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Utah State and Local Government Fiscal Impact Model
Working Paper Series: 94-2

Exports From Utah's Regional Economies
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The Fiscal Impact Model (FIM) Working Paper Series is the product of a continuing research project within the Demographic and Economic Analysis Section of the Utah Governor's Office of Planning and Budget. This Office has a primary function of evaluating state budgetary and planning issues. The Utah State and Local Government Fiscal Impact Model is an analytical process used to evaluate many of these issues. The model was originally developed in 1990 through the collaborative efforts of the Office's research staff and university faculty. Although the basic structure of the model is at this point institutionalized, refinements occur at practically each application. This working paper series documents the ongoing research associated with the development of this model.

Working Paper 94-2 has been partially funded with a grant from the Economic Development Administration. This working paper is an analysis of Utah's regional exports. The economic base concept and Utah's economic regions are discussed. Finally, estimates of exports by major industry are presented.

Other papers in the series currently include Working Paper 94-1: *The Base Period 1992 Utah Multiregional Input-Output (UMRIO-92) Model: Overview, Data Sources, and Methods*, and Working Paper 94-3: *Analytical Foundations, Research Findings, and Sensitivity Analysis*.

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I. Introduction

State government has a variety of options available to improve economic conditions at the state and local level. In addition to the traditional efforts of recruiting and attracting businesses, state governments apply innovative and creative approaches such as providing loan guarantees, supplying a source of seed capital for business start-ups, assisting in developing international markets, supporting community development, finding links between university research efforts and private industry, and many, many more.

Despite this proliferation of economic development programs, the most powerful forces under a state's control are the education of the population; the development and maintenance of the infrastructure (roads, airport, water systems, parks, etc.); the ensuring of a competitive tax structure, fair legal environment, and reasonable regulatory climate; and the availability of useful information to inform economic decisions. The focus of this research report is the latter, that is, creating a database and preparing economic analysis that helps decision-makers, in both the public and private sector, better understand Utah's regional economies. This understanding includes knowledge about economic base theory, identification of regional economies, and information on the industries that propel economic growth. With an improved understanding of the economy, decision makers can formulate policies that support and/or help create vibrant, competitive, and diversified economies.

This working paper presents many of the findings from an 18-month data development and modeling process on Utah's economy. To conduct this analysis,

large employment, wage, and personal income databases at the detailed county level were developed. The findings are presented by first describing the concept of economic base analysis. Economic base theory helps explain why the sources of outside income such as exports are so vital to local economies. A complete understanding of economic base theory also includes knowledge about the importance of internal forces of economic growth and import substitution. Next, economic regions are delineated. These regions are defined with the recognition that Utah's political boundaries, both as a state and counties, do not match economic boundaries or trading areas. The economic base can be better understood by grouping counties into more functional regional economies. Finally, estimates of exports from these regional economies by major industry are presented. These estimates of exports provide economists and economic development planners with the first and only published estimates of the sources of outside wealth to Utah's regional economies.

The Governor's Office of Planning and Budget (GOPB) wishes to recognize the funding support of the Economic Development Administration. This funding has permitted the office to devote resources towards the development of databases and models that otherwise would not exist. GOPB is committed to making information from this work readily available to interested researchers throughout the country and to build upon this research to improve economic conditions in Utah.

II. Economic Base Concept

Today's economy embodies a complex combination of specialized buyers and sellers. Interactions between buyers and sellers are dependent on multiple chains of relationships, stretching back through a maze of choices and alternatives. Economists are always searching for models that help simplify this complexity. Models help bring order and direction to observations about the economy so that an understanding of the underlying logic of the system can be gleaned. This logic can then guide decisions.

The economic base concept is derived from models analyzing the forces that drive economic activity. Understanding the economic base concept is vital to evaluating economic development policies and the importance of regional exports.

