

# Appendix A.

## The REMI Model

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REMI Policy Insight® is a structural model, meaning that it clearly includes cause-and-effect relationships. The model is based on two key underlying assumptions from mainstream economic theory: households maximize utility and producers maximize profits. Since these assumptions make sense to most people, lay people as well as trained economists can understand the model.

In the model, businesses produce goods to sell locally to other firms, consumers, investors, and governments, and from purchasers outside the region. The output is produced using labor, capital, fuel, and intermediate inputs. The demand, per unit of output, for labor, capital, and fuel depends on their relative costs, since an increase in the price of any one of these inputs leads to substitution away from that input to other inputs. The supply of labor in the model depends on the number of people in the population and the proportion of those people who participate in the labor force. Economic migration affects the population size. People will move into an area if the real after-tax wage rates or the likelihood of being employed increases in a region.

Supply and demand for labor determine the wage rates in the model. These wage rates, along with other prices and productivity, determine the cost of doing business for each industry in the model. An increase in the cost of doing business causes either an increase in prices or a cut in profits, depending on the market for the product. In either case, an increase in costs would decrease the share of the local and U.S. market supplied by local firms. This market share, combined with the demand described above, determines the amount of local output. Of course, the model has many other feedbacks. For example, changes in wages and employment impact income and consumption, while economic expansion changes investment, and population growth impacts government spending.

Figure 2-1 is a pictorial representation of REMI Policy Insight®. The Output block shows a business that sells to all the sectors of final demand as well as to other industries. The Labor and Capital Demand block shows how labor and capital requirements depend both on output and their relative costs. Population and Labor Supply contribute to demand and to wage determination. Economic migrants in turn respond to wages and other labor market conditions. Supply and demand interact in the Wage, Prices, and Profits block. Prices and profits determine market shares. Output depends on market shares and the components of demand.

16 The following discussion of the REMI model was taken from material prepared by Regional Economic Models, Inc. page 1.

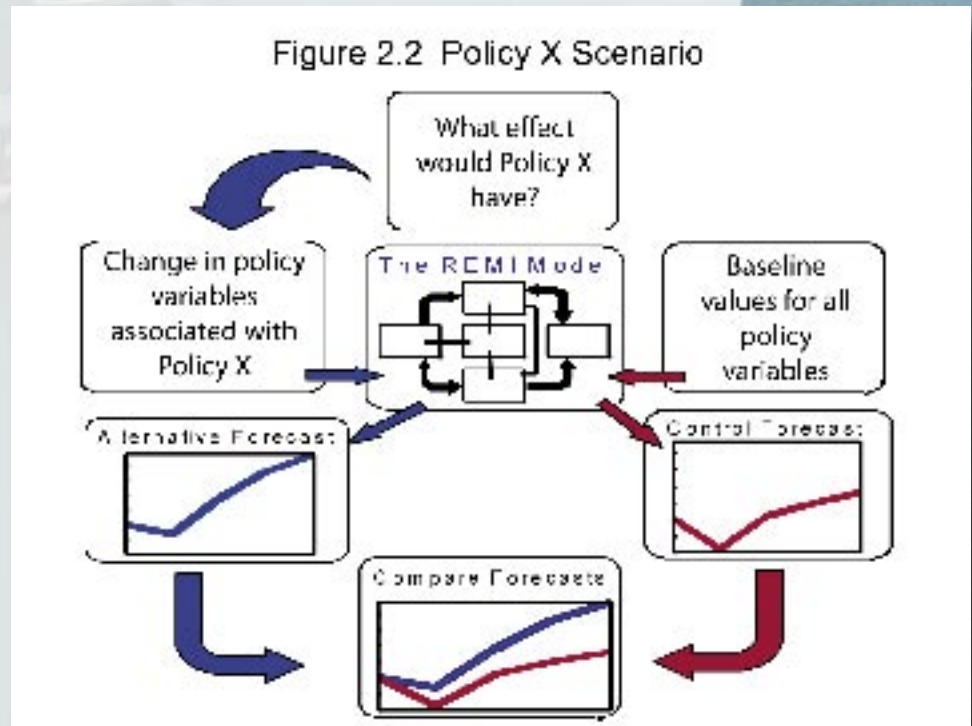
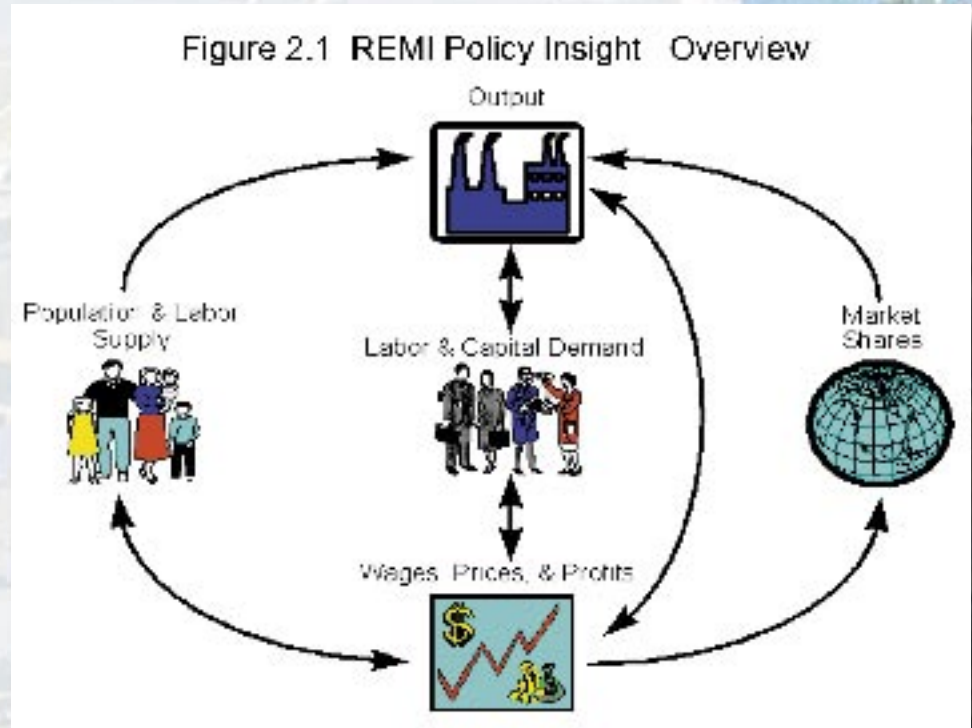


