The Impact of Single Households on Local Economy: Evidence from Korea's Demographic Trends*

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Abstract

Is the recent stagnation in population growth a threat to the economy? The answer may not be obvious if cities are losing population while gaining households. This paper unveils an important but unexplored channel for local economic growth: the rise in single-person households. We analyze the intercity relationship between the growing number of single-person households and its impact on the local economy. To address endogeneity concerns, we predict the actual concentration of singletons using the uneven distribution of convenience store operating permits attracting one-person households. IV-2SLS results indicate that single households generate new jobs, firm entry, and a higher level of gross regional domestic product. The effect is primarily caused by industries substituting household production, meal preparation, and recreation services.

JEL classification: E24, J12, R12, R20

Keywords: Single-person household; Local economy; Employment; Firm entry; Gross Regional Domestic Product; South Korea

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1. Introduction

Do flatlining world population growths pose an existential threat to economic growth and prosperity? While aging populations and reduced fertility rates have been a global trend (Adsera, 2004; Shrestha, 2000), no clear answer verifies whether a stagnant population would harm our economy. However, recent demographic trends may provide evidence to the question: a worldwide increase in single-person households (Yeung and Cheung, 2015). Given that one-person households have been the fastest-growing household type globally, including in North America, Europe, and Asia (Snell, 2017), could an increase in the number of household units mitigate the potential adverse economic effects of declining population growth?

We focus our study on South Korea, a homogeneous country with two competing demographic forces: a visible decline in population growth and a sharp increase in single-person households. Population and Housing Census Report (Statistics Korea, 2022) suggests that South Korea's population growth rate has been moderately declining since 2010, with negative growth rates since 2020. The population is rapidly aging as a result of a sharp decline in fertility rates and constant mortality rates, with Koreans' median age expected to rise the fastest among OECD countries (OECD, 2019). In contrast, the proportion of one-person households increased by more than 5 percentage points in just five years, with approximately 40% of total households living alone in 2020. Single-person households are now Korea's most common type of household (Statistics Korea, 2022). Although numerous studies on the impact of population growth and fertility on economic growth have been opulent in economic literature, the contrasting effect of single-person households as the dominant form of the population on the local economy has yet to be explored.

This study aims to present a hypothesis that connects the contrasting forces in demographics: the economy could still prosper from sufficient consumption and demand if stagnant population growth is offset by an increasing number of households differentiating. We verify our claim by utilizing the intercity relationship between the proportion of single-person households and the local economy in related industries. We do so using the Population and Housing Census data from 2015 to 2019. We estimate the regression model by analyzing the impact of single households on jobs, business, and consumption in the same city over the same period.

Determining causality on the effects of household demographic shift is difficult because of the endogeneity between single households and the local economy. For instance, unobservable city-specific factors could affect single households while influencing the local economy. Another issue to be concerned about is reverse causality, which occurs when local economic conditions attract single households to the region. To overcome the empirical challenges, we employ an instrumental variables approach. We use the uneven distribution of local business and infrastructure more than ten years before the sample period to predict the actual number of one-person households in a city by interacting the initial concentration of operating permits for convenience store businesses with the national number of single households by age. Our instrument in the form of shift-share instrumental variable (IV) satisfies the exclusion restriction, benefiting from the Tobacco Business Act, which prohibits convenience stores from operating densely in areas with a high concentration of single households. Moreover, the instrument has significant explanatory power, with an F-statistic value of 116.58.

Our empirical results provide that the presence of single households significantly and positively affects local employment and the number of firms. The effects are primarily due to industries that substitute home production, meal preparation, and family leisure, which are supported by an increase in regional GDP levels. The results for heterogeneous effects indicate that an elderly population of single households increases demand for local services, resulting in more jobs and businesses in the city. Despite being marginal, female households living alone have stronger effects than male households.

This study makes two significant contributions. First, we explain the economic implications of a recently discovered demographic trend: rapid growth in single-person households. Analyzing the consumption habits of single households, the most common type of household with a rapidly increasing population, provides predictions on how labor and service market demand will progress. Industries that provide services to single-family homes may benefit from a first-mover advantage. Furthermore, we find contradictory evidence that the economy will inevitably suffer if low fertility rates and stagnant population growth continue. The study posits that household differentiation into smaller units may compensate for population decline. Because living alone includes spending on products and services covered by other family members, cities' declining population may, in contrast, continue to grow local economies by increasing households.

The remainder of this paper is organized as follows. Section 2 examines South Korea's demographics and reviews previous literature. Sections 3 and 4 present the data and the identification strategy, respectively. Section 5 presents empirical results and the heterogeneity analysis. Finally, Section 6 concludes the paper.

