CHAMBERLAIN ECONOMICS, L.L.C.
TAX DISTRIBUTION MODEL METHODOLOGY

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The Chamberlain Economics, L.L.C. tax distribution model is a microsimulation model designed to provide estimates of federal, state and local tax burdens for U.S. households. The model combines demographic, tax, income and expenditure data from a variety of government sources into a statistically matched database, allowing detailed tax estimates for various income groups, age groups and family sizes.

This memo outlines the methodology, data sources, and definitions of income and taxes used to develop the Chamberlain Economics, L.L.C. tax model.

A. CORE MATCHED DATABASE

The foundation of the model is a statistically matched database of U.S. households. The database merges actual tax return data from the most recently available 2004 Public Use File (PUF)[1] from the IRS's Statistics of Income (SOI) division with rich demographic data from the 2005 Current Population Survey (CPS) March Supplement[2] from the U.S. Census Bureau.

The matched database is developed through a widely used method known as "constrained statistical matching." The technique matches hypothetically created tax units from the CPS to actual tax returns in the PUF. The process begins by developing comparable tax units in both files. These units are then partitioned into various categories based on elderly status, presence of business income, presence of capital income and filing and dependency status.

Once partitions are established, the data sets are statistically matched. First, we identify demographic and income variables common to both files. Next, we perform an ordinary least-squares regression inside the PUF. The common variables are the independent variables, and taxable income is the dependent variable. The resulting regression coefficients are then used to predict the taxable income for family units inside both files. Family unit records are then ranked based on their predicted income, and records in both files are statistically matched on this basis.

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[1] Information about IRS Individual Public-Use Microdata Files is available online at http://www.irs.gov/taxstats/article/0,,id=169090,00.html. The IRS's Statistics of Income division provides access to the microdata files for a fee of $4,000 per tax year.

[2] Background information on the Current Population Survey's March Supplement is available online at http://www.bls.census.gov/cps/ads/adsdes.htm.

Once the matched database is complete, we project or "age" records in the file from 2004 through 2020 to allow estimation of tax burdens in various years. The statistical aging draws on various data sources, including: published individual income tax data from the IRS's SOI division; summary tables from the most recent CPS microdata files; published aggregates from the U.S. Bureau of Economic Analysis (BEA); and official projections from the U.S. Congressional Budget Office (CBO). Using these sources, each quantitative variable in the database is aged through 2020, and records in the database are re-weighted to match various qualitative and quantitative targets from CBO and BEA sources.

As a final step, supplemental data from the U.S. Bureau of Labor Statistics' Consumer Expenditure Survey (CEX) and the Federal Reserve Board's Survey of Consumer Finances (SCF) is incorporated into the matched database. These data contain information on household wealth and spending patterns, which allow for estimation of each family unit's share of consumption-style taxes such as sales, excise, airline transport and other taxes.

B. TAX DEFINITIONS AND TAX COLLECTIONS DATA

The Chamberlain Economics, L.L.C. model includes all federal, state and local taxes as defined by the U.S. Bureau of Economic Analysis. All tax definitions and collections data are based on the National Income and Product Accounts (NIPA)[3] maintained by the BEA. Tables 1 and 2 below list the federal and state-local taxes included in the model, along with their corresponding NIPA tables.

TABLE 1. FEDERAL TAXES INCLUDED IN THE MODEL

Federal Taxes	NIPA Table
Federal Income Taxes	Table 3.4
Federal Payroll Tax (Contrib. for Govt. Social Insurance)	Table 3.2
Federal Corporate Income Tax	Table 3.2
Federal Customs Duties	Table 3.5
Federal Gasoline Tax	Table 3.5
Federal Estate Tax	Table 5.10
Federal Air Transport Tax	Table 3.5
Federal Diesel Fuel Tax	Table 3.5
Federal Alcohol Tax	Table 3.5
Federal Tobacco Tax	Table 3.5
Other Federal Excise Taxes	Table 3.5

Source: Chamberlain Economics, L.L.C.; U.S. Bureau of Economic Analysis.

[3] Additional information about the BEA's National Income and Product Accounts is available online at http://bea.gov/national/nipaweb/Index.asp.

