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EMPLOYMENT GROWTH AND THE ALLOCATION OF NEW JOBS IN NORTH CAROLINA, 2010-2015

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A county-level labor market model is estimated for North Carolina for the period 2010-2015. The model accounts for inter-county commuting, migration, and within-county adjustments to labor demand shocks. Econometric results indicate that over the period considered most employment growth (about 85%) was accommodated by changes in commuting flows. In both metro and rural counties, changes in in-commuting were the dominant means by which labor supply responded to job growth. In metro counties, the results indicate that all manner of adjustments occurred (increased in-migration, reduced out-commuting and reduced unemployment). In contrast, the results for rural counties suggest that reduced unemployment and (especially) increased in-commuting accompanied job growth.

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Employment Growth and the Allocation of New Jobs in North Carolina, 2010-2015

Local economic development policies are typically oriented toward stimulating employment growth. The measuring stick most commonly used for gauging the success of a particular municipal or county development effort—as well as the individuals charged with formulating and implementing it—is the number of new jobs it creates. Widespread appreciation for spillovers from direct employment shocks via local production and consumption linkages reinforces the competition among jurisdictions of all sizes for attracting new firms and industries.

The emphasis on job creation has been particularly strong in recent years as the national economy was recovering from the Great Recession of 2008-2009. Among those charged with promoting local economic development, recruitment of new firms to an area is commonly viewed as a central element in revitalizing the local economy. In large measure, this is the result of a perception that new firms are required to compensate for job losses that accompany economic downturns. Public finance considerations are also important. Declines in the local tax base that occur when a major plant closing occurs can be devastating, particularly in an era in which a greater share of the overall burden of providing infrastructure and other public goods has devolved to local governments. Recruiting new businesses to replace old ones facilitates provision of the same level of publicly financed services without significant changes in property tax rates.

But when employment growth occurs within a county or some other administrative jurisdiction who actually gets the new jobs? Are they taken primarily by local residents, ostensibly target group for locally sponsored economic development initiatives? Or do sizable fractions of the jobs go to mobile workers residing in other nearby jurisdictions, or to new residents who have chosen to migrate to the county (perhaps in direct response to that employment growth)?

Historically, much of the impact assessment literature has assumed, often implicitly, that all new jobs that a new firm brings to a locality are taken by residents of that locality (Burchell, Listokin, and Dolphin 1985; Siegel and Leuthold 1993). But given that workers are mobile, it seems eminently more reasonable to assume *a priori* that employment growth in a given community will actually be partitioned between current residents of that community, new residents (in-migrants), and non-resident commuters. In fact, work that I conducted about fifteen years ago indicated that in the 1980s and 1990s a very large fraction of the adjustment of labor supply in Southern states—60 to 70 percent—was accounted for by changes in commuting flows; and that most of the remainder (30 to 40 percent) was accounted for by labor force growth (Renkow 2003, 2006).

The analysis presented here re-visits the question of how employment growth is allocated among different types of workers. To do so, I estimate a county-level labor market model to quantify the spatial partitioning of employment growth during the period 2010-2015 using the Census Bureau data on commuting, employment and labor force dynamics. The labor market model explicitly accounts for movements of workers across county lines—in addition to within-county labor market adjustments—when a labor demand shock takes place. The model features structural equations for in-commuting, out-commuting, labor force size, and local unemployment, relating these variables to employment changes and migration while controlling

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for spatial wage and housing price differentials and the spatial distribution of workers and employment opportunities within the larger regional labor market in which the county is located. The model thus allocates newly created jobs between residents of nearby counties and local residents, the latter group comprising both residents currently working outside the county and new entrants into the local labor force—including both in-migrants and those (re)).

The model is estimated in first differences using a two-period panel of data for North Carolina's 100 counties in 2010 and 2015. Econometric results indicate that about 85% of the adjustment of labor supply to new employment opportunities is accounted for by changes in commuting flows, and that the remainder was accounted for by reduced unemployment (about 9%) and labor force growth (6%). Significant rural-urban differences are found to exist, as well. The econometric results suggest that up to one-quarter of employment growth in metro counties was accounted for by new (in-migrating) residents, whereas in rural counties 25 percent new jobs were filled by formerly unemployed county residents with the remainder of labor market adjustment taking the form of increased in-commuting (estimated changes in unemployment and out-commuting were small and statistically insignificant).

