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INTRODUCTION

The rural health sector often plays a vital yet overlooked role in the economy of many rural areas. At the same time, the rural health care delivery system is rapidly changing. These changes, which may or may not be for the better, have the potential for affecting the quality and quantity of delivered health care in Morgan County West Virginia and other rural locations. Changes in the health care delivery system include the growth in managed care systems, which may require local patients to bypass local health delivery systems and decreases in Medicare and Medicaid subsidies to local hospitals and other service providers, which could also lead to a reduction in locally provided health services. The growth in provider networks may change the nature and location of local health care services. The growth in the use of telemedicine has the potential for increasing access to consultative and specialty care at the local level. The designation of critical access hospitals for underserved rural areas by the federal government could help rural communities retain local health care service providers.

Because of all of these elements, understanding the contribution of the local health care sector to a local economy is a vital piece of information. This contribution has been examined in many communities throughout the US. Input-output (I-O) models have usually been the tool of choice for such studies. The Social Accounting Matrix (SAM) has been advanced as an alternative and perhaps superior tool for examining economic impacts and drawing inferences concerning policy analysis at the regional level. However, SAMs have not been properly used to examine the impact of the local health care sector on a regional economy. Presented here is preliminary analysis discussing the use of a regional SAM in evaluating such impacts in Morgan County, West Virginia.

Initially provided is a short discussion concerning why the health sector is important to a local economy, especially a growing economy such as Morgan County. A short discussion of the economic structure of the county is also provided. The IMPLAN model building system was used to help construct a SAM of the Morgan County economy. Workers and their consumption

are usually delineated by functional or income class in a SAM. Workers and their household spending are delineated by income class In IMPLAN-based SAMs. However, extensive work was required to modify the original IMPLAN-based SAM. Currently, this modification centers on introducing industry detail into the linkage between local payments to labor by local industry and resulting household consumption. Hence, the modification of the original SAM is extensively discussed, including how money and nonmoney income was allocated by income class. Results from the preliminary model of the Morgan County Economy with respect to the health care sector are then discussed. Finally, areas of future work are highlighted.

ECONOMIC DEVELOPMENT AND HEALTH CARE SERVICES

The nature of local health care services can influence economic development and growth by adding in the attraction and retention of local businesses and by attracting affluent retirees and others to an area. Of course, the sector also makes a direct and indirect contribution to local economic activity.

Health Care and Economic Development

Businesses and industries arise in places for very many different reasons. Some industries, such as coal mines or certain food processors, exist in a given location because of local natural resources. Other businesses, such as major retail outlets, are often attracted to larger communities because of the large population and income base. Still other businesses grow in certain locations because of specialized local labor forces and the interconnections between firms. For many so-called footloose businesses, especially technology-oriented firms that many communities seek to attract, the local quality of life (QOL) is an important element.

The local availability of high quality health services is an important QOL element in the location of many footloose firms (Lyne, 1990). First, businesses do not wish to relocate managers and workers to an area where health care services are subpar. Second, local individuals who wish to grow a business may opt to move elsewhere if they perceive the local

health care system to be of poorer quality. Local health care is also important because of its influence on worker productivity (Eilrich et al. 2000). A healthier workforce is also more productive; hence, the interest by businesses in the quality and availability of local health care services.

The cost of health care services is another potentially important factor in business location decisions. Corporations are constantly seeking ways to control health care costs. Areas that can provide health care at a lower cost have a leg-up on other communities. One study indicated that health care costs were used as a tie-breaker between similar sites in many location decisions (Lyne).

Attracting affluent retirees has become an economic development strategy for many rural communities. Such retirees are generally amenity seeking and desire a mixture of outdoor activity, good weather, and cultural and social activities. A Gallup poll survey of people age 50 and older also indicated that 60 percent of all respondents felt small towns and rural areas were better places to make ends meet and get in touch with more important values (Graff and Wiseman, 1990). Individuals 65 and older account for 50 percent of discretionary spending on a national basis. Attracting affluent retirees is particularly appealing for a local community because on average these individuals spend an estimated 90 percent of their discretionary income locally (Fagan, 1995).

Local health care services are a key element in the location decisions of most retirees. *Where to Retire* magazine conducted a survey of its subscribers concerning the most important considerations for choosing a retirement community. Good nearby hospitals ranked only behind low local crime rate in importance as a factor retirees use in deciding where to live (Longino, 1995). In her study of migration in the Pacific Northwest region, Cook (1990) indicated that per capita number of physicians was an important element in relocation decisions by retirees.