The REMI model brings together all of the above elements to determine the value of each of the variables in the model for each year in the baseline forecast.

The model includes all the interindustry interactions that are included in input-output models in the Output block, but goes well beyond an input-output model by including the linkages among all of the other blocks shown in Figure 2-1.

In order to broaden the model in this way, it was necessary to estimate key relationships. This was accomplished by using extensive data sets covering all areas in the country. These large data sets and two decades of research effort have enabled REMI to simultaneously maintain a theoretically sound model structure and build a model based on all the relevant data available.

The model has strong dynamic properties, which means that it forecasts not only what will happen but also when it will happen. This results in long-term predictions that have general equilibrium properties. This means that the long-term properties of general equilibrium models are preserved while maintaining accurate year-by-year predictions and estimating key equations using primary data sources.




An aerial photograph of a coastal town. On the left, a large white water tower with 'NAVY' written on it stands prominently. Below it, a large industrial building with a blue roof is visible. The town extends along a waterfront with several boats and a marina. The right side of the image is faded and overlaid with text.

Figure 2-2 shows the policy simulation process for a scenario called Policy X. The effects of a scenario are determined by comparing the baseline REMI forecast with an alternative forecast that incorporates the assumptions for the scenario. The baseline REMI forecast uses recent data and thousands of equations to generate projected economic activity for a particular region. The policy variables in the model are set equal to their baseline value (typically zero for additive variables and one for multiplicative variables) when solving for the baseline forecast. To show the effects of a given scenario, these policy variables are given values that represent the direct effects of the scenario. The alternative forecast is generated using these policy variable inputs.

Figure 2-2 shows how this process would work for a policy change called Policy X.

### **Figure 2-2 Policy X Scenario**

For this study, the Policy X is the closure of the Portsmouth Naval Shipyard. The impact is assessed relative to the expected growth in the region's economy assuming no closure and growth as forecasted to 2021 by REMI.



# Appendix B.

## Portsmouth Naval Shipyard Civilian Occupations by General Schedule Group/Federal Wage System Family on February 24, 2005

### General Schedule

Number	Occupation Family/Group	Number
GS-0800	Engineering And Architecture Group	1,008
GS-1600	Equipment, Facilities, And Services Group	199
GS-0300	General Administrative, Clerical, and Office Services Group	132
GS-1300	Physical Sciences Group	119
GS-1100	Business And Industry Group	75
GS-1700	Education Group	65
GS-1900	Quality Assurance, Inspection, And Grading Group	45
GS-2200	Information Technology Group	32
GS-0500	Accounting And Budget Group	29
GS-0000	Miscellaneous Occupations Group	26
GS-2000	Supply Group	22
GS-1000	Information And Arts Group	9
GS-1400	Library And Archives Group	8
GS-0600	Medical, Hospital, Dental and Public Health Group	7
GS-2100	Transportation Group	5
GS-0900	Legal And Kindred Group	3
GS-0200	Human Resources Management Group	1
GS-1500	Mathematics And Statistics Group	1
	GS Subtotal	1,786

