Louisiana Distribution of Income – Lorenz, Gini, and Palma
(as measured by Federal Adjusted Gross Income, State Tax Year 2019)

An accompanying graph depicts the distribution of income in the state, as measured by federal adjusted gross income for tax year 2019. Income distribution is depicted here through a Lorenz Curve[1], a common tool for picturing the overall observed distribution of income relative to a theoretical absolute of perfectly equal income distribution. In this type of depiction, the diagonal represents absolute or perfectly equal income distribution. All along the diagonal the cumulative percentage of tax returns[2] (measured along the horizontal axis) is exactly the same as the cumulative percentage of income[3] (measured along the vertical axis). The curved line is the observed cumulative distribution of income reflected in Louisiana tax returns for the 2019 tax year. All along a curved line that lies below the diagonal the cumulative percentage of income will be less than the cumulative percentage of tax returns. For example, 25% of returns would reflect 25% of the income if income were equally distributed (along the diagonal). However, we actually observe that the lowest 25% of the returns reflect only about 4% of the income[4] (along the curve). In the graph, this observed inequality of income distribution is described at various points along the curved line from the perspective of the bottom cumulative percentage of returns and the corresponding highest cumulative percentage of returns.

A similar graph is provided for the United States as a whole; for tax year 2018, the latest data available as of this writing. While difficult to see visually, the U.S. graph depicts a somewhat more unequal distribution of income than in Louisiana, based on federal adjusted gross income or tax return income. An overall comparison of the two distributions can be attained by calculating the Gini coefficient[5] for each; the ratio of the area between the diagonal and observed curved line to the entire triangle area beneath the diagonal. The Gini coefficient summarizes the entire Lorenz Curve / income distribution into a single value. In effect, the graphs show that observed inequality of income distribution in the state is 55.26% of perfect income inequality, while the U.S. graph shows that observed inequality of income distribution in the nation is 59.98% of perfect income inequality[6]. Based on these depictions and calculations, Louisiana is similar to the nation as a whole in its distribution of income; having a 2019 Gini coefficient value some 92.1% of the 2018 U.S. Gini value.

A significant qualification to this analysis should be made here. The true degree of income inequality in the state and the nation, as measured by the Gini coefficient, is actually less than indicated here. Broader concepts of income and households used by specialists in the field result in actual Louisiana and U.S. level Gini coefficient estimates that are lower than those calculated here; 0.494 for Louisiana in 2018 and 0.498 in 2019, and 0.485 and 0.481 for the U.S. in those years, respectively[7]. Also noteworthy is the fact that in the Census analysis the Louisiana Gini coefficients are somewhat higher than the U.S. coefficients, implying a small degree of greater income inequality in the state that in the nation as a whole, while the opposite result occurs when considering the narrower tax and household concepts from income tax data, implying less income inequality in the state than in the nation as a whole. While the different concepts of income and households utilized can generate opposing results with respect to the absolute positions of more or less income inequality, both analyses generate state level results fairly close to national level results, although the Census analysis points out that the Louisiana Gini is statistically different from the U.S. Gini (as is the case for most of the states). While the tax data analysis generates results somewhat farther apart than the Census analysis[8], both analyses point out that Louisiana is largely similar to the nation as a whole with respect to overall income inequality. A third graph is included that depicts both curves together, highlighting this similarity.

An alternative measure of income inequality, or more appropriately income concentration, referred to as the Palma ratio[9], can also be obtained. The Palma ratio divides the income share of the top 10% by that of the bottom 40%, providing a metric that reflects how many multiples of the income of the bottom 40% of households are received by the top 10% of households. Since most changes in income inequality occur at the top and bottom of the income spectrum, changes in the Palma ratio reflect those changes better than the Gini coefficient does.

The 2019 tax year data for Louisiana generates a Palma ratio of 4.64, indicating that the top 10% of filers receive 4.64 times as much federal adjusted gross income than the bottom 40% of filers. The 2018 tax year data for filers in the nation as a whole generates a Palma ratio range[10] of 5.09 - 8.35, indicating more income concentration in the U.S. as a whole than in the state.

The Palma ratio is a relatively recent addition to income inequality measures, and estimates of the ratio for states are not readily available. However, a qualification to the Palma ratio, similar to that discussed above with regard to the Gini coefficient, should be made here, as well, in that the true degree of income concentration in the state and the nation, as measured by the Palma ratio, is likely to be less than indicated by the tax data. Broader concepts of income and households used by specialists in the field result in Louisiana and U.S. level Palma ratios that are lower than those calculated here. Moody's Analytics has estimated a 2017 state ratio of some 3.83, and a U.S. ratio of 3.25[11]. As with the Gini coefficient, mixed results occur, in that the narrower tax data results in a measure of less income concentration in Louisiana than the U.S. as a whole, while broader data appears to tend to result in a measure of somewhat more income concentration in the state than the U.S as a whole.

