The Discrepancy of Fertility Recuperation after the Great Recession:

The geographic and Industrial characteristics of U.S. counties

The University of Texas at San Antonio

Jeongsoo Kim

Lloyd Potter, Ph.D

Abstract

The U.S. fertility rates also plummeted to below the replacement level since the Great Recession, but relatively few studies shed light on how heterogeneous the fertility recuperation has been. This study suggests that industrial characteristics at the county level correlate with the extent of fertility recuperation after the Great Recession. Data from the U.S. Census Bureau's Population Estimates Program (PEP) and the American Community Survey (ACS) are used to estimate the discrepancy of recuperation at the county level. By describing variation in the slopes of fertility by county, this paper illustrates discrepancies in recuperation exist across geographic areas. We then examine the industrial characteristics associated with variation in the recuperation of post-recession fertility by using a quantile-based logit model. Results suggest that there are geographic differentials in post-recession recuperation, thereby three distinctive fertility recuperation related to the share of the labor force in a specific industry at the county level: invariable and stable, volatile and versatile, and precarious and vulnerable industrial sectors to the influence of the recession on fertility.

1. Introduction

The U.S. fertility rate plummeted to below the replacement level since the Great Recession. The tempo effect (Bongaarts & Feeney, 1998) was expected to recover the U.S. fertility rates; rather, a trend of fertility decrease has emerged since the economic recession. Sobotca et al. (2011) argue that economic recession affects fertility behaviors by descending GDP levels, falling consumer confidence, and rising unemployment rates. This study assumes that the recent fertility drop implies the beginning of an unprecedented change in U.S. fertility.

Even though many studies highlighted U.S. fertility decline from economic uncertainty settings (Goldstein et al., 2013; Villarreal, 2014; Comolli, 2017), and labor force participation (Ahn & Mira, 2002; Andersson et al., 2009; Frejka el al., 2018), and labor market conditions (Kotowska et al., 2008; Adsera, 2011; Goldstein et al., 2013) relatively few studies shed light on the socioeconomic gradients of fertility recuperation after the Great Recession. This paper posits that U.S. fertility has recovered heterogeneously by the industrial characteristics of geographic areas. Indeed, fertility recuperation in the U.S. is not equivalent to the fertility rates before the recession. Specifically, this study focuses on geographically-clustered industries related to the patterns of fertility recuperation at the county level. The fertility recuperation after the Great Recession varies by the county as a function of the proportion of the labor force working in different industries. This study examines whether there are geographic gradients in the recuperation of fertility level in the U.S. from a macroeconomic perspective.

The U.S. Census Bureau's Population Estimates Program (PEP) includes estimates of fertility as part of estimates of components of population change. Also, the American Community Survey (ACS) provides information for this analysis of the characteristics of the labor force. Analytic methods employ a measure of the directionality and trend of fertility by

estimating linear regression slopes of fertility rates at a county over three periods: pre-recession (2001-2007), during the recession (2007-2011), and post-recession (2011-2016). Based on quantile logistic regression models, this study defines two fertility outcomes: non-recuperation and recuperation after the Great Recession. These separate fertility outcomes are designed to examine the association with the proportion of the labor force in an industry by county.

By focusing on discrepancies in fertility recuperation, this study aims to answer the following questions. What industry has favorable or adverse characteristics for fertility recuperation at a geographically clustered areas? What industry is stable in fertility volatility at a county level in the U.S.? By using quantile regression with two separate models, we can avoid the central tendency of fertility distribution and can capture the distinct characteristics in the distribution. More importantly, using slopes of fertility rates other than fertility rates contributes to neglecting temporal fertility change factors at a small area, and estimates longterm trends of fertility recuperation.

Results suggest that the variation of fertility-recuperation has an association with the industrial composition at the county level as indicated by the proportion of the labor force working in select industries. First, we illustrate the geographic discrepancies of fertility recuperation during the recession and post-recession. We then used the quantile-based logistic regression model to examine the relationship between the industrial characteristics of a county and fertility recuperation.

2. Background and Prior Research

Becker (1960) argues that the desired number of children is positively related to parents' income because children are durable goods for consumers. This argument suggests that the ability to reproduce children depends on parents' income and preferences. Later, Becker (1965)

also explains the negative relationship between childbearing and income in the context of increasing costs of childbearing. Not only at an individual level, but the occupational instability under economic distress is also one of the critical factors of the postponement of fertility: a decline in GDP, unemployment increase, weakening consumer confidence, decreasing quality jobs, and rising housing delinquencies (Sobotka, Skirbekk, & Philipov, 2011).

However, individuals' fertility response to the economic crisis has not been universal. The recent fertility decline within Southern European countries occurs with the individual postponement of marriage, which is influenced by high unemployment rates among the younger population (Kohler, H. P., Billari, F. C., & Ortega, 2002). There are several factors economic recession influences fertility behaviors such as the effects of economic uncertainty, reduced income, changes in the housing market, and rising enrollment in higher education (Fiori, Graham, & Rinesi, 2018; Morgan, 2015). On the other hand, there are counter-intuitive findings regarding whether occupational uncertainty has a specific relationship with fertility decline. Kohler and Kohler (2002) conducted a longitudinal survey to examine if the economic recession of the late 1990s influenced fertility outcomes in Russia. The results of this survey identified no negative relationships between the financial crisis and fertility outcomes. Instead, fertility had increased because of the end of postponement, which had suppressed the period fertility rates during the recession (Goldstein, Karaman Örsal, Kreyenfeld, & Jasilioniene, 2013).