### Federal Wage System

FWS-5300	Industrial Equipment Maintenance Family	357
FWS-3800	Metal Work Family	272
FWS-4100	Painting And Paperhanging Family	267
FWS-4200	Plumbing And Pipefitting Family	220
FWS-2800	Electrical Installation And Maintenance Family	204
FWS-5200	Miscellaneous Occupations Family	182
FWS-3400	Machine Tool Work Family	167
FWS-3700	Metal Processing Family	154
FWS-2600	Electronic Equipment Installation And Maintenance Family	135
FWS-4300	Pliable Materials Work Family	66
FWS-3600	Structural And Finishing Work Family	48
FWS-5800	Transportation/Mobile Equipment Maintenance Family	45
FWS-3100	Fabric And Leather Work Family	37
FWS-5700	Transportation/Mobile Equipment Operation Family	25
FWS-4700	General Maintenance And Operations Work Family	16
FWS-6900	Warehousing And Stock Handling Family	14
FWS-3300	Instrument Work Family	13
FWS-4800	General Equipment Maintenance Family	9
FWS-5400	Industrial Equipment Operation Family	6
FWS-7000	Packing And Processing Family	6
FWS-3500	General Services And Support Work Family	5
FWS-6500	Ammunition, Explosives, And Toxic Materials Work Family	2
	FWS Subtotal	2,250

**Shipyards Total** **4,036**

Note: PNS provided additional detail by GS series and FWS occupation which was converted to O\*NET occupations for comparison to New Hampshire occupational data.



# Appendix C.

## Portsmouth Naval Shipyard Civilian Employment by Standard Occupational Classification (SOC)

SOC Code	Occupation	Portsmouth, Dover,		Statewide Estimated Empl. <sup>2</sup>
		PNS Employment <sup>1</sup>	Rochester Area Estimated Empl. <sup>2</sup>	
11-3011	Administrative Services Managers	6	170	1,010
11-3021	Computer and Information Systems Managers	3	420	1,360
11-3031	Financial Managers	1	560	3,090
11-3040	Human Resources Managers	10	150	850
11-3051	Industrial Production Managers	46	130	1,030
11-3061	Purchasing Managers	10	70	410
11-3071	Transportation, Storage, and Distribution Managers	2	80	410
11-9041	Engineering Managers	105	230	990
11-9121	Natural Sciences Managers	6	n/a	90
13-1081	Logisticians	5	n/a	n/a
13-1111	Management Analysts	29	310	1,150
13-2011	Accountants and Auditors	3	550	2,870
13-2031	Budget Analysts	10	n/a	100
15-1041	Computer Support Specialists	4	370	1,840
15-1071	Network and Computer Systems Administrators	19	280	1,010
15-1081	Network Systems and Data Communications Analysts	7	80	410
15-2021	Mathematicians	1	n/a	n/a
17-2041	Chemical Engineers	2	n/a	70
17-2071	Electrical Engineers	38	90	830
17-2072	Electronics Engineers, Except Computer	11	70	690
17-2081	Environmental Engineers	8	n/a	160
17-2111	Health and Safety Engineers, Except Mining Safety Engineers and Inspectors	29	n/a	60
17-2112	Industrial Engineers	42	100	720
17-2121	Marine Engineers and Naval Architects	25	n/a	n/a
17-2131	Materials Engineers	6	40	250
17-2141	Mechanical Engineers	184	280	1,480
17-2161	Nuclear Engineers	180	n/a	n/a
17-3011	Architectural and Civil Drafters	45	160	710
17-3023	Electrical and Electronic Engineering Technicians	102	140	1,050
17-3025	Environmental Engineering Technicians	35	n/a	80
17-3026	Industrial Engineering Technicians	45	50	360
17-3027	Mechanical Engineering Technicians	266	30	420
19-2031	Chemists	8	60	160
19-2041	Environmental Scientists and Specialists, Including Health	5	n/a	280
19-4031	Chemical Technicians	72	30	150
19-4051	Nuclear Monitoring Technicians	4	n/a	n/a
23-1011	Lawyers	2	250	1,480
23-2011	Paralegals and Legal Assistants	1	NP	590
25-1194	Vocational Education Teachers, Postsecondary	57	NP	200
25-4010	Archivists, Curators, and Museum Technicians	1	30	150
25-4021	Librarians	4	180	910
25-4031	Library Technicians	4	110	690
27-1024	Graphic Designers	1	110	570
27-3031	Public Relations Specialists	3	90	450
27-3042	Technical Writers	2	50	240
27-3043	Writers and Authors	2	60	180
29-2071	Medical Records and Health Information Technicians	2	n/a	840
29-9010	Occupational Health and Safety Specialists and Technicians	15	n/a	160
33-1012	First-Line Supervisors/Managers of Police and Detectives	2	80	360
33-9032	Security Guards	5	180	2,220
43-1011	First-Line Supervisors/Managers of Office and Administrative Support Workers	3	1,250	7,420
43-3031	Bookkeeping, Accounting, and Auditing Clerks	8	1,510	9,270
43-3051	Payroll and Timekeeping Clerks	5	90	680
43-5011	Cargo and Freight Agents	5	50	120



