Implications of Mobility in Open Local Labor Markets

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1. Introduction

Throughout the United States, governments and non-profit agencies seek to promote economic development at the local level, employing a wide range of strategies typically intended to foment the expansion of private business activity. These strategies include dissemination of recruitment information; investment in industrial parks, business incubators and infrastructure (including tourist attractions); provision of small-scale credit programs; manipulation of zoning and environmental regulations; granting of tax concessions and other, similar measures.

Despite their ubiquity, these efforts are rarely informed by a coherent understanding of what the *economic development* they are trying to achieve really is, particularly in its qualitative dimensions. Instead, economic development is usually taken to reside in the quantitative growth of some local aggregate (such as jobs, sales, or new business formations), or even in the growth of a programmatic output (businesses recruited or credit granted, for example). Qualitative dimensions of development linked to the actual improvement in the well being of existing residents – reduction of poverty and unemployment, boosting the pay of existing residents, protection of environmental quality, provision of public amenities (except insofar as they affect "business climate"), improvements in public health, and the like - appear to play a negligible role in the formulation and evaluation of development strategies.[1]

This apparent disconnect is of course explained by the conviction that quantitative growth brings, in its wake, qualitative change. This may happen in any number of ways, but a critical one, and the focus of this paper, is the way in which the growth of *demand* for locally owned resources – labor, in particular – affects the incomes of the owners of these resources. The implicit assumption is that there are local markets for labor, real estate, and other resources, and that the growth of demand in these markets will raise prices (rents, wages, and so forth) and hence local incomes.[2]

In the case of the labor market, a common variant of this argument is that not just any sort of demand growth will do; rather, what is required is growth in the number of "good, high paying" jobs. Such jobs are typically associated with particular industries (mining and manufacturing, for example) and it is implicitly assumed that workers who are currently unemployed or earning low wages would be able to occupy such jobs if only they were locally available. Thus an increase in the number of good jobs is seen to address the problem of low local incomes in part directly, rather than indirectly through a generalized increase in labor demand and wages.[3]

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[1] For example, the economic development effect of local projects is commonly assessed using economic impact models to calculate the number of jobs the project will generate. Ironically, the derivation of the multipliers used in these models typically implicitly *assumes* that job growth will not have positive wage effects.

[2] Some development policies – business incubators and micro-credit programs, for example – aim to raise incomes, particularly those of low income individuals and families, by also increasing the *supply* of complementary factors such as technology and human and financial capital.

[3] Whether a job is good or not might of course be considered a matter of *occupation* rather than *industry*. But if that were the case, a pattern of development which is deliberately biased towards good job growth

Whether growth in local demand for resources will in fact lead to higher resource prices and local incomes depends on the elasticity of resource supplies. At one extreme, resources that are locally fixed in supply, or nearly so – prime commercial or residential locations, for example – will accrue economic rents as demand grows. At the other extreme, in the case of some resources – credit, for example - the local economy is small and open, meaning that prices are tied, through resource mobility and arbitrage, to those in broader regional, national or global markets. In these cases there are, in effect, no closed local resource markets; local demands determine only the extent to which resources are used, while external markets determine the prices.[4]

We argue in this paper that local labor mobility is such that in most communities, labor markets are small and open and that wages and unemployment rates are determined by conditions in larger, external labor markets and by patterns of inter-local compensating differentials and differences in costs of living. This has several important implications for local economic development initiatives and for the interpretation of local labor market conditions. In particular, in the following sections we show that high labor mobility implies that:

1. Local differences in local wages overstate differences in economic welfare,

2. Most of the decline in average earnings that has been attributed to the loss of good jobs would have occurred even if the good jobs had been kept,

3. The paths that workers follow as they move through the economy tend to have moderately positive slopes, i.e. job changes lead to gains in mean earnings, and

4. Relatively large accelerations in the rate of employment growth produce very modest and transitory improvements in local labor market conditions, even where a large part of the labor force is thought to be place-bound.

We develop these findings in Sections 2 through 5 below. Section 6 is a summary of our conclusions.

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would have the effect of increasing inequality, rather than raising the wages of the most poorly paid workers.

[4] That credit markets are understood to be quite open is reflected in program design. Local development loan programs appear to be aimed at overcoming distortions in credit markets resulting from lack of lender competition, discrimination against certain classes of borrowers, or the like. They rarely, if ever, attempt to raise local incomes by presenting local savers with investment opportunities superior to those currently available in national markets. Nor do they attempt to lower the cost of credit for local borrowers by increasing the local savings rate.

2. Spatial Variations in Earnings and Employment in an Open Economy: Theory and Evidence

A. Firm and Household Equilibrium Location

The conventional formulation of firm and household location decisions follows Roback's (1982, 1988) characterization of the economic system. Households evaluate the earnings opportunities, cost of living (residential land rent costs), and amenities or disamenities associated with alternative residential locations across the nation. Households are assumed to be free to reside and seek employment they wish, although there are costs associated with such moves. Firms evaluate the cost of obtaining the labor and land they will need at different locations around the nation.[5] In addition, different locations are likely to have different characteristics that raise or lower firm costs of production. These could include, for instance, agglomeration economies associated with dense urban settlements, transportation costs, or site specific features such as mineral deposits or fertile agricultural land.

Households seek the optimal combination of economic opportunity, cost of living, and quality of life. In equilibrium, no household can improve its overall well being by moving. Similarly, firms will seek sites that minimize their costs, while competition eliminates all but normal profits so that costs of production match commodity prices established in the national market. For all locations, i, the households' indirect utility function is given by equation (1),

(1) $U(w_i, r_i, a_i) = U^*$

and the firm's *unit* cost function is given by equation 2,

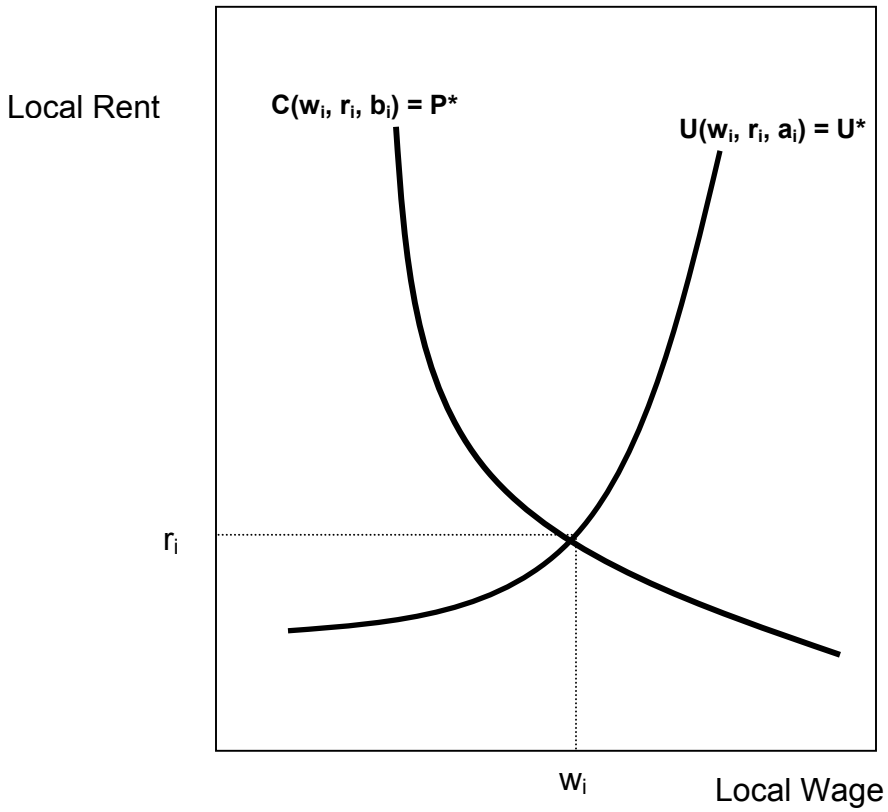
(2) $C(w_i, r_i, b_i) = P^*$

where w_i and r_i are the wage and rent levels at location i and a_i is the site characteristics relevant to household location choice and b_i is the site characteristics relevant to firm location choice. These two conditions fully determine the equilibrium wage and rent at each location as a function of the exogenous variables: the common utility level, national commodity prices, and the site-specific characteristics of different locations to households and firms. See Figure 1.

In this setting, locations that are attractive to households but unattractive to firms will have lower wages than elsewhere. Locations that are attractive to firms but unattractive to households will have higher wages than elsewhere. The effects of these location characteristics on population size, the demand for land, and, therefore, land rental costs, however, are ambiguous without additional constraints (Mueser and Graves 1995, p. 178).

[5] Capital is assumed to be available nationally at a common risk-adjusted market rate.

Figure 1: Equilibrium Wage and Rent Levels



Of course the national economy need not be in equilibrium because there may be ongoing changes in household preferences, changes in production technology, etc. to which firm and household location decisions adjust only with a lag. Alternatively, the situation could be seen as one of a "moving equilibrium" in which systematic forces such as declines in transportation and communication costs, shifts away from land-based production and heavy industry, rising incomes, etc. are constantly changing the determinants of household and firm location decisions in a particular way.

This way of looking at the determinants of the distribution of population and economic activity has several important implications, including the following:

1. National market forces play a powerful role in determining local economic outcomes. The value of mobile economic resources will be largely determined by those national economic forces. That includes the return on capital, the price of commodities, and the wages earned by labor of different qualities.

2. One location is not likely to maintain an economic welfare advantage over another for very long. Migration of households and firms will systematically eliminate such differences in economic well being over time.

