A Research Paper by



The Role of Non-Labor Income in the West



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ABOUT HEADWATERS ECONOMICS

Headwaters Economics is an independent, nonprofit research group whose mission is to improve community development and land management decisions in the West.

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I. EXECUTIVE SUMMARY

Non-labor income (NLI) is one of the largest and fastest growing sources of income, constituting more than one-third of personal income in the U.S. West and more than half of net growth in real personal income in the last decade. Because of the unprecedented growth in NLI and its diverse make-up, which includes investment income, Social Security, Medicare and Medicaid, and welfare, we studied the relationships between different types of NLI and local economies and social well-being.

We classify NLI into payments associated with investments, aging, and economic hardship, and evaluate the relationships to socioeconomic performance in western counties. We find:

- Types of NLI are clustered in different counties of the West, aggregating largely in rural counties.
- Investment income is associated with higher educational attainment, an older population, and larger construction, health care, and real estate sectors.
- Payments associated with aging are related to lower household income and educational attainment, higher poverty and unemployment rates, and a larger health care sector with lower average wages.
- Payments associated with economic hardship are associated with lower household income and educational attainment, higher poverty and unemployment, and a shrinking population. The health care sector is relatively large in communities with a high proportion of hardship payments.

Policies and demographic trends that affect the disbursement of NLI (e.g., aging baby boomers and reforms to retirement, income maintenance, and medical benefits) will have widespread effects, particularly in the rural West.

II. INTRODUCTION

Non-labor income (NLI), also known as non-earnings income, is one of the largest and fastest growing sources of personal income in the economy, particularly in the eleven Western U.S. states. NLI constitutes more than a third of all personal income and more than half of net growth in personal income in the last decade. In many counties NLI is the single largest contributor to income, and economists commonly refer to the importance of the "mailbox economy," particularly in rural areas. In the U.S. economy, NLI constituted 54 percent of net new real personal income in the last decade, while in the West during that time NLI constituted 60 percent of net new personal income growth. In both the U.S and the West, NLI made up 34 percent of total personal income in 2011. Measured as a share of each county's total personal income, on average non-labor comprised 39 percent of U.S. counties' personal income and 41 percent of Western counties' personal income (U.S. Department of Commerce, 2012).

NLI is often reported as one broad category, but it consists of two very different types of payments: investment income (Dividends, Interest, and Rent) and government transfer payments (Transfer Receipts). Within Transfer Receipts, some are associated with aging, while others are associated with economic hardship. Some transfer receipts are related to educational payments and others to medical and veterans

benefits. These income sources accrue to different segments of the population, which spend these payments differently. Understanding which economic sectors are most closely connected to these components of non-labor income can help us to better understand how this sizable income source flows through a community, which sectors might be stimulated by these payments, which sectors might be lower than average where these payments dominate local income, and how these payments are associated with measures of social well-being.

Abbreviations Used in the Paper
NLI: Non-Labor Income
TPI: Total Personal Income
DIR: Dividends, Interest, and Rent
TR: Transfer Receipts
ARP: Age-Related Payments
HRP: Hardship-Related Payments

The importance of separately evaluating the sources of NLI is illustrated by looking at two counties with comparable levels of total NLI: Lincoln County, Montana and Teton County, Wyoming. Both have more than half of total personal income in the form of NLI, yet they are very different from each other. Lincoln County's economy has been dominated historically by a declining mining and logging industry, and currently has high unemployment and low per capita income, whereas Teton County's economy is dominated by a growing tourism and recreation sector spurred by wealthy "amenity migrants" and second home buyers, and has low unemployment and high per capita income. While in Teton County, high NLI is an indication of economic growth that is led by investments, likely driven by the stock market and the in-migration of wealthy people, in Lincoln County, NLI income is driven by an aging population and higher levels of economic hardship, likely related to the loss of mining and timber jobs and the outmigration of the younger, working population. Although overall levels of NLI are similar, the types of NLI accruing within these counties are certainly related to different causes and different outcomes for their local economies. An approach that does not distinguish between the components of NLI would miss some very important distinctions between these two communities.

This example illustrates the importance of the research described in this paper. It is important to differentiate between components of non-labor income in order to understand the relationship with measures of local socioeconomic well-being, such as income, education, migration, and poverty rates. Testing different components of non-labor income, such as investment versus age-related payments, also helps to better understand the relationship to particular sectors, such as health care, construction, and real estate.

In this paper we:

- Describe what non-labor income is and what it includes,
- Reorganize non-labor income into five logical categories,
- Describe long-term trends comparing the U.S. to western states,
- Show the distribution of different types of non-labor income in the Western U.S. counties,
- Review literature on the role of non-labor income in socioeconomic development, and
- Test the relationship between types of non-labor income with particular sectors of the economy and measures of socioeconomic well-being.

We use the construction, health care, and real estate sectors as case studies to test whether there is a relationship between non-labor components and major economic sectors. Health care is a logical choice since it is has become an increasingly important component of the economy, particularly for rural areas, and because medical spending, in the form of Medicare and Medicaid, is a large and growing portion of NLI. We include construction and real estate as sectors likely boosted by the presence of investment income, and possibly also by retirement related NLI.

Description of Non-Labor Income

As defined by the by the Bureau of Economic Analysis (BEA) of the U.S. Department of Commerce, NLI consists of two subcategories: Dividends, Interest, and Rent (DIR) plus Transfer Receipts (TR). DIR includes personal dividend income, personal interest income, and rental income of persons with capital consumption adjustment, as well as income related to the rental of real property and royalties from patents and natural resource leases. These income sources are sometimes referred to as "investment income" or "property income". TR are defined as payments to persons for which no current services are performed, and consist of payments to individuals and to nonprofit institutions by federal, state, and local governments and by businesses (U.S. Department of Commerce, 2012d).

TR receipts of individuals from government are defined by the BEA as consisting of the following seven elements, described in greater detail in Appendix A:

- (1) Retirement and disability insurance benefits
- (2) Medical benefits, including Medicare and Medicaid
- (3) Income maintenance benefits
- (4) Unemployment insurance compensation
- (5) Veteran's benefits
- (6) Education and training assistance
- (7) Other transfer receipts of individuals from governments

The magnitude of these two types of payments relative to total personal income is summarized in Table 1. In both the U.S. and the West, non-labor income – DIR plus TR – equaled 34 percent of total personal income in 2011. In 2011, DIR was 16 percent of total personal income in the U.S., and 17 percent of total personal income in the West. Interest and Dividends – the "investments" components of DIR – constitutes 80 percent of DIR in the U.S., and 76 percent of DIR in the West. TR consisted of 18 percent of total personal income in the U.S. and 17 percent of total personal income in the U.S. and 17 percent of total personal income in the West.

Table 1: Dividends, Interest, and Rent as a Percent of Total Personal Income (TPI) in the U.S. and West, 2011

	U.S.	U.S.		West	
Personal Income Source	Income (Billions of 2012 \$s)	% of TPI	Income (Billions of 2012 \$s)	% of TPI	
Total Personal Income	13,220		2,990		
All Non-Labor Income	4,510	34%	1,010	34%	
Dividends, Interest, & Rent	2,140	16%	520	17%	
Dividends	690	5%	160	5%	
Interest	1,030	8%	230	8%	
Rent	420	3%	130	4%	
Transfer Receipts	2,370	18%	490	17%	

Source: U.S. Department of Commerce, 2012a

Reorganization of Non-Labor Income Categories

In order to evaluate the relationships between the components of NLI and socioeconomic performance, we reclassify NLI data into five categories that relate more logically to socioeconomic drivers and outcomes:

- 1) DIR (e.g., investment income)
- 2) Age-Related Payments (e.g., retirement, social security, Medicare)
- 3) Hardship-Related Payments (e.g., Medicaid, income maintenance benefits)
- 4) Education Payments
- 5) Other NLI

This reclassification is explained in more detail in the Data and Methods section and in Appendix A.

Our analysis uses a statistical approach to evaluate the relationships between these reclassified components of NLI, socioeconomic performance metrics, and the construction, health care, and real estate sectors during the period 1990 to 2011 in all counties within the conterminous U.S. West: Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming.

We focus on the West since it has experienced even faster growth in NLI in the past two decades (1990-2011) than the rest of the country. Sixty percent of net growth in personal income occurred in the form of non-labor income in the West, compared to 54 percent in the non-West. By 2011, NLI exceeded labor earnings in 16 percent of western counties (as opposed to 9 percent in non-western counties) (U.S. Department of Commerce, 2012).

III. TRENDS IN NON-LABOR INCOME

In the U.S. economy non-labor income constituted 34 percent of total personal income in 2011, as shown in Table 2. The largest components of NLI are investment income, or Dividends, Interest and Rent (16.2% of total personal income), followed by age-related payments (ARP; 9.8% of TPI; i.e. Social Security, Medicare), and hardship-related payments (HRP; 6.2% of TPI; i.e. SSI, Medicaid). These three consist of 94 percent of all non-labor income. The remainder is made up of Other and Education related transfer payments.