A. Defining Economic Base

The notion of economic base or, more often, "basic", means very different things to economists and non-economists. In identifying what is basic, economists are simply trying to identify those economic activities that create economic growth. The concept has both broad and narrow connotations. Defined broadly the economic base includes all activities in a local area that contribute, in a primary way, to the economic well-being of residents. Defined narrowly the economic base consists of those activities that result in the export of goods or services from a region and, therefore, generate income from the outside. Both the broad and narrow concepts are important to economic development planning.

The broad definition includes both internal and external forces that make an economy an attractive place to live, work, and do business. From this very broad

perspective, the economic base includes the quality of the environment, the safety of the community, the quality of public services and infrastructure, the richness of the culture, and the quality of the workforce. All of these factors are important to economic well-being and influence buyers and sellers in their economic choices.

The more distinct and narrow definition of economic base is quite simple: the local economy is divided into two sectors--a basic sector and a non-basic or service sector. Those economic activities resulting in the export of goods or services from a region, generating income from outside, are viewed as basic. The sale of goods and services to others within the region takes place in the non-basic or service sector. The basic sector "drives" the local economy, providing the income that fuels activity in the service sector. The level of economic activity in the service sector thus depends on the level of basic activity. It is this definition that is most specific to the research described in this paper, although the broader context is important because many factors beyond exports stimulate economic growth.

B. Internal and External Forces of Economic Growth

Within the context of understanding the economic base are the internal and external forces that propel economic growth. While the focus of this paper is external, with a focus on the contribution that exports make to economic growth, internal forces of economic growth are extremely important. These forces include the following.

- o Technological advances
- o Increased knowledge
- o Organizational improvements
- o Savings and investment

- o Entrepreneurial spirit
- o Workforce improvements

These internal forces help determine the quantity and quality of economic growth. In addition to these factors, changes in demographic structure such as rates of growth and age characteristics can impact economic activity, as can changes in labor force participation.

The point is that the forces that drive economic activity are much broader than just exports. Exports and local economic activity work together to create economic growth. This working paper focuses on exports, but acknowledges that other factors are important as well.

C. Import Substitution

In helping to create and nurture vibrant economies, decision makers must not only understand the internal and external forces of economic growth, but also the relevance of import substitution as it relates to exports. Exports are critically important to fueling economic development because of the outside income that flows into the economy. Import substitution is of equal importance because it has the same effect. Import substitution occurs when residents of an area substitute goods and services that would have been purchased from outside the regional economy for goods and services provided locally. Import substitution, therefore, prevents the leakage of income from the regional economy. When economies import less, they become more self-sufficient, less dependent, and more diversified.

Economic development, therefore, is multi-faceted. It involves an understanding of the economic base, including both the internal and external determinants of

economic growth. Economic development also depends on the level of exports and import substitution occurring within local economies.

D. Economic Regions and the Economic Base

While the initial focus of this research effort was to analyze industries in rural Utah, problems with a rural-urban distinction became apparent early on. First, the notion of separating rural from urban is problematic because economic performance in one is tied to the other. Second, defining what is urban and what is rural is difficult. The Bureau of the Census utilizes several different concepts including rural/urban, metropolitan/nonmetropolitan, and urbanized area. These concepts serve different purposes and follow different levels of geography. Third, and perhaps most important, for the purposes of describing what drives the level of economic activity, a rural/urban distinction makes no economic sense because it is not based on the flow of goods and services among trading regions. To understand the industries that fuel economic growth, regions must be identified that roughly approximate regional trading regions.

As discussed in the working paper FIM 94-1, which documents the Base Period 1992 Utah Multi-Regional Input-Output (UMRIO-92) modeling project, defining a region for the purposes of economic analysis is inherently subjective and the appropriate regional delineation depends on the application of the analysis. Insofar as possible, the regions used in UMRIO-92 are Utah's multi-county districts (MCDs), which are also the regions within the Utah Process Economic and Demographic (UPED) model. The UMRIO-92 regions decided upon are comprised of the following counties:

1. Southwest: Beaver, Garfield, Iron, Kane and Washington;
2. Southeast: Grand and San Juan;

3. Carbon-Emery: Carbon and Emery;
4. Central: Juab, Millard, Piute, Sanpete, Sevier and Wayne;
5. Bear River: Box Elder, Cache and Rich.
6. Wasatch Front: Davis, Morgan, Salt Lake, Utah and Weber;
7. Summit-Wasatch: Summit and Wasatch;
8. Uintah Basin: Daggett, Duchesne and Uintah; and
9. Tooele: Tooele.

