39
CT	17693.12	26454.19	NM	11296.44	14586.35
DC	15259	24677.5	NV	16583.66	20158.65
DE	17478.31	23168.23	NY	14785.92	21904.17
FL	11144.64	13155.23	OH	19089	22991.88
GA	9316.419	17346.42	OK	14494.28	19615.63
HI	14712.44	23006.9	OR	15110.35	24603.51
IA	15157.42	21069.7	PA	23456.41	32603.01
ID	13485.14	15550.78	RI	17224.43	22231.24
IL	19716.87	21204.59	SC	15235	23468.64
IN	13796.04	19193.51	SD	12945.08	19801.98
KS	16474.11	20537.98	TN	13276.24	23004.02
KY	14011.49	20014.02	TX	16694.31	24893.35
LA	10607.8	20016.49	UT	13354.6	16917.32
MA	16772.08	24837.63	VA	18418.89	26528.38

MD	17551.28	22386.52	VT	14746.29	23342.4
ME	15966.16	18539.63	WA	15512.31	22439.75
MI	16199.71	23892.26	WI	16926.16	20205.48
MN	15777.83	21464.55	WV	9446.198	13984.04
MO	15729.47	20603.59	WY	10103.92	13510.09
MS	13220.69	15114.15			

Table 17: Average annual net cost per student by state for school years 2008-2009 and 2021-2022

State	Unit ID	Institution	Years
AK	102553	University of Alaska Anchorage	2006-2021
AK	102614	University of Alaska Fairbanks	2006-2021
AL	100751	The University of Alabama	2006-2021
AL	100858	Auburn University	2006-2021
AR	106397	University of Arkansas	2006-2021
AR	106704	University of Central Arkansas	2006-2021
AZ	104151	Arizona State University	2006-2021
AZ	104179	University of Arizona	2006-2021
CA	110565	California State University-Fullerton	2012
CA	110583	California State University-Long Beach	2006, 2008
CA	110608	California State University-Northridge	2011, 2013-2017
CA	110635	University of California-Berkeley	2009-2010
CA	110644	University of California-Davis	2018-2019
CA	110662	University of California-Los Angeles	2006-2021
CA	110680	University of California-San Diego	2020-2021
CA	122409	San Diego State University	2007
CO	126614	University of Colorado Boulder	2006-2021
CO	126818	Colorado State University	2006-2021
CT	128771	Central Connecticut State University	2006-2021
CT	129020	University of Connecticut	2006-2021
DC	131399	University of the District of Columbia	2006-2021
DE	130934	Delaware State University	2006-2021
DE	130943	University of Delaware	2006-2021
FL	132903	University of Central Florida	2006-2021
FL	134130	University of Florida	2006-2021
GA	139940	Georgia State University	2007-2013
GA	139959	University of Georgia	2006-2021
GA	486840	Kennesaw State University	2015-2021
HI	141565	University of Hawaii at Hilo	2006-2021
HI	141574	University of Hawaii at Manoa	2006-2021

IA	153603	Iowa State University	2006-2021
IA	153658	University of Iowa	2006-2021
ID	142115	Boise State University	2006-2021
ID	142285	University of Idaho	2006-2021
IL	145600	University of Illinois Chicago	2017-2021
IL	145637	University of Illinois Urbana-Champaign	2006-2021
IL	145813	Illinois State University	2008-2017
IL	147703	Northern Illinois University	2006-2007
IN	151351	Indiana University-Bloomington	2006-2021
IN	243780	Purdue University-Main Campus	2006-2021
KS	155317	University of Kansas	2006-2021
KS	155399	Kansas State University	2006-2021
KY	157085	University of Kentucky	2006-2021
KY	157289	University of Louisville	2021
KY	157951	Western Kentucky University	2006-2020
LA	159391	Louisiana State University and Agricultural & Mechanical College	2006-2021
LA	160658	University of Louisiana at Lafayette	2006-2021
MA	165024	Bridgewater State University	2008
MA	166513	University of Massachusetts-Lowell	2009-2021
MA	166629	University of Massachusetts Amherst	2006-2021
MA	167987	University of Massachusetts-Dartmouth	2006-2007
MD	163286	University of Maryland-College Park	2006-2021
MD	164076	Towson University	2006-2021
ME	161253	University of Maine	2006-2021
ME	161554	University of Southern Maine	2006-2021
MI	170976	University of Michigan-Ann Arbor	2006-2021
MI	171100	Michigan State University	2006-2021
MN	173920	Minnesota State University-Mankato	2011-2021
MN	174066	University of Minnesota-Twin Cities	2006-2021
MN	174783	Saint Cloud State University	2006-2010
MO	178396	University of Missouri-Columbia	2006-2021
MO	179566	Missouri State University	2006-2021
MS	176017	University of Mississippi	2006-2021
MS	176080	Mississippi State University	2006-2021
MT	180461	Montana State University	2006-2021
MT	180489	The University of Montana	2006-2021
NC	198464	East Carolina University	2006-2013
NC	199139	University of North Carolina at Charlotte	2014-2021

NC	199193	North Carolina State University at Raleigh	2006-2021
ND	200280	University of North Dakota	2006-2021
ND	200332	North Dakota State University-Main Campus	2006-2021
NE	181394	University of Nebraska at Omaha	2006-2021
NE	181464	University of Nebraska-Lincoln	2006-2021
NH	183044	University of New Hampshire-Main Campus	2006-2021
NH	183062	Keene State College	2006-2016
NH	183080	Plymouth State University	2017-2021
NJ	185590	Montclair State University	2006-2021
NJ	186380	Rutgers University-New Brunswick	2006-2021
NM	187985	University of New Mexico-Main Campus	2006-2021
NM	188030	New Mexico State University-Main Campus	2006-2021
NV	182281	University of Nevada-Las Vegas	2006-2021
NV	182290	University of Nevada-Reno	2006-2021
NY	196088	University at Buffalo	2006-2021
NY	196097	Stony Brook University	2006-2021
OH	201885	University of Cincinnati-Main Campus	2006-2021
OH	204796	Ohio State University-Main Campus	2006-2021
OK	207388	Oklahoma State University-Main Campus	2006-2021
OK	207500	University of Oklahoma Norman Campus	2006-2021
OR	209542	Oregon State University	2006-2021
OR	209551	University of Oregon	2006-2021
PA	214777	Pennsylvania State University-Main Campus	2006-2021
PA	216339	Temple University	2006-2021
RI	217420	Rhode Island College	2006-2021
RI	217484	University of Rhode Island	2006-2021
SC	217882	Clemson University	2006-2021
SC	218663	University of South Carolina-Columbia	2006-2021
SD	219356	South Dakota State University	2006-2021
SD	219471	University of South Dakota	2006-2021
TN	220978	Middle Tennessee State University	2006-2021
TN	221759	The University of Tennessee	2006-2021
TX	228723	Texas A & M University	2006-2021
TX	228778	The University of Texas at Austin	2006-2021
UT	230728	Utah State University	2006-2021
UT	230764	University of Utah	2006-2021
VA	232186	George Mason University	2017-2021

VA	233921	Virginia Polytechnic Institute and State University	2006-2021
VA	234030	Virginia Commonwealth University	2006-2016
VT	230834	Castleton State College	2006-2021
VT	231174	University of Vermont	2006-2021
WA	236939	Washington State University	2006-2021
WA	236948	University of Washington-Seattle Campus	2006-2021
WI	240444	University of Wisconsin-Madison	2006-2021
WI	240453	University of Wisconsin-Milwaukee	2006-2021
WV	237525	Marshall University	2006-2021
WV	238032	West Virginia University	2006-2021
WY	240727	University of Wyoming	2006-2021

Table 18: Largest institutions sample for robustness check C

B – Graduation rates for 2001-2016 freshman cohorts

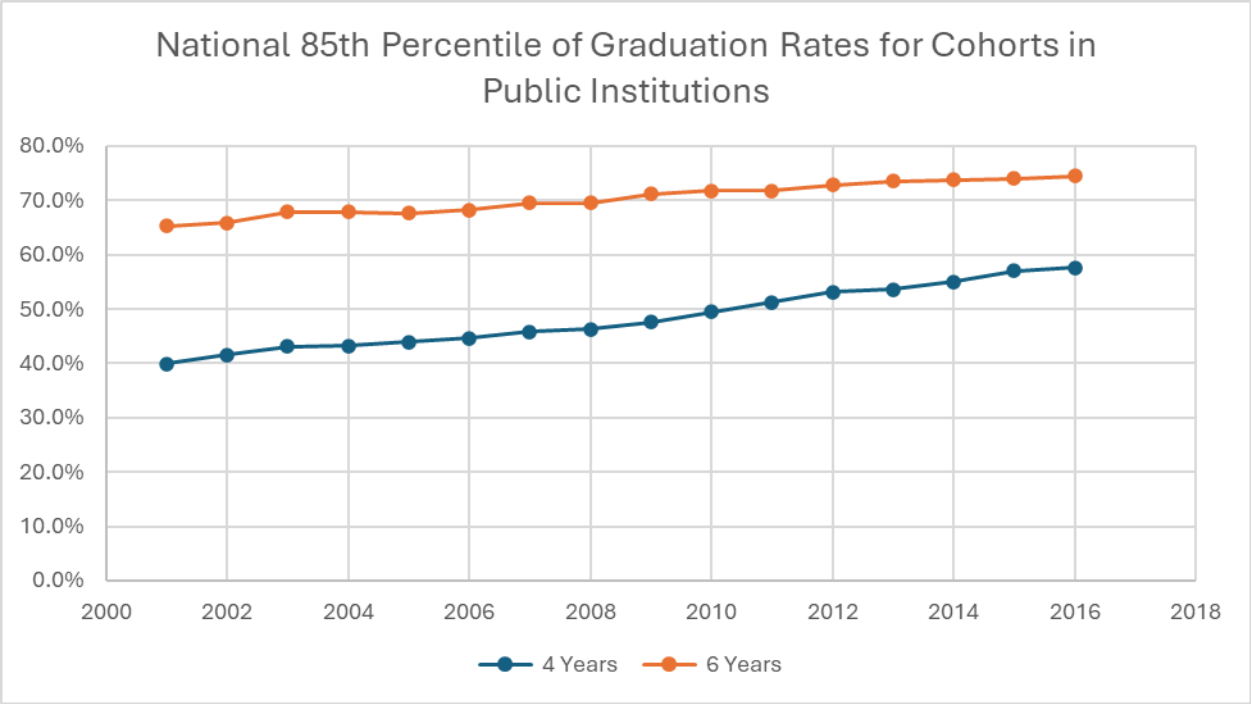


Figure 32: National 85th percentile of graduation rates for cohorts in public 4-year institutions

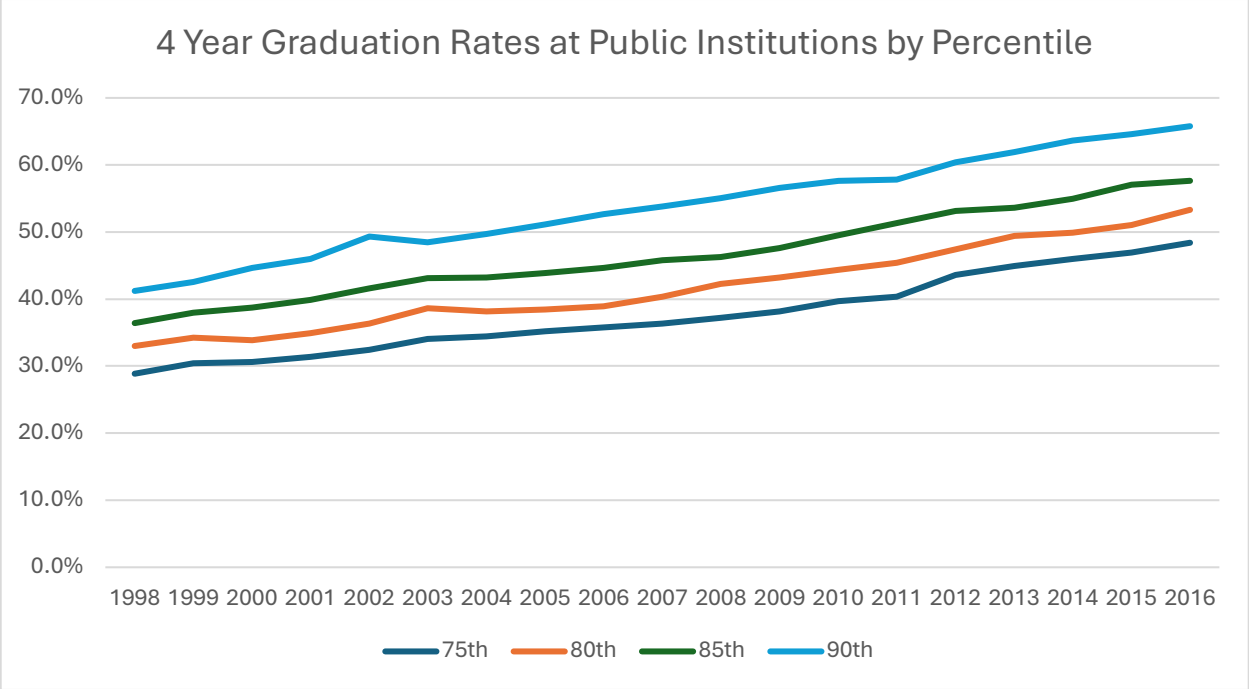
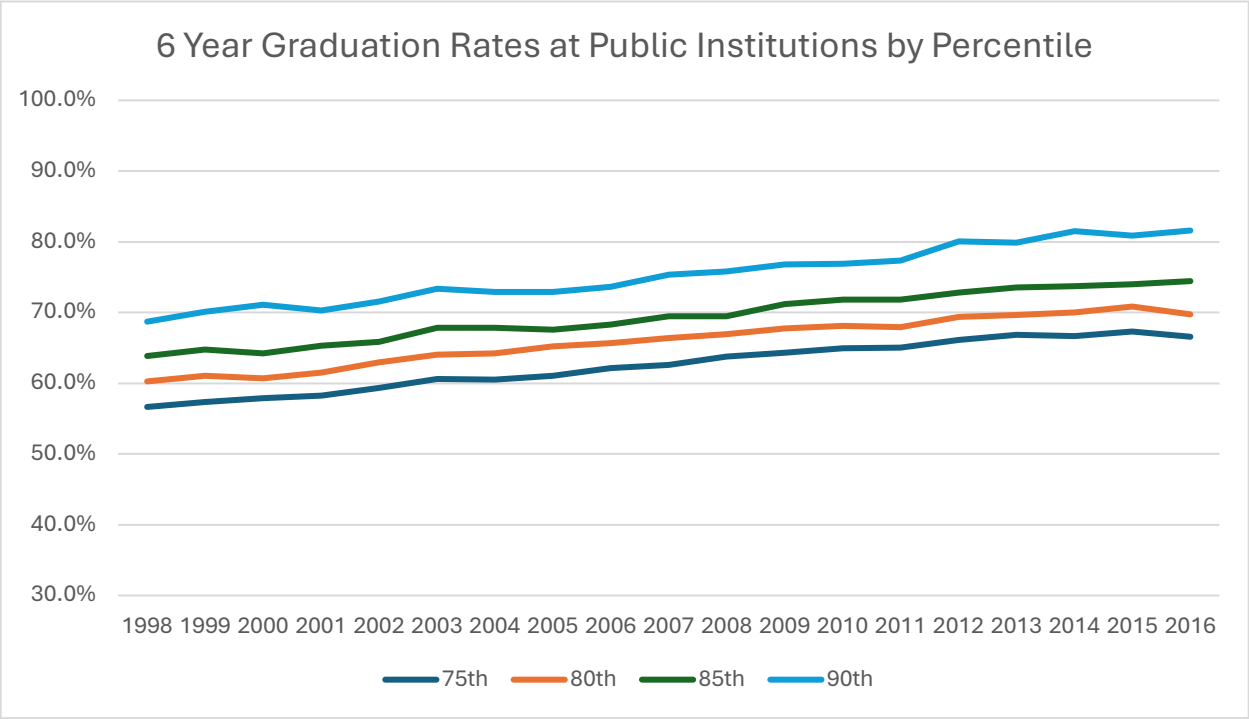


Figure 33: 4-year graduation rates at public institutions by percentile



C - Imputations to share of full-time first-time students who pay in-state tuition for FE model

To set up the model predicting the percent of total grant aid going to in-state FTFT students, LISEP needs accurate data on total grant aid disbursed and FTFT student populations for each year at each institution. As a result, LISEP must ensure that the student count data from the SFA survey is accurate for every year at each tracked institution, so LISEP matches the SFA data with the Fall Enrollment (EF) data by state of residency from IPEDS (ef2000c – ef2021c) to check robustness and make any necessary adjustments. It's only mandatory to submit data on enrollment of first-time undergraduate students by residency in even-numbered years[106], but some institutions, including most in the MQL sample, report it in odd-numbered years as well. Additionally, the EF data is reported for all first-time degree-seeking freshmen, meaning that it also includes part-time students, so the SFA and EF student counts are not necessarily equal. Part-time students are a minority among freshman students at the tracked institutions, so the difference should not be significant.[107] Overall, the Fall Enrollment data helps check trends over time in in-state enrollment

[106] Integrated Postsecondary Education Data System. Fall Enrollment (EF). *National Center for Education Statistics.* Retrieved March 25, 2024, from https://nces.ed.gov/ipeds/survey-components/8.
[107] Around 80% of undergraduates enrolled in public 4-year programs are full-time while 20% are part-time. Author's calculation based on Figure 1.4 "Undergraduate Enrollment by Sector and Enrollment Intensity". National Student Clearinghouse Center. Current Term Enrollment Estimates. Spring 2024. Retrieved March 25, 2024, from https://nscresearchcenter.org/current-term-enrollment-estimates/.

and ensures data quality from the SFA counts (see Robustness Checks section). Below are important adjustments that were made for cases with poor data quality when determining the share of in-state FTFT degree-seeking students out of all FTFT degree-seeking students.

Using the Fall Enrollment in-state rate to adjust for students with unknown residency/tuition status

The first adjustment that needs to be made is for cases where the SFA data reports too many students with unknown residency or tuition-paying status but has not made the mistake of recording all students as having unknown residency or tuition-paying status. The share of in-state students can be significantly underestimated when the number of students with unknown residency is too large. LISEP flags the observations where i) more than 5% of all FTFT degree-seeking students have unknown residency status and ii) where the relative difference between the ratio of in-state students over all students in the EF data and in the SFA data is abnormally large. This means that the share of in-state students in the SFA data is both at least 5% larger (in absolute terms) than the share of in-state students in the EF data for that given year and is at least 20% larger than the mean relative difference between the SFA and EF ratios throughout the entire sample for that institution:

$$i)\ \left|\frac{\varphi_{EF\,t\,i}}{\varphi_{SFA\,t\,i}} - 1\right| > 0.05$$

$$ii)\ \left|\frac{\varphi_{EF\,t\,i}}{\varphi_{SFA\,t\,i}} - 1\right| > 1.2 \times \frac{\sum_{t=2001}^{j}\left(\left|\frac{\varphi_{EF\,t\,i}}{\varphi_{SFA\,t\,i}} - 1\right| \times F_{t\,i}\right)}{\sum_{t=2001}^{j} F_{t\,i}}$$

Where t denotes the year, *j* the latest year where SFA data is available, *i* the institution. ϕ denotes the in-state student rate in year *t* at institution *i* from the respective *EF* and *SFA* surveys. $F_{t\,i}$ is an indicator variable equal to 1 if there is EF in-state student count data available for a given year and if the in-state count from the SFA data is not missing or equal to zero, and 0 if not.

The goal is to only adjust the observations where the relative difference is significant and abnormal.[108] There are 22 cases spanning across 8 institutions that are flagged. For these cases, LISEP adjusts the in-state rate by taking the calculated in-state rate from the Fall Enrollment data

Additionally, Education Data Initiative reports that among first-time, first-year college students, 82% are full time. Hanson M. College Enrollment & Student Demographic Statistics. Retrieved March 25, 2024, from https://educationdata.org/college-enrollment-statistics#:~:text=Among%20first%2Dtime%2C%20first%2Dyear%20college%20students%2C%2082.0%25%20are%20full%2Dtime%20students.

[108] For example, the SFA and EF in-state enrollment rates at the University of Georgia only differ by 0.0028 on average (in absolute terms), so a couple of years with a relatively few unknown students (2010-2012) the difference seems abnormally large (over 20% of the mean difference of 0.0028), the actual difference between the EF rate and the SFA rate is very small (between 0.4% and 0.6%). Consequently, both the 5% and the 20% thresholds need to apply to make changes to the in-state rate derived from the reported SFA data.

and adjusts it by the average ratio of the in-state rate from the EF data and the in-state rate from the SFA data in the years without student population data issues:

$$\varphi'_{Final\ t\ i} = \varphi_{EF\ t\ i} \times \mu_{Ratio\ i}$$

Where ϕ denotes the in-state rate in year *t* at institution *i*. ϕ' denotes that the in-state rate is imputed. *EF* denotes that the estimate is derived from the Fall Enrollment data and *SFA* denotes that the estimate is derived from the Student Financial Aid data. Finally, μ_{Ratio} refers to the average difference of the percent of in-state students at institution *i* across all years with robust student count data between the EF and the SFA datasets, meaning.

$$\mu_{Ratio\ i} = \frac{\sum_{p=1}^{n}\left(\frac{\varphi_{EF\ p\ i}}{\varphi_{SFA\ p\ i}} \times K_{\ p\ i}\right)}{k_i}$$

Where *n* denotes the number of years *p* in the sample where p corresponds to 1 in 2001, 2 in 2002 and so forth until the last year p = n. $K_{p\ i}$ is an indicator variable that equals 1 in years *p* where both the EF and the SFA student count data at an institution *i* is robust and 0 if not. The student count data is considered to be robust in both datasets if and only if all of the following conditions are met:

1) The SFA estimates of in-state students and out-of-state students each year are not missing or equal to 0[109]
2) Estimates for the share of students who are in-state in a given year from both the EF and the SFA data are available
3) The relative difference between the EF and SFA estimates of the share of students who are in-state is not significant and abnormal as described above.

Finally, let k_i be the total number of years at an institution where the student count data in both datasets is robust such that:

$$k_i = \sum_{p=1}^{n} K_{p\ i}$$

[109] The adjustments for these cases are detailed in the subsequent sections.