Portsmouth,  
Dover,

SOC Code	Occupation	PNS Employment <sup>1</sup>	Rochester Area Estimated Empl. <sup>2</sup>	Statewide Estimated Empl. <sup>2</sup>
43-5061	Production, Planning, and Expediting Clerks	58	200	1,120
43-5081	Stock Clerks and Order Fillers	15	1,120	8,540
43-6011	Executive Secretaries and Administrative Assistants	19	1,090	5,980
43-6014	Secretaries, Except Legal, Medical, and Executive	39	1,160	7,680
43-9011	Computer Operators	4	90	440
43-9022	Word Processors and Typists	3	30	400
43-9051	Mail Clerks and Mail Machine Operators, Except Postal Service	1	50	760
43-9061	Office Clerks, General	14	1,910	10,230
47-1011	First-Line Supervisors/Managers of Construction Trades and Extraction Workers	201	290	2,470
47-2031	Carpenters (Boat Builders and Shipwrights)	41	NP	4,410
47-2111	Electricians	153	420	2,140
47-2131	Insulation Workers	33	n/a	n/a
47-2152	Plumbers, Pipefitters, and Steamfitters	129	NP	2,300
47-2211	Sheet Metal Workers	45	120	650
47-3013	Helpers--Electricians	35	n/a	300
47-3015	Helpers--Pipelayers, Plumbers, Pipefitters, and Steamfitters	41	n/a	160
47-3019	Helpers - Construction Trades, All Others	10	n/a	230
47-4041	Hazardous Materials Removal Workers	3	40	80
49-1011	First-Line Supervisors/Managers of Mechanics, Installers, and Repairers	103	420	25,650
49-2092	Electric Motor, Power Tool, and Related Repairers	7	n/a	640
49-2094	Electrical and Electronics Repairers, Commercial and Industrial Equipment	93	50	300
49-3042	Mobile Heavy Equipment Mechanics, Except Engines	36	30	100
49-9021	Heating, Air Conditioning, and Refrigeration Mechanics and Installers	11	380	100
49-9041	Industrial Machinery Mechanics	250	170	130
49-9042	Maintenance and Repair Workers, General	7	720	1,340
49-9069	Precision Instrument and Equipment Repairers, All Other	4	n/a	100
49-9093	Fabric Menders, Except Garment	35	n/a	n/a
49-9096	Riggers	92	n/a	n/a
49-9098	Helpers--Installation, Maintenance, and Repair Workers	103	150	730
51-1011	First-Line Supervisors/Managers of Production and Operating Workers	93	550	52,080
51-4011	Computer-Controlled Machine Tool Operators, Metal and Plastic	3	n/a	50
51-4022	Forging Machine Setters, Operators, and Tenders, Metal and Plastic	3	n/a	690
51-4041	Machinists	117	340	180
51-4111	Tool and Die Makers	9	70	570
51-4121	Welders, Cutters, Solderers, and Brazers	98	170	460
51-4192	Lay-out Workers, Metal and Plastic	106	n/a	n/a
51-7031	Model Makers, Wood	6	n/a	n/a
51-8031	Water and Liquid Waste Treatment Plant and System Operators	5	110	100
51-9061	Inspectors, Testers, Sorters, Samplers, and Weighers	38	510	80
51-9122	Painters, Transportation Equipment	152	n/a	500
51-9198	Helpers--Production Workers	243	240	530
51-9199	Production Workers, All Other	51	280	1,370
53-1031	First-Line Supervisors/Managers of Transportation and Material-Moving Machine and Vehicle	3	120	480
53-7021	Crane and Tower Operators	22	n/a	170
53-7061	Cleaners of Vehicles and Equipment	6	120	1,680

<sup>1</sup> Portsmouth Naval Shipyard civilian employment on February 24, 2005

<sup>2</sup> Estimated area and statewide employment are based on the November 2003 New Hampshire Occupational Employment and Wages survey by the Occupational Employment Statistics (OES) Program

n/a - not available

NP - indicates that the estimated employment is not publishable