Females responded to economic uncertainty by avoiding childbearing, but the variation of effects rely on population subgroups (Percheski & Kimbro, 2014). In Germany, the influence of exogenous economic uncertainty on fertility are heterogeneous by perceiving individually different uncertainty, which was prominent among couples of male breadwinner model, a median household income, and already had children (Hofmann & Hohmeyer, 2013). Related studies

suggest that the Great Recession is associated with a fertility decline by 9 to 11 percent in the United States. (Cherlin, Cumberworth, Morgan, & Wimer, 2013). Fertility rates at younger ages appear more responsive to economic distresses; fertility plans can be elective at younger ages compared to those who age closer to the biological limits of fecundity. Economic difficulties and increased economic uncertainty of the Great Recession at the state level generally hurt reproductive behaviors, eventually decreasing fertility rates (Schneider, 2015).

Economic recession and deteriorated employment conditions substantially reduce first birth among both males and females under age 30 in Europe while recuperation of fertility depends on labor markets conditions (Neels, Theunynck, & Wood, 2013). In Europe, unemployment and temporary job opportunities are associated with reductions in the second childbearing, especially for middle-income educated women (Wood, Neels, & Vergauwen, 2016). Eun (2007) suggests that the 1997 economic crisis in South Korea influenced the increase in the age at first marriage and contraceptive use, coinciding with following economic factors: joblessness among youth, high unemployment rates, and the high costs of child-rearing and housing, and insufficient childcare facilities (Eun, 2007).

Lesthaeghe (2001) conducted a cohort-comparative model of fertility by examining deviation from the benchmark cohort, which became an initial model of cohort fertility postponement and recuperation. Sobotka et al. (2012) found evidence for a structural postponement transition by using three key indicators in European countries and the United States: initial fertility level, absolute fertility decline at young adults, and the relative extent of fertility recuperation at older ages. The following study suggests that the postponement in an economic recession is not just tempo distortion but more likely to be “postponement transition,”

which implies that dynamics of fertility recuperation differ widely across countries (Lesthaeghe 2010; Frejka 2012; Sobotka et al. 2012).

3. Data and Methodology

This analysis uses State and County Components of Population change data from inter-censal estimates (2001 to 2010) and post-censal estimates (2011-2016) data from the U.S. Census Bureau's Population Estimates Program (PEP). These estimates have data on components of population change for each county for each year. The unit of analysis is a county (or county equivalent) and for all counties in the United States (N=3142). We employed the fertility rates for each county and each year. We estimated the linear regression slopes of three sets of fertility rates for each county (2001-2007, 2007-2011, and 2011-2016). The slopes of fertility rates for each county are an indicator of the trend in the fertility rate over each time-period and the slopes across periods can be compared regardless of geographic and periodic distortion. The industry compositions of the labor force in counties are derived from ACS estimates from the 2006-2012 5-year sample summary file.

S_{it} = Slope of fertility rates, *i* County, *t* periods

$D_{id} = S_{id}$ during the recession - S_{ib} before the recession

$D_{ia} = S_{ia}$ after the recession - S_{ib} before the recession

The trends (slopes) of birth rates (S_{it}) are examined for three-time periods; pre-recession (from 2001 to 2007, S_{ib}), during the recession (from 2007 to 2011, S_{id}), and post-recession (from 2011 to 2016, S_{ia}). We create trends (slopes) of fertility rates at the county level and then compare discrepancies across the three-time periods by subtracting trends (slopes) of fertility rate before the recession (the reference period, 2001-2007) from the trends (slopes) of during-recession and from the trends (slopes) of post-recession each.

The focal determinant is a discrepancy of slopes (D_{it}) between the two periods. We examine to what extent of the trends of fertility rates declined during the recession, and to what extent of the trends of fertility rates recuperated after the recession. Thus, if the slopes during the recession were lower than the slopes of pre-recession, discrepancies of the fertility slopes (D_{id}) would be 'negative' values, indicating that the fertility declined during the recession. On the other hand, if the slopes of during-recession were higher than the slopes of pre-recession, the discrepancies of fertility slopes (D_{id}) would be 'positive' values in the above equations, meaning that the fertility increased during the recession. Likewise, higher slopes of post-recession than pre-recession means fertility recuperation whereas lower slopes of post-recession than pre-recession means non-recuperation in post-recession. Most importantly, the 'negative' values of D_{ia} suggests that fertility rates are not recuperated after the recession compared to pre-recession.

First, we visualize changes in fertility trends at the county level both during the recession and post-recession compared to pre-recession. The purpose of visualizing discrepancies between before and during the recession is to show which counties are vulnerable to the impact of economic recession. Also, the goal of illustrating discrepancies of fertility slopes between before and after the recession is to examine which counties more resiliently recuperated fertility rates from the Great Recession. We then describe the geographic patterns of fertility-slopes changes between the pre-recession and the two observation periods (during-recession and post-recession).

Second, we use multinomial logit regression models to identify how the industrial composition of the labor force of a county correlates with fertility recuperation across 2001-2016. This study assumes that there are differences in fertility recuperation by geographic areas about the relative effect of the recession on people employed in different industries. This analysis

posits that non-recuperation in post-recession correlates with the distinctive economic impact of the recession on different industries.

The dependent variables of these models are the discrepancies of recuperation in post-recession (D_{ia}) which ranges from 'negative' values (-1424.5) to 'positive' values (724.9). Also, using slopes of fertility rates for the discrepancies of recuperation advantage to avoid temporal fertility change at a small area and estimating long-term trends of fertility recuperation This study assumes that the counties of the resilient fertility recuperation have different labor force composition from the counties of non-recuperation. Based on quantile regression models, this study defines two fertility outcomes: non-recuperation and recuperation of fertility in post-recession.