Regions 3 through 9 are the sub-regions within the main North region. The Southwest, Central, Bear River, and Uintah Basin regions match the MCDs, and the Southeast and Carbon-Emery UMRIO-92 regions together match the Southeast MCD. The divergence from MCDs occurs in the UMRIO-92 Wasatch Front, Summit-Wasatch, and Tooele regions. The map on the following page illustrates the economic subregions for UMRIO-92.

Map

III. Estimates of Regional Exports

Economic development planners in Utah have never had estimates of regional exports by industry available to help with decisions about where to allocate resources. In fact for years the only way of understanding the economic base has been to examine estimates of employment or income by industry and then make judgements about the relative importance of each industry. In developing economic impact models for UMRIO-92, GOPB has utilized mechanical techniques and the informed judgement of the State Economic Coordinating Committee to develop estimates of exports by economic region in the state. These estimates are presented in this working paper by briefly describing the methodology and then giving an overview of the highlights at the major industry level by region.

A. Methodology

The methodology used in the UMRIO-92 project is more fully documented in the working paper FIM 94-1. Regional export estimates are a crucial part of the UMRIO-92 modeling process because these estimates are used to adjust national production technology to reflect regional trading patterns. In the sense that the UMRIO-92 models of Utah's various regional economies are based on national technology, they are part of a class known as non-survey based input-output models. The distinction between survey and non-survey based models is that survey models are based on original data collected through surveys of firms.

In general, input-output models are a means to examine structural relationships between various sectors of an economy. Input-output analysis most typically involves

the use of industry multipliers to measure the total effect throughout the economy resulting from a change in the output of a given industry. Input-output multipliers can be estimated in a number of ways, but it is generally agreed that the most accurate multipliers are based on an original data collection process which measures the flows of goods and services between the various sectors of the economy. Such a process can be used to develop a set of accounts, referred to as input-output accounts, which record transactions between different sectors of the economy and balance the sale of goods and services with the purchase of goods and services. The Interindustry Economics Division of the Bureau of Economic Analysis (BEA) has an ongoing program to produce input-output accounts for the U.S. economy. Every five years, primarily based on data gathered in the quintennial economic census by the Bureau of the Census, BEA constructs what are known as the Benchmark Input-Output Accounts for the U.S. Economy. The most recent benchmark accounts are for 1987 and have been summarized in the *Survey of Current Business* (April, 1994: pages 73-115).

During the course of the UMRIO-92 project, estimates of regional employment, earnings, value added, output, and exports, in addition to a number of other variables have been produced. While a set of input-output accounts for each region is largely implicit in the models, these accounts have not been explicitly developed. The main data sources used to develop the models, which will be discussed in turn, are the following.

- o Wages and employment by county at the industry (four-digit) level of the *Standard Industrial Classification* for 1989 and 1992 from the Utah Department of Employment Security.

- o Earnings by county at the major group (two-digit) level of the Standard Industrial Classification (SIC) for 1989 from BEA.
- o Gross state product, or value added, for Utah at the major group (two-digit) level of the SIC for 1989 from BEA.

The technique used to build the UMRIO-92 models requires estimates of output and exports by industry. Variables such as earnings and value added are used to estimate output, which is then used to estimate exports. Although much of the source data used in developing the UMRIO-92 models was reported at the county level, this data was simply summed to arrive at regional totals.

As part of its administration of unemployment insurance in Utah, the Department of Employment Security collects what are known as the employer payroll ES-202 reports. These reports, filed by every business with payroll, list number of employees and payroll wages, as well as information about the employer such as SIC industry and business address. The ES-202 reports are the most comprehensive and accurate source of data available concerning economic activity in Utah. Wages by industry and county from these reports formed the base data needed to build the UMRIO-92 models. Employment by itself was unnecessary during the model building, but since it is essential to report employment impacts as part of an analysis, the ES-202 reports provide the detailed employment data needed as part of the UMRIO-92 models' reporting feature.