3. Money wage differences at different locations are likely to persist but are unlikely to represent real differences in economic well being. Those differences in pay levels are likely to be *compensating* differentials that are offset by the local cost of living and value of local amenities or cost of local disamenities. The lesson in this finding for local economic development authorities is that the significance of low local wages should be interpreted critically, and should not necessarily be taken as an indication that the local economy is relatively backward or in crisis.

4. Firm location decisions are not necessarily the only or primary force determining the distribution of employment opportunities and population. In this economic setting jobs can follow people just as people can follow jobs. The relative importance of the demand for local amenities as opposed to the productivity characteristics of particular sites for firms is an empirical question that may vary over time and space. It would be a serious error, however, to ignore the role of amenities and household location choice in the determination of the geographic distribution of economic activity.

5. The site-specific local productivity advantages of a particular location for firms will affect different industries differently, leading to a particular industry mix. To the extent that industries make use of different mixes of skilled and unskilled labor and/or pay non-competitive premia (positive and negative) to all of their workers, the local distribution of jobs across industries can have an effect on regional average pay.

B. Significant Empirical Findings from Previous Studies:

1. The persistent regional differences in pay levels in the United States (e.g. the South compared to the Northeast) appear to be explained almost entirely by differences in the value of amenities and do not represent real differences in regional economic well being. (Roback 1982, p. 1259; Roback 1988, p. 32)

2. When migration patterns among the states are analyzed to indicate household judgments ("voting with their feet) about the standard of living found in various states, many of the low-pay states in 1990 (GA, NC, SC, FL, AL) appear to have higher standards of living than the high-pay states (NY, AK, NJ, PA). (Douglas 1997, Table 2; Wall 2001)

3. Whether analyzed at the state, MSA, or county level, differences in local amenities exert a significant impact on population flows. (Knapp and Graves 1989; McGranahan 1999, Dissart and Deller 2000; Deller et al. 2001, Mueser and Graves 1995; Rupasingha and Goetz 2003; Green 2001)

4. Workers respond to changes in labor demand by changing their place of residence, leading to offsetting changes in labor supply. These offsetting supply

adjustments over time tend to eliminate the short-run wage impacts of local changes in labor demand so that, for instance, in-migrants ultimately fill most of the new local jobs created by local job creation. Empirical evidence on the speed of these labor supply responses is mixed. (Bartik 1991; Blanchard and Katz 1992; Bond and Holzer 2000; Partridge and Rickman 2003; Rappaport 2000).

5. All groups of workers are not equally mobile. During the 1980s older (more experienced), less educated, and black workers did not show as much mobility and their relative wages suffered because of that. (Bond and Holzer 2000). There is also some evidence that low skilled workers are less responsive to amenity and disamenity differences among areas (White et al. 2003).

6. High amenity areas are likely to be characterized by relatively lower wages and higher unemployment rates that do not reflect reduced levels of economic well being. (Deller and Tsai 1998; Blanchflower and Oswald 1996)

3. Local Pay and Industrial Structure in an Open Regional Economy

In an open regional *multi-sectoral* economy characterized by both site-specific amenities that are valued by households and site-specific productivity or cost differences that are valued by firms, we would expect average earnings to deviate from national levels for two reasons. First, compensating wage and land rental differences will arise because of the amenities. Second, the local productivity effects for firms will affect different industries differently, leading to a particular industry mix. To the extent that industries make use of different mixes of skilled and unskilled labor and/or pay non-competitive premia (positive and negative) to all of their workers, the local distribution of jobs across industries can have an effect on regional average pay.

Equation (1) implies that in location j, earnings ($E_{i,j}$) in industry i will be a function of local amenities (a_j), local rents (r_j) and the exogenous level of household utility, U_i^*. Household utility varies with the industry of employment because of inter-industry earnings differences.[6]

(3) $E_{i,j} = E(a_j, r_j, U_i^*)$

We assume that the exogenous level of household utility available across the economy in industry i is a function of the average national level of earnings ($E_{N,i}$), rents (r_N) and amenities (a_N), so that

(4) $E_{i,j} = E(a_j, a_N, r_j, r_N, E_{N,j})$

[6] Equation (1) is stated in terms of wages (w) while equation (3) is stated in terms of earnings (E). The two concepts are obviously related, but not identical. We switch to earnings here because the data available at the local level allows us to compute earnings per job but not hourly wages. The latter variable, if it were available, would be more suitable theoretically.

Equation (4) implies that local earnings in any industry are proportional to national earnings in that industry, with the proportion depending on differences between the local and national economies in rents and amenities, i.e.

(5) $E_{i,j} = a_j^* E_{N,i}$

where

(6) $a_j^* = a(a_j - a_{N,}\, r_j, - r_N)$

Equation (5) implies that local industrial level earnings can change because earnings are changing in national labor markets or because local/national amenity or rent differentials are changing.

To assess the relative roles of changes in industry level earnings and the industry mix of employment in generating changes in local average earning, we express average earnings in location j (E_j) as

(7) $E_j = \Sigma s_{i,i} a_j^* E_{N,i} = \Sigma s_{i,j} E_{i,j}$ for all industries i = 1….n

where $s_{i,j}$ is the share of industry i in total employment in location j.

Shifts in the industrial structure of employment can be represented with a set of changes in industrial employment shares, $ds_{i,j}$. Taking the partial derivative of (7) with respect to the share of industry i

(8) $\delta E_j/\delta s_{i,j} = a_j^* E_{N,i} + s_{i,j} E_{N.i}(\delta a_j^*/\delta s_{i,j}) + s_{i,j}\, a_j^*(\delta_j E_{N.i}/\delta s_{i,j})$

We assume that the value of a_j^* is independent of the industry mix of employment, i.e. changing the local industry mix does not affect either rents or amenities, locally or nationally. We assume that migration implies that in any industry j the supply of labor is perfectly elastic at the national earnings rate $E_{N,j.}$. The value of $E_{N,j}$ is thus independent of the local level of employment in the industry. Thus the $\delta a_j^*/\delta s_{i,}$ and $\delta_j E_{N.i}/\delta s_{i,}$ terms in in equation (8) equal 0 and

(9) $\delta E_j/\delta s_{i,j} = a_j^* E_{N,I} = E_{i,j}$ for all industries i = 1….n

The critical implication of the assumption that the values of a_j^* and $E_{N,j}$ are independent of the values of industry shares is that changing the local industrial mix will have no effect on industry level earnings.[7] Equation (9), however, implies that industry mix, can affect local average earnings. This is because local average earnings are a weighted average of (exogenously determined) local, industrial level earnings. As the weights

[7] In a closed economy, changes in the industrial composition of output and employment lead to changes in the pattern of derived demand for labor of different types, and therefore to changes in the level and structure of wages; hence, for example, the impact of international trade on factor prices. What we assume here is that in a small, open local economy, these effects can be safely ignored.

shift in favor of higher or lower earnings industries, average earnings will rise or fall. At the same time, local average earnings may move up or down in response to exogenous changes in industry level earnings at the national level.[8] It is these two independent sources of changes in average earnings that lie at the heart of the public discourse about the significance for local income levels of the substantial changes in local industrial structure experienced over the past 25 years.

A popular explanation for the lower pay found in many rural areas and small cities in the United States is that the industrial structure deteriorated significantly, especially during the 1980s, with high-paying jobs in natural resource industries (e.g. mineral extraction and forest products) and heavy manufacturing (e.g. primary metal production), being lost and much lower-paying jobs in trade and services replacing them. Metaphorically, miners and loggers have become "burger flippers" or ski lift operators.

We have tested this hypothesis in a variety of different ways in the Mountain West and Pacific Northwest states of the United States,[9] and reported our results in detail elsewhere.[10] Our general empirical conclusions include the following:

1. The decline in the share of employment in the natural resource sectors of the Mountain West economy explains almost none (less than 10 percent) of the decline in real pay in the region. Rather than shifts in job share from natural resource industries to other sectors, it was an overall decline in real pay across most sectors of the economy, including the natural resource sectors, that explains falling average pay. If, instead, the change in industrial structure is characterized as a shift towards services from all other sectors or a shift from goods-production to services-production or even a shift away from the highest paid sectors and into the rest of the regional economy, the results are the same: Job shifts between these popular bifurcations of the regional economy into good jobs and lousy jobs do not explain most of the decline in real pay in the region between 1978 and 1988.

2. If we move away from these popular bifurcations of jobs and look instead at all of the different ways in which jobs shares shifted among industries, the industrial structure of employment (or job mix) plays a somewhat more important role. Across the Mountain West about a third of the decline in real pay could be explained by shifts in employment among about 70 two-digit industries. That is, the wages-paid effect was about twice as strong as the job-mix effect. However, these more detailed employment shifts did not fit the popular characterization of relative job loss in the natural resource sectors or the shift from goods to services. Instead, the somewhat larger impact of

[8] Exogenous shifts in the value of a_i^* could also affect industrial level earnings, but this possibility has generally been ignored in public discussions of the issue of falling earnings.
[9] The Mountain West is a US Census region that includes the states of Idaho, Montana, Wyoming, Utah, Colorado, Nevada, Arizona, and New Mexico. The Pacific Northwest is a more informally defined region that here includes Washington, Oregon, Idaho, and Montana.
[10] See Power and Barrett, 2001, Chapter 4, p. 69-102. Also see Barrett and Power, 2003a and 2003b.

changes in job mix in explaining the decline in real pay was associated with shifts in employment *within* services or *within* manufacturing or *within* transportation. In any case, even in this more disaggregated analysis, changes in industrial structure remained a much weaker force than the overall decline in pay across industries.