The economic impact of the local health sector is also another important contribution to the local economy. For many rural communities, the health care sector is responsible for a

disproportionate percentage of local jobs and income. In many rural communities, jobs in the local health sector account for 10-15% of all local employment (Eilrich et al.). This impact grows when secondary impacts are included. For example, a study conducted in Grant County, Wisconsin indicated that the local health care sector was directly responsible for six percent of local employment and seven percent of local earnings. However, the contribution of the sector to local employment increased to 12% and contribution to personal income grew to 13% when the multiplier effect was accounted for (Bodeen and Shaffer, 1998).

The Morgan County Economy

Morgan County is located in the eastern panhandle of West Virginia and borders western Maryland. Census data indicates that the county had a population growth of 23.2% (2,815 people) in the 1990s, the second largest percent increase in population among all West Virginia Counties. Much of the growth is undoubtedly due to the county's close proximity to the Baltimore-Washington Metropolitan Area. Economic activity is concentrated in tourism and trade, sand and gravel mining, and the wood products industry.

Data indicates that the health care sector continues to grow in Morgan County. Reported employment in the sector grew by 2.4% from 1997 to 1999, and the number of health care establishments that reported having employees to the West Virginia Bureau of Employment increased from 14 to 16. This bodes well for the local health sector as local demand for health services can be expected to increase with growth in local population and income.

THE MORGAN COUNTY SAM

Interindustry models are a well-established procedure for examining the effects of the development of a particular industry on a regional economy. This set of models include the more traditional input-output (I-O) model, the social accounting matrix (SAM) (Adelman and Robinson 1986), and the price flexible Computable General Equilibrium (CGE) model (Berck et al., 1990). In the SAM, the I-O framework is extended by explicitly modeling relationships

involving nonmarket income flows, such as government transfer payments to households. The flow of income from industries in the region to regional households as providers of factors of production is also explicitly outlined in a regional SAM. Historically, SAMs have been constructed along either income class or functional lines to allow for examining changes in income distribution under various scenarios.

Current research effort has been placed on verifying and, when appropriate, changing the original Morgan County SAM generated with IMPLAN (1997 data). We feel that such efforts are important, in that a misspecified model could yield inaccurate results and hence, erroneous conclusions and recommendations. The result was a so-called hybrid model, where a nonsurvey model, such as the one produced by IMPLAN, is changed to improve accuracy that is based on knowledge of the local economy and superior data (Miller and Blair 1985).

The original IMPLAN model was verified and, when appropriate, changed based on four data sets: the ES202 data set for Morgan County from 1997-1999 at the four-digit Standard Industrial Classification (SIC) Code level; the Regional Economic Information System (REIS) data set for 1997-1998 at the two-digit SIC Code level produced by the U.S. Department of Commerce; information concerning the level of self-employment in industries based on the North American Classification System (NAIC) also produced by the U.S. Department of Commerce; and the ReferenceUSA Business Database (formerly the American Business Disk).
[i]

The calibration of the IMPLAN model is similar in many respects to that found in the IMPLAN User's Guide (Minnesota IMPLAN Group, 2000). However, our version of the model has the added advantage of being constructed based on a completely disclosed ES202 data set for Morgan County (IMPLAN relies on County Business Patterns to account for data not disclosed in their ES202 data set). Further, their data set for a county involves a RAS procedure based on a state data set, which we found to produce inaccurate results for some

industries. For example, the supply estimate for hospitals (490) in the original IMPLAN model was much too low because it is a government owned facility.

The IMPLAN sectoring scheme provided in Appendix A of the IMPLAN User's Guide (2000) was implemented in an Excel array formula based program. This program was employed to sum our Morgan County ES202 data set for number of establishments, number of jobs, and total covered wages. A separate Excel array formula based program was used to calculate the ratio between earnings (from REIS) and ES202 wages at the West Virginia State level. This ratio at the two-digit level was used to bridge ES202 wage data for each IMPLAN sector in the Morgan County model into earnings estimates. The ratio between these earnings based estimates were then used to provide estimates of industry output, and of all elements of value added in the modified Morgan County IMPLAN model. Employment estimates were obtained in a similar fashion, except recently published data concerning self-employment at the state level (U.S. Bureau of the Census, 2001) were used to provide the bridging ratios. Finally, our estimates were compared to those found in the ReferenceUSA Business Database and the REIS dataset for the county. We made adjustments to our estimates particularly in the retail trade and nonmedical services.