Income Source Category	Income (Billions of 2012\$s)	Category as % of TPI
Total Personal Income	13,220	
Non-Labor Income	4,510	34.1%
Dividends, Interest, & Rent	2,140	16.2%
Age Related Payments	1,300	9.8%
Hardship Related Payments	820	6.2%
Other Transfer Payments	180	1.3%
Educational Transfer Payments	70	0.6%



Source: U.S. Department of Commerce, 2012

Figure 1 shows the long-term trends in the components of non-labor income for the U.S. economy. From 1990 to 2011, NLI has been the source of 37 percent of the net real growth in total personal income (and 54% of net growth from 2001 to 2011). The influence of the stock market on DIR can readily be seen by the rapid rise, decline, and more recent turnaround during the period that included the Great Recession. Similarly, hardship payments rose during the recession, and are more recently beginning to decline. Notably, age-related payments have grown continuously and steadily, even during the recession. As a component of net new personal income from 1990 to 2011, 14.1 percent was from age-related payments and 11.4 percent were from hardship-related payments; in contrast, 9.2 percent was from DIR.



Figure 1: Change in Components of Non-Labor Income, 1970-2011, U.S

The trends are similar in the U.S. NLI constituted 33.9 percent of total personal income in 2011, as shown in Table 3. The largest components of NLI are Dividends, Interest and Rent (17.3% of total personal income), followed by age-related payments (8.4% of TPI), and hardship-related payments (6.1% of TPI). These three consist of 94 percent of all non-labor income. The remainder is made up of Other and Education related transfer payments.

Income Source Category	Income (Billions of 2012\$s)	Category as % of TPI
Total Personal Income	2,990	
Non-Labor Income	1,010	33.9%
Dividends, Interest, & Rent	520	17.3%
Age Related Payments	250	8.4%
Hardship Related Payments	180	6.1%
Other Transfer Payments	50	1.6%
Educational Transfer Payments	20	0.6%

Table 3. Non-Labor Inco	me in the West as	a Percent of total	Personal Income	2011
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Source: U.S. Department of Commerce, 2012

Figure 2 shows the long-term trends in the components of non-labor income for the West. From 1990 to 2011, NLI has been the source of 37 percent of the net real growth in total personal income (and a remarkable 60% of net new TPI growth from 2001 to 2011). As a component of net new personal income from 1990 to 2011, 23.1 percent was from age-related payments (compared to 14.1% for the U.S.); 20.2 percent was from hardship-related payments (compared to 11.4% for the U.S.); and 11 percent was from DIR (compared to 9.2% for the U.S.). As in the U.S. economy, age-related payments have continued to grow steadily over the decades, and have not slowed down, even during the last recession. This likely corresponds to an aging population, in particular the Baby Boomer cohort.

Figure 2: Change in Components of Non-Labor Income, 1970-2011, West



Non-labor income has been a larger component of growth in personal income in the West than in U.S., in particular in the last decade (60% of net personal income growth in the West in the last decade compared to 54% in the U.S.). Table 4 and Figure 3 show that while total personal income grew at the same rate from 2001 to 2011, non-labor income and its components grew faster in the West than in the U.S. during that period.

Table 4: Change in Total Real Personal Income and Components of Non-Labor Income, U.S. and West, 2001-2011

Income Source Category	Change from 2001-2011 (Billions of 2012\$s)	Percent Change, 2001-2011
U.S.		
Total Personal Income	1,710	15%
Non-Labor Income	920	26%
Dividends, Interest, & Rent	90	5%
Age Related Payments	420	48%
Hardship Related Payments	330	69%
Other Transfer Payments	30	24%
Educational Transfer Payments	40	121%
West		
Total Personal Income	380	15%
Non-Labor Income	230	29%
Dividends, Interest, & Rent	40	9%
Age Related Payments	90	55%
Hardship Related Payments	80	75%
Other Transfer Payments	10	30%
Educational Transfer Payments	10	139%

Source: U.S. Department of Commerce, 2012

These figures illustrate that while non-labor income is important to the U.S. economy, it is an even larger driver of the economy in the West.





IV. THE GEOGRAPHIC DISTRIBUTION OF NON-LABOR INCOME IN THE WEST

Maps 1 through 4 show the distribution of non-labor income and its various subcomponents for all counties in the West. Dividends, Interest and Rent (DIR), age-related payments (ARP), and hardship-related payments (HRP) are mapped. These three subcomponents represent 94 percent of all non-labor income. The remainder, Other and Education-related transfer payments, are not shown in maps.



Map 1: Non-Labor Income as a Percent of Total Personal Income, 2011

Map 1 shows the distribution of NLI across western counties. Relatively high levels of NLI can be seen in a number of areas, including southeast Oregon, northwest and central Montana, and northeast Arizona, among others. As the following maps illustrate, the make-up of NLI can differ significantly between regions of the West.





Map 2 shows that DIR payments tend to be heavily concentrated in some parts of the West more than others. Some high payments are due to investment income, as is the case with Teton County, Wyoming, which includes the wealthy town of Jackson in the northwest corner of the state. In other counties high levels of "Rent" likely drive high DIR payments. These could include counties with a relatively higher dependence on farming, where farmers earn money by renting land to neighboring farmers. This is common in places like central Montana. Rent could also be due to royalty payments to private individuals who lease minerals rights on private land for oil and gas development, common in eastern Montana and Wyoming. Appendix B includes a map and description of the methods used to determine the likelihood that the Rent component of DIR is likely due to rental and royalty income associated with agriculture and/or oil and gas development.

Map 3: Age-Related Payments as a Percent of Total Personal Income, 2011



Map 3 shows the distribution of age-related payments, which are more heavily concentrated in areas with high proportions of retirees. In some counties, this is due to in-migration of retirees. This includes retirement destination communities known for their amenities and quality of life, such as those in southeast Oregon and central Arizona. In other counties, the higher concentration of retirees is due to the out-migration of working age residents due to a declining economy and poor job prospects. This may be the case, for example, in northwest Washington, where the loss of timber jobs has left some communities along the coast with retirement payments as their single largest source of income (note from Map 4, below, that hardship related payments are also high in this area).

In contrast, ARP are a lower proportion of TPI in areas like northeast Arizona, with a large American Indian reservation, and central Wyoming, where there is relatively high dependence on oil and gas production.





Map 4 demonstrates that, in general, areas with high concentrations of hardship-related payments differ from areas with high concentrations of DIR or ARP. HRP are notably high in the Southwest, in eastern Arizona, New Mexico, and the San Luis Valley of Colorado. HRP are also relatively high in the northwest corners of California and Washington, areas where the decline in the timber industry has been a long-term trend that was exacerbated during the Great Recession. Some areas of high HRP correspond to the presence of American Indian reservations (e.g., northeast Arizona and southeast Utah, and three counties in northern Montana).

V. LITERATURE REVIEW

Research on non-labor income has focused on two primary themes. The first centers on identifying the geographic distribution of NLI and explaining why NLI is growing in some areas and not in others. The second main area of research addresses the socioeconomic implications for communities where NLI is a significant or growing part of the economy.

Geographic Patterns

NLI, because it is not connected to employment in a particular area, tends to be much more mobile than labor income. Therefore understanding factors that attract migrants with non-labor income is the key to understanding the current and future geographic distribution of NLI. We expect that migration patterns for non-labor migrants differ significantly depending on whether income is coming from DIR, age-related payments, or hardship-related payments, but the literature on NLI has focused primarily on DIR, with some attention to Social Security Income.

Previous research has demonstrated that NLI is becoming more concentrated in certain areas of the West, particularly if one looks at DIR only. These areas tend to be non-metropolitan counties high in amenities and with high rates of in-migration.

Using a combination of economic indicators and amenity measures for counties in the Western US, Shumway and Otterstrom (2001) find that counties with the highest amenity scores that are retirement of recreation destinations, with dominant service-based economies are experiencing the greatest growth due to in-migration and have the highest per capita income. They also find that while population and per capita income have increased across non-metropolitan counties throughout the West, it is concentrating in these particular areas, suggesting that migrants are bringing higher incomes with them.

Reichert and Rudzitis (1994) show that members of the "non-labor force" are more likely to prefer areas with high amenities and relatively low housing cost, and are not likely to move in response to higher wages. They find this is particularly true for migration from metro to non-metro counties. Similarly, Judson, Reynolds-Scanlon, and Popoff (1999) found that people moving for quality of life reasons, including wealthy near-retirees and older retirees, are willing to move to places with lower average wages but higher overall amenities.

Nelson and Beyers (1998) used methods similar to Shumway and Otterstrom, but instead broke out dividends and transfer payments from total personal income. They find that DIR is higher in communities with high in-migration and high employment. Additionally, they note that income from renting farm land is a component of DIR, and will be a significant component of personal income in farming-dependent communities.

A 1999 paper by Nelson finds that DIR is concentrated in particular areas in the rural West: the Olympic Peninsula, the Northern Rockies along the Idaho-Montana border, and the Colorado Rockies. He shows that the high levels of DIR tend to perpetuate even more DIR in the future, referring to growth in these areas as "self-reinforcing."