These findings have important implications for local economic development policies. Specifically, even when such policies are designed to encourage the creation of good jobs, they are unlikely to have much effect on average earnings unless they can achieve extremely large changes in local industrial structure. Such changes are unlikely to be attainable; in the Mountain West, even if local development policies could restore the industrial structure that prevailed 25 years ago, the effect on average earnings would be modest. Moreover, even if attracting highly paid jobs were successful in raising average earnings, it is not clear that individuals whose earnings are currently low would experience wage gains. To illustrate this point, we cite the example of our own community, Missoula, Montana, which has emerged as a regional medical center and has enjoyed rapid growth in the employment of medical service providers with relatively high earnings. It is apparent, however, that the good jobs that are being created in this situation are not generally being occupied by erstwhile low-wage workers, but by in-migrants. To the extent that the relatively rapid growth of the medical services industry is raising average earnings, it is because the community is acquiring new, more highly trained, skilled and educated members, and not because low wage workers are experiencing significant improvement in earnings.

The growth of high wage employment can increase the earnings of low wage workers if the high wages contain a significant positive non-competitive premium. In this case, a worker with low earnings has the possibility of moving into high wage employment, although to do so requires successful navigation of the non-price mechanisms that allocate such favorable jobs among the large number of workers who want them. A substantial literature on inter-industry wage differentials (see, for example, Krueger and Summers, 1986 and 1988) has demonstrated that such non-competitive differentials are significant and robust. But their magnitude is not great and Bound and Johnson (1992) found that they played a relatively small role in explaining changes in wage structures during the 1980s.

4. Worker Transitions in a Changing Local Economy

One of the important aspects of the location choice model of the local economy is its emphasis on workers, households, and firms as economic actors making choices in the context of the economic circumstances with which the local and national economy present them. Instead of being passive victims of economic change, they are active participants in a dynamic market economy.

Analysis of the job transitions workers have actually made as the economies of the western states have changed can dramatize this point. State employment insurance programs provide a source of data that allow work and pay histories to be constructed

for all workers "covered" by those programs. We used that data source to study worker transitions in Montana during the period 1985-1995 (Power and Barrett, 2001, pp. 69-102; Barrett and Power 1997). Helvoigt, Adams, and Ayer (2003) have used the equivalent Oregon database to study the transitions made by Oregon wood products workers between 1989 and 1998.

Both studies were focused on "committed" workers in the sense of workers who had been in the employment insurance database and employed in a single industry for at least two years. In our analysis, we also focused on those workers who made successful transitions to another industry in which they were also employed for at least two years.[11] We tracked all such committed workers that could be identified from the 1985-1995 data, although we paid special attention to workers in forest products, mining, and metal smelting, where employment was declining. The Oregon study only considered workers who were employed in wood products in 1989-1991 and who could also be found in the 1998 employment insurance database. In both studies, all workers changing industry during the study period were included, not just those who had been laid off. Thus, in addition to those who were laid off, our analysis also includes those who voluntarily changed jobs.

A. Montana Worker Transitions

Montana committed workers who changed industries saw their relative wages rise as a result of those job changes. The average increase was 33 percent in the initial two-year period on the new job and a 44 percent increase at the end of the fourth year after the change. The *median* increase was much smaller, 8 percent, suggesting that the average was strongly influenced by some workers who saw very large increases in pay as a result of the job changes. Importantly, even those moving into what are usually thought of as low paid sectors, sales and tourism, saw their pay increase, by 34 and 17 percent respectively. These relative pay increases underline the voluntary nature of most of the job changes: People were switching industries partially in the pursuit of higher paying jobs and, on average, were succeeding in improving their economic conditions.

Natural resource industry workers were not as successful. Forest products workers saw a slight decrease (2 percent) in relative pay on average while those in mining and metal smelting saw a 16 percent decline in relative pay during the initial period following the move out of these industries.[12] By the fourth year after the job change, however, the ex-forest products workers' pay had recovered to its previous level and the pay of those who had left mining and metal smelting was slightly higher (2 percent) than their relative pay before the job change.

[11] Public policy considerations motivated the focus on such committed workers. New entrants to the labor force or intermittent labor force participants or workers who are regularly changing jobs do not raise the same concerns when they voluntarily or involuntarily change jobs as workers who have a significant work history and investment in a particular company or a particular industry. The level of disruption and the possibility of the loss of accumulated human capital are much higher in the latter case.

[12] The median changes were –8.2 and –16.9 percent.

This stability in the relative pay of workers who left natural resource industries was impressive given that these industries were shrinking dramatically. Between 1978 and 2000 wood products employment declined by almost 30 percent while metal mining and smelting jobs shrank by 40 percent. This pay stability for these relatively high paid natural resource workers who left those industries is explained by the fact that they were able to find employment in other relatively high paid industries. In particular 30 to 40 percent of these workers were able to find well-paid jobs in construction, transportation, public utilities, or other manufacturing. Another 30-35 percent were able to obtain employment in services-producing industries that paid above average wages: business and medical services, government, education, and finance. Only 5 percent shifted to tourist-related jobs while about a fifth took jobs in other retail sales jobs. In short, workers leaving natural resource jobs, on average, were able to re-employ their skills for similar rewards in other industries.

B. Oregon Wood Products Workers' Job Transitions

The Oregon analysis found a similar pattern for the wood products workers on which it exclusively focused.[13] Between 1988 and 2000 wood products jobs in Oregon declined by over 27,000 jobs, a 29 percent loss. Despite this dramatic downsizing of the wood products industry, Oregon wood products workers remained relatively strongly committed to Oregon employment. For all Oregon workers in covered employment, 40 percent of those found in the 1989-1991 employment insurance database were no longer in covered employment in 1998, having retired or quit working for other reasons, become self-employed, or left the state. This "loss" of covered workers took place during a period of rapid expansion in the Oregon economy when 450,000 jobs were being added, a 29 percent increase. In contrast to the 40 percent attrition among all covered workers, only 28 percent of the 1989-91 wood products workers were no longer in covered employment in 1998, a 30 percent lower attrition rate.

The Oregon wood products workers who were earning the lowest pay within the industry were the ones who left wood products but stayed employed elsewhere in the Oregon economy. The workers who left wood products were earning about 30 percent or $8,800 per year less than the wood products workers who stayed. The level of pay in wood products for those who left was similar to the pay found in the relatively low-paid retail trade sectors. That low pay explains both why these workers left wood products and why they suffered hardly any decline in pay as a result of leaving (-1 percent). About half of the workers who left wood products moved into industries where the median pay was significantly higher than the pay they had faced in wood products. In that sense, those leaving wood products may have faced superior economic opportunities relative to what wood products had presented to them. About a fifth of the workers who left wood products shifted to trade jobs were median pay was similar to what they have been receiving in wood products. About a quarter shifted into services

[13] Newspaper stories that reported on this study incorrectly suggested that the study showed that Oregon wood products workers had been seriously harmed by their shift out of wood products employment. As we show below, that was not true. They fared about as well as those who stayed in wood products.

jobs where the median pay was significantly below what they had been paid in wood products. Those wood products workers who stayed in that industry did slightly better than those who left, seeing their median pay rise by 6 percent. But both those who left wood products and those who stayed saw much smaller pay increases than those experienced by other Oregon workers who stayed in covered employment for the same period (+23 percent).

This more rapid growth in median pay for Oregon covered employees means that the *relative* position of wood products workers declined. Those who stayed in wood products saw the premium pay they received relative to all covered workers fall from 53 percent above the median to being 32 percent above. A large wood products wage premium deteriorated but remained significant. For those who left wood products, their median pay went from being about 8 percent higher to being 13 percent below the median for all covered workers. So even though those who left wood products saw hardly any decline in pay in absolute terms and those who stayed saw a very small increase in pay, both saw their pay decline by similar amounts in relative terms, -19 percent for those who left wood products and –16 percent for those who stayed. Thus, remaining in wood products did not protect workers against erosion in their relative pay compared to those who left.

One group of wood products workers who left the industry experienced a significant increase in pay, those who moved out of eastern and southwestern Oregon to northwestern Oregon where the state's dominant metropolitan region, Portland, is located. About 30 percent of those who left wood products in eastern and southwestern Oregon moved to northwestern Oregon where their median pay was $24,400 compared to those who left wood products but did no move who faced median pay of $19,000.[14] Geographic mobility, following economic opportunity, was a successful strategy for some of the rural wood products workers.

These studies of the job transitions individual workers actually experienced in Montana and Oregon during periods of significant structural change in the economy underline the importance of workers' active labor market engagement. Workers regularly change jobs and industries in the pursuit of superior opportunities. Even those who do not leave a job voluntarily face a range of economic opportunities other than permanent unemployment. It is not safe to evaluate the actual opportunities available to workers by using aggregate statistics about which industries have expanding employment and which have contracting employment. Even though employment opportunities in high wage industries may be shrinking and employment opportunities in low wage industries may be expanding, that does not imply that workers are experiencing declines in pay. Shrinking industries may make much of their adjustment through normal worker attrition (retirement and voluntary quits). Many of the workers who quit an industry, even a high paying industry, may be doing so in the pursuit of a better job and our data indicates that, on average, they succeed in those pursuits in a significant manner. Expanding low wage industries also draw much of their workforce largely from new entrants into the workforce. For those workers, their pay, no matter how low, is higher than it had been.

[14] This comparison does not seek to account for differences in the cost of living between the two areas.

Our data indicates that expanding, low wage industries will have very significant worker turnover as workers gain experience and then carry that experience to another industry where their pay significantly improves. New entrants replace them. At the same time, our data shows that experienced workers shifting into "low paid" industries see their pay, on average, rise significantly as they transfer their experience and make better use of their skills. Finally, workers leaving relatively high paid industries have been successful, on average, in transferring their human capital to other industries where they have been able to receive similarly high pay. In this setting workers can experience ongoing improvements in their economic well being despite the "loss of good jobs."