The first model examined whether recuperation dependent variables is associated with industry composition in all U.S. counties considering socioeconomic determinants: age, females, net-migration, household income, and unemployment rates. The dependent variables (D_{ia}) is discrepancies of fertility slopes, which measures the extent of recuperation by using slopes of fertility at each county. In the following models, we divided 3142 counties with three quantile-based subgroups. Then, we tested the association between the industrial labor force composition and fertility recuperation among the two extreme recuperation cases: the lowest recuperation of quantile and the highest recuperation of quantile, or one for 'non-recuperation' (negative values of D_{ia}) and the other for 'recuperation' (positive values of D_{ia}).

To estimate the influence on fertility trends of industrial characteristics, we controlled sociodemographic and socioeconomic factors: median age, the percentage of women in fecund ages, the slopes of net-migration, median household income, the percentage of the population below the poverty, and unemployment rates. Data for women in fecund ages come from the 2000

census. Data for median household income, poverty, and employment by industry are from the American Community Survey 2005-2009 5-year samples. Data for unemployment rates come from Local Area Unemployment Statistics (LAUS) produced by the U.S. Bureau of Labor Statistics. Finally, net migration data are from components of change in the U.S. Census Bureau's population estimates program.

4. Results

The U.S. fertility rate plummeted to below 2.0 TFR since the Great Recession, showing a structural transition of which recuperation is limitedly expected (Figure 1) in the United States. The scattergram between the fertility slopes of pre-recession (X-axis) and the fertility slopes of during the recession (Y-axis) at the county level illustrates that there was a substantial decrease in fertility trends during the recession (Figure2). The other scatter gram between the slopes of pre-recession (X-axis) and the slopes of post-recession (Y-axis) exhibits that the level of recuperation was insufficient, and a substantial gap exists up to the full recuperation line in post-recession (Figure 3).

[Figure 2, 3 about here]

The discrepancy map of fertility slopes during the Great Recession exhibits how fertility rates decreased at a county level (Figure 4). Also, the discrepancy map of fertility slopes after the Great Recession describes how disproportionately fertility rates recuperated by counties (Figure 5). During the Great Recession, the fertility rates in most of the U.S. counties plummeted, and the fertility trends in urban areas adaptively changed during the economic recession. Not only both the West and East coastal counties but also principal-central counties show a substantial reduction in fertility rates during the Great Recession. Most importantly, even though a

significant recuperation in fertility rates has proceeded after the Great Recession, the discrepancies of slopes are heterogeneous by counties.

[Figure 4, 5 about here]

Figure 5 identifies two critical findings. First, there were discrepancies to the extent of recuperation between metropolitan cities and rural areas. Second, there were particular patterns by industrial characteristics in the degree of fertility recovery. For example, workers in the place where is high proportions of the labor force in the oil industry in Midland (TX), IT in San Jose (CA), and pharmaceuticals in Middlesex (MA) more resiliently recuperated fertility rates after the Great Recession.

Figure 6 shows the comparison of the occupational proportion between the highest discrepancy counties and the lowest fertility discrepancy counties in recuperation map of Figure 5. Moreover, Figure 7 exhibits the comparison of the share of the labor force in the industry between the highest and the lowest discrepancies in recuperation map of Figure 5. The highest recuperation counties show a higher share of 'management jobs' than the biggest fertility drop counties (Figure 6).

[Figure 6, 7 about here]

The counties with a high proportion of labor force in 'education,' 'professional & scientific,' 'manufacturing,' and 'finance' industry show a more resilient recuperation of fertility slopes (Figure 7). Also, the highest recuperation counties tend to have a lower share of the labor force in 'retail,' 'entertainment' and 'construction' compared to the counties where show lack of fertility recuperation. Because the Great Recession was a financial-service sector related crisis, labor force belongs to the financial service could be more vulnerable to the economic crisis regarding fertility outcomes.

[Table 1 about here]

Table 1 describes the characteristics of explanatory variables of all counties compared with non-recuperation and recuperation counties, which are the samples of our logistic regression models. The aggregated all U.S counties includes 3142 counties whereas non-recuperation of lowest quantile and recuperation of the highest quantile consists of 1048 counties each. It is noteworthy that the median age of non-recuperation counties is the 38.1 years old, which is relatively younger than both all U.S. and recuperation counties. Non-recuperation counties show a higher proportion of fecund females. Also, the net migration slopes are negative in non-recuperation counties whereas that of recuperation counties is positive. Unexpectedly, the counties of non-recuperation show a higher median income than those of recuperation whereas the unemployment rates in the non-recuperation show the highest level.

[Table 2 about here]

Table 2 exhibits the results of a logistic regression models of which fertility recuperation in each category has associations with the proportion of labor force in each industry at a county level. Model 1 regressed the fertility recuperation discrepancies of all counties with the share of the labor force in the industry. Most industry compositions revealed that slight negative association with fertility recuperation. Because about two-thirds of all U.S. counties show non-recuperation of fertility in post-recession, this simple logistic regression model does not capture the industrial characteristics of recuperation. Thus, we divided counties into two different models with non-recuperation (Model 2) and recuperation (Model 3) separately. Through this division, the labor force compositions of each model provided more implications regarding the contribution of industrial compositions to fertility recovery. Also, for intuitively easy interpretation, we converted the non-recuperation values by multiplying '-1,' meaning that

higher coefficient in non-recuperation model stands for the more negative industrial characteristics in fertility recuperation.