As previously stated the focus here was on constructing a properly delineated SAM. Accordingly, another important change that was made to the original IMPLAN SAM for the regional economy concerned the way in which payments to labor (employee compensation in IMPLAN) and payments to owner-operators (proprietors income in IMPLAN, which are a mixture of returns to capital and labor) are accounted for. In the original IMPLAN SAM, In terms of consumption and aggregate nonmarket income flows, IMPLAN reports household interaction with the rest of the economy by dividing households into nine income groups (ranging from under $5,000 (the lowest) to over $70,000 (the highest) categories). However, for employee compensation and proprietors income, payments to each type of household are placed in a common income pool (i.e., payments to labor and returns to proprietors at the industry level

form a single row). Total payments are then allocated to the nine income households based on fixed income shares. Any change in earnings by a particular industry is treated as a typical or regional average change in income across the nine income groups. But the distribution of earnings between income levels can vary markedly among different regional industries. The result of this approach is the so-called "brain dead" SAM, where effects of industry and policy changes on the distribution of income can not be estimated or evaluated (Alward 1996).

Our strategy was to attempt to eliminate the brain dead SAM problem, by constructing an income distribution matrix linking payments to labor by industries to households by their personal income class. Personal income accounts are used in building and generated from input-output model building systems, such as IMPLAN. For example, IMPLAN relies heavily on the Regional Economic Information System (REIS) data that is generated at the county, state, and Metropolitan Statistical Area levels by the Bureau of Economic Analysis in the US Department of Commerce. Personal income estimates and other REIS data are consistent with national income and product accounts. Estimates of personal income are the driving force behind household consumption in any IMPLAN generated model (Olson, No Date).

Our task of generating the income distribution matrix was daunting because personal income is comprised of both money and nonmoney income (Olson). Based on national data for 1997 provided in Olson, money income only constitutes 75% of personal income (or personal income is 35% larger than money income). Estimates of money income by class can be obtained at least at the state level by income class for workers in a variety of industries. A more difficult task is to construct a reasonably accurate way of distributing non-money income to households by income class on the income-earning (as opposed to consumption) side.

We used the Integrated Public Use Microdata Series (PUMS) dataset (Ruggles and Sobek et al., 1997), to estimate the relationship between industry and household by money income class for West Virginia (and Morgan County). The PUMS dataset is based on the 5% Sample from the ten-year Census, meaning we relied on 1990 data, the most recent available at

the time this part of the analysis was done. Array formulas were used in Excel to calculate these relationships consistent with the industry aggregation and income aggregation in our IMPLAN model.

We then estimated the relationship between money household income and the various forms of nonmoney, personal income by money household income group. That is, how much nonmoney income does a typical household in a given money income class receive from a specific source, such as food stamps? A possible limitation of such an approach is that the estimates of these relationships are generally based on national data. This requires the assumption that within an income class, behavior at the state or regional level is the same as found nationally. While we believe that this assumption is reasonable, it is also eased to a certain extent by the use of regional control total in several different ways. First, REIS and other data source usually provide regional control totals for indicating the total level of nonmoney payments. Further, based on annual census and other data sources, IMPLAN provides an estimate of personal income by income class (Olson). These estimates are used to drive household spending in the model. Hence, our procedure of building up from the PUMs data yields estimates that must ultimately be reconciled with these other data sources.

Personal income excluded from money income are generally "payments" may to or on behalf of individuals, but which do not go to the individual as immediate money income. For example, employer payments to government employee retirement plans and to private health and pension plans form nonlabor income as part of personal income. These payments are not included in money income. Transfer payments are an important part of personal income and money income. However, the value of in-kind transfer payments are included in personal income but excluded from money income. For example, Medicaid and Medicare are payments made to medical service providers on behalf of individuals. These payments are treated as income in personal income, but are not money income. Food stamps are another form of in-kind payments to individuals. Various types of imputed income (the valuation of a "free" service or a

capital consumption) are also included in personal income but not money income (US Dept. of Commerce, BEA, 2001).