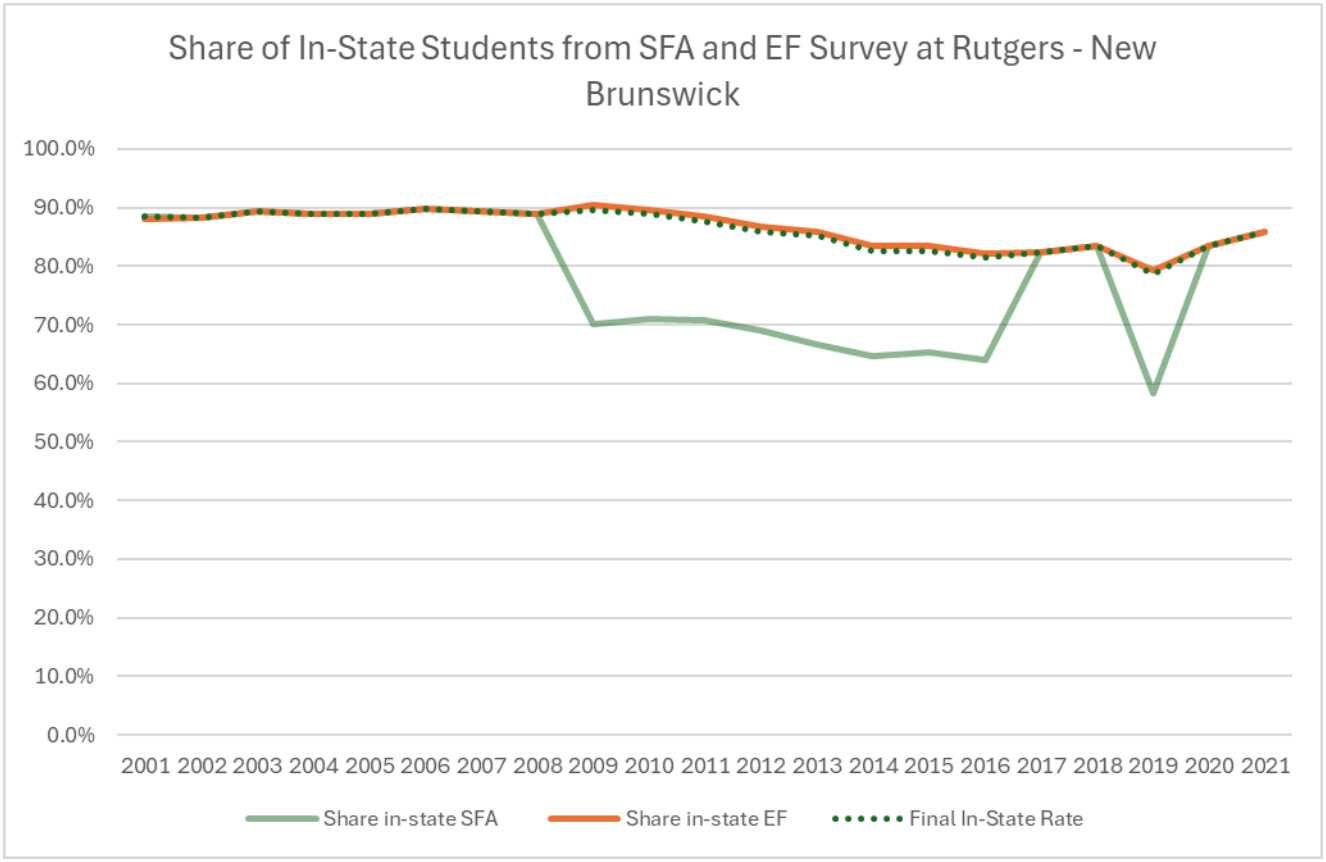


Figure 34: Share of in-state students from SFA and EF surveys at Rutgers - New Brunswick

Using trends in Fall Enrollment to adjust for misreporting in the SFA

The second adjustment regards cases where the SFA student count reports all FTFT degree-seeking students as having an unknown residency or tuition-paying status. This issue happens on 23 occasions across 10 institutions. Again, LISEP uses EF data to impute the annual percent of FTFT in-state students at institutions with poor data quality. Because the rate of in-state students in the EF dataset might over or underestimate that in-state rate in the SFA dataset, LISEP decided to apply the trends in the in-state fall enrollment rate to the SFA series starting in 2008. Since this implicitly assumes that the share of in-state students in the EF and the SFA data trends parallelly, LISEP only applied this adjustment for institutions where the absolute difference in trends was less than 2% in years with robust data for both SFA and EF data. As a result, 20 observations across 8 institutions were adjusted using EF trends (see Table 15):

$$\varphi'_{Final\ t\ i} = \varphi_{SFA\ 2008\ i} + (\varphi_{EF\ t\ i} - \varphi_{EF\ 2008\ i})$$

Where ϕ denotes the in-state rate in year *t* at institution *i*. ϕ' denotes that the in-state rate is imputed. *EF* denotes that the estimate is derived from the Fall Enrollment data and *SFA* denotes that the estimate is derived from the Student Financial Aid data.

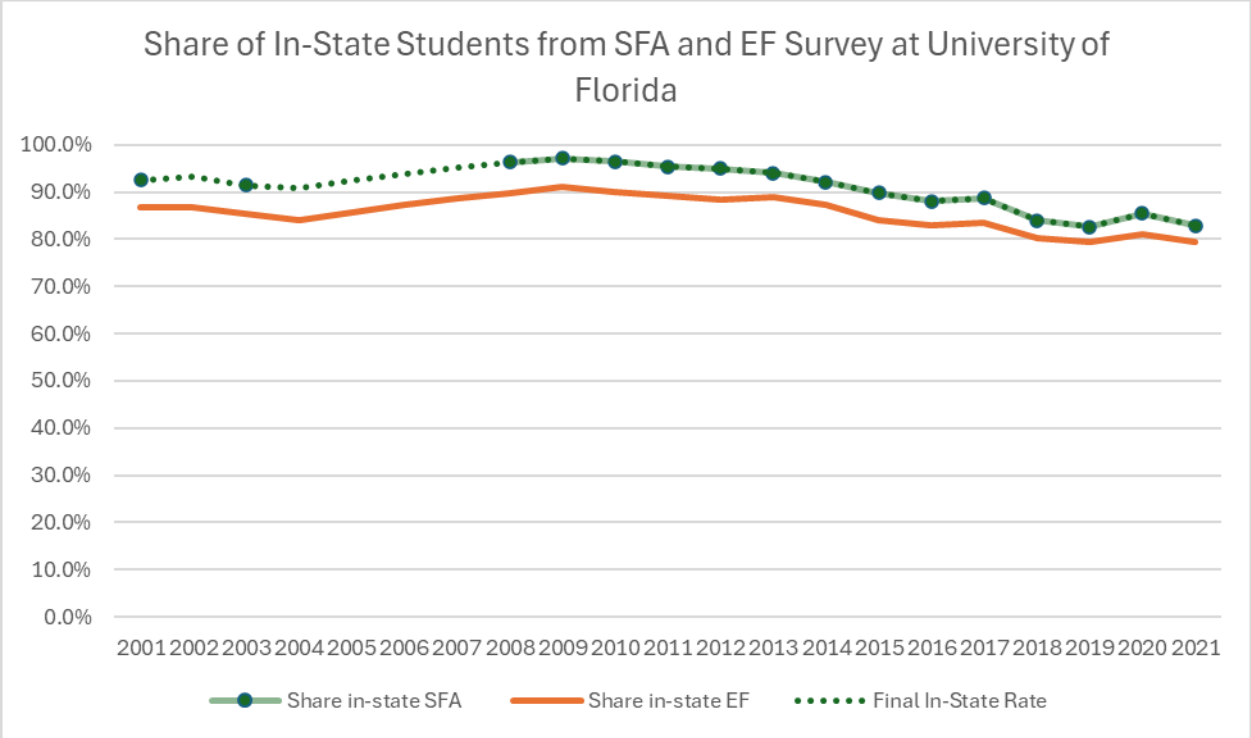


Figure 35: Share of in-state students from SFA and EF surveys at University of Florida

Using Linear Interpolation to adjust for misreporting in the SFA when the missing data is not in consecutive years

The third adjustment concerns cases where the missing in-state student population data does not happen in consecutive years, the trends in SFA percent of in-state student enrollment are consistent over time and no adjustments are made with the previous two methods. This happens in odd-numbered years when the institution did not report EF data or if the trends in in-state student enrollment in the EF data don't match with the trends from the SFA data even though the SFA data appears consistent. The latter only happens once for the University of South Dakota while the former happens on 15 occasions across 9 institutions. Consequently:

$$\varphi'_{Final\ t\ i} = \frac{\varphi'_{SFA\ t-1\ i} + \varphi'_{SFA\ t+1\ i}}{2}$$

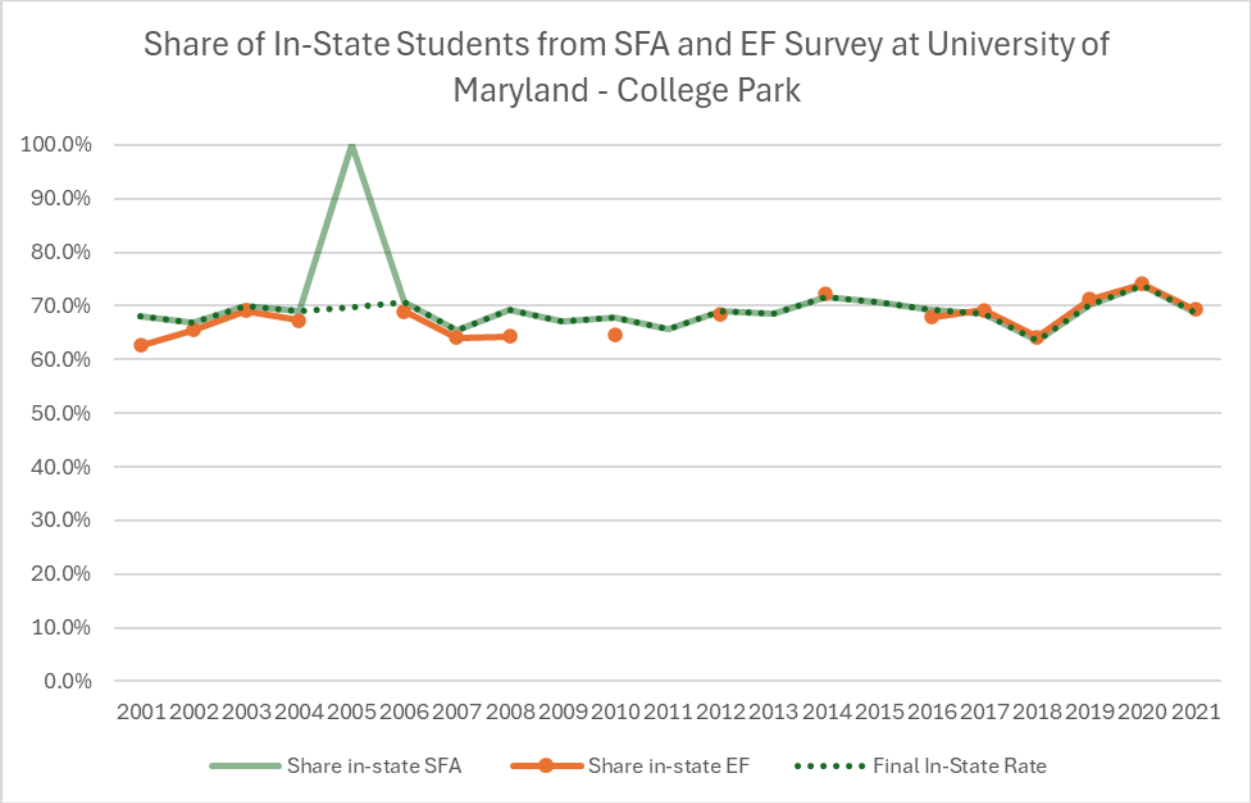


Figure 36: Share of in-state students from SFA and EF surveys at University of Maryland - College Park

Special Cases

Two institutions have highly variable rates for the percent of in-state students between 2001 and 2007 using the SFA data. The first one is the University of North Dakota where SFA student enrollment data by residency is very volatile from 2001 to 2007. As Figure 37 shows, the SFA enrollment data from the University of North Dakota becomes much more consistent from 2008 onwards which coincides with the year for which reporting standards improved. Additionally, the series of percent of in-state students from the Fall Enrollment data follows the trend of the SFA series from 2008 to 2016, after which there's a gap in EF data, and matches the 2008 anchor closely. Consequently, for the purposes of tracking trends in the share of students paying in-state tuition over time, LISEP applied the EF rates for the years between 2001 and 2007 where the difference between the SFA estimate and the EF estimate appears to be caused by inconsistent data reporting (in this case if the absolute difference between the SFA and the EF rate was over 10%).

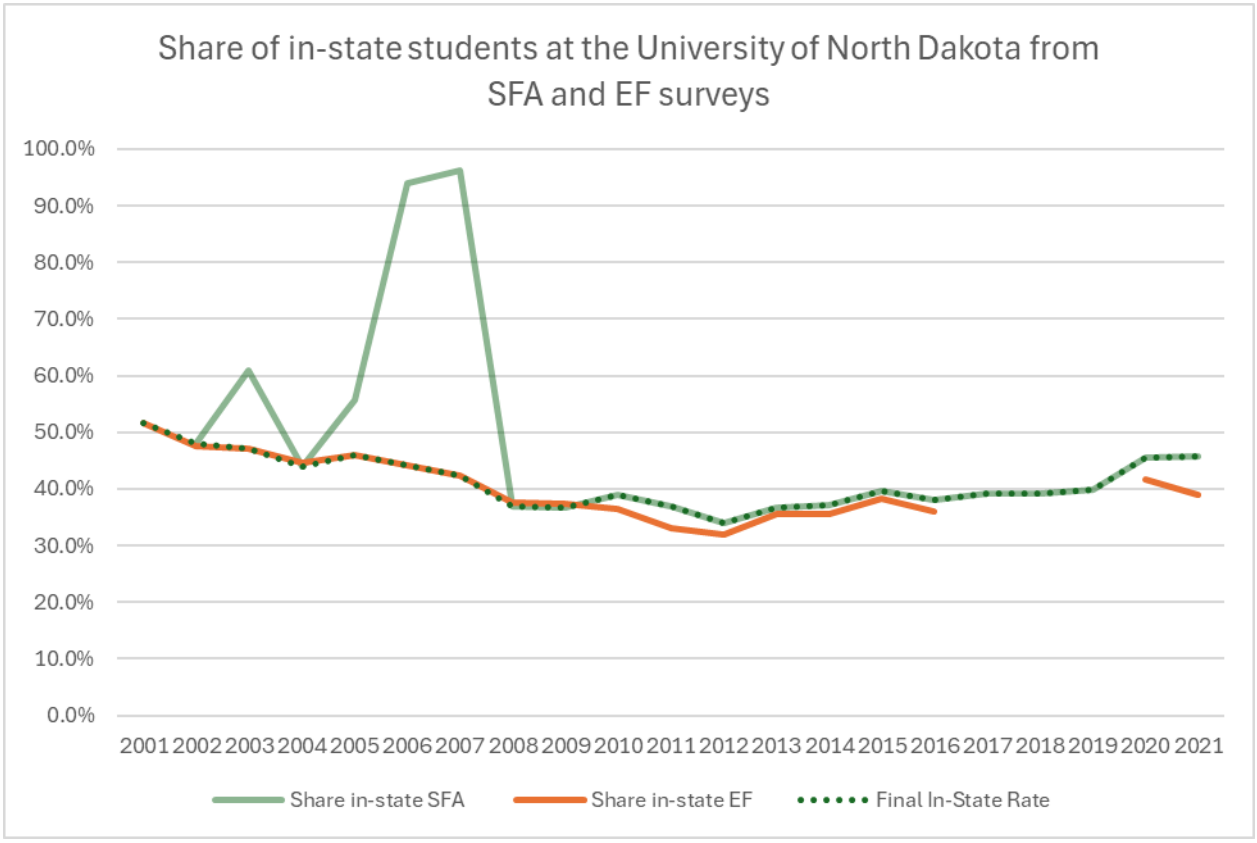


Figure 37: Share of in-state students at the University of North Dakota from SFA and EF surveys

The other institution with a highly variable in-state rate from the SFA data is the University of the District of Columbia. This is to be expected given the small size of the institution and the different composition of its student population compared to other flagship schools, including a higher share of part-time students and transfers among the undergraduate student body.[110] Both the SFA and EF data are volatile, so LISEP decided to track the SFA estimate over time. However, in 2003 the share of in-state students as determined by the SFA data was 100%, which is almost certainly a data-entry error, especially when considering that the EF in-state rate was 46.1%. LISEP imputes the 2003 value for the SFA series with a linear interpolation based on the 2002 and 2004 values.

Another special case is the SUNY College of Environmental Science and Forestry, included in the list of minimally adequate universities at the national level, which does not have good SFA in-state student count data for 2020 and 2021 as it reports that all students are in-state. To account for this, LISEP can impute the rate of in-state students for 2020 using the trends in the Fall Enrollment data. While the Fall Enrollment and the SFA data generally trend very closely for this institution, the

[110] For example, in Fall 2023, among the 1,447 undergraduate students seeking a bachelor's degree, only 840 or 58% were enrolled full-time, with a freshman class of only 453 students. The SFA data for public institutions focuses on first-time, full-time degree-seeking students. https://www.udc.edu/irap/fact-sheets/

SFA and EF in-state rate values trend significantly different between 2007 and 2009, which is problematic since the above method takes the 2008 value to anchor the SFA and EF series. If using the year 2008 as an anchor, then the 2020 in-state rate would show an increase in in-state enrollment even though the EF data trends in the opposite direction. Consequently, LISEP takes the trend from 2019 to 2020 instead in the EF data and applies it to the SFA series for 2020. However, this isn't possible in 2021 since the school did not report Fall Enrollment numbers on IPEDS at the time of writing. And because there isn't any SFA data for 2022 currently available that would allow to impute the 2021 in-state rate through linear interpolation, LISEP decided to apply the same in-state rate as in 2020 for 2021. As new data comes out, LISEP will update this method depending on whether the 2020 and 2021 values are revised and on the quality of the 2022 data.

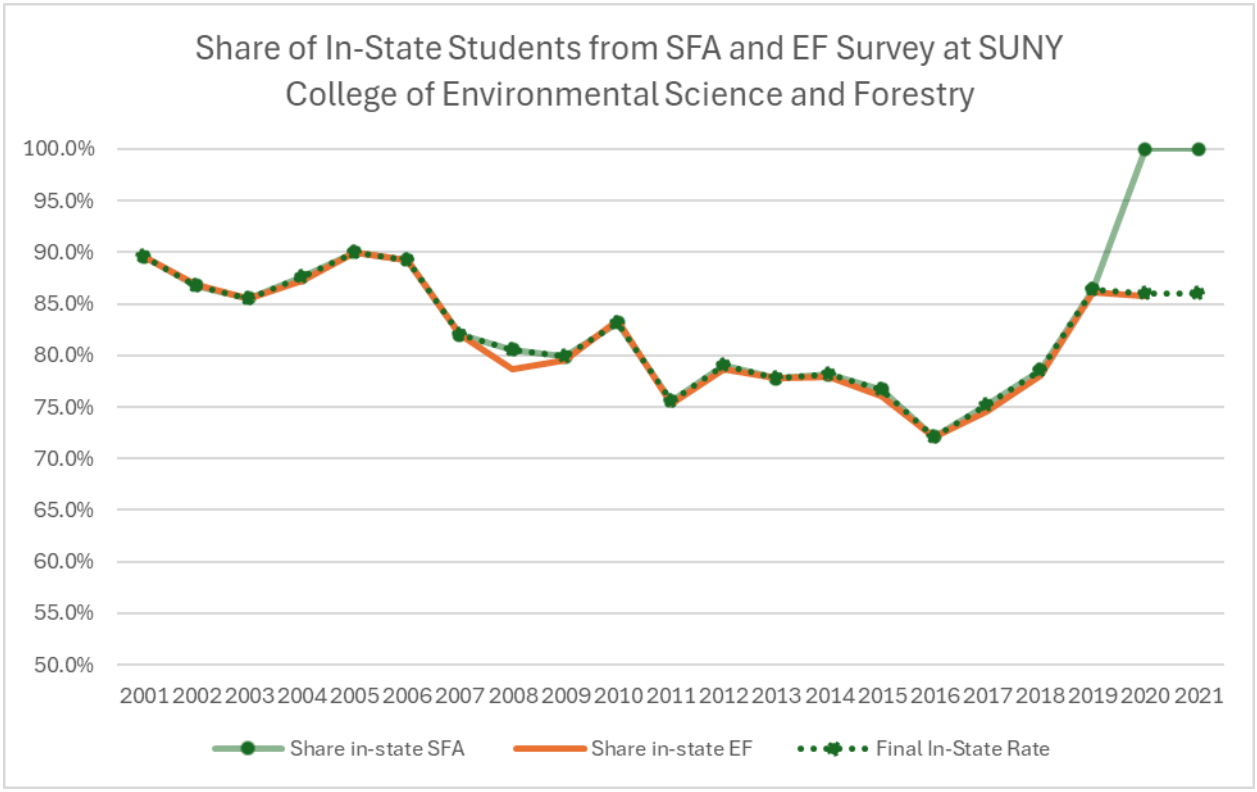


Figure 38: Share of in-state Students from SFA and EF surveys at SUNY College of Environmental Science and Forestry

D - Fixed Effects Regression Summary Results

```
Fixed-effects (within) regression               Number of obs      =      1,288
Group variable: unitid                          Number of groups   =         92

R-squared:                                      Obs per group:
     Within  = 0.3581                                         min =         14
     Between = 0.7377                                         avg =       14.0
     Overall = 0.6813                                         max =         14

                                                F(14,1182)         =      47.09
corr(u_i, Xb) = 0.4506                          Prob > F           =     0.0000
```

share_instateaid	Coefficient	Std. err.	t	P>|t|	[95% conf.	interval]
instate_rate_imputed	.6764163	.0386714	17.49	0.000	.6005441	.7522885
year_fall						
2009	-.0003324	.0085655	-0.04	0.969	-.0171377	.0164729
2010	.0030883	.0085676	0.36	0.719	-.0137211	.0198977
2011	-.0084619	.0085844	-0.99	0.324	-.0253043	.0083804
2012	-.0018202	.0086261	-0.21	0.833	-.0187443	.0151039
2013	-.0102333	.0086486	-1.18	0.237	-.0272017	.006735
2014	-.0115353	.0087061	-1.32	0.185	-.0286164	.0055458
2015	-.0160173	.0087289	-1.83	0.067	-.0331432	.0011086
2016	-.0141017	.0087188	-1.62	0.106	-.0312077	.0030043
2017	-.0134725	.0087157	-1.55	0.122	-.0305725	.0036276
2018	-.0159411	.0087454	-1.82	0.069	-.0330995	.0012172
2019	-.0367106	.0087246	-4.21	0.000	-.0538279	-.0195932
2020	-.0523501	.0086351	-6.06	0.000	-.069292	-.0354083
2021	-.0749726	.0088493	-8.47	0.000	-.0923348	-.0576104
_cons	.2366959	.0295573	8.01	0.000	.1787052	.2946865
sigma_u	.10857204					
sigma_e	.05809135					
rho	.7774373	(fraction of variance due to u_i)				

```
F test that all u_i=0: F(91, 1182) = 38.21                     Prob > F = 0.0000

. estimates store Attempt1
```

Figure 39: Fixed effects regression summary results

E – Integrated Postsecondary Education Data System Variables List

Survey	Title	Years	Variable
Institutional Characteristics	Directory Information	2001-2022	instnm

Institutional Characteristics	Directory Information	2001-2022	fips
Institutional Characteristics	Directory Information	2001-2022	sector
Institutional Characteristics	Directory Information	2005-2022	instsize
Institutional Characteristics	Student Charges for Academic Year Programs	2001-2022	chg2ay
Institutional Characteristics	Student Charges for Academic Year Programs	2001-2022	chg4ay
Institutional Characteristics	Student Charges for Academic Year Programs	2001-2022	chg5ay
Institutional Characteristics	Student Charges for Academic Year Programs	2001-2022	chg6ay
Institutional Characteristics	Student Charges for Academic Year Programs	2001-2022	chg7ay
Institutional Characteristics	Student Charges for Academic Year Programs	2001-2022	chg8ay
Graduation Rates	Graduation Rate Data, 150% of Normal Time to Complete	2001-2022	grtype
Graduation Rates	Graduation Rate Data, 150% of Normal Time to Complete	2008-2022	grtotl
Graduation Rates	Graduation Rate Data, 150% of Normal Time to Complete	2001-2007	grrace24
Student Financial Aid and Net Price	Student Financial Aid and Net Price	2001-2022	scfa1n
Student Financial Aid and Net Price	Student Financial Aid and Net Price	2001-2022	scfa11n
Student Financial Aid and Net Price	Student Financial Aid and Net Price	2001-2022	scfa12n
Student Financial Aid and Net Price	Student Financial Aid and Net Price	2001-2022	scfa13n
Student Financial Aid and Net Price	Student Financial Aid and Net Price	2001-2022	scfa14n
Student Financial Aid and Net Price	Student Financial Aid and Net Price	2009-2022	gistn
Student Financial Aid and Net Price	Student Financial Aid and Net Price	2009-2022	giston
Student Financial Aid and Net Price	Student Financial Aid and Net Price	2009-2022	gistof
Student Financial Aid and Net Price	Student Financial Aid and Net Price	2009-2022	gista
Student Financial Aid and Net Price	Student Financial Aid and Net Price	2009-2022	gistt

Student Financial Aid and Net Price	Student Financial Aid and Net Price	2009-2022	agrnt_t
Student Financial Aid and Net Price	Student Financial Aid and Net Price	2001-2022	fgrnt_a
Student Financial Aid and Net Price	Student Financial Aid and Net Price	2001-2022	fgrnt_n
Student Financial Aid and Net Price	Student Financial Aid and Net Price	2001-2022	sgrnt_a
Student Financial Aid and Net Price	Student Financial Aid and Net Price	2001-2022	sgrnt_n
Student Financial Aid and Net Price	Student Financial Aid and Net Price	2001-2022	igrnt_a
Student Financial Aid and Net Price	Student Financial Aid and Net Price	2001-2022	igrnt_n
Fall Enrollment	Residence and Migration of First-Time Freshman	2001-2021	line
Fall Enrollment	Residence and Migration of First-Time Freshman	2001-2021	efres01
Fall Enrollment	Residence and Migration of First-Time Freshman	2001-2021	efres02

Table 19: List of Variables Used with their Survey of Origin

Appendix: Revisions

2024 Data Update (February 2026)

For the MQL 2024 update, LISEP revised previously published cost estimates to reflect updated data sources, methodological refinements, and corrections to the eating out, travel, television, weekend leisure, and education components. Revisions to cost components that are included in the True Living Cost (TLC) Index were also implemented in the MQL: please refer to the TLC methodology for more details.

