



CAPABILITIES, DATA, AND KEY PERSONNEL OF THE PENN STATE WORKFORCE EDUCATION AND DEVELOPMENT INITIATIVE

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Capabilities

Penn State Workforce Education and Development Initiative

The Penn State Workforce Education and Development (WED) Initiative is a partnership between Penn State's College of Education and Penn State Outreach. The mission of the Penn State WED Initiative is to support the development of the workforce in Pennsylvania primarily through the application of Penn State resources to conduct various types of workforce assessments for employers, industry partnerships, nonprofit organizations, and government entities. In addition to technical research reports, the WED Initiative produces a variety of reports for public use, such as through its *Economic and Workforce Brief* product (see <http://PSUBrief.notlong.com>).

The College of Education's Workforce Education and Development academic program within the Department of Learning and Performance Systems provides the academic home for the WED Initiative through its Institute for Research in Training and Development (IRTD). The Office of Economic and Workforce Development within Penn State Outreach supplies management for proposals and projects of the WED Initiative through its new Workforce Assessment Center. The Workforce Assessment Center enhances Penn State's reputation as a key resource for workforce assessments.

For approximately 20 years, the IRTD has been a research unit of Penn State's academic program in Workforce Education and Development, which recently was selected by *US News and World Report* as one of the top-ranked academic programs in its field. Researchers affiliated with the IRTD are members of the faculty of this Penn State academic program.

The Workforce Assessment Center is a relatively new unit within Penn State Outreach. Its mission is to: conduct workforce-related assessments and educational events; develop tools and services; identify funding, university resources, and external partners for workforce development projects; prepare proposals for and manage assessment projects; and establish and maintain communications with clients, partners, and University personnel.

Economic, Demographic, and Workforce Analysis, Modeling, and Forecasting

The WED Initiative team has substantial experience with economic and employment forecasts and analyses anticipated in this project. Among the diverse analytical studies that the Penn State WED Initiative team has completed are:

- County-level costs of lost regional economic development opportunities;



- Economic effects for Pennsylvania of cuts in federal defense spending;
- Economic impact of the Pennsylvania ski industry;
- Economic implications of educational reform;
- Job displacement resulting from Pennsylvania adoption of California pollution standards;
- Economic impact of Pennsylvania waste industries;
- Employment outlook for managers;
- Employment forecasts for all Pennsylvania industries as a benchmark comparison for official Pennsylvania Department of Labor and Industry forecasts;
- Job and income effects of motor vehicle emission testing;
- Effects of reduction in adolescent fertility on the Commonwealth economy;
- The impact of increased labor market activity by Pennsylvania's older population;
- Regional employment effects of national health care reform;
- Pennsylvania employment outlook for cosmetologists;
- Impact of national infrastructure investment on the Pennsylvania economy;
- Changes experienced by Pennsylvania manufacturing;
- The economic effects of the 1994 baseball strike.

These economic and employment forecasts and analyses have resulted in 6 chapters in books, 6 articles in academic journals, 14 articles written for the popular press, 19 technical reports to agencies, 24 presentations invited by agencies worldwide, 35 presentations at international, national, and regional conferences, and 14 projects funded by agencies and organizations external to Penn State.

Members of the Penn State WED Initiative team have provided consulting services related to economic and demographic analysis and forecasting for: PECO Energy, Philadelphia Pennsylvania; the Office of the Attorney General of Pennsylvania, Harrisburg, Pennsylvania; Labor Market Analysis Committee of the *Team Pennsylvania* Human Resource Investment Council; the Blue Ribbon Panel, Pennsylvania Department of Labor and Industry, Bureau of Research and Statistics; the North Central Regional Planning and Development Commission; the Southcentral Workforce Investment Board; the *Johnstown Tribune–Democrat*; the *Pittsburgh Post–Gazette*.

Some examples of economic analysis, modeling, and forecasting reports by members of the Penn State WED Initiative team are available for review. One study, *Ballpark Estimates: Impact of the 1994 Baseball Strike on the Pennsylvania Economy*, appeared in the *Journal of Sport and Social Issues*. Download various reports from this study at <http://PSUBaseball.notlong.com>. Another study, *Health Care and Service Employment and Training Through 2005: Prospects and Uncertainties*, issued by the Pennsylvania Economic Modeling and Forecasting Project (a precursor to the WED Initiative), examines the impact of a wide range of national health care financing reforms on employment and training of health care and service professionals in Pennsylvania. Download various reports from this study at <http://PSUHealth.notlong.com>.