The paper is organized as follows. The next section describes the analytical framework used to isolate how new jobs in a local economy are allocated. Next, empirical results are presented and discussed. Some concluding remarks are found in the final section. An appendix provides more detailed discussion of the conceptual frameworks, the econometric specification, and data construction, along with the full econometric results.

DECOMPOSING COUNTY EMPLOYMENT GROWTH

To quantify how employment growth is divided between different groups of residents and non-residents, I used an approach similar to what I used in earlier work focused on North Carolina in the 1980s (Renkow 2003) and 13 Southern states in the 1990s (Renkow 2006). Specifically, I utilized a simple empirical model of a spatial labor market that is composed of mobile workers living in a multi-county commutershed. Workers are assumed to move between counties in response to changes in employment and residence opportunities within a multi-county area.[1] That is, a working person might choose to live and work in the same county; but she might also choose to live in one county and commute to another.

The econometric strategy for quantifying the allocation of new jobs derives from an identity expressing the aggregate labor market response to an employment shock (ΔEMP). Adjustments will include changes in the number of in-commuters and out-commuters ($\Delta INCOM$ and $\Delta OUTCOM$), changes in the size of the labor force (ΔLF), and changes in the level of unemployment ($\Delta UNEMP$): [2]

[1] I relied on the USDA's delineation of multi-county Commuting Zones as the basic geographic demarcation of "local labor markets."

[2] Total employment in county i at time t includes individuals who live and work within the county (L_{it}) plus workers who commute from elsewhere: $EMP_{it} = L_{it} + INCOM_{it}$. The labor force is composed of L_{it}, residents who work in a different county, and unemployed persons: $LF_{it} = L_{it} + OUTCOM_{it} + UNEMP_{it}$. Combining these expressions, taking first differences, and re-arranging yields equation (1).

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(1) $\Delta EMP = \Delta INCOM - \Delta OUTCOM + \Delta LF - \Delta UNEMP$

Equation (1) demonstrates the multiplicity of effects that may accompany employment shocks within a given county. The size of the labor force might change due to migration response and/or changes in participation rates. Unemployment rates may change. Adjustments also may occur in the volume of out-commuting and in-commuting.

Changes in commuting flows are of particular interest here. In the language of economic impact analysis, in-commuting adjustments represent leakages that would reduce changes in final demands in the county of work relative to those that would prevail if existing residents or in-migrants took all the new jobs. By the same token, final demands would be augmented by the new flow of earnings into the residence county from which those same workers out-commute.[3]

Differentiating equation (1) with respect to ΔEMP yields a cross-equation restriction that can be imposed on a system of four structural equations relating the four variables on the right-hand side of equation (1) to changes in local employment (among other relevant variables):

$$(2) \quad 1 = \frac{d\Delta INCOM}{d\Delta EMP} - \frac{d\Delta OUTCOM}{d\Delta EMP} + \frac{d\Delta LF}{d\Delta EMP} - \frac{d\Delta UNEMP}{d\Delta EMP}$$

Imposing this restriction amounts to partitioning the proportion of observed changes in local employment to changes in in-commuting, out-commuting, labor force size, and unemployment, while controlling for other relevant variables thought to affect these four dependent variables.[4]

FINDINGS

I estimated the empirical model sketched out above using county-level commuting and employment data from the U.S. Census Bureau's On the Move data set; labor force and unemployment data from the Bureau of Labor Statistics' Local Area Unemployment Statistics; and wage and house-price data from the U.S. Census Bureau's American Community Survey database. The period of analysis was 2010 to 2015—that is, I related county-level changes in employment over that five-year period to changes in commuting, labor force size and unemployment over the same period. In addition to running the analysis for all counties in North Carolina, I also conducted separate analyses of metro and rural counties in order to examine possible rural-urban differences in how local labor markets accommodate employment growth.