Money income also includes some income that is excluded from personal income. This included sources of income are personal contributions for social insurance, various forms of retirement income from government worker retirement plans and private pensions and annuities and certain interpersonal income transfers, such as child support payments (US Dept. of Commerce, BEA, 2001).

Of these exclusions, the most important was the contribution to social insurance. We adjusted money income levels based on income class and the rules for social security contribution income limits for 1997 (U.S. Social Security Administration, 2003). We also limited our use of the PUMS data to positive earnings only, thus reducing the import of any type of current retirement money payment.

Other labor income forms one part of the nonmoney personal income flow to households from industries primarily in the form of employee insurance and retirement benefit payments. Estimates of the value of employer provided health insurance as a employee benefit by income class were based on the Current Population Survey (CPS) Special March Supplement Survey (U.S. Bureau of Labor Statistics and U.S. Bureau of the Census, 2001). According to the US Department of Labor survey based publication (2002) “Employer Costs for Employee Compensation, 1986-99”, health care was responsible for 90.2% of all employer paid insurance related benefit costs in 1997. Accordingly, is was assumed that the distribution of all employee provided insurance benefits by income followed the distribution that we estimated for health care as a worker benefit.

Another element of personal, nonmoney income is funds that are generated by retirement accounts but are not currently being received by households. This change in asset base is considered as a source of personal income in product and income accounts and hence should be included in any regional SAM. Household financial data published by the U.S.

Federal Reserve Board (2002) were used to estimate the distribution of this type of income by our household income groups. This data is reported for 1995 and 1998 based on surveys of 4,325 households nationally. We used a variable that reported the level of the total value of IRA accounts, thrift accounts, and future pensions to measure the value of retirement payments by our household income classes. Because the data is reported as a stock, it was necessary to calculate the changes in the value of this variable from 1995 to 1998. We calculated the change in the median value of this asset across our income groups. This change was annualized to arrive at an estimate of the change in household income by money income class due to growth or decline in retirement accounts. As expected, the increase in absolute and even percentage terms was concentrated in higher income classes. In fact, the four income classes under $20,000 reported drops in the value of such assets during this period.

Another important element of nonmoney income was interest income. This income took the form of imputed income and nonmoney income that is actually received but not accounted for in census data. Part of imputed income is an estimate for the value of a service that is an individual receives but there is no charge for that service. One form of imputed interest income is financial services that are performed by banks and other financial fiduciaries for individuals, but where there is no charge. Several data sources were evaluated as a means to estimate the distribution of various types of nonmoney and imputed income as interest payments. Ultimately (following the convention used in state personal income accounts), it was assumed that interest payments of this type (with the exception of the value of owner housing) followed the same distribution as reported by income class in Internal Revenue Service data (2003) adjusted gross income (AGI) data. We used the same procedure to distribute the value of nonmoney dividend payments (once again, primarily a valuation of free services) not accounted for in the census money income data.

Another form of nonmoney personal income is the value of owner occupied housing. The value of imputed net income on owner occupied housing was calculated based on the

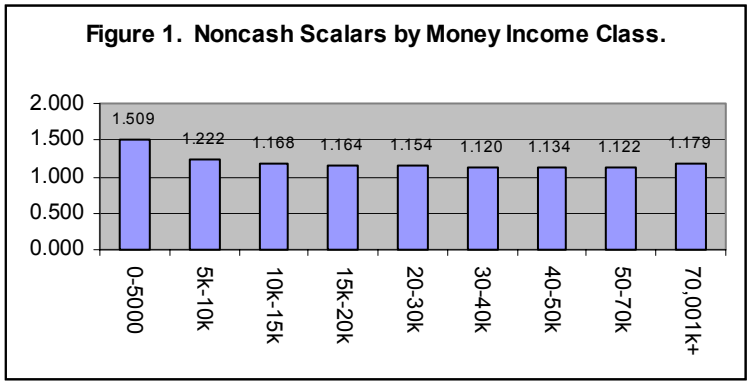
Consumer Expenditure Survey (CES) (U.S. Dept. of Labor, 2003). The CES reports housing principal payments by income class. This value was used as a proxy to estimate how much the value of owning a home enhances money income for a typical household in each money income class.