Age is negatively associated with both recuperation models 2 and 3, meaning fertility trends of the counties with high median ages are neither non-recuperation nor recuperation factor. In other words, a higher median age is of a less negative influence on recuperation, but a higher median age is also not a decisive factor for recuperation at a county level. Similarly, counties with a high proportion of fecund females who age 15 to 49 exhibits a negative association with non-recuperation, meaning fertility trends of the counties with a higher share of fecund women were less sensitive in the economic recession. One of the most important covariates is net-migration at a county level. As expected, counties with a high rate of net-migration are negatively associate with non-recuperation while high net-migration rates are positively associated with recuperation. On the other hand, high poverty rates of counties are more likely to recuperate fertility. Also, high unemployment rates correlate with both non-recuperation and recuperation, but the strength of association is relatively high in non-recuperation, meaning higher unemployment rates of counties are less likely to recuperate fertility.

The purpose of these two models (2 & 3) is to examine how industrial compositions at a county level are associated with fertility recuperation in the U.S., controlling for age, female proportions, net-migration, household income, poverty, and unemployment rates. First, the counties with a high proportion of labor force in ‘agriculture, ‘retail trade’ and ‘public service’ are associated with neither non-recuperation nor recuperation, meaning the fertility behaviors of the high share of the labor force in ‘agriculture,’ ‘retail trade’ and ‘public service’ was less sensitive to the economic recession.

On the other hand, counties with a high proportion of labor force in 'information,' 'finance and insurance,' and 'professional & scientific' sectors show a significant association with both a probability of non-recuperation and recuperation. In other words, the counties with a high proportion of these industrial sectors show the most versatile fertility change in post-recession. It is noteworthy that counties with a high share of the labor force in so-called 'STEM' industries such as 'information' and 'professional & scientific industries' correlate with non-recuperation strongly as well as a high proportion of labor force in 'information' and 'professional & scientific industries' also show a resilient recuperation. Also, counties with a high share of a labor force of 'wholesale trade' and 'arts and entertainment' sectors are more likely of non-recuperation with statistical significance in model 2. Besides, even though it is not statistically significant, a high proportion of labor force in 'construction' and 'transportation' show a negative association with recuperation and more likely to be of non-recuperation.

In sum, counties with high net-migration, related to occupational opportunities, correlate with a resilient recuperation and less likely to reduce fertility. First, there are changeless industrial sectors to the influence of the recession on fertility: 'agriculture,' 'retail trade' and 'public service.' Second, there are more volatile and versatile industrial sectors regarding the influence of the recession on fertility: 'information,' 'finance and insurance,' and 'professional & scientific' sectors. Third, there are more precarious industrial sectors to the influence of the recession on fertility: 'construction,' 'transportation,' 'wholesale trade,' and 'art & entertainment' sectors.

5. Discussion

Current fertility rates in the U.S. are falling to below the replacement level, which means some point in the future the total population of the U.S. will decrease. This study examines how

the Great Recession affects trends of fertility rates at the U.S. county level. Other than socio-demographic changes such as age, sex, and net-migration, economic uncertainty has a specific mechanism to constrain fertility behaviors in a way that couples postpone both marriage and childbearing (Cherlin, Cumberworth, Morgan, & Wimer, 2013; Schneider, 2015). The focal point of the recuperation process from the recent economic crisis is that the degree of recuperation is not at the same level as before and varies by subgroups (Percheski & Kimbro, 2014).

Unlike previous recessions, the recent fertility decline is of a moment in that the fertility drop occurred when the fertility is below replacement level and not as resilient as before. Also, the extent of recuperation appears to correlate with the proportion of the labor force in a regional area. The different recovery by the proportion of labor force in a specific industry implies that we need to consider fundamentally different demographic policies considering labor force compositions. For instance, pro-natalist policies need to consider business cycles at a regional level, providing incentives to the industries with more resilient or changeless to the economic recession. Moreover, the high proportion of net immigrants who are to migrate following occupational opportunities has some dynamics with industrial characteristics at the regional level.

Notwithstanding significant policy implications, some limitations exist in this study. One of them is that the industry classification of this study is not comprehensive. More detailed specification of occupations and industry could precisely reveal economic activities associated with variation of fertility recovery. Still, the attempt of this paper is contributable to the existing literature by using slopes of birth rate data from the U.S. Census and by generating a slope over periods at the county level to capture the fertility trends. Future research needs to take into

account further the relationship between fertility and structural characteristics such as welfare policies, migration trends. Also, consideration for the population structure at a different geographic area needs to be incorporated.

6. Conclusion

Economic recession affects fertility behaviors not only endogenously in the context of a postponement of the family formation based on sociodemographic factors but also exogenously by economic uncertainty from the economic cycles; faltering GDP, dwindling consumer confidence, and increasing unemployment (Sobotka et al., 2011). Despite the structural flow of net international migrants in the United States, the Great Recession had a fundamental impact on fertility behaviors. Even though fertility trends at the county level after the Great Recession are versatile, the slopes of birth rate after the Great Recession overall indicate that recuperation of fertility trends relies on the economic confidence toward the future.

This study highlights geographic discrepancies of fertility recuperation, focusing on occupational and industrial compositions at the county level. The results support two primary findings. First, there is a discrepancy in the extent of recuperation between metropolitan cities and rural areas. Second, there are associated patterns in the degree of fertility recovery by the proportion of the labor force in a regional economy. Specifically, the fertility of the counties with a high proportion of labor force 'information,' 'finance and insurance,' and 'professional & scientific' sectors are versatile and volatile to the economic recession. On the other hand, the fertility recuperation of high share of the labor force in 'agriculture,' 'retail trade' and 'public service' sectors are stable and invariable to the Great Recession. Last, the fertility of the counties with a high proportion of labor force in 'construction,' 'transportation,' 'wholesale trade,' and 'art & entertainment' sectors appears precarious and vulnerable to the economic impacts.