Table 1 summarizes the empirical result of primary interest here—the percentage decomposition of employment growth implied by the restricted parameter estimates on ΔEMP in the labor market model (full econometric results are found in Appendix Table 2). There it may

[3] With regard to fiscal impacts, commuting adjustments tend to have little impact on local housing markets, and so have much a smaller affect on both demands for publicly provided services and the contribution of residential property tax revenues than those that generally accompany labor force growth attributable to in-migration. An important exception is when suburbanization and exurbanization give rise to simultaneous increases in in-migration and out-commuting – either when urban workers move to suburban or rural residences without changing jobs, or when new workers migrate into a region but choose to live in a different community than where they work.

[4] Control variables for each of these four structural equations included wages, housing prices, employment and labor force in other counties within the local commuting zone. Further details are contained in the appendix to this report.

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be seen that changes in commuting flows—increased in-commuting plus decreased out-commuting—account for the great bulk of labor market adjustment to employment shocks. Of particular interest here is that roughly half of all new jobs in a given county were taken by (non-resident) in-commuters. This represents a significant spillover of the benefits associated with job growth to workers located *outside* the county in which that job growth occurred.

Table 1. ALLOCATION OF EMPLOYMENT GROWTH IN NORTH CAROLINA, 2010-2015

Activity	All Counties
Increased in-commuting	49.0%
Decreased out-commuting	34.9%
Decreased unemployment	9.1%
Increased labor force	6.9%

Table 1 also indicates that substantial decreases in unemployment as well as a somewhat smaller increase in labor force size. In interpreting these results it is important to recognize that the period of time over which this analysis was conducted extended from the depths of the Great Recession through the ensuing recovery.[5] The decreases in unemployment clearly reflect this turnaround; but the labor force numbers also probably reflect some re-entry to the labor force of "discouraged" workers who had withdrawn from the labor force during the heart of the recession (in-migration of relocating workers would account for the balance of labor force changes).

In order to isolate rural-urban differences in how North Carolina's labor force responded to employment growth, I performed separate analyses for rural and metro counties as classified by the Office of Management and Budget. These findings are summarized in Table 2 (full econometric results are presented in Appendix Tables 3 and 4).

Table 2. ALLOCATION OF EMPLOYMENT GROWTH IN NC: METRO VERSUS RURAL COUNTIES

Activity	Metro Counties	Rural Counties
Increased in-commuting	45.6%	77.1%
Decreased out-commuting	23.5%	-5.6% [ns]
Decreased unemployment	7.0%	28.3%
Increased labor force	23.8%	0.1% [ns]

[5] Strictly speaking, the Great Recession ended in June of 2009, but labor markets experienced something of a "hangover" that lasted somewhat longer in many locations.

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The results for North Carolina's metro counties are roughly similar to the overall pattern for the state as a whole. Changes in commuting flows represent approximately 70 percent of labor force adjustment; and as before, and roughly half of new jobs went to in-commuters. But in metro counties a substantial fraction of new jobs—nearly one-quarter—was accounted for by increased labor force size. As noted above, re-entry of discouraged laborers may account for some of this; but it is also likely that substantial migration into metro counties occurred over the period of analysis, as the economy recovered from the Great Recession.

The results are rather different for rural counties. Changes in in-commuting and reductions in unemployment were the dominant means by which local labor markets adjusted to employment growth, whereas no statistically significant impacts on either out-commuting nor labor force growth were detected. The large decrease in unemployment reflects the fact that rural communities were hit particularly hard by the Great Recession.[6] Even more importantly, the fact that roughly three-quarters of new jobs in rural counties were taken by in-commuters from *other* counties illustrates labor market trends that have been widely observed in North Carolina (and across the country more generally)—namely that the geographic extent of local labor markets has broadened and intensified over time. Two important manifestations of these trends are that (a) ever-greater numbers of workers live in a different county than the one where they work; and (b) as a result, there are significant "leakages" of the benefits associated with new employment opportunities outside of the specific location (county) where that job growth has occurred.