Data Sources

REMI Model

The REMI Model is a structural economic/demographic/employment model that the Penn State WED Initiative leases for projects from Regional Economic Models, Inc, from Amherst, Massachusetts (see <http://www.remi.com>). The Model is organized around the North American Industry Classification System (NAICS) coding system. The REMI Model that can be leased contains up to 170 NAICS sectors.

The REMI Model is used by government agencies, consulting firms, nonprofit institutions, universities, and public utilities. REMI Model simulations forecast the comprehensive economic and demographic effects in wide-ranging initiatives such as: economic impact analysis; policies and programs for economic development, transportation, infrastructure, environment, energy and natural resources; and state and local tax changes. Articles about the Model's equations and research findings have been published in professional refereed journals such as the *American Economic Review*, *The Review of Economics and Statistics*, the *Journal of Regional Science*, and the *International Regional Science Review*. The *International Regional Science Review* wrote that the REMI model is one of the “extraordinary successes in the history of regional modeling” and represents the “state of the art in multiregional econometric modeling practice.”

The REMI Model tracks the complex interindustry relationships that deliver industrial output in a region for personal consumption expenditures, government demand for goods and services, fixed investments, and domestic and international exports. It documents the role that these destinations for industrial output play in supporting jobs and income throughout the economy.

In a single source, the REMI Model provides information about the performance of the Pennsylvania economy as well as unique information about the relative competitiveness of the Pennsylvania economy with the rest of the United States in terms of prices, costs, productivity, and profitability in industrial sectors. Also available is demographic information and forecasts for 808 age/sex/race groups. Detailed information is provided about employment in 628 occupations, taxes by source, and transfer payments by type. The REMI Model synthesizes information from many sources—to name a few: Bureau of Economic Analysis employment, wage, and personal income series; Bureau of Labor Statistics employment and wage data; and County Business Patterns data collected by the Bureau of the Census in conjunction with the Social Security program.