Earnings include wages as well as proprietor's income and other labor income such as health and retirement benefits. Given BEA estimates of earnings at the two-digit level, the four-digit level ES-202 wages were used to disaggregate earnings to the

four-digit level. Value added by industry and region, which is the income that originates in the production of goods and services attributable to labor, property, and other factor services, was estimated by region and four-digit industry based on information from the 1982 U.S. National Input-Output Accounts (NIOA), and BEA's estimate of Utah's value added by two-digit industry. Given value added, total gross output by industry, which is the purchase of various inputs produced by other industries as well as the purchase of labor, property and other factor services, is estimated based on the 1982 NIOA.

The output of a given industry is either purchased locally by businesses, governments and consumers, or is exported outside the region. Exports are defined to be output sold outside the region, or, more generally, output purchased with funds from outside the region. Without an original data collection process, such as surveying individual firms, exports can only be estimated indirectly. In the UMRIO-92 models, exports are estimated as a residual. Given estimates of each industry's output, the estimation procedure identifies what portion of a given industry's output is required by other industries within the region. The difference between these regional requirements and output is the estimate of exports. Two mechanical estimates of regional requirements, discussed in more detail below, are produced. Since understating exports tends to overstate multipliers, the largest of the two regional requirements estimates is used to estimate exports.

The two procedures used to estimate regional requirements involve a value added location quotient and non-basic requirements. A value added location quotient measures the concentration of a region's value added within an industry relative to the nation. A location quotient of three means a given industry is three times as important

in the region as the nation. Given a location quotient of three in a particular industry, regional requirements would be estimated as one-third of the industry's output, while two-third's of its output would be exported. A location quotient less than one implies the industry does not export its output. The non-basic requirements technique estimates requirements based on the level of output in each of the region's industries. Assuming regional industries use national technology to produce output implies the inputs required to produce a given level of output. In other words, each industry's output implies certain requirements for the output of other industries. Assuming regional industries purchase inputs from suppliers within the region, it is possible to estimate the amount of each industry's output produced for local demand. As mentioned above, the largest of either the location quotient or non-basic requirement's estimate is used to estimate exports.

B. Regional Exports

The estimates of exports presented in this working paper include all output from private sector industries that is sold outside the region. In terms of the economic base concept discussed earlier in this working paper, these regional exports portray the sources of outside income to regional economies and are the more narrowly defined economic base. Economic development planners can use this information to help develop, shape, and prioritize efforts to improve economic conditions.

Bear River Graph

1. *Bear River (Box Elder, Cache, and Rich Counties)*

Exports in the Bear River regional economy are dominated by manufacturing. Manufacturing comprises 94 percent of total exports, the largest share dominated by one industry in any of the nine defined economic regions. The Bear River region has several large manufacturing employers including Thiokol Corporation, the manufacturer of the Space Shuttle solid booster rocket motor, missile propulsion units, and composites, and Morton International, the largest manufacturer of automobile airbags in the world.

Although none of the other major industries account for more than two percent of total exports, exports are estimated to be more than 10 percent of output in mining, construction, trade and services. With Bear Lake as a major tourist attraction, the export component of trade and services is largely tourism related. It is worth noting that though the export component of agriculture is about five percent, much of the region's livestock production is processed by the Miller Company's meat packing plant. The Miller Company's product is then exported as a manufactured good.

2. *Wasatch Front (Davis, Weber, Morgan, Salt Lake, and Utah Counties)*

The Wasatch Front regional economy has the largest private sector regional output at nearly \$45 billion. As the largest regional economy in the state it is also very well diversified with every industry but agriculture, mining, and construction contributing more than 6 percent of total exports. The Wasatch Front is the central place in Utah's

economy and serves as a financial, commercial, transportation and communication center for the intermountain west. Pacific Corp. power company and U.S. West Communications are both large utilities located in the Wasatch Front Region. The Salt Lake City International Airport is located in the Wasatch Front, along with a large distributing and wholesaling network. The Salt Lake metropolitan area serves as a central clearinghouse for a vast amount of economic activity statewide.