The last set of nonmoney income involved transfer payments that were in the form of in-kind services or payments (food stamps and Medicaid). [ii] The value of food stamps was distributed to the money income classes based on data taken from the CES (U.S. Dept. of Labor) and REIS estimates of state and county-level food stamp payments. The CES reports money income by income class; it also reports a total for public assistance, supplemental security income (SSI) payments, and food stamps by money income class. Public assistance and SSI are cashed based types of payments (U.S. Social Security Administration) and hence already accounted for as money income. Based on state REIS data for transfer payments, a coefficient was calculated for food stamps as a percent of these three categories. The resulting coefficient was used to estimate the value of food stamp payments by income class. Food stamp payments were then calculated as percent over and above money income (i.e., dividing the total of food stamps plus money income by money for each income class). The result was an estimate of how much food stamps "enhances" money income for a typical household in each money income class.

The value of Medicaid payments as a form of household income by income class was estimated based on data collected in the Current Population Survey (CPS) Special March Supplement Survey (U.S. Bureau of Labor Statistics and U.S. Bureau of the Census). The value of Medicaid surveys and household money income levels are reported by observation in the survey database.

Our final estimates of the distribution of our non-money income scalars by money income class are provided in Figure 1. As show in the figure, the distribution of the scalars is u-shaped. The adjustment to the lower income households is relatively large. The adjustment

then declines for middle-income households, before increasing again for the higher income households. This effect is not surprising given the nature of non-money income. That is, a significant share is in the form of program such as Medicaid, which primarily go to lower income households. On the other hand, other forms of non-money income, such as non-money interest



and dividend payments, tend to disproportionately benefit higher income households.

The adjustment values were used to scale the individual estimates from the PUMS data. By working on the individual observation level, households could move between income classes in going from money to personal income. For example, households in the higher end of the $40,000 to $50,000 money income class would move into the $50,000-$70,000 personal income class. Households in the lower end of the $40,000 to $50,000 income class would not shift to a higher personal income class.

Accuracy of our income distribution matrix was a major concern given the way in which we calculated money income and the various types of adjustment that we made to those estimates in arriving at our income-side distribution of personal income. We evaluated accuracy in several respects. First, we compared our income-side personal income estimates to the distribution of personal income that is used to drive household consumption estimates in IMPLAN. We compared both the estimates of total income by personal income class and the number of households in each personal income class between the two sets of estimates. Second, we did the same comparison using the three personal income classes found in earlier

versions of IMPLAN. Third, we examined the distribution of personal income to workers for the individual industries in our model for any anomalies.

We also realized that the match between the two sets of estimates would not be exact, given that we omitted Medicaid because it primarily supports health care for retired individuals and that we only included PUMS data where individuals reported some type of earned income. Both Medicaid benefits and individuals with no-earned income influence personal income on the consumption side (i.e., the IMPLAN household spending based estimates).

Given these caveats, we were generally pleased with the "accuracy" of our estimates of the distribution of personal income from the payment side. In particular, differences between personal income from the payment side and consumption side were not large. For the five personal income classes ranging from the $5,000-$10,000 class to through the $30,000-$40,000 class the largest difference was 8.4%. Our estimates were somewhat lower than the IMPLAN estimates for the subsequent next two highest income classes and somewhat higher than the IMPLAN estimates for the highest income class ($70,000 plus). Our estimates also exceeded those from the consumption side for the lowest income class (less than $5,000). The mean squared error between the two sets of estimate was 0.0218. Both a zero intercept and unconstrained regression between the two estimates indicated an r-square value well over 90% and a slope coefficient close to (within one standard error of) one (Aigner, 1972).

We also analyzed our results based on the personal income classes (less than $20,000, $20,000-$40,000, and $40,000 and over) used in earlier versions of IMPLAN. For less the than $20,000 income class, our estimate was 1.4% less than the estimate on the consumption side, for the middle income group the two estimates were almost the same (a difference of under 1%) and for the $40,000 and up income class the difference was just over 1%. The mean squared error between the two sets of estimates was 0.000119. Given how well the two sets of data tracked, we decided to base our analysis on a three-income level SAM from both the consumption and income reception sides.

We used the income side to divide employee compensation and proprietors income into our three income classes. The resulting matrix and the matching three final demand vectors were both joined to the regional input matrix. The resulting model was inverted in the usually manner to provide multiplier estimates and industry-based analysis.

MODEL RESULTS

Model results were compared to results from the original IMPLAN SAM. Model results were also used to provide a preliminary analysis of the economic impact of the local health care sector. The latter took the form of a 50% change in direct activity at the local hospital.