Under the updated methodology, the cumulative increase in the MQL between 2001 and 2023 is 99.4%, compared to 99.5% under the previously published version. The year-over-year increase for 2023 was revised from 8.6% to 9.0%. Under the 2024 update, total costs for LISEP family types in 2023 are between 0.6% and 2.6% lower than previously reported—representing reductions of $262 to $3,450, depending on household structure.

YEAR	LISEP FAMILY TYPE	TOTAL COSTS 2023 UPDATE	TOTAL COSTS 2024 UPDATE
2023	Single with No Child	44737	44475
2023	Single with 1 Child	77894	77381
2023	Single with 2 Children	99845	97340
2023	Single with 3 Children	114282	111725
2023	Couple with No Child	73254	72410
2023	Couple with 1 Child	99719	98404
2023	Couple with 2 Children	120302	117283
2023	Couple with 3 Children	130673	127222

Eating Out: Revisions reflect a lower average number of meals per household throughout the entire period after incorporating the Consumer Expenditure Survey data for 2024. Throughout the period, annual eating out costs were 1%, 0.9%, 0.7%, 0.7% and 1.1% for household sizes of one through five people respectively. Because the cost per meal by household size remains the same, the percentage change in the cost of eating out from 2001-2023 remains unchanged.

Travel: Revisions reflect a methodological change of determining the second income quartile of households for each household size using before-tax rather than after-tax income throughout the entire period. LISEP implemented this change given the lack of an after-tax income variable in the 2024 Consumer Expenditure Survey data and prioritized tracking a consistent income group over time.

- The percentage increase of travel costs between 2001-2023 was 181.5% under the 2024 MQL update compared to 169.6% under the previously published version, or 4.82% compared to 4.61% per year.
- The effect of revision on costs is ambiguous and varies based on the year and the household size.
    - Overall, costs ranged from 16% smaller (family size 3-4 people) to 5.2% larger (family size 2 people) after the revision in 2001 – which is particularly volatile due to being a one-year rather than three-year average. This represents at most $314 less for a 4-person HH in 2001 than previously.
    - Overall, costs ranged from 9.6% smaller (family size 5 people) to 4.6% larger (family size 1) in 2023, determined by the three-year average cost of 2021-2023, which translates to between -$400 and $121 difference.

MQL Transportation: The revisions to the transportation costs component under the TLC also apply to the MQL Index 2024 update, which allocates 15,000 miles of driving per year for car owners instead of 10,000 miles under the TLC. As a result, the percentage increase between 2001-2023 was 59.4% under the MQL 2024 update compared to 55.1% under the previously published version. National transportation costs for a single adult in 2023 were $11,262 under the MQL 2024 update compared to $11,182, or 0.72% higher given the larger revision to variable costs.

Television Set: Revisions reflect the revision to the seasonally adjusted CPI index for televisions for the month of August, affecting the years 2019-2023. The percentage increase of the physical television costs between 2001-2023 was 70.7% under the 2024 MQL update compared to 71.3% under the previously published version. The cost of a physical television allocated by the MQL was 0.36% or 12 cents lower in 2023 following the revision.

Weekend Leisure: Revisions reflect a correction to the movie tickets allocation to households to scale the cost of attendance by the number of people in the household as well as a revision to the movie ticket price data from the Motion Picture Association published by The Numbers for 2023.

- The percentage increase of weekend leisure costs between 2001-2023 was 90.7% under the 2024 MQL update compared to 89.2% under the previously published version.
- Combined with the $0.16 increase in the revised average ticket price for 2023, the revisions to the movie tickets allocation to households resulted in an increase of $66.60 per additional person for family types with two or more people. At most, the weekend leisure budget was $264 or 63% larger following the revision for a five-person household in 2023.

Education: Revisions reflect changes to the list of tracked colleges as well as updates to the net cost of attendance following the addition of financial aid data for the school-year 2023-2024, from the Student Financial Aid and Cost II components under the Integrated Postsecondary Education Data Survey, impacting a university's net cost of attendance. Additionally, for the years 2001-2006 where LISEP forecasts the share of total aid going to in-state students at the university level, the estimated share was capped at 100% as there were eighteen cases where this share was slightly

over 100%, which is implausible and resulted in underestimating the net cost of attendance at these institutions by 0.84 percentage points on average.

- The percentage increase of education costs between 2001-2023 was 118.4% under the 2024 MQL update compared to 121.7% under the previously published version, or 3.62% compared to 3.69% per year.
- In 2023, education costs rose 3.6% under the 2024 MQL update compared to 4.9% under the previously published version, mostly due to the incorporation of new financial aid data.
- Overall, costs allocated for education savings under the 2024 MQL update were between 1.2% and 1.5% lower and between $48 and $137 lower depending on the family type than in the previously published version.
- Changes to colleges:
    - The colleges of Stockton University (NJ), University of North Carolina – Wilmington, and the University of Mary Washington (VA) were dropped from the list of minimally adequate colleges at the national level for the purposes of the MQL. The University of California - Riverside (CA) was added to the list. Minimal adequacy at the national level is determined based on graduation rates relative to other institutions.
    - Utah State University was dropped from the list of colleges minimally adequate at the state level. Minimally adequacy at the state level entails that a university is cost competitive and of comparable quality based on graduation rates

Appendix: Methodology for Initial Iteration of Minimal Quality of Life Index (2023 Release)

Cost of Recreational Activities for Low- and Middle-Income American (LMI) Families (2001 – 2020)

Diana Dayoub

Objective

In this research, we argue that studying the affordability of leisure for Americans in the 21st century is imperative to understanding the evolution of the American Dream. We specifically focus on recreational activities that occur during individuals' leisure time. While leisure is commonly conceptualized as free time, a state of being away from work, or freedom from necessity of labor, recreation specifically encompasses activities done during leisure time, especially activities which provide benefits to individuals and society. For example, many recreational activities provide benefits to physical, mental, and social health.[111]

The focus on cost

At the Ludwig Institute for Shared Economic Prosperity (LISEP), we chose to focus on the cost of recreational activities. The reason is simple: rising costs have been consistently cited as the primary reason that has prevented Americans from pursuing several recreation activities during their leisure time. In a 2019 press release, the U.S. Travel Association announced that American workers collectively wasted 768 million vacation days in 2018, citing cost as the top barrier.[112] According to University of Utah researchers, the skyrocketing cost of youth sports is the number one reason fewer and fewer children, especially from low- and middle-income (LMI) backgrounds, are playing sports.[113] The State of Play report from the Aspen Institute concluded that parents spent an average of $693 per child, per year for one sport, which results in most children quitting sports by age 11.[114] Disney World, once thought to be a must-take trip for all families, has now become a "luxury-priced destination," with prices for one-day adult tickets increasing from $3.50 in 1971 to $159 in 2019, a staggering increase of more than 3000%.[115] And the list goes on. Although the

[111] LISEP would like to thank Dr. Sammie Powers for her invaluable contribution to the formulation of this methodology

[112] Alford, T. (2019, November 11). *Study: A Record 768 Million U.S. Vacation Days Went Unused in '18, Opportunity Cost in the Billions*. U.S. Travel Association. Retrieved January 20, 2022, from https://www.ustravel.org/press/study-record-768-million-us-vacation-days-went-unused-18-opportunity-cost-billions.

[113] Barone, E. (2017, August 24). *The Astronomical Cost of Kids' Sports*. Time. Retrieved January 20, 2022, from https://time.com/4913284/kids-sports-cost/.

[114] *Survey: Kids Quit Most Sports By Age 11*. (2019, August 1). The Aspen Institute Project Play. Retrieved January 20, 2022, from https://www.aspenprojectplay.org/national-youth-sport-survey/kids-quit-most-sports-by-age-11.

[115] Passy, J. (2021, October 4). *In its 50-year history, Walt Disney World has evolved from a $3.50-a-ticket amusement park to a "luxury-priced destination."* MarketWatch. Retrieved January 20, 2022, from

right to leisure is recognized in the United Nations Declaration of Human Rights,[116] American households experience significant financial barriers to engaging in recreational activities during their leisure time. In this light, we start by conceptualizing the "minimal adequate needs" of recreation, that is the activities necessary for American households to maintain a minimum level of physical, mental, and social health. We trace the cost of participating in a set of recreational activities for the period 2001-2020. Our goal is to assess the percentage of American households that are still able to afford minimal recreation after satisfying their basic living needs (housing, food, healthcare, etc.) compared to the onset of the century.

Connection to the True Living Cost Index (TLC)

In a separate effort, we, at LISEP, estimated the true living cost for LMI American families.[117] We did that by constructing a bundle of goods and services that households in which the adult(s) work full-time jobs and earn median wages require to satisfy their minimal adequate needs. We define those needs as the ones necessary for a household of a given size to lead a life in which they can purchase goods and services that meet a certain level of quality, with the goal of maintaining reasonable physical and mental health without falling out of their socioeconomic status. We emphasize the "basic" nature of these needs in constructing this consumption bundle by not accounting for the expenses of any recreational, higher education, or civic activities. This research on the cost of recreation comes as a complement to the TLC Index. It asks the question: "after households meet their minimal adequate needs (which does not imply thriving), how much would it cost for them to participate in recreational activities?" Here too, we seek to stress the "essential" nature of the activities we chose for the recreation bundle, with chosen activities informed based both on popularity among the American public as well as activities that provide essential physical, mental, and social benefits. Our goal is to allocate activities to LMI households that help them maintain a minimum of physical, mental, and social health, while also accounting for the popularity of certain recreational activities.

Why leisure?

In the period from 1894 to 1915, when industrial employers instituted a Saturday half-day holiday and began offering unpaid vacation days, Americans welcomed recreational activities into their lives.[118] Motion pictures became a very popular entertainment channel for urban Americans, sports became a common pastime with the opening of public gymnasiums and YMCAs, and Americans increasingly ventured to the countryside and beaches for vacation.[119] And so enjoying leisure time became a prime characteristic of the American Dream. In his book titled *Free Time: The Forgotten American Dream*, historian Benjamin Kline Hunnicutt argues that "economic, political, and civic ends" were never final or complete in the American imagination.[120] Their function was as "means" to lead to the pursuit of happiness, which, in Hunnicutt's

https://www.marketwatch.com/story/how-walt-disney-world-went-from-3-50-a-ticket-to-becoming-a-luxury-priced-destination-11633108165.

[116] The United Nations. (1948). *Universal Declaration of Human Rights*.

[117] Ludwig Institute for Shared Economic Prosperity. (2022). *What Is the "True Living Cost (TLC) Index"?* Retrieved July 19, 2022, from https://www.lisep.org/costs.

[118] *America at Work, America at Leisure: Motion Pictures from 1894–1915*. (n.d.). The Library of Congress. Retrieved January 20, 2022, from https://www.loc.gov/collections/america-at-work-and-leisure-1894-to-1915/articles-and-essays/america-at-leisure/.

[119] Ibid.

[120] Hunnicutt, B. (2013). *Free Time: The Forgotten American Dream*. Temple University Press, p.2.

words, was understood as "a cultural opening in which humans practice the skills of living together."[121] In this sense, participating in leisure activities becomes an act of community building. In short, most Americans in the 18th and 19th centuries viewed society's ultimate progress as freedom from scarcity and the ability to engage in recreational activities outside work settings.[122]

Functions of recreation

I. Adults

We seek to highlight the mechanisms through which recreation ensures a healthy life for a working-age adult. First, several studies have established that participating in recreational activities supports mental recovery from stress and strain, which is "a crucial and recurrent self-regulatory task in everyday life."[123] Such activities range from social activities that facilitate recovery through "social support" to physical activities that provide an opportunity for "psychological detachment" and set off several physiological processes that promote mental recovery.[124] We do not solely view the function of recreation as hedonic, that is inducing happiness and cultivating a good mood. Research has made it clear that non-hedonic dimensions of recreational activity are equally effective in promoting mental recovery. Examples of non-hedonic pathways to mental recovery are disconnecting one's brain from daily preoccupations, cultivating skills, and "the satisfaction of the intrinsic needs for competence, autonomy, and relatedness."[125] In a nutshell, it is important for working-age adults to participate in "minimal" recreational activities to ensure that the strain of life's responsibilities does not impede them from carrying out these very responsibilities.

Second, many recreational activities provide opportunities for both physical recovery and activity, which are incredibly important for current physical health and longevity. Researchers have found that moderately intense physical activity is significantly correlated with the physical and mental elements of quality of life.[126] An array of recreational activities such as park visitation, participation in outdoor recreation, and playing team sports provide opportunities for physical activity, and in turn, physical health benefits.[127,128]

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[121] Ibid., p.3.
[122] Ibid.
[123] Reinecke, L., & Eden, A. (2017). *Media use and recreation: Media-induced recovery as a link between media exposure and well-being*. In L. Reinecke & M.B. Oliver (Eds.), The Routledge handbook of media use and well-being: International perspectives on theory and research on positive media effects (pp. 106-117). New York: Routledge.
[124] Ibid.
[125] Ibid.
[126] Iwasaki, Y. (2006). Leisure and quality of life in an international and multicultural context: what are major pathways linking leisure to quality of life? *Social Indicators Research*, 82(2), 233–264. https://doi.org/10.1007/s11205-006-9032-z.
[127] Bailey, R., Cope, E., & Parnell, D. (2015). Realising the benefits of sports and physical activity: the human capital model. *Retos: Nuevas Perspectivas de Educación Física, Deporte y Recreación*, (28), 147-154.

[128] Bedimo-Rung, A. L., Mowen, A. J., & Cohen, D. A. (2005). The significance of parks to physical activity and public health: A conceptual model. *American Journal of Preventive Medicine, 28*(2), 159–168. http://doi.org/c36s53

In fact, parks and outdoor recreation spaces are increasingly recognized as essential components of our healthcare system.[129]

Studies have consistently shown that physical inactivity is strongly correlated with chronic diseases, irrespective of race, age, and sex.[130] Moreover, epidemiological studies demonstrated that being physically active reduces that risk of various chronic diseases.[131] Recreational activities that provide these benefits are also key to being sufficiently physically healthy to carry out one's work and family duties. Thus, in our recreation budget, we aim to include the cost of essential goods and services that allow LMI adults to be physically active through recreation.[132]

Lastly, recreational activities are important for individual and community social health. We conceptualize social health as encompassing the interrelated aspects of interactions across people from different social groups, social capital, and democratic/civic participation. Recreation facilitates social interactions and building "social capital," which is understood to encompass trust, norms, resources, and reciprocity arising from social interactions and connections.[133,134,135] Social capital can strengthen community social fabric and democratic participation.[136,137] Social capital is commonly defined as a three-dimensional concept encompassing bonding capital, bridging capital, and linking capital. While bonding social capital refers to social relationships between individuals from similar social groups, such as people of the same socio-

[129] Mowen, A. J., Barrett, A. G., Graefe, A. R., Kraschnewski, J. L., & Sciamanna, C. N. (2017). "Take in two parks and call me in the morning"–Perception of parks as an essential component of our healthcare system. *Preventive Medicine Reports*, *6*, 63-65.

[130] Haskell, W. L., Blair, S. N., & Hill, J. O. (2009). Physical activity: Health outcomes and importance for public health policy. *Preventive Medicine*, 49(4), 280–282. https://doi.org/10.1016/j.ypmed.2009.05.002.
[131] Examples of such diseases are "blood pressure, atherogenic lipoprotein profile, blood clotting/fibrinolysis, insulin-mediated glucose uptake, bone and muscle strength, autonomic nervous system regulation." Source: Ibid.
[132] Some may argue that LMI families that earn their income from physical labor (construction, farm work, etc.) do not need to dedicate a part of their recreation budget to physical activities because they already being physically active. However, researchers found that "occupational physical activity (OPA)" does not promote positive health outcomes. The contrary is in fact true; it can in many cases be detrimental to health. Research has shown that OPA "increases the risk for cardiovascular disease (CVD) and mortality outcomes, even after extensive adjustments for other risk factors including socioeconomic status, [leisure time physical activity] LTPA and other health behaviours." Source: Holtermann, A., Krause, N., van der Beek, A. J., & Straker, L. (2017). The physical activity paradox: six reasons why occupational physical activity (OPA) does not confer the cardiovascular health benefits that leisure time physical activity does. *British Journal of Sports Medicine*, 52(3), 149–150. https://doi.org/10.1136/bjsports-2017-097965.
[133] Bourdieu, P. (1986). The forms of capital. In: Handbook of theory and research for the sociology of education. JG Richardson. *New York, Greenwood*, *241*(258), 19.
[134] Coleman, J. S. (1988). Social capital in the creation of human capital. *The American Journal of Sociology*, *94*, S95–S120.
[135] Putnam, R. D. (2000). *Bowling alone: The collapse and revival of American community*. New York, NY: Simon & Schuster.

[136] Hemingway, J. L. (1999). Leisure, Social Capital, and Democratic Citizenship. *Journal of Leisure Research*, 31(2), 150–165. https://doi.org/10.1080/00222216.1999.11949855.
[137] Powers, S., & Webster, N. (2021). A conceptual model of intergroup contact, social capital, and youth civic engagement for diverse democracy. *Local Development & Society*, 1-18.

economic status or of the same race, bridging social capital refers to a larger social network that "bridges" connections between different social groups, such as people of different socio-economic levels.[138] Research has shown that bridging social capital is especially valuable for linking individuals to different resources and levels of the social system (i.e., linking social capital).[139] For LMI individuals, linking social capital has the potential to connect them to resources for personal and professional advancement that can support both youth and adults, and research suggests that recreational activities and settings are associated with social capital development.[140,141,142,143] For example, parks can encourage social capital development, especially among low-income families with children.[144] Furthermore, at the community level, research has shown that higher levels of social capital are commonly associated with lower levels of various types of crime.[145,146] Thus, recreational activities which support social capital development provide valuable benefits for LMI individuals and their communities.

An all-encompassing American culture where active participation in democracy is encouraged necessitates members of society to participate in recreational and civic activities. In a seminal article titled *Leisure, Social Capital, and Democratic Citizenship*, J.L. Hemingway argues that participating in recreational activities during leisure time and interacting with members of society allows for building "a person's social repertoire, enabling her/him to deal with specific aspects of social relations."[147] Regarding the role of leisure in democratic citizenship, Hemingway underlines the fact that the nature of the participatory democracy in the U.S. demands citizens' engagement. The importance of recreational activities in building social capital is particularly urgent in a time when such capital is reportedly declining. Findings from the General Social

[138] Putnam, R. D. (2000). *Bowling alone: The collapse and revival of American community*. New York, NY: Simon & Schuster.

[139] Enfield, R. (2008). Social capital and implications for positive youth development. *Monograph*, *1998*, 1–18. November 10, 2019. http://4h.ucanr.edu/files/1224.pdf

[140] Holtan, M. T., Dieterlen, S. L., & Sullivan, W. C. (2015). Social life under cover: tree canopy and social capital in Baltimore, Maryland. *Environment and Behavior*, *47*(5), 502-525.

[141] Pitas, N. A., Hickerson, B. D., Koerte, T., Kerstetter, D., & Mowen, A. J. (2017). "A unifying force in the community": Perceptions of a neighborhood park renovation. *Community Development*, *48*(3), 420-435.

[142] Perks, T. (2007). Does sport foster social capital? The contribution of sport to a lifestyle of community participation. *Sociology of Sport Journal*, *24*(4), 378-401.,

[143] Pitas, N. A., Mowen, A. J., & Powers, S. L. (2021). Person-place relationships, social capital, and health outcomes at a nonprofit community wellness center. *Journal of Leisure Research*, *52*(2), 247-264.

[144] Mullenbach, L. E., Larson, L. R., Floyd, M. F., Marquet, O., Huang, J. H., Alberico, C., ... & Hipp, J. A. (2022). Cultivating social capital in diverse, low-income neighborhoods: The value of parks for parents with young children. *Landscape and Urban Planning*, *219*, 104313.

[145] Robison, L. J., Siles, M. E., & Jin, S. (2011). Social capital and the distribution of household income in the United States: 1980, 1990, and 2000. *The Journal of Socio-Economics*, *40*(5), 538-547.

[146] Galea, S., Karpati, A., & Kennedy, B. (2002). Social capital and violence in the United States, 1974–1993. *Social science & medicine*, *55*(8), 1373-1383.