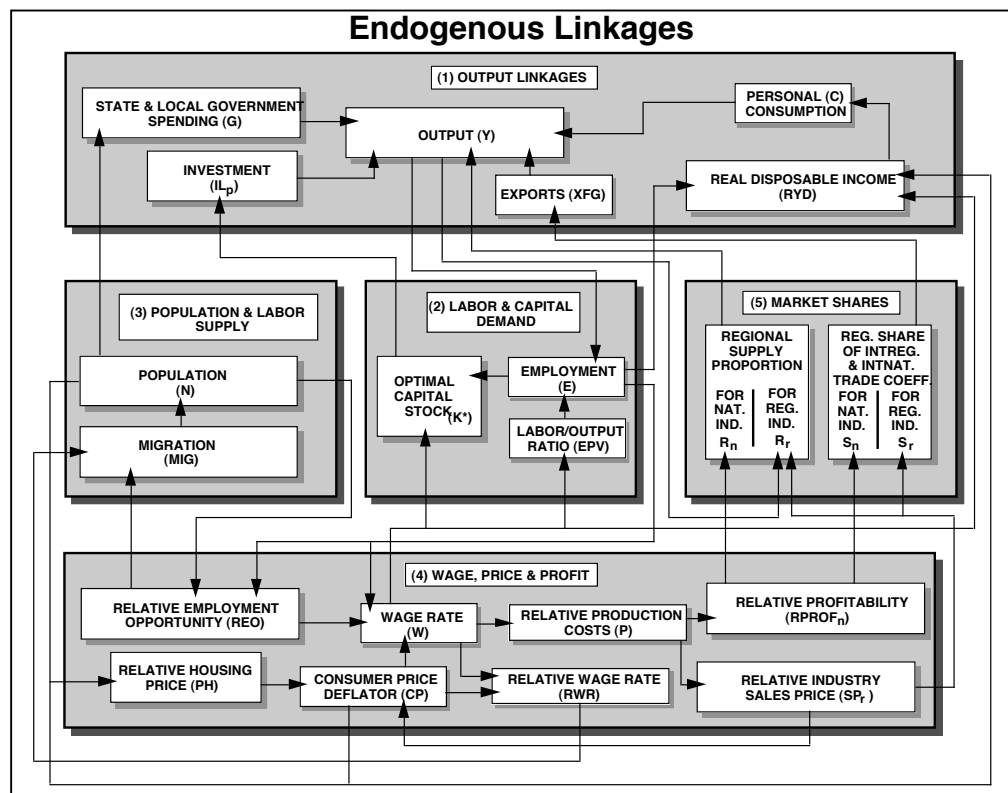


Figure 1. Endogenous Linkages in the REMI Model Among Economic Output, Labor and Capital Demand, Population and Labor Supply, Wage, Price and Profit, and Market Shares.

Shown in Figure 1 are the major paths of economic interrelationships endogenous to the REMI Model. This figure summarizes a large number of simultaneous equations that form the mathematics behind the Model. The REMI Model contains five sections of linked equations:

- The *output* section of the Model (Block 1) accounts for economic output that is created by personal consumption, government spending, fixed investment, and net exports.
- The *labor and capital demand* section (Block 2) models demand for nonresidential structures and equipment. Cobb–Douglas production function technologies are used to model substitution between capital and labor and to determine the amount of labor needed to deliver a unit of economic output (i.e., labor intensity). Industrial employment requirements are calculated by multiplying labor intensity by industrial output (Block 1). Occupational staffing patterns within each industry parse industry employment by occupation.
- The *population and labor supply* section (Block 3) accounts for the effects of demography on the economy as well as the effects of the economy on demography. For instance, the size of the Pennsylvania population affects government spending because many government services (e.g., health, education, and safety) are delivered on a per capita basis. Moreover, the size of the population in Pennsylvania population is affected by economic conditions. For instance, migration into and out of the Commonwealth is affected by employment opportunities and wage rates relative to the rest of the United States. The Model contains complex algorithms for forecasting births, deaths, and net migration due to immigration, migration of retirees and former military personnel, and economically–induced migration.



- The *wage, price, and profit* section of the Model (Block 4) determines wage rates, prices for regional and nationally–competitive industries, and profits for nationally–competitive industries. Pennsylvania wages relative to the rest of the US are a function of, among other factors, relative employment opportunities and consumer price changes. The Model calculates costs of fuel, labor, capital, and intermediate products relative to the rest of the US. Some business taxes are modeled as capital costs to industries. Profitability is affected by costs and selling prices. The relative profitability of Pennsylvania industries affects regional, interregional, and international market shares held by the industries.
- The *market shares* section of the Model (Block 5) are divided into two types of shares: regional market shares and export shares. Regional shares are the proportion of Pennsylvania demand fulfilled by Pennsylvania industries. Export shares include domestic and international exports and are affected mostly by changes in production costs. Because firms do not move to Pennsylvania instantly as a result of changes in costs, the Model contains empirically estimated lags between cost changes and changes in export shares. Increases in regional shares substitute Pennsylvania products for imports.

Indicators summarized in the five blocks in Figure 1 are calculated and forecasted for all industrial sectors of the Model.

Reported through the REMI model are the following current and historical information elements for Pennsylvania employment, output, relative price, costs, productivity, profitability, and population:

Employment

- *total employment*
 - total employment
 - total employment as a % of US
 - total employment by sector (private non–farm sectors, one farm, and 3 government)
 - total employment by source of final demand (intermediate inputs, local consumption, government, investment, exports)
 - total employment by source of final demand and by private non–farm sector
- *private non–farm employment*
 - private non–farm employment
 - private non–farm employment as a % of US
- *civilian employment*

Output

- *Gross regional product (GRP)*
 - GRP by final demand segmented by consumption, investment government purchases, exports, total imports
 - GRP by private non–farm sector
 - GRP by private non–farm sector and source of demand
- *total output (GRP + intermediate)*
 - total output by private non–farm sector
 - total output by industry
- *regional purchases*
 - total regional purchase coefficient
 - regional purchase coefficient by private non–farm sector