C. Policy Implications.

These results suggest several points that are relevant to the development of effective local economic development policies:

1. Most of the successful adjustments that are made to changes in the structure of the economy are made by individual workers acting to take advantage of the emerging employment opportunities in the new economy. Public policy should seek to facilitate this entrepreneurial adaptation by workers.

2. Local policies that focus on trying to protect the industries that were important in the past are likely to ignore the new sources of economic vitality and employment. Just as important, such policies are likely to fail because they seek to offset locally powerful national and international economic forces. Such a misplaced focus undermines their effectiveness.

3. Those new sources of economic vitality, including those supported by the attractiveness of local amenities, can provide the employment opportunities that allow workers to make successful movements between industries as economic structure changes.

4. The movement of workers between industries and between geographic areas in the pursuit of more attractive economic opportunities is a powerful economic force stabilizing local and regional economies. Local policies that support this both help protect the economic well being of local residents and the stability of the regional economy.

5. Job Creation and Local Labor Market Conditions

As noted previously, job creation is often represented as the ultimate goal of local economic development policies, and throughout the United States, it is common for local authorities to assess the impact of potential policies in terms of that goal. In fact, virtually every type of public expenditure, whether or not its ostensible purpose is to promote development, is likely to be evaluated in terms of its potential to create jobs. For example, this kind of analysis has been applied to environmental remediation projects, public support for the arts, public subsidies for privately developed sports

stadiums, expenditures for restoration and preservation of historic landmarks, and decisions concerning the use and protection of publicly owned natural resources.

The urgency of job creation is felt most acutely in local areas that perceive themselves to be particularly disadvantaged economically. This is true, for example, of non-metropolitan areas throughout the Mountain West; over the past 25 years, these areas have experienced both rapid, disruptive growth and stagnation and decline, accompanied in both cases by a fall in earnings relative to the rest of the nation.[15] These conditions have been particularly prevalent on the region's Indian reservations, which tend to perform very poorly on virtually every index of social and economic health. In the case of reservations, one of the most common, and controversial, strategies for job creation has been the opening of tribal casinos.[16]

Job growth is not, of course, valued as an end in itself, but because it is widely believed that accelerating the rate of growth will have positive impacts on labor market conditions, i.e. wage levels, hours, unemployment and labor force participation rates. But as the discussion in section 2 above makes clear, the likelihood of these impacts actually being produced declines with the openness of the local labor market. Increases in labor demand may temporarily raise wages or reduce unemployment, but these improvements in labor market conditions are likely to trigger in-migration, which will attenuate, or indeed entirely reverse, the initial gains.

There is some reason to hope that the impacts of employment creation may be more positive on Indian reservations than elsewhere. This is because tribal members are frequently described as somewhat place-bound, and there is evidence to suggest that that is true. For example, most Montana reservations are surrounded by counties that during the 1990 experienced either substantial out-migration and declining population, or growth that was slower than that of the reservations they surrounded[17]; the reservations themselves, however, grew[18]. Reservation governments also report extremely high unemployment rates among tribal members, which might under other circumstances be expected to trigger out-migration.

To investigate the relationship between accelerated employment growth and labor market outcomes, following Bartik (1991), we used pooled data from 189 Mountain West counties over 20 years (1979 to 1999) to estimate (with OLS) unrestricted finite distributed lag equations of the form

[15] These effects were observed in non-metropolitan areas throughout the nation, not just the Mountain West.

[16] The 1988 Indian Gaming Act allows federally recognized tribes to negotiate compacts with individual states to permit casino-style gambling. Compacts govern multiple aspects of casino operations, including state-tribal revenue sharing. Some tribal casinos, notably in the east and Midwest, have turned out to be extremely successful business ventures.

[17] The exceptions were the Flathead Reservation, which is located in Western Montana counties where the non-native population grew rapidly, and the Crow Reservation, which is contiguous with a metropolitan area county (Yellowstone).

[18] The population of the Fort Belknap Reservation declined, but by less than those of t the surrounding counties.

(10) $\Delta X = b_0 + b_1 g + b_2 g_{t-1} + b_3 g_{t-2} + \ldots + b_n g_{t-n} + b_{n+1} t_1 + b_{n+2} t_2 + \ldots + b_{n+j} t_j$

where g is the growth rate of employment and t_i is a dummy variable equal to 1 in year i and 0 otherwise. The labor market outcome variables, ΔX, are the change, between t-1 and t in (a) real (1983) earnings per job, (b) real (1983) wage and salary disbursements per wage and salary job[19], (c) the employment rate, measured as jobs per capita[20] and (d) the unemployment rate.[21] The length of the lag (n) was determined by minimizing the Aikake Information Criterion.

The counties included in the analysis are all rural, in the sense that they have scores of 7 or better on the US Department of Agriculture's "rurality scale." In essence, this means that they are neither included in a metropolitan statistical area nor are they contiguous to a county that is. There is still a good deal of variety in these counties, which span the gap between the very sparsely populated desert counties of Southern Arizona to, for example, Lewis and Clark County, Montana, which contains the state capital, Helena. Data for all variables except the unemployment rate was retrieved on line from the Regional Economic Information System website operated by the Bureau of Economic Analysis (http://www.bea.doc.gov/bea/regional/data.htm). Unemployment rates, which refer to the period 1990-1999 only, were retrieved from the Bureau of Labor Statistics website (http://www.bls.gov/lau/home.htm).

Reservation and county boundaries are never exactly the same. Several counties contain more than one reservation and a majority of reservations cover parts of two or more counties, so there is no such thing as an unambiguous reservation county, and data describing reservations, analogous to that describing counties, is not generally available. In order then to analyze the differences in the behavior of reservation and non-reservation labor markets using county data, we estimated equations similar to (1), but which contained an interaction term, gna, equal to the product of the growth rate, g, and the percentage of the county population that is listed as Native American in the nearest decennial Census (http://quickfacts.census.gov/qfd/index.html):

With the inclusion of these interaction terms, the equation to be estimated is:

11) $X = b_0 + b_1 g + b_2 gna + b_3 g_{t-1} + b_4 gna_{t-1} + \ldots + b_n gna_{t-n} + b_{n+1} t_1 + b_{n+2} t_2 + \ldots + b_{n+j} t_j$

[19] Because "jobs" entail variable numbers of weekly hours, both earnings per job and wage and salary disbursements per job can vary because of changes in hourly wages and/or numbers of weekly hours. We are forced to use these measures because hourly wage figures are not available on a county basis.

[20] Note that this measure is similar but not identical to the labor force participation rate (LFPR). If multiple job holding increases when employment growth accelerates, the employment rate as specified here can rise even if the LFPR is unchanged.

[21] See Bartik (1991), pp. 265-292 for the derivation of this "quasi-reduced form" equation from a simple model of the labor market and for a discussion of econometric issues regarding its estimation.

Table 1: Descriptive Statistics

NAME	N	MEAN	ST. DEV	VARIANCE
Real (1983) earnings/job	3969	$13,926.00	3661.60	1.34E+07
Annual change in real earnings/job	3780	-$96.05	1418.40	2.01E+06
Real (1983) wages and salaries/job	3969	$13,334.00	3073.00	9.44E+06
Annual change in real wages and salaries/job	3780	-$83.77	972.04	9.45E+05
Employment rate (jobs/capita)	3969	0.55	0.24	5.75E-02
Annual change in employment rate	3780	0.01	0.04	1.50E-03
Percent Native American (2000)	3969	4.68	11.92	142.07
Annual percent growth rate of employment	3780	1.69	5.49	30.139
Unemployment rate (percent)	1840	6.19	2.93	8.605
Annual change in unemployment rate	1656	-0.03	1.30	1.702

Descriptive statistics for all variables are shown in Table 1. To describe the impact of employment growth on labor market outcomes, we used the estimated coefficients in equation (10) to calculate the increment to the outcome variable occurring over a five year period following a shock to employment growth consisting of a permanent 1 percentage point increase in the employment growth rate, beginning in year 0. The time paths of these increments are shown in Figures 2 to 5. Since the dependent variables in (10) express the annual *changes* in earnings, unemployment, etc., Figures 2 to 5 depict the *additional change* that is predicted to occur each year as the effect of the increase in the employment growth rate is extended over a larger number of periods. Regression results are listed in the appendix.

Figure 2: Estimated Effects Over Time of a 1 Percent Shock to Local Employment Growth: Increment to the Change in Real Earnings/Job

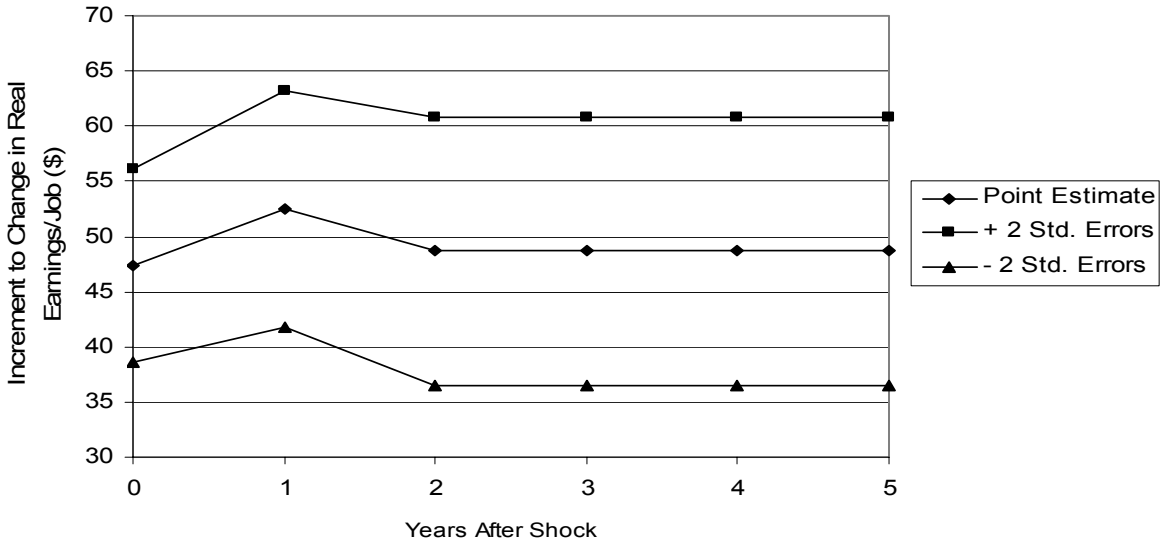


Figure 3: Estimated Effects Over Time of a 1 Percent Shock to Local Employment Growth: Increment to Change in Wages and Salaries/Job