[147] Ibid.

Survey (GSS) indicate that more and more Americans say that they have never interacted with their neighbors[148] and Pew reports show just over half of Americans (around 53%) voted in the 2020 general election.[149] Thus, participating in recreation and civic activities, from this lens, is intrinsic to maintaining a vibrant American society and healthy democratic institutions.

II. Youth

Similar to the benefits provided to adults, recreational activities provide important health benefits to youth. Recreational activities, especially outdoors, are also critical for physical fitness, which researchers have found to correlate positively with cognitive development and academic performance.[150] Many recreational activities, including visits to parks and playgrounds, playing sports, and participating in outdoor recreation, provide opportunities for physical activity, an important determinant of health both in childhood and adulthood.[151] For example, research shows that participation in youth sports is associated with higher levels of physical activity not only during childhood, but also greater persistence in physical activity later in life.[152] Given that physical inactivity is associated with higher levels of obesity and greater risk of chronic disease, recreational activities that promote youth physical activity are essential.[153] Furthermore, recreational activities are frequently associated with positive youth development because of the additional benefits they provide, including providing positive role models for youth, safe environments, and diversions from risky behaviors.[154]

Another important function of recreation for youth is enhancing their ability to learn. The American Academy of Pediatrics established that play is essential for children's healthy brain development.[155] Research from the National Wildlife Federation showed that exposure to the outdoors through recreational

[148] Poon, L. (2015, August 19). *Why Won't You Be My Neighbor?* Bloomberg CityLab. Retrieved January 21, 2022, from https://www.bloomberg.com/news/articles/2015-08-19/why-americans-are-less-likely-to-interact-with-their-neighbors-than-ever-before.

[149] Daniller, A., & Gilberstadt, H. (2020, December 15). *Key findings about voter engagement in the 2020 election*. Pew Research Center. Retrieved January 21, 2022, from https://www.pewresearch.org/fact-tank/2020/12/14/key-findings-about-voter-engagement-in-the-2020-election/.

[150] Haapala, E. A. (2013). Cardiorespiratory Fitness and Motor Skills in Relation to Cognition and Academic Performance in Children – A Review. *Journal of Human Kinetics*, 36(1), 55–68. https://doi.org/10.2478/hukin-2013-0006.

[151] Bailey, R., Cope, E., & Parnell, D. (2015). Realising the benefits of sports and physical activity: the human capital model. *Retos: Nuevas Perspectivas de Educación Física, Deporte y Recreación*, (28), 147-154.

[152] Lee, J. E., Pope, Z., & Gao, Z. (2018). The role of youth sports in promoting children's physical activity and preventing pediatric obesity: a systematic review. *Behavioral Medicine*, *44*(1), 62-76.

[153] Anderson, E., & Durstine, J. L. (2019). Physical activity, exercise, and chronic diseases: A brief review. *Sports Medicine and Health Science*, *1*(1), 3-10.

[154] Berdychevsky, L., Stodolska, M., & Shinew, K. J. (2019). The roles of recreation in the prevention, intervention, and rehabilitation programs addressing youth gang involvement and violence. *Leisure Sciences*, 1-23.

[155] Ginsburg, K. R. (2007). The Importance of Play in Promoting Healthy Child Development and Maintaining Strong Parent-Child Bonds. *Pediatrics*, 119(1), 182–191. https://doi.org/10.1542/peds.2006-2697.

activities reduced youth's school-related stress and improved their sleep quality.[156] Other research has shown that when in nature, youth form social connections more easily and their wellbeing outcomes improve significantly.[157] This was reinforced in Article 31 of the Convention on the Rights of the Child adopted in 1990, which emphasized the right of children to play.[158] With this in mind, we determined that a part of the household's recreation budget ought to be allocated to recreation and play for youth.

Recreational Activities

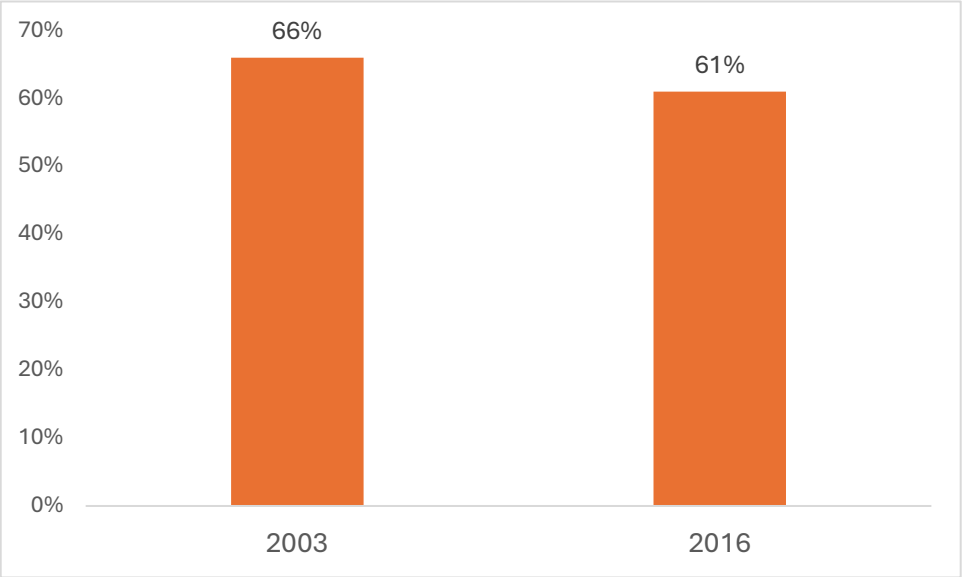
I. Dining Out

A. Rationale

According to the Simmons National Consumer Survey (2018), dining out with friends and family is one of the most popular recreational activities in the United States.[159] In a 2017 survey by Pew Research, 69% of adults surveyed said that spending time with family "provides a great deal of meaning and fulfillment in their lives" while 47% said the same about spending time with friends.[160] Spending time with family, friends, and neighbors is a common way of relaxing and disconnecting from work. Recent findings from the 2021 American Perspectives Survey show that most Americans rely on friends and family for personal support and that two thirds of Americans have a childhood friend.[161] We chose to focus on the cost of dining out due to the social benefits it provides. It has increasingly become a way that many Americans spend time with friends and family during their leisure time.[162] Gallup polls show that, at least 60% of Americans consistently ate at a restaurant at least once in the past week since 2003.

Figure 1: Percent of respondents in Gallup poll who said they have eaten at a restaurant of any kind one or more times in the past week

[156] Gagnon, S. (2018, August 30). *Reducing Student Stress through Nature*. The National Wildlife Federation Blog. Retrieved January 21, 2022, from https://blog.nwf.org/2018/08/reducing-student-stress-through-nature/.
[157] Warber, S. L., DeHudy, A. A., Bialko, M. F., Marselle, M. R., & Irvine, K. N. (2015). Addressing "Nature-Deficit Disorder": A Mixed Methods Pilot Study of Young Adults Attending a Wilderness Camp. *Evidence-Based Complementary and Alternative Medicine*, 2015, 1–13. https://doi.org/10.1155/2015/651827.
[158] *Convention on the Rights of the Child.* (1990, September 2). Office of the United Nations High Commissioner for Human Rights. Retrieved January 21, 2022, from https://www.ohchr.org/en/professionalinterest/pages/crc.aspx.
[159] Pinkus, A. (2019, December 14). *Cultural Ties: Where Americans Meet and Part on Leisure Time*. American Communities Project. Retrieved January 21, 2022, from https://www.americancommunities.org/cultural-ties-where-americans-meet-and-part-on-leisure-time/.
[160] *Where Americans Find Meaning in Life*. (2018, November 20). Pew Research Center. Retrieved January 21, 2022, from https://www.pewforum.org/2018/11/20/where-americans-find-meaning-in-life/.
[161] Cox, D. A. (2021, June 8). *The state of American friendship: Change, challenges, and loss*. The Survey Center on American Life. Retrieved January 21, 2022, from https://www.americansurveycenter.org/research/the-state-of-american-friendship-change-challenges-and-loss/.
[162] Saad, L. (2017, January 11). *Americans' Dining-Out Frequency Little Changed From 2008*. Gallup. Retrieved June 13, 2022, from https://news.gallup.com/poll/201710/americans-dining-frequency-little-changed-2008.aspx.



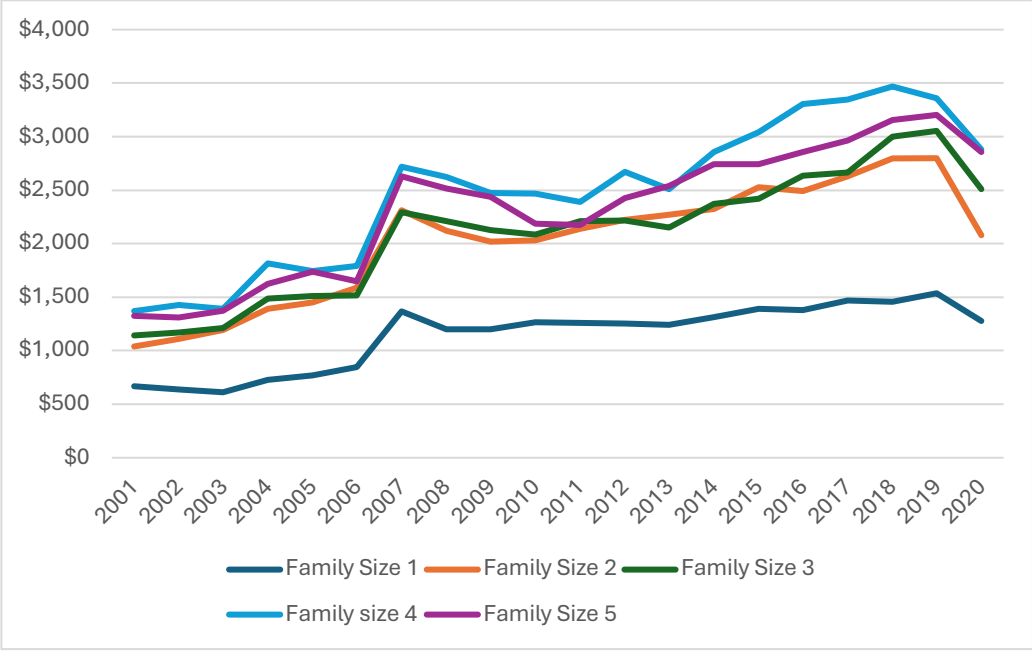
Source: Saad, L. (2017, January 11). *Americans' Dining-Out Frequency Little Changed From 2008*. Gallup. Retrieved June 13, 2022, from https://news.gallup.com/poll/201710/americans-dining-frequency-little-changed-2008.aspx.

B. Pricing

To trace the cost of dining out over the past two decades, we use the FDXMAPCQ and FDXMAPPQ variables from the interview files of the Consumer Expenditure Survey (CE). These variables record expenditure on food away from home excluding meals as pay this quarter and the previous one. To calculate the expenditure of an average LMI family on dining out, we restrict ourselves to the sample of households earning between the 25th and 75th percentile of earnings, hence excluding households that are in dire difficulty and cannot afford dining out and wealthy households that frequent high-end restaurants. We calculate the average expenditure on food away from home by household size, ranging from one (single person) to five (couple with three children). We allocate the LMI household the annual amount spent on dining out as per the CE survey depending on the household size (Figure 2). Note that the dining out budget considerably shrank in 2020 due to the COVID-19 pandemic and the closure of many restaurants and street food vendors.

There is a clustering of expenditure line graphs for family sizes of three and greater. This suggests that even when children are added to the household, spending on food does not increase significantly compared to two-person households. Two hypotheses are possible: either families' ability to spend on food away from home declines as they grow bigger and hence expenditure doesn't increase in an arithmetic fashion, or families find food places where cheaper prices or family discounts are available.

Figure 2: Average expenditure on food away from home by household size for households earning between the 25th and 75th percentiles of income



Source: *Consumer Expenditure Survey*. (n.d.). Bureau of Labor Statistics. https://www.bls.gov/cex/.

II. Watching television

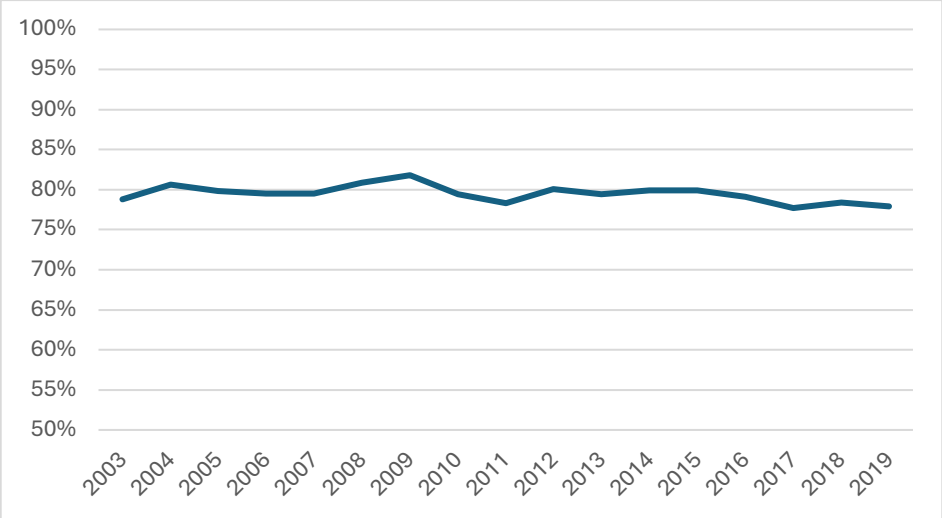
A. Rationale

The American Time Use Survey (ATUS) offers consistent evidence that TV has been widely popular among American adults for the past two decades.[163] Figure 3 shows the average percentage of American adults who watch TV daily, an unwavering 80% with very slight fluctuations since 2003. Among those who watch TV, Figure 4 shows that the duration of watching TV per day on average has remained almost the same since 2003, always hovering around 3.5 hours a day.[164][165] For this reason, we consider it reasonable to track the cost of having TV services in one's home since it's a very popular, relaxing recreational activity that Americans engage in during their leisure time. Watching TV in moderation can provide a mechanism for people to destress and disconnect from their everyday lives. Media including TV can also help with mental

[163] *American Time Use Survey Home Page*. (n.d.). Bureau of Labor Statistics. https://www.bls.gov/tus/#tables.
[164] The Bureau of Labor Statistics (BLS) started collecting data for the ATUS in 2003. Thus, data for 2001 and 2002 are unavailable. Source: *American Time Use Survey User's Guide: Understanding ATUS 2003 to 2020*. (2021, November). Bureau of Labor Statistics. https://www.bls.gov/tus/atususersguide.pdf, p.6.
[165] Annual estimates for 2020 are unavailable due to interruptions in the ATUS data collection in the beginning of the COVID-19 pandemic. Source: *American Time Use Survey*. (n.d.). Bureau of Labor Statistics. Retrieved February 1, 2022, from https://www.bls.gov/tus/.

recovery.[166] People often come together to watch shows and movies, and watching TV is not only a way to experience popular culture but can also help stimulate social connectedness and shared social worlds with one's family and friends.[167]

Figure 3: Percent of American adults who regularly watch TV

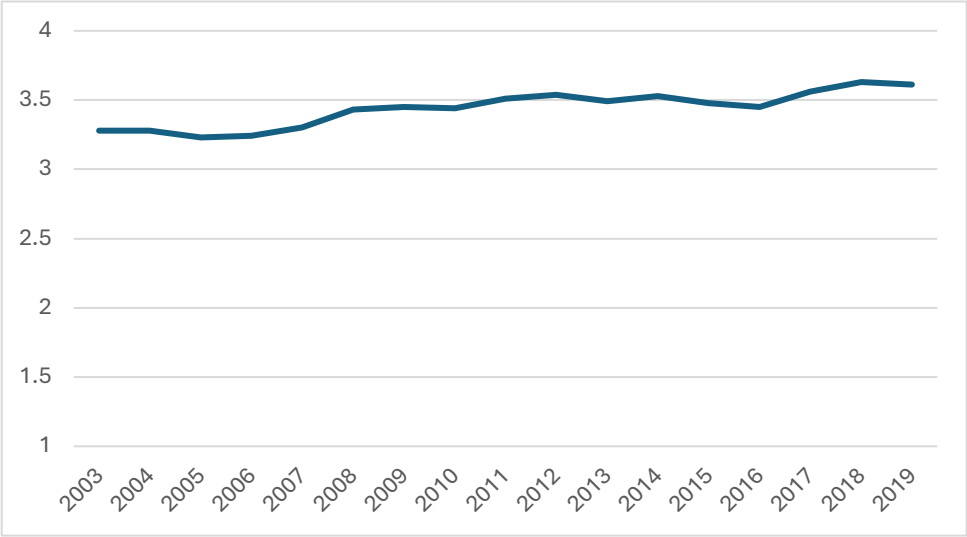


Source: *American Time Use Survey Home Page*. (n.d.). Bureau of Labor Statistics. https://www.bls.gov/tus/#tables.

Figure 4: Hours spent watching TV daily for American adults who reported watching TV regularly

[166]Reinecke, L., & Eden, A. (2017). *Media use and recreation: Media-induced recovery as a link between media exposure and well-being*. In L. Reinecke & M.B. Oliver (Eds.), The Routledge handbook of media use and well-being: International perspectives on theory and research on positive media effects (pp. 106-117). New York: Routledge.

[167] Gomillion, S., Gabriel, S., Kawakami, K., & Young, A. F. (2017). Let's stay home and watch TV: The benefits of shared media use for close relationships. *Journal of Social and Personal Relationships*, *34*(6), 855-874.



Source: *American Time Use Survey Home Page*. (n.d.). Bureau of Labor Statistics. https://www.bls.gov/tus/#tables.

B. Pricing

We track the price of a subscription to a multichannel video programming distributor (MPDV). Even though 44% of Americans have "cut the cord" according to Pew research,[168] the majority of American households still subscribe to some version of multichannel television. The cable TV share of the MPDV has been steadily declining, but it has been since replaced by direct broadcast satellite (DBS) and telephone TV (AT&T U-verse, Verizon FiOS, etc.).[169] Figure 5 shows that through 2015, pay TV has maintained popularity, but cable companies lost significant market share.[170] For the years following 2015, the market research company eMarketer found that subscribers to pay TV (cable, satellite, telephone) have declined, but as of 2020, 70% of TV households still use MPDV subscriptions (Figure 6).[171] For pricing, we used the average monthly prices for expanded basic service reported by the Federal Communications Commission (FCC), which is the authoritative source on price fluctuations in all communication technologies.[172] Extended basic service offers ample choice of channels that suits different ages and interests. For example, the Disney Channel, offered through extended basic service, caters to children, while basic TV packages

[168] Rainie, L. (2021b, March 17). *Cable and satellite TV use has dropped dramatically in the U.S. since 2015*. Pew Research Center. Retrieved February 9, 2022, from https://www.pewresearch.org/fact-tank/2021/03/17/cable-and-satellite-tv-use-has-dropped-dramatically-in-the-u-s-since-2015/.

[169] *Video Competition Reports*. (n.d.). Federal Communications Commission. https://www.fcc.gov/reports-research/reports/video-competition-reports.

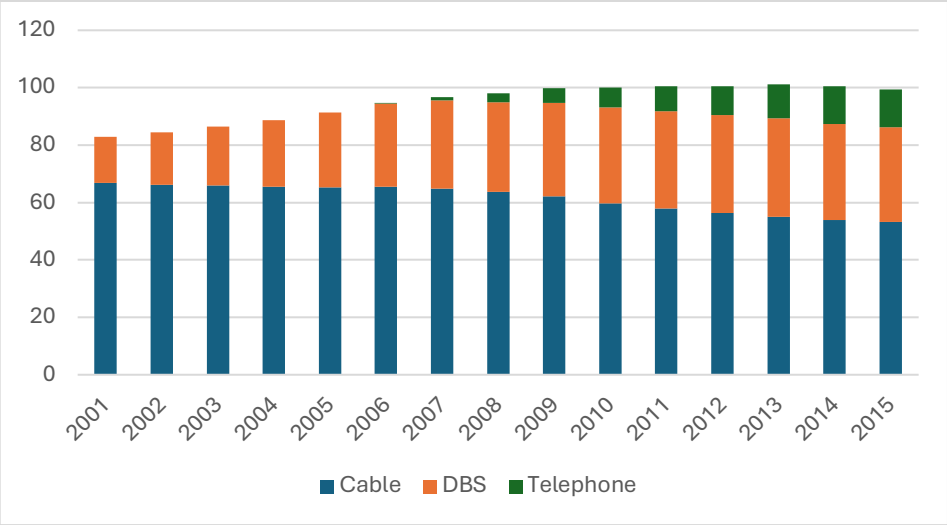
[170] The reason the data ends at 2015 is because that last report on video competition was issued by the FCC in 2017 titled "18th Annual Video Competition Report." Credible data isn't available for 2016-2020 on the MPDV market breakdown.

[171] He, A. (2019, August 8). *More Consumers Will Continue to Drop Pay TV Because of Price Hikes*. eMarketer. Retrieved February 9, 2022, from https://www.emarketer.com/content/more-consumers-will-continue-to-drop-pay-tv-because-of-price-hikes.

[172] *Cable Industry Prices Reports*. (n.d.). Federal Communications Commission. https://www.fcc.gov/reports-research/reports/cable-industry-prices-reports.

do not offer children's entertainment channels.[173] Starting in 2006, we averaged the costs of cable and satellite subscriptions, given that the latter has gained significant market share (since 2006, a third of households in the U.S. subscribed to satellite service). Figure 7 shows the changes in cable prices over time.

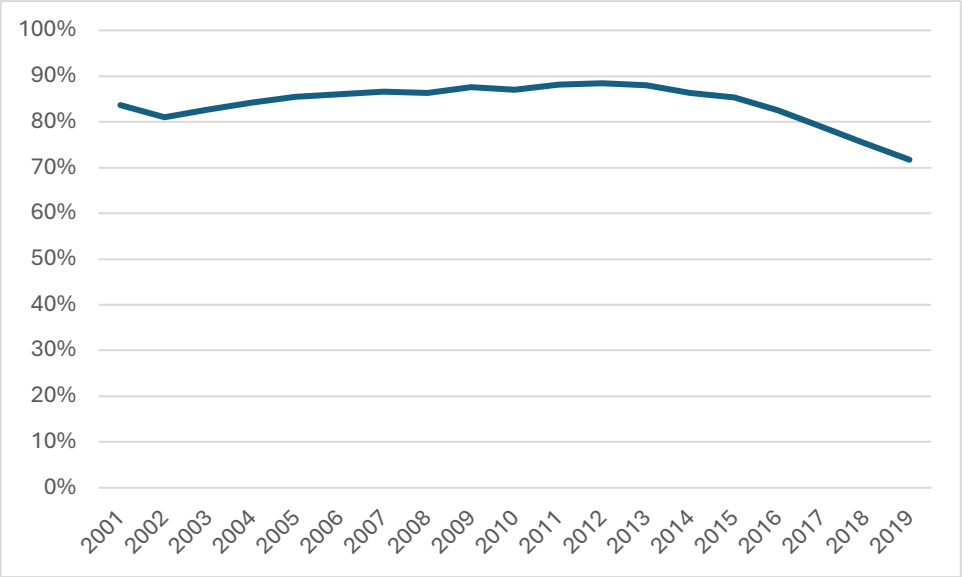
Figure 5: Number of Pay TV Subscribers (millions)



[173] *What is Basic Cable?* (n.d.). Dish.Com. Retrieved January 21, 2022, from https://www.dish.com/programming/packages/what-is-basic-cable/.