TABLE 2. STATE-LOCAL TAXES INCLUDED IN THE MODEL

State-Local Taxes	NIPA Table
State-Local Property Tax	Table 3.4
State-Local Income Tax	Table 3.4
State-Local General Sales Tax	Table 3.5
Other State-Local Taxes on Production and Imports	Table 3.5
State-Local Corporate Income Tax	Table 3.3
State-Local Gas Tax	Table 3.5
Other State-Local Sales Taxes	Table 3.5
State-Local Public Utilities Tax	Table 3.5
State-Local Payroll Tax (Contrib. for Govt. Social Insurance)	Table 3.3
State-Local Personal Property Tax	Table 3.4
State-Local Tobacco Tax	Table 3.5
State-Local Insurance Tax	Table 3.5
State-Local Severance Tax	Table 3.5
State-Local Business Motor Vehicles Tax	Table 3.5
State-Local Special Assessments	Table 3.5
Other Personal State-Local Taxes	Table 3.4
State-Local Alcohol Tax	Table 3.5
State-Local Estate Tax	Table 5.10

Source: Chamberlain Economics, L.L.C.; U.S. Bureau of Economic Analysis.

Collections for each tax are projected through calendar year 2010 using official U.S. Congressional Budget Office forecasts. These aggregate collections are then allocated to family units within the matched database based on various assumptions of economic incidence and statistical allocators in the file. For a complete list of tax incidence assumptions and statistical allocators, see Tables 3 and 4 below.

C. UNIT OF ANALYSIS AND TIME PERIOD

The basic unit of analysis in the model is "family economic units." This measure is similar to the unit previously employed by the U.S. Treasury Department's Office of Tax Analysis.[4] A family economic unit is a group of individuals that would normally file a federal tax return together, assuming that all U.S. individuals are required to file some type of tax return. This generally corresponds to the conventional definition of "family" as understood by most laypersons. The time period for the tax burden estimates is Calendar Year 2009.

D. COMPREHENSIVE FAMILY INCOME CONCEPT

It is important for tax distribution studies to use a broad measure of household income. Because all taxes in the economy are attributed to households—including business taxes as well as

[4] See Cronin, Julie-Anne (1999), "U.S. Treasury Distributional Analysis Methodology." U.S. Treasury *Office of Tax Analysis Paper 85*. Washington, D.C., U.S. Department of Treasury.

personal taxes—it becomes important to also attribute to households as income all the resources in the economy that are available to pay those taxes. The comprehensive family economic income concept used in the model is a broad measure that begins with each family's Personal Income as defined by the Bureau of Economic Analysis.[5] To arrive at a comprehensive income measure, we subtract any pension contributions made, add pension benefits received, add capital gains earned, and add corporate income taxes paid.[6]

This measure best represents the real economic resources available to households to bear total tax burdens in the economy. Whenever family tax burdens are expressed as a percentage of income, this income measure—rather than the narrower measure of cash income—is used as the denominator.

E. TAX INCIDENCE ASSUMPTIONS

Allocating aggregate tax collections to households requires various assumptions about the economic incidence of taxes. The Chamberlain Economics, L.L.C. tax model broadly follows the economic incidence assumptions from a comprehensive 2007 study of U.S. tax burdens from the Tax Foundation.[7] Tables 3 and 4 present the incidence assumptions and statistical allocators used to distribute each tax to families within the core matched database.

TABLE 3. FEDERAL TAX INCIDENCE ASSUMPTIONS AND STATISTICAL ALLOCATORS

Federal Taxes	Incidence Theory	Statistical Allocator
Individual Income Taxes	Assumed to fall on individual income earners	Federal Income Tax Liability (simulated)
Payroll Taxes (Contributions to Government Social Insurance)	Assumed to fall entirely on workers earning wages and salaries	Federal Payroll Taxes (simulated)
Corporate Income Taxes	Assumed to fall 70 percent on wages and salaries, 30 percent on owners of capital[8]	Business Tax Allocator (70 percent on wages and salaries, 30 percent on capital income)
Federal Excise Taxes – Gasoline	Assumed to fall on consumers of gasoline, and on all consumers in proportion to their total consumption expenditures	Fraction of national consumption for consumers borne by gasoline consumers; fraction of national consumption for business borne by all consumers
Federal Excise Taxes -- Alcoholic Beverages	Assumed to fall on consumers of alcoholic beverages	Alcoholic Beverages (CEX)

[5] BEA defines Personal Income as "[I]ncome received from participation in production as well as from government and business transfer payments." Additional detail is available online at http://bea.gov/glossary/glossary.cfm.

[6] Corporate income taxes paid represent a portion of business income throughout the economy that is available to pay those corporate taxes, and must therefore be added to Personal Income to arrive at a comprehensive economic income measure.

[7] See Chamberlain, Andrew and Gerald Prante (2007), "Who Pays Taxes and Who Receives Government Spending? An Analysis of Federal, State and Local Tax and Spending Distributions, 1991-2004," Tax Foundation *Working Paper No. 1*. Washington, D.C., Tax Foundation.