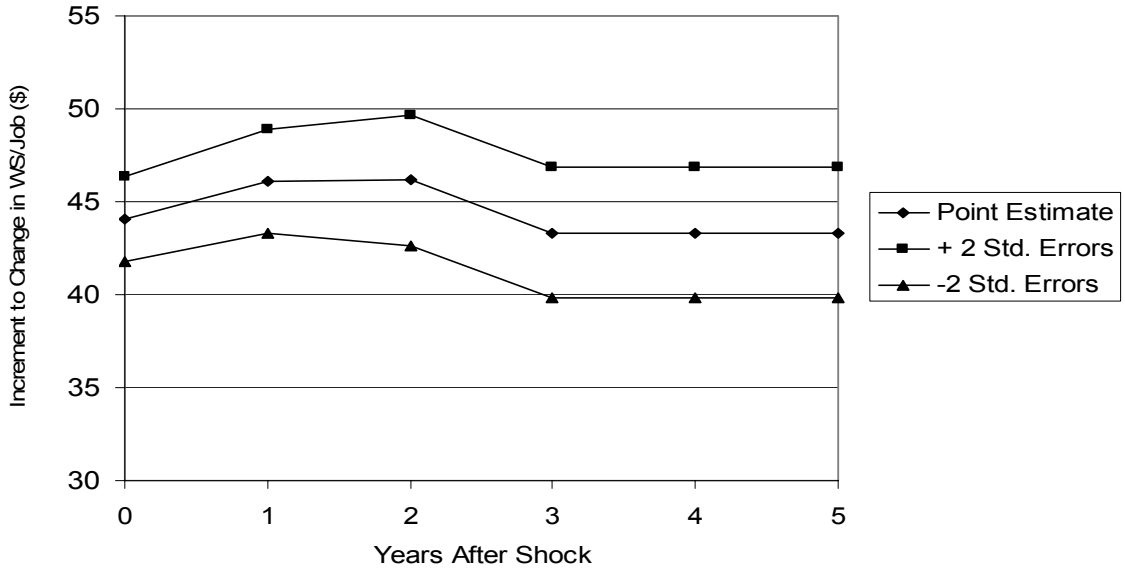


Figure 4: Estimated Effects Over Time of a 1 Percent Shock to Local Employment Growth: Increment to Change in the Local Employment Rate

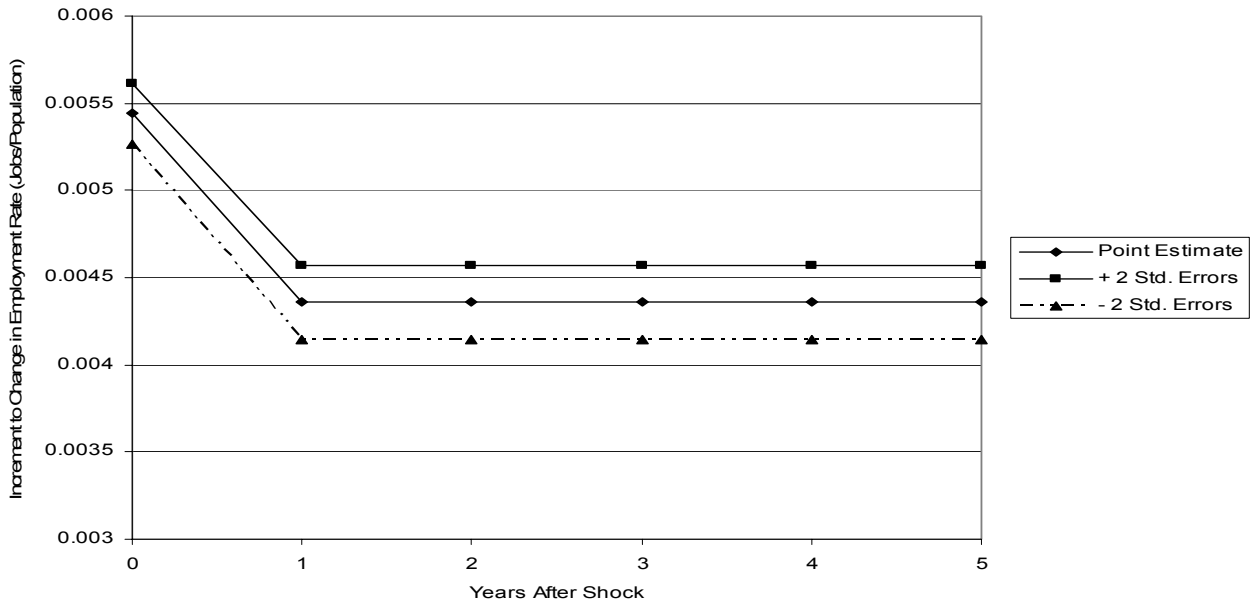
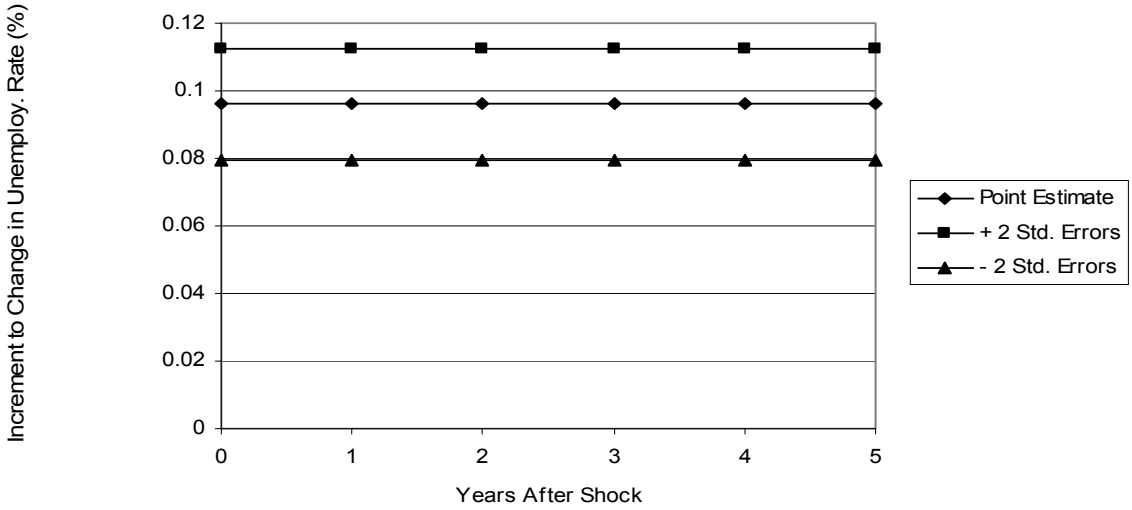


Figure 5: Estimated Effect Over Time of a 1 Percent Shock to Local Employment Growth: Increment to Change in Unemployment Rate



Labor market responses to accelerated employment growth show a similar, characteristic pattern. In all cases, the immediate effect of the positive shock is an improvement: earnings/job, wage and salary disbursements/job and the employment rate all rise more than they otherwise would; the unemployment rate falls more than it otherwise would. In the case of earnings/job and wage and salary disbursements per job, there are further modest improvements in years 1 and 2 respectively. At these points improvements begin to attenuate, but do not disappear. The long-run adjustment of changes in earnings/job occurs two years following the shock; earnings per job increase by approximately $49 (1983 prices) more per year than they otherwise would. Long-run adjustment of changes in wages and salaries/job occurs in year 3; wages and salaries/job increase by about $45 (1983 prices) more than they otherwise would. In the case of the employment rate, attenuation of the impact of the shock in year 0 occurs immediately; long-run adjustment takes place by year 1 and the employment rate rises annually by about .0045 more than it otherwise would. Finally, in the case of the unemployment rate, long-run adjustment occurs immediately, with the unemployment rate falling annually by .1% more than it otherwise would.

To assess the magnitude of the impacts depicted in Figures 2 to 5, we consider the effects of a successful local effort to increase the rate of employment growth by one percentage point and to sustain this increase for 10 years. On average, real annual earnings per job for this group of counties fell by about $96 per year. The effect of accelerated growth would be to partially arrest this decline, and after ten years of accelerated growth, the *accumulated* 10 year decline in earnings would be smaller, and earnings themselves higher, than if employment growth had not accelerated. We estimate this 10 year cumulative difference in earnings to be approximately $490. In Table 2, we list estimates for the analogous 10 year cumulative differences in wages and salaries per job, the employment rate, and the unemployment rate. We also calculate a quasi-elasticity of the form $[\Sigma_{10}\Delta\Delta X/X]/(\Delta g/g)$, where $\Sigma_{10}\Delta\Delta X$ is the ten year cumulative difference in the outcome variable; Δg, the change in the growth rate, equals 1; and X and g are the mean values of the outcome variable and the growth rate respectively. These values are reported in Table 2.

