MACROECONOMIC ANALYSIS AT THE JOINT COMMITTEE ON TAXATION AND THE MECHANICS OF ITS IMPLEMENTATION

OUTLINE OF PRESENTATION OF THE JOINT COMMITTEE STAFF AT THE BROOKINGS INSTITUTION PROGRAM "DYNAMIC SCORING: NOW WHAT?"

Prepared by the Staff
of the
JOINT COMMITTEE ON TAXATION

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Macroeconomic Analysis at the Joint Committee on Taxation and the Mechanics of Its Implementation

Prepared by the Staff of the Joint Committee on Taxation

January 2015

Overview

- I. Context - Development of JCT's Macro Modeling Capacity
  - 1996-97 Modeling Symposium and subsequent model development
  - House Rule 2003
  - Macro models in use at JCT
- II. Nuts and Bolts of Current Practice
  - Complexity of tax code
  - Micro modeling of proposals
  - Bridge between micro and macro modeling of proposals
  - House Rule 2015

What We Mean by "Model"

- "A model is a theoretical construct representing economic processes by a set of variables and a set of logical &/or quantitative relationships between them." -- Wikipedia

- Models differ in what features of the world are considered important and what features can be ignored.

[JOINT COMMITTEE PRINT]

JOINT COMMITTEE ON TAXATION TAX MODELING PROJECT AND 1997 TAX SYMPOSIUM PAPERS

PREPARED AND COMPILED

BY THE STAFF

OF THE

JOINT COMMITTEE ON TAXATION

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Description of Experiment

- Nine modelers modeled the same proposals, using the same starting assumptions about the economy (to the extent possible):
  - 3 overlapping generations models
  - 3 infinitely lived agent models
  - 3 econometric models.
- They modeled two basic proposals for consumption tax reform:
  - Unified income tax (corporate integration)
  - Consumption tax (VAT or flat)
  - With and without transition relief (depreciation and NOLs).

Table 1.—Simulation Results: Medium-Run and Long-Run

[Percent differences from current tax code baseline]

Summary variables	Net change international capital flows	Consumption tax [1]			Unified income tax [2]		
		2005	2010	Long run	2005	2010	Long run
Real GDP:							
Fullerton-Rogers—low [3]	No	.....	.....	1.7	.....	.....	1.8
Fullerton-Rogers—high [4]	No	.....	.....	5.8	.....	.....	3.8
Auerbach, Kotilkoff, Smetters & Walliser	No	4.0	5.0	7.5	−1.7	−2.1	−3.0
Engen-Gale	No	1.8	2.1	2.4	−0.2	−0.3	−0.5
Jorgenson-Wilcoxen	No	3.6	3.3	3.3	1.6	1.4	1.3
Macroeconomic Advisers (transition relief [5])	Yes	1.4	1.3	5.4	.....	.....	.....
Robbins	Yes	16.4	16.9	.....	14.6	15.4	.....
DRI Inc./McGraw-Hill	Yes	4.7	.....	.....	−1.1	.....	.....
DRI Inc./McGraw-Hill—("VAT")	Yes	−4.2	.....	.....	.....	.....	.....
Gravelle	No	0.7	1.0	3.7	0.6	0.7	1.8
Coopers & Lybrand	Yes	1.2	.....	.....	1.1	.....	.....
Capital Stock:							
Fullerton-Rogers—low [3]	No	.....	.....	5.2	.....	.....	5.4
Fullerton-Rogers—high [4]	No	.....	.....	23.8	.....	.....	11.8
Auerbach, Kotlikoff, Smetters & Walliser	No	14.0	19.1	31.5	−4.2	−5.9	−10.5
Engen-Gale	No	7.0	7.6	9.8	−0.7	−1.0	−1.6
Jorgenson-Wilcoxen	No	0.9	0.6	0.3	−2.0	−2.3	−2.6
Macroeconomic Advisers (transition relief [5])	Yes	4.3	4.8	13.2	.....	.....	.....
Robbins	Yes	47.0	57.2	.....	38.8	48.6	.....
DRI Inc./McGraw-Hill	Yes	13.7	.....	.....	−1.5	.....	.....
DRI Inc./McGraw-Hill—("VAT")	Yes	−0.7	.....	.....	.....	.....	.....