CONCLUSION

Locally elected government officials and economic development professionals working for municipal and county governments place a huge emphasis on job creation. Indeed, the measuring stick most commonly used for gauging the success of a particular municipal or county development effort – not to mention the individuals charged with formulating and implementing it – is the resulting number of new jobs. Appreciation for the indirect benefits from employment growth mediated through local production and consumption linkages reinforces the competition among jurisdictions of all sizes for attracting new firms and industries.

The evidence presented above suggests that a substantial amount of the direct, income-generation benefits of industrial recruitment and other local job creation strategies will flow into other jurisdictions. This may represent a less-than-desirable outcome for local officials, particularly if and when substantial incentive packages are used to attract new firms.

On the other hand, these findings also indicate that some communities may be able to "free ride" on the success of other communities' industrial recruitment efforts if they are within commuting distance. In other words, from the standpoint of promoting income generation, it may make little difference where a new firm locates as long as it is within the local commutershed. Rural and suburban communities near fast-growing urban employment hubs would appear to be most likely to enjoy the fruits of this sort of free riding.

Turning to fiscal impacts, there has been a tendency in the literature to assume that employment growth translates into population growth at least as large as the number of new jobs—or greater to the extent that workers have dependents (Siegel and Leuthold 1993). The

[6] Unemployment rates in 2010 averaged 12.1% in rural counties, compared with 10.3% in metro counties. By 2015 these had fallen to 6.5% and 5.5% in rural and metro counties, respectively.

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results presented here offers a contrasting view, indicating that in-migration accounts at most for only about a quarter of employment growth in metro counties, and not at all in rural counties. As such, fiscal impacts associated with changes in both residential demands for publicly provided services (e.g., schools) and residential provision of tax revenues (e.g., property taxes) will be quite a bit smaller than is usually supposed.

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APPENDIX:
CONCEPTUAL FRAMEWORK, ECONOMETRIC SPECIFICATION, AND VARIABLE CONSTRUCTION

Conceptual Fra`mework

To model the market level response of labor demand shocks, I employed the analytical framework that I used in prior work (Renkow 2003, 2006). Consider a spatial labor market composed of mobile workers living in a multiple-county commutershed. Workers are assumed to be able to move between counties in response to changes in employment and residence opportunities within the multi-county area. Thus, a working person may choose to live and work in the same county, or s/he may live in one county and commute to another.[7]

Within a given county, total employment at time t (EMP_t) is accounted for by individuals who both live and work within the county (L_t^H) plus workers who commute in from nearby counties ($INCOM_t$):

(1) $EMP_t = L_t^H + INCOM_t$

The labor force (LF_t) within a given county is composed of individuals who both live and work in the county, workers who live in the county but work in a different county ($OUTCOM_t$), and unemployed persons ($UNEMP_t$):

(2) $LF_t = L_t^H + OUTCOM_t + UNEMP_t$

Combining these expressions yields an identity partitioning a county's labor force:

(3) $LF_t = EMP_t — INCOM_t + OUTCOM_t + UNEMP_t$

Totally differentiating (3) and re-arranging makes it clear that aggregate labor market responses to an employment shock in a particular county can take a variety of forms, including changes in the number of in-commuters and out-commuters, changes in the level of unemployment, and changes in size of the labor force:

(4) $dEMP = dLF + dINCOM — dOUTCOM — dUNEMP$

Equation (4) demonstrates the multiplicity of effects that may accompany employment shocks within a given county. The size of the labor force might change due to migration response and/or changes in participation rates. Unemployment rates may change. And adjustments in the volume of both out-commuting and in-commuting may occur. In-commuting adjustments are of particular interest. In the context of standard economic impact analysis, they represent "leakages" that would attenuate the impact of changes in labor demand on final demands. In the context of fiscal impact analysis, the in-commuting adjustments would tend to reduce both the demands for publicly provided services and the contribution of tax revenues (especially property tax revenues) associated with labor demand shocks. The empirical analysis is oriented toward quantifying these adjustments.