Viewed in this way, the impact of accelerated employment growth is quite modest. For the sample of counties used in this study, the mean annual growth rate of employment over the period was 1.69%. It would appear difficult for local economic development authorities to increase employment growth by 1 percentage point and to sustain this increase for a 10 year period. Even if this could be accomplished annual earnings and wages and salaries per job at the end of the period would only be approximately $490 and $440 higher than they otherwise would have been; the unemployment rate would be about 1 percentage point lower. The $490 difference in earnings/job equals 3.5% of mean earnings per job of $13,926 and the $440 difference in wages and salaries/job equals 3.2% of means wages and salaries per job of $13,334. The 1 percentage point difference in the unemployment rate equals 16% of the mean unemployment rate of 6.19%.

Table 2: 10 Year Cumulative Difference in Labor Market Outcome Variables Resulting from a Permanent 1 Percentage Point Increase in Employment Growth Rate and 10 Year Quasi-elasticities at Means

Variable	10 Year Cumulative Difference	Quasi-elasticity
Earnings/job	$488.97	.06
Wages and salaries/job	$439.74	.05
Employment rate (jobs/capita)	.045	.14
Unemployment rate (%)	.960	.26

It is possible, of course (though in our view not likely), that rather than being concerned the level of earnings or unemployment at the conclusion of a successful effort to increase employment growth, what policy makers care more about is year to year changes in earnings, unemployment, and so forth.[22] In this case, they will evaluate the effects of accelerated employment growth more favorably. Table 2 lists the elasticities of each of the labor market outcome income variables in the long term with respect to the growth rate of employment. Elasticities for changes in earnings/job and wages and salaries/job are negative because over the period of study these variables on average declined (see Table 1). A permanent, 1 percentage point increase in employment growth (at the mean, a 60% permanent increase in the growth rate), would eliminate about half of this average annual decline. Although the additional changes in employment and unemployment rates resulting from accelerated growth are small, these measures tended to change very little over the period; as a result, the elasticities reported in Table 2 for these variables are large. Compared to the normal state of affairs, employment and unemployment rates start to change a good deal when growth accelerates. Policy makers might regard that as a good thing, even though the change is small enough that its accumulated impact over a long period is quite minor.

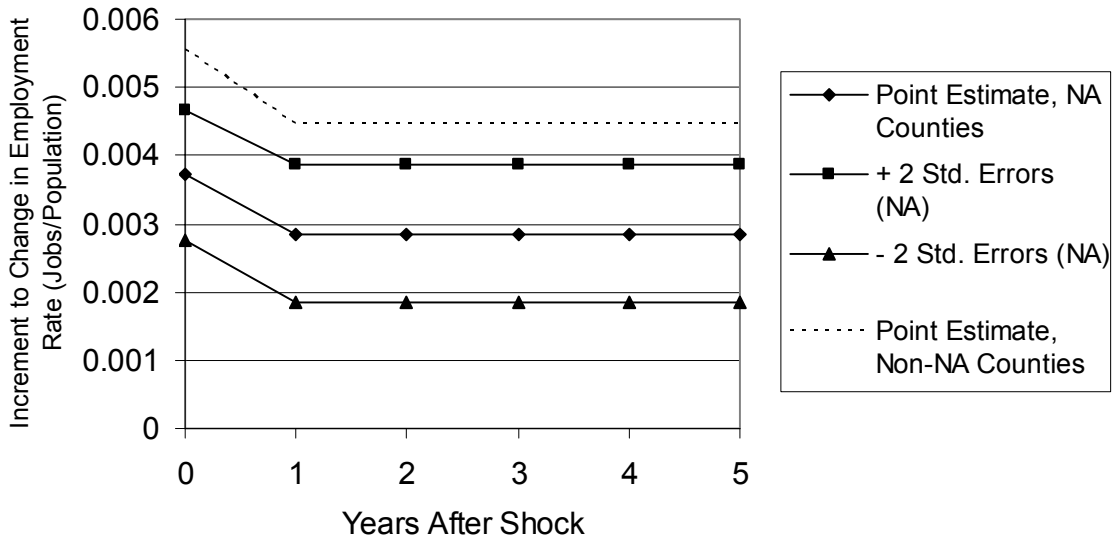
Table 3: Long-term Elasticities at Means of Labor Market Outcome Variables with Respect to the Growth Rate of Employment

Variable	Long-term Elasticity
Annual change in earnings/job	-.86
Annual change in wages and salaries/job	-.87
Annual change in employment rate	2.22
Annual change in unemployment rate	-4.91

[22] Prospect theory assumes that in economic decision making, "the carriers of value are changes in wealth or welfare, rather than final states" and that "losses loom larger than gains." (Kahneman and Tversky, 2000, p 32-33). Thus policy makers might wish to avoid situations in which earnings fall relative to some national average, even if there are more than compensating gains in relative amenities and/or rents.

To describe the impact of employment growth on labor market outcomes on counties with a large Native American population, we used the estimated coefficients in equation (2) to again calculate the cumulative change in the outcome variable over years 0 to 5 of a shock to employment growth consisting of a permanent 1 percentage point increase in the growth rate, occurring in year 0; the calculation assumed that the county population was 50 percent Native American. In all cases, the impacts on Native American counties were *less* positive than they were for all counties in general, or for non-Native American counties. This appears to be inconsistent with the evidence, cited above, for the relative immobility of reservation residents. This may be explained by the behavior of a group of young workers who move readily back and forth between reservations and regional metropolitan areas as reservation employment opportunities wax and wane. Given the typical magnitude of variations in employment growth, mobility of such a group could have significant effects even though the group itself was quite small in relation to the labor force in general. In any case, the standard errors of the estimated coefficients of interaction terms in equation 2 (gna_t, gna_{t-1}, etc.) were very large; in only one case (the employment rate) did the differences between 50 percent Native American and non-Native American counties in the impacts of accelerated employment growth approach statistical significance. Figure 6 depicts the time path of accumulated changes in the employment rate.

Figure 6: Estimated Effect Over Time of a 1 Percent Shock to Local Employment Growth: Increment to Change in the Local Employment Rate, Non-Native American Counties



Local economic development policies typically work to accelerate employment growth by increasing labor demand. The results presented here accurately portray the labor market effects of demand driven increases in employment growth only to the extent that

growth was not fueled by exogenous increases in labor supply. To the extent that supply shifts did occur in the counties under study, we underestimate the positive effects of demand driven employment growth. The limited data available at the county level do not permit a suitable treatment of this simultaneous equations problem.[23]

6. Conclusions

A large body of evidence suggests that labor mobility will confound the best intentions of local economic development authorities when they attempt to stimulate employment growth. Even substantial and sustained acceleration of the employment growth rate will have modest cumulative effects on earnings and employment and unemployment rates. This is because mobility between open labor markets links wages and unemployment rates to those determined in larger regional or national markets. Targeted efforts to attract high wage jobs to a local community can be successful, but even a substantial shift in the industrial structure of local employment in favor of high wage sectors will have at best a small impact on average earnings, and is unlikely to assure that low wage workers will get high wage jobs.

The positive side of mobility is that it suggests that local wages that are relatively low, or unemployment rates that are relatively high, will often reflect the availability in the community of a variety of highly valued social, environmental and recreation amenities. In these situations, earnings and employment disadvantages do not imply any loss of wellbeing for local residents. Moreover, the earnings histories of individuals as they move from industry to industry indicate that such movements are frequently beneficial and for that reason appear to be largely voluntary.

None of the foregoing is intended to deny that significant numbers of workers and their families have unacceptably low earnings. But effective strategies to raise these earnings should concentrate on improving the skills, training and general labor market competitiveness of affected workers, and on providing supportive social services to their families. Employment creation by itself will do little to improve their situations.

[23] See Bartik (1991) for a simultaneous equations model using micro data for metropolitan areas.

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Appendix

Regression Results

Listed below is the Shazam regression output for the estimation of equations (10) and (11), used in preparing Figures 2 to 6, Tables 2 and 3, and the accompanying discussion.

A. Equation 10

1. Dependent variable = annual change in earnings/job

```
R-SQUARE =   0.1616     R-SQUARE ADJUSTED =   0.1566
 VARIANCE OF THE ESTIMATE-SIGMA**2 =  0.15496E+07
 STANDARD ERROR OF THE ESTIMATE-SIGMA =   1244.8
 SUM OF SQUARED ERRORS-SSE=  0.52392E+10
 MEAN OF DEPENDENT VARIABLE =  -47.647
 LOG OF THE LIKELIHOOD FUNCTION = -29061.9
```

VARIABLE NAME	ESTIMATED COEFFICIENT	STANDARD ERROR	T-RATIO 3381 DF	P-VALUE	PARTIAL CORR.	STANDARDIZED COEFFICIENT	ELASTICITY AT MEANS
G	47.334	4.397	10.77	0.000	0.182	0.1843	-1.5595
G1	5.1726	4.258	1.215	0.225	0.021	0.0213	-0.1821
G2	-3.8678	4.038	-0.9579	0.338	-0.016	-0.0163	0.1401
T83	737.56	129.6	5.690	0.000	0.097	0.1247	-0.8600
T84	331.00	129.6	2.555	0.011	0.044	0.0559	-0.3859
T85	349.55	128.4	2.723	0.006	0.047	0.0591	-0.4076
T86	916.29	129.0	7.102	0.000	0.121	0.1549	-1.0684
T87	281.86	130.3	2.163	0.031	0.037	0.0476	-0.3286
T88	-130.99	131.3	-0.9976	0.319	-0.017	-0.0221	0.1527
T89	732.86	128.8	5.691	0.000	0.097	0.1239	-0.8545
T90	348.64	129.2	2.698	0.007	0.046	0.0589	-0.4065
T91	75.692	128.7	0.5883	0.556	0.010	0.0128	-0.0883
T92	722.68	128.7	5.613	0.000	0.096	0.1221	-0.8426
T93	847.64	130.0	6.523	0.000	0.111	0.1433	-0.9883
T94	-1018.4	131.4	-7.750	0.000	-0.132	-0.1721	1.1874
T95	136.81	128.9	1.061	0.289	0.018	0.0231	-0.1595
T96	99.367	130.0	0.7643	0.445	0.013	0.0168	-0.1159
T97	-173.92	128.8	-1.350	0.177	-0.023	-0.0294	0.2028
T98	1347.8	128.8	10.47	0.000	0.177	0.2278	-1.5716
T99	853.16	128.5	6.641	0.000	0.113	0.1442	-0.9948
CONSTANT	-482.71	91.90	-5.253	0.000	-0.090	0.0000	10.1311

