A MELI Manifesto: Median Expected Lifetime Income and Complementary Measures

Jonathan Andreas (Bluffton University, United States)

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By Jonathan Andreas

Bluffton University, Bluffton, Ohio, USA

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Abstract

As the title suggests, unlike most IARIW papers, this is a white paper. It argues that median income is a better statistic of central tendency for skewed income data than mean income (per-capita GDP). It offers philosophical and practical reasons for why Median Expected Lifetime Income (MELI) should supersede GDP as a measure of welfare. MELI is a snapshot of a nation's health and earnings during a particular year. It is the amount that a person could reasonably expect to earn over a lifetime if conditions always remained exactly the same as during the measured year. This paper demonstrates that MELI can be measured at minimal expense using data that is already available in rich nations. Even though MELI is already a better measure of welfare than GDP, I also give suggestions for how MELI and related statistics could be improved substantially by spending a modest amount of resources to gather better data and develop more sophisticated methodologies. I examine why GDP has been successful from interdisciplinary perspectives and use these perspectives to argue why MELI has more potential for success at going beyond GDP than all the numerous other attempts. As a generalist white paper, it raises some big-picture philosophical issues that will hopefully be at least incidentally relevant to a wide variety of other IARIW-BOK conference paper topics.

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1. Introducing MELI

Per-capita GDP (or "mean GDP") revolutionized applied welfare economics in the 20th century because it is correlated with all sorts of welfare measures that people care deeply about such as longevity and educational attainment and because income itself is crucial to economic welfare. It has been more useful than any other measure to date, but it also has deep flaws, which have motivated thousands of economists and statisticians to attempt to create a better welfare measure that goes beyond GDP. Despite a half century of attempts, all have utterly failed. All attempted replacements combined probably have less than one tenth as much influence as GDP today.

Although scholars agree that GDP isn't the best measure of wellbeing, and numerous scholars have developed a wide array of alternatives, GDP retains its overwhelming popularity. One reason many attempts have failed is because they created measures that are too complicated and the public finds them less trustworthy. GDP remains dominant because most people feel confident that they understand it even though even most economists have a somewhat false understanding of how it relates to welfare. Thus, the most likely way to succeed in going beyond GDP is to find an alternative that fills the same niche better without sacrificing comprehensibility. This paper proposes Median Expected Lifetime Income (MELI) as a replacement for mean GDP as a measure of wellbeing because it strikes the best balance of fixing GDP's flaws without adding complexity and dubious psychological assumptions about utility functions. It is better than GDP due to handling inequality better which makes it more democratic, and it is closer to a measure of consumption. It is also more likely to succeed in the marketplace of ideas than other potential replacements for GDP because MELI is cheap and easy to produce, it almost identically fills GDP's niche, it is even easier to understand than GDP, and it is complementary with reforms in the national income accounts that would measure sustainability better.

2. MELI estimation methodology:

Jake Headings and Jonathan Andreas (2017) used the following methodology to calculate MELI using household income data from the Current Population Survey (Flood, King, Ruggles, & Warren, 2015) and the average between male and female death probabilities using Social Security Administration data. There are other ways to calculate MELI using more comprehensive definitions of income or more complex methods for dividing up household income, but this is probably the simplest and most conservative methodology because it uses the same definition of income used to calculate median household income and divides household income the same way it is divided when mean GDP is calculated: equal division.

1. Divide the income of each household among its individuals to get individual income.
    See [Section 3.8](#) for more details.
2. Calculate median individual income for each age.
    Separate each individual into age groups and find the median income at every year of age using individual income calculated in step #1.
3. Calculate the expected median income for each age.
    Calculate the probability of surviving to each age and multiply it times median individual income calculated in step #2 to get the expected median income for each age group during the contemporary year.

4. Sum the expected median income at each age calculated in step #3.

Median Expected Lifetime Income (MELI) is a snapshot of the central tendency of the health and earnings of the individuals in a group during a particular year. If the conditions during that year were always constant in the future, then a child born during that year could reasonably expect to earn that amount over his or her lifetime.

2.1. Results for the USA

This methodology produces the following graph after adjusting for inflation using the chained-price PCE index.
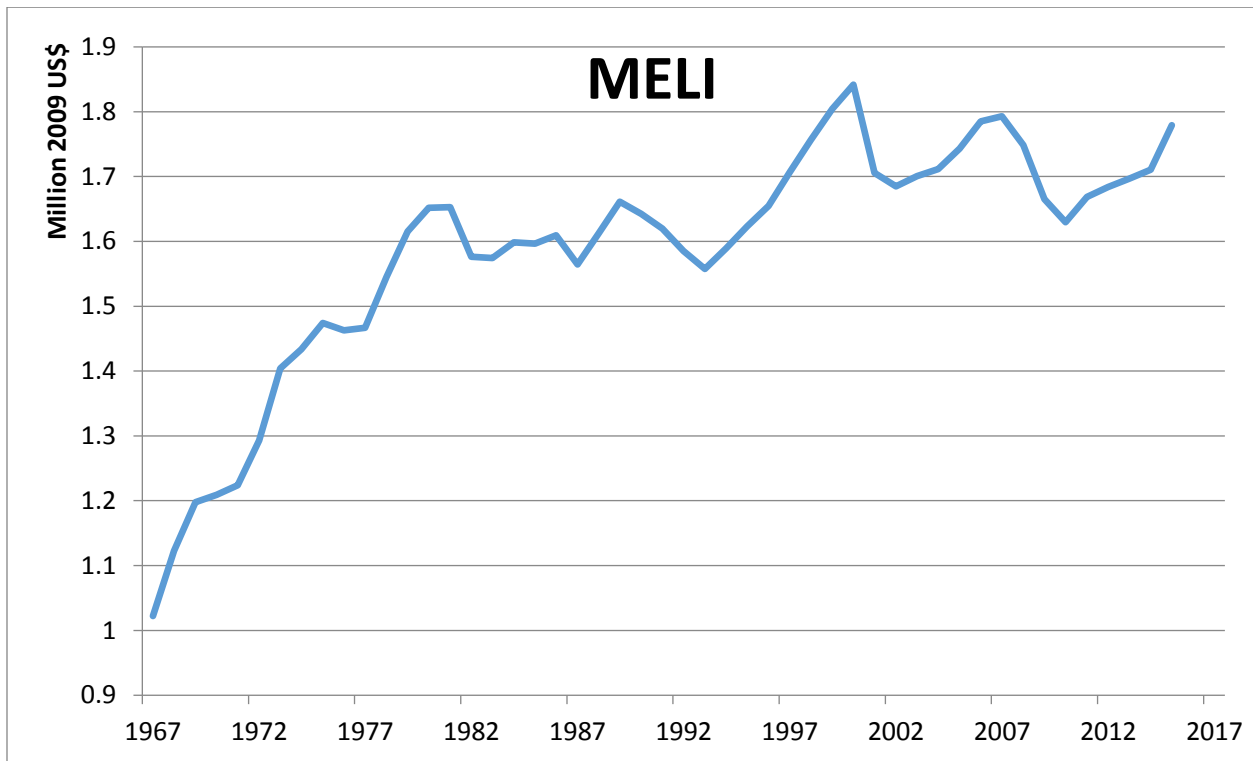
MELI gives fairly similar results as median household income, but it is significantly different even for the same nation over a fairly small time-scale. The advantages of MELI would be even greater for comparisons between countries or time periods with wider variation in household size and longevity. The graph below compares MELI with the official Census Bureau's median household income data. Median income is so neglected, that the government has never bothered to release official median household income statistics for all the years in its data set, so rather than extending back to 1967 as we did above, the following graph only goes back to the beginning of the official data series in 1984:

MELI vs. Median Household Income
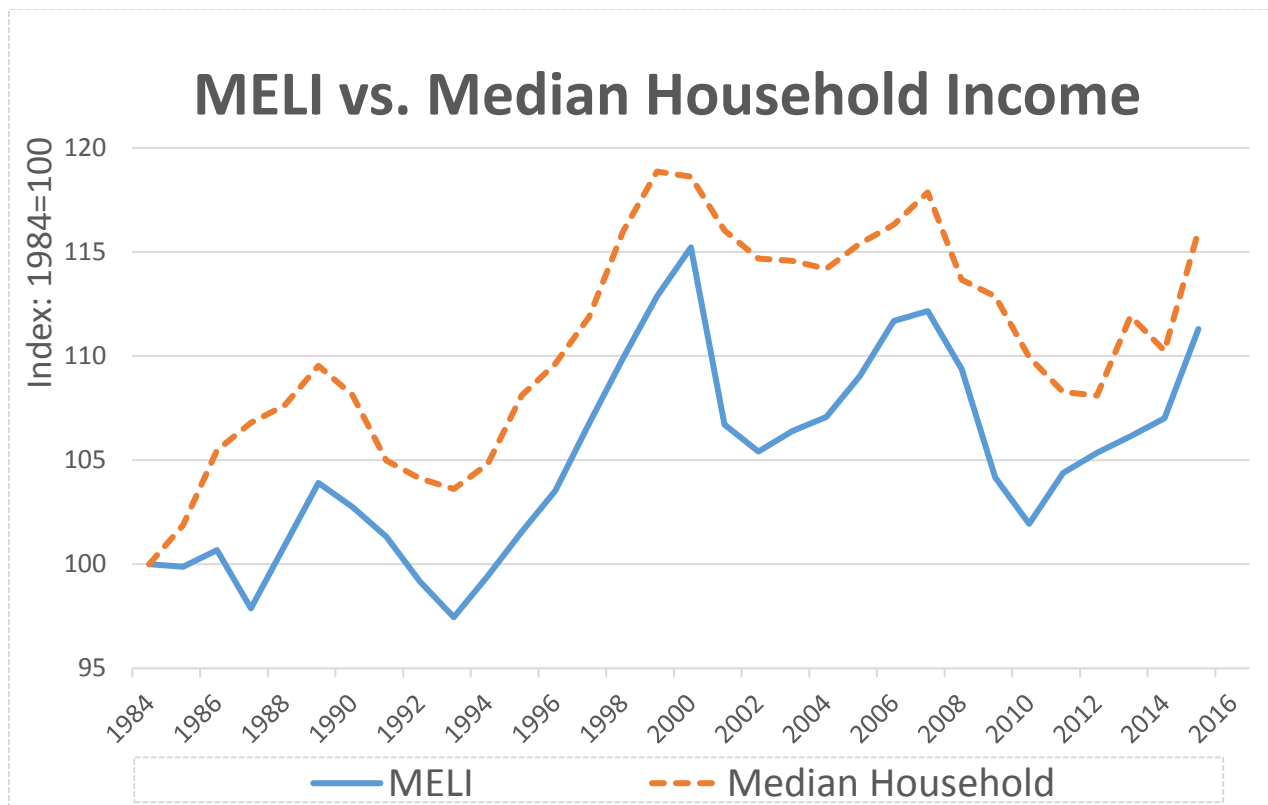
As you can see above, MELI gives a significantly different perspective on economic performance than median household income. The difference between MELI and mean GDP is even more striking:

Which is "The Economy"?
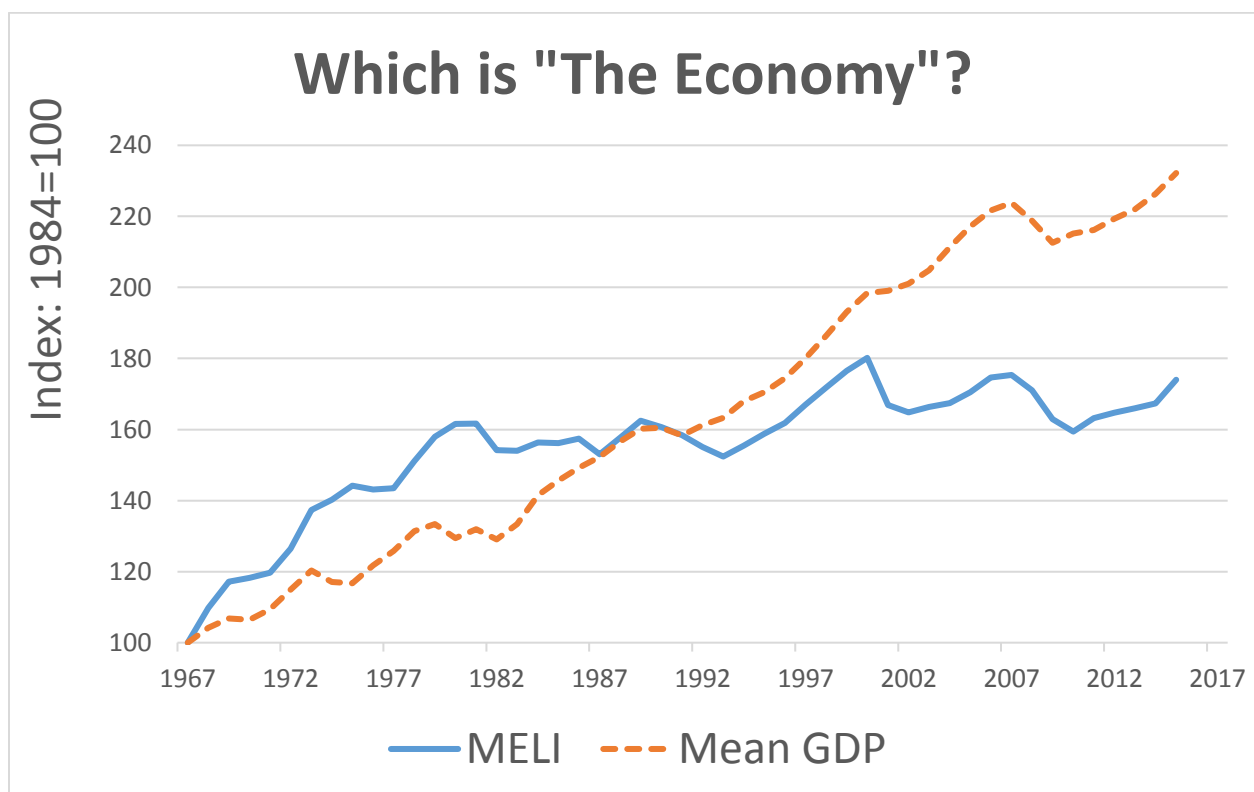
Median economic wellbeing rose more quickly than mean GDP from 1967 to 1980, but has languished in relative stagnation since then except for a modest period of growth in the 1990s.

3. Why MELI is best.

The following is a table of contents for this section giving the headings within Section 3 which summarize the basic arguments for why MELI is best:

MELI is based on median income which is better than mean GDP because median income…

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3.4) Is easier to understand than mean GDP.

3.5) Is easier to measure than GDP.

3.6) Better accords with democratic values.

MELI is also better than other measures of median income because it…

3.7) Incorporates life expectancy, the simplest, most precise, and most powerful measure of health.

3.8) Addresses the crucial role of the household in distributing individual income.

MELI has advantages over other economic welfare measures in addition to GDP because MELI…

3.9) Solves the problem of demographic artifacts that distort all other measures of economic welfare.

3.10) Is simpler than "multidimensional" measures like the United Nations' HDI

3.11) Is more complementary with efforts to measure sustainability because it helps clarify the distinction between goods that affect experienced welfare versus goods that affect expected welfare.

3.1. Median income adjusts for the skew of the income distribution better. The majority of people are closer to the median income than to the mean income

Because income data is strongly skewed and has a single mode, a median is always a more appropriate measure of central tendency than a mean. This is a very basic statistical principle. Fortunately, almost all empirical work using income data already implicitly recognizes this principle because the standard practice is to almost always use an estimate of the median income rather than the mean. Now that claim probably raises some eyebrows because most researchers are unaware that they are already, de facto, closely approximating the median income in all their statistical work. But they are because their standard practice is to work with the mean of log income. Because the income distribution is always very close to a lognormal distribution, this is tantamount to using an approximation of the median income because the mean of lognormal data is the median.

MELI is based upon median income which is a better measure of income than GDP because the skew of inequality means that more people are closer to the median than to the mean. This is particularly

salient in the USA where rising inequality since the 1970s has decoupled GDP growth from the lives of most American households as you saw in the previous graph.

Movements in mean GDP are so dominated by a minority of rich elites that the mean can rise even when the majority of people have falling incomes. A bigger plurality of people will see their incomes rise and fall in sync with median income and in a democracy, welfare statistics should move in correlation with a majority of the population.

Similarly, it is easier to make a Rawlsian argument that people would care more about median income than mean income from behind the 'veil of ignorance.' For example, suppose that before each person was born they were given a choice as to which country and they would be born in, but they would be born into a random person in a random family in that country. If you could only learn about a single measure of economic welfare before birth, what statistic would you want to know? And would you care more about the median income or the mean income? Consider the following example where Norway has double the median income, but Qatar has double the mean income.

	Hypothetical Median income	≈Mean GDP in 2009
Norway	$40,000	$60,000
Qatar	$20,000	$120,000

The median income numbers are just hypothetical because median income statistics are neglected at best and probably actively suppressed by authoritarian regimes with embarrassingly high inequality, but these hypothetical estimates of median income are within the realm of possibility because Norway has much less income inequality than Qatar. If you believe in the constant marginal utility of money (mmutilitarianism), you would definitely pick Qatar, but most people would probably pick Norway for both the selfish reason of having a much greater chance of earning twice as much money (modest risk aversion) and the altruistic reason of wanting to live in a society where the less fortunate are not suffering as much.

Economists are not helping policymakers develop the kind of societies that we would (probably) all prefer from behind the veil of ignorance because we are not providing median income statistics that would help guide them towards policies that could benefit the median income. By spending most of a century prioritizing mean income, we have been elevating the political priorities that produce nations that are more like Qatar and less like Norway. This is a very political choice we have made and it has significant consequences.

Business cycles should also be examined using median income rather than just GDP. The economic "recovery" in the USA began when mean GDP began rising beginning in mid-2009, even though the median American household (and probably the majority of Americans) continued to see their incomes falling for almost two more years. President Obama's over reliance on GDP caused him to begin prioritizing deficit reduction with bipartisan support in 2009 which was a long way before the majority of Americans had even hit the bottom of the recession, much less rebounded to where they had started. Mean GDP also contributed to the Fed's decision to pivot away from stimulus towards inflation worries too early. The Fed cared so little about the median American that it didn't even include median income among the over 83,000 different data series in its FRED database until 2014. Somehow, the Fed had decided that it was more important to track the Anchorage Alaska House Price Index and the Z-score for Uganda's Banks than any measure of American median income.

Mean GDP was undoubtedly a better measure for fighting recessions in America during its first half century because inequality was falling or low, so it is understandable that economics developed a tradition of monomania at that time. But since about 1980, rising inequality has weakened mean GDP for all policy purposes including macroeconomic stabilization. The national income accounts will always be useful for understanding business cycles, but median income should also play a role in policy.

The premature pivot away from stimulus in 2009 undoubtedly contributed to prolonging the economic misery for most Americans and increased the distrust of the median voter towards Washington elites who seemed out of touch when they declared the recession over. No wonder Trump supporters don't trust America's official economic statistics. GDP, our flagship statistic, doesn't reflect the reality for most Americans, and this may have helped fuel a bit of the distrust that helped elect Donald Trump. He pandered to his supporters by promoting the notion that our official economic statistics are fake and many of them loved it.

3.2. Median income doesn't assume constant marginal utility of income. Mean GDP Mean GDP is philosophically risible for doing this.

Most people think mean GDP is an objective statistic, but it is really a very crude, value-laden utility function. Maximizing GDP is exactly the kind of utility function that Jeremy Bentham's[1] autistic doppelganger would produce if he believed that only money mattered for utility and that every dollar of production always produces exactly the same utility for every person. If non-market goods like love, freedom, and leisure time generated zero utility and there were constant marginal utility of money, then maximizing GDP would be Bentham's utilitarian objective. This mutation of classical utilitarianism is sometimes called money-metric utilitarianism. This is such an extreme assumption to place upon our psychological theory of the mind (utility) that it deserves to be named mmutilitarianism because this describes the implicit moral philosophy more clearly.

Mmutilitarianism has accidentally become the main ethical system of economists who think that they are using it to give objective, value-free policy recommendations. It is the ethical system that not only underpins the use of GDP for welfare, but also cost-benefit analysis, and most applications of economic efficiency. It is rare that economists develop any consensus about policy advice based on justifications that contradict mmutilitarian logic.

This unconscious ethical system underpins the widespread judgement among economists that high tariffs, rent control and the gold standard are bad, whereas monetary stimulus to fight recessions and congestion pricing are good. None of these ideas are Pareto-efficient because each would make somebody worse off somewhere. But all these recommendations are mmutilitarian-efficient.

Using mean GDP as a measure of welfare relies upon the assumption that a dollar of income has constant marginal utility for all people. It implicitly assumes that a homeless person would get exactly the same amount of utility from finding a dollar bill blowing down the sidewalk as the richest man in the world.

Mean GDP is a money-metric mutation of 'average utilitarianism' that economists like Henry Sidgwick promoted in the 1800s. In the 1800s, most economists like Sidgwick believed in the law of diminishing

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[1] Jeremy Bentham was the first prominent 19th-century founder of utilitarianism who argued that society should try to maximize the sum of the utility of every individual.

marginal utility and would never consider using mean income for measuring welfare. The utilitarians of the era theorized that each unit of utility could be worth the same for each person, but they never dared propose a concrete protocol for measuring utility and were sure that every dollar of money does not always give the same amount of utility to everyone.

Mean GDP is THE measure of economic welfare against which all others are judged, even though there is a non-mmutilitarian alternative that could avoid assuming constant marginal utility: median income. Unlike mean income, median income does not require a specific cardinal utility function because a median is compatible with both cardinal and ordinal measures. This is a basic statistical principle. If you can order measurements, then you can find a median, but you must have a cardinal measurement of each observation to calculate a mean.

For example, if you have a pile of uniformly-sized gravel from two different quarries, and you want to determine which quarry has harder gravel, you could take a sample from each quarry and order the stones in each sample from softest to hardest by scratching the different minerals against each other. Harder stones scratch the softer ones. Once you have lined up each sample into an ordinal ranking, then the median hardness of each sample is the stone in the middle. By comparing the hardness of the two median stones, you can get a useful idea about which pile of stones is harder without any cardinal information.

Mean income is only valid as a measure of welfare if and only if the marginal utility of money is constant for everyone. This is the unique feature that distinguishes mmutilitarians from people who call themselves utilitarians. Utilitarians completely reject mmutilitarianism because they almost universally believe in the law of diminishing marginal utility. Of course mmutilitarian economists don't actually say that every dollar is worth the same to everyone either, but they make policy recommendations as if they believed it. The very idea of the constant marginal utility of money is so philosophically risible that nobody defends it except as a convenience that simplifies welfare analysis. But assuming constant marginal utility doesn't really simplify the measurement of central tendency for income because median income is an even simpler alternative as argued in section 3.5.

During the ordinal revolution Vilfredo Pareto (1971 [1927]), John Hicks (1934), Paul Samuelson (1938) and other 'ordinalists' succeeded in convincing the economics discipline that we should abandon the law of diminishing marginal utility of money because, according to their argument, the utility of money is only ordinally measurable. This argument won the day with respect to the abolishment of diminishing marginal utility from most of the economics literature, including from most Public Finance textbooks where it should remain as an important normative concept! But the use of mean income for measuring welfare signifies that the ordinal revolution is still incomplete because it is impossible to meaningfully calculate the mean of ordinal data (Andreas, 2011).

This is all the more important because mmutilitarianism is completely avoidable in this context due to the fact that median income is an ordinal alternative that is cheaper to gather, easier to understand, and more accurate. Section 4 will give more reasons why economists and statisticians have let this statistic languish in obscurity while prioritizing billions of dollars over the past 80 years for measuring mean GDP in every nation on earth and even across millennia in the case of the ongoing Angus Maddison Project. But one reason is that many economists have developed a false understanding of mean GDP because they do not realize their own mmutilitarian tendencies throughout the discipline.