Much of the research on NLI has focused on its relationship to an aging population, with particular attention on the effect that migration of "pre-retirees" and retirees has had on non-metropolitan counties in the West. Nelson (2005) finds that Social Security Insurance (SSI) payments are flowing from metro to non-metro counties as retirees migrate to certain areas. This paper also finds that investment income is growing the most in the Rockies, and these increases are driven entirely by non-metropolitan counties.

The findings from Nelson's 2005 paper also indicate that people out-migrating from these booming regions occupy a lower socioeconomic position than those moving in, as out-migrants have lower income from DIR and lower overall per capita income. Analyzing patterns of migration associated with hardship payments would shed further light on this finding.

Cromartie and Nelson (2000) also found that a boom in retiree population in a community parallels a boom in Transfer Receipts (TR), and these booms are generally found in places with scenic and urban amenities, high second-home concentrations, relatively lower housing costs, and proximity to large cites. It is likely that their findings are being driven by the Social Security and Medicare payments that are included in TR.

As non-labor economies have expanded in the West, some authors have used the dominance of NLI as an indicator that the economy is no longer based on the extraction of natural resources, such as timber, minerals, and fossil fuels, but instead describe the economies of the "New West," which are based more on services industries that include software development and health care (Lorah, 2000 and Rosenberger, Sperow, and English, 2008). These studies found that the presence of wilderness is associated with an earlier transition to a non-labor economy from an extractive economy. These results are consistent with studies discussed earlier in the context of migration and concentration of NLI: amenities are a primary driver.

Much of the literature in this field has focused on the role amenities play in the geographic distribution of non-labor income. In this paper we build on these findings by controlling for counties' unique attributes, but also considering changing population, unemployment, and poverty.

Social and Economic Implications

As NLI becomes an increasingly important income source, understanding what this means for the economic and social vitality of these counties is essential. Most research has focused on the economic implications associated with DIR, with a few studies addressing DIR associated with retirees and baby boomers (although no studies we found parsed out the effect of what we call age-related payments).

Along the lines of the research finding that NLI, and particularly investment income (DIR), is becoming more concentrated in certain areas, these studies have demonstrated that high DIR tends to attract more DIR-dependent residents and encourage DIR growth within that community. These communities then develop a competitive advantage in generating DIR income in the future (Nelson, 1999).

But DIR growth does more than just attract more investment income to a community. Nelson also found that economic and population growth is most rapid in communities with high levels of investment income (Nelson, 1999), although he did not address specific economic sectors.

However, the literature is not unanimous on this topic, as Vias's study of the non-metro Rocky Mountain West (1999) found that a higher proportion of DIR as a percentage of TPI only induced employment growth in 1970-1980 and 1980-1990 time periods, but not in 1990-1995. This result may be driven by employment increasing in some sectors and decreasing in others, while net employment remained constant.

We are only aware of one study that considered the implications of a high proportion of Transfer Receipts (TR) relative to overall income (TPI). Vias (1999) found that a higher proportion of TR corresponded with decreased employment growth across all time periods in the non-metro Rocky Mountain West. The model used in that paper assumes that TR has the same effect across all counties, regardless of their major

economic sectors. It is not clear whether a model that allowed for different effects depending on the economic sectors would yield different results.

Studies that have considered the effect of NLI growth on economic growth in other economic sectors have focused on the NLI from baby boomers and retirees and its effect on the local economy. Stockdale and MacLeod (2013), looking at boomer migration in rural Scotland, find that many migrants are in the process of transitioning out of the labor force and are likely to start a small home business when they move to a new area. These new small businesses often hire local employees such as bookkeepers, thereby creating an "entrepreneurial infusion" in areas targeted by pre-retirees. In the U.S., Nelson, Oberg, and Nelson (2010) find that each retiree moving into a community generates 0.34-0.58 additional jobs, and these jobs are generally in the construction, health services, personal services, and household services sectors. Another paper found that not only do boomers stimulate growth in low-wage service-sector jobs, but they stimulate migration by the people who work in those jobs (Nelson, Lee, and Nelson, 2009).

We are aware of one study that looked at the effect of NLI on socioeconomic indicators. Petrigara, Patriquin, and White (2012) looked at how Canadian communities with high NLI differ from resource-dependent communities, lumping together DIR and TR. They found that NLI-dependent communities have the following characteristics: lower labor-force participation rates, higher unemployment rates, higher poverty rates, higher levels of economic diversity, and higher percentage of old-age populations. Some of these results match our expectations about NLI-dependent communities, such as higher levels of economic diversity and old-age populations. These are likely attributable to lumping together all NLI into a single category, as DIR and hardship-related TR likely have very different effects on these socioeconomic factors.

While several studies have looked at the role of overall NLI on a community (Petigara, Patriquin, and White, 2012; Nelson and Beyers, 1998; Reichert and Rudzitis, 1994) and others have looked at patterns in NLI growth associated with baby boomers and retirees (Nelson, 2005 and Nelson, Lee, and Nelson, 2009), we are not aware of other studies that have parsed out the components of NLI in the manner we propose. Additionally, we are aware of no research that has evaluated the socioeconomic implications of the growth and geographic concentration of these NLI components, a gap this paper aims to fill.

Taken together, the existing literature suggests that the source of NLI affects the socioeconomic relationships. Several studies demonstrate positive relationships between socioeconomic performance, DIR, and the populations (retirees and baby-boomers) associated with DIR and age-related sources of NLI. Additionally, Vias' (1999) findings indicate that TR may have the opposite relationship with socioeconomic well-being. Our research approach is informed by these studies and by the lack of empirical evidence of the relationships between the individual components of NLI and socioeconomic performance. No studies to date have evaluated the relationships between the components of NLI and socioeconomic performance using a consistent quantitative methodology. In order to do so, we reclassify NLI data into categories that relate more logically to socioeconomic drivers and outcomes: DIR, Age-Related Payments, Hardship-Related Payments, Education Payments, and Other NLI.

VI. HYPOTHESES TESTED

Empirical evaluations of basic performance metrics are necessary to assess the presence or absence of relationships between NLI components and socioeconomic performance before analysts can begin to consider questions about causation. For this reason, our analysis is framed around a clear set of testable hypotheses about the relationships between NLI components and socioeconomic performance metrics, which have been suggested but not yet established by the economic development literature for the U.S. West. Our hypotheses are as follows:

- 1) We expect DIR to be related to higher levels of household income, educational attainment, migration rate, average wages, and the share of the population of retirement age. We also expect DIR to be related to lower poverty and unemployment rates.
- 2) We expect Hardship-Related Payments (HRP) to have the opposite effect as DIR. We expect HRP to be associated with higher poverty and unemployment rates, and with lower levels of household income, educational attainment, migration rate, average wages, and the share of the population of retirement age.
- 3) We expect Age-Related Payments (ARP) to be associated with a higher share of population of retirement age, lower household income and educational attainment, and not associated (either positively or negatively) with poverty rate, unemployment rate, migration rate, and average wages.
- 4) We expect DIR, ARP, and HRP to be positively related to the percentage of jobs in the health care sector. We expect the magnitude of this relationship to be largest for ARP due to high demand for health care services by older populations.
- 5) We expect DIR to be related to higher average wages in the health care sector, which is consistent with our hypothesis that DIR will be related to higher average wages overall. We expect ARP and HRP to be related to lower wages in the health care sector, which is also consistent with our hypotheses that APR and HRP will be related to lower averages wages overall.
- 6) We expect DIR to be positively related to average annual wages and the share of employment in the construction sector as income from investments is invested locally in new commercial or residential development, increasing the demand and wages for construction workers. We expect to find no relationship between ARP and average wages and the share of employment in construction, as we do not expect retirees to be any more or less likely to build new homes. We expect a negative relationship between HRP and the share of employment in the construction sector as those in financial hardship are less likely to demand new homes or businesses.
- 7) We expect DIR to be positively related to average annual wages and the share of employment in real estate, as wealthier residents who receive DIR payments will likely purchase more properties and the properties will be more expensive, thereby increasing realtors' commissions. We expect no relationship between ARP and real estate wages and employment share, as we do not expect retirees to be any more or less likely to invest in real estate. We expect a negative relationship between HRP and real estate wages and employment share, as HRP accrue to a poorer population less likely to purchase real estate, and the properties purchased would be less expensive.

The data and methods described in the following section address these hypotheses empirically for the western U.S. We do not investigate the effects of NLI categorized as Education Payments or Other NLI, which comprised only 6 percent of NLI in the West in 2011 (U.S. Department of Commerce, 2012). The

sample, timeframe, and statistical approach allow us to evaluate the unique relationships between NLI components and local economies.

VII. DATA AND METHODS

The study used county-level data for the time period 1990-2011 for all counties in the West, excluding Broomfield County, Colorado, which was incorporated in 2001 and therefore does not have the full time series available. In total, we analyzed data for 413 counties in the conterminous U.S. West: Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming.