Table 6.—Behavioral Sensitivities Assumed in Models

Participants' model	Labor supply elasticity		Savings rate elasticity	Factor substitution elasticity
	Compensated	Uncompensated		
Macroeconomic Advisers	N/A	0.3	0.2	1.0
Robbins	N/A	0.2	[1] 1.0	1.0
DRI Inc./McGraw-Hill	N/A	0.2	0.2	1.0
Gravelle:				
Income tax	0.2	0.0	0.2	1.0
Consumption tax	0.2	0.0	0.4	1.0
Coopers & Lybrand	0.2	0.0	0.4	[2] <0.3

Participants' model	Intratemporal parameter	Intertemporal parameter	Factor substitution elasticity
Fullerton-Rogers:			
Low sensitivity	0.15	0.15	[3] 0.8
High sensitivity	0.50	0.50	[3] 0.8
Auerbach, Kotlikoff, Smetters & Walliser	0.80	0.25	1.0
Engen-Gale	[4] 0.80	0.30	1.0
Jorgenson-Wilcoxen	0.80	1.00	[5] 0.2

[1] Indicates elasticity within a closed economy. Note: the model's open economy assumption is that when net international capital flows are allowed, an infinite amount of savings becomes available for U.S. investment as long as real after-tax returns to capital are above baseline levels.

[2] The producers equipment portion of capital spending uses an elasticity of 0.3; the remaining structures portion uses a zero elasticity.

[3] Weighted average of elasticities that vary by industry within the model.

[4] The Engen-Gale model's labor supply assumption, which only allows a discrete choice between working full time and working at all, lowers the sensitivity of labor to changes in wages. As a result the approximate uncompensated labor supply elasticity is close to zero.

[5] Value-added weighted average of industry elasticities. The value of the median elasticity is 0.32.

Summary of Results

- GDP effects for the VAT varied across models and varying modeling assumptions within models from:
  - -4.2 percent to 16.4 percent growth in the short-run;
  - 1.7 to 7.5 percent in the long-run;
  - The range was even larger for the corporate integration proposals
  - Not all models could model short-run; not all models could model long-run.
- Many parameter assumptions varied less between models than the GDP effects did.

Key Modeling Lessons from Symposium

- Modeling framework matters.
- Parameter magnitudes matter.
- Monetary policy matters in some models.
- Characterization of present law matters.
- Details of the proposal matter – examples:
  - Transition relief
  - Fiscal balance (in some models).

Additional Expert Input / Continuing Research

- Presented JCT Models to 2 separate economist advisory panels (in 2002 and 2005)
- Presented model research at academic conferences, e.g.
  - Corporate Tax Reform: A Macroeconomic Perspective (2011)
  - Macroeconomic Analysis Of A Proposal To Broaden The Individual Income Tax Base And Lower Individual Income Tax Rates (2006)
  - Use of Fiscal Policy Reaction Functions in Analyzing the Macroeconomic Effects of Tax Policy (2006)
  - The Role of Dynamic Scoring in the Federal Budget Process (2005)
  - Macroeconomic Analysis of Various Proposals to Provide $500 billion in Tax Relief (2005)
  - Issues in Analyzing the Macroeconomic Effects of Tax Policy (2003)

Criteria for Macro Models Used by JCT Staff

- Models should reflect, to the extent possible, the state of the art of macroeconomic modeling of tax policy consistent with academic research, taking into account the importance of:
  - Time constraints for producing results useful to the legislative process;
  - An ability to reflect the range of results based on varying modeling assumptions and results from economic research; and
  - The need to model as accurately as possible complex tax policy changes.
- Models should have as much tax detail as possible.

Macroeconomic Analysis and House Rules

- For the past decade, House Rule XIII(3)(h)(2) has required the staff of JCT to provide a macroeconomic impact analysis of all tax legislation reported by the Ways and Means Committee.
- Joint Committee staff has responded to the Rule with several different types of analyses.
  - For most tax bills, the expected effects were so small that a brief statement to that effects was all that was required.
  - Short qualitative analyses were provided for legislation that JCT macro models were not configured to model.
  - For major tax legislation, JCT staff has provided detailed quantitative analysis of a possible range of effects on GDP, employment, investment, and revenues, based on the results of multiple models using multiple parameter assumptions.