Throughout history, The U.S. rarely worried about the lack of fertility because of migrants' higher fertility outcomes (Parrado, 2011). However, one of the essential reasons for migration is occupational opportunities (Lindstrom & Ramírez, 2010), now influencing fertility outcomes not at the same level as before the Great Recession. The exogenous business cycles might threaten occupational stability not only the regional economy but also individual demographic features. Emerging a forecast of the decline in the United States population, it is also expected that there will be a substantial geographic variation in population decline near future. Therefore, the population policies in the U.S. also need to consider geographic and industrial discrepancies of fertility outcomes at the regional level.

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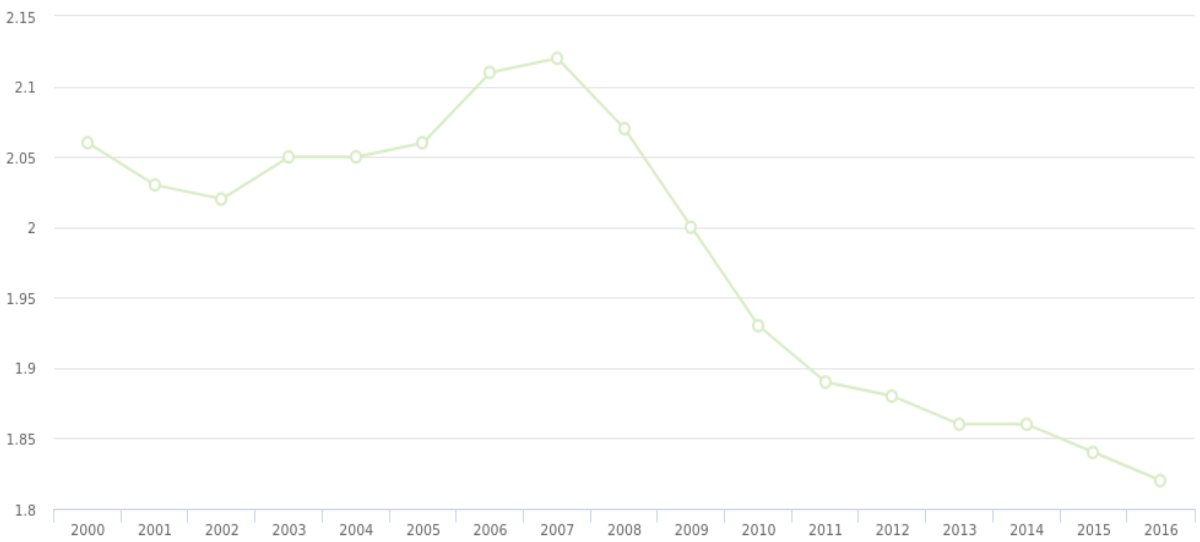
Figure 1. U.S. TFR trends