Output multipliers for the 27 industry sectors in our IMPLAN SAM and the original IMPLAN SAM for Morgan County are provided in Table 1. As expected, multipliers for most sectors (twenty-five) increased slightly with our three-income class model as compared to the original IMPLAN–based estimates. The largest increases were noted in service sectors, government, and trade. For example, the output multiplier for government increased from 1.3186 to 1.4639. The output multiplier for personal services showed a 5.3% increase. Using an unweighted average, the output models in the revised SAM increased to 1.3864 from 1.3480 in the original SAM (a change of 2.84%) and the change in the secondary impact portion was 11.01%.

We also compared the impact of a 50% change in activity at the local hospital ($3.22 million) on the local economy (Table 2). The total impact on output in the local economy was $4.696 million (a 2.1% change in total economic output in Morgan County in 1997). The largest impacts were in trade ($0.185 million), financial activity (FIRE) ($0.471 million), and professional services. (In the original SAM model, the same impact scenario led to a predicted change in economic activity of $4.513 million).

We also used the SAM to assess the impact in terms of the three income classes (Table 2). The lowest income class would experience the smallest decrease in income ($0.406 million) or 19.8% of the total income impact. The impact on the middle income group was projected at

$0.804 million (39.2% of the total) and the effect on the highest income class was $0.843 million (41.0%). Our ability to examine impacts by income class is a major advantage of the revised over the original SAM model of Morgan County.

Summary and Conclusions

We attempted to provide some preliminary numbers concerning the impact of the local health sector on the Morgan County West Virginia Economy. A revised version of an IMPLAN-based SAM for 1997 was used to examine that impact and the local economy. The revision was primarily based on adjusting the way that IMPLAN accounts for the distribution of income from industries to households. The discussion focused on how the money and nonmoney income portions of personal income were both allocated by income class. Despite the use of many different sources of data, often at the national level, evaluation of the resulting industry to income distribution matrix indicated that it was sufficiently accurate to draw inferences from model results. We compared multipliers from both versions of the IMPLAN-SAM for Morgan County and a preliminary health sector (hospital) based impact.

Future work needs to be conducted in several different ways. First, the analysis should be expanded to include all parts of the local health care sector. Second, an evaluation should be conducted to determine how the various shocks could affect the distribution of local income. That is, would growth in the local health sector be primarily skewed toward higher income classes? Finally, the income analysis should be tied to employment, possible through an industry-occupation matrix, to evaluate the impacts on jobs (occupations).

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Table 1. Comparison of Output Multipliers from the Revised and Original IMPLAN-Based SAM of the Morgan County Economy.

Sector Number and Name	Revised SAM Total Output	Revised SAM Income	Orignal SAM Type I Output	Orignal SAM Output	Revised vs. Original Output	Revised vs. Original Secondary Impacts
27 Agriculture	1.6215	1.4032	0.2183	1.2967	1.3735	2.16%	7.94%
28 Mining	1.7934	1.2857	0.5077	1.0677	1.2313	4.42%	23.55%
53 Petroleum	1.5812	1.3753	0.2058	1.2909	1.3747	0.05%	0.18%
56 Construction	1.6875	1.3907	0.2969	1.2644	1.4062	-1.10%	-3.81%
58 Food Processing	1.5649	1.3763	0.1886	1.2795	1.3416	2.59%	10.17%
108 Textiles	1.5922	1.3058	0.2864	1.1652	1.2591	3.71%	18.03%
133 Wood Products	1.9227	1.5722	0.3506	1.4041	1.5305	2.72%	7.85%
161 Paper, Printing	1.7053	1.3193	0.3860	1.1461	1.3046	1.13%	4.84%
186 Chemicals	1.5680	1.2984	0.2696	1.1888	1.2845	1.08%	4.88%
254 Metals	1.8951	1.3166	0.5785	1.0818	1.2698	3.69%	17.35%
355 Electronic Equipment	1.4988	1.3672	0.1315	1.3092	1.3563	0.81%	3.07%
400 Miscellaneous Manufacture	1.8818	1.4001	0.4817	1.1777	1.3359	4.80%	19.10%
433 Transport, Communications	1.6754	1.3807	0.2947	1.2477	1.3590	1.60%	6.06%
443 Utilities	1.5711	1.2456	0.3255	1.1119	1.2230	1.85%	10.13%
447 Wholesale Trade	1.8596	1.3608	0.4988	1.1301	1.2929	5.25%	23.17%
455 Trade	1.8572	1.3533	0.5039	1.1123	1.2940	4.58%	20.16%
456 FIRE	1.3669	1.2238	0.1430	1.1602	1.2145	0.77%	4.33%
463 Personal Services	1.9450	1.4701	0.4750	1.2383	1.3967	5.25%	18.50%
469 Business Services	1.6976	1.3481	0.3495	1.1830	1.3309	1.30%	5.22%
483 Recreation	1.7685	1.3337	0.4349	1.1295	1.2921	3.22%	14.23%
490 Doctors and Dentists	1.9075	1.4067	0.5007	1.1977	1.4059	0.06%	0.20%
491 Nursing and Protective Care	2.0478	1.4761	0.5717	1.1896	1.4159	4.25%	14.47%
492 Hospitals	2.0959	1.4583	0.6375	1.1620	1.4019	4.03%	14.04%
494 Professional Services	1.6912	1.3531	0.3381	1.2117	1.4419	-6.16%	-20.10%
495 Education	2.2948	1.6006	0.6942	1.2610	1.4906	7.38%	22.41%
499 Miscellaneous Services	2.1275	1.5462	0.5813	1.2648	1.4514	6.53%	21.00%
516 Government	2.4323	1.4639	0.9684	1.0161	1.3186	11.02%	45.59%
Unweighted Average		1.3864			1.3481	2.84%	11.01%