Components of Non-Labor Income (Explanatory Variables)

The most detailed data on NLI in the U.S. are available from the Bureau of Economic Analysis' Regional Economic Information System (REIS), which reports income by place of residence (U.S. Department of Commerce, 2012). REIS reports DIR and TR (in Table CA05N), which when summed, constitute all NLI. REIS also reports seven major components of TR, many of which are further subdivided providing more detail (in Table CA35). We used these data to create the following five categories that sum to total NLI:

- 1) Dividends, Interest and Rent (DIR): This category generally represents earnings from investments, and is used as reported in Table CA05N (Line code 46).
- 2) Age-Related Payments (ARP): We used measures that are most likely to be associated with an older segment of the population. These consist of Social Security benefits, railroad retirement and disability payments, and Medicare benefits from Table CA35 (Line codes 40, 50, and 111).
- 3) Hardship-Related Payments (HRP): This category consists of public assistance medical care benefits (Medicaid and other medical care benefits), income maintenance benefits (supplemental security income, family assistance, TANF, SNAP, and other income maintenance benefits), and unemployment insurance compensation from Table CA34 (Line codes 112, 120, and 170).
- 4) Education Payments: Only education and training assistance from Table CA35 were assigned to this category (Line code 280).
- 5) Other NLI: This last category includes all other forms of NLI: Worker's Compensation, other government retirement and disability insurance benefits, military medical insurance benefits, veteran's benefits, other transfer receipts of individuals from governments, and current transfer receipts of non-profit institutions. (Line codes 90, 100, 115, 230, 290, and 300).

The above categories account for all personal income reported in DIR and TR by BEA.

Socioeconomic Measures (Dependent Variables)

We used seven variables to represent overall county socioeconomic well-being and two variables to represent the health care sector (Table 5). When possible, we collected data for each year from 1990-2011. The variable with the most restrictive range of data availability was "persons with college degree as % of adult population", which was only available for four time periods: 1990, 2000, 2006-2010, and 2007-2011. A total of six data sources, four from the U.S. Census Bureau and two from the U.S. Bureau of Labor Statistics, were used for the dependent variables. The U.S. Census Bureau data were compiled from the Small Area Income and Poverty Estimates, the Population Estimates, the American Community Survey, and the Decennial Census. The Bureau of Labor Statistics data were from the Local Area Unemployment Statistics and Quarterly Census of Employment and Wages. We used the consumer price index to adjust all dollar amounts to 2012 dollars prior to making other calculations.

Average earnings per job for all industries (NAICS 10), average earnings per job for health care (NAICS 62), and percent of employment in health care (NAICS 62), were calculated using data reported for private industries from QCEW (U.S. Department of Labor, 2013). Average annual unemployment rates were obtained from Local Area Unemployment Statistics (U.S. Department of Labor, 2013a). College education was obtained from the Decennial Census of Population and Housing (U.S. Department of Commerce 1990; U.S. Department of Commerce 2000) and from the American Community Survey (ACS) (U.S. Department of Commerce, 2012a). The ACS data result from a five-year survey, and are representative of average characteristics during the survey period. The five-year ACS estimates tend to report higher accuracy for rural areas, making them ideal for cross-geography comparisons. College education was used as a measure of the quality of human resources and the potential for economic development since many high-wage occupations such as engineering, architecture, finance, and health care require college-educated workers. Median household income, poverty rates, population over 65 years of age, and migration rates were obtained from the U.S. Census Bureau's Population Division (U.S. Department of Commerce, 2012b) and Small Area Income and Poverty Estimates Program (U.S. Department of Commerce, 2012c).

Confounding Variables

Three variables were identified as possibly confounding associations between the NLI explanatory variables and the socioeconomic dependent variables (Table 5). We included total personal income, obtained from the Bureau of Economic Analysis' Regional Economic Information System (REIS) Table CA05N (Line code 10), to control for the size of the economy (U.S. Department of Commerce, 2012). We also included an indicator equal to one in counties with greater than 15 percent of jobs in farming. Rental income from leasing farm land can be a large source of DIR in farm communities, which exhibit unique socioeconomic characteristics. Including this variable allowed us to quantify the effect of DIR after accounting for the effect of farming. Total employment (NAICS 10) and farm employment (NAICS 11) were obtained from data reported for private industries from QCEW (U.S. Department of Labor, 2013). We also included an indicator variable used as a proxy measure for potential income from oil and gas royalties since socioeconomic performance may be different for communities where oil and gas royalties comprise a large part of DIR. The oil and gas royalties indicator was equal to one for counties where more than zero percent employment occurred in oil and gas extraction (QCEW, NAICS 211) and where more than 50 percent of oil and gas basins, identified using GIS, occurred on private land.

In addition, we included indicator variables for each unique year and county. The year variables were used to control for macroeconomic trends that vary over time but have the same effect on all counties. The county variable was used as a measure of each county's average socioeconomic conditions across the study period. These variables were controlled for to improve our ability to detect the true association between the components of NLI and the socioeconomic dependent variables.

Table 5: Variables used to determine whether non-labor income components are associated with increased or decreased socioeconomic measures in western counties. Unless otherwise noted, data were compiled for each year from 1990-2011. Variable types are as follows: E = explanatory, D = dependent, C = confounding.

Variable	Average	Std. Dev.
Dividends, Interest, and Rent as % of total personal income	21%	6%
Age-Related Payments as % of total personal income	11%	4%
Hardship-Related Payments as % of total personal income	5%	3%
Median household income in 2012 \$s, (1993, 1995, 1997-2011)	\$48,466	\$12,046
Persons with college degree as % of adult population (1990, 2000, 2006-2010, 2007-2011)	20.7%	9.3%
Poverty rate (1993, 1995, 1997-2011)	14.6%	5.4%
Unemployment rate	6.7%	3.4%
Migrants per 1,000 persons (2000-2011)	1.9	15.3
Average earnings per job in 2012 \$s	\$24,900	\$9,360
Persons aged 65 and older as % of population	10%	5%
Construction sector employment as % of total employment	6.43%	4.55%
Construction sector earnings per job in 2012 \$s	\$32,250	\$16,255
Health care sector employment as % of total employment	6.9%	6.9%
Health care sector earnings per job in 2012 \$s	\$21,388	\$18,750
Real estate sector employment as % of total employment	1.35%	1.27%
Real estate sector earnings per job in 2012 \$s	\$19,579	\$14,802
Total personal income in 2012 \$s	\$5,956,720	\$24,100,000
Indicator for farming-dependent counties (> 15% of employment in farming)	0.07	0.25
Indicator for counties with oil and gas royalties (> 0% employment in oil and gas AND > 50% of oil and gas basins occur on private land)	0.04	0

* U.S. Department of Commerce. 2012. Bureau of Economic Analysis, Regional Economic Information System

** U.S. Department of Labor. 2012. Bureau of Labor Statistics, Quarterly Census of Employment and Wages

***U.S. Department of Commerce. 2012. Census Bureau, Decennial Census and American Community Survey (ACS). ACS dannual surveys conducted during a 5-year period and are representative of average characteristics during that period. ^ U.S. Department of Commerce. 2012. Census Bureau, Small Area Income and Poverty Estimates Program

MU.S. Department of Labor. 2013. Bureau of Labor Statistics, Local Area Unemployment Statistics

MM U.S. Department of Commerce. 2012. Census Bureau, Population Division

Statistical Analyses

Statistical analyses were performed using Stata IC version 13.1, using user-written modules xtserial, xtcsd, and xtpcse. To test all hypotheses, we estimated a county-level linear fixed effects model, regressing the socioeconomic dependent variable of interest on the proportion of total personal income from DIR, ARPs, and HRPs. The models allow us to estimate the relationships between NLI sources and socioeconomic variables, but these relationships cannot be interpreted as socioeconomic effects caused by changes in NLI sources. The general model follows:

Socioeconomic Variable_{iy} = $\beta_0 + \beta_1 DIR_{iy} + \beta_2 ARP_{iy} + \beta_3 HRP_{iy} + \beta_4 \ln(total personal income)_{iy} + \beta_5 FarmDependent_{iy} + \beta_6 Royalty_{iy} + \alpha_i + \gamma_y + u_{iy}$

where *i* ranges from 1 to 413 to index the counties and *y* ranges from 1 to 21 to index the years 1990 to 2011. The variable α_i shifts the intercept for county *i*, and the variable γ_y shifts the intercept for year *y*. The structure of the error term, u_{iy} , is described in further detail below.

County-level longitudinal socioeconomic data tend to be highly correlated within the county over time (e.g., the current year's poverty rate is highly correlated with the previous year's poverty rate), and also across nearby counties (e.g., poverty tends to cluster in some areas). We tested for correlation within a county over time using Wooldridge's test for serial correlation in panel data (Wooldridge, 2010). We tested for contemporaneous correlation across counties using Pesaran's cross-sectional dependence test (Pesaran, 2004). The results for each dependent variable used in the analysis are summarized in Table 6.