Current JCT Macro Models

- The Joint Committee staff is currently working with three macroeconomic models:
  - A structural macroeconomic equilibrium growth model (MEG),
  - An overlapping generations model (OLG –leased from Tax Policy Advisors, LLC.), and
  - A dynamic stochastic general equilibrium model (DSGE).
- See discussion of models at www.jct.gov, under Macroeconomics tab.
- Analysis of Representative Camp's Tax Reform Act of 2014 used the MEG and OLG models.

MEG and OLG Models: Similar Neoclassical Foundations

- Consumption is modeled according to life-cycle consumption patterns.
- Labor supply responds to marginal and average changes in after-tax wages.
- Saving and consumption respond to after-tax return to saving and after-tax income.
- Business investment responds to expected return on investment and to after-tax cost of capital, which in part depends on availability of savings.
- Changes to cross border capital flows and net exports affect domestic economy.

Features Specific to the MEG Model

- Prices adjust so that long-run demand equals supply; in the short-run, less than full employment may exist.
- Behavioral equations are structural, using elasticities from empirical research rather than deep parameters.
- Labor supply is separately modeled for four groups, allowing better modeling of tax policies that affect different groups differently:
  - High income primary earners
  - High income secondary earners
  - Low income primary earners
  - Low income secondary earners
- Myopic individuals and businesses allow simulation of non-sustainable fiscal policy.

Features Specific to the OLG Model

- Following trends in academic literature, the model is constructed on microeconomic foundations, with deep parameters in behavioral equations.
- Individuals and businesses forecast the entire future path of the economy—making decisions based on perfect foresight.
- Prices adjust so that supply equals demand in both the short and long run.
- Economic decisions modeled separately for each of 55 adult-age cohorts.
- Perfect foresight means the model cannot solve if fiscal policy is not sustainable, thus
  - Requiring a counterfactual assumption about how fiscal policy will be made sustainable,
  - Which for some types of tax policies can distort the analysis.
- The OLG model used by JCT staff includes a multinational corporate sector with foreign subsidiaries, allowing better analysis of proposals targeted to these types of firms.

Ongoing Model Development

- JCT staff updates models frequently, as indicated by academic research and the types of proposals that require analysis.
- Recent innovations include
  - Ongoing JCT staff research on profit-shifting elasticities and other parameterization associated with the new multinational sector in the OLG model, and
  - Modifications to the MEG model to improve the modeling of the consumption effect of proposals affecting passthrough income.
- Developmental work on in-house OLG and DSGE models , as well as additional upgrades to the MEG model are under way.

Modeling a Major Reform package

- The development of macroeconomic models is only half the story.
- The additional challenge for analyzing the effects of each proposal is distilling it into inputs to the macroeconomic models.
- Example: Representative Camp's Tax Reform Act of 2014

JOINT COMMITTEE ON TAXATION
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ESTIMATED REVENUE EFFECTS OF THE "TAX REFORM ACT OF 2014"

Fiscal Years 2014 - 2023

[Billions of Dollars]