3.3. Median income is closer to a consumption measure. Income measures like GDP also include savings which does not affect economic wellbeing in the current period

Income isn't the ideal measure of the flow of economic wellbeing because some income is saved, which means that it is not relevant to the current flow of economic wellbeing. Consumption is the appropriate measure of the flow of economic welfare. Ideally we would produce a measure of Median Expected Lifetime Consumption (MELC), but that would require a much bigger investment than MELI. MELI is already much closer to a measure of consumption than mean GDP, because savings are even more skewed towards elites and median-income individuals' income is relatively close to their level of consumption in comparison with mean GDP. Plus, as explained beginning in Section 5.5, GDP includes net exports and investment which are in large part driven by the savings of businesses and governments and this exacerbates the gap between GDP and consumption. See for more details.

3.4. Median income is easier to understand than mean GDP.

MELI is even easier to explain than mean GDP because a median is easier to explain than a mean. A median is so simple, it can even be explained to innumerate people who don't know enough arithmetic to understand the addition and division required to understand a mean.

Furthermore, everyone understands household income whereas a true understanding of GDP requires knowledge of components like investment and net exports which are trickier because they have no direct effect on experienced wellbeing and most individuals cannot directly relate to how a change in these variables might affect them personally. As a result of its additional complexity, GDP is widely misinterpreted and even most economists don't seem to understand all the ways that it is misleading. For example, the NIPA accounts include measures of consumption which is a better measure of welfare than production (as explained in Section 5.5), and most economists don't seem to understand their own mmutilitarian assumptions involved in using it for welfare (as discussed in Section 3.2). Whereas most of the proposed replacements for GDP build on top of the GDP infrastructure in an attempt to patch over its inadequacies by adding more complexity (see Section 3.10), MELI does the opposite. It begins with a fresh source of data, households, and produces a simpler statistic that is easier to understand and cheaper to measure.

### 3.5. Median income is easier to measure than GDP.

Whereas than median income just measures the income of households, GDP is much more complicated because it also measures business investment, government expenditures, and net exports. It is so complicated that the United Nations basic instruction manual is 722 pages long (2009) plus there are many additional papers with more guidelines. In comparison with the massive team effort that the US Bureau of Economic Analysis puts into measuring GDP, median income statistics are so easy, the US government collects the information we use to calculate median income as an almost incidental part of its census operation.

Median income data collection requires almost zero additional cost for all developed nations which already have detailed tracking of household incomes near the median for census purposes and, more importantly, because this is middle class data which is the most important source of income taxes. Income tax records miss some income such as implicit rents, but they are incredibly comprehensive and

could be complemented with additional surveys which most rich nations are already doing for demographic census purposes.

Even for nations without comprehensive income taxes, surveying households is much cheaper than measuring GDP because whereas GDP requires measuring ALL production everywhere, median income only requires a survey that focuses on households near the median. There is no need to try to measure the incomes of all the richest and poorest households and they are the hardest to estimate because the rich can afford expensive schemes to hide their income to escape taxation, and the poor are harder to find and are less likely to accurately track their incomes because they do more informal work and have less pressure to track their income for tax recording purposes.

Median income is so much easier to get than GDP that the USA has median income statistics for every state and over 3,000 counties and metropolitan areas. There is no equivalent measure of GDP for small regional areas because total production is harder to measure than median income. Whereas it gets more expensive to scale down GDP to subnational regions, it gets cheaper to measure median income with smaller populations. The problem with measuring GDP for small regions is the difficulty measuring net exports because smaller regions have much larger trade as a percent of their GDP. This is also true of nations, as you can see in this Gapminder graph of GDP vs imports (with log-scale on the vertical axis).
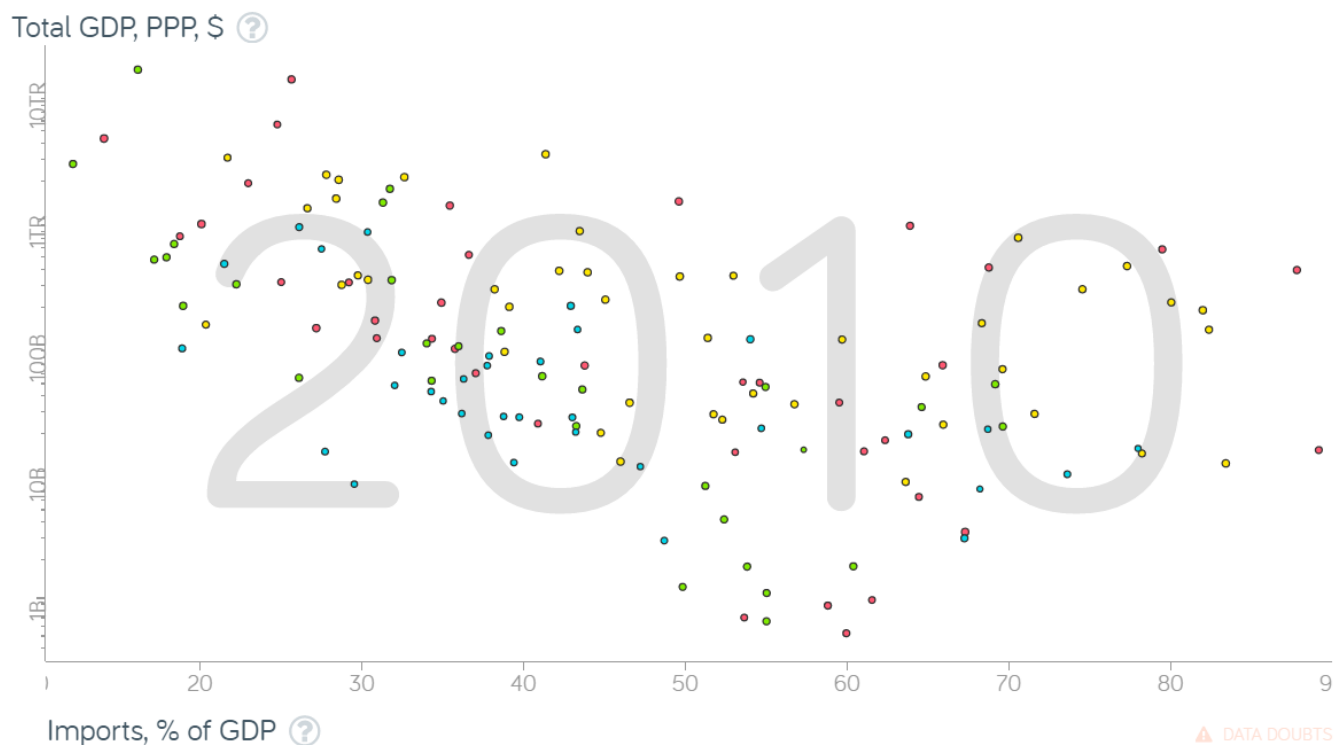
(World Bank data via Gapminder.org: http://bit.ly/2ea82mK)

Net exports are always difficult to measure accurately, and they are more important for smaller groups of people, but net exports are not part of median income and they should not be part of a measure of experienced wellbeing because they do not impact it. They only impact it indirectly if they affect consumption, and MELI would pick that up because it is close to a measure of consumption. Median

income is always easier to measure than GDP and this advantage is bigger for smaller regions because median income does not require a measure of net exports.

3.6. Median income better accords with democratic values.

An economic statistic that is closer to the majority of the population should be more important to democracy because democracy is (in the least flattering characterization) a dictatorship of the median voter. Ideally in a democracy, the politicians should care more about the wellbeing of the people near the median-income than the elites. They certainly say that they prioritize the median because their rhetoric, at least in America, indicates an obsession with the middle class.

Median income is better for assessing the middle class and if democracies worked perfectly, politicians would prioritize it. But in part because of democracy's flaws, politicians have been happy to track mean GDP instead. This is because politicians' incomes and that of their social circles is closer to the mean income than to the median. Politicians also need campaign contributions and the average contribution dollar comes from people who are above the mean income. Finally, a realist politician cares more about voters above the median income than those below because higher-income people are more likely to vote than the lower classes. This may explain why political science research shows that politicians care more about the preferences of economic elites than the preferences of the middle class (Gilens & Page, 2014). But all of the reasons why politicians are likely to prefer mean income are due to distortions of democracy and economists have no business abetting the statistical corruption of politicians.

Fortunately politicians do also have some self-interest in getting better statistics because political science research shows that swing voters make decisions based more upon their objective experience in the recent past than on their views about economic policies for the future. In other words, they tend to vote for change when the economy has performed badly for them in the recent past and are more likely to vote to keep incumbents in power when the economy has been performing well. Median income will be better than GDP for politicians to evaluate policies to deliver the economic goods so that the median voter is satisfied enough to re-elect them.

3.7. MELI incorporates life expectancy, the simplest, most precise, and most powerful measure of health.

MELI makes greater advantage of its three dimensions than other simple income measures because it adds information about life expectancy to the time dimension. Life expectancy is arguably the single best measure of welfare and it is probably the most accurately measured economic statistic around the world because everyone cares deeply about births and deaths and there is relatively little subjectivity about collecting the data.

I sometimes ask in presentations for people to raise their hand to indicate who would prefer to double their lifespan (holding annual income constant) or double their annual income (holding lifespan constant). Most people would prefer to double their lifespan.

Many developing nations like China, and Vietnam actually achieved a doubling of lifespan between WWII and 1980, without any significant growth in mean GDP. Despite this miraculous progress in life expectancy during this period, mmutilitarian economists in the 1980s saw none because they were fixated on stagnant GDP and this led many to argue that economic development aid had been a failure.

But much of the development aid had been spent on improving health and contributed to the at dramatically raising life expectancy across the developing world. This also led to skyrocketing population growth which diluted GDP growth and so many economists didn't see any development because of their misplaced focus on stagnant mean GDP. So many lives were saved that economists should have been celebrating and looking for the heroes who were responsible. Even in the comic books, it would take legions of superheroes to save enough lives to double life expectancy!

MELI would more accurately give much greater optimism to the development projects of this period when life expectancy skyrocketed. When I point this out in presentations, some economists have objected that an increase in life expectancy is not necessarily a good thing when people live in miserable poverty, but this is not the perspective of the poor. It is the perspective of pampered, elite economists. If life weren't worth living in poor nations, suicide rates would be higher there, but there is insignificant correlation between suicide rates and income.
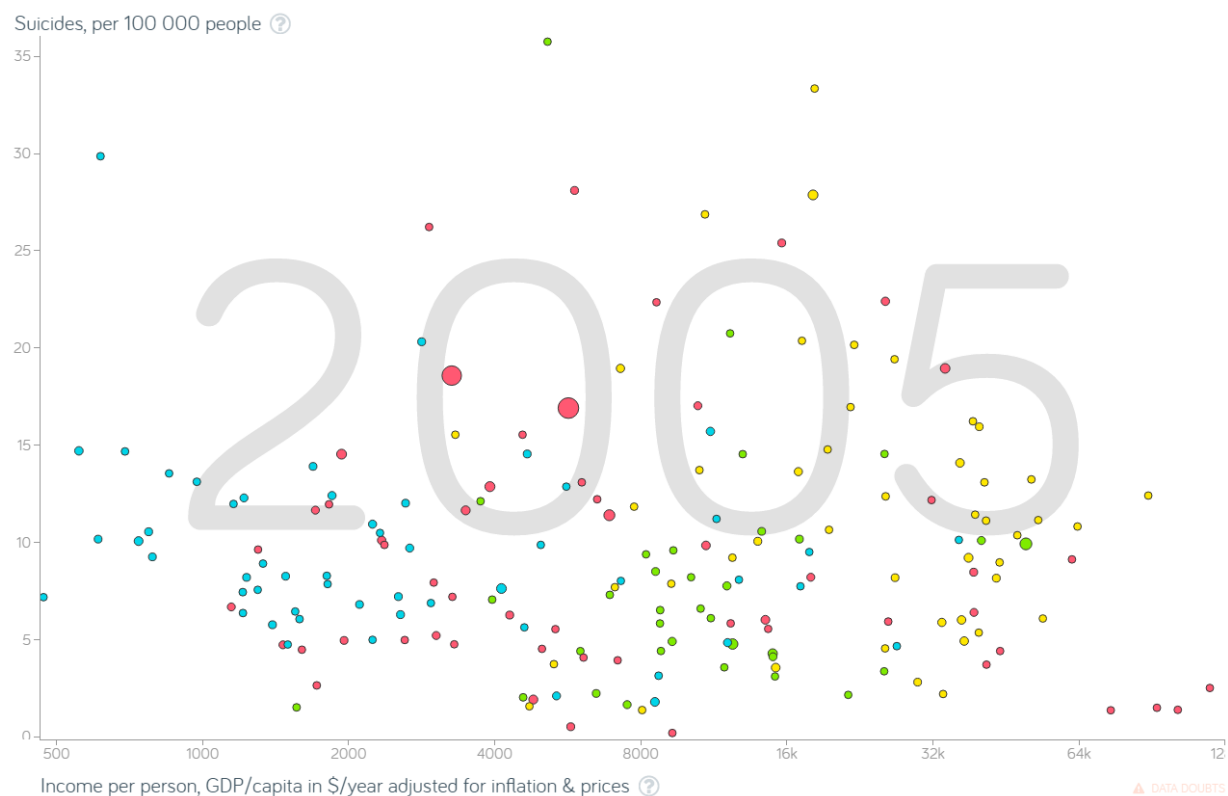
(WHO data via Gapminder.org: http://bit.ly/2okPns3)

Perhaps some economists think that life expectancy is a poor measure of wellbeing in poor nations partly because of the way economists value life. When economists measure the statistical value of a life in nations around the world they interpret the choices that people make to imply that people in poor nations don't value their lives as much as people in rich nations. For example, the measured statistical value of a life in Malawi is well under $1million whereas in the USA, it is closer to $10million. But the idea that rich people value life more than poor people comes from the mmutiltarian philosophy that the dollar is the constant standard of value against which all other things should be judged.