Dependent Variable	Wooldridge Test for Serial Correlation Test Statistic (p-value)	Pesaran's Test for Cross-Sectional Dependence Test Statistic (p-value)
Ln(Median Household Income)	267.6 (0.00)	-2.24 (0.03)
Percent with College Degree	84.8 (0.00)	0.17 (0.87)
Poverty Rate	247.3 (0.00)	8.73 (0.00)
Unemployment Rate	1,447.4 (0.00)	15.57 (0.00)
Migrants per 1,000 persons	17.9 (0.00)	2.58 (0.01)
Ln(Average Annual Wages)	3.8 (0.05)	304.83 (0.00)
Percent over 65 Years	20,596.3 (0.00)	-0.80 (0.42)
Ln(Average Annual Wages in Construction)	18.3 (0.00)	567.747 (0.00)
Percent of Jobs in Construction	18.9 (0.00)	46.319 (0.00)
Ln(Average Annual Wages in Health Care)	87.7 (0.00)	271.320 (0.00)
Percent of Jobs in Health Care	83.1 (0.00)	71.980 (0.00)
Ln(Average Annual Wages in Real Estate)	42.8 (0.00)	468.096 (0.00)
Percent of Jobs in Real Estate	12.8 (0.00)	24.687 (0.00)

Table 6: Results from tests for serial correlation and cross-sectional dependence for socioeconomic and health care sector models.

For all models, we rejected the null hypothesis of no first-order autocorrelation correlation. We rejected the null of no cross-sectional dependence for all models except the percent of the population over 65 and the percent of the population with a college degree. Ignoring these relationships in the error terms would lead to biased, inconsistent parameter estimates, likely inflating our estimates of how differences in NLI proportions affect socioeconomic conditions. To account for correlation in the data between years and across counties, we estimated the linear fixed effects model using a Prais-Winsten transformed regression estimator (Prais, 1954). In this specification the error terms, u_{iy} , have first-order autocorrelation and satisfy the following condition:

$$u_{iy} = \rho_i u_{i,y-1} + \varepsilon_i$$

where ρ_i is a county-specific autoregression parameter and ε_i are distributed as N(0, σ_i^2) with panelspecific standard deviations. The covariance matrix for *u* allows for heteroskedasticity across panels and autocorrelation within the panels. The models for the percent of the population over 65 and percent of residents with college degrees, which we found are not contemporaneously correlated across counties, are identical except ρ is constant across all counties.

VIII. RESULTS

When ranked by the percent of total personal income from NLI sources in 2011, the top 50 western counties are either rural or micropolitan statistical areas with exception of Yavapai County, AZ, which is classified by the Census Bureau as a metropolitan statistical area and has relatively high ARP. The tendency for high NLI to occur disproportionately in rural areas can be seen in maps (Figures 1, 2, and 3) and is observed across the three major categories of NLI. Among the top 50 counties when ranked by the percent of total personal income from ARP, only three counties are metropolitan. When ranked by DIR, only six counties are metropolitan, and when ranked by HRP, only nine counties are metropolitan.

In western counties in 2011, NLI ranged from 16 to 63 percent of total personal income, and was over 40 percent of total personal income in the majority of counties. The three counties with highest NLI (as a percent of total personal income) were: San Juan County, WA; Meagher County, MT; and Huerfano County, CO. DIR ranged from 7 to 48 percent of total personal income, and was over 18 percent in the majority of counties. The counties with the highest percent DIR were: Teton County, WY; San Juan County, WA; and Hinsdale County, CO. ARP ranged from 3 to 26 percent, and was over 12 percent in the majority of counties. The counties with the highest percent ARP were: Wheeler County, OR; Lewis County, ID; and Mohave County, AZ. HRP ranged from 0.01 to 28 percent, and was over 6 percent in the majority of counties. The counties with the highest HRP were: Apache County, AZ; Navajo County, AZ; and Mora County, NM.

Statistical Analyses

Table 7 summarizes the direction of the relationships between the three NLI sources and the socioeconomic dependent variables. Table 8 presents the magnitude of these relationships and whether our *a-priori* hypotheses were supported.

Counties with higher than average proportion of personal income from DIR tend to have older and more educated residents, with lower poverty rates. Median household income and average wages across all sectors are lower in these counties. The construction, health care, and real estate sectors have a larger share of total employment, and average wages are higher in health care and real estate, but lower in construction. On average, these counties are neither gaining nor losing population, nor are their residents more likely to be employed or unemployed.

Residents in counties with a higher than average proportion of personal income from ARP are older, less educated, poorer, and with lower employment rates. Average annual wages are lower across all sectors, and within construction, health care, and real estate as well. The construction and real estate sectors comprise a smaller proportion of employment, and the health care sector is a larger share of employment. There is no trend in migration rates in these communities.

Residents in counties with a higher than average proportion of personal income from HRP are less educated and poorer, with higher poverty and unemployment rates. They are losing population, and average annual wages are lower across all sectors and within the construction and real estate sectors. Construction and real estate also comprise smaller shares of total employment. Health care wages are no different in these counties than in a county with the average level of HRP, but health care makes up a greater share of total employment.

Table 7: Direction of relationships between higher proportion of NLI source and socioeconomic variables.*+ means variable is positively associated with the proportion of income from NLI source; - means negatively associated; and 0 means there is no relationship.

	Direction of Statistical Relationship	Overview
Counties with higher proportions of Divide following socioeconomic relationships:	ends, Interest, and Rent (DIR) have the	
Median Household Income	-	DIR comprised 17% of personal income
Percent with College Degree	+	
Poverty Rate	-	143 counties (35%) in the West had at
Unemployment Rate	0	in 2011.
Migration Rate	0	Of these 442 sourtise 447 (000/) wars
Average Annual Wages	-	non-metro.
Percent over 65 Years	+	
Construction average wages	-	
Construction share of total employment	+	
Health care average wages	+	
Health care share of total employment	+	
Real estate average wages	+	
Real estate share of total employment	+	
Counties with higher proportions of Age-F following socioeconomic relationships:	Related Payments (ARP) have the	
Median Household Income	-	ARP comprised 8% of personal income
Percent with College Degree	-	
Poverty Rate	+	19 counties (5%) in the West had at
Unemployment Rate	+	in 2011.
Migration Rate	0	
Average Annual Wages	-	of these 19 counties, 17 (90%) were non-metro.
Percent over 65 Years	+	
Construction average wages	-	
Construction share of total employment	-	
Health care average wages	-	
Health care share of total employment	+	
Real estate average wages	-	
Real estate share of total employment	-	
Counties with higher proportions of Hards following socioeconomic relationships:	ship-Related Payments (HRP) have the	
Median Household Income	-	HRP comprised 6% of personal income
Percent with College Degree	-	
Poverty Rate	+	5 counties (1%) had at least 20% of
Unemployment Rate	+	in 2011.
Migration Rate	-	Of these 5 counties of 5 (1000) were
Average Annual Wages	-	non-metro.
Percent over 65 Years	-	
Construction average wages	-	
Construction share of total employment	-	
Health care average wages	0	
Health care share of total employment	+	
Real estate average wages	-	
Real estate share of total employment		

* The magnitude of the relationships is also important. This information is provided in detail in Table 8.

As described in Table 8, the majority of our a-priori hypotheses were supported. As hypothesized, DIR was found to be positively related to the percent of adults with a college degree (95% CI 0.46 to 0.64%), the percent of the population of retirement age (65 years and older) (95% CI 1.18 to 1.58%), average annual wages in health care (95% CI 0.03 to 0.46%), the percent of jobs in health care (95% CI 0.001 to 0.05%), the percent of jobs in construction (95% CI 0.0004% to 0.06%), log transformed average annual wages in real estate (95% CI 0.39 to 0.93%), and the percent of jobs in real estate (95% CI 0.015 to 0.034%). Also, as hypothesized, DIR was found to be negatively related to the poverty rate (95% CI -0.7 to -0.13%). Inconsistent with our a-priori hypotheses, median household income (95% CI -0.24 to - 0.04%) average annual wages (95% CI -0.48 to -0.25%), and average annual wages in construction (95% CI -0.30 to 0.00%), all log-transformed prior to performing the regressions, were found to be negatively related to DIR. Whereas we had hypothesized that DIR would be negatively associated with both unemployment rate and migration rate, confidence intervals on the coefficient estimates (95% CI -0.20 to 0.26% and -1.62 to 1.92% respectively) suggest that they are not associated with either an increase or decrease in DIR (Table 8).

Table 8: Hypotheses and inference statistics for changes in socioeconomic responses associated with a 1% increase in the percent of total personal income from the three types of non-labor income. The reported ranges represent 95% confidence intervals. Intervals that do not overlap zero and support the *a-priori* hypotheses are shown in bold green.