2. Dependent variable = annual change in wages and salaries/job

```
 R-SQUARE =   0.1680     R-SQUARE ADJUSTED =   0.1628
VARIANCE OF THE ESTIMATE-SIGMA**2 =  0.37197E+06
STANDARD ERROR OF THE ESTIMATE-SIGMA =   609.89
SUM OF SQUARED ERRORS-SSE=  0.11873E+10
MEAN OF DEPENDENT VARIABLE =  -52.520
LOG OF THE LIKELIHOOD FUNCTION = -25154.4
```

VARIABLE NAME	ESTIMATED COEFFICIENT	STANDARD ERROR	T-RATIO 3192 DF	P-VALUE	PARTIAL CORR.	STANDARDIZED COEFFICIENT	ELASTICITY AT MEANS
G	44.087	2.278	19.36	0.000	0.324	0.3392	-1.4482
G1	2.0210	2.230	0.9062	0.365	0.016	0.0163	-0.0620
G2	0.54187E-01	2.101	0.2579E-01	0.979	0.000	0.0005	-0.0017
G3	-2.8145	2.001	-1.407	0.160	-0.025	-0.0246	0.0914
T84	145.60	63.51	2.292	0.022	0.041	0.0514	-0.1631
T85	291.28	63.68	4.574	0.000	0.081	0.1028	-0.3262

T86	191.37	63.07	3.034	0.002	0.054	0.0676	-0.2143
T87	-98.498	63.22	-1.558	0.119	-0.028	-0.0348	0.1103
T88	-35.039	64.19	-0.5458	0.585	-0.010	-0.0124	0.0392
T89	-44.427	64.36	-0.6903	0.490	-0.012	-0.0157	0.0498
T90	-121.25	63.13	-1.921	0.055	-0.034	-0.0428	0.1358
T91	-3.9891	63.31	-0.6300E-01	0.950	-0.001	-0.0014	0.0045
T92	387.60	63.04	6.148	0.000	0.108	0.1368	-0.4341
T93	-2.3904	63.26	-0.3779E-01	0.970	-0.001	-0.0008	0.0027
T94	215.34	64.29	3.350	0.001	0.059	0.0760	-0.2412
T95	138.89	64.41	2.156	0.031	0.038	0.0490	-0.1556
T96	79.322	63.27	1.254	0.210	0.022	0.0280	-0.0888
T97	352.54	63.72	5.533	0.000	0.097	0.1245	-0.3949
T98	348.78	63.14	5.524	0.000	0.097	0.1231	-0.3906
T99	303.55	63.12	4.809	0.000	0.085	0.1072	-0.3400
CONSTANT	-253.52	45.08	-5.624	0.000	-0.099	0.0000	4.8272

3. Dependent variable = annual change in employment rate

```
 R-SQUARE =   0.5543     R-SQUARE ADJUSTED =   0.5518
VARIANCE OF THE ESTIMATE-SIGMA**2 =  0.68348E-03
STANDARD ERROR OF THE ESTIMATE-SIGMA =  0.26143E-01
SUM OF SQUARED ERRORS-SSE=   2.4400
MEAN OF DEPENDENT VARIABLE =  0.58640E-02
LOG OF THE LIKELIHOOD FUNCTION =  8001.28
```

VARIABLE NAME	ESTIMATED COEFFICIENT	STANDARD ERROR	T-RATIO 3570 DF	P-VALUE	PARTIAL CORR.	STANDARDIZED COEFFICIENT	ELASTICITY AT MEANS
G	0.54435E-02	0.8640E-04	63.00	0.000	0.726	0.7622	1.5169
G1	-0.10829E-02	0.8431E-04	-12.84	0.000	-0.210	-0.1551	-0.3195
T82	-0.74313E-03	0.2710E-02	-0.2742	0.784	-0.005	-0.0042	-0.0067
T83	0.13651E-02	0.2709E-02	0.5040	0.614	0.008	0.0078	0.0123
T84	0.95838E-02	0.2695E-02	3.556	0.000	0.059	0.0548	0.0860
T85	0.15866E-01	0.2709E-02	5.857	0.000	0.098	0.0907	0.1424
T86	0.15512E-01	0.2722E-02	5.699	0.000	0.095	0.0887	0.1392
T87	0.13658E-01	0.2711E-02	5.038	0.000	0.084	0.0781	0.1226
T88	0.15761E-01	0.2696E-02	5.845	0.000	0.097	0.0901	0.1415
T89	0.15904E-01	0.2695E-02	5.901	0.000	0.098	0.0910	0.1427
T90	0.10813E-01	0.2691E-02	4.018	0.000	0.067	0.0618	0.0971
T91	0.61142E-02	0.2692E-02	2.271	0.023	0.038	0.0350	0.0549
T92	0.40702E-02	0.2693E-02	1.511	0.131	0.025	0.0233	0.0365
T93	0.26529E-02	0.2693E-02	0.9852	0.325	0.016	0.0152	0.0238
T94	0.35822E-02	0.2700E-02	1.327	0.185	0.022	0.0205	0.0322
T95	0.23298E-02	0.2703E-02	0.8618	0.389	0.014	0.0133	0.0209
T96	0.42798E-02	0.2690E-02	1.591	0.112	0.027	0.0245	0.0384
T97	0.66495E-02	0.2690E-02	2.472	0.013	0.041	0.0380	0.0597
T98	0.79112E-02	0.2691E-02	2.940	0.003	0.049	0.0452	0.0710
T99	0.10838E-01	0.2694E-02	4.022	0.000	0.067	0.0620	0.0973
CONSTANT	-0.88492E-02	0.1923E-02	-4.601	0.000	-0.077	0.0000	-1.5091

4. Dependent variable = annual change in unemployment rate

```
R-SQUARE =   0.1844     R-SQUARE ADJUSTED =   0.1799
 VARIANCE OF THE ESTIMATE-SIGMA**2 =   1.3955
 STANDARD ERROR OF THE ESTIMATE-SIGMA =   1.1813
 SUM OF SQUARED ERRORS-SSE=   2297.1
 MEAN OF DEPENDENT VARIABLE = -0.33031E-01
 LOG OF THE LIKELIHOOD FUNCTION = -2620.71
```

VARIABLE NAME	ESTIMATED COEFFICIENT	STANDARD ERROR	T-RATIO 1646 DF	P-VALUE	PARTIAL CORR.	STANDARDIZED COEFFICIENT	ELASTICITY AT MEANS
G	-0.95681E-01	0.8324E-02	-11.49	0.000	-0.273	-0.2745	6.8490
T92	-0.57599E-01	0.1232	-0.4677	0.640	-0.012	-0.0139	0.1938
T93	-0.97838	0.1242	-7.875	0.000	-0.191	-0.2358	3.2911

T94	-0.89324	0.1279	-6.983	0.000-0.170	-0.2153	3.0047
T95	-0.56195	0.1232	-4.561	0.000-0.112	-0.1354	1.8903
T96	-0.43222	0.1237	-3.495	0.000-0.086	-0.1042	1.4539
T97	-1.1003	0.1233	-8.926	0.000-0.215	-0.2652	3.7013
T98	-0.39983	0.1232	-3.246	0.001-0.080	-0.0964	1.3450
T99	-0.95942	0.1233	-7.783	0.000-0.188	-0.2312	3.2273
CONSTANT	0.79131	0.8793E-01	8.999	0.000 0.217	0.0000	-23.9563

A. Equation 11

1. Dependent variable = annual change in earnings/job

```
R-SQUARE =   0.1626     R-SQUARE ADJUSTED =   0.1569
 VARIANCE OF THE ESTIMATE-SIGMA**2 =  0.15491E+07
 STANDARD ERROR OF THE ESTIMATE-SIGMA =   1244.6
 SUM OF SQUARED ERRORS-SSE=  0.52330E+10
 MEAN OF DEPENDENT VARIABLE =  -47.647
 LOG OF THE LIKELIHOOD FUNCTION = -29059.9
```