Legislative Fiscal Office — Greg Albrecht
March, 2021 — Chief Economist

[1] Developed by the American economist Max Otto Lorenz in 1905.

[2] Each tax return can be a proxy for a household, and the number of resident tax returns reflected in this analysis (1,775,027) is roughly comparable to the total number of households in the state estimated by the U.S. Census Bureau by an annually updated five-year average for 2015-2019 of 1,739,497.

[3] The income concept employed here for both the state and the U.S. is federal adjusted gross income (FAGI). This concept is narrower than what would be employed by specialists in income distribution, but is readily available from the Legislative Fiscal Office state personal income tax simulation model, and the federal Internal Revenue Service.

[4] The farther out to the right the curved line occurs the more unequal is the distribution of income. Perfectly unequal income distribution would be depicted by an observed line running straight along the bottom horizontal axis and straight up the right vertical axis. Indicating that only one tax return (household) has all the FAGI.

[5] Developed by the Italian statistician Corrado Gini in 1912.

[6] The farther out to the right the curved line occurs the closer to 1.0 is the Gini coefficient; the more the area between the diagonal and the observed curved line becomes the entire triangle area under the diagonal; the more the observed line becomes a straight line along the bottom axis and up the right axis; the more the observed distribution approaches perfect income inequality.

[7] See a brief report, "Household Income 2019, American Community Survey Briefs, U.S. Census Bureau, September 2020 at https://www.census.gov/content/dam/Census/library/publications/2020/acs/acsbr20-03.pdf.

[8] The tax data analysis generates a Louisiana Gini coefficient that differs from the U.S. level Gini coefficient by about 8%, while the Census analysis difference is about 1.8% to 3.5%. In addition, the tax data analysis is a more casual analysis working with limited sets of data of different sizes. The Gini coefficient levels and differences generated by the utilized Louisiana and U.S. level tax data contains considerably fewer data observations than the Census analysis, and the Louisiana tax data has substantially more data observations within it than does the utilized U.S. level tax data.