	Dividends, Interest, & Rent	Age-Related Payments	Hardship-Related Payments
Ln(Median Household Income)	-0.24 to -0.04%	-2.24 to -1.88%	-3.3 to -2.63%
Percent with College Degree	0.46 to 0.64%	-1.44 to -0.90%	-0.40 to -0.12%
Poverty Rate	-0.70 to -0.13%	1.16 to 2.16%	9.67 to 13.22%
Unemployment Rate	-0.20 to 0.26%	0.16 to 1.25%	4.12 to 5.99%
Migrants per 1,000 Persons	-1.62 to 1.92	-0.37 to 5.01%	-7.83 to -2.89%
Ln(Average Annual Wages)	-0.48 to -0.25%	-1.56 to -1.16%	-1.25 to -0.74%
Percent over 65 Years	1.18 to 1.58%	6.22 to 8.52%	-1.70 to -1.08%
Ln(Average Annual Wages in Construction)	-0.30 to 0.00%	-1.42 to -0.82%	-1.63 to -1.04%
Percent of Jobs in Construction	0.00 to 0.06%	-0.32 to -0.20%	-0.28 to -0.18%
Ln(Average Annual Wages in Health Care)	0.028 to 0.46%	-0.98 to -0.08%	-0.11 to 0.61%
Percent of Jobs in Health Care	0.001 to 0.05%	0.29 to 0.45%	0.15 to 0.28%
Ln(Average Annual Wages in Real Estate)	0.39 to 0.93%	-2.60 to -1.74%	-1.66 to -0.57%
Percent of Jobs in Real Estate	0.015 to 0.034%	-0.84 to -0.05%	-0.04 to -0.018%

Following are examples of the magnitude of four relationships between DIR and socioeconomic variables: poverty rate and education rate, and in the next paragraph, median household income and average annual wages, which were both log-transformed. We estimate with 95 percent confidence that an increase in the proportion of income from DIR of 6 percentage points, which is equal to one standard deviation from the mean, is associated with a drop in poverty rate of between 0.6 and 4.2 percentage points. For reference, contrast a hypothetical county characterized by the average poverty rate within our sample (14.6 percent of individuals) and the average proportion of income from DIR within our sample (17.4 percent of total personal income) to a second hypothetical county that is identical in every way except that the proportion of personal income from DIR is 6 percentage points higher (23.4% of total personal income). Based on the inference statistics, the second county is expected to have a poverty rate between 10.4 and 14.0 (as opposed to the 14.6 poverty rate of the first county). We also estimate with 95% confidence that an increase in the proportion of income from DIR of 6 percentage points, or one standard deviation from the mean, is associated with a 2.8 to 3.8 percentage point increase in the college attainment rate, which has an average value within our sample of 20.7 percent of adults.

Because median household income and average annual wages were log-transformed, the relationships between DIR and these variables are expressed in terms of percent change. On average, an increase in the proportion of income from DIR of 6 percentage points, or one standard deviation from the mean, is associated with a -0.2 to -1.4 percent change in median household income. If a hypothetical county with the average median household income within our sample (\$48,466) experienced an increase of 6 percentage points in the proportion of income from DIR, the associated decrease in median household income is expected to be between \$116 and \$698. Similarly, we estimate with 95 percent confidence that an increase in the proportion of income from DIR of 6 percentage points is associated with a 1.5 to 2.9 percent decrease in average annual wages. Using the average annual wages within our sample (\$24,900), an increase in the proportion of income from DIR of 6 percentage points is associated with a decrease in average annual wages of \$374 to \$717.

Most of our hypotheses regarding the relationships between ARP and the socioeconomic dependent variables were supported. As hypothesized, ARP was found to be positively related to both the percent of the population greater than 65 years of age (95% CI 6.22 to 8.52%) and the percent of jobs in health care (95% CI 0.29 to 0.45%). Also supported were our hypotheses that ARP would be negatively related to median household income, log-transformed, (95% CI -2.24 to -1.88%), the percent of adults with a college degree (95% CI -1.44 to -0.90%), and log-transformed average wages in health care (95% CI - 0.98 to -0.08%). We had expected to find no relationship with poverty rate, unemployment rate, average wages, and average wages and share of employment in construction and real estate. Instead, we found that ARP was positively related to both poverty rate (95% CI 1.16 to 2.16%) and unemployment rate (95% CI 0.16 to 1.25%), and negatively related to log-transformed average annual wages (95% CI -1.56 to -1.16%). ARP is also negatively related to log-transformed average annual wages in construction (95% CI -1.42 to -0.82%), percent of jobs in construction (95% CI -0.32 to -0.20%), log-transformed average annual wages in real estate (95% CI -2.60 to -1.74%), and percent of jobs in real estate (95% CI -0.84 to -0.05%).

The magnitude of the relationship between ARP and the percent of the population of retirement age (65 years and older) is much larger than for other type of NLI. On average, an increase in the proportion of income from ARP of 4 percentage points, which is equal to one standard deviation from the mean, is associated with an increase in the proportion of retirement age individuals of 24.9 to 34.1 percentage points. It should be noted that the upper end of this interval is outside the range of data within our sample, in which the maximum proportion of the population that is 65 years and older is 32 percent. This suggests that the true relationship between ARP and the retirement age population is most likely non-linear.

The decline in average annual wages and educational attainment and the increase in the proportion of jobs in health care associated with increasing ARP are larger in magnitude than these relationships for either DIR or HRP. For example, an increase in the proportion of income from ARP of 4 percentage points, or one standard deviation from the mean, is associated with a 3.6 to 5.7 percentage point decrease in the college attainment rate. An increase in the proportion of income from ARP of 4 percentage points is also associated with a decrease in average annual wages of \$1,733 to \$2,331, when using the average annual wages within our sample (\$24,900) as a starting point, a necessary reference since this relationship is expressed in percent change. Also, when compared to other types of NLI, the extent to which the proportion of jobs in health care increases with increasing ARP is largest. An increase in the proportion of income from ARP of 4 percentage point increase in the proportion of jobs in health care, which has an average value within our sample of 6.9 percent.

All but one of our a-priori hypotheses regarding the relationships between HRP and the socioeconomic dependent variables were supported. As hypothesized, HRP was found to be positively related to both poverty rate (95% CI 9.67 to 13.22%), unemployment rate (95% CI 4.12 to 5.99%), and the percent of

jobs in health care (95% CI 0.15 to 0.28%). Also as hypothesized, HRP was found to be negatively related to log-transformed median house income (95% CI -3.3 to -2.63%), percent of adults with a college degree (95% CI -0.40 to -0.12%), migration rate (95% CI -7.83 to -2.89%), log-transformed average annual wages (95% CI -1.25 to -0.74%), percent of the population greater than 65 years of age (95% CI - 1.70 to -1.08%), log-transformed average annual wages in construction (95% CI -1.63 to -1.04%) and real estate (95% CI -1.66 to -0.57%), and the share of jobs in construction (95% CI -0.28 to -0.18%) and real estate (95% CI -0.04 to -0.018%). Whereas we had hypothesized that HRP would be negatively associated with log-transformed average wages in health care, the confidence intervals on the coefficient estimate (95% CI -0.11 to 0.61%) suggests no association with either an increase or decrease in HRP (Table 3).

For many variables, including poverty rate, unemployment rate, median household income, migration rate, and log-transformed average annual wages in construction and real estate, the relationships with HRP are larger in magnitude than for other types of NLI. Overall, the largest observed effects are with poverty and unemployment rates. We estimate with 95 percent confidence that an increase in the proportion of income from HRP of 3 percentage points, which is equal to one standard deviation from the mean, is associated with an increase in poverty rate of between 29.0 and 39.7 percentage points. For reference, the maximum poverty rate within our sample is 43.9 percent of individuals. We also estimate that, on average, an increase in the proportion of income from HRP of 3 percentage points. Evaluated at the mean average construction wages (\$32,250), in a county with 3 percentage points. Evaluated at the mean annual real estate wages (\$19,579), average annual wages in a county with 3 percent more personal income from HRP will have real estate average annual wages \$335 to \$975 lower than an otherwise identical county.

Similar to DIR and ARP, HRP is associated with a slight increase in health care jobs; an increase in the proportion of income from HRP of 3 percentage points is associated with a 0.5 to 0.8 percentage point increase in the proportion of jobs in health care. Higher HRP is associated with smaller proportion of construction jobs, with a one standard deviation increase in HRP corresponding to 0.54 to 0.84% smaller proportion of jobs in the health care sector. While the relationship to the proportion of jobs in real estate is statistically significant, the effect is small: a one standard deviation increase in HRP is associated with a decrease in the proportion of jobs in real estate ranging from 0.05 percent to 0.12 percent. Lastly, HRP is the only type of NLI to show a significant relationship with migration rate, represented as net migrants per 1,000 people. On average, an increase in the proportion of 142,678; a loss of 9 to 24 people per thousand translates to between 1,284 and 3,424 people leaving per year.

IX. DISCUSSION

We find that NLI components (Dividends, Interest and Rent; age-related payments; and hardship-related payments) have large and statistically significant relationships with many county-level measures of socioeconomic performance in the West. The majority of our hypotheses regarding these relationships are supported, indicating that the types of NLI accruing in western counties are associated with predictable socioeconomic characteristics –in some cases desirable and in other cases undesirable. The categories of NLI we create are useful in that they reflect meaningful differences between western counties; DIR, ARP, and HRP have different associations with socioeconomic performance.

Dividends, Interest, and Rent

In agreement with previous research (Nelson 1999; Vias 1999; Nelson and Beyers, 1998), we find that DIR is associated with some favorable socioeconomic measures including higher education attainment and lower poverty. However, on average, household income and average wages decrease with increasing DIR, and no relationship with unemployment rate is evident. Whereas some of the highest ranking counties in the West, when ordered by the percent of personal income from DIR, are affluent and experiencing high levels of in-migration (e.g., Teton County, WY; San Juan County, WA; and Summit County, CO), the majority are isolated from markets with older populations and out-migration resulting in a declining workforce (e.g., Hinsdale County, CO; Carter County, MT; and Meagher County, MT). Relatively low income levels and wages are common among isolated counties of the West that are losing population. In many of these isolated communities, the proportion of income from non-labor is quite high because labor income is low.