Provision	Effective	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2014-18	2014-23
I. Tax Reform for Individuals													
A. Individual Income Tax Rate Reform													
1. Simplification of individual income tax rates [1]	tyba 12/31/14	---	-43.4	-62.5	-61.7	-64.1	-62.8	-64.8	-60.1	-64.6	-59.9	-231.9	-543.8
2. Deduction for adjusted net capital tax:													
a. Tax capital gains at ordinary rates, with a 40% deduction for net capital gain	tyba 12/31/14	---	0.3	2.0	2.4	2.7	3.0	3.3	3.7	4.1	4.4	7.4	26.0
b. Tax dividends at ordinary rates, with a 40% deduction for qualifying dividends	tyba 12/31/14	---	0.7	2.1	2.2	2.2	2.3	2.3	2.3	2.3	2.3	7.2	18.7
3. Conforming amendments related to simplification of individual income tax rates	tyba 12/31/14	*Estimate Included in Item I.A.1.*											
B. Simplification of Tax Benefits for Families													
1. Increase in standard deduction, including phase-out of benefit for all filers with MAGI exceeding certain thresholds [1]	tyba 12/31/14	---	-44.2	-66.0	-70.3	-73.0	-76.3	-79.4	-82.2	-85.8	-89.1	-253.5	-666.2
2. Increase and expansion of child tax credit, including phase-out of credit for taxpayers with MAGI above certain thresholds [1]	tyba 12/31/14	---	-5.0	-45.7	-48.0	-55.1	-72.6	-74.6	-82.3	-84.0	-86.5	-153.9	-554.0
3. Modification of earned income tax credit [1]	tyba 12/31/14	---	0.2	15.9	15.9	16.2	32.5	33.1	33.8	34.4	35.2	48.2	217.2
4. Repeal of deduction for personal exemptions [1]	tyba 12/31/14	---	66.1	99.0	104.2	108.1	112.3	116.6	121.5	126.8	132.6	377.4	987.2
C. Simplification of Education Incentives													
1. American opportunity tax credit [1]	tyba 12/31/14	---	0.3	5.4	5.8	5.7	-5.3	-4.9	-5.3	-5.3	-5.2	17.2	-8.7
2. Expansion of Pell Grant exclusion from gross income	tyba 12/31/14	*Estimate Included in Item I.C.1.*											
3. Repeal of exclusion of income from United States savings bonds used to pay higher education tuition and fees	tyba 12/31/14	---	[2]	[2]	[2]	[2]	[2]	[2]	[2]	[2]	[2]	[2]	0.1
4. Repeal of deduction for interest on education loans	tyba 12/31/14	---	0.3	1.5	1.5	1.5	1.6	1.6	1.6	1.6	1.7	4.8	13.0
5. Repeal of deduction for qualified tuition and related expenses	tyba 12/31/13	*Provision Expired December 31, 2013*											
6. No new contributions to Coverdell education savings accounts	cma 12/31/14	---	[2]	[2]	[2]	[2]	[2]	[2]	[2]	[2]	[2]	[2]	0.2
7. Repeal of exclusion for discharge of student loan indebtedness	ada 12/31/14	---	[2]	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.4	1.1