The largest export industry is manufacturing, comprising 57 percent of total exports. The Wasatch Front region includes over 2,100 manufacturing establishments. Many of these establishments export products outside of the region. The two largest manufacturing companies located in the Wasatch Front region are Geneva Steel, Inc., which accounts for about two percent of the nation's steel production, and Hercules, one of the nation's largest aerospace manufacturers.

3. *Wasatch and Summit Counties*

Wasatch and Summit Counties both have strong ties to the Wasatch Front, but are also quite distinct. The services and trade industries together account for nearly 50 percent of all exports from the region. These exports occur largely in the form of tourist spending for skiing, food, lodging, and gas. Manufacturing comprises 8 percent, followed by agriculture and mining which each comprise 7 percent.

With exports of \$90 million, finance, insurance and real estate (FIRE) comprises over 24 percent of total exports, and is thus an important part of the region's export base. The role of tourism in Wasatch-Summit's FIRE sector is particularly intriguing.

Wasatch Front Chart

Wasatch-Summit Chart

While FIRE output is \$387 million, \$192 million, or almost 50 percent, of this was housing output. Of the \$192 million in housing output, about \$30 million is estimated to be exported, or the second homes of people residing outside the region. In addition to these tourist expenditures on housing, much of the housing sold in Wasatch-Summit is sold to people moving into the region from outside. This phenomenon, which is especially pronounced in this region, is estimated to require the export of \$60 million of output from real estate.

4. *Central (Sanpete, Sevier, Millard, Juab, Wayne, and Piute Counties)*

The Central region's exports are dominated by essentially two large economic activities: power generation and turkey farming. The Intermountain Power Plant (IPP) is a coal fired power plant located in Millard County. IPP is a major exporter of electricity and helps explain why, with 39 percent of the total, the transportation, communications, and public utilities (TCPU) industry comprises the largest portion of exports. In the sense that electricity is a processed form of coal which is exported over power transmission lines, IPP is an example of what is known as exporting "coal by wire." Comprising 29 percent of total exports, turkey farming in particular, and agriculture in general, is the second largest export industry in the region. Agriculture makes up a larger share of the economic base in the Central region than any other region in the state.

Manufacturing is the third largest component of the economic base, with 15 percent of total exports. Interestingly, more than three-fourths of the region's

Central Utah Chart

manufacturing exports are in the form of processed agricultural products. Almost half of the region's manufacturing exports are from turkey processing plants, and more than one-fifth are from cheese processing plants.

Mining comprises nearly 10 percent of the economic base. Coal mining in Sevier County is the major component of mining in the region.

5. *Southwestern (Beaver, Iron, Washington, Garfield and Kane Counties)*

Exports in the Southwestern region are dominated by three industries: manufacturing, with 30 percent of total exports; services, with 28 percent; and trade, with 19 percent. The region has over 130 manufacturing establishments exporting \$134 million of goods, which is 73 percent of all manufacturing output. Exports from the trade and service industries, which result from tourist purchases, total \$210 million: 24 percent of trade output and 32 percent of service output are for export. The Southwest region is home to several national and state parks and has climate and scenery that attract many nonresident visitors to the region. Though agriculture accounts for less than 8 percent of exports, about \$35 million of agricultural products are exported, which is 35 percent of the industry's output. Interestingly, over 13 percent, or \$29 million, of FIRE output is exported, reflecting the large presence of non-resident second homes and real estate activity servicing non-resident home-buyers.