2. Background

South Korea's demographics closely resemble the fourth stage of the traditional demographic transition theory (Kirk, 1996). Population growth has slowed primarily due to declining birth and stable mortality rates. According to the latest report by Statistics Korea, population growth rates have fallen from 0.53 in 2015 to −0.14 in 2020, followed by negative growth rates of −0.18 and −0.23 for two consecutive years, 2021 and 2022. Korea is rapidly approaching an aging society, with the median age rising from 40.9 in 2015 to 43.7 in 2020. Moreover, the fertility rate has dropped from 1.24 in 2015 to 0.84 in 2020, with only 0.27 million babies born. In this aspect, South Korea appears to be losing its economic agents of consumption and demand.

However, a contrasting trend appears when observing the population unit as households. Household differentiation has actively reduced family size to smaller units as a result of rapid urbanization and industrialization (Bell, 2004). Population and Housing Census suggests that while the number of households increased from 21.3 million in 2015 to 23.1 million in 2020, the number of single-person households increased from 7.2 million in 2015 to 9.1 million in 2020. In just five years, the proportion of one-person households increased from 33% to 39.4%, becoming the dominant type of household in South Korea (Statistics Korea, 2022).

An important point to address is how the increasing trend in one-person households is very heterogeneous. Figure 1 illustrates that the increase in single households between 2015 and 2019 is not spatially uniform. Furthermore, the concentration of single-household population varies spatially by age group. The uneven distribution demonstrates how local characteristics attract one-person households to certain areas. The driving force behind the increase in single-person household proportions in Korea is young and middle-aged adults (Palmer, 2006; Yeung and Cheung, 2015).

[Figure 1]

However, the commonality lies in that gradual changes in household structures for all ages are having a dynamic impact on consumer behaviors and spending patterns (Klepek and Matusinska, 2016). The rapid increase in single households is primarily attributed to young adult urban migration (Park, 1994; Yeung and Cheung, 2015), an increasing divorce ratio in the middle-aged, an increase in unmarried young adults (Lee et al, 2011), and housing demands (Yoo and Nam, 2014). Because these people are more concerned with their careers and leisure than with starting families, the rapid increase in single homes introduces new consumption needs and trends to the market.

While existing research examines the demographic effects of an increase in low-skilled workers (Adams-Prassl et al., 2020), dual-earner households (Lee et al., 2022), and women (Dang and Nguyen, 2021) on local economies, studies on single-person households are rare. According to studies on vulnerability to negative economic shocks, single-person households cannot pool their risk when compared to married households (Ortigueira and Siassi, 2013; Wang, 2019).

3. Data

This section elaborates on the data used for our empirical analysis. To begin, we use the annual Population and Housing Census from 2015 to 2019 to calculate the increase in single-person households. The nationwide census investigates all Korean and foreign residents residing in Korean territory to determine the size, distribution, and demographic structure of the population and housing at the district level (n = 229). Using the data, we construct district (Sigungus) level growth of one-person households.

Subsequently, we combine household data from two sources with district-level statistics on the local economy. The district-level annual numbers of employees and firms are obtained from the annual Census on Establishments, Statistics Korea. We collect data on the annual gross regional domestic product (GRDP) reported by local governments at the district level in 17 regions (Sidos). Data on the local economy are provided in aggregate and by industrial classifications based on the Korea Standard Industry Code. We calculate the local economy's growth rate per district and industry based on the data.

Finally, we quantify the uneven distribution of operating permits on convenience store businesses using the Local Administrative Permit data, Korea Local Information

Research & Development Institute. The data consists of information on every store in 195 business sectors in South Korea that obtained a license or permit to operate from the time the permit was issued until today. We are interested in the regional distribution of convenience store operating permits; hence, we extract information on the location of the business, the initial year of the permit, and whether the business is currently operating. We obtained the annual number of permits obtained by convenience stores at the district level by aggregating the operation status. Later, we utilize the spatial characteristic as the level of exposure to local infrastructure that is appealing to the lifestyle of single households.

[Table 1]

Table 1 displays the dataset's summary statistic results. We construct our observation periods as the annual growth rate changes, from 2015 to 2019. Each column represents the difference between adjacent years, and each row represents values for different industries for Panels A, B, and C. Finally, Panels D and E summarize South Korea's demographic characteristics.

4. Empirical Strategy

To effectively estimate the causal effect of the presence of single households on employment, the number of firms, and the GRDP in local economies, we must solve the empirical challenges, including endogeneity and reverse causality. The causal estimate could be obtained using a simple linear regression if single households were randomly assigned. However, severe endogeneity lies between one-person households and their local economies. Although the effect we are interested in is the influx of single households influencing local employment and businesses, this relationship is reversed as local amenities and commercial surroundings attract people living alone. As a result, we employ a more demanding strategy that accounts for such endogeneity, as follows:

$$\frac{\Delta Y_{it}}{L_{i,2015}} = \alpha + \beta \frac{\Delta Single_{it}}{L_{i,2015}} + \gamma X'_{it} + \delta_d + \tau_t + \epsilon_{it}. \quad (1)$$

The dependent variable ΔY_{it} captures variation in the local economy, such as GRDP levels,[1]

[1] Gross regional domestic product levels are adjusted to price level in the initial year (2015).