**Income**

- *labor and proprietor's income*
- *wage and salary disbursements*
 - total wage and salary disbursements
 - wage and salary disbursements by private non–farm sector
- *personal income (not decomposed by industry)*
 - total personal income
 - real disposable income
 - real disposable income by component (derived from labor and proprietors income):
 - –less social insurance payments
 - +plus residential adjustment
 - +plus dividends, interest, and rent
 - +plus transfer payments
 - transfer payments by type (medical payments, employees insurance benefit payments, veterans benefit payments, federal education/training assistance payments, other payments to individuals, payments to nonprofit institutions, business payments to individuals)
 - –minus taxes
 - personal tax and non-tax payments by type (federal government net of refunds, state governments, local governments)
 - –deflated by price index
 - real disposable income per capita
 - wages
 - average wages (in thousands) by private non–farm sector
 - occupational wage rate change from previous year by private non–farm sector

Selling prices, costs, productivity, and profitability relative to US

- *relative selling prices*
 - selling prices for all industries
 - selling prices by private non–farm sector
- *relative factors costs*
 - relative total factors input costs for all industries
 - relative labor costs
 - relative fuel costs
 - relative capital costs
 - relative total factors input costs by private non–farm sector
 - relative total labor costs by private non–farm sector
 - relative total fuel costs by private non–farm sector
 - relative total capital costs by private non–farm sector
- *relative factor productivity*
 - relative productivity for all industries
 - relative productivity by private non–farm sector
- *relative profitability (for national industries only)*
 - relative profitability
 - relative profitability at private non–farm sector level only for durables, nondurables, and service industries
- *relative productivity (for national industries only)*
 - relative productivity
 - relative productivity at private non–farm sector level only for durables, nondurables, and service industries
- *relative productivity*
 - relative productivity for all industries
 - relative productivity at private non–farm sector level only for durables, nondurables, and service industries



- *relative labor intensity*
 - relative labor intensity for all industries
 - relative labor intensity for private non–farm sector

Population

- *total population*
 - total population by age (5–year and 1–year), sex, and race
- *total deaths*
 - survival rates by age (1–year cohorts), sex, and race
- *total births*
 - birth rates by age of mother
- *total migrants*
 - migrants by age (5–year cohorts), sex, and race
- *total labor force*
 - labor force by age (5–year cohorts), sex, and race
 - labor force participation rates by age (5–year cohorts), sex, and race

IMPLAN

An economic model called IMPLAN (**I**mpact for **P**lanning and **A**nalysis) is used by the Penn State WED Initiative team. IMPLAN originally was developed by the USDA Forest Service, but now a firm, Minnesota IMPLAN Group, Inc. sells IMPLAN tools, data, and support for the IMPLAN model. Economic information and indicators are available in IMPLAN for the entire Commonwealth as well as separately for all Pennsylvania counties. Penn State purchased the IMPLAN model and all Pennsylvania, Maryland, Delaware, New Jersey, and Indiana county–level data.

IMPLAN uses local–level input–output models to calculate the economic impact of, for example, new firms moving into an area, professional sports teams, recreation and tourism, and many other activities affecting the economy. IMPLAN data files include information for a set of highly disaggregated industries, generally at the four– and five–digit NAICS levels. Information available includes employment, income, value added, and household and government consumption. Included along with county data files are national input–output structural matrices. IMPLAN data files are compiled from a wide variety of sources, including the US Bureau of Economic Analysis, the US Bureau of Labor, and US Census Bureau. The heart of IMPLAN is an input–output model of the economies of a state and its counties, which is supplemented by extensive social accounting data showing the flow of income and revenue among households, businesses, and governments in the counties and with the rest of the world.

Strategic Advantage

Strategic Advantage (see <http://www.economicmodeling.com>) is both a database and an analysis tool that provides economic, workforce, and demographic information. Main modules of Strategic Advantage include: Economic Forecaster; Economic Impact; and Career Pathways. The Penn State Workforce Education and Development Initiative leases a version of Strategic Advantage that allows economic and demographic analysis, modeling, and forecasting for the entire Commonwealth, with capabilities to drill this information down to county, county group, and zip code levels of geographic detail.

The *Economic Forecaster* reports current status and projections for industries, occupations, and demographics in a selected region or groups of regions. Hundreds of industries (two– through



five-digit NAICS levels) and occupations (two- through five-digit Standard Occupational Classification levels) are available in the Economic Forecaster, and results can be filtered and organized using multiple criteria, such as number and percent change of jobs, education level, and earnings.