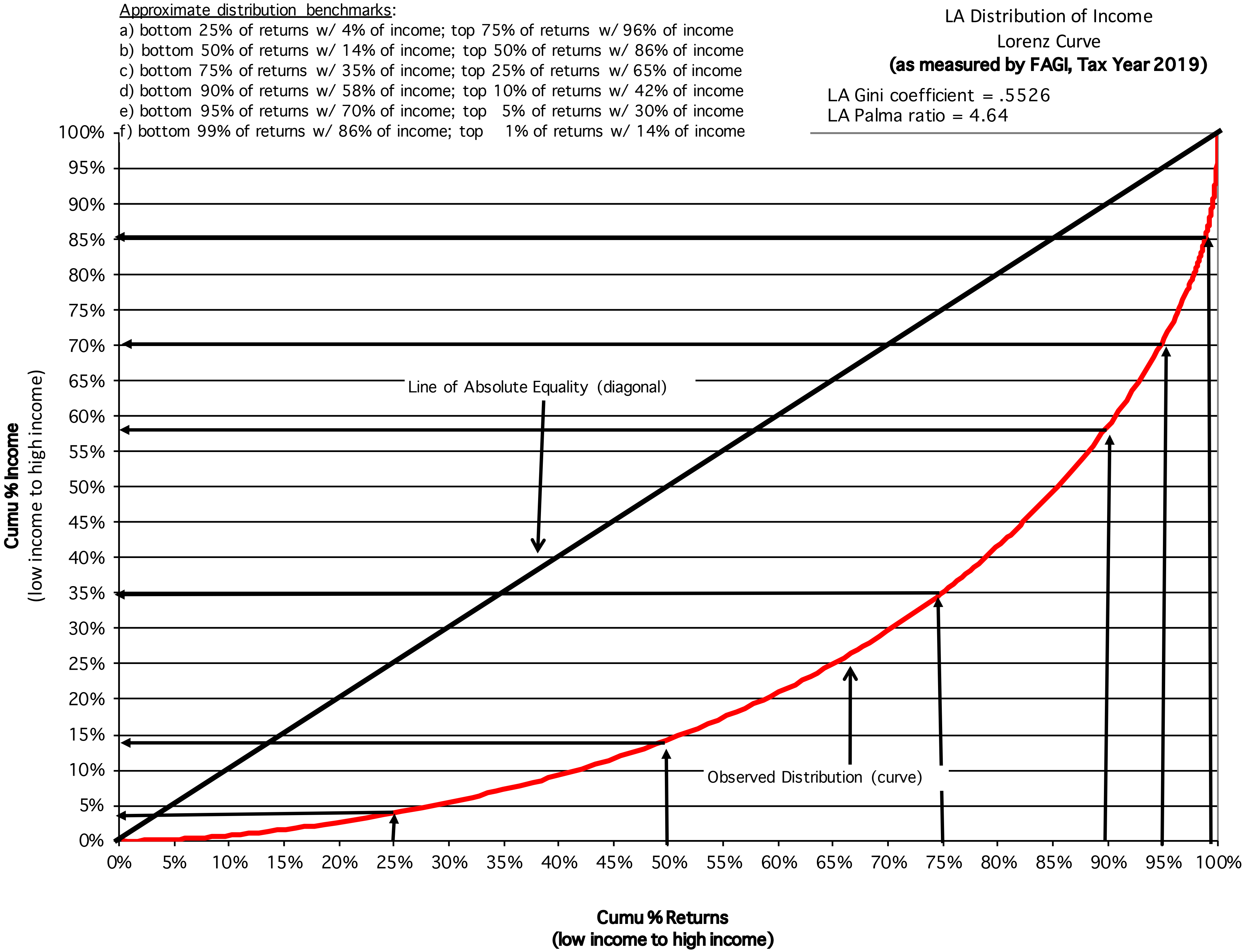
[9] Named for the Chilean economist Jose Gabriel Palma. He observed that in most countries, the middle class – defined as those in the fifth to ninth deciles (the 50% between the 40% and 90% deciles) – receive approximately half of total income, and this share is relatively stable across data sets, countries, and time periods. On that basis, an argument can be made that the Gini coefficient, which is sensitive to changes in the middle of the income spectrum but relatively insensitive to changes at the extremes, should be replaced with the Palma ratio, which is sensitive to the extremes and not sensitive to the middle (by design). Since the middle is relatively stable, income inequality is mostly about the extremes that the Palma ratio targets.

[10] A range is reported here because the federal income tax data being utilized does not provide sufficiently narrow ranges of adjusted gross income to calculate a close approximation of the share of income received by the top 10% of filers. The smaller Palma ratio is associated with approximately the top 5% of filers, while the larger ratio reflects approximately the top 20% of filers. Simplistically, this suggests that the actual ratio is likely closer to the lower value.