The value-of-life literature is correct that poor people are willing to accept much higher risk of death for much less money than rich people, but this doesn't mean that they value their lives any less than rich people. An alternative interpretation is that poor people value money a lot more than rich people. For anyone but mmutilitarians, the value of life literature is yet another piece of evidence for the diminishing marginal utility of money. It is much more plausible that all people, rich and poor, value their lives the same, but rich people value money less than poor people. Mmutilitarians unwittingly use money as the numéraire against which to value all other things, including life. But human life is a better universal constant against which to judge all value. Rich people just have much lower value of money and are willing to spend vast amounts for relatively trivial purposes that won't buy significant additions to their lives whereas poor people have to be more careful in their expenditures and demand more years of life per each dollar.

So life expectancy is a better measure of wellbeing than income because there is a stronger philosophical justification for using life as the numéraire of value rather than money. Even if you believe in the mmutilitarian idea that life is worth less in poor nations than in rich nations, that doesn't mean life expectancy would be a bad measure because we can still agree that more life is better and so it is still a useful ordinal measure of welfare. Furthermore, a longer life leads to more wage income and higher lifetime income. In the introductory anecdote of this section, I asked if it is better double your lifespan (holding annual income constant) or double your annual income (holding lifespan constant). Even for mmutilitarians it should not be a difficult choice because both options yield the same total amount of income and one choice also gives the bonus of double the lifespan. More is better.

If MELI replaced GDP as the primary measure of welfare, it would help elevate concerns about the downturn in American life expectancy in 2015 and highlight the dramatic growth of lifespan in South Korea as a successful model that America might try to emulate. The current life expectancy recession in America should get at least as much attention as the quarterly GDP numbers, but it is relatively ignored. The drop in US life expectancy has been particularly concentrated among the low-education white Americans who overwhelmingly voted for Donald Trump's promise to "make America great again." In Trump's first two months, his biggest legislative priority was health reform, but making life expectancy great again was never even a part of this effort. Instead, he focused on cutting healthcare spending. If MELI replaced GDP, that might do a little bit to help keep life expectancy on the policy agenda where it belongs, particularly in regards to healthcare legislation.

3.8. MELI addresses the crucial role of the household in distributing individual income.

Previously most median income statistics have been misleading as a measure of wellbeing because of ignoring the huge amount of income distribution that takes place within households. This is a major flaw in the way median-income has been measured and makes it much less useful than MELI. In fact, median income has been measured so poorly that it has deserved to be neglected (as explained in Section 4). Fortunately, MELI demonstrates that this flaw is easy to correct.

So far, there have been two main kinds of median income statistics, and both are worse than MELI mainly because of ignoring household distribution.

3.81: Problems with median household income

The most popular measure of median income is median **household** income, but its main problem is that we want median *individual* wellbeing rather than median household wellbeing because a household is

not a fundamental unit of welfare; a person is. If a household earns $100k we don't really know anything about the welfare of the people in it for the same reason that knowing that Singapore's aggregate GDP was US306B in 2014 doesn't tell us anything useful about the welfare of Singaporeans. In order to understand welfare, we have to know population so that we can estimate an individual-level statistic.

Because of changing household sizes, median household income is not comparable over time nor across societies so before median income can be as useful as mean GDP, we need to develop a methodology to decompose each household's income among its individuals into median individual income. Although this isn't very complicated, statistical agencies have never developed any consensus about methodology and it is rarely attempted.

The lack of agreement about a protocol for household decomposition is emphatically NOT a reason to prefer GDP which suffers from exactly the same problem except worse. Whereas household members probably do not share their income perfectly equally, per capita GDP not only assumes that I share my income with my wife and children perfectly equally, but that I also share my income equally with everyone from Bill Gates to the homeless and that they all reciprocate! It is exponentially more ridiculous, but perhaps because the size of the forest (GDP) is so much harder to imagine than a thicket (household), people have an easier time imaging how hard it would be to develop a realistic protocol for dividing up income within households when every household divides up resources in a unique way. But it is trivially easy to develop such a protocol that is more realistic than our protocol for mean GDP because it is much more realistic to assume that households equally divide resources among their members than assuming that everyone in society gets an equal share of GDP.

3.82: Problems with median wage

One way to avoid households and focus on individual earnings is to use a measure like median personal income or median weekly earnings as displayed in the graphs below. Unfortunately, these measures are even more problematic than median household income and again the problems are caused by the fact that they ignore how households distribute resources.

The first problem is that individuals who live communally in households pay part of their income to other residents, primarily by providing in-kind goods and services. Thus these statistics overstate the individual income of household members with high weekly wages and understate the real income of members with low weekly wages.

Even worse, these statistics completely ignore individuals without external income. They are excluded from the measure as if they didn't exist. No measure of wellbeing should completely ignore anyone just because they don't have income sources that are external to the household. Everyone must have some real source of income or they would die, so everyone should be included in the ideal statistic.

The problem of excluding part of the population leads to major measurement errors. For example, due to wage stickiness and the fact that low-wage workers are the most likely to be laid off during a recession, median weekly earnings sometimes rise during recessions even though economic wellbeing clearly falls. This is what happened during the 2000 and 2008 US recessions:
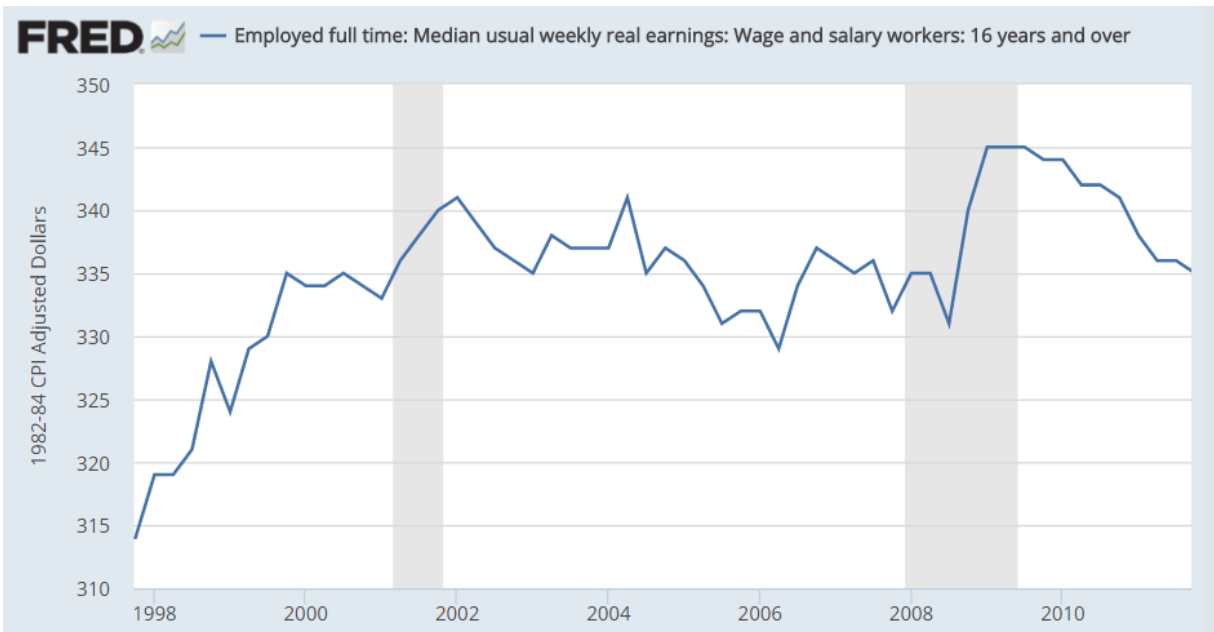
For another example of how median earnings is misleading, suppose a nation becomes less sexist and begins allowing women to work, but remains somewhat sexist and pays them less than men. The increasing number of women workers would increase the low-wage portion of the labor force which would tend to suppress the median wage although in reality, economic wellbeing should increase when more people get more choices and household incomes rise. This is a somewhat realistic description of the US labor market in the 1970s-1990s.

Median personal income is somewhat better than median earnings because it encompasses a broader segment of the population, but it still suffers from the same problems. For example, in the following graph median personal income steadily rose during the 1981-82 recession.
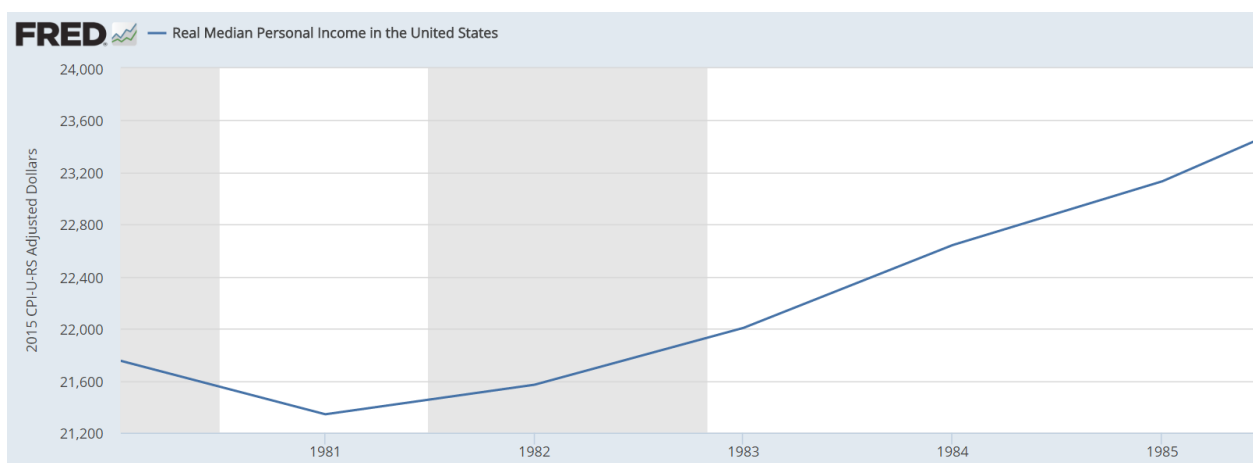
Despite these liabilities, many people still use these statistics for measuring welfare. For example, the Social Science Research Council uses median personal earnings to produce their multidimensional

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replacement for GDP, the American Human Development Index (SSRC, 2017). They would probably be better off using GDP instead of median earnings, but MELI would be even better.

3.83: Recommended method for dividing household income

The lack of a comprehensive median individual income statistic is not due to a problem of nature. It is just due to a shocking failure of the imagination because it is easy to adjust household income for changes in household size. I recommend equal division, because more complex methods do not change MELI very much and unless the additional complexity can be proven to yield more useful information, it is probably best to avoid it so that the end user can understand the measure better.