The observation that very different types of counties can share the characteristic of having high DIR is worth noting, and demonstrates that having relatively high levels of income from DIR is not synonymous with socioeconomic well-being. This finding is unique in that previous research has found largely positive economic performance associated with DIR. We believe that the causes of high DIR in western communities likely vary depending on whether the population is growing or shrinking, and the role DIR plays (e.g., in contributing to growth in other sectors of the economy) is likely to vary with population change as well. This is a topic that merits future research. Additionally, more research is also needed to investigate the effects of components of DIR if a suitable data source can be identified that differentiates between DIR rather than aggregating them.

Age-Related Payments

For ARP, all the investigated associations with socioeconomic performance appear to be disadvantageous. On average, median household income, educational attainment, in-migration, and average wages decline and poverty and unemployment rate increase with increasing ARP. The extent of these negative relationships is consistent with studies such as Lambert et al. (2007), which found lower rates of job growth in communities with a high proportion of residents over age 65, and Day and Barlett (2000), which found that health care wages are lower in communities with numerous retirees. Most research finding lower socioeconomic performance associated with retirees attribute the effect to poorer, older retired populations that are aging in place (Serow, 2003). However, other literature focused on the West argues that an influx of retirees can stimulate economic growth (Nelson, Oberg, and Nelson, 2010; Nelson, Lee, and Nelson, 2009). The apparent disagreement between these conclusions is likely related to whether retirees are moving in because the county is a retirement destination, or whether working-age people are moving out, leaving behind retirees as the only major driving force of the economy (Serow, 2003).

Among western counties with high ARP, there are counties in which retirees are moving in and counties in which working-age people are moving out (which likely explains the why we did not find a statistically significant pattern between the proportion of ARP and migration rate). In the majority of western counties with high ARP, a high proportion of an older population is due to out-migration of working-age people-the majority of counties with high ARP are experiencing either population decline or slower growth than the national average (Department of Commerce 2000, Department of Commerce 2012a). This is true of population change from 2000 to 2012 for 70 percent of the top 50 counties ranked by the percent of total personal income from ARP. Examples are Wheeler County, OR, Huerfano County, CO and Wibaux County, MT, in which roughly one-quarter of personal income comes from ARP. Each of these counties experienced a loss of one-sixth of their population from 2000 to 2012, resulting in an 8 to 10 year increase in the median age, which exceeds 50 in all three counties (compared to the national average of 37.2). Among counties with out-migration of the working-age population, socioeconomic performance is typically poor (DeVanzo, 1978; Schlottmann and Herzog, 1981; Rabe, 2012).

Although they are in the minority, there are certainly counties with high ARP that are experiencing population growth caused by in-migration of retirees. Included in this list are metropolitan and micropolitan counties (e.g., Mohave County, AZ; Nye County, NV; and Crook County, OR) and rural counties (e.g., Piute County, UT; Sanders County, MT; and Pend Oreille County, WA). Studies of the effects of in-migration by retirees suggest a rosier picture for these types of counties – one where retirees stimulate economic growth in other sectors (Nelson, Oberg, and Nelson, 2010; Nelson, Lee, and Nelson, 2009). The counties we have listed as examples appear to have lower income levels and higher poverty than average for either the West or the nation, but further quantitative research is needed to adequately test whether the relationships between ARP and socioeconomic performance differ between counties experiencing in-migration versus out-migration.

Hardship-Related Payments

The relationships between HRP and socioeconomic well-being are consistently undesirable, similar to ARP, but with larger magnitude. Not surprisingly, the most dramatic relationships are with poverty and unemployment rates. A one percentage point increase in HRP is associated with increases in poverty and unemployment of approximately eleven and five percentage points, respectively (95 percent confidence intervals are reported in the results section). Out-migration is also associated with higher HRP, which is the only type of NLI to show a significant relationship with migration rate.

High HRP is also unique in that it is not predominantly a rural phenomenon. In fact, high HRP appears to be distributed evenly among rural and non-rural (micropolitan or metropolitan) counties. The same percent of counties are classified as non-rural in the West as in the top 50 counties when ranked by the share of personal income from HRP –in both cases 54 percent of counties are classified by the Census Bureau as either micropolitan or metropolitan statistical areas.

Non-labor Income and the Health Care Sector

While previous studies have investigated the ties between NLI and socioeconomic performance, this study was the first to investigate the connections between NLI individual sectors of the economy. We found that the types of NLI do indeed have different relationships with the health care sector.

The relationship between DIR and the health care sector is, on average, positive. The share of jobs and the average wages in health care tend to increase slightly with increasing DIR. For communities characterized by high DIR and growth, this may reflect greater wealth or a higher tendency of DIR recipients to use health care services, including higher paid health care specialists. For the communities characterized by high DIR and population decline, this may reflect the higher demand for health care services by older populations, which are typical of these types of communities.

The relationships between ARP and the health care sector are mixed. As ARP increases, wages in health care decrease and the share of jobs in health care increases. The magnitude of the relationship between ARP and health care jobs, although small, was larger for ARP than either HRP or DIR. An increase in ARP of ten percentage points is associated with roughly a four percentage point increase in the share of jobs in health care. This relationship is expected due to high demand for health care services by older populations, which are most strongly associated with ARP.

HRP and average wages in health care appear unrelated. However, average wages across all sectors are lower when HRP increases. Taken together, this suggests that while average wages tend to be depressed in communities with high HRP, average wages in health care are not affected. From this we infer that health care sector jobs are relatively better paying than jobs in other sectors. Given that the relationship with the share of jobs in health care is positive, the health care sector is also relatively larger in communities with higher HRP. Therefore the health care sector, with its relatively large proportion of total jobs and relatively high paying jobs, is particularly important for communities experiencing the greatest economic hardship.

Non-Labor Income and the Construction Sector

We hypothesized that DIR would be positively associated with the construction sector, as income associated with investments would accrue to a wealthier population who would then invest in local construction. The results suggest that this may be the case, as higher DIR is associated with a statistically significant greater share of total employment in construction. However, the effect is quite small, with a 10 percent increase in DIR associated with 0.3 percent greater employment in construction. Although the construction sector is larger in communities with greater DIR, average construction wages are slightly lower.

Communities with higher ARP on average have a smaller construction sector and lower average construction wages, differing from our hypothesis that there would be no relationship between ARP and the construction sector. This may be due to retirees being less inclined to build new housing, and would be consistent with communities dominated by retirees who are aging-in-place, rather than in-migrating retirees who might be more likely to construct new housing. These would also be communities that are experiencing other measures of hardship, such as higher poverty and unemployment rates, and lower average wages across all sectors.

Of the three NLI sources, HRP has the biggest relationship with average wages in construction. Evaluated at the mean annual wages in construction, the average construction wages in a community with 1 percent greater proportion of HRP will be \$430 lower than a community with average HRP. Construction also makes up smaller proportion of total employment in communities with higher HRP. From our other analyses we know communities high in HRP are losing population, and communities that are not experiencing population growth will have little need for new construction, whether residential or commercial.

Non-Labor Income and the Real Estate Sector

Communities with a higher proportion of DIR have a larger and better paid real estate sector, supporting our hypothesis. This is likely due to a higher value of the properties bought and sold. However, our analysis of other socioeconomic variables demonstrated that, on average, communities with higher proportions of DIR have lower average wages across all sectors and lower median household income. These findings together suggest that real estate might be particularly expensive in communities with high DIR, despite relatively low wages, making these communities less affordable for those whose income comes from labor earnings. We hypothesized that ARP would have no relationship to the real estate sector, but instead found that average wages and the share of employment in real estate are significantly lower in places with higher proportions of ARP. As with the construction sector, this finding suggests that many recipients of ARP are aging-in-place and not purchasing new homes rather than moving to a retirement destination and purchasing a home. Of the three NLI sources, ARP has the largest effect on real estate wages, with a one percentage point increase in ARP associated with \$424 lower annual wages.

Communities with high proportions of HRP have lower average wages and a lower share of total employment in real estate. As with the construction sector, this likely reflects these counties' trend of declining population, coupled with poverty, unemployment, and low income that reduce the likelihood of real estate purchases.

Limitations

As with all observational studies, causality is not implied. People accumulate different types of non-labor income, and spend that income in different ways. Socioeconomic characteristics likely both cause and result from patterns in non-labor income. Before causality can be explored, it is necessary to clarify the socioeconomic characteristics that exist in counties accumulating different types of non-labor income. That is the goal of this study.

We go a step further than previous research by dissecting the effects associated with types of NLI, and by exploring the relationships between types of NLI and one particular sector of the economy –health care. More research is needed to investigate the effect of types of NLI on other major economic sectors such as construction, professional services, and retail. We also believe that it would be worthwhile to investigate whether the relationships with NLI components differ for counties with population growth versus decline. High NLI can result from both population gain (e.g., in-migration of retirees) and loss (e.g., out migration of workers and aging-in-place seniors), to which patterns in socioeconomic performance are closely tied.