Southwestern Chart

Southeastern Chart

6. *Southeastern (Grand and San Juan Counties)*

With exports of almost \$100 million, the mining sector comprises 61 percent of the total in the Southeastern region. Although this region is rich in oil and gas resources, oil is transported out of the region to be refined. The next largest contributors to regional exports are the services industry at 17 percent and the trade industry at nearly 10 percent. With several wilderness areas, two national monuments, Lake Powell, and Arches and Canyonlands National Parks, as well as world renowned mountain-biking and river-rafting, the region attracts thousands of tourists every year. Services and trade exports reflect tourist purchases of lodging, food, and gas, as well as guided tours and biking incidentals. No other industry comprises more than 5 percent of regional exports.

7. *Carbon and Emery Counties*

The Carbon and Emery economic region is rich in coal. The abundance of coal helps explain why TCPU and mining together account for over 88 percent of the region's exports. The size of the TCPU industry reflects the region's export of "coal by wire" as there are two large coal fired power plants transmitting electricity outside of the region. Exports of coal are estimated to be about \$250 million, while exports of electricity are estimated to be almost \$280 million, or almost 100 percent of electricity production. Thus coal, in the form of a hydrocarbon or in the form of electricity, is a tremendous source of wealth for the region.

Carbon-Emery Chart

While agriculture is little more than 2 percent of the region's total exports, over 80 percent, or about \$13 million, of agricultural production is exported. Some construction and manufactured goods are exported as well. In addition, the trade and service industries export about \$19 million in output to tourists.

8. *Uinta Basin (Duchesne, Uintah, and Daggett Counties)*

Manufacturing and mining account for nearly 78 percent of total exports in the Uintah Basin region. The region is rich in oil and gas reserves and exports both the resource and the manufactured product outside of the region. Over 95 percent of the region's \$356 million in manufactured exports are petroleum related products. The TCPU industry is also a large contributor to regional exports commanding nearly 14 percent. The Deseret Generating facility is located in Uintah County as are both above and below ground oil and gas transportation industries. Though agricultural products account for less than 6 percent of the region's exports, the \$51 million of agricultural exports comprises over 80 percent of the industry's output.

9. *Tooele County*

With exports of \$377 million, manufacturing accounts for almost 70 percent of Tooele County's exports. This amount is split between Reilly Industries' petroleum refining facility in Wendover and Magnesium Corporation of America's processing operations on the west shore of the Great Salt Lake. With \$61 million, TCPU accounts

Uinta Basin Chart

Tooele Chart

for over 11 percent of exports. Most of these exports reflect the hazardous waste disposal operations of U.S. Pollution Control and E.G. and G. Defense Materials.

Though agricultural exports, at \$10 million, are less than 2 percent of the total, almost 70 percent of the County's agricultural output is exported. Reflecting a growing tourism sector, trade and service exports amount to \$34 million, or about 6 percent of the total.

IV. Conclusion

Developing, analyzing, and disseminating economic information is one of the main functions of government in economic development. In formulating economic development policies, decision makers need information about the forces that drive economic growth. Decision makers need to understand the importance of external and internal forces in shaping the quantity and quality of economic growth. It is also important that economic development efforts recognize the concept of regional economies and not just the political economies of states and counties. Finally, decision makers need specific information about the major industries that are sources of outside income to the economy.

This working paper has presented estimates of Utah's regional exports by first elaborating on the economic base concept. The point has been made that exports are very important, but are not the only factor in determining economic growth and vitality. Internal forces such as technological advances, increased knowledge, organizational improvements, savings and investment, entrepreneurial spirit, and workforce improvements have also been identified as very important components in creating economic wealth.

Economic regions have been defined and presented. These regions are based on planning regions developed in the past, but have been reevaluated from an economic perspective and a few refinements have been made. Journey to Work data from the 1990 Census and the political needs for data and analysis have both been

considered. Nine regions have been delineated with the Wasatch Front representing the central core of the nine regions.

Using mechanical procedures and the judgement of informed economists within the state, estimates of exports by region have been identified. These regional exports portray the economic base of nine regional economies in Utah. Highlights from these estimates have been briefly summarized.

This report provides decision makers with information about economic base theory, Utah's regional economies, and regional exports. Economic development planners can now use this analysis to formulate policies that support and/or create vibrant, competitive, and diversified economies.