Furthermore, equal division is the same method used for dividing up national income among individuals to calculate mean GDP. Anyone who accepts the use of mean GDP cannot reasonably object to equal division of household income. It is also appealing to people with egalitarian normative preferences. However, the division of resources within households is an area that deserves more study and more research might be able to develop a better methodology for dividing household income. This is explored in Section 5.7.

It is hardly a new idea to adjust household income by dividing by household size, but the methodology for MELI is unique to my knowledge because previous authors have merely divided the value of median household income by the average household size. Even though this kind of adjustment is very simple to do, it is almost never done. Below is an example from Mark J. Perry (2016) which is a true contribution to the measurement of welfare because it is a much more accurate statistic than either mean GDP or median household income.
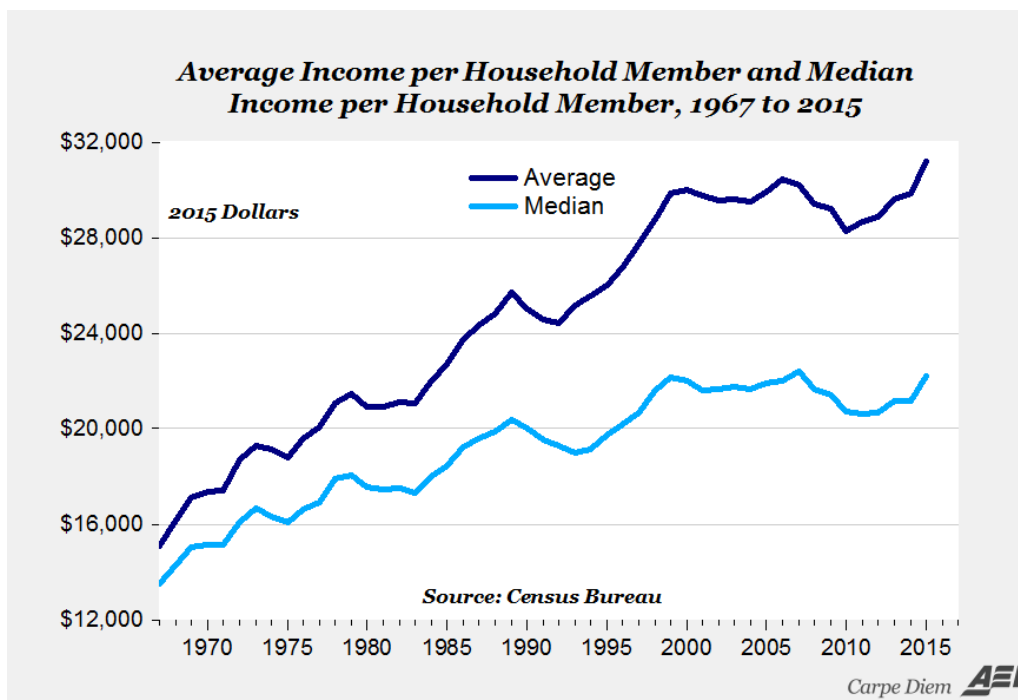
But this is a much cruder adjustment that MELI does because it just divides two aggregate statistics thereby causing aggregation errors. For example, suppose you have three households in a population

that each have a different household income with a median household income of $20 and an average household size of four people.

# people in household	Household income
1	$10
1	$20
10	$30

Mark Perry's method divides the median household income by the average household size: $20/4 = $5. MELI's methodology is better because MELI divides up the income of each household among its members to get a measure of each individual's income and then use that to find median individual income:

# people in household	Household income	Individual income assuming equal division within household
1	$10	$10
1	$20	$20
10	$30	$3

Median individual income is now $3 which is 40% less than what Mark Perry's methodology produced. Median individual income is much more representative in this example because the vast majority of the population is living in a household that is sharing $30 amongst ten people.

MELI's assumption of perfectly equal division of household income amongst household members may seem ridiculously egalitarian, but it is no more egalitarian than mean GDP. At the other extreme we could assume each household member keeps exactly what he or she earns in the marketplace without sharing anything in the household. The second methodology, zero sharing, is also completely ridiculous, but it is implicitly assumed by median personal wage mentioned earlier. So MELI's method is admittedly unrealistic, but it is well within the norm for economics statistics which always have to rely upon some unrealistic simplifications. In fact, a simplification is what a statistic is. A statistic is a way of compressing the complexity of reality into a relatively simple number. That always requires discarding some realism, but that is the goal of simplification which is what statistics is all about. MELI is just a crude oversimplification, but it is a more useful oversimplification than the alternatives for understanding wellbeing.

3.9. MELI solves the problem of demographic artifacts that distort all other measures of economic welfare.

All other income measurements suffer from demographic artifacts that MELI avoids. For example, suppose Japan has a very large population of retired people in small households relative to Singapore. That would make Japan's mean income look lower than Singapore's even if Japanese individuals at every age actually had higher income than Singaporeans. The fact that more Japanese people were enjoying the fruits of retirement would make Japan look worse off than Singapore due to an artifact of demography. If Japanese individuals at each age were getting more resources than Singaporeans of the same age, MELI would correctly show the Japanese as being better off.

This is because MELI was inspired by the way life expectancy is calculated. Life expectancy is not effected by the age distribution of the population and MELI shares that characteristic. For example, a nation like Singapore has more young people and fewer old people than a nation like Japan and so

Singapore would have a lower mean age of death simply due to having a younger population even if the risk of death for every age was the same in Singapore as in Japan. Life expectancy is a better measure of health than mean age of death because it is unaffected by demographic baby boom which is irrelevant to the actual health of the population, but which would have a big effect on the mean age of death. Similarly, if median earnings are the same for every age in two nations, and risk of death are the same for every age, then MELI will be the same even if one nation has many more elderly retired people.

For another example, Japan's economy has grown more slowly than the US economy since the mid 1990s according to mean GDP, but GDP per working-age-adult has grown about the same as in the US so the difference is primarily due to Japan's growing elderly population and shrinking working-age population. Whereas mean GDP understates the rise in Japan's material wellbeing as more Japanese people enjoy retirement, GDP per working-age-adult overstates it because the working-age population must share more of their production with the retired population.

MELI strikes a balance between the strengths of both examples that no other simple statistic has done. Ceteris paribus, MELI should show Japan's wellbeing increasing more than GDP/capita as lifespan and leisure increases, but less than GDP/working-age-adult which completely ignores a large and growing segment of the population. Retirement is a good thing that societies should aspire to expand and our measures of wellbeing should not make an expansion of retirement look disastrous if working-age people are still just as prosperous.

One side benefit of MELI is that it will also result in the annual analysis of income at each age which will make it easy to automatically produce estimates of inter-generational changes in lifecycle consumption like the ones in the figure immediately preceding Section 5.7.

3.10. MELI is simpler than "multidimensional" measures like the United Nations' HDI

> "That's been one of my mantras — focus and simplicity. Simple can be harder than complex: You have to work hard to get your thinking clean to make it simple. But it's worth it in the end because once you get there, you can move mountains." –Steve Jobs (BBC, 2011)

Economists have achieved success at developing economic statistics that influence a wide array of political and business judgements when they have developed statistics that are simple to understand. Whereas the process of creating an economic statistic is often as complex as the guts of the Iphone, as long as the end product can be used with an intuitive understanding, it can succeed as a consumer good. All of the most successful economic statistics like GDP, unemployment, and inflation are successful because members of the public can intuitively relate the statistics to their everyday lives and this helps them use the information and trust the authorities to measure them.

The first United Nations Human Development Report understood that to replace GDP, they would have to produce a statistic that is just as "crude and convenient" (UNDP, 1990) and the report produced what has become the second most popular measure of economic welfare, the Human Development Index (HDI). But despite the annual investment of millions of dollars ploughed into developing the HDI, it has failed to be a satisfactory alternative to GDP as witnessed by numerous conferences over the years that largely ignore the HDI as they continue to seek a new measure that can finally go "Beyond GDP."

The main reason the HDI has failed to replace GDP is that nobody intuitively understands it because it is too complex. Even most professional economists don't understand it well enough to have the foggiest idea how important a 20% increase would be. Do you know how important it would be if Nigeria's HDI changed from 0.5 to 0.6? But everyone intuitively understands how remarkably significant it would be to increase their median lifetime income from US$500,000 to US$600,000. Although the HDI has numerous qualities that make it a theoretically richer measure than GDP, almost everyone prefers GDP because its meaning is much easier to understand and interpret.

The main reason the HDI is too complex is that it has five incommensurable dimensions whereas all of the most successful economic measurements only have three. For example, GDP has three dimensions for time, people, and monetary value whereas the HDI uses GDP and also adds education and health. For example, we can measure the GDP of a time (365 days during 2013), a people (those living in China) and monetary value (of final goods and services produced) to produce a measure of Chinese GDP. We can divide GDP by one of these same dimensions (population) and produce mean GDP which is a human-scale metric of the flow of income that is directly relatable to any individual's experience.

Most economists think that GDP has only one dimension because they ignore the time and people dimensions, but MELI has the same dimensions as mean GDP and the only reason MELI is better is because each of its three dimensions are selected more carefully to represent welfare better. It time dimension incorporates expected lifespan rather than just an arbitrary 365 days. Its people dimension represents the person in the exact middle of the income distribution rather than the person who happens to have the average amount of money, but who is actually richer than the average person. Its monetary dimension uses a household perspective which is more closely related to consumption which is preferable to income as explained in [Section 5.5](#).

So MELI is very similar to GDP because both share the same dimensions which means that it is more likely to be able to fill exactly the same niche and displace GDP (for use as a measure of welfare) than a measure with completely different dimensions. MELI also is very similar to the HDI because the HDI only adds one more kind of data (education). MELI combines the HDI's two most powerful and reliable components, income and longevity, but omits education because that cannot be combined with the more powerful measures into a three-dimensional form that preserves meaningful units. Like GDP, MELI is measured in currency units that everyone can relate to.

All of the most successful economic measurements are directly relatable to personal experience. For example, every adult can relate the unemployment rate with direct experience by interpreting it as one's risk of being unemployed or the percent of one's community that is suffering from it. The HDI fails because it isn't relatable to personal experience. It doesn't even have any units at all, so it is comparable to absolutely nothing in the real world except to itself.

A major problem with mean GDP is that it requires a very strong mmutilitarian assumption about individual human utility functions: It assumes that the marginal utility of money is constant as explained in [Section 3.2](#). But welfare measures that combine more than three dimensions (often called "multidimensional welfare") are forced to make even more detailed, deterministic assumptions about human utility functions in order to distill the information into a single number and in doing so, they require the user to trust the implicit utility function that the economists designed to produce the statistic. Why would anyone trust economists to know how to build realistic utility functions when we

have enthusiastically based most of our policy recommendations on an accidental mmutilitarian moral philosophy with nary a reservation ever expressed about it?

The HDI is a good example of a deeply-flawed multidimensional utility function. It accepts the standard mmutilitarian assumptions of mean GDP and then combines that into an even more complex utility function that makes very specific assumptions about the relative utility of health, education, and GDP. It then combines and averages these three dimensions into a kind of operationalization of utilitarianism that Bentham would undoubtedly disavow due to the crudeness of its assumptions. One metaphysical argument the authors of the HDI use to deny that they have created a form of utilitarianism is that their measure is unit-free, but they often interpret it as if it were a cardinal utilitarian measure of welfare and they calculate it exactly as if it were a Benthamite utility function. They begin with a collection of inputs that they use as cardinal measures to calculate an output measure of the wellbeing of society with the goal of knowing how to maximize their social utility function which is just like what Bentham dreamed about accomplishing. The HDI is a distant intellectual heir (or perhaps an illegitimate child) of Jeremy Bentham. They may claim that the HDI is unit free, but they have really invented a new measure of utility.

Nobody can experience utility the way the HDI calculates it and so nobody can get an intuitive sense of how accurately it measures utility. Good welfare measures should be testable against individual experience in what Max Weber called verstehen. Like all welfare measures with more than three dimensions ("multidimensional"), the HDI ceases to be something that any person can directly relate their experience to.