Provision	Effective	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2014-18	2014-23
8. Repeal of exclusion for qualified tuition reductions	tyba 12/31/14	---	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.8	2.5
9. Repeal of exclusion for education assistance programs	apoeia 12/31/14	---	0.2	1.2	1.2	1.2	1.3	1.3	1.3	1.3	1.4	3.8	10.5
10. Repeal of exception to 10-percent early distribution tax for higher education expenses	dma 12/31/14	*Estimate Included in Item I.G.6.*											
D. Repeal of Certain Credits for Individuals													
1. Repeal of dependent care credit [1]	tyba 12/31/14	---	[2]	3.1	3.2	3.2	3.2	3.3	3.3	3.3	3.4	9.5	26.0
2. Repeal of credit for adoption expenses	apoia 12/31/14	---	0.1	0.5	0.6	0.6	0.6	0.6	0.6	0.6	0.6	1.7	4.7
3. Repeal of credit for nonbusiness energy property	ppisa 12/31/13	*Provision Expired December 31, 2013*											
4. Repeal of credit for residential energy efficient property	ppisa 12/31/14	---	0.5	1.1	0.6	---	---	---	---	---	---	2.3	2.3
5. Repeal of credit for qualified electric vehicles	vaa 12/31/11	*Provision Expired December 31, 2011*											
6. Repeal of alternative motor vehicle credit	ppa 12/31/14	*Provision Expires December 31, 2014*											
7. Repeal of alternative fuel vehicle refueling property credit	ppisa 12/31/14	*Provision Expires December 31, 2014*											
8. Repeal of credit for new qualified plug-in electric drive motor vehicles	vaa 12/31/14	---	0.1	0.3	0.4	0.6	0.7	0.8	0.7	0.7	0.6	1.4	5.0
9. Repeal of credit for health insurance costs of eligible individuals	mba 12/31/13	*Provision Expired December 31, 2013*											
10. Repeal of first-time homebuyer credit	rpa 6/30/11	*Provision Expired December 31, 2010*											
E. Deductions, Exclusions and Certain Other Provisions													
1. Changes to certain itemized deductions [1]	tyba 12/31/14	---	48.0	82.9	85.9	92.1	97.5	103.3	109.8	116.1	122.9	309.0	858.4
2. Exclusion of gain from sale of a principal residence	saea 12/31/14	---	0.6	1.3	1.7	1.8	1.9	2.0	2.1	2.2	2.3	5.5	15.8
3. Mortgage interest (includes lodging allowance exemption limitation)	tyba 12/31/14	*Estimate Included in Item I.E.1.*											
4. Charitable contributions	cmi tyba 12/31/14	*Estimate Included in Item I.E.1.*											
5. Denial of deduction for expenses attributable to the trade or business of being an employee	tyba 12/31/14	*Estimate Included in Item I.E.1.*											
6. Repeal of deduction for taxes not paid or accrued in a trade or business	tyba 12/31/14	*Estimate Included in Item I.E.1.*											
7. Repeal of deduction for personal casualty losses	tyba 12/31/14	*Estimate Included in Item I.E.1.*											
8. Limitation on wagering losses	tyba 12/31/14	---	[2]	[2]	[2]	[2]	[2]	[2]	[2]	[2]	[2]	[2]	0.1
9. Repeal of deduction for tax preparation expenses	tyba 12/31/14	*Estimate Included in Item I.E.1.*											
10. Repeal of deduction for medical expenses	tyba 12/31/14	*Estimate Included in Item I.E.1.*											
11. Repeal of disqualification of expenses for over-the-counter drugs under certain accounts and arrangements [3]	eia 12/31/14	---	-0.2	-0.3	-0.3	-0.3	-0.4	-0.4	-0.4	-0.5	-0.5	-1.1	-3.3
12. Repeal of deduction for alimony payments and corresponding inclusion in gross income	dosaeia 12/31/14	---	0.1	0.2	0.3	0.4	0.6	0.7	0.9	1.1	1.2	1.0	5.5
13. Repeal of deduction for moving expenses	tyba 12/31/14	---	0.5	0.7	0.8	0.8	0.9	1.0	1.0	1.1	1.2	2.9	8.0
14. Termination of deduction and exclusions for contributions to Archer medical savings accounts	tyba 12/31/14	*Negligible Revenue Effect*											