The *Economic Impact* module provides a host of critical information about the health and alternative future directions of a regional economy. It produces a customizable snapshot of a region's economic base in terms of jobs, earnings, and sales by occupation or industry. This module also produces impact simulations (or "what if" scenarios) that demonstrate the ripple effects of growth or decline of jobs, earnings, or sales in specific industries.

The *Career Pathways* module provides the vital data needed to help transition workers from declining occupations to high-growth occupations with similar skill requirements. Career Pathways describes the knowledge, skills and abilities employed in regional occupations through access to O*NET (see <http://tinyurl.com/mekzo>), the nation's primary source of comprehensive information about key attributes and characteristics of workers and occupations.

GroupSystems

A data collection and organization asset that the Penn State WED Initiative team brings to projects use of GroupSystems software (see <http://www.groupsystems.com>). GroupSystems is a comprehensive, robust, and open-structured set of software tools that support a wide range of face-to-face as well as distributed group processes for strategic planning, activity-based costing, business process reengineering, and innovative problem-solving. The system is based on processes such as: brainstorming; list building; information gathering; and voting, organizing, prioritizing, and creating consensus of opinions. Quality participation is encouraged by designing individual responses to focus group tasks to remain anonymous, while supporting real-time, rich group interaction. Participants can use Penn State's GroupSystems installation in a lab on the University Park Campus. Penn State also can deploy an on-site version of GroupSystems in the field that employs wireless networked laptop computers. In addition, a web-based version of GroupSystems is available for data collection and integration at a distance and over extended time periods.

The Penn State WED Initiative team has applied GroupSystems software for strategic planning, stakeholder focus groups, grant planning, organizational self-assessment, customized occupational profiling, and performance gap analysis in partnership with Penn State Management Development Programs and Services. Clients have included numerous businesses and government agencies throughout the Commonwealth. Recently, GroupSystems software was used for industry cluster development.

GroupSystems software reduces the costs and time required to gather information. Anonymous responses by GroupSystems' participants allows all to enter information without revealing personal identities. Participants are not pressured by their formal, acknowledged roles, and all participants have equal weight in responses to questions. The facilitation allows further the categorization of ideas that evolve and powerfully add finer detail and spur additional thoughts about topics.



Miscellaneous

The Penn State WED Initiative team also will access many other sources of data in the course of its work on research projects for various unique and special purposes. Some examples:

Community HotReports for Economic Development, a US Census data base containing information about Pennsylvania counties about general, economic, demographic, housing, transportation, and other community assets (the Penn State Workforce Education and Development Initiative team is part of the beta test for this database).

Shift–Share Analysis for Regional Employment, a website for calculating regional shift–share coefficients from the US Census of Employment and Wages for every Pennsylvania county by 11 major industry classifications.

Living Wage Calculator, a database of typical expenses and wages offered and living wage estimates in communities within counties in Pennsylvania.

County–to–County Commuter Flow Files, a US Census database of travel between place of residence and place of work, including all counties in Pennsylvania.

Longitudinal Employment and Household Dynamics, a state, county, and sub–county database of workforce flows linking federal administrative data, censuses, surveys, and ES202 data.

The Penn State Workforce Education and Development Initiative team also uses microdata from sources such as the *National Longitudinal Surveys of Labor Market Experience* and other databases with households or persons as the unit of analysis.



Key Personnel

Rose M. Baker, Program Manager of the Workforce Assessment Center and Assistant Professor of Education

Dr. Baker is Program Manager of Penn State's Workforce Assessment Center, a new unit within the Office of Economic and Workforce Development in Penn State Outreach. She also is Assistant Professor of Education associated with the Workforce Education and Development program and a Professional Associate of Penn State Management Development Programs and Services.

Dr. Baker is a certified Project Management Professional through the Project Management Institute. Dr. Baker's current research includes management techniques and statistical applications for operations improvement, economic analysis, occupational forecasting, benchmarking, evaluation of training outcomes, training needs assessment, and job task analysis. Dr. Baker has extensive experience in the analysis, interpretation, and reporting of labor market data. Dr. Baker's MEd degree is in Adult Education Theory and Practice, and her PhD degree is in Instructional Systems, with an emphasis in Training, Technology, and Systems Design and Development.