Source: *Annual Assessment of the Status of Competition in the Market for the Delivery of Video Programming*. (n.d.) Federal Communications Commission. https://www.fcc.gov/documents

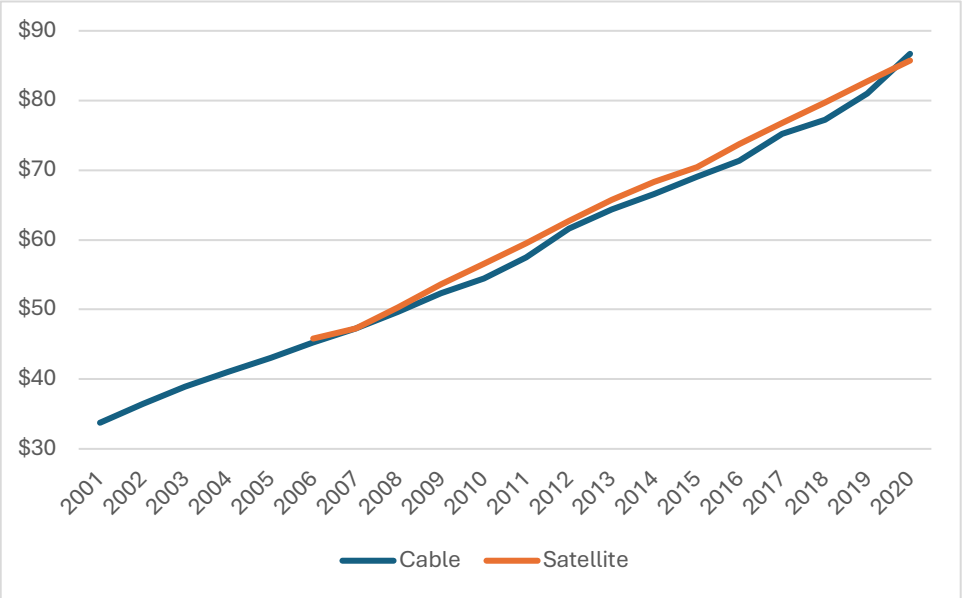
Figure 6: Percent of U.S. TV households who subscribe to pay TV



Sources:

1. *Annual Assessment of the Status of Competition in the Market for the Delivery of Video Programming*. (n.d.) Federal Communications Commission. https://www.fcc.gov/documents
2. *US Pay TV vs. Non-Pay-TV Households, 2016–2024 (millions)*. (2020, September 1). eMarketer. Retrieved June 14, 2022, from https://www.emarketer.com/chart/239301/us-pay-tv-vs-non-pay-tv-households-2016-2024-millions

Figure 7: Average Price of Extended Basic Service TV



Source: *Cable Industry Price Reports*. (n.d.). Federal Communications Commission. https://www.fcc.gov/reports-research/reports/cable-industry-prices-reports.

III. Subscription Video on Demand (SVOD) services

a. Rationale

We recognize that the declining admissions per capita at the movies explains a mounting trend of abandoning the cinema experience for a more convenient at-home screening (Figure 8). This trend started as early as 2001 when Gallup reported that Americans are much more likely to watch movies at home than at the movie theater.[174] The poll reported that "[m]ore than nine in 10 Americans say they own a home video player such as a VCR or DVD player, with 70% owning just a VCR, 1% owning just a DVD player, and 23% owning both." In 2006, Pew Research reported that three-quarters of U.S. adults prefer watching movies at home than going to the theater.[175] Pew also indicated that 56% of adults cited DVD as their preferred way to watch a movie at home.[176] Given this, we do not allocate LMI families the cost of going to the movies since most families have largely abandoned this recreational experience since 2001. Additionally, we choose not to allocate LMI families the cost of a DVD player and DVD purchases or rentals even though 81% of U.S. households owned a DVD player in 2006.[177] This choice was made because

[174] Carroll, J., & Jones, J. M. (2001, March 23). *Julia Roberts Is Top Current Movie Star, While John Wayne Is All-time Favorite.* Gallup. Retrieved April 20, 2022, from https://news.gallup.com/poll/1870/julia-roberts-top-current-movie-star-while-john-wayne-alltime-favorite.aspx.

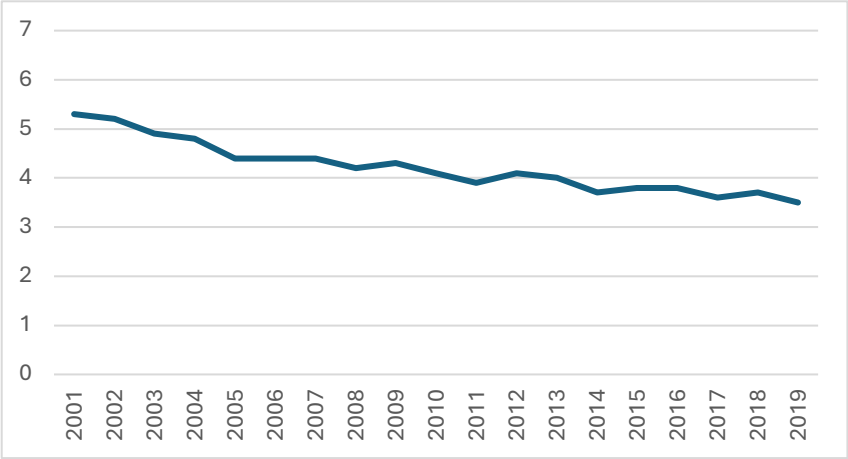
[175] *Increasingly, Americans Prefer Going to the Movies at Home*. (2006, May 16). Pew Research. Retrieved April 11, 2022, from https://www.pewresearch.org/social-trends/2006/05/16/increasingly-americans-prefer-going-to-the-movies-at-home/.

[176] Pew Research Center. (2006, May). *Home "ticket sales" dwarf theater attendance 5–1, survey shows. Increasingly, Americans Prefer Going to the Movies At Home*. Pew Research. https://www.pewresearch.org/wp-content/uploads/sites/3/2010/10/Movies.pdf.

[177] *Survey: DVD players overtake VCRs in popularity*. (2006, December 26). CNN Money. Retrieved April 11, 2022, from https://money.cnn.com/2006/12/26/technology/dvd_vcr/.

expanded basic cable service offers access to an array of movies, which allow viewers to achieve an acceptable level of integration into popular culture. There are a multitude of movie offerings on basic cable in broadcast network prime time ratings. For example, between Dec. 31, 2001, and Jan. 6, 2002, ABC Saturday Night Movie, NBC Saturday Night Movie, Fox Movie Special, and CBS Sunday Movie ranked high in basic cable programming.[178] Another proof point that movies have been available on basic cable is American Movies Classics (AMC), which has been a channel on basic cable throughout the 2000s.[179]

Figure 8: U.S./Canada admissions per capita



Sources:

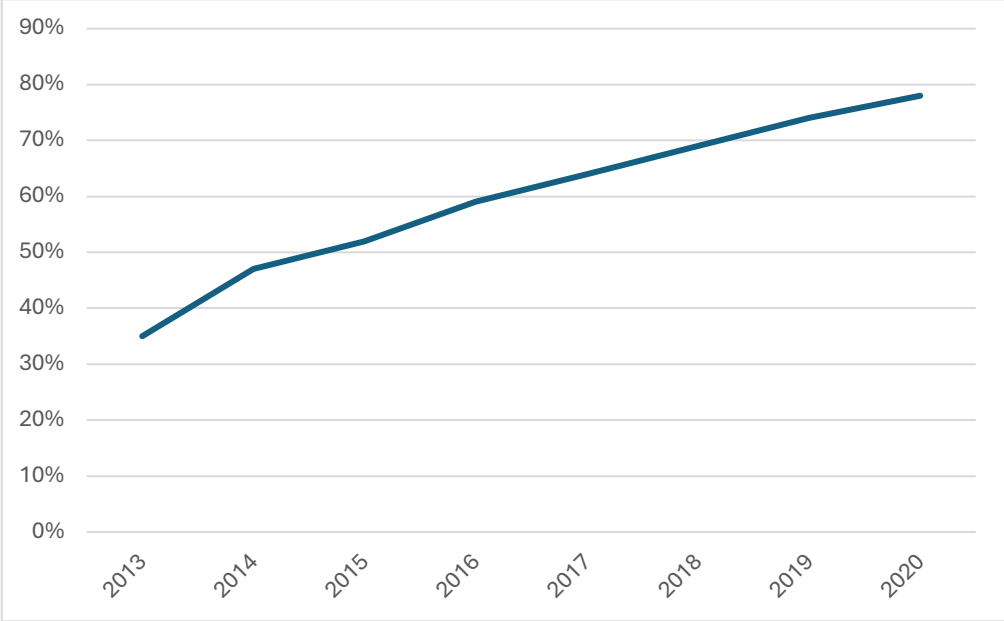
1. Motion Picture Association. (2019). *THEME Report 2019*. https://www.motionpictures.org/wp-content/uploads/2020/03/MPA-THEME-2019.pdf
2. Motion Picture Association. (2014). *Theatrical Market Statistics 2013*. https://www.motionpictures.org/wp-content/uploads/2014/03/MPAA-Theatrical-Market-Statistics-2013_032514-v2.pdf
3. Motion Picture Association. (2004). *US Entertainment Industry: 2004 MPA Market Statistics*. https://www.immagic.com/eLibrary/ARCHIVES/GENERAL/MPAA_US/M050309M.pdf

More recently, the influx of streaming services and its relative affordability has led us to consider a subscription to at least one Subscription Video on Demand (SVOD) service as a minimal recreational need given the preference of most American adults to watch movies and other programming at home. This preference is prevailing and consistent over time; for example, a survey reported that 70% of adults prefer watching movies at home, even if theaters were to reopen following the pandemic.[180] To decide the year in which to effectuate this shift, we evaluated survey data from Leichtman Research, a widely quoted media

[178] Ray, K. (2002, January 14). BroadcastWatch. *Broadcasting & Cable*, 132(2). Retrieved April 20, 2022, from https://worldradiohistory.com/Archive-BC/BC-2002/BC-2002-01-14.pdf.
[179] Wikipedia contributors. (n.d.-a). *AMC (TV channel)*. Wikipedia. Retrieved April 20, 2022, from https://en.wikipedia.org/wiki/AMC_(TV_channel).
[180] Pesce, N. L. (2020, May 21). *70% of people would rather watch movies at home, even if theaters reopen: survey*. MarketWatch. Retrieved April 11, 2022, from https://www.marketwatch.com/story/70-of-people-would-rather-watch-movies-at-home-even-if-theaters-reopen-survey-2020-05-21.

research group.[181] Figure 9 shows its finding on the percentage of U.S. households subscribing to at least one SVOD service. This percentage surpassed 30% in 2013, which we take as the year to introduce an SVOD subscription into the recreational bundle. However, since SVOD penetration is gradual and many households remain reliant on cable/satellite for TV service, we don't phase out cable/satellite from the bundle entirely. Instead, we construct an average weighted price that takes into account the percentage of households still exclusively subscribed to cable/satellite and the percentage of households that have at least one SVOD service. For example, in 2013, the first year in which we introduced a SVOD subscription into the bundle, we multiply the average SVOD subscription cost by 0.35, which is the percent of households that adopted at least one SVOD service, and add the average subscription cost to a multichannel TV (cable or satellite), which we multiplied by 0.65 i.e., the number of households that didn't subscribe to SVOD (1-0.35).

Figure 9: Number of households with at least one SVOD service



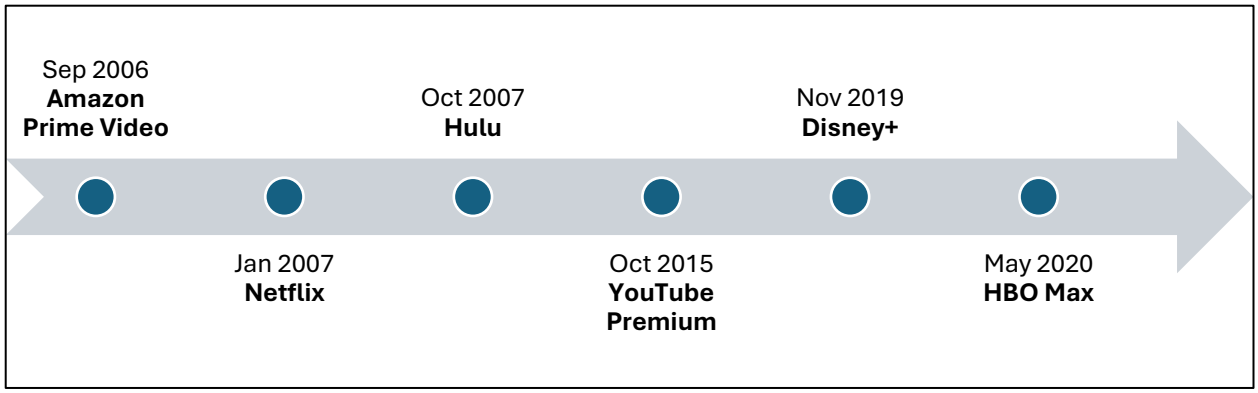
Source: *78% of U.S. Households Have an SVOD Service*. (2020, August 28). Leichtman Research Group. Retrieved June 14, 2022, from https://www.leichtmanresearch.com/78-of-u-s-households-have-an-svod-service/.

Our goal is to give LMI families the choice between at least two streaming services, considering the difference in movie offerings between the different services. To determine a choice of two services, we consider three criteria: 1) continuous presence in the market for a considerable time, 2) popularity among U.S. households and 3) affordability. Firstly, the two streaming services need to have existed at least since

[181] *78% of U.S. Households Have an SVOD Service*. (2020, August 28). Leichtman Research Group. Retrieved June 14, 2022, from https://www.leichtmanresearch.com/78-of-u-s-households-have-an-svod-service/.

2015. Thus, looking at a timeline of the founding dates of the most popular streaming services (Figure 10), we see that that Netflix and Amazon Prime Video were the first to enter the SVOD market.[182]

Figure 10. SVOD Market Entry



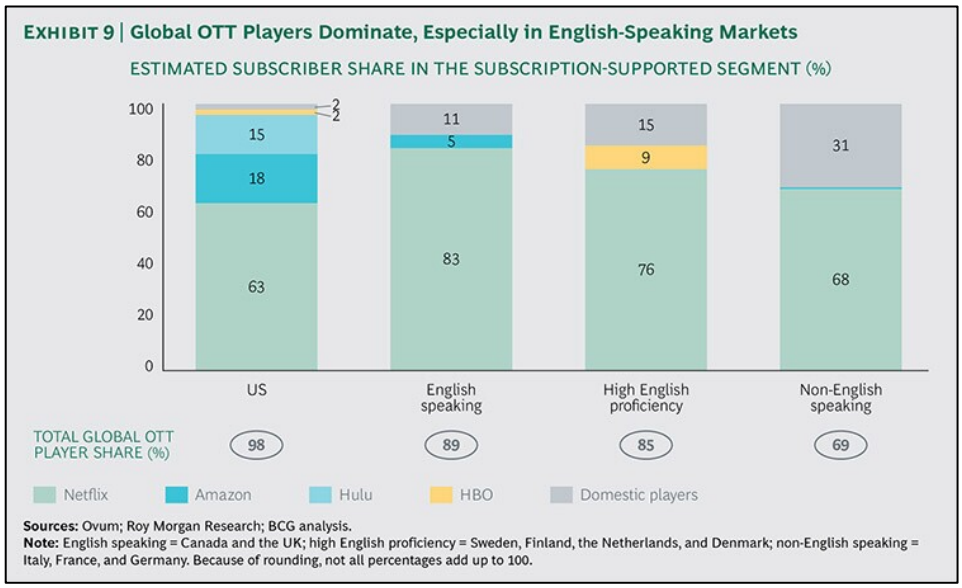
Source: Wikipedia contributors. (n.d.). *List of streaming media services*. Wikipedia. Retrieved June 14, 2022, from https://en.wikipedia.org/wiki/List_of_streaming_media_services.

Secondly, the most popular streaming services by subscriptions are also Netflix and Amazon Prime Video (Figure 11). Figure 12 shows that by 2020, Netflix had around 74 million paid memberships in the U.S. and Canada.[183] As of December 2020, 142 million consumers subscribed to Amazon Prime (Figure 13).[184][185] But Amazon Prime is first and foremost a delivery service, so one might question how many subscribers use the service for streaming movies. According to a Morning Consult poll, of the 54% of adults who subscribe to Amazon Prime, 22% use the streaming service every day, 32% use it several times a week, and 16% use it once a week.[186] That is, 70% of Prime subscribers use the streaming service at least once a week. Thus, we assume that an Amazon Prime subscription in the majority of cases implies a frequent usage of the video streaming service. Both Netflix and Amazon Prime are popular across the board, with a recent survey showing that these two services were the most subscribed to by Baby Boomers, Generation X, Millennials, and Generation Z.[187] Thirdly, regarding affordability, an Amazon Prime or Netflix subscription is very much cheaper than the cost of going to the movies since the average price of one movie ticket stood

[182] Wikipedia contributors. (n.d.). *List of streaming media services*. Wikipedia. Retrieved April 11, 2022, from https://en.wikipedia.org/wiki/List_of_streaming_media_services.
[183] Statista. (2022, January 21). *Number of Netflix paid streaming subscribers in the U.S. and Canada Q1 2013- Q4 2021*. Retrieved April 11, 2022, from https://www.statista.com/statistics/250937/quarterly-number-of-netflix-streaming-subscribers-in-the-us/.
[184] Garcia, T. (2021, January 20). *Amazon Prime members in the U.S. reaches 142M, more shoppers choose annual option: CIRP*. MarketWatch. Retrieved April 11, 2022, from https://www.marketwatch.com/story/amazon-prime-member-total-reaches-142-million-in-u-s-with-more-shoppers-opting-in-for-a-full-year-data-shows-11611073132.
[185] Davis, D. (2021, November 3). *Most Amazon shoppers have eyes only for Amazon*. Digital Commerce 360. Retrieved April 11, 2022, from https://www.digitalcommerce360.com/article/amazon-prime-membership/.
[186] Morning Consult. (2021, May). *National Tracking Poll #210591*. https://assets.morningconsult.com/wp-uploads/2021/06/16171008/210591_crosstabs_MC_ENTERTAINMENT_AVOD_STREAMING_Adults_v1_NP.pdf.
[187] Hepburn, T. (2022, January 12*). Survey: Amazon Prime Video is the Most Popular Streaming Service Across all Generations*. Cord Cutters News. Retrieved April 11, 2022, from https://www.cordcuttersnews.com/survey-amazon-prime-video-is-the-most-popular-streaming-service-across-all-generations/.

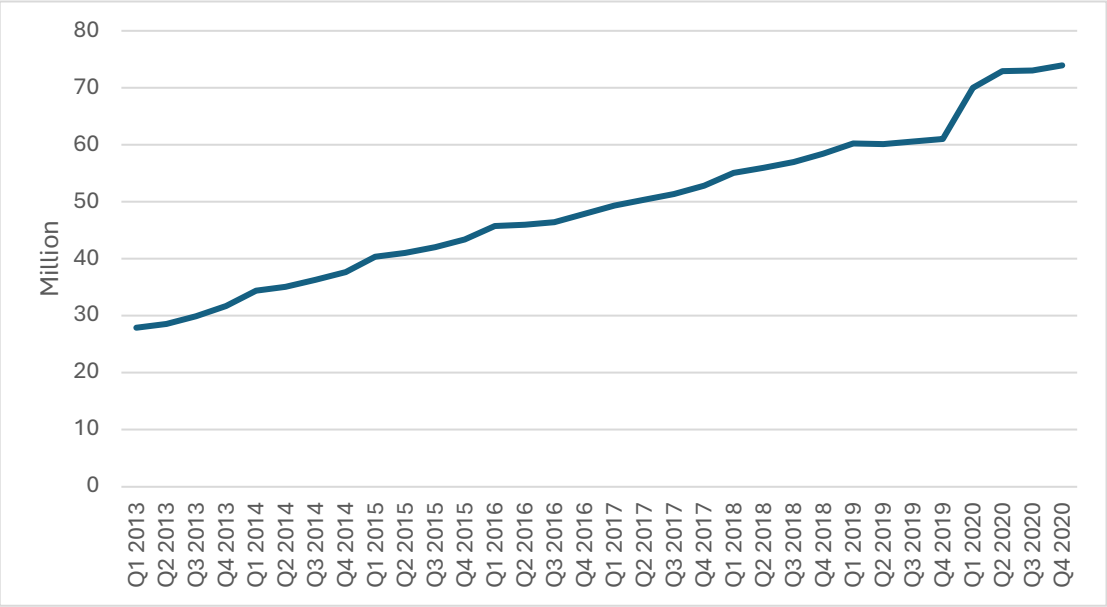
somewhere between $8 and $9 in the period 2015-2020 (one trip to the movies would cost $8-9 multiplied by the number of the family's members).

Figure 11. SVOD Subscriber Share in English-Speaking Markets



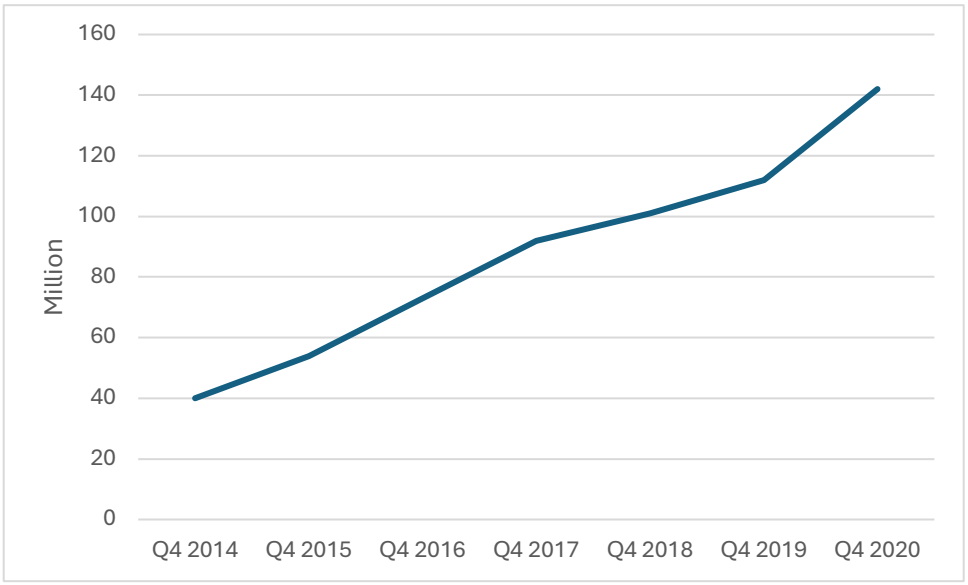
Source: Arthofer, F., Kon, M., Lee, E., Rose, J., & Hardarson, Á. (2016, September 20). *The Future of Television: The Impact of OTT on Video Production Around the World*. BCG Global. Retrieved April 12, 2022, from https://www.bcg.com/publications/2016/media-entertainment-technology-digital-future-television-impact-ott-video-production.