Provision	Effective	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2014-18	2014-23
15. Repeal of 2-percent floor on miscellaneous itemized deductions	tyba 12/31/14	*Estimate Included in Item I.E.1.*											
16. Repeal of overall limitation on itemized deductions	tyba 12/31/14	*Estimate Included in Item I.E.1.*											
17. Deduction for amortizable bond premium allowed in determining adjusted gross income	tyba 12/31/14	---	[4]	[4]	[4]	[4]	[4]	[4]	[4]	[4]	[4]	[4]	[4]
18. Repeal of exclusion, etc., for employee achievement awards [5]	tyba 12/31/14	---	0.2	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.5	1.3	3.4
19. Clarification of special rule for certain governmental plans	pa DOE	[4]	[4]	[4]	[4]	[4]	[4]	[4]	[4]	[4]	[4]	[4]	[4]
20. Limitation on exclusion for employer-provided housing	tyba 12/31/14	---	[2]	[2]	[2]	[2]	[2]	[2]	[2]	[2]	[2]	[2]	[2]
21. Fringe benefits [6] [7]	tyba 12/31/14	---	2.7	3.8	4.1	4.3	4.5	4.6	4.8	5.0	5.1	15.0	39.0
22. Repeal of exclusion of net unrealized appreciation in employer securities	da 12/31/14	---	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.4	0.9
23. Consistent basis reporting between estate and person acquiring property from decedent	tfwaetrifa DOE	[2]	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.6	1.6
F. Employment Tax Modifications													
1. Modifications of deduction for Social Security taxes in computing net earnings from self-employment [8]	tyba 12/31/14	---	0.4	0.5	0.6	0.6	0.6	0.6	0.6	0.6	0.6	2.0	5.1
2. Determination of net earnings from self-employment [9]	tyba 12/31/14	---	0.3	0.9	1.2	1.5	1.7	1.9	2.2	2.6	2.9	4.0	15.3
3. Repeal of exemption from FICA taxes for certain foreign workers [10]	rrfspa 12/31/14	---	0.5	0.8	0.8	0.8	0.9	0.9	1.0	1.0	1.1	2.9	7.7
4. Repeal of exemption from FICA taxes for certain students [11]	rrfspa 12/31/14	---	0.9	1.2	1.3	1.4	1.5	1.5	1.6	1.7	1.8	4.8	13.0
5. Override of Treasury guidance providing that certain employer-provided supplemental unemployment benefits are not subject to employment taxes [12]	generally Apa 12/31/14	[4]	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.4	0.9
6. Treatment of certified professional employer organizations	[13]	---	[2]	[2]	[2]	[2]	[2]	[2]	[2]	[2]	[2]	[2]	[2]
G. Pensions and Retirement													
1. Elimination of income limits on contributions to Roth IRAs	tyba 12/31/14	---	1.1	2.3	2.2	2.1	2.0	1.9	1.8	1.7	1.6	7.7	16.7
2. No new contributions to traditional IRAs [1]	tyba 12/31/14	*Estimate Included in Item I.G.1.*											
3. Inflation adjustment for Roth IRA contributions	tyba 12/31/14	*Estimate Included in Item I.G.1.*											
4. Repeal of special rule permitting recharacterization of Roth IRA contributions as traditional IRA contributions	tyba 12/31/14	[2]	[2]	[2]	[2]	[2]	0.1	0.1	0.1	0.1	0.1	0.2	0.4
5. Repeal of exception to 10-percent early distribution tax for first home purchases; and elimination of first time home purchase as a basis for a distribution from a Roth IRA being a qualified distribution	da 12/31/14	---	[2]	[2]	[2]	[2]	[2]	[2]	[2]	[2]	[2]	0.1	0.3
6. Termination for new SEPs	tyba 12/31/14	---	[2]	[2]	[2]	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.6

Provision	Effective	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2014-18	2014-23
VII. Excise Taxes													
1. Repeal of medical device excise tax	sa DOE	-1.6	-2.4	-2.5	-2.7	-2.9	-3.1	-3.3	-3.5	-3.7	-3.8	-12.2	-29.5
2. Modifications relating to oil spill liability trust fund	[29]	---	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.4	1.2
3. Modification relating to inland waterways trust fund financing rate	fua 12/31/14	---	[2]	[2]	[2]	[2]	[2]	[2]	[2]	[2]	[2]	0.1	0.2
4. Excise tax on systemically important financial institutions (.035% quarterly tax rate)	cqba 12/31/14	---	3.1	7.5	9.2	9.8	10.3	10.8	11.3	11.9	12.5	29.6	86.4
5. Clarification of orphan drug exception to annual fee on branded prescription pharmaceutical manufacturers and importers	fiwapda 12/31/13	*No Revenue Effect*											
Total of Excise Taxes		**-1.6**	**0.8**	**5.1**	**6.6**	**7.0**	**7.3**	**7.6**	**8.0**	**8.4**	**8.9**	**17.9**	**58.3**
VIII. Deadwood and Technical Provisions													
A. Repeal of Deadwood	DOE	*No Revenue Effect*											
B. Conforming Amendments Related to Multiple Sections	DOE	*Estimates Included in the Sections to Which the Changes Relate*											
Total of Deadwood and Technical Provisions		*No Revenue Effect*											
NET TOTAL		**-13.9**	**47.1**	**-18.5**	**6.9**	**-1.5**	**-17.2**	**-3.7**	**-0.2**	**11.5**	**-12.8**	**23.5**	**3.0**

Joint Committee on Taxation

NOTE: Details may not add to totals due to rounding. Revenue provisions as submitted in statutory draft CAMP_041.