Dr. Baker's full curriculum vitae is available at <http://rosebaker.notlong.com>.

Mike Lawrence, Director, Workforce Development Initiatives

Prior to his appointment as the Director of Workforce Development Initiatives with the Office of Economic and Workforce Development, Mr. Lawrence was Deputy Director for Workforce Development for the North Central Pennsylvania Planning and Development Commission. He is vice president of the National Workforce Association and is on the Board of Directors of the Northwest Pennsylvania Industrial Resource Center.

With 23 years of workforce development experience, Mr. Lawrence has established industry partnerships in manufacturing, oil and gas production, and healthcare. He recently helped to establish a manufacturing education and economic network that brought together three Workforce Investment Boards, the Northwest PA Industrial Resource Center, the Ben Franklin Technology Partners, and the Northwest and North Central Regional Planning and Development Commissions.

Mr. Lawrence also has extensive experience assisting and integrating projects and activities with Workforce Investment Boards across the Nation and Commonwealth. The North Central WIB was the only mentor Workforce Investment Board selected from Pennsylvania as part of the National Business Learning Partnership and with that role mentored several protégé Workforce Investment Boards from across the nation. In addition, Mr. Lawrence has extensive experience with collaborative projects with Workforce Investment Boards including assisting with WIB technical assistance to transition from the Job Training Partnership Act to the Workforce Investment Act.

David Passmore, Director of the Institute for Research in Training and Development, Professor of Education, and Professor of Operations Research

David L. Passmore is Professor of Education in the Workforce Education and Development Program at The Pennsylvania State University. He also is Professor of Operations Research in the dual degree, intercollege Operations Research Program, Director of the Institute for Research in Training and Development, and a Professional Associate in Management Development Programs and Services. He is an Adjoint Graduate Faculty Member in Human Resource Development and Technology for the College of Business and Technology at The University of Texas at Tyler.

Since 1979, Passmore has held positions at Penn State as University-wide Director of the Office for the Protection of Human Subjects and Faculty Fellow and Director of the Multimedia Technology Group for the Center for Academic Computing. He has held faculty appointments as



Professor of Mineral Engineering Management and Professor of Adult Education. In addition, Passmore has served as Senior Scientist in the Institute for Policy Evaluation and Research and Faculty Associate of the Center for the Study of Higher Education.

Passmore was Visiting Scholar in Maternal and Child Health at the Harvard School of Public Health for one year, Director of Occupational Research at the National Technical Institute for the Deaf for three years, and Visiting Scholar of the University Council on Workforce Development for one year. He served on graduate faculties of the University of Northern Iowa and the University of Massachusetts/Amherst. He held adjunct faculty appointments at the University of Minnesota, Westfield State College, and St. John Fisher College. Passmore was Editor of the *Journal of Industrial Teacher Education*, Statistical Editor of *Human Resource Development Quarterly*, and an editorial board member for a number of academic journals. He was named a distinguished graduate of the College of Technology at Bowling Green University.

As a charter member of the Penn State Economic Modeling and Forecasting Project, and continuing with his involvement with Penn State Outreach through Penn State's Office of Economic and Workforce Development, Passmore has studied the regional implications of public policy, economic development, and demographic changes using structural econometric and input-output models and data bases such as REMI Policy Insight, Strategic Advantage, and IMPLAN.

Passmore has provided consulting services to a variety of corporate and government clients, including PECO Energy, Johns-Manville, Esso-Interamerica, Joy Manufacturing Technologies, Lord Corporation, E-Systems, Woolrich Inc., Liquid Carbonic, CIGNA HealthCare, National Institute for Metalworking Skills, Campbell Communications, American Council on Education, Research for Better Schools, John F. Kennedy Jr. Foundation, Special Olympics, the Pennsylvania Office of Attorney General, and a number of universities. He is author of over 450 publications and presentations, received 16 awards for his research, writing, and service, and was project director or associate on sponsored projects totaling \$5 million.

Passmore earned academic degrees from State University College of New York at Buffalo (BS, 1969), Bowling Green State University (MEd, 1970), and University of Minnesota (PhD, 1973).

Dr. Passmore's full curriculum vitae is available at <http://davidpassmore.notlong.com>.