Source: Population Reference Bureau 2016

Figure 2. Fertility decline during the recession

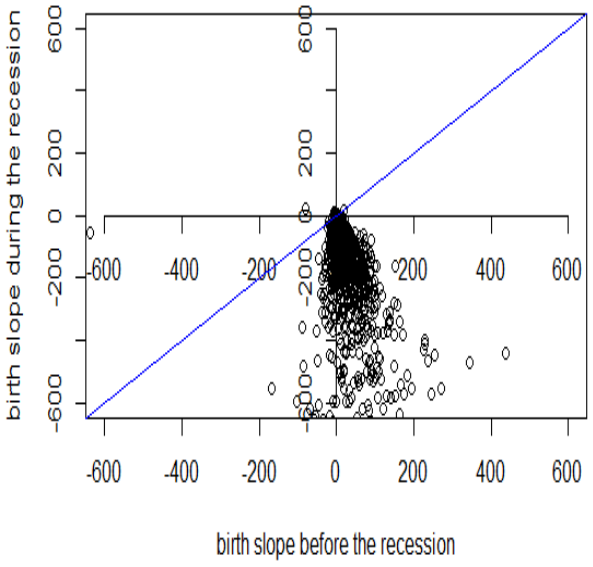
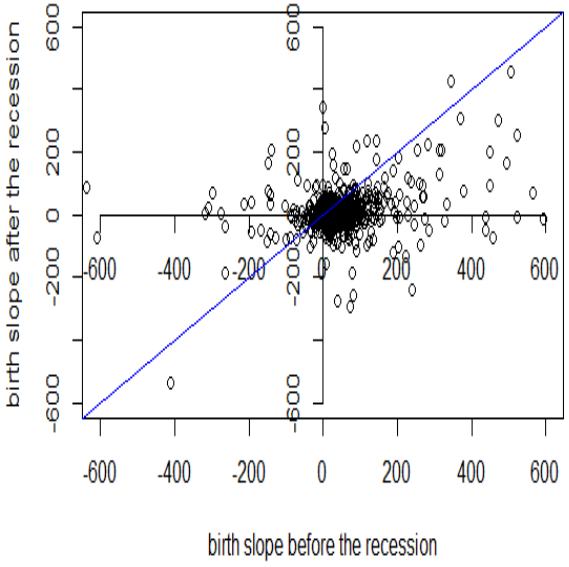
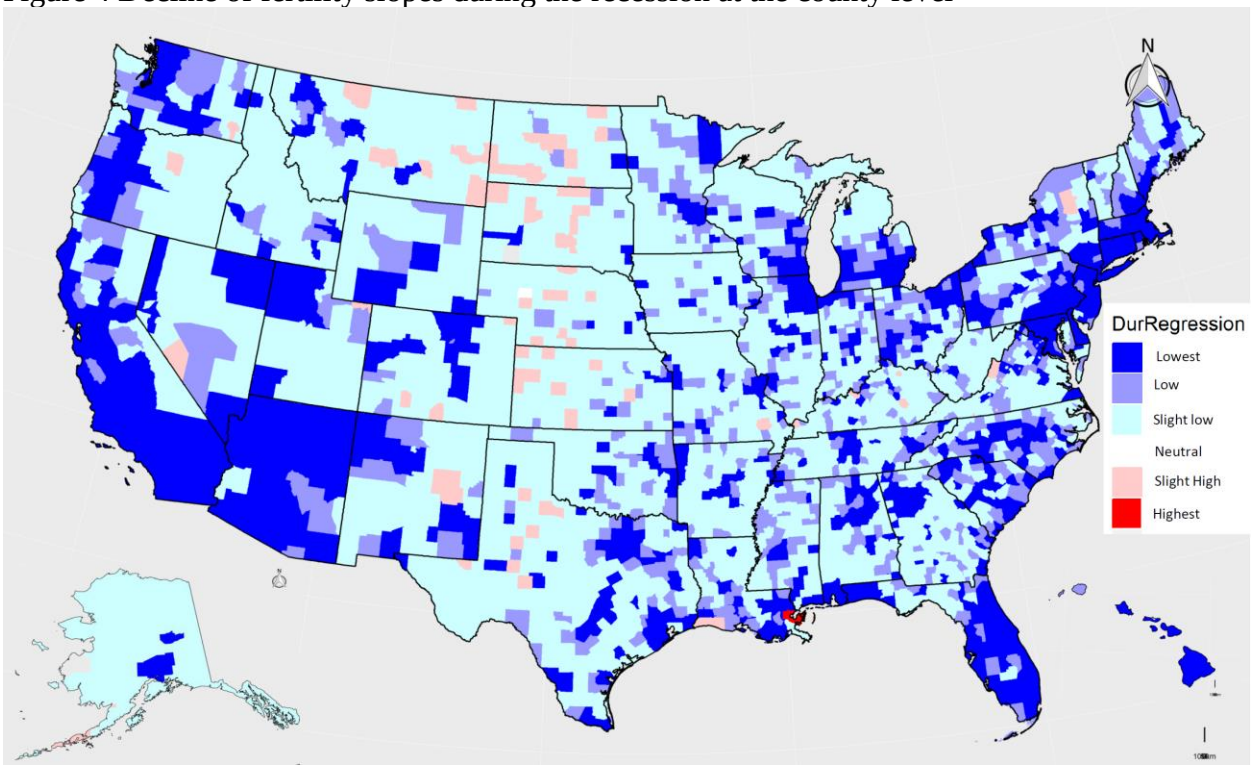


Figure 3. Fertility recuperation after the recession



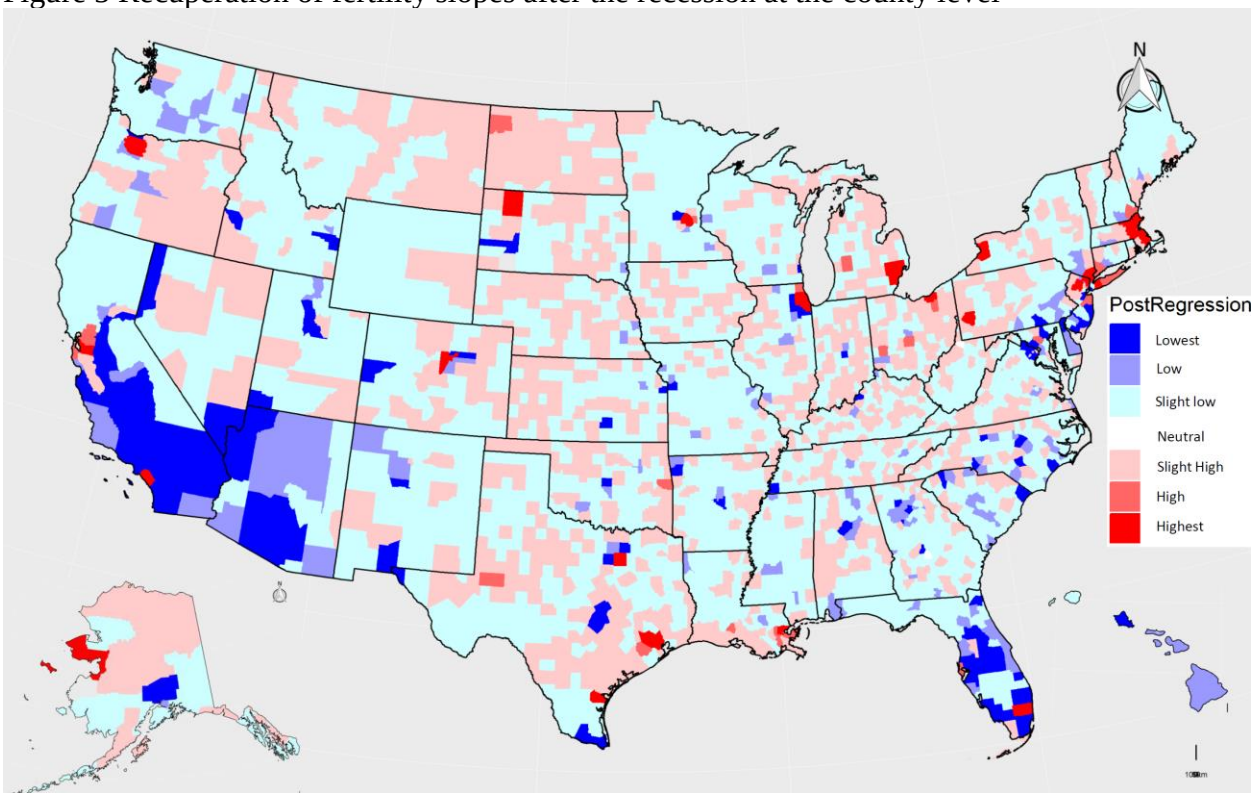
Data sources: U.S. Census Bureau, Population Estimates Program,
2000-2010 Intercensal Estimates and 2016 vintage Postcensal estimates.