Preparing Tax-Related Inputs

- Many people talk about dynamic analysis as though it is impossible to do –
  - We think we have been producing reasonable results for over a decade.
  - Though we welcome comments and discussion.
- Many others talk about dynamic analysis as if it can magically be produced at the press of a button, e.g. producing "real-time" estimates of macro effects of proposed amendments.
- Perhaps this partially owes to Clarke's Law: "Any sufficiently advanced technology is indistinguishable from magic."
- This part of our comments provides a look at the mechanics of dynamic analysis—a look inside the hat, if you will. There is no magic button.

Preparing Tax-Related Inputs

- Besides initializing the models to NIPA macroeconomic aggregates, demographic info, empirical-literature-consistent parameter values, elasticities, etc …
- "The Role of Dynamic Scoring in the Federal Budget Process …" showed the importance of disaggregation and distinguishing between ATR and MTR effects.
- Ultimately, we need to know current-law and proposed-law ATR and MTR for eight sources of income, including four wage groups split by income and primary vs secondary.

Preparing Tax-Related Inputs (2)

- Individual ATR & MTR for
  - Wage & Salary; Total, High & Low, Primary & Secondary
  - Interest
  - Dividends
  - Capital Gains
  - Business Income on Individual Returns
  - Other
  - Total
- Corporate ATR, MTR
- Combined Business ATR, MTR given forecast shares.
- Business Depreciation/Expensing.
  - Present-value effect
  - Liability effect
  - Implied change in capital consumption allowances

Parsing the Conventional Estimate Table

	2015	…	2014-23	ITM	IM	BM	Depreciation
…							
26. Phaseout and repeal of deduction for income attributable to domestic production activities...	2.5	…	115.8		1.0	1.0	
…							

- For each provision, need to determine whether:
  - It's on the Individual Tax Model (ITM);
  - Primarily average-tax-rate or also marginal or cost-of-capital effects;
    - Individual (IM), Business (BM), or both;
  - Depreciation-related … which is handled separately;

Parsing the Conventional Estimate Table (2)

- Toughest (most time-consuming) can be the "Is it marginal" question.
  - Macro staffer interviews conventional estimate staffer to understand provision.
  - Both work to classify provision as marginal or not.
    - Domestic Production Deduction obviously marginal; individual & corporate.
    - Repeal of Last-In First-Out Method of Inventory is not.
      - Mostly average effect: "Revaluation"
      - But moving forward, e.g. under current law an extra $100 of gross sales would be offset by $98 of LIFO inventory deductions for a net income of $2 and liability of $0.50.
      - With repeal of LIFO, the $100 is offset by $90 of FIFO inventory deduction for a net income of $10 and liability of $2.50.
      - Therefore, partially "business marginal".

Mapping Proposal to Macro Model

- At this stage, we have a good idea of the details of the proposal.
- Question: Can the existing models handle the proposal, or are there features that require modification?
- E.g. first time we modeled repeal of home-mortgage-interest deduction in MEG, we had to make corresponding changes to the housing cost-of-capital equations.
- Revise models accordingly, if required.

Estimating Average and Marginal Rates on the ITM

- For provisions modeled using the ITM, need to compute the effect on average and marginal rates, by source of income.
- The ATR/MTR calculator modifies &/or adds 3,000 lines of Fortran to ITM's 52,000 lines.
- Calculating ATR and MTR may seem trivial. It isn't.
- For MTR by income source, roughly forty iterations through the ITM are required—each source with initial values of income, then with marginally incremented income, in both the current-law and proposed-law calculators.
- Important for proposals that include base broadening: average and effective marginal rates are calculated relative to a broad definition of income for both present law and the proposal.

Estimating Average & Marginal Effects on the ITM (2)

- Seemingly-simple changes can be unexpectedly difficult to debug.
- E.g. switch from taxing capital gains using a separate rate schedule to allowing an exclusion and taxing gains at ordinary rates.
- Measured capital gains changes from current to proposed, as does AGI.
- Caused havoc in ATR/MTR calculator, owing in part to iterative nature of the calculations.