In contrast, MELI makes none of these kinds of assumptions about people's utility functions because it is just an attempt to make an empirical representation of central tendency. It attempts to represent the income of an average person in a population over the course of the expected lifespan during a given year. MELI doesn't impose a utility function on the observer. It is just an attempt to produce an empirical measurement that represents a kind of experience that an actual person could have. Each individual can put that measurement into their own unique utility function to imagine how much utility a person with that kind of real-world experience might have. Each observer can use their own personal utility function to decide how good the measure is based on relating it to their experiences.

Although MELI is a more complex measure of wellbeing than median income, MELI is no less precise than median income alone because it only adds life expectancy information which is even more precisely measured than income. In contrast, the HDI adds education measures which increases the overall error of the HDI because education is less accurately measured than the other dimensions of the HDI. Whereas the HDI adds life expectancy as a fourth dimension, in MELI, it just uses it to enhance the existing time dimension much like mean GDP is an enhanced version of aggregate GDP with the same number of dimensions.

3.11. MELI is more complementary with efforts to measure sustainability because it helps clarify the distinction between goods that affect experienced welfare versus goods that affect expected welfare.

As mentioned in Section 3.3, MELI is better than GDP because it is closer to a measure of consumption. It will also hopefully provide a step towards progress developing Median Expected Lifetime Consumption (MELC) by increasing interest in investing resources to developing the data sources.

Income is always a mixture of consumption plus savings and MELC will be a pure consumption measure which is better for measuring the flow of experienced welfare. In contrast, savings is an investment in the stock of goods for increasing expected welfare. Once we separate income into savings and consumption, we will be better able to measure what level of consumption is sustainable. See Section 5.8 for details. MELI will help move in that direction because it is closer to a measure of pure consumption than GDP is.

4. Why has median income been neglected despite its advantages?

Economists frequently object that GDP fails to adequately reflect changes in inequality, and they almost always explain the problem by comparing it with median income. Strangely, they rarely propose to simply use median income instead of GDP. For example, the Sarkozy Commission's report uses median income to help explain why mean GDP is flawed in comparison and it recommends using household data (like median income) for measuring wellbeing (Fitoussi, Sen, & Stiglitz, 2009, pp. 32, 113–119, 136).

Unfortunately, the report failed to develop much momentum around any particular solution for how to go beyond GDP and instead of suggesting concrete ways to improve household-level measurement of wellbeing, the report complains about median income, saying, "it is difficult to compute a median …that is compatible with the average figure in the national accounts" (2009, p. 114) The report later explains that, "Ideally, such distributional measures should be conceptually compatible with average measures from the national accounts." (2009, p. 119) Instead of providing directions for how to use household measures like median income, they remained too beholden to the national accounting approach as if the national accounts [GDP] is the gold standard and median income is flawed simply because it cannot be directly fit into the national accounting approach. However, in Section 5.8, I recommend a path for relating MELI with the national accounting system which can enhance the usefulness of both by recognizing how their separate strengths are complementary.

Almost nobody pays attention to median income partly due to this kind of failure of imagination and also due to accidents of history. GDP rose to prominence not principally as a measure of welfare, but as a way to understand the Great Depression and as part of the effort for mobilizing wartime production. It was a primary focus of investment in early economics statistics because of the pressing need to address these twin crises. GDP soon became our primary measure of economic wellbeing because it also served that purpose much better than any other statistic that had been developed and this bonus benefit added to the justification for the world's nations to work together to standardize its methodology and invest billions of dollars annually in producing it. GDP was such a monumental accomplishment that Kuznets truly deserved the third economics Nobel Memorial Prize in history for it.

The 80-plus years of investment into measuring GDP has also created a path dependence which reduced the impetus for developing an alternative purely for measuring wellbeing. In the USA, Median income was developed as an afterthought and it piggybacked on a tiny part of the Census' efforts to expand collection of demographic information in 1967. Median income statistics are ignored because nobody invests any money specifically for improving them and they are collected badly. That causes a vicious cycle in which it is not used because it is measured poorly and it is measured poorly because there is no point in investing more resources in something that nobody uses.

Whereas GDP information in the USA is disseminated quarterly and with great expense to produce advance estimates as quickly as possible, median income is disseminated annually and the latest

estimates are always 1-2 years old, so it is not as useful as GDP for policymakers and businesses who need to understand the current state of the economy. Unlike mean GDP, median income cannot be used for international comparisons because of a shocking lack of availability and the few international examples that are available are not fully comparable because they lack standardization.

There can be greater confidence in the precision of GDP because it is calculated from a much larger sample than median income. For example, the Census Bureau's graph of the income distribution is excessively noisy due to the small sample size. It shows the imprecision of the measure of median income. It may look like a very smooth distribution of data, but look at the bar just below the median which is probably about 20% bigger than the bar just above the median. But the excessive noise is easy to fix without significant investment because we could incorporate more data that is already available as proposed in Section 5.2 or with a bit more money we could increase the survey size which would produce a graph with less uncertainty that would be closer to the red distribution curve.
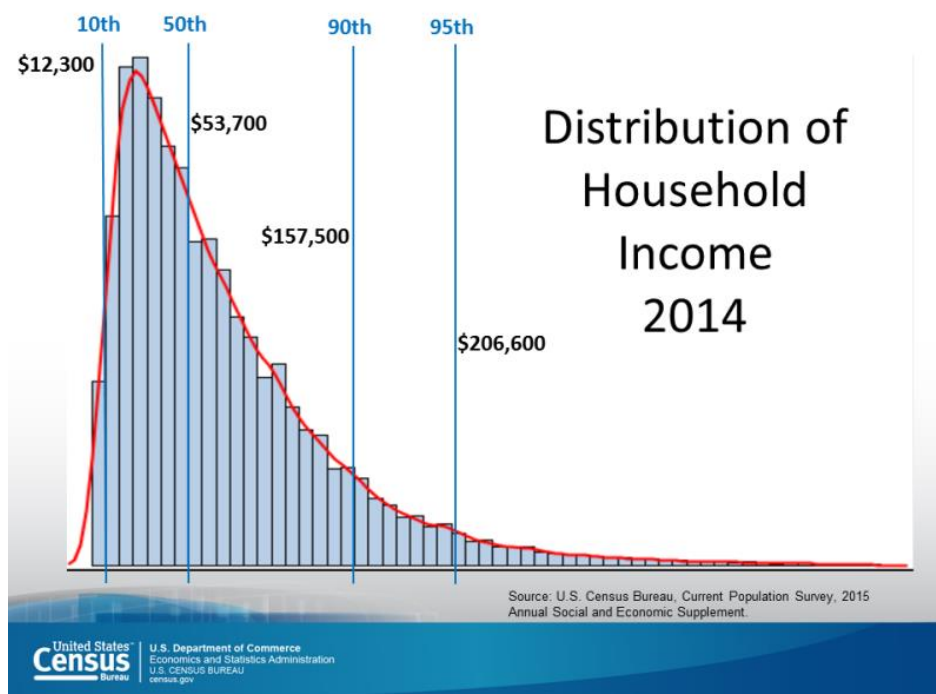
(U.S. Census Bureau, 2015)

GDP has a much better theoretical and empirical apparatus for producing a valid, accurate measure due to more than 80-years of expensive empirical work improving GDP measurements, plus decades more theoretical work on how to best measure "the national dividend" and although GDP has well-known flaws, the flaws that remain are extremely difficult to fix. In contrast, median income measurements are rife with problems that would be trivially simple to fix.

For example, Section 3.8 explains the flaws in past measures of median income like median household income and median wage that are caused by failing to acknowledge how income is re-distributed within households. It is trivially simple to make the same sort of adjustments to median household income that we make with GDP to divide income among individuals. Without adjustment for household size, median household income is so flawed that it is understandable why most people have preferred mean GDP even when both were available.

The Sarkozy Commission report was published, Rebecca Blank was the official in charge of the US agencies that measure GDP. She said agreed with the report that the "household perspective" (which yields median income) would be better than GDP, but she did not do anything about it because, she said:

> "But some of the constraint is we don't have the money to do it, ….Some of the constraint is we know how to do it, but we need to collect additional data that we don't currently have. And some of the constraint is that we don't really know how to do it quite yet." (Gertner, 2010)

Institutional momentum also helps keep GDP supreme. Thousands of bureaucrats and scholars have made a career out of measuring it around the world. There are over 500 employed in the US government alone and they have an incentive to maintain its status. Another response to the Sarkozy report by GDP careerists said that, "it is critical that such an expansion of the scope of the accounts not occur at the expense of funds needed to maintain, update, and improve the existing GDP accounts." (Landefeld, Moulton, Platt, & Villones, 2010)

Median income suffers from a chicken and egg problem. There is no point in putting more resources into measuring it better if nobody uses it and nobody is going to use it as long as it is measured so badly. GDP also suffered from the same sort of vicious cycle during many decades of work by numerous economists before Kuznets was finally able to be part of a big push effort brought on by the coincident necessities of depression and war. It is probably no coincidence that the Sarkozy Commission was also established during the biggest recession since the Great Depression, but it utterly failed to put a dent in the supremacy of GDP just like thousands of other attempts.

Fortunately median income is much easier to measure than GDP, and we already have most of the data, so it might only require a very small push to elevate it to a stature that that begins to compete with GDP if a few international leaders each invest a just a couple million dollars to begin improving the existing statistics and begin publishing official statistics where they are absent. Median income data is so neglected by US officials that a private firm, Sentier Research, has been filling the void in the official statistics by selling median income statistics that are better and more up-to-date than what the US government publishes even though Sentier is merely analyzing government data that US officials are neglecting ("Sentier Medians and the Household Income Index (HII)," n.d.). Sentier's work demonstrates that it doesn't require much investment to improve our median income statistics and that there is a market demand for it.

The economists and politicians who have had power to influence priorities for developing official economic statistics have also had an intuitive reason to prefer mean GDP over median income measures. As mentioned in Section 3.6, the income of their social class is closer to the mean than the median and so their personal experience relates better to mean GDP. Mean GDP really is a more accurate representation of "the economy" for us and most of our associates because even though we mostly consider ourselves to be middle class, we actually belong to a significantly more elite class than the median person and this inevitably produces some amount of bias in how we view reality.

5. Going beyond MELI: Future improvements in MELI and related measures of economic wellbeing.

The previous section of the paper focused on why MELI is already the best measure of economic welfare even just using existing household survey data without investing any additional resources. However, if MELI got as many resources as the UN spends on the HDI, we could produce much better economic statistics and if MELI got 10% as many resources as the world spends on measuring GDP, there is no telling where further research would lead us. After all, scholars have published untold thousands of pages of manuals and research just about how to best measure GDP and there are continuing developments every year.

This section suggests a number of concrete suggestions for future improvements and research including:

5.1: Include ALL people. Go beyond households to include the institutionalized and homeless.
5.2: Use income tax data to calibrate surveys and improve precision.
5.3: Calculate life expectancy data for different economic classes.
5.4: Adjust inflation measurement.
5.5: Measure consumption rather than income.
5.6: Measure real income and/or consumption by including imputed rents and government services and subtracting taxation.
5.7: Research how households actually divide resources among members.
5.8: Adjust for sustainability.

5.1. Include ALL people. Go beyond households to include the institutionalized and homeless.

Even though critics of median income complain that it ignores everyone except the median person, that isn't completely true. Every person who is added just doesn't usually have as big of an effect on a median as on a mean. But this objection does relate to a much bigger flaw of our median income statistics: they don't even bother to include a significant portion of the population. I addressed this shortcoming of the median wage in Section 3.82, and there is a similar flaw in many household data series which ignore the portion of the population that is not living in traditional households. For example, the CPS data that produced the MELI statistics in this paper excludes prisoners, residents of old age homes, and people in mental institutions among others.

For the purposes of calculating MELI, it would be very inexpensive to include the homeless population because we can assume that they earn less than the median income, so their numbers can simply be counted for the purpose of deciding where the median falls. The institutionalized population is more difficult to include because some are likely to be close to the median and will require an estimate of their income. But in most cases, it will be sufficient to just estimate whether their income is higher or lower than the median without having to specify an exact dollar amount. Because no precise estimate of individual income is necessary for most individuals, it won't require nearly as much expense to measure this data to determine a median as it does to calculate a statistic like mean income. The bigger related challenge will be to figure out how best to measure real income (see Section 5.6) or consumption (see Section 5.5) for institutionalized people.