Figure 4 Decline of fertility slopes during the recession at the county level



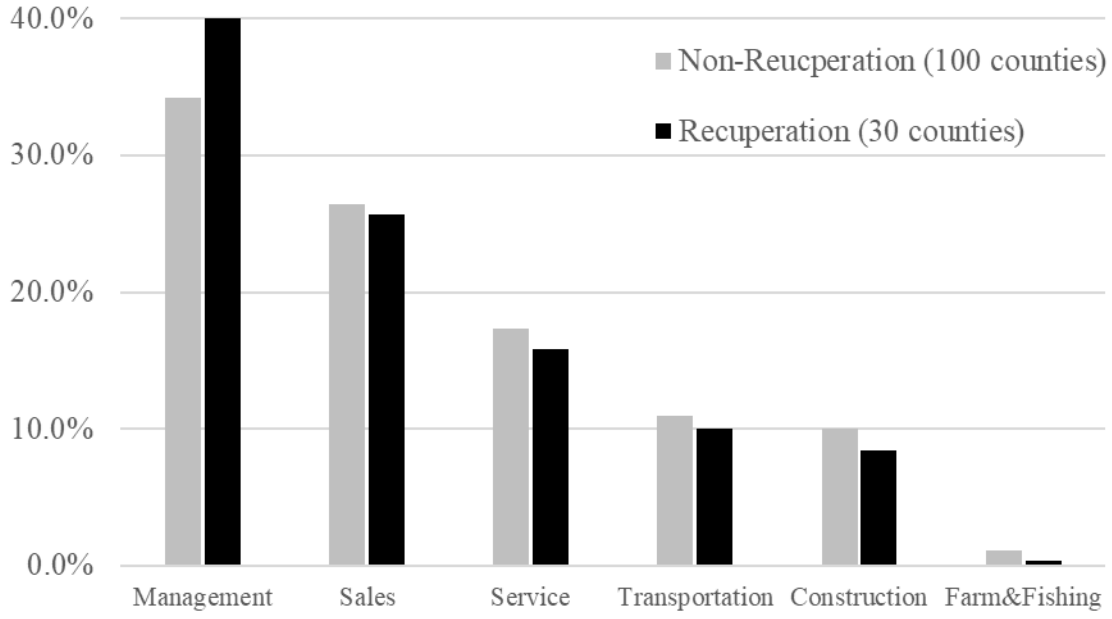
Data sources: U.S. Census Bureau, Population Estimates Program,

Figure 5 Recuperation of fertility slopes after the recession at the county level



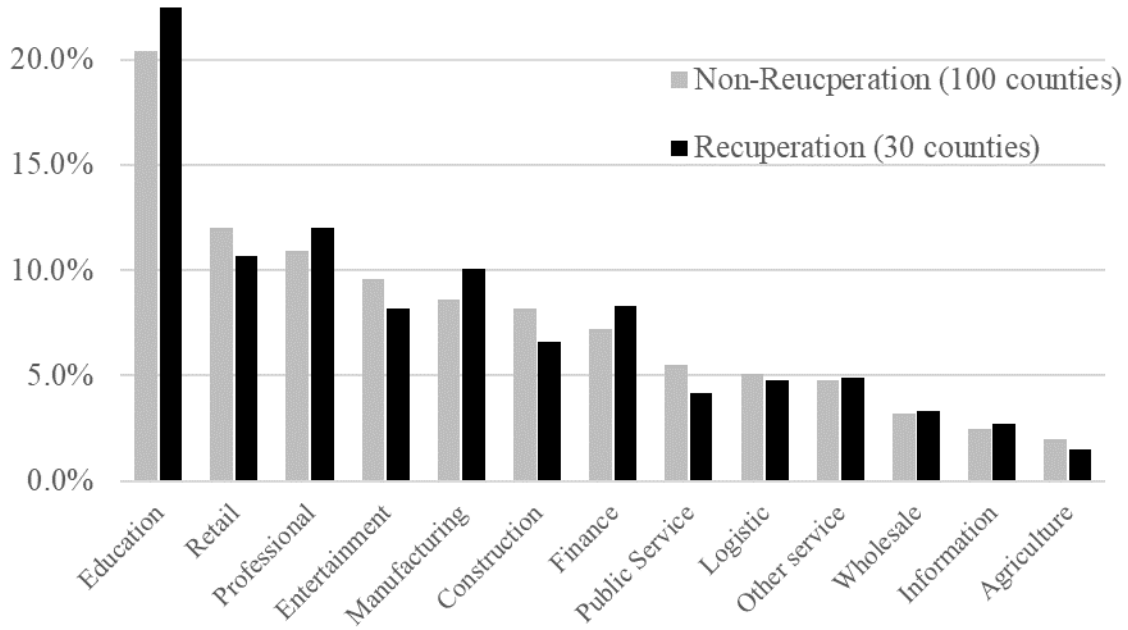
Data sources: U.S. Census Bureau, Population Estimates Program,

Figure 6. The occupational share comparison between non-recuperation and recuperation



Data sources: U.S. Census Bureau, Population Estimates Program, 2000-2010 Intercensal Estimates and 2016 vintage Postcensal Estimates.