[7] In this paper "commuting" refers to crossing county lines to go to work.

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Econometric Specification

I posit the following set of equations describing changes in in-commuting, out-commuting, unemployment, and labor force size within a given county i:

$$\textbf{(5)} \quad \Delta INCOM_i = f^I(\underset{+}{\Delta EMP_i}, \underset{?}{\Delta LF_i}, \underset{+}{\Delta CZLF_i}, \underset{+}{\Delta RWAGE_i}, \underset{+}{\Delta RHOUSE_i}, \underset{+}{METRO_i})$$

$$\textbf{(6)} \quad \Delta OUTCOM_i = f^O(\underset{-}{\Delta EMP_i}, \underset{?}{\Delta LF_i}, \underset{+}{\Delta CZEMP_i}, \underset{-}{\Delta RWAGE_i}, \underset{-}{\Delta RHOUSE_i}, \underset{+}{METRO_i})$$

$$\textbf{(7)} \quad \Delta LF_i = f^L(\underset{+}{\Delta EMP_i}, \underset{+}{\Delta CZEMP_i}, \underset{+}{\Delta RWAGE_i}, \underset{-}{\Delta RHOUSE_i}, \underset{+}{METRO_i})$$

$$\textbf{(8)} \quad \Delta UNEMP_i = f^U(\underset{?}{\Delta EMP_i}, \underset{-}{\Delta CZEMP_i}, \underset{?}{\Delta RWAGE_i}, \underset{+}{METRO_i})$$

where

$CZLF_i$ = labor force in other counties within county i's commuting zone

$CZEMP_i$ = total employment in other counties within county i's commuting zone

$RWAGE_i$ = the wage in county i relative to other counties within the same commuting zone

$RHOUSE_i$ = the cost of housing in county i relative to the cost of housing in other counties within county i's commuting zone

$METRO_i$ = a dummy variable equal to 1 for metro counties and 0 for rural counties

The expected signs of the first derivatives are given underneath the individual variables. The employment variables *EMP* and *CZEMP* are taken to be proxies for labor demand within the county and within the larger commuting zone within which the county is located.[8] Hence, a positive shock to within-county employment (ΔEMP) is expected to have a positive impact on in-commuting and a negative impact on out-commuting, while a positive change in *CZEMP* is expected to have a positive effect on the number of out-commuters.[9] Changes in both employment variables (ΔEMP and $\Delta CZEMP$) are further expected to be positively related to changes in the size of the labor force through effects on in-migration and participation rates. The likely impact of ΔEMP and $\Delta CZEMP$ on unemployment are ambiguous, depending on whether employment growth causes the labor force size and/or labor force participation to grow by more than the number of new jobs created.

The inclusion of the labor force change variable (ΔLF) in the two commuting equations captures the relationship between commuting and migration. The sign of its coefficient is

[8] I relied on the USDA's delineation of multi-county Commuting Zones as the basic geographic demarcation of "local labor markets."

[9] Similarly, the size of the labor force in other counties within the commuting zone is indicative of the pool of potential workers; hence $CZLF_i$ is expected to be positively related to $INCOM_i$.

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indeterminate *a priori*; it depends on whether commuting and migration are substitutes or complements (Evers). An example of substitution between commuting and migration is the case in which positive local labor market shocks were to simultaneously lower the propensity of households to out-commute and increase the rate of in-migration—i.e., when a strong local economy *pulls in* new residents and new workers. In this event, the sign on the migration variable would be negative in the out-commuting equation and positive in the in-commuting equation. Coefficients would be of the opposite sign when commuting and migration are complements—e.g., when net in-migration into a county is a reflection of suburbanization and exurbanization.

Changes in relative wages are expected to exert a positive influence on in-commuting and a negative influence on out-commuting. *Ceteris paribus*, higher relative wages may be expected to draw in workers from nearby counties and make employment opportunities in other counties comparatively less attractive to out-commuters. Higher wages are also expected to have a positive impact on labor force size by stimulating both in-migration and greater labor force participation rates. Their effect on unemployment is ambiguous, however, depending on whether the positive impacts on labor force size cause more laborers to enter the market than can be accommodated by greater employment opportunities underlying wage increases.