5.2. Use income tax data to calibrate surveys and improve precision.

As mentioned in Section 3.5, most rich countries already have incredibly detailed income tax data which is rarely used to create economic statistics due to traditional legal restrictions, but this data would be tremendously helpful for measuring the economic wellbeing of the median person more accurately by dramatically expanding the data sample size and most people are worse at accurately recalling their income for a survey than when there are tax penalties on the line.

Plus, it could help increase the frequency of data collection so that median income could be accurately tracked at least quarterly like mean GDP. In the US there are at least three different major annual sources of household income: the CPS, ACS, and income tax data. Because these sources of data come in at different times during the year, they could be used to estimate median income more frequently than once per year without adding any survey expense and that would make median income more timely for guiding policy. Currently there are long lags in the release of the official median income data which make it almost useless for things like macroeconomic stabilization policy.

5.3. Calculate life expectancy data for different economic classes.

There has been rising inequality in life expectancy in America over the past several decades as wealthier Americans are living longer and poorer Americans are living shorter lives. To get a better measure of MELI we should actually look at the life expectancy of individuals who lived middle-income lives. In the US, both the tax and the pension bureaucracies keep track of lifetime earnings and age of death, so reasonably comprehensive data already exists that could be used for this purpose if there were any political will. Sometimes these kinds of efforts to examine the welfare of different economic classes get derided as attempts at "class warfare," but it will be hard for anyone to declare that it is class warfare to examine the wellbeing of median-income citizens given the tremendous political popularity of the middle class.

5.4. Adjust inflation measurement.

To measure the real growth in income we need a price index, but there is always subjectivity about what basket of goods should be used for calculating the changes in prices. If MELC is adopted, it will motivate a new way to select the basket of goods. The basket should be the kinds of goods that individuals near the median income are consuming. This will make it more accurate for assessing changes in prices for median income individuals. Purchasing Power Parity and regional cost of living estimates might see a similar change in emphasis.

5.5. Measure consumption rather than income.

MELI should just be seen as an imperfect stepping stone towards Median Expected Lifetime Consumption (MELC) which will be a much better measure, but one that will require new priorities for survey instruments.

As mentioned before, all successful economic statistics have at least three dimensions: time, people, and the economic good. When used to assess welfare, mean GDP makes sloppy assumptions about the time dimension because welfare is a flow and not a stock. A welfare measure shows the average welfare flow during a particular period in time and so it must clearly define the period of time when the welfare is experienced. GDP, like all measures of income, doesn't do this. Consumption is the only accurate way to use goods and services to measure the flow of economic welfare.

There are two fundamentally different ways to analyze the welfare flow of consumption. First is the experienced welfare flow over some past time period and the second is an expected welfare flow in a future time period. The flow of past consumption is the best measure of past economic welfare and the stock of wealth is the best measure for estimating expected future welfare because it is expected to produce future consumption. GDP muddies the two time periods because it combines consumption and savings into one measure. Whereas consumption is a valid measure of the flow of past experienced welfare, savings will only hopefully contribute to expected welfare in the future.

GDP is an income measure that is commonly defined as consumption (C) plus government spending (G) plus investment (I) plus net exports (NX). For the present purposes, the government spending category can be eliminated by separating it into the consumption and investment categories. Savings (S) in this context is defined as: S = I+NX. So GDP = C + S.

Because GDP is a composite of both consumption and savings, it muddies the flow of past welfare (C) together with expected additions to future utility (S). Combining both together makes GDP bad at measuring when welfare happens. It cannot measure either form of welfare: experienced nor expected.

Savings has nothing to do with experienced welfare except by requiring a sacrifice of consumption. Savings is important for expected welfare, but it is still inadequate as defined here because it just measures the gross additions to the total stock of wealth, without including depreciation and depletion which are just as important as will be examined in Section 5.8.

For example, consider the economic wellbeing of the USA versus Qatar according to World Bank Data:

2014	Mean GDP	Mean Consumption
Qatar	$141,442	$40,065
USA	$54,398	$45,224

Mean GDP makes Qatar appear to be far better off than the USA, even though Americans consumed more and Americans would have felt more prosperous. IF Qatar were investing the rest of their GDP, then one might expect their mean consumption will grow much faster than in the USA. Unfortunately, GDP doesn't actually tell us that because it doesn't make any simple accounting for depreciation nor natural resource depletion which makes it a bad measure of production. Because oil and natural gas accounted for 55% of Qatar's GDP in 2015 (Organization of the Petroleum Exporting Countries, 2016) and most of that value is unsustainable depletion rather than production, Qatar's expected future welfare might not be any brighter than their present experienced welfare. GDP is a poor measure of both.

It would be fairly simple to account for just the value added that is being produced and subtract the national wealth that disappears when fossil fuels are burnt, but we don't and one reason why people are reluctant to make this adjustment is because it would make GDP an even worse measure of experienced wellbeing.

This section gave an example for why consumption is better for measuring welfare than income using national income accounts as an example, and the same holds true at the level of individual people. The big difference is that people know that they will die and plan their lives so that lifetime income is more

equal to lifetime consumption. For this reason, there is going to be less difference between MELI and MELC than between GDP and aggregate consumption. MELC would be the most accurate measure of the flow of individual wellbeing if we can change the household surveys to measure savings so that we can derive individual consumption from the data.

5.6. Measure real income and/or consumption by including imputed rents and government services and subtracting taxation.

This paper shows an estimate of MELI using a definition of income that is closest to the traditional definition for GDP and median household income, but this is far from ideal. The Current Population Survey data that was used to calculate MELI includes imputed rent of owner-occupied housing and incorporating that would be a very simple way to improve its measure of real income and/or consumption.

The ongoing development of MELI should reopen some of the thorny areas of debate from the early development of GDP. For example, how do we decide which expenditures are goods and which are bads? Private security spending to avoid crime does not directly enhance welfare, so it could be excluded from MELI. As with GDP, the protocols we develop are inherently normative and reflect our subjective priorities and should be developed with as much consensus as possible, so this work of determining protocols is best accomplished by the cooperation of multilateral institutions just like GDP has been developed. As with the development of GDP, our priorities will probably often be dictated by the desire for parsimony and simplicity rather than any higher philosophical reason. For example, I would be happy to just count private security spending as a good out of laziness and simplicity even though I philosophically know that it is a bad. It just seems like it would be expensive to measure and it would add complexity, so there is probably a bad cost/benefit ratio to try to subtract it out.

Subtracting taxes would be a simpler improvement, but then there should logically also be some estimate of the real income/consumption provided by the value of government services. This is a potentially thorny political issue. In the US, the most expensive government program is healthcare and adding this is relatively simple because it could be treated as an individual health insurance expenditure. Just add the actuarially-fair value for each age group. The second most expensive government expenditure category is pensions which is already included in standard statistics. The third biggest is education which accounts for the majority of local government spending and although the value of the individual benefits would be fairly straightforward to estimate, for some reason it is almost never done. The fourth biggest is defense and now we are getting into a thorny political thicket, but I would suggest that this expense be excluded from individual income/consumption, because this should be treated more like pollution cleanup or an intermediate good like investment that is not directly consumed. This stance was common in the early debates about how to construct the national accounts. Kuznets' view that it should be excluded is even more persuasive for measuring individual consumption because changes in defense spending rarely have any direct effect on the flow of consumption among individuals in the year that they are spent. This stance is also partly motivated by convenience; even if each dollar of defense spending were claimed to provide a direct stream of psychological consumption benefits to median-income individuals, it is too difficult to accurately measure and we are better off only counting income that can be measured accurately without such tremendous uncertainty.

The above categories account for over 2/3 of total government spending in the US. Hopefully this exercise gives some idea how simple it could be to account for the government's effect on individual

consumption in a given year, but more research will be needed to develop a broad consensus about how to estimate real consumption in a way that ordinary people can intuitively understand and trust.

The following graphs give another example of the feasibility of estimating real consumption, and they also demonstrate a side benefit of gathering MELC data. Because MELC will estimate real consumption for every year of age during every calendar year, it would also produce much more detailed statistics about intergenerational changes in lifecycle consumption than these estimates based on US data from the National Transfer Accounts project:
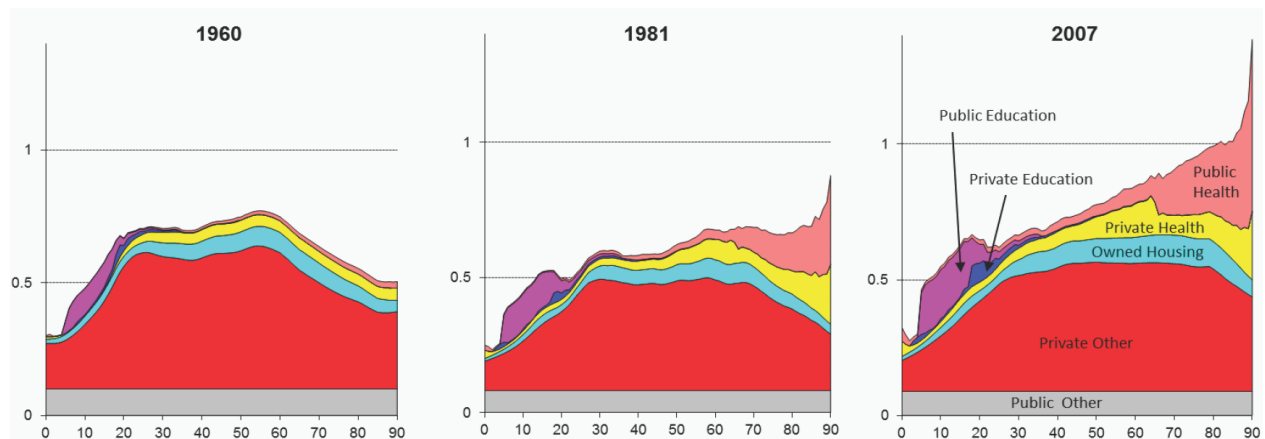
(National Research Council, 2012, p. 48)

5.7. Research how households actually divide resources among members.

Economics is often defined as the study of the production and distribution of goods and services and the household is undoubtedly the most important institution for distribution. Most people choose to live with other individuals in households and gift-exchange and sharing within households likely distributes more resources to individuals than either markets or governments. Less than half of the American population has ever been employed in market work in any given year, so labor markets have never been the most important way that the median American has gotten income, and even in households where every person has market work, there is considerable production and redistribution within the household too. Government distribution has an even smaller share of the economy than market distribution in most nations. Household distribution is not only a foundation of the economy, but our species would probably be extinct without it. Few people throughout all of history would have survived to adulthood without households to sustain them.

Because households play such a crucial role in determining real individual income, we cannot determine median individual income without examining it. In Headings and Andreas (2017) we experimented with several methods for dividing household income and they all produce MELI statistics that are fairly similar, so the choice of methodology for household distribution is not as important as just picking one because they all produce a measure that is better than mean GDP. In this paper I chose the simplest method, equal household division, because that makes MELI easier to explain and more comparable to mean GDP which I hope to displace. Furthermore, our statistical methodologies reflect our normative values and I would not want our statistics to imply that unequal division between household members is normal.

In some ways it might be more realistic to award household wage-earners a higher percent of household income than adults in the household without sources of outside income. Wage earners do have greater costs than unemployed adults due to the cost of commuting, work clothing, and other work-related expenses, but these kinds of expenditures don't increase the well-being of the employed above the economic well-being of their non-employed housemates. Furthermore, if the job produces disutility, then the family member who stays home might actually have higher welfare despite lower income. Whereas I have no evidence that equal division is the most realistic way to divide household income between adult household members, it would probably be very difficult to prove that another protocol for dividing income between household adults is better and so I predict that equal division will be the standard due to our ignorance and the benefits of its simplicity.