Figure 12. Number of Netflix paid streaming subscribers in the U.S. and Canada



Source: Statista. (2022, January 21). *Number of Netflix paid streaming subscribers in the U.S. and Canada Q1 2013-Q4 2021*. Retrieved April 11, 2022, from https://www.statista.com/statistics/250937/quarterly-number-of-netflix-streaming-subscribers-in-the-us/.

Figure 13. Number of Amazon Prime subscribers in the U.S.



Source: Davis, D. (2021, November 3). *Most Amazon shoppers have eyes only for Amazon*. Digital Commerce 360. Retrieved April 11, 2022, from https://www.digitalcommerce360.com/article/amazon-prime-membership/

b. Pricing

We include an average of the annual Amazon Prime subscription and the annual equivalent of Netflix monthly payments. This gives LMI families a choice to subscribe to either service, but not both. For Netflix, we use the least expensive plan, the Basic Plan, which allows for only one account. Historical price data is reported by the Verge, a technology news website operated by Vox.[188] For the Amazon annual subscription, we use information on price changes since 2005 compiled by CNN Money.[189] We choose to include the annual subscription over the monthly price because it is more economical (see Table 1).

Table 1. Average SVOD prices for the period 2015-2020

Year	Netflix (Basic, Annualized)	Amazon Prime (Annual)	Average
2013	$95.88	$79	$87.44
2014	$95.88	$99	$97.44
2015	$95.88	$99	$97.44
2016	$95.88	$99	$97.44
2017	$95.88	$99	$97.44
2018	$95.88	$119	$107.44
2019	$107.88	$119	$113.44
2020	$107.88	$119	$113.44

Source: Yurieff, K. (2018, April 28). *Amazon Prime: A timeline of the membership service*. CNNMoney. Retrieved April 11, 2022, from https://money.cnn.com/2018/04/28/technology/amazon-prime-timeline/index.html.

IV. Physical activity for adults

A. Rationale

Since we are concerned with defining a "minimal" level of recreation, it is important to create a budget that allows adults and children in LMI families to be physically active without gym memberships. We consulted a variety of sources focused on outdoor recreation and sport participation. In this section, we focus on outdoor recreation, which can provide individuals with a host of benefits including physical activity, time in nature, and time away from the stress of everyday life.[190] To assess outdoor recreation participation, we examined the Outdoor Participation Reports issued by the Outdoor Foundation annually, which track trends in outdoor recreation. We identified four activities that account for a significant portion of the outdoor recreation in which Americans take part, namely running or jogging, hiking, fishing, and biking (see Figure 14).[191] Although the participation rates are for all Americans aged six and older, adults (25-years-old and older) have consistently indicated a preference for these activities (highest participation rates and

[188] Kastrenakes, J. (2022, January 14). *Netflix raises prices on all plans in US*. The Verge. Retrieved April 11, 2022, from https://www.theverge.com/2022/1/14/22884263/netflix-price-increases-2021-us-canada-all-plans-hd-4k.
[189] Yurieff, K. (2018, April 28). *Amazon Prime: A timeline of the membership service*. CNNMoney. Retrieved April 11, 2022, from https://money.cnn.com/2018/04/28/technology/amazon-prime-timeline/index.html.
[190] Godbey, G. (2009). Outdoor recreation, health, and wellness: Understanding and enhancing the relationship. Resources for the Future. https://media.rff.org/documents/RFF-DP-09-21.pdf.

[191] *2020 Outdoor Participation Report*. (2020, December). Outdoor Foundation. https://outdoorindustry.org/resource/2020-outdoor-participation-report/.

participation frequencies).[192][193][194][195] Amongst these four, we allow LMI adults the choice between running/hiking and biking. We selected these activities because they are among the most popular outdoor recreation activities in the U.S., and they are activities that require only minimal equipment and limited recurring costs (fishing is more equipment-intensive). Based on this, we allow LMI households equipment needed for running/jogging, hiking, or biking. We do this by constructing a weighted average of prices given the activity's popularity among Americans. We allocate this equipment to adults only because we consider children's participation in school sports and free park play a sufficient opportunity for physical activity.

B. Pricing

i) Equipment prices

To determine the cost of equipment needed to practice these outdoor activities, we used data from the National Sporting Goods Association (NSGA).[196] For running/jogging and hiking, we allocate each member of the family athletic sneakers. For biking, we allocate the cost of bicycles and helmets. The cost of bicycles was recorded in the survey starting in 2012, so to obtain prices for prior years, we adjust the 2012 price back using the Consumer Price Index (CPI) for Sports vehicles including bicycles. Figure 15 details the change of these equipment prices over time.

ii) Depreciation

There is no definite lifespan for a bicycle, as that depends on the model, usage, maintenance frequency, etc. However, generally speaking, a "high-milage" bicycle is one that has around 10,000 miles.[197] This means if a person rides a bike for one hour a week for 10 miles, which is the miles per hour that is assumed for most Google Maps routes and for beginner bikers,[198][199] they put 520 miles on the bike every year. This means an average bike's lifespan is 20 years. We thus allocate ever adult in the LMI family a new bike every 20 years and divide the cost by 20 to smooth it in the budget. However, for the bike to last 20 years, it requires maintenance at least once a year.[200] A bicycle could require tuning up more than once a year

[192] The Outdoor Foundation. (2017). *Outdoor Recreation Participation Topline Report 2017*. https://outdoorindustry.org/wp-content/uploads/2017/04/2017-Topline-Report_FINAL.pdf.
[193] The Outdoor Foundation. (2016). *Outdoor Recreation Participation Topline Report 2016*. https://outdoorindustry.org/wp-content/uploads/2017/05/2016-Topline-Report.pdf.
[194] The Outdoor Foundation. (2015). *Outdoor Recreation Participation Topline Report 2015*. https://arrowcreek411.files.wordpress.com/2015/06/researchparticipation2015topline.pdf.
[195] The Outdoor Foundation. (2014). *Outdoor Recreation Participation Topline Report 2014.* https://industry.traveloregon.com/wp-content/uploads/2015/07/OutdoorRecParticipationReport2014.pdf.
[196] *Sports Research Reports*. (n.d.). National Sporting Goods Association. Retrieved February 22, 2022, from https://www.nsga.org/research/.
[197] Bassett, E. (2021, June 14). *How Long Do Bicycles Actually Last?* Two Wheels Better. Retrieved May 2, 2022, from https://twowheelsbetter.net/bicycle-lifespan/.
[198] Whitehouse, T. (n.d.). *What is a good average speed on a road bike?* Road Bike Basics. Retrieved May 9, 2022, from https://roadbikebasics.com/average-speed-on-road-bike/.
[199] Chandler, M. (2021, May 25). *How Fast Does Google Maps Assume You Bike?* Discerning Cyclist. Retrieved May 9, 2022, from https://discerningcyclist.com/google-maps-cycling-speed/.
[200] Hobby Biker. (n.d.). *Average Cost of a Bike Tune-Up: And What is Included*. Retrieved May 2, 2022, from https://hobbybiker.com/average-cost-of-a-bike-tune-up/.

depending on riding conditions, but to meet the minimal criterion, we are assuming exceptional care so that it would only need an annual check-up, which we allocate LMI once a year. However, many parts require replacing in a bicycle at the 5,000-mile mark to continue to ensure safe riding, like tires, chain, cogs, etc.[201] Thus, we allocate the cost of a major tune-up every 10 years (given a riding rate of 520 miles/year). Most bike experts agree that the average minor tune up cost is between $50 and $90 (we take the midpoint at $70, once every year), and a major tune up costs between $120 and $150 (we take the midpoint at $135, once every five years).[202] Regarding the bike helmet, the U.S. Consumer Product Safety Commission (CPSC) states that one should replace a helmet every 5-10 years.[203] We take a conservative approach and assume that the LMI family would change their helmet once every 10 years. Again, this bike is meant for adult use and serves as an option for physical activity. Children's physical activity is discussed below separately.

For jogging/running shoes, their lifespan is strongly correlated with frequency of usage. It is difficult to judge how often and for how long individuals run/jog or hike as it's highly variable depending on the person. Given this, we take the minimum recommended running/jogging to remain in good health. A study from the Mayo Clinic showed that running/jogging only five miles per week ensures having the full benefits of avoiding cardiovascular diseases and all-cause mortality.[204] Most experts specify an average lifetime of running/jogging shoes between 300-500 miles.[205] We take the end of this range to meet the minimal criterion and ensure that when the shoes are replaced, it's because they have become virtually become unusable. Thus, assuming a 5 miles/week usage rate, the shoes would end their lifetime in two years. Based on this, we allocate LMI families the budget to replace running/jogging shoes once every two years.

iii) Extending prices to 2001

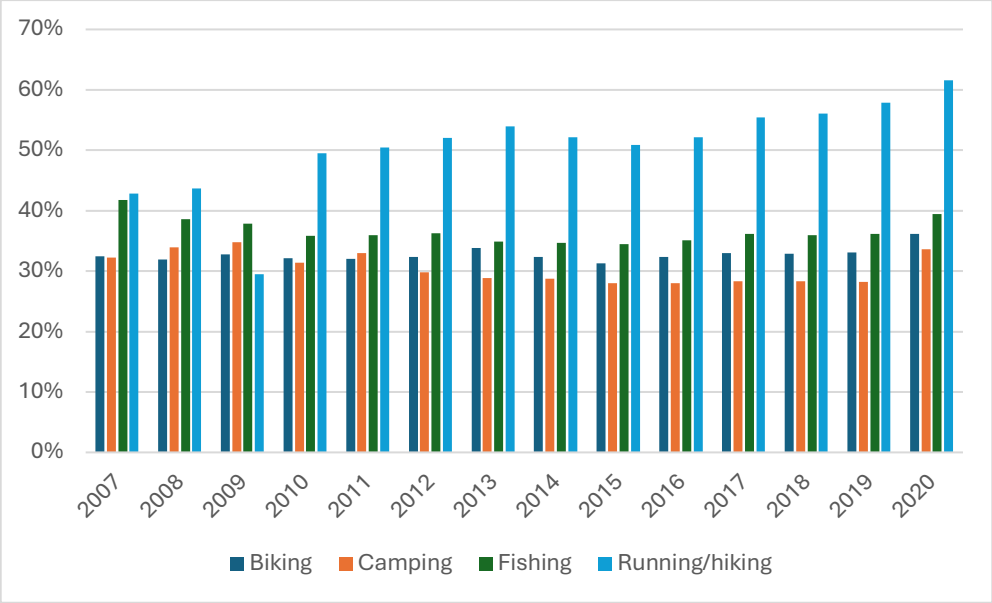
Since the NSGA data stops in 2018, we use the CPI for different categories of goods to extend equipment prices to 2020. For bicycles, we use the CPI for sports vehicles including bicycles (which includes ELI RC013 for bicycles), for helmets, the CPI for sports equipment (which includes ELI RC021), and for running/jogging shoes, the CPI for footwear (ELIs AE011, AE021, AE022, and AE031).

iv) Note on outwear

[201] Bassett, E. (2021, June 14). *How Long Do Bicycles Actually Last?* Two Wheels Better. Retrieved May 2, 2022, from https://twowheelsbetter.net/bicycle-lifespan/.
[202] Gibbons, R. (2021, December 18). *How Much Is a Bike Tune-Up? An In-Depth Look At Pricing*. Decline Magazine. Retrieved May 2, 2022, from https://www.declinemagazine.com/bike-maintenance/how-much-is-a-bike-tune-up/.
[203] U.S. Consumer Product Safety Commission. (n.d.). *Which Helmet for Which Activity?* Retrieved May 2, 2022, from https://www.cpsc.gov/safety-education/safety-guides/sports-fitness-and-recreation-bicycles/which-helmet-which-activity.
[204] Lavie, C. J., Lee, D. C., Sui, X., Arena, R., O'Keefe, J. H., Church, T. S., Milani, R. V., & Blair, S. N. (2015). Effects of Running on Chronic Diseases and Cardiovascular and All-Cause Mortality. *Mayo Clinic Proceedings*, 90(11), 1541–1552. https://doi.org/10.1016/j.mayocp.2015.08.001.
[205] Triola, P. (2021, June 14). *How Long Do Running Shoes Last?* Runner's World. Retrieved May 2, 2022, from https://www.runnersworld.com/gear/a33233314/how-many-miles-do-running-shoes-last/.

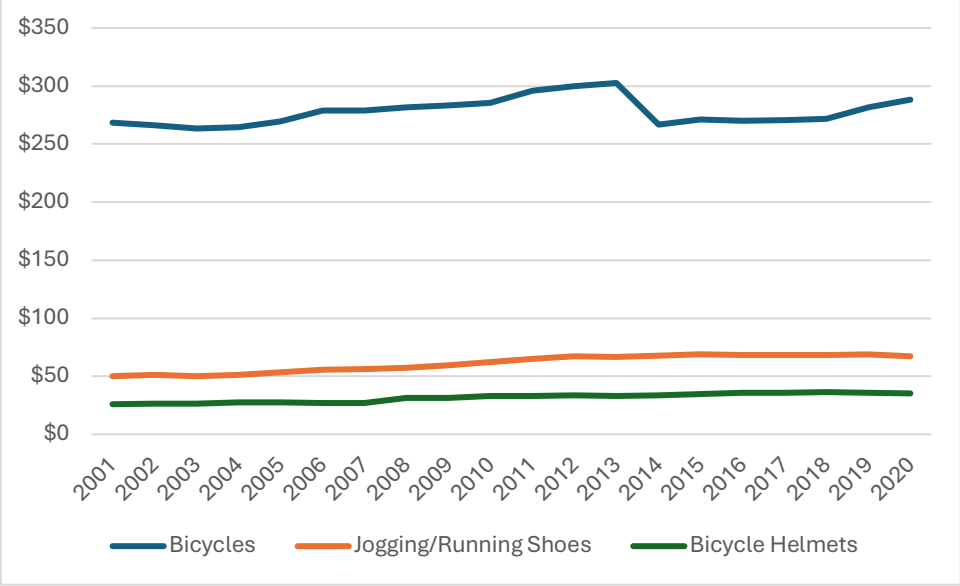
For athletic outwear, since biking, running/jogging, and hiking don't require any sport-specific outwear, we assume that members of the household will use their apparel budget detailed in the main TLC index to purchases sweatpants, t-shirts, shorts, and other sport-appropriate clothing.

Figure 14: Outdoor Participation Rates for Aged 6+



Source: *2020 Outdoor Participation Report*. (2020, December). Outdoor Foundation. https://outdoorindustry.org/resource/2020-outdoor-participation-report/.

Figure 15: Running/jogging & biking equipment prices



Source: *Sporting Goods Market 2019 Edition*. (2019). National Sporting Goods Association. Retrieved June 14, 2022, from https://www.nsga.org/research/nsga-research-offerings/sporting-goods-market-2019/.

V. Physical activity for children

A. Rationale

Sports provide opportunities for physical health and development of social relationships across the lifespan,[206,207] and among youth in particular, sports are an important context for positive youth development.[208] Examples of sport benefits that aid personal and social development are "1) a stronger sense of self-confidence in building relationships with others and having an expanded capacity for empathy; 2) developing a better understanding of self and in so doing understanding how their actions affect others; and 3) building foundations for lifelong fitness habits."[209] For the family types we consider, the children are 4, 8, and 12-years-old. However, most of the data we cite going forward concerns high school sports. This is because most data focus on high school sports, and there are no surveys we've found that focus exclusively on sports in elementary or middle school specifically, except for the Aspen Institute's Project Play reports. Thus, we use Aspen's data as well as the data focused on high school sports to guide our thinking because we reason that if certain sports rank at the top in terms of popularity in high school, then it logically follows that most children in middle schools play these same sports in preparation for high school.

Figure 16 shows that half of students participate in sports, indicating that other students participate in other extracurricular clubs. Other clubs, aside from team sports, can also be opportunities for physical activity, like dance and theater. With this in mind, the pay-to-play fee defined below can also be viewed as a fee to participate in other clubs that allows for physical activity. We focus on team sports as the main activity because the participation data and fee associated with it is available at the national level.

In addition to the health benefits of being physically active, children's participation rates have consistently confirmed that sports are a desired high school extracurricular. According to data from the Centers for Disease Control and Prevention (CDC), more than 50% of high school students consistently have played at

[206] Gayman, A. M., Fraser-Thomas, J., Dionigi, R. A., Horton, S., & Baker, J. (2017). Is sport good for older adults? A systematic review of psychosocial outcomes of older adults' sport participation. *International Review of Sport and Exercise Psychology*, *10*(1), 164-185.

[207] Shores, K., Becker, C. M., Moynahan, R., Williams, R., & Cooper, N. (2015). The Relationship of Young Adults' Health and Their Sports Participation. *Journal of Sport Behavior*, *38*(3).

[208] Bruner, M. W., McLaren, C. D., Sutcliffe, J. T., Gardner, L. A., Lubans, D. R., Smith, J. J., & Vella, S. A. (2021). The effect of sport-based interventions on positive youth development: A systematic review and meta-analysis. *International Review of Sport and Exercise Psychology*, 1-28.

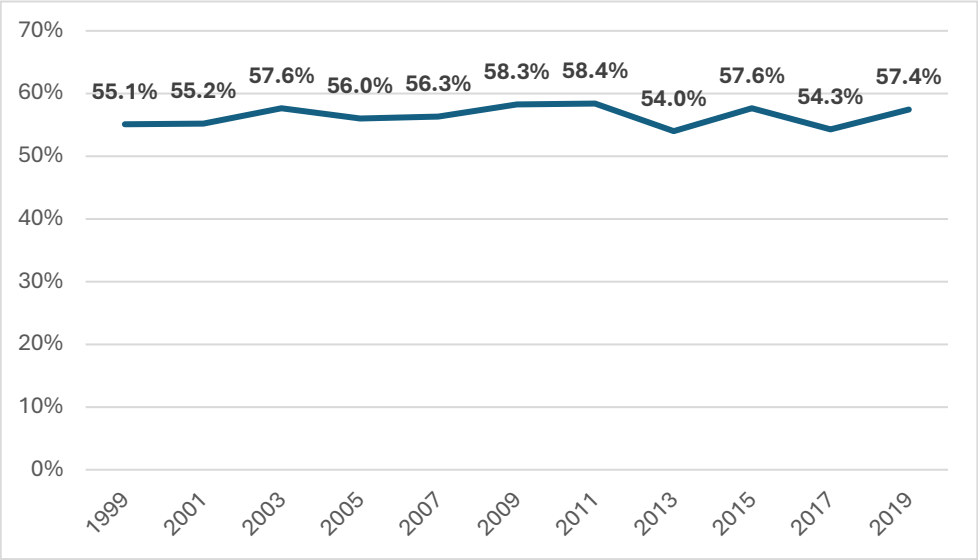
[209] Amaro, S. (2020, January 22). *Participation in High School Athletics Has Long-lasting Benefits*. National Federation of State High School Associations. Retrieved May 6, 2022, from https://www.nfhs.org/articles/participation-in-high-school-athletics-has-long-lasting-benefits/.

least one team sport since 1999 (see Figure 16).[210] For children aged 6-12 years, data from the Sports and Fitness Industry Association shows participation rates in team sports consistently more than 50% since 2012.[211] To choose the school sports that children are most likely to play, we look at participation rates from the High School Participation Survey conducted by the National Federation of State High School Associations (NFHS). Figures 17 and 18 show the number of high school students playing the top four most popular sports for boys and girls, respectively. The most popular sports for boys have remained the same since 2001 (football, basketball, track and field, and baseball) while for girls, softball was replaced by soccer in 2010 as the fourth most popular sport. To make sure these findings are applicable to 6–12-year-old children like the ones we consider in our family types, we look at the Aspen Institute's findings, which state that the top four preferred team sports for this age group are baseball, basketball, football (flag and tackle football combined), and soccer. We exclude bicycling, which is popular for this age group but is not a team sport (cycling can be a team sport for professionals). Thus, in our bundle, we give children the choice between the sports most played in high school by creating a weighted average (by participation rate and sex) of sports equipment to represent both girl and boy sports preferences.

Even though this data is collected for high school students, we assume it's a minimal adequate need for children to participate in sports both in middle and high school. There is also a practical consideration given that the pay-to-play model has been prevalent in schools for these age groups and the nationally representative data samples families with children aged 12-17. For the family types with children in elementary school and younger, we determine that play in local playgrounds, state parks, and in school is sufficient opportunity for physical activity. For family types with children aged 8 and 12, we allocate the cost of school sport participation fees and equipment costs. We allocate a sports budget for an eight-year-old based on the recommendation of a medically verified family wellness resource.[212] The effect of these age-related assumptions regarding sport participation on the families' budget cancel out over the long-term because all children will grow up and enter middle and high school at some point.

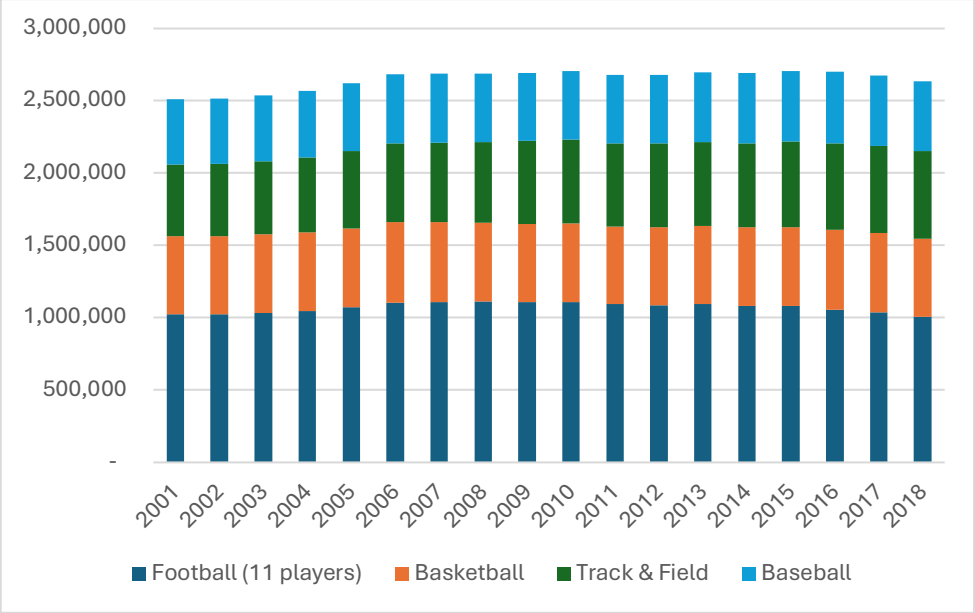
Figure 16: High School Students Who Played On At Least One Sports Team

[210] Centers for Disease Control and Prevention (CDC). (n.d.). *1991-2019 High School Youth Risk Behavior Survey Data*. Retrieved May 6, 2022, from https://yrbs-explorer.services.cdc.gov/#/graphs?questionCode=H82&topicCode=C06&location=XX&year=2019.
[211] The Aspen Institute Project Play. (2020). *Youth Sports Facts: Participation Rates*. Retrieved May 9, 2022, from https://www.aspenprojectplay.org/youth-sports/facts/participation-rates.
[212] Holecko, C. (2020, December 3). *Is Your Child Ready to Play a Competitive Sport?* Verywell Family. Retrieved June 15, 2022, from https://www.verywellfamily.com/when-should-kids-start-competitive-sports-1257040.