Lastly, the Bureau of Economic Analysis data used in this study did not offer the level of detail required to investigate components of DIR. If a suitable data source could be found, it would be worthwhile to measure the characteristics of communities related to dividends versus types of interest versus rent.

X. CONCLUSIONS

The implications of this research are important for nearly all western counties and for the U.S. in general. Dramatic growth in non-labor income is ubiquitous, and policies and demographic trends (e.g., the aging baby boomer generation) that affect the disbursement of non-labor income have widespread effects. Particularly during times of national economic contraction, federal policies that affect government payments (e.g., retirement and disability benefits, income maintenance benefits, medical benefits, and many other forms of transfer receipts) are heavily scrutinized.

In 2012, age, health, and social assistance-related payments comprised 55 percent of the federal budget: Social Security comprised 22 percent of total; Medicare, Medicaid and Children's Health Insurance Program (CHIP) were 23 percent, and "safety net" programs such as unemployment and disability insurance, comprised another 10 percent. By 2023, these payments are projected to account for 61 percent of the total federal budget, with 24 percent from Social Security, 31 percent from Medicare, Medicaid, and CHIP, and 6 percent from safety net programs (Congressional Budget Office, 2013). As mandatory federal spending continues to increase and concern over the deficit remains at the political forefront, lawmakers are looking for ways to reduce these payments.

The classification system presented in this paper that differentiates between components of non-labor income can help explain how different forms of non-labor income are distributed across counties and how federal policies to reform DIR and TR could affect some local economies more than others. For example, Social Security and Medicare dependent counties tend to be economically stressed, with relatively low average wages, median household income, and educational attainment, yet these counties can benefit from expenditures by retirees, the flow of federal medical payments into the community, and the relatively higher wages in the health care sector. Policies that affect age-related non-labor income such as Social Security and Medicare benefits can therefore have a significant, disproportionate impact on counties with an aging population.

In many areas of the U.S. non-labor income is already the single largest source of personal income in the county. This source of income will continue to grow as the baby boomer generation continues to age and retire from the workforce, and as the stock market continues its recovery from the recession. At the same time, federal policies may change the size of some components of non-labor income. For these reasons, it is important to understanding the makeup of NLI, how it is distributed, and how these types of payments can affect the local economy.

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APPENDIX A: DATA, DEFINITIONS, AND SOURCES

Non-labor income is generally described as money earned from investments and government transfer payments to individuals. Non-labor income consists of two general categories: Dividends, Interest and Rent (DIR), and Personal Current Transfer Receipts, abbreviated as Transfer Receipts (TR) (U.S. Department of Commerce, 2012d).

Dividends, Interest and Rent (DIR)

The three components of DIR are defined by the Bureau of Economic Analysis (BEA) as follows:

(1) Dividends: "Payments in cash or other assets, excluding the corporation's own stock, made by corporations located in the United States and abroad to stockholders who are U.S. residents." Dividends constitute approximately 5.8 percent of total personal income in the U.S. (U.S. Department of Commerce, 2012d).

(2) Interest: "Personal interest income is the interest income (monetary and imputed) from all sources that is received by individuals, employee retirement plans, and quasi-individuals" (U.S. Department of Commerce, 2012d). Personal interest income is approximately 8.1 percent of total personal income in the U.S.

(3) Rent: "Earnings from the rental of real property by persons who are not primarily engaged in the real estate business. It also includes the imputed net rental income of owner-occupants and the royalties received by persons from patents, copyrights, and rights to natural resources." (U.S. Department of Commerce, 2012d). Rental income is approximately 2.8 percent of total personal income in the U.S.

Transfer Receipts (TR)

The BEA defines Transfer Receipts (TR) as "benefits received by persons for which no current services are performed. They are payments by government and business to individuals and nonprofit institutions."

TR receipts of individuals from government are defined by the BEA as consisting of the following seven elements:

(1) Retirement and disability insurance benefits, consisting of these components:

- *Social Security benefits* are "monthly benefits received by retired and disabled workers, dependents, and survivors and lump-sum benefits received by survivors."
- *Railroad retirement and disability*: benefits "received by retired and disabled railroad employees and their survivors under the federal program of retirement insurance for railroad employees, who are not covered by Social Security."
- *Worker's compensation*: compensation "received by individuals with employment-related injuries and illnesses from publicly administered workers' compensation insurance from both the federal and state governments."
- Other government retirement and disability insurance benefits, which includes "temporary disability benefits, black lung benefits, and benefits from the Pension Benefit Guaranty Corporation."

Retirement and disability insurance benefits are approximately 5.9 percent of total personal income in the U.S. of which the majority, 5.6 percent, is in the form of Social Security benefits.

(2) Medical benefits:

- *Medicare: "federal government payments made directly or through* intermediaries to vendors for the care provided to individuals under the Medicare program."
- Medicaid: "medical benefits are received by low-income individuals."
- *Other medical care benefits*: benefits received by low-income individuals that consist "mainly of the payments made directly or through intermediaries to vendors for care provided to individuals under the Title XXI of the federally assisted, state-administered Children's Health Insurance Program (CHIP), and under the general assistance medical programs of state and local governments."
- Military medical insurance benefits.

Medical benefits are approximately 7.7 percent of total personal income in the U.S., of which 4.2 percent is in the form of Medicare, and 3.3 percent from Medicaid.

(3) Income maintenance benefits:

- Supplemental Security Income (SSI) benefits: benefits "received by the aged, the blind, and the disabled from both the federal and state governments."
- *Family assistance*: assistance provided through the Temporary Assistance to Needy Families (TANF) program.
- Supplemental Nutritional Assistance Program (SNAP): (formerly called food stamps, "these benefits are issued to qualifying low-income individuals in order to supplement their ability to purchase food."
- *Other income maintenance benefits*: includes "foster care and adoption assistance, earned income tax credits, energy assistance, and the value of vouchers issued under the Special Supplemental Nutrition for Women, Infants and Children (WIC) program."

Income maintenance benefits are approximately 2.1 percent of total personal income in the U.S.

(4) Unemployment insurance compensation:

This includes benefits paid to individuals from state administered unemployment insurance programs, unemployment compensation for federal employees, unemployment compensation for railroad employees, and for "unemployed veterans who have recently separated from military service and who are not eligible for military retirement benefits." Unemployment insurance compensation payments are approximately 1.1 percent of total personal income in the U.S.

(5) Veteran's benefits

Veteran's benefits are approximately 0.5 percent of total personal income in the U.S.

(6) Education and training assistance:

This includes "payments to outstanding science students who receive National Science Foundation (NSF) grants, the subsistence payments to the cadets at the six state maritime academies, and the payments for all other federal fellowships." It also includes payments to students who participate in Fulbright scholarships, interest payments on guaranteed student loans, higher education federal assistance (Pell grants), Job Corps benefits, and state educational assistance. Education and training assistance constitutes approximately 0.5 percent of total personal income in the U.S.

(7) Other transfer receipts of individuals from governments.

This category includes payments to survivors of state and local employees, such as police officers and firefighters; compensation to victims of crime; Alaska Permanent Fund benefits; disaster relief funds; radiation exposure compensation; Japanese intern redress benefits, among others. Other transfer receipt payments constitute approximately 0.1 percent of total personal income in the U.S.

TP payments also consist of payments to non-profit institutions, constitute approximately 0.3 percent of total personal income in the U.S. Finally, the Bureau of Economic Analysis also counts as part of TR the receipts of individuals from business (about 0.2% of total personal income in the U.S.). This includes, for example BP oil spill payments.

APPENDIX B: IDENTIFYING FARMING AND OIL AND GAS COUNTIES

The Dividends, Interest, and Rent category covers a broad range of sources, including investments, rental income from commercial and residential properties, rental income from leasing farm land, and royalty payments from oil and gas leases. We expect these sources would have different relationships to economic sectors and social outcomes, and therefore account for the different sources using indicator variables for farming-dependent and oil and gas-dependent counties. Map C1 shows in grey the farm-dependent counties, and in grey stripes the oil and gas-dependent counties. The methods we use to define these variables follow:

- (1) Farm dependent was defined as a county where at least 15 percent of employment was in farming in 2011, following the methods used by the USDA Economic Research Service (U.S. Department of Agriculture, 2013). We used NAICS code 11 from the Quarterly Census of Employment and Wages to measure farm employment as a percent of total employment (U.S. Department of Labor, 2013). These are counties where we assumed that because they were relatively dependent on farming, DIR would be significantly influenced by rental income earned when farmers rent to neighboring farmers.
- (2) Oil and gas dependence was defined as counties in which more than 50 percent of the basin where extraction occurs takes place on private lands. Detailed information on the methods used to identify these counties can be found in Haggerty et al, 2013. Although we cannot separately identify how much of DIR income comes from royalties, we expect that DIR payments in these counties contains a higher proportion of royalty payments than counties with less oil and gas production.

Map B1: Dividends, Interest, and Rental Income and Counties Where Rent is Likely Due to Farming and/or Oil and Gas Royalty Payments