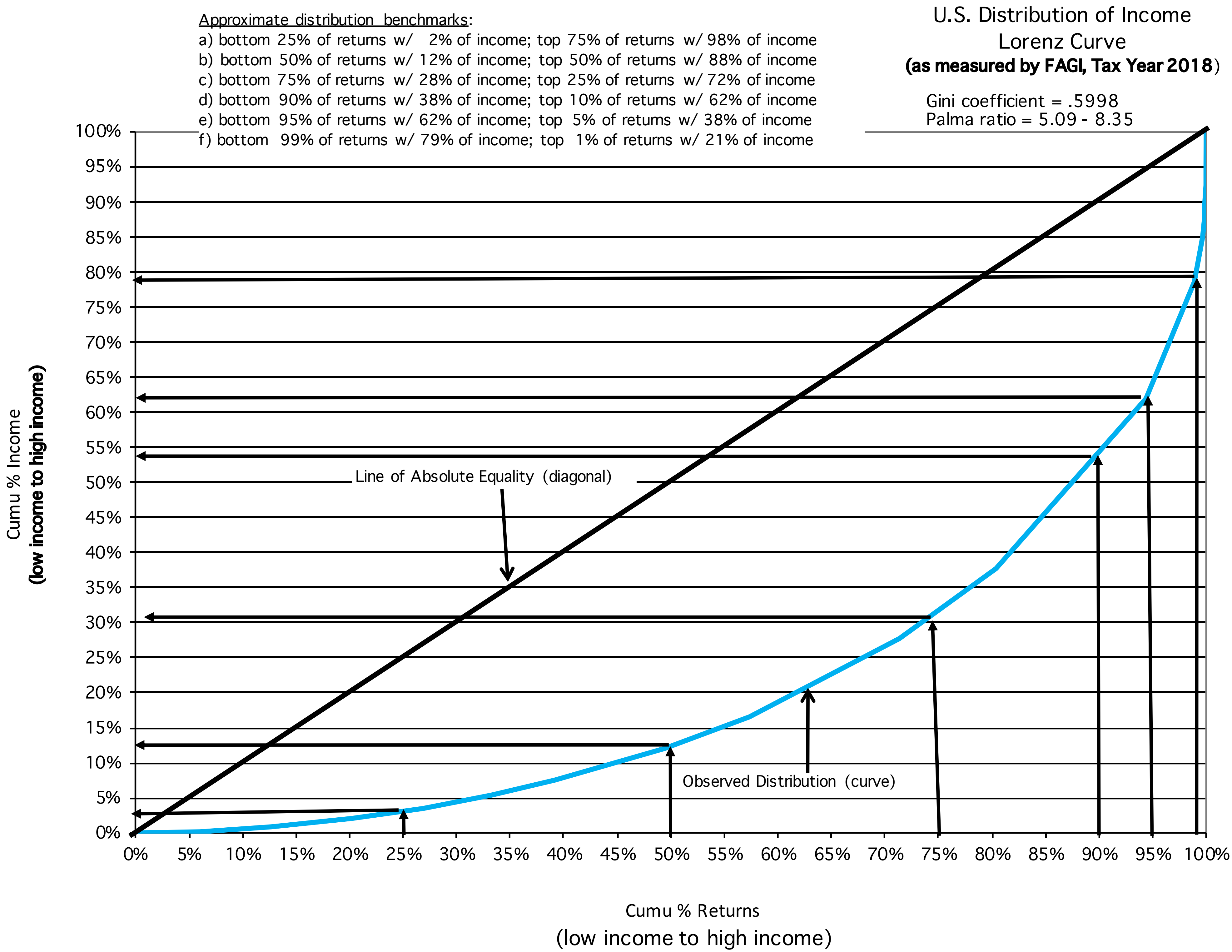
[11] Of note here is that estimates of the Palma ratio for the U.S. as a whole, made by international organizations such as the Organization of Economic Cooperation and Development to compare across countries, are even lower, approximately 1.9. In addition, the Census Bureau, in research comparing the ratio to other inequality metrics across metropolitan areas of the U.S., reported estimates in the range of 1.5 – 1.6, for two metros reported in the research summary. It seems likely that the datasets utilized for the various estimates reflect significant differences in the concepts of households/individuals and income, as well as the granularity of the data itself.