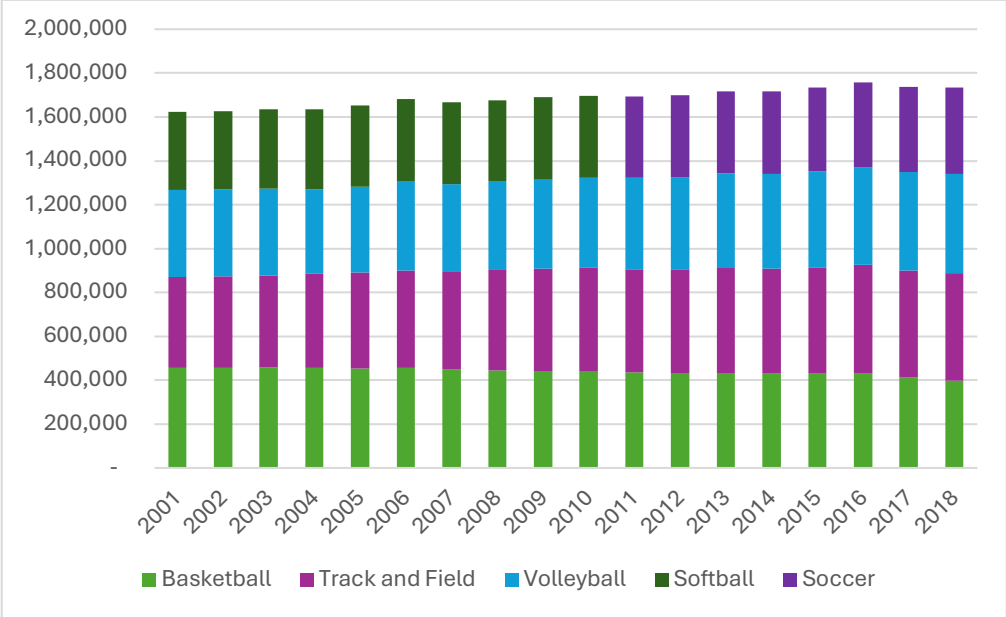
Source: *High School Students Who Played On At Least One Sports Team*. (2019). Centers for Disease Control and Prevention. Retrieved June 14, 2022, from https://yrbs-explorer.services.cdc.gov/#/graphs?questionCode=H82&topicCode=C06&location=XX&year=2019.

Figure 17: Top Four Boy High School Sports



Source: *High School Participation Survey Archive*. (n.d.). National Federation of State High School Associations. Retrieved June 14, 2022, from https://www.nfhs.org/sports-resource-content/high-school-participation-survey-archive/.

Figure 18: Top Four Girl High School Sports



Source: *High School Participation Survey Archive*. (n.d.). National Federation of State High School Associations. Retrieved June 14, 2022, from https://www.nfhs.org/sports-resource-content/high-school-participation-survey-archive/.

B. Pricing

i. Participation fees

To estimate the cost of sports participation fees for children in middle and high school, we use average estimates from the C.S. Mott Children's Hospital National Poll on Children's Health from the University of Michigan Health.[213] The questions concerning participation fees were asked for the school years 2011-12,[214] 2013-14,[215] 2015-16,[216] and 2018-19.[217] To extend the 2011-12 price point back to 2001 and the 2018-19 price point to 2020, we use the CPI for fees for lessons or instructions. For the missing years in between

[213] *National Poll on Children's Health: Poll Reports*. (n.d.). C.S. Mott Children's Hospital. Retrieved May 3, 2022, from https://mottpoll.org/reports.
[214] C.S. Mott Children's Hospital. (2012, May 14). *Pay-to-play sports keeping lower-income kids out of the game*. National Poll on Children's Health. Retrieved May 3, 2022, from https://mottpoll.org/reports-surveys/pay-play-sports-keeping-lower-income-kids-out-game.
[215] C.S. Mott Children's Hospital. (2015, January 20). *Pay-to-play sports keeping some kids on the sidelines*. National Poll on Children's Health. Retrieved May 3, 2022, from https://mottpoll.org/reports-surveys/pay-play-sports-keeping-some-kids-sidelines.
[216] C.S. Mott Children's Hospital. (2016, October 17). *Pay-to-participate limiting school activities for lower-income students*. National Poll on Children's Health. Retrieved May 3, 2022, from https://mottpoll.org/reports-surveys/pay-participate-limiting-school-activities-lower-income-students.
[217] C.S. Mott Children's Hospital. (2019, March 18). *Pay-to-participate: Impact on school activities*. National Poll on Children's Health. Retrieved May 3, 2022, from https://mottpoll.org/reports/pay-participate-impact-school-activities.

known price points, we perform linear interpolation to estimate prices for those years. The cost estimates shown below in Figure 19 are per child per sport. To ensure that our allocation is minimal, we allocate each child the cost of participating in one sport at school.

ii. Equipment

We allocate children the footwear appropriate for the sport they choose to play. We consider this to be a minimal adequate need because the American Academy of Orthopedic Surgeons makes clear that "if you participate in a single sport more than two times a week, you should purchase a shoe specifically designed for that sport" because this will prevent foot and ankle injuries.[218] For football, baseball, and softball, we assume that equipment (bats, helmets, etc.) is provided by the schools free of charge.[219][220]

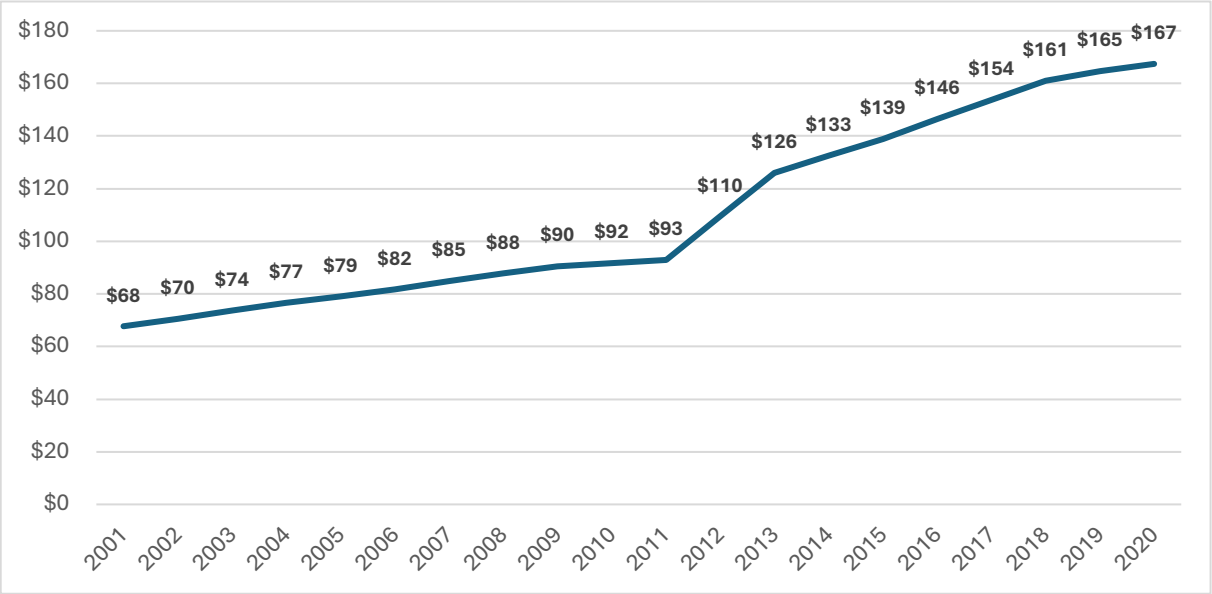
For the remaining sports, specialized shoes are the main piece of equipment needed, which we include in the budget (see Figure 20 for prices). Every year, we create a weighted average by participation rate in the sport in that year and by sex. For example, 41% of high school boys participated in football in 2001. So, we multiply the football shoes' cost by 0.41 to account for that participation rate and then by 0.5 to account for the fact that boys are one half of the population. We do this for all sports for boys and girls each year and then sum the resulting numbers to obtain the weighted average (see equation below). We adopt a replacement rate of one year since intensive use in school sports leads to the wearing out of shoes significantly. Regarding balls, we assume the school provides them as the ball is utilized by all the team members and no one student could be held accountable for purchasing team-wide equipment.

$$Wighted\ average\ of\ spending\ on\ footwear = \sum_{i=1}^{n\ sports} price\ of\ shoes_i \times participation\ rate_{ij} \times 0.5$$

Where i is one of the sports shown in Figures 17 and 18 and j is the sex (boys or girls).

Figure 19: Average Sport Participation Fees for Middle & High School Students

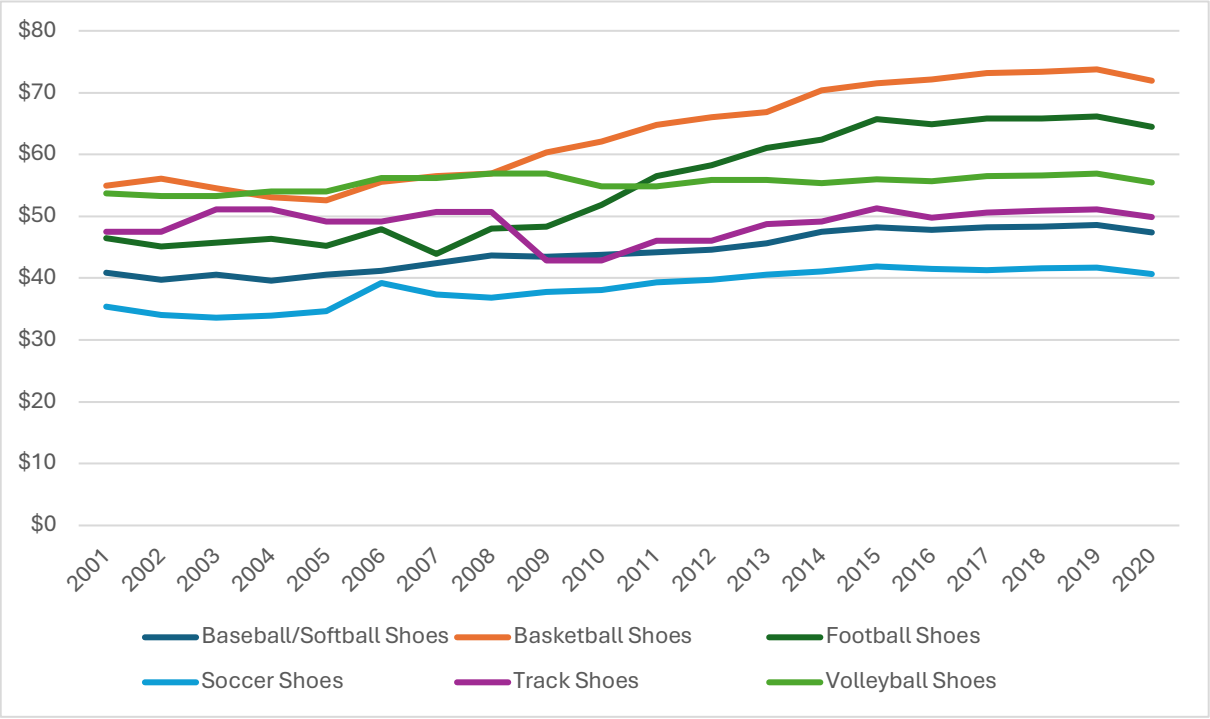
[218] The American Academy of Orthopaedic Surgeons. (n.d.). *Athletic Shoes*. OrthoInfo. Retrieved May 5, 2022, from https://orthoinfo.aaos.org/en/staying-healthy/athletic-shoes/.
[219] Daschel, N. (2012, August 29). *Football: Equipment issues as much a part of a high school coaches' life as Xs and Os*. The Oregonian. Retrieved May 9, 2022, from https://www.oregonlive.com/highschoolsports/article/football-equipment-issues-as-much-a-part-of-a-high-school-coaches-life-as-xs-and-os/.
[220] Taylor, K. (2016b, August 17). *The cost of the game.* The Gadsden Times. Retrieved May 9, 2022, from https://eu.gadsdentimes.com/story/sports/high-school/football/2016/08/17/cost-of-high-school-football-dollars-must-be-stretched-to-train-equip-feed-teams/25620194007/.



Sources:

1. C.S. Mott Children's Hospital. (2012, May 14). *Pay-to-play sports keeping lower-income kids out of the game*. National Poll on Children's Health. Retrieved May 3, 2022, from https://mottpoll.org/reports-surveys/pay-play-sports-keeping-lower-income-kids-out-game.
2. C.S. Mott Children's Hospital. (2015, January 20). *Pay-to-play sports keeping some kids on the sidelines*. National Poll on Children's Health. Retrieved May 3, 2022, from https://mottpoll.org/reports-surveys/pay-play-sports-keeping-some-kids-sidelines.
3. C.S. Mott Children's Hospital. (2016, October 17). *Pay-to-participate limiting school activities for lower-income students*. National Poll on Children's Health. Retrieved May 3, 2022, from https://mottpoll.org/reports-surveys/pay-participate-limiting-school-activities-lower-income-students.
4. C.S. Mott Children's Hospital. (2019, March 18). *Pay-to-participate: Impact on school activities*. National Poll on Children's Health. Retrieved May 3, 2022, from https://mottpoll.org/reports/pay-participate-impact-school-activities.

Figure 20: Sport footwear prices



Source: *Sporting Goods Market 2019 Edition*. (2019). National Sporting Goods Association. Retrieved June 14, 2022, from https://www.nsga.org/research/nsga-research-offerings/sporting-goods-market-2019/.

VI. Spectator sports

A. Rationale

Attending sports games is a popular activity. For example, 68.5 million fans attended Major League Baseball games in 2019 while the number of Americans attending Minor League Baseball was close to 50 million.[221] According to a 2019 poll by Morning Consult, only one third of American adults said that they do not follow any of the professional leagues, while 33% said they follow the NFL, 16% said they follow the MLB, 10% said they follow the National Basketball Association, and 5% said they follow the National Hockey League.[222] Additionally, organizations like "Study in US" used to assist foreign students in their transition to the US highlight the important of sports and entertainment in the United States. A Study in the US article on the subject states "Sports and entertainment are two very important parts of culture in the United States, and many Americans consider them to be a regular part of their lives."[223] We determine that a "minimal" recreational experience regarding spectator sports is the attendance of a minor league baseball game.

[221] Love, J. (2019, October 22). *How Popular Is Baseball, Really?* The New York Times. Retrieved January 23, 2022, from https://www.nytimes.com/interactive/2019/10/22/sports/baseball/baseball-popularity-world-series.html.
[222] *National Tracking Poll #190752*. (2019, July). Morning Consult. https://morningconsult.com/wp-content/uploads/2019/08/190752_crosstabs_EPL_Adults_v3_STACKED_JB.pdf.
[223] *Athletics and Entertainment*. (2015, January 23). Study in US. Retrieved April 11, 2022, from https://studying-in-us.org/athletics-and-entertainment/.

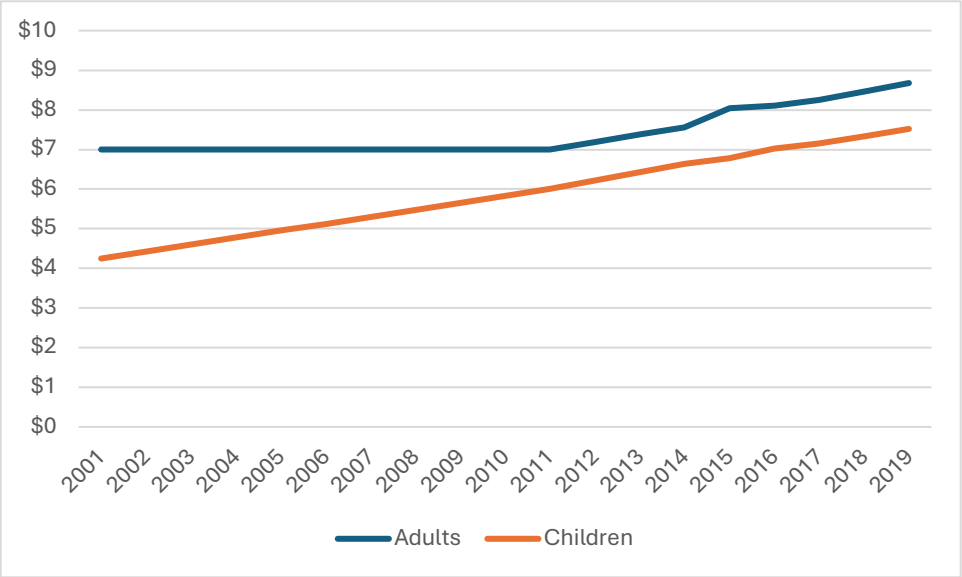
We choose a minor league game for several reasons. The first is that a crucial aspect to spectator sports for Americans is the family and community atmosphere that the game creates. Minor league baseball, with hometown feeling, fan involvement, and nightly specials, involves all of these. This point is made extensively throughout the book *Minor League Baseball*: *Community Building Through Hometown Sports*.[224] Moreover, minor league baseball is much more accessible geographically than professional sports, with over 200 teams across the nation,[225] and much more accessible financially than major league baseball, with ticket prices being a fraction of the price of the major leagues. In 2019, for example, average tickets would cost a family of four about $132 just to get in the door of a major league game.[226] But $69.60 would get you parking, four tickets, four hot dogs, and four drinks at the average minor league game.[227]

B. Pricing

We use the average ticket prices published each year in the survey conducted by Minor League Baseball. This survey takes the average costs across A, AA, and AAA minor league teams for attending a game that year. It also takes the cost of four hot dogs, four drinks and parking. In our "minimal bundle," we include only the ticket prices. It's not possible to unbundle the parking cost from the "family of four" price, so we assume free parking at the venue or negligible parking fees. Ticket prices are shown in Figure 21. For the years where prices were not publicly available, we performed linear interpolation between two known price points to estimate prices for the missing years. We exclude this activity from the bundle in 2020 due to the cancellation of most sporting events during the COVID-19 pandemic.

[224] Hoffman, F., F., Kraus,, R. S., & Manning, M. J. (2003). *(2003). Minor League Baseball: Community Building Through Hometown Sports*. Routledge. https://doi.org/10.4324/9780203049198.
[225] Ibid.
[226] Hartweg, C. (2019, March 20). *2019 MLB Fan Cost Index Inches Up 1.8%.* Team Marketing Report. Retrieved June 10, 2022, from https://teammarketing.com/fci/2019-mlb-fan-cost-index-inches-up-1-8/.
[227] The Editors. (2020, February 21). *Take me out to the (minor league) ballgame*. America Magazine. Retrieved June 10, 2022, from https://www.americamagazine.org/politics-society/2020/02/21/take-me-out-minor-league-ballgame.

Figure 21: Average Cost of Minor League Baseball Tickets



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1. *Take me out to the (minor league) ballgame*. (2020, February 21). America Magazine. Retrieved June 15, 2022, from https://www.americamagazine.org/politics-society/2020/02/21/take-me-out-minor-league-ballgame.
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6. Smith, M. (2013, May 16). Peanuts, Cracker Jack and Big Bucks. Albuquerque Journal. Retrieved June 15, 2022, from https://www.abqjournal.com/239583/balancing-cost-value.html.
7. Smith, C. (2012, June 12). How billionaires like Warren Buffett profit from minor-league baseball ownership. Yahoo Sports. Retrieved June 15, 2022, from https://sports.yahoo.com/news/how-billionaires-like-warren-buffett-profit-from-minor-league-baseball-ownership.html.
8. *Average Cost For Family Of Four Under $60 For MiLB Game*. (2011, April 15). Minor League Baseball. Retrieved June 15, 2022, from https://www.milb.com/news/gcs-17807326.
9. *Average Cost for Family of 4 to See a MiLB Game is $57*. (2010, April 20). Minor League Baseball. Retrieved June 15, 2022, from https://www.milb.com/news/gcs-9437352.
10. Katz, B., & Teller, M. (2008, August 6). *Minor Leagues, Major Profits*. Forbes. Retrieved June 15, 2022, from https://www.forbes.com/2008/08/06/baseball-minors-sacramento-biz-sports-cz_mo_0806minors.html?sh=6db3b1273e01.
11. *O-Royals ticket prices stay the same in 2007*. (2006, November 7). Minor League Baseball. Retrieved June 15, 2022, from https://www.milb.com/news/gcs-142722.

12. Ryan, K. L. (2002, June 21). *Major Fun With the Minor Leagues*. The Washington Post. Retrieved June 15, 2022, from https://www.washingtonpost.com/archive/lifestyle/2002/06/21/major-fun-with-the-minor-leagues/18515ec4-c96c-4415-9bb9-4bfd16a71ab4/.

VII. Trip

A. Summer Road Trip

a. Rationale

One of the most popular ways Americans prefer to take time off is by going on a road trip, so much so that has become a "cultural rite of passage for American families."[228][229] Given the popularity of travel both during summer when school is not in session and around the winter holidays, in our bundle, we give LMI families the option between the two vacations. We argue that it's a minimal need for families to take at least one three-day vacation every year.

b. Pricing

When pricing a summer road trip, the main elements one must consider are the cost of gas, overnight stays, and food.[230] The National Household Travel Survey, 2001-2002 conducted by the Bureau of Transportation Statistics (BTS) found that the average summer road trip was 284 miles one way, with a summer road trip defined as trips that "are more than 50 miles from home to the furthest destination (…) [and] begin the Thursday before Memorial Day and end the Wednesday after Labor Day."[231] Based on this, we consider a long-distance summer trip to be 568 miles round trip. We allocate three days to this trip to match the winter holidays trip because we consider the two trips equivalent. Assuming a 60 MPH speed limit, which is the most common on rural and urban interstate highways,[232] we consider that the driver will drive 4.5 hours a day which is the number of hours recommended for driving before taking a break.[233] At this rate, the driver is assumed to finish most of the trip within two days and to drive only 28 miles on the last day. We thus allocate the family a two-night stay at a hotel.