Table 2. Impact of 50% Reduction in Local Hospital Activity on the Morgan

Sector Number and Name	Low	Medium	High	Total
		(Millions 1997 $)		
27 Agriculture	0.002	0.007	0.003	0.013
28 Mining	0.000	0.000	0.000	0.000
53 Petroleum	0.000	0.001	0.000	0.002
56 Construction	0.008	0.025	0.012	0.045
58 Food Processing	0.000	0.000	0.000	0.000
108 Textiles	0.000	0.000	0.000	0.001
133 Wood Products	0.003	0.008	0.004	0.014
161 Paper, Printing	0.001	0.003	0.001	0.005
186 Chemicals	0.010	0.032	0.015	0.057
254 Metals	0.000	0.000	0.000	0.000
355 Electronic Equipment	0.002	0.006	0.003	0.011
400 Miscellaneous Manufacture	0.000	0.000	0.000	0.000
433 Transport, Communications	0.009	0.029	0.013	0.052
443 Utilities	0.004	0.013	0.006	0.023
447 Wholesale Trade	0.010	0.031	0.015	0.056
455 Trade	0.034	0.104	0.048	0.185
456 FIRE	0.086	0.264	0.122	0.471
463 Personal Services	0.011	0.034	0.016	0.061
469 Business Services	0.019	0.060	0.028	0.107
483 Recreation	0.000	0.001	0.000	0.001
490 Doctors and Dentists	0.007	0.022	0.010	0.039
491 Nursing and Protective Care	0.006	0.019	0.009	0.033
492 Hospitals	0.596	1.838	0.849	3.283
494 Professional Services	0.024	0.074	0.034	0.131
495 Education	0.001	0.004	0.002	0.006
499 Miscellaneous Services	0.009	0.026	0.012	0.047
516 Government	0.009	0.028	0.013	0.051
Total Output				4.696
Income under $20,000	0.074	0.227	0.105	0.406
Income $20,000-$40,000	0.146	0.450	0.208	0.804
Income over $40,000	0.153	0.472	0.218	0.843
Total Income				2.053

[i] ReferenceUSA is an Internet-based library reference service provided by the Library Division of infoUSA (ReferenceUSA 2000). The database contains detailed information on nearly 12 million U.S. businesses. This information is amassed from Yellow Page and Business White Page telephone directories; annual reports, 10-Ks and other SEC information; federal, state and municipal government data; Chamber of Commerce information; leading business magazines, trade publications, newsletters and major newspapers; and postal service information, including National Change of Address updates. Business information is verified each year by telephone and information for businesses, with at least 100 employees, is verified twice a year.

[ii] Medicare is another important source of this type of income. However, because we are primarily interested in earned income, we ignored recipients of Medicare benefits, who are primarily retirees.