Changes in relative housing prices are also included in the in-commuting, out-commuting, and labor force equations. Increases in the relative cost of housing in a county is expected to increase the likelihood that individuals employed within that county choose to live elsewhere. Thus, the sign of the coefficient on the housing cost variable ($\Delta RHOUSE$) is expected to be positive for in-commuting and negative for out-commuting and labor force.

Finally, in order to account for rural-urban differences (including possible agglomeration economies in urban labor markets and other time-varying fixed effects) a dummy variable taking the value of 1 for a metro county and 0 for a rural county is included. The metro dummy is expected to have positive coefficients in all cases.

Data and Variable Construction

The empirical model was implemented using 2010 and 2015 county-level data for all 100 North Carolina counties, as well as a handful of counties in adjoining states that belong to commuting zones also North Carolina counties. These include 3 counties in Georgia, 3 counties in South Carolina, 1 county in Tennessee, and 25 counties in Virginia.

The commuting and employment data came from the U.S. Census Bureau's On the Move data set. County-level data on unemployment and labor force size taken from the Bureau of Labor Statistics (BLS) Local Area Unemployment Statistics. Wage and housing price data came from the U.S. Census Bureau's American Community Survey database. Employment and wages are the number of full time job equivalents by place of work, while labor force and unemployment data are by place of residence. Commuting zone employment (*CZEMP*) for each county was calculated as the total employment within the county's commuting zone (as delineated by the USDA), net of county employment. Commuting zone labor force (*CZLF*) data were similarly constructed. Designation of metro and rural counties is based on the USDA's Rural-Urban Continuum Code; by this definition, North Carolina is composed of 35 metro counties and 65 rural counties.

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Relative wages were based on the county average earnings per worker reported by the BLS. The relative wage variable ($RWAGE_i$) was computed as the ratio of the average earnings per worker in county i to the commuting zone average. Relative housing costs were also based on BLS data on median price of a single-family house in each county. Each county's median house price was divided by the weighted average of median prices for all counties within the relevant commuting zone.

Appendix Table 1 presents summary statistics, broken down by metro and rural counties. Appendix Tables 2, 3, and 4 provide the econometric results for the full sample, rural counties, and metro counties, respectively. The relevant decomposition of employment growth can be read directly off the first row of each table.

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APPENDIX TABLE 1. SAMPLE STATISTICS

Variable	Mean	Coefficient of Variation	Minimum	Maximum
	----------Metro counties----------			
2015 Labor force	99,985	1.25	9,470	565,288
2015 Employment	94,531	1.25	8,930	534,989
2015 In-commuters	20,066	1.62	1,146	151,233
2015 Out-commuters	1,786	10.34	2,184	83,547
2015 Unemployment	5,454	1.17	540	30,299
2015 CZ employment	519,713	0.79	61,446	1,086,876
2015 Real wage[a]	36,361	0.21	27,574	60,775
Δ Real wage, 2010-2015	625	2.01	-2746	2969
2015 Real house price[a]	143,070	0.27	75,645	250,861
Δ Real house price, 2010-2015	-7,532	1.08	-30,589	11,776
	----------Rural counties----------			
2015 Labor force	19,528	0.08	1,547	82,183
2015 Employment	18,255	0.08	1,400	77,666
2015 In-commuters	2,496	1.08	102	16,467
2015 Out-commuters	3,596	1.19	102	23,100
2015 Unemployment	1,273	0.76	147	4,517
2015 CZ employment	282,204	1.25	12,857	1,086,876
2015 Real wage[a]	30,871	0.10	25,794	42,387
Δ Real wage, 2010-2015	125	11.37	-4,743	4,143
2015 Real house price[a]	118,104	0.34	64,602	260,800
Δ Real house price, 2010-2015	-6,912	1.95	-81,300	24,848

a. Wages and housing price expressed in 2010 dollars using the U.S. Department of Commerce's GDP deflator.