On the other hand, there is enough consistency across times and cultures in the fact that children get fewer household resources than adults that it might be worth developing a protocol for addressing it. Plus, there are normative reasons to argue that children should get less because families give to each member somewhat according to need and children use fewer economic resources than adults. They eat less and use less clothing and need less housing space. Plus, there is already a tremendous amount of research about how economic resources are divided between adults and children that is already being used for poverty calculations. For example, the US Department of Agriculture has a long history of estimating what fraction of household expenditures go to children in different kinds of households (Lino, Kuczynski, Rodriguez, & Schap, 2017), and the OECD has a long history of using various equivalence scales (OECD, 2013). If another methodology is going to be developed for dividing up household income, these kinds of institutions already have tremendous expertise.

It might not be worth the additional complexity to divide up income unequally between children and adults because it wouldn't have much effect on MELI anyhow. Because MELI adds up the median income for each age, giving less household income to children than to adults is not going to have much impact on MELI because it subtracts from the young ages and adds that same amount back in to older ages which are all ultimately added back together to calculate MELI. The exact method of household income decomposition between adults and children is less important than it might initially seem because MELI is calculating a measure of lifetime income. If children are assumed to get zero income within households, that reduces the earnings of younger years, but raises the earnings of later years by exactly the same amount which doesn't have much net effect on lifetime earnings, but I still recommend developing a protocol to give children a smaller division of household income than their parents because it would calculate a more accurate picture of the median consumption of each age, and this could make MELI slightly more accurate.

Equivalence scales attempt to adjust households for economies of scale in consumption which might be a good idea in theory, but not if it destroys the person dimension of the measure. That would add excessive complexity and prevent people from being able to identify with how the measure relates to their personal life experience. Any additional theoretical detail that this kind of adjustment brings is not worth the destruction of real units that people understand and have confidence in. For example, the Sarkozy Commission's report recommends equivalence scales that would produce income per "consumption unit" rather than income per person (Fitoussi et al., 2009, pp. 33–37). That isn't the kind of elegant, simple measurement design that would inspire the public to switch away from their reliance upon mean GDP.

Everyone can imagine that mean GDP represents the average person's income (even though that is a misleading picture). That is what makes GDP so useful and so seductive. Nobody can imagine what a consumption unit is, but it certainly doesn't sound human and it will be hard to get policymakers to care any more about the welfare of consumption units than they care about the unitless HDI.

Because we are trying to replace GDP, we should remember that nobody worries about adjusting for changing economies of scale as household sizes change when using mean GDP and the issue is exactly the same for both aggregate consumption and household consumption. Since nobody argues that this is a flaw in GDP, there is probably little need to address the problem in MELI unless it can be done in a way that preserves useful units and does not reduce the confidence of ordinary people that they understand the measure. I doubt this is possible.

As David Betson wrote, "'equivalence scales are inherently arbitrary' and as such are in reality subjective judgments masquerading as science", such that "the setting of scales is more a matter of policy judgment than the application of scientific theory." (2004) Adding equivalence scales is not worth stirring up controversy that could reduce the public's trust and complexity that makes the measure harder to understand.

5.8. Adjust for sustainability.

Economists from Kuznets to Sen have observed that GDP is used for two main purposes: welfare and production. These purposes often require divergent priorities and as a result of the compromises necessary to fulfill both purposes, GDP falls short for both. The only way to accomplish both purposes better is to develop two separate measurements. If we adopt MELC for welfare, then the national income accountants would naturally refocus more on developing a better measure of production and this would help address environmental concerns that MELC cannot address directly.

Part of the tension between measuring wellbeing and production goes back to the difference between measuring stocks and flows mentioned in [Section 5.5](). Wellbeing cannot be stockpiled whereas production can. These two measurement goals are in tension because it is possible to consume a big part of the stock of human wealth in a fun party, thereby boosting the experienced flow of wellbeing without any increase in real production. GDP accountants are forced to choose whether an increased consumption of wealth should be counted as an increase of GDP because it increases experienced wellbeing or whether the destruction of wealth is a decrease of GDP because it is the opposite of investment and decreases productive capacity.

For example, if Qatar pumped oil out from below a river bank and sold it to finance a big party, it would certainly boost the current wellbeing of Qataris, but the entire market value of the oil should not be counted as production any more than if Qatar pulled gold out of a bank account to finance the party. There is some production (or value added) that is generated by transporting the oil or gold out of the bank and selling it, but most of what oil "production" officially adds to GDP is not really production, it is spending down the national wealth. In this kind of scenario, GDP accountants have prioritized the flow of consumption perhaps because of a desire to design GDP to prioritize the measurement of wellbeing rather than production. This is ironic considering that the last letter of GDP stands for Production. If we

really want to measure production, then we should only focus on the value added and it would be trivially easy to do better at this.

There is a basic tension between production and wellbeing that stems from the fact that people can produce a different amount than they consume at any point in time because resources can be stockpiled and nature has already stockpiled a vast amount of resources that we can deplete. It would be fairly easy to subtract depletion from production. That would make GDP worse at measuring the flow of wellbeing, but MELC should replace GDP in this role so that we can shift the focus of the national accounts to Net Domestic Product (NDP) by subtracting the depletion of natural resources and depreciation of capital. William Nordhaus (1972), Martin Weitzman (1976) and likeminded economists (National Research Council, 1999) have been recommending these kind of improvements for decades and the BEA has been working on them, but these efforts have done little to diminish the supremacy of GDP. One roadblock has been the desire for the national accounts to measure welfare too, but they were never purely designed for welfare and due to the inherent tensions between the two goals for GDP, it has served both masters poorly.

The world has tens of thousands of highly-skilled professionals who are highly invested in producing annual GDP estimates and they get much of their raison d'être from the status that the world accords to GDP as a welfare measure. But even if MELC replaces GDP for measuring wellbeing, we will still need our national accounts for measuring production and by focusing on that goal, they can do it better.

A better national income account would calculate both GDP and NDP and the difference between the two would be an attempt to measure the depletion and depreciation of wealth. The difference between NDP and domestic consumption would estimate what I will call net savings to distinguish it from the traditional definition of savings used earlier, most notably in Section 5.5. We need a separate term because the traditional definition ignores depreciation and depletion. The net savings divided by domestic consumption would yield the net savings rate which would communicate whether a society is overconsuming or growing its wealth for future generations. For example if the net savings rate is 10%, then society's wealth is growing at a rate of 10% of current consumption.

This is complementary with MELC because it could be used to adjust MELC to give expectations about its sustainable level. For example, if the net savings rate is -20%, then MELC could be interpreted as being about 20% below the steady-state consumption level, holding technology and population growth constant. It should be interpreted as if 20% of consumption is a transfer away from future generations because the present generation is overconsuming the national wealth.

The American political arena has produced a lot of heat debating how much the government deficit is burdening future generations. In contrast, it has almost completely ignored what our sustainable consumption rate is. This is misguided because the US deficit is mostly what Americans borrows from ourselves and has little intergenerational effect. What really matters for intergenerational accounting is whether the stock of national wealth is growing or falling, but we have no measures of that so we ignore things like infrastructure and focus more on the deficit because the deficit numbers are ready available and that makes it more salient. We need better measures of net savings so that we can prioritize sustainability more.

None of these suggestions for the national income accounts are new (except perhaps for any errors—this is far from my specialty) because numerous brilliant people have been working on these ideas for

longer than my lifetime, but the fact that they have had so little impact upon GDP and sustainable economic policy should give us all pause. For example, despite 70 years of work by the International Association of Research in Income and Wealth (IARIW), nobody has developed a broadly trusted measure of national wealth. This is at least partly because it is too hard to measure the value of crucial natural capital like air and rain and human capital for which there are no markets. But instead of trying to measure the total wealth, it is more feasible to begin measuring aspects of net savings. Net savings is the change in the stock of wealth and it would be just as useful as wealth for understanding sustainability. We may also fail at creating a good measure of net savings, but we should prioritize it because it is just as useful and much more feasible.

For example, we cannot estimate with any certainty the total oil wealth in the ground because much of it is undiscovered and markets and technology rapidly change its accessibility and value. But we can fairly precisely measure the change in the value of the national wealth that is destroyed when oil is pumped out and consumed. Ceteris paribus, producing and consuming oil results in a negative net savings rate and it is relatively easy to measure this change in total oil wealth even though we have no idea what the total oil wealth is. In measurement theory terms, wealth is an interval-scale measure like temperature was before we discovered absolute zero. That means we can cardinally measure changes in the total amount of wealth (net savings), but we cannot measure total wealth itself.

The idea that wealth is only measurable on an interval scale could help explain why IARIW members have failed to measure it in total. If wealth is an interval-scale variable, the IARIW will always fail to measure it. But because it is more feasible to estimate net savings (changes in wealth), the IARI**W** would have more success if it changes its name and its goal from researching **W**ealth to researching **S**avings. But that would make the last part of its name, "Income and Savings", redundant because savings is already a part of income (because savings = income - consumption). Furthermore, as explained in [Section 5.5](), it is conceptually important to analyze both savings and consumption independently rather than glomming them together as a single income measure, so a more coherent goal for our organization would be to research **C**onsumption and **S**avings rather than income and wealth. Thus the IARIW should change its name to the International Association for Research in Consumption and Savings (IAR**CS**) because that would express priorities that fit better with the world's current needs for research. Even though the name change is never going to happen in such an august organization, the new acronym would be easier to pronounce too!

Under this proposed regime, I recommend MELC as the best simple measure of consumption for assessing economic welfare, and the net savings rate as the best simple measure for evaluating sustainability. Although MELC cannot directly contribute to our understanding of sustainability, it is complementary with this goal because it helps clarify the need for two separate measures: the flow of experienced welfare and the sustainability of changes in the stock of national wealth. The two measures are incommensurable and by recognizing the need to separate the two goals, we will be able to develop better measures of both.

The tension between sustainability and consumption gives support to proponents of the dashboard approach to measuring wellbeing because the two measures are complementary and both deserve a separate place on the dashboard. The net savings rate and MELC could be combined into a meaningful single measure without exceeding three dimensions but it would be analogous to a measure of income.

And income is a muddled measure of welfare (as explained in [Section 5.5](#)) so each of its two components are more useful when they are available separately.

6. Conclusion

Median Expected Lifetime Income (MELI) has a better chance of supplanting GDP for measuring economic wellbeing than any alternatives because it is similar enough to mean GDP to fulfill the same purposes as well as being easier to understand, more comprehensive because it incorporates lifespan, less distorted by national savings, more democratic, less skewed by inequality, and several other advantages.

Right now median income is poorly measured because no official statistical agency on earth prioritizes it partly because it is calculated using a completely different paradigm from the accounting approach that the most important agencies have been so invested in. But because MELI is simpler than GDP, it could probably be estimated as accurately as GDP (also far from perfect) if the effort got a similar amount of resources as the UN uses for producing the HDI or a tiny fraction of the resources used to produce GDP. MELI is easy to calculate using statistics that are readily available in well-governed economies and that gives MELI a higher benefit/cost ratio than most potential replacements for GDP. With a bit more investment we could produce an even better measure: Median Expected Lifetime Consumption (MELC).

MELC has the same three non-commensurable dimensions as mean GDP, but each dimension is more carefully selected to measure wellbeing better. The person dimension represents the person in the middle of the income distribution rather than one who is closer to the elites. The monetary dimension excludes changes in the stock of wealth (savings) which has no bearing on experienced wellbeing during the measured time period and focuses on the flow of consumption. The time dimension adds information about lifespan. Because MELC just has these three dimensions which represent a more ordinal measure of a representative individual in the population, it is a measure of central tendency that is easier to understand and trust than all other rival welfare statistics, including mean GDP and the HDI. All other measures make much more extreme psychological assumptions about human utility functions.

If MELC gains importance it will also naturally lead to changes in an array of other statistics including a refocusing of the national income accounts away from gross production (GDP) towards net production because they will no longer need to attempt to account for both wellbeing and production in a single measure and whereas gross production is a better measure of experienced wellbeing, net production is a better measure of productivity. MELC cannot address the need for a measure of sustainability by itself because experienced wellbeing is inherently unrelated to sustainability, but this new focus on a separate measure of experienced wellbeing should increase the specialization of the NIPA accounts to focus on what they do best: measuring production. Hopefully that will encourage more emphasis on measuring changes in the stock of national wealth as a measure of sustainability. That would be highly complementary with MELC for evaluating how much consumption is sustainable.

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