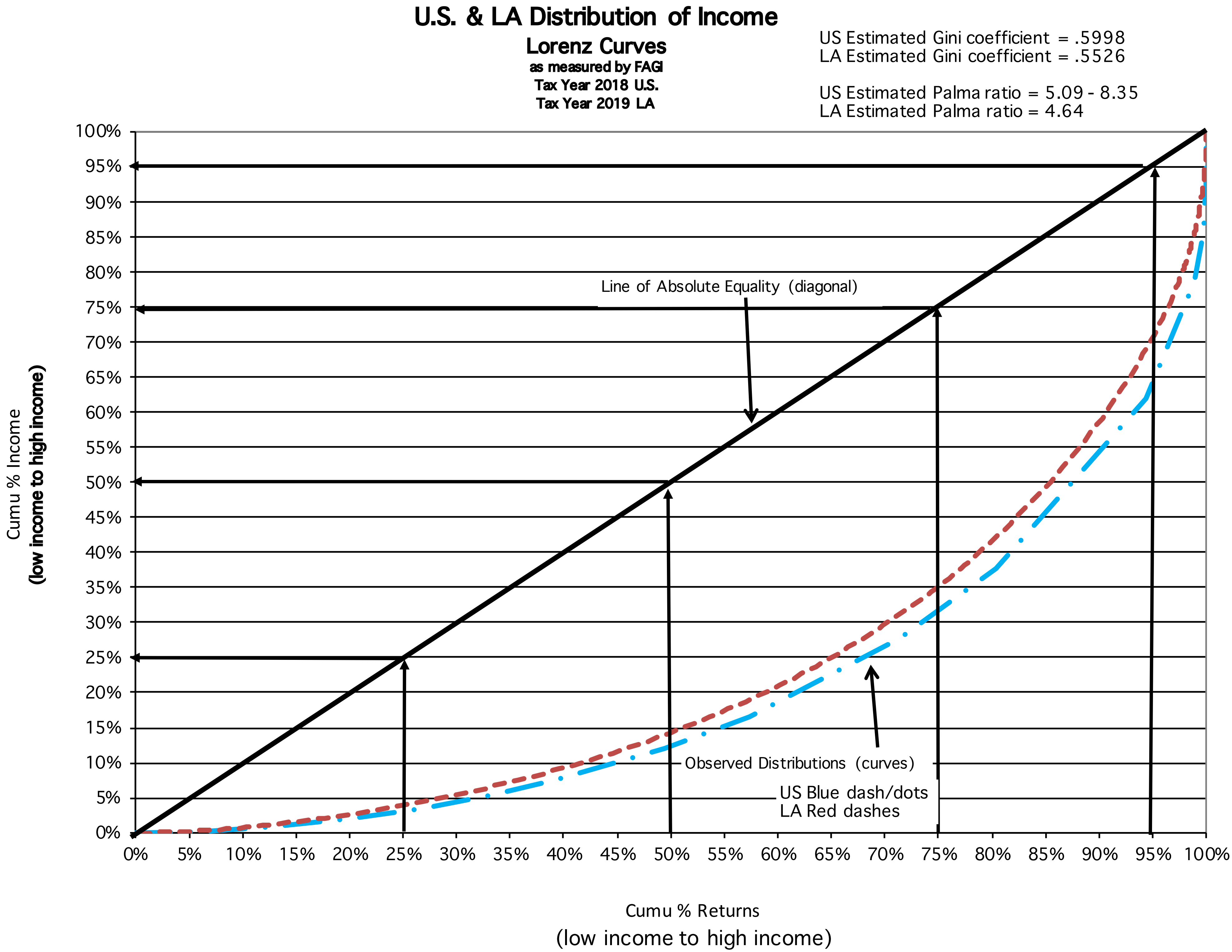
Legislative Fiscal Office
March, 2021

Greg Albrecht
Chief Economist



Approximate distribution benchmarks:
a) bottom 25% of returns w/ 4% of income; top 75% of returns w/ 96% of income
b) bottom 50% of returns w/ 14% of income; top 50% of returns w/ 86% of income
c) bottom 75% of returns w/ 35% of income; top 25% of returns w/ 65% of income
d) bottom 90% of returns w/ 58% of income; top 10% of returns w/ 42% of income
e) bottom 95% of returns w/ 70% of income; top 5% of returns w/ 30% of income
f) bottom 99% of returns w/ 86% of income; top 1% of returns w/ 14% of income
LA Distribution of Income
Lorenz Curve
(as measured by FAGI, Tax Year 2019)
LA Gini coefficient = .5526
LA Palma ratio = 4.64
Line of Absolute Equality (diagonal)
Observed Distribution (curve)
Cumu % Income
(low income to high income)
Cumu % Returns
(low income to high income)
0%
5%
10%
15%
20%
25%
30%
35%
40%
45%
50%
55%
60%
65%
70%
75%
80%
85%
90%
95%
100%


U.S. Distribution of Income
Lorenz Curve
(as measured by FAGI, Tax Year 2018)
Gini coefficient = .5998
Palma ratio = 5.09 - 8.35
Approximate distribution benchmarks:
a) bottom 25% of returns w/ 2% of income; top 75% of returns w/ 98% of income
b) bottom 50% of returns w/ 12% of income; top 50% of returns w/ 88% of income
c) bottom 75% of returns w/ 28% of income; top 25% of returns w/ 72% of income
d) bottom 90% of returns w/ 38% of income; top 10% of returns w/ 62% of income
e) bottom 95% of returns w/ 62% of income; top 5% of returns w/ 38% of income
f) bottom 99% of returns w/ 79% of income; top 1% of returns w/ 21% of income
Line of Absolute Equality (diagonal)
Observed Distribution (curve)
Cumu % Income
(low income to high income)
Cumu % Returns
(low income to high income)
0%
5%
10%
15%
20%
25%
30%
35%
40%
45%
50%
55%
60%
65%
70%
75%
80%
85%
90%
95%
100%


U.S. & LA Distribution of Income
Lorenz Curves
as measured by FAGI
Tax Year 2018 U.S.
Tax Year 2019 LA
US Estimated Gini coefficient = .5998
LA Estimated Gini coefficient = .5526
US Estimated Palma ratio = 5.09 - 8.35
LA Estimated Palma ratio = 4.64
Line of Absolute Equality (diagonal)
Observed Distributions (curves)
US Blue dash/dots
LA Red dashes
Cumu % Income
(low income to high income)
Cumu % Returns
(low income to high income)
0%
5%
10%
15%
20%
25%
30%
35%
40%
45%
50%
55%
60%
65%
70%
75%
80%
85%
90%
95%
100%