To determine the price of a hotel stay and meals, we use the per diem rates issued by the U.S. General Services Administration (GSA). Per diem payments are "are daily allowances paid to employees to cover

[228] Ryerson, L. (2020, April 16). *10 ways road trips have changed over the years — and they're all for the better*. Insider. Retrieved April 21, 2022, from https://www.insider.com/road-trips-then-now-2018-5.
[229] Firshein, S. (2020, September 4). *To Many Travelers, 2020 Was the Summer of 1965*. The New York Times. Retrieved April 25, 2022, from https://www.nytimes.com/2020/09/04/travel/to-many-travelers-2020-was-the-summer-of-1965.html.
[230] Klurman, M. (2021, August 11). *How to Budget for a Road Trip*. Reader's Digest. Retrieved April 25, 2022, from https://www.rd.com/article/road-trip-cost/.
[231] Bureau of Transportation Statistics. (n.d.). *National Household Travel Survey Summer Travel Quick Facts*. Retrieved April 25, 2022, from https://www.bts.gov/statistical-products/surveys/national-household-travel-survey-summer-travel-quick-facts.
[232] *Speed: Maximum posted speed limits by state.* (2022, April). Insurance Institute for Highway Safety. Retrieved April 25, 2022, from https://www.iihs.org/topics/speed/speed-limit-laws.
[233] *How Far Can You Drive Safely In A Day?* (With Advice On Breaks). (2021, November 10). The Road Trip Expert. Retrieved April 25, 2022, from https://www.theroadtripexpert.com/how-far-can-you-drive-safely-in-a-day/.

costs incurred while on a business trip."[234] While these rates are not explicitly for vacation purposes, they provide robust estimates of the cost of lodging and meals in most locations in the continental U.S. The lodging per diem rate is based on the hotel average daily rate (ADR), which is a widely used metric in the hotel industry calculated by dividing room revenue by the number of rooms rented.[235] The reason the per diem lodging estimate is a better fit for our purposes than the raw ADR is because it accounts for a "mid-range" quality of hotels, thereby excluding any upscale or luxury lodging options and meeting the "minimal" criteria we have set.[236] The GSA issues standard per diem rates and separately, rates for Non-Standard Areas (NSAs).[237] NSAs are areas that are "are frequently traveled by the federal community." We use the standard per diem rates because they apply to almost 85% of counties in the continental U.S.[238] The cost of per diem meals includes breakfast, lunch, dinner, meal taxes and tips, and incidentals, which are "fees and tips given to porters, baggage carriers, hotel staff, and staff on ships."[239] We allocate families the cost of a two-night, one-room hotel stay no matter the family size. To be conservative in our estimates, we assume that families with two or three children will make sleeping space in the same room for the children. Since hotel rates tend to spike during the summer due to an uptick in demand, we adjust the per diem lodging cost to reflect this. Since the GSA monthly per diem rates are only published for specific areas, national monthly per diem rates aren't available. Instead, we use the ADR of U.S. hotels to determine the ratio of prices in the summer compared to the rest of the year. We find that summer prices are 2% higher than the annual average. Thus, we multiply the per diem lodging rates by 1.02 to reflect this. We estimate that this is a good approximation since the per diem lodging rate is based on the ADR but focuses on affordable hotels. Further, we allocate each member of the family, both adults and children, the per diem cost of food (which includes the three meals) for three days. See Figure 22 for lodging and food prices.

For the gas cost, we assume a gas consumption of 19 gallons based on a 30 MPG rate,[240] which we multiply by the average of gas prices during the months of June, July, and August[241] to obtain the cost of gas for the summer trip (Figure 23). Since most road trips consist of interstate driving, we account for an "average" cost of tolls on interstate highways. We assume the vast interstate highway system is a good route for most

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[234] Kagan, J. (2021, June 27). *What Are Per Diem Payments?* Investopedia. Retrieved April 28, 2022, from https://www.investopedia.com/terms/p/per-diem-payments.asp.
[235] U.S. General Services Administration. (n.d.). *Factors Influencing Lodging Rates.* Retrieved April 28, 2022, from https://www.gsa.gov/travel/plan-book/per-diem-rates/factors-influencing-lodging-rates.
[236] Ibid.
[237] U.S. General Services Administration. (n.d.). *Frequently Asked Questions, Per Diem.* Retrieved April 28, 2022, from https://www.gsa.gov/travel/plan-book/per-diem-rates/frequently-asked-questions-per-diem.
[238] Ibid.
[239] Ibid.
[240] *Fuel Economy of 2016 Honda Accord.* (n.d.). U.S. Department of Energy: Fuel Economy. Retrieved January 24, 2022, from https://www.fueleconomy.gov/feg/PowerSearch.do?action=noform&path=7&year=2016&make=Honda&model=Accord&srchtyp=ymm.
Fuel Economy of 2006 Honda Accord. (n.d.). U.S. Department of Energy: Fuel Economy. Retrieved January 24, 2022, from https://www.fueleconomy.gov/feg/bymodel/2006_Honda_Accord.shtml.
Fuel Economy of 1996 Honda Accord. (n.d.). U.S. Department of Energy: Fuel Economy. Retrieved January 24, 2022, from https://www.fueleconomy.gov/feg/bymodel/1996_Honda_Accord.shtml
[241] *US Regular All Formulations Gas Price.* (n.d.). FRED Economic Data. Retrieved January 24, 2022, from https://fred.stlouisfed.org/series/GASREGW.

if not all destinations given its expansiveness and length of 46,876 miles.[242] Although some travel bloggers recommend back road driving rather than the interstate highways because they render the road trip richer and more interesting,[243] this usually entails traveling more miles to arrive at the same destination, and since time is an important factor in our minimal bundle given our assumption of full-time work and limited vacation days, we assume the LMI family will mostly drive on the interstates. For a 568-mile trip of mostly interstate driving, we estimate the average cost of tolls to be 10 cents per mile. We estimate this number by taking the average cost per vehicle-mile data across all interstate roads (not tunnels and bridges) for which the data is available from the Federal Highway Administration.[244] At this rate, the average toll cost for the road trip is $56.8.

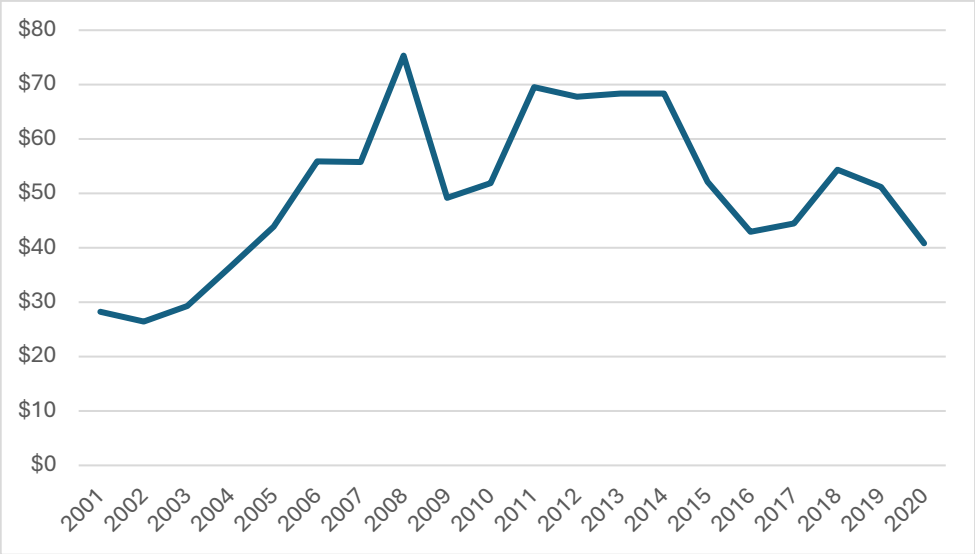
Finally, it might seem important to allocate some budget to activities that the family would engage in during the trip such as visiting national parks or going to museums. However, since our goal is to construct a bundle of "minimal" recreational activities, we assume that families would find free activities and venues to populate their trip schedule. And there is no shortage of such opportunities. All states have a host of free museums, festivals, gardens, beaches, etc.[245][246]

Figure 22: Lodging and Meals Per Diem Rates

[242] Federal Highway Administration. (2021, April 27). *Interstate Frequently Asked Questions*. U.S. Department of Transportation Federal Highway Administration. Retrieved May 3, 2022, from https://www.fhwa.dot.gov/interstate/faq.cfm.
[243] McCool Travel. (n.d.). *8 Great Reasons Take Road Trips On Smaller Roads Rather Than Highways*. Retrieved May 3, 2022, from https://www.mccooltravel.com/8-great-reasons-take-road-trips-on-smaller-roads-rather-than-highways/.
[244] Federal Highway Administration. (2018, March). *Toll Facilities in the United States*. Retrieved May 9, 2022, from https://www.fhwa.dot.gov/policyinformation/tollpage/.
[245] Brownfield, C. (2021, November 4). *The Best Free Tourist Attraction in Every State*. Reader's Digest. Retrieved April 28, 2022, from https://www.rd.com/list/best-free-tourist-attraction-in-every-state/.
[246] Teel, C. M. (2012, June 27). *America's Best Free Tourist Attractions*. SmarterTravel. Retrieved April 28, 2022, from https://www.smartertravel.com/americas-best-free-tourist-attractions/.

Source: U.S. General Services Administration. (n.d.). *Per Diem Files.* Retrieved April 28, 2022, from https://www.gsa.gov/travel/plan-book/per-diem-rates/per-diem-files.

Figure 23: Trip gas cost assuming 30MPG and summer average gas price



Source: Authors' calculations based on the trip length, summer average gasoline prices and the assumption of 30MPG consumption.

B. Winter Holiday Trip

a. Rationale

It is customary for Americans to travel for the holidays, at least every few years, to re-connect with friends and family, and this is especially important for individuals' social wellbeing. Thanksgiving and the winter holidays are usually the most popular travel times in the U.S. According to Holiday Travel Forecasts by the American Automobile Association (AAA), travel over the winter holidays is significantly more common than over Thanksgiving (Figure 24). Thus, we allocate LMI families the opportunity to travel over the winter holidays (during the month of December) to visit their families, as a part of their mental and physical recovery at the end of the year. We assume that the family will travel by car as opposed to taking a plane because consistently over the years, around 90% of traveling Americans take their car to reach their destination, according to the AAA forecasts. We use the Allianz's definition of "vacation" in its widely used Vacation Confidence Index reports. A vacation is "a leisure trip of at least a week to a destination that is 100 miles or more from home."[247] Thus, we consider it to be a minimal recreational need to travel at least 100 miles one-way from home to a chosen destination. However, in the interest of estimating minimal

[247] *The 2019 Vacation Confidence Index: A White Paper from Allianz Global Assistance.* (2019, August). Allianz. https://www.allianzworldwidepartners.com/usa/v_1565708380589/media/vci_2019_whitepaper_aga.pdf.

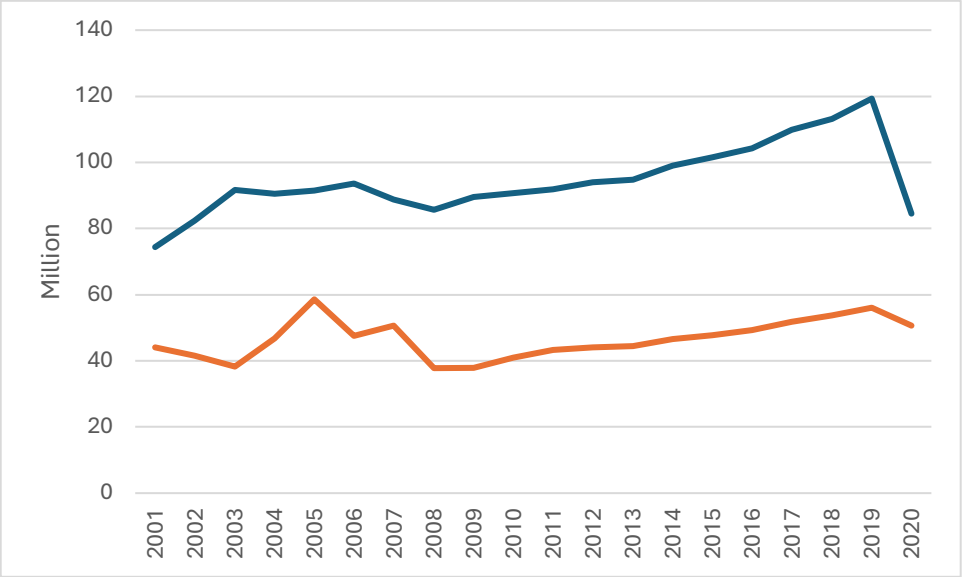
recreation needs, we focus on a weekend trip rather than a weeklong trip, estimating a three-day trip to a destination 100 miles or more from home.

b. Pricing

To estimate the price of gas, we assume an MPG of 30 given that the most popular sedans (such as a Honda Accord) in the U.S. had an MPG of 25-26 in the city and 32-34 on the highway.[248] We then use the average gas price during the month of December of each year published by the U.S. Energy Information Administration to calculate the cost of a 200-mile round trip during the winter holidays (Figure 25).[249] We allocate families the same rate of interstate tolls (10 cents per mile) since most travel requires driving on interstate roads, which equals $20 for a 200-mile trip. Applying the same toll rate ensures consistency with the summer trip.

For lodging, to remain consistent with the summer trip, we allocate families the per diem lodging cost for one hotel room for two nights. Since ADR data indicates that December prices are consistently 3% lower than the annual average, we multiply the per diem rate by 0.97 to reflect this. For food, we also allocate each member of the family the per diem food costs for three days.

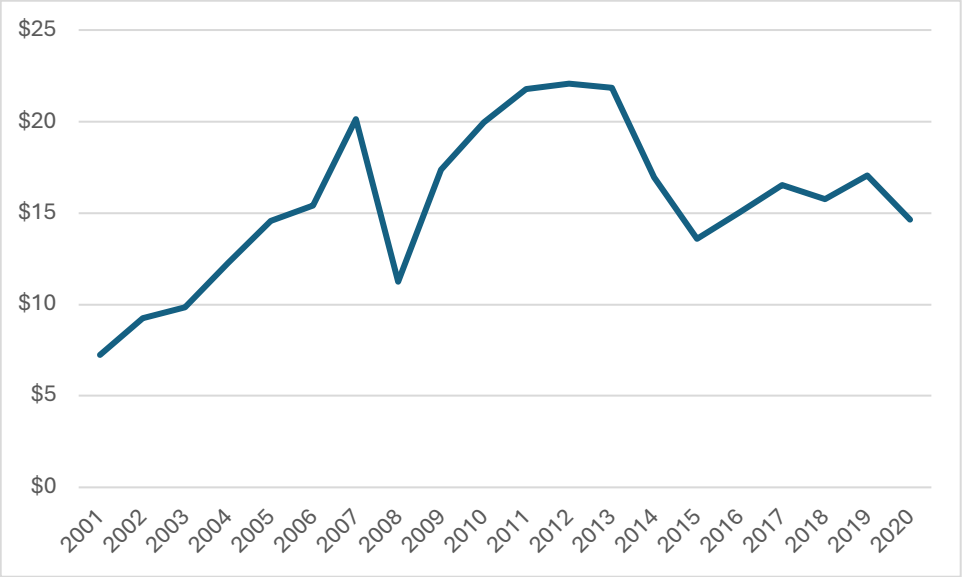
Figure 24: Numbers of Americans travelling over the winter holiday



[248] *Fuel Economy of 2016 Honda Accord.* (n.d.). U.S. Department of Energy: Fuel Economy. Retrieved January 24, 2022, from https://www.fueleconomy.gov/feg/PowerSearch.do?action=noform&path=7&year=2016&make=Honda&model=Accord&srchtyp=ymm.
Fuel Economy of 2006 Honda Accord. (n.d.). U.S. Department of Energy: Fuel Economy. Retrieved January 24, 2022, from https://www.fueleconomy.gov/feg/bymodel/2006_Honda_Accord.shtml.
Fuel Economy of 1996 Honda Accord. (n.d.). U.S. Department of Energy: Fuel Economy. Retrieved January 24, 2022, from https://www.fueleconomy.gov/feg/bymodel/1996_Honda_Accord.shtml.
[249] *US Regular All Formulations Gas Price.* (n.d.). FRED Economic Data. Retrieved January 24, 2022, from https://fred.stlouisfed.org/series/GASREGW.

Source: this data was generously shared with us by Ellen Edmonds of the American Automobile Association (AAA)

Figure 25: Winter trip gas cost assuming 30MPG and December average gas price



Source: Authors' calculations based on the trip length, December average gasoline prices and the assumption of 30MPG consumption.

VIII. December Holidays (e.g., Christmas, Hannukah, Kwanza)

Buying holiday presents for one's children and the associated traditions and stories, such as Santa Claus for Christmas, are an essential part of the American holiday experience. We allocate LMI families the cost of holiday decorations, festive food, and a gift budget since giving and receiving gifts is a fundamental part of the holiday tradition. The National Retail Federation (NFR) shows that 96-98% of Americans buy gifts for family, 91-93% buy food and candy, and 64-71% buy decorations each year consistently.[250] We restrict the gift budget to family members, which means we do not allocate any cost for gifts for friends and coworkers.

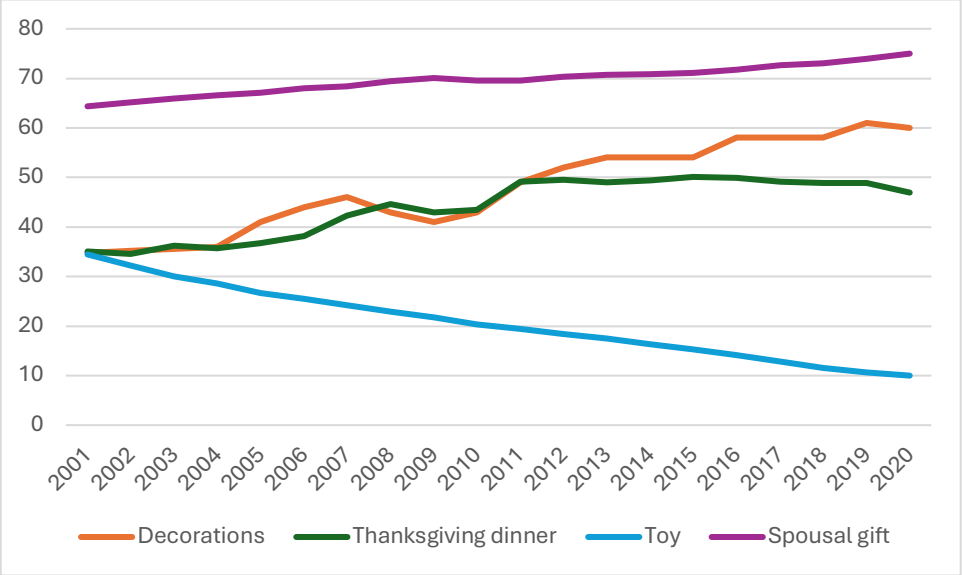
For the holiday budget, we estimate that it's a minimal adequate need for the children aged 4-12 in our family types to receive a toy as a Christmas present. To estimate the price of a toy, we reason that a toy accepted as a donation for the charity Toys for Tots is a conservative estimate for a toy cost.[251] We look at two company websites that ran campaigns to raise money/gifts for Toys and Tots. They recommend a toy

[250] *Winter Holidays Data Center*. (n.d.). National Retail Federation. Retrieved January 24, 2022, from https://nrf.com/topics/holiday-and-seasonal-trends/winter-holidays/winter-holidays-data-center.
[251] *Marine Toys for Tots*. (n.d.). Marine Toys for Tots. Retrieved June 10, 2022, from https://www.toysfortots.org/.

that costs at least between $10 and $20.[252][253] To be conservative, we allocate families $10 per child in gifts. To extend this price point before 2020, we use the CPI for Toys. Additionally, for adults, Bankrate, a consumer financial services company that's best known for personal finance recommendations blog, recommends a spousal gift of $75-$100.[254] Again, to be conservative, we take the $75 price point and extend it back to 2001 using the CPI for Recreation. We allocate a gift spending for adults even in the absence of a spouse, i.e., in the case of single parents or single individuals because it's typical for adults to incur spending during the holidays and buy desirable items, such as festive clothes.

For holiday food spending, we allocate families the cost of a Thanksgiving dinner reported by the American Farm Bureau Federation (AFBF) which we estimate is the best proxy for a festive holiday dinner.[255] The AFBF prices a Thanksgiving dinner for 10 individuals. To tailor this cost to the eight different family sizes, we calculate the Thanksgiving dinner cost per person (by dividing the AFBF estimate by ten) and multiply that per-person cost by the number of individuals in a given family type (for a two-parent family with one child, we multiply the per-person cost by three, etc.). Further, we allocate each family the average spending on decorations as reported by the NRF. See Figure 26 for prices over time.

Figure 26: Holiday Budget Items



[252] *Toys For Tots Gift Guidelines*. (n.d.). Murphy Insurance Agency. Retrieved June 10, 2022, from https://www.dfmurphy.com/resources/Toys-for-Tots/Gift-Guidelines.aspx.
[253] *Welcome to Wilde's Toys for Tots Drive!* (n.d.). Wilde Toyota. Retrieved June 10, 2022, from https://www.wildetoyota.com/toys-for-tots/.
[254] Wisniewski, M. (2019, December 3). *How Much Should You Spend On Your Holiday Gifts?* Bankrate. Retrieved June 10, 2022, from https://www.bankrate.com/personal-finance/how-much-should-you-spend-on-holiday-gifts/.
[255] *Farm Bureau Survey: Thanksgiving Dinner Cost Down 4%*. (2020, November 19). American Farm Bureau Federation. Retrieved June 10, 2022, from https://www.fb.org/newsroom/farm-bureau-survey-thanksgiving-dinner-cost-down-4.

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2. *Winter Holidays Data Center*. (n.d.). National Retail Federation. Retrieved January 24, 2022, from https://nrf.com/topics/holiday-and-seasonal-trends/winter-holidays/winter-holidays-data-center.
3. Wisniewski, M. (2019, December 3). *How Much Should You Spend On Your Holiday Gifts?* Bankrate. Retrieved June 10, 2022, from https://www.bankrate.com/personal-finance/how-much-should-you-spend-on-holiday-gifts/.
4. *Toys For Tots Gift Guidelines*. (n.d.). Murphy Insurance Agency. Retrieved June 10, 2022, from https://www.dfmurphy.com/resources/Toys-for-Tots/Gift-Guidelines.aspx.

Activities Not Included in the Recreation Basket

Reading

Although 37% of American adults say that they get "a great deal of meaning and fulfillment in their lives" from reading for pleasure, according to Pew Research in 2017, the reading habit has been on decline in the adult population.[256] According to ATUS, the average percentage of adults who read daily declined from 26.3% in 2003 to 19% in 2017.[257] Thus, we decided to not include reading in the recreational activity bundle. However, even if an LMI family wanted to read to their children for educational purposes, they would have access to 9,045 public libraries across the U.S. where borrowing books is free of charge.[258]

Religion and Civic Activities

We do not allocate spending to tithing because it is not common among American adults; only 5% American adults are tithers.[259] We also do not allocate any driving costs to political events or volunteering sites because we maintain that one can be an active citizen by emailing, writing to, and calling representatives, which is "minimal" political engagement.

[256] Ingraham, C. (2018, June 29). *Leisure reading in the U.S. is at an all-time low*. The Washington Post. Retrieved January 23, 2022, from https://www.washingtonpost.com/news/wonk/wp/2018/06/29/leisure-reading-in-the-u-s-is-at-an-all-time-low/.
[257] Ibid.
[258] *Fast Facts*. (n.d.). National Center for Education Statistics. Retrieved January 23, 2022, from https://nces.ed.gov/fastfacts/display.asp?id=42.
[259] *30+ Church Giving Statistics - 2022 Update*. (2021, December 31). Balancing Everything. Retrieved January 24, 2022, from https://balancingeverything.com/church-giving-statistics/.