Estimating Off-Model
Individual and Business ATR & MTR Effect

- Now we have the effect of On-ITM-Model provisions.
- But many Individual provisions are not on the ITM;
- Nor are the Corporate and other business provisions.
- We use the information from parsing the revenue table to figure out how much needs to be added or subtracted from ATR/MTR for
  - Individual off-model effects by source of income;
  - Businesses, with depreciation changes handled separately.
- Actual implementation of off-model ATR/MTR is non-trivial and proposal-specific.

Next Steps: Actually Running a Model

- Preliminary macro runs.
  - Compute current-law macroeconomic baseline.
  - Read in proposed-law change.
  - Holding macro quantities constant, use proposed-law change to compute effect on liability, in total and by source.
  - Essentially this is the definition of a conventional estimate, since by construction the proposed-law rates include conventionally-assumed, fixed-GDP behavioral effects.

Next Steps: Actually Running a Model

- Preliminary macro runs (cont'd).
  - So … does the macro model's conventional estimate match the official conventional estimate? Do the liability changes by source match with those implied by the conventional estimate?
    - Not infrequently the answer is no.
    - Iterate between ITM, spreadsheet inputs, and macro model until conventional estimates match.

Next Steps: Actually Running a Model (2)

- Preliminary macro runs (cont'd).
  - Compute the proposed-law macro response.
  - Is the percent change in revenue owing to macro response roughly consistent with the percent GDP change?
  - Do changes in the macro aggregates (e.g. consumption, capital stock, labor supply) make sense in the context of the proposed-law change?
  - Are there aspects of the proposed-law change that we thought were modeled correctly that in fact are not?

Next Steps: Actually Running a Model (3)

- Preliminary macro runs (cont'd).
  - If results are puzzling, perform debugging runs.
  - E.g., implementing just the ITM changes, just the off-model individual changes, just the off-model business changes, just the depreciation changes …
  - Then stacking them progressively …
  - Perform sensitivity runs, varying:
    - Monetary policy
    - Labor-supply elasticies
    - Marginal propensity to consume
    - Intertemporal elasticity
    - International response sensitivity
    - Fiscal closing assumptions

Next Steps: Cross-checking Results Across Models

- Meanwhile, someone else has implemented all of the above in the other macro models.
- Now we consolidate results into a single spreadsheet so that we can cross-check them.
- Do the differences in results between models and between their sensitivity variations make sense in the context of what we know about how those models work, and in the context of the proposed-law change?
- Often at this step, we find it useful to do more debugging runs to help us understand why the models are behaving the way they are.

Next Steps: Writing a Report

- Meanwhile … by this time someone has written the shell of a report, providing background, describing the proposal and its effect on tax rates, etc.
- As macroeconomic results become available, the report begins to be fleshed out, and the way in which the proposal affects the economy in different models is discussed.
- Yet another opportunity to think through whether results are reasonable.

Next Steps: Writing a Report (2)

- Many reports currently posted at www.jct.gov under the Macroeconomics tab, e.g.
  - **Macroeconomic Analysis for Bonus Depreciation Modified and Made Permanent** (July 03, 2014)
  - **Macroeconomic Analysis for American Research and Competitiveness Act of 2014** (May 02, 2014)
  - **Macroeconomic Analysis for America's Small Business Tax Relief Act of 2014** (May 02, 2014)
  - **Macroeconomic Analysis for Save American Workers Act of 2014** (March 26, 2014)
  - **JCX-22-14** (February 26, 2014) MACROECONOMIC ANALYSIS OF THE "TAX REFORM ACT OF 2014"
  - **Macroeconomic Analysis for Small Business Tax Cut Act** (April 10, 2012)

Moving Forward

- The new House Rule requires a point (single) estimate within the budget window of the deficit effect due to the macroeconomic response to certain proposed legislation.
  - The requirement applies to bills with gross budget effects > 0.25 % of GDP (about $45 billion in 2015)
  - It also requires qualitative analysis for 20 years after the budget window.
- Moving from providing dynamic analysis to providing dynamic scores is a new and significant challenge.
- We are currently assessing the best way to provide Members of Congress information on likely macroeconomic feedback effects that best represents the current state of macroeconomic research.