Figure 7. The Industrial labor force share comparison between non-recuperation and recuperation



Data sources: U.S. Census Bureau, Population Estimates Program, 2000-2010 Intercensal Estimates, and 2016 vintage Postcensal Estimates

Table 1. Descriptive analysis each non-recuperation and recuperation

Recuperation Differentials by Quantile		Aggregation		Non-Recuparation		Recupearation	
		All U.S. Counties		Lowest quantle		Highest quantile	
Descriptive Statistics at a County Level		Value	S.D	Value	S.D	Value	S.D
Age	Median (years), 2010	40.3	5.0	38.1	4.4	41.3	4.9
Fecund Female	Percentage (%), 2000	46.8	4.7	49.1	4.4	46.1	4.7
Net Migration	Slopes (2001-2016)	-0.11	0.9	-0.5	0.8	0.3	1.0
Household Income	Median (USD), 2009	41673	11514	44713	12102	41290	12333
Poverty	Percent(%), 2009	11.4	5.7	11.0	5.5	10.9	5.5
Unemployment	Slopes (2001-2016)	17.8	13.2	21.3	11.8	15.0	13.6
Industry	Percentage (%), 2009						
	Agriculture	7.2	7.6	4.0	4.3	8.6	8.9
	Construction	8.2	2.9	8.3	2.6	8.0	2.9
	Wholesale trade	2.7	1.2	2.9	1.0	2.7	1.3
	Retail trade	11.4	2.5	12.0	1.9	11.0	2.5
	Trasportation	5.5	2.2	5.2	1.8	5.7	2.4
	Information	1.6	0.9	1.8	0.9	1.6	1.0
	Finance & Insurance	4.8	2.1	5.5	2.2	4.7	2.0
	Professional & Scientific	6.2	3.2	7.6	3.1	5.9	3.4
	Educational service	21.7	4.7	21.8	4.7	21.8	4.3
	Arts & Entertainments	7.7	3.5	8.5	3.3	7.2	3.3
	Other service	4.6	1.3	4.7	0.9	4.6	1.4
	Public administraion	5.5	3.2	5.5	3.0	5.3	3.2
Number of counties		3142		1048		1048	
Population 2010		308,647,400		186,678,900		94,212,860	

Source: 2009 ACS 5years, Census PEP 2001-2016

-Age for 2010 Census and percentage of a fecund female at a county level for 2000 Census, higher reliability of Census data.

Table 2. Logistic regression models of fertility recuperation at a county level by recuperation

Socio economic predictors and proportion of labor force in a industry		Model 1 All counties Coef. S.E		Model 2 Non-Recuperation Coef. S.E		Model 3 Recuperation Coef. S.E	
	Intercept	171.7 (37.99)	***	592.0 (100.4)	***	20.44 (43.76)	
Age	Median (years), 2010	3.328 (0.385)	***	-9.562 (1.061)	***	-1.065 (0.462)	*
Fecund Female	Percentage (%), 2000	163.1 (43.48)	***	-788.7 (112.8)	***	-82.89 (51.26)	
Net Migration	Slopes (2001-2016)	16.45 (1.441)	***	-11.58 (3.928)	**	14.90 (1.553)	***
Household Income	Median (USD), 2009	0.000 (0.000)	*	-0.001 (0.001)		-0.001 (0.000)	**
Poverty	Percent(%), 2009	0.768 (0.331)	*	1.248 (0.905)		1.269 (0.377)	***
Unemployment	Slopes (2001-2016)	-25.85 (10.42)	*	85.53 (25.57)	***	31.81 (11.86)	**
Industry	Percentage (%), 2009						
	Agriculture	-1.159 (0.212)	***	-1.001 (0.794)		-0.444 (0.225)	*
	Construction	-0.394 (0.424)		0.493 (1.228)		-0.658 (0.471)	
	Wholesale trade	-2.311 (1.008)	*	5.915 (3.165)	·	1.219 (1.067)	
	Retail trade	-0.707 (0.492)		-0.905 (1.558)		-0.858 (0.569)	
	Transportation	-0.790 (0.559)		1.219 (1.591)		-0.207 (0.567)	
	Information	-2.902 (1.326)	*	7.728 (4.092)	·	3.487 (1.318)	**
	Finance & Insurance	-2.058 (0.693)	**	3.531 (1.646)	*	3.850 (0.780)	***
	Professional & Scientific	-3.095 (0.539)	***	7.505 (1.432)	***	2.164 (0.565)	***
	Educational service	0.061 (0.280)		0.410 (0.741)		0.334 (0.311)	
	Arts & Entertainments	-1.568 (0.364)	***	3.855 (0.923)	***	0.710 (0.450)	
	Other service	-0.094 (0.892)		0.623 (3.106)		0.297 (0.952)	
	Public service	-0.001 (0.385)		-2.259 (0.991)	*	-1.179 (0.427)	**
Number of counties		3,142		1,048		1,048	

Signif. codes: *** p< 0.001, ** p< 0.01, * p<0.05, · p<0.1
Source: 2009 ACS 5years, Census PEP 2001-2016

1. Recuperation differentials range from -1424.5 to 724.9 (Median -2.5)
2. Age for 2010 Census and share of a fecund female at a county level for 2000 Census, and higher reliability of Census data.

Source: 2009 ACS 5years, Census PEP 2001-2016