VARIABLE NAME	ESTIMATED COEFFICIENT	STANDARD ERROR	T-RATIO 3378 DF	P-VALUE	PARTIAL CORR.	STANDARDIZED COEFFICIENT	ELASTICITY AT MEANS
G	50.171	4.633	10.83	0.000	0.183	0.1953	-1.6530
GNA	-0.94058	0.4918	-1.913	0.056	-0.033	-0.0345	0.1425
G1	5.2030	4.493	1.158	0.247	0.020	0.0214	-0.1832
GNA1	0.32929E-01	0.5085	0.6475E-01	0.948	0.001	0.0012	-0.0051
G2	-4.5572	4.266	-1.068	0.285	-0.018	-0.0192	0.1651
GNA2	0.23830	0.4601	0.5179	0.605	0.009	0.0095	-0.0344
T83	741.34	129.6	5.719	0.000	0.098	0.1253	-0.8644
T84	336.00	129.6	2.592	0.010	0.045	0.0568	-0.3918
T85	349.97	128.4	2.725	0.006	0.047	0.0591	-0.4081
T86	917.11	129.1	7.103	0.000	0.121	0.1550	-1.0693
T87	287.97	130.4	2.208	0.027	0.038	0.0487	-0.3358
T88	-130.37	131.4	-0.9923	0.321	-0.017	-0.0220	0.1520
T89	735.66	128.9	5.707	0.000	0.098	0.1243	-0.8578
T90	349.19	129.2	2.702	0.007	0.046	0.0590	-0.4072
T91	77.109	128.8	0.5989	0.549	0.010	0.0130	-0.0899
T92	726.68	128.8	5.642	0.000	0.097	0.1228	-0.8473
T93	850.74	130.0	6.543	0.000	0.112	0.1438	-0.9919
T94	-1017.3	131.5	-7.738	0.000	-0.132	-0.1719	1.1862
T95	138.48	129.0	1.073	0.283	0.018	0.0234	-0.1615
T96	99.027	130.1	0.7614	0.446	0.013	0.0167	-0.1155
T97	-175.94	128.9	-1.365	0.172	-0.023	-0.0297	0.2051
T98	1350.9	128.8	10.49	0.000	0.178	0.2283	-1.5751
T99	854.28	128.5	6.649	0.000	0.114	0.1444	-0.9961
CONSTANT	-482.96	91.94	-5.253	0.000	-0.090	0.0000	10.1362

2. Dependent variable = annual change in wages and salaries/job

```
R-SQUARE =   0.1700     R-SQUARE ADJUSTED =   0.1637
 VARIANCE OF THE ESTIMATE-SIGMA**2 =  0.37155E+06
 STANDARD ERROR OF THE ESTIMATE-SIGMA =   609.55
 SUM OF SQUARED ERRORS-SSE=  0.11845E+10
 MEAN OF DEPENDENT VARIABLE =  -52.520
 LOG OF THE LIKELIHOOD FUNCTION = -25150.6
```

VARIABLE NAME	ESTIMATED COEFFICIENT	STANDARD ERROR	T-RATIO 3188 DF	P-VALUE	PARTIAL CORR.	STANDARDIZED COEFFICIENT	ELASTICITY AT MEANS
G	45.982	2.398	19.17	0.000	0.322	0.3538	-1.5104
GNA	-0.61616	0.2477	-2.487	0.013	-0.044	-0.0453	0.0930
G1	2.2640	2.350	0.9634	0.335	0.017	0.0183	-0.0695

GNA1	-0.77711E-01	0.2561	-0.3035	0.762-0.005	-0.0059	0.0110	
G2	-0.52080	2.217	-0.2350	0.814-0.004	-0.0045	0.0166	
GNA2	0.20394	0.2528	0.8068	0.420 0.014	0.0159	-0.0280	
G3	-3.1073	2.114	-1.470	0.142-0.026	-0.0272	0.1009	
GNA3	0.53598E-01	0.2277	0.2354	0.814 0.004	0.0044	-0.0071	
T84	146.79	63.50	2.312	0.021 0.041	0.0518	-0.1644	
T85	288.95	63.69	4.537	0.000 0.080	0.1020	-0.3236	
T86	188.69	63.09	2.991	0.003 0.053	0.0666	-0.2113	
T87	-97.610	63.25	-1.543	0.123-0.027	-0.0345	0.1093	
T88	-37.339	64.23	-0.5813	0.561-0.010	-0.0132	0.0418	
T89	-45.845	64.37	-0.7122	0.476-0.013	-0.0162	0.0513	
T90	-123.72	63.18	-1.958	0.050-0.035	-0.0437	0.1386	
T91	-5.6632	63.31	-0.8945E-01	0.929-0.002	-0.0020	0.0063	
T92	387.38	63.06	6.143	0.000 0.108	0.1368	-0.4339	
T93	-2.8972	63.26	-0.4580E-01	0.963-0.001	-0.0010	0.0032	
T94	213.25	64.31	3.316	0.001 0.059	0.0753	-0.2389	
T95	137.25	64.42	2.130	0.033 0.038	0.0485	-0.1537	
T96	76.449	63.29	1.208	0.227 0.021	0.0270	-0.0856	
T97	348.78	63.73	5.473	0.000 0.096	0.1231	-0.3906	
T98	347.72	63.14	5.507	0.000 0.097	0.1228	-0.3895	
T99	302.07	63.12	4.785	0.000 0.084	0.1066	-0.3383	
CONSTANT	-250.67	45.10	-5.558	0.000-0.098	0.0000	4.7728	

3. Dependent variable = annual change in employment rate

```
R-SQUARE =   0.5561     R-SQUARE ADJUSTED =   0.5534
 VARIANCE OF THE ESTIMATE-SIGMA**2 =  0.68105E-03
 STANDARD ERROR OF THE ESTIMATE-SIGMA =  0.26097E-01
 SUM OF SQUARED ERRORS-SSE=   2.4300
 MEAN OF DEPENDENT VARIABLE =  0.58640E-02
 LOG OF THE LIKELIHOOD FUNCTION =  8008.70
```

VARIABLE NAME	ESTIMATED COEFFICIENT	STANDARD ERROR	T-RATIO 3568 DF	P-VALUE	PARTIAL CORR.	STANDARDIZED COEFFICIENT	ELASTICITY AT MEANS
G	0.55531E-02	0.9106E-04	60.98	0.000	0.714	0.7776	1.5474
GNA	-0.36658E-04	0.9948E-05	-3.685	0.000	-0.062	-0.0475	-0.0445
G1	-0.10857E-02	0.8887E-04	-12.22	0.000	-0.200	-0.1555	-0.3204
GNA1	0.43308E-05	0.9499E-05	0.4559	0.648	0.008	0.0059	0.0052
T82	-0.71123E-03	0.2706E-02	-0.2629	0.793	-0.004	-0.0041	-0.0064
T83	0.15975E-02	0.2705E-02	0.5907	0.555	0.010	0.0091	0.0143
T84	0.98499E-02	0.2693E-02	3.658	0.000	0.061	0.0563	0.0884
T85	0.15987E-01	0.2706E-02	5.907	0.000	0.098	0.0914	0.1435
T86	0.15690E-01	0.2718E-02	5.772	0.000	0.096	0.0897	0.1408
T87	0.14010E-01	0.2708E-02	5.173	0.000	0.086	0.0801	0.1257
T88	0.15878E-01	0.2694E-02	5.894	0.000	0.098	0.0908	0.1425
T89	0.16151E-01	0.2692E-02	6.000	0.000	0.100	0.0924	0.1450
T90	0.10929E-01	0.2689E-02	4.065	0.000	0.068	0.0625	0.0981
T91	0.63043E-02	0.2688E-02	2.345	0.019	0.039	0.0361	0.0566
T92	0.43240E-02	0.2690E-02	1.607	0.108	0.027	0.0247	0.0388
T93	0.28839E-02	0.2690E-02	1.072	0.284	0.018	0.0165	0.0259
T94	0.37425E-02	0.2696E-02	1.388	0.165	0.023	0.0214	0.0336
T95	0.25019E-02	0.2700E-02	0.9266	0.354	0.016	0.0143	0.0225
T96	0.43799E-02	0.2687E-02	1.630	0.103	0.027	0.0250	0.0393
T97	0.66908E-02	0.2686E-02	2.491	0.013	0.042	0.0383	0.0601
T98	0.81327E-02	0.2687E-02	3.027	0.002	0.051	0.0465	0.0730
T99	0.10955E-01	0.2691E-02	4.070	0.000	0.068	0.0627	0.0983
CONSTANT	-0.89585E-02	0.1921E-02	-4.663	0.000	-0.078	0.0000	-1.5277

4. Dependent variable = annual change in unemployment rate

```
R-SQUARE =   0.1844     R-SQUARE ADJUSTED =   0.1794
 VARIANCE OF THE ESTIMATE-SIGMA**2 =   1.3964
 STANDARD ERROR OF THE ESTIMATE-SIGMA =   1.1817
 SUM OF SQUARED ERRORS-SSE=   2297.0
```

MEAN OF DEPENDENT VARIABLE = -0.33031E-01
LOG OF THE LIKELIHOOD FUNCTION = -2620.69

VARIABLE NAME	ESTIMATED COEFFICIENT	STANDARD ERROR	T-RATIO 1645 DF	PARTIAL P-VALUE	STANDARDIZED CORR.	ELASTICITY COEFFICIENT	AT MEANS
G	-0.96098E-01	0.8645E-02	-11.12	0.000	-0.264	-0.2757	6.8789
GNA	0.13780E-03	0.7663E-03	0.1798	0.857	0.004	0.0042	-0.0377
T92	-0.57729E-01	0.1232	-0.4686	0.639	-0.012	-0.0139	0.1942
T93	-0.97841	0.1243	-7.873	0.000	-0.191	-0.2358	3.2912
T94	-0.89295	0.1280	-6.978	0.000	-0.170	-0.2152	3.0037
T95	-0.56193	0.1232	-4.560	0.000	-0.112	-0.1354	1.8902
T96	-0.43173	0.1237	-3.489	0.000	-0.086	-0.1040	1.4523
T97	-1.0996	0.1234	-8.913	0.000	-0.215	-0.2650	3.6988
T98	-0.39975	0.1232	-3.244	0.001	-0.080	-0.0963	1.3447
T99	-0.95907	0.1233	-7.777	0.000	-0.188	-0.2311	3.2261
CONSTANT	0.79085	0.8800E-01	8.987	0.000	0.216	0.0000	-23.9425