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APPENDIX TABLE 2. REGRESSION RESULTS – ALL COUNTIES[a]

Variable	In-commuting	Out-commuting	Unemployment	Labor Force
County employment	0.490*** (0.033)	-0.349*** (0.033)	-0.091*** (0.008)	0.069*** (0.005)
County labor force	-0.209*** (0.054)	0.682*** (0.053)	—	—
Commuting zone employment	—	0.013*** (0.002)	-0.007*** (0.002)	0.012*** (0.004)
Commuting zone labor force	0.009*** (0.002)	—	—	—
Relative wage[b]	95.1 (3,428)	3,168 (4140)	-2,713 (3347)	18,044*** (6383)
Relative housing price[b]	-759.9 (2,328)	-482.1 (2267)	—	10,286** (4370)
Metro dummy	375.6 (285.3)	1,845*** (343.4)	-1,470*** (275.3)	5,865*** (510)
Intercept	-78.6 (166.4)	676.2*** (202.1)	-838.1*** (162.2)	720.9** (310.6)
R^2	0.96	0.75	0.75	0.95
N	100	100	100	100

a. These are seemingly unrelated regression estimates. Standard errors are in parentheses. *** ** and * denote significance at the .01 .05 and .10 levels respectively. System weighted R^2 = .986. Except for the metro dummy all variables are first differences (2015 value less 2010 value).

b. These are mean county values divided by commuting zone average values for wages and housing prices respectively.

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APPENDIX TABLE 3. REGRESSION RESULTS – RURAL COUNTIES[a]

Variable	In-commuting	Out-commuting	Unemployment	Labor Force
County employment	0.771*** (0.024)	0.056 (0.050)	-0.283*** (0.008)	0.001 (0.007)
County labor force	-0.211*** (0.054)	0.574*** (0.028)	—	—
Commuting zone employment	—	0.006*** (0.002)	-0.004** (0.002)	0.007** (0.003)
Commuting zone labor force	0.001 (0.001)	—	—	—
Relative wage[b]	472.6 (881.2)	2,107 (1,964)	-310.4 (2,184)	6,217*** (3,966)
Relative housing price[b]	66.0 (551.3)	615.0 (710.9)	—	2,532** (2,342)
Intercept	3.7 (40.9)	728.6*** (89.8)	-861.4*** (162.2)	-632.7*** (179.6)
R^2	0.95	0.76	0.38	0.32
N	65	65	65	65

a. These are seemingly unrelated regression estimates. Standard errors are in parentheses. *** ** and * denote significance at the .01 .05 and .10 levels respectively. System weighted R^2 = .985. Except for the metro dummy all variables are first differences (2015 value less 2010 value).

b. These are mean county values divided by commuting zone average values for wages and housing prices respectively.

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APPENDIX TABLE 4. REGRESSION RESULTS –METRO COUNTIES

Variable	In-commuting	Out-commuting	Unemployment	Labor Force
County employment	0.456*** (0.058)	-0.235*** (0.057)	-0.070*** (0.012)	0.238*** (0.0105)
County labor force	-0.157 (0.096)	0.483*** (0.095)	—	—
Commuting zone employment	—	0.025*** (0.006)	-0.005 (0.005)	0.017* (0.009)
Commuting zone labor force	0.027*** (0.007)	—	—	—
Relative wage	-2,998 (11,965)	7,918 (13,882)	-10,221 (11,567)	45,482** (22,148)
Relative housing price	-2,882 (12,517)	-5,266 (12,209)	—	98,276*** (22,694)
Intercept	-78.6 (166.4)	2,053*** (503.1)	-2,658*** (414.9)	3,904** (797.1)
R^2	0.96	0.68	0.68	0.95
N	35	35	35	35

a. These are seemingly unrelated regression estimates. Standard errors are in parentheses. *** ** and * denote significance at the .01 .05 and .10 levels respectively. System weighted R^2 = .954. Except for the metro dummy all variables are first differences (2015 value less 2010 value).

b. These are mean county values divided by commuting zone average values for wages and housing prices respectively.