[8] Follows the empirical estimate of the economic incidence of the corporate income tax in an open economy from William Randolph, "International Burdens of the Corporate Income Tax," CBO Working Paper 2009-09 (August 2006).

Federal Taxes	Incidence Theory	Statistical Allocator
Federal Excise -- Tobacco	Assumed to fall on consumers of tobacco products	Tobacco and Smoking Related Products (CEX)
Federal Excise -- Diesel Fuel	Assumed to fall on consumers in proportion to their total consumption expenditures	Expenditures (CEX)
Federal Excise -- Air Transport	Assumed to fall on consumers of air travel, and on all consumers in proportion to their total consumption expenditures	Fraction of national consumption for consumers borne by airline consumers; fraction of national consumption for business borne by all consumers
Federal Excise -- All Other Excise Taxes	Assumed to fall on consumers in proportion to their total consumption expenditures	Expenditures (CEX)
Federal Customs Duties, etc.	Assumed to fall on consumers in proportion to their total consumption expenditures	Expenditures (CEX)
Estate and Gift Taxes	Assumed to fall on decedents	Federal Estate Tax Liability (simulated)

Source: Chamberlain Economics, L.L.C.

TABLE 4. STATE-LOCAL TAX INCIDENCE ASSUMPTIONS AND STATISTICAL ALLOCATORS

State and Local Taxes	Incidence Theory	Allocator
Individual Income Taxes	Assumed to fall on individual income earners	State Income Tax liability (simulated)
Corporate Income Taxes	Assumed to fall 70 percent on wages and salaries, 30 percent on owners of capital	Business Tax Allocator (70 percent on wages and salaries, 30 percent on capital income)
Personal Property Taxes	Assumed to fall on payers of personal property taxes	Other Personal Taxes (CEX)
Other State and Local Personal Taxes	Assumed to be proportional to total household money income	Household Cash Money Income (CPS)
General Sales Taxes	Assumed to fall on consumers in proportion to their expenditures on taxable goods and services	Taxable General Sales (CEX) = Expenditures Less: Food at Home, Housing (except for "Other Lodging"), Utilities, Fuels and Public Services, Gas and Motor Oil, Public Trans., Healthcare, Education, Cash Contributions, Personal Insurance and Pensions.
Payroll Taxes (Contributions for Government Social Insurance)	Assumed to fall entirely on workers earning wages and salaries	Federal Payroll Taxes
Gasoline Excise Taxes	Assumed to fall on consumers of gasoline, and on all consumers in proportion to their total consumption expenditures	Fraction of national consumption for consumers borne by gasoline consumers; fraction of national consumption for business borne by all consumers
Alcoholic Beverages Excise Taxes	Assumed to fall on consumers of alcoholic beverages	Alcoholic Beverages (CEX)
Tobacco Excise Taxes	Assumed to fall on consumers of tobacco products	Tobacco and Smoking Related Products (CEX)
Public Utilities Taxes	Assumed to fall on consumers of utility services and on all consumers in proportion to their total consumption expenditures	Fraction of national consumption for consumers borne by utility consumers (CEX); fraction of national consumption for business borne by all consumers
Insurance Receipts Taxes	Assumed to fall on consumers of insurance services	Fraction of national consumption for consumers borne by insurance consumers (CEX); fraction of national consumption for business borne by all consumers
Other Selective Sales Taxes	Assumed to fall on consumers in proportion to their total consumption expenditures	Expenditures (CEX)

State and Local Taxes	Incidence Theory	Allocator
Motor Vehicle Licenses on Production & Imports	Assumed to fall on consumers in proportion to their total consumption expenditures	Expenditures (CEX)
Severance Taxes	Assumed to fall on consumers of energy services and on all consumers in proportion to their total consumption expenditures	Fraction of national consumption for consumers borne by energy consumers (CEX); fraction of national consumption for business borne by all consumers
Property Taxes	Assumed to fall 70 percent on wages and salaries, 30 percent on owners of capital	Business Tax Allocator (70 percent on wages and salaries, 30 percent on capital income)
Special Assessments Taxes	Assumed to fall 70 percent on wages and salaries, 30 percent on owners of capital	Business Tax Allocator (70 percent on wages and salaries, 30 percent on capital income)
Other Taxes on Production and Imports	Assumed to fall on consumers in proportion to their total consumption expenditures	Expenditures (CEX)
Estate and Gift Taxes	Assumed to fall on decedents	Federal Estate Tax Liability

Source: Chamberlain Economics, L.L.C.

Questions about the Chamberlain Economics, L.L.C. tax model may be directed to:

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