the number of local firms per industry, the number of entrant firms per industry, and the number of workers per industry and employment type. We take the first difference ($\Delta Y_{it} = Y_{it} - Y_{it-1}$) and divide it by the logarithm form of total population of district i in the initial year ($L_{i,2015}$). The same transformation applies to single-person households ($\Delta Single_{it} = Single_{it} - Single_{it-1}$). First differencing eliminates the potential influence of fixed local characteristics, while standardizing the variables by the total population of the initial year eliminates the inherent specification bias from scale effects (Peri and Sparber, 2011). The main coefficient of interest is β, which estimates how the number of one-person households affects the local economy and employment. If $\beta > 0$, an increase in the number of single-person households attracts firms and new jobs, resulting in an increase in consumption and employment. If $\beta < 0$, people living alone crowd out the local economy. Lastly, $\beta = 0$ indicates no empirical evidence of a relationship between the variables of interest.

We add year-fixed effects τ_t and location-fixed effects δ_d[2] to account for both time-invariant and location-invariant domestic conditions. X_{it} indicates the vector of region-specific controls including the initial year's industrial characteristics per district, and ϵ_{it} is the idiosyncratic error term. The study calculates the single-household effect over a five-year period, from 2015 to 2019. The observational unit is 229 districts (Sigungu) within 7 regions (Sido). Although our empirical strategy accounts for most potential confounding factors, concerns for potential time-variant district-specific confounders remain. To successfully correct such shocks, we develop an instrumental variable to predict the actual variation in single-household migration, as elaborated in the following subsection.

4.1. Instruments

To develop an instrumental variable independent of the time-variant unobservable confounders, we focus on the uneven concentration of operating permits in convenience store businesses in 2006.[3] Figure 2 depicts the newly issued business permits for 229 districts

[2] For location fixed effects, we utilize living zones (LZ) constructed by the Statistics Development Institute of the National Statistical Office. The living zone is a similar concept to the commuting zone in the U.S. (Autor and Dorn, 2013), where cities are grouped into 58 regions based on residents' actual living areas.

[3] We choose 2006 as the main period of the instrumental variables because it marks ten years before our period of observation. However, using values between 2001 and 2010 yield similar results..

(Sigungu) in South Korea. We contend that the observed differences in local infrastructure provide evidence for regional differences in the growth rates of the single-household population. Because of the lack of caregivers, those living alone must devote time to meal preparation and household chores. Furthermore, statistics show that most one-person households live in homes with limited indoor kitchen space, limiting their ability to cook meals at home. As a result, single-person households require nearby services to supplement home production activities. The increase in demand allows areas to provide convenient outdoor meals and processed foods in small quantities preferred by single households, attracting an influx of singles to the region.

[Figure 2]

Therefore, the basic specification exploits the uneven distribution of local stores for the instrument as defined in Equation (2). The instruments are constructed in the same manner as our variables of interest, by taking the first difference in the yearly cumulative number of businesses and standardizing by the population's log form in 2006:

$$IV_{it} = \frac{\Delta S_{i,2006}}{L_{i,2006}}. \quad (2)$$

However, we go a step further to boost our instrument's explanatory power by introducing the shift-share instrumental variable. The instrument specifically predicts the number of single-person households in district *i* for year *t*. Because the importance of local infrastructures in deciding where to live varies by age, we consider the age of single households to increase the instrument's power:

$$\widehat{IV_{it}} = \sum_a \Delta Single_{at} \cdot \frac{\Delta S_{i,2006}}{S_{2006}}. \quad (3)$$

The term $\Delta Single_{at}$ is the growth in the total number of single-person households from age group a[4] for year *t*. The shift is distributed by $\frac{\Delta S_{i,2006}}{S_{2006}}$, the proportion of new convenience store operating permits in year 2006 for district *i*, as weight. Departing from the conventional shift-share IV by distributing the same weight comes from the assumption that all age groups face the same exposure to business permits. By using this metric, our instruments capitalize on the effect of newly established businesses in the region. Our first-stage regression equation

[4] Age groups are defined in eight groups: (1) below 20 years, (2) 20–29 years, (3) 30–39 years, (4) 40–49 years, (5) 50–59 years, (6) 60–69 years, (7) 70–79 years, and (8) above age 80 years

has the following form:

$$\frac{\Delta Single_{it}}{L_{i,2015}} = \mu + \phi \frac{\widehat{IV_{it}}}{L_{i,2015}} + \Gamma X'_{it} + \rho_d + \sigma_t + u_{it}. \quad (4)$$

The coefficient ϕ captures the increase in one-person households as a result of concentration in single-household preferred businesses. The power of this coefficient should be significant for a valid causal interpretation of our main study question. The validity of our specification is based on the assumption that the government-issued predetermined operating permits on convenience store business issued across districts in 2006 (ten years before our observation period) attract the local supply of single households while remaining independent of other confounders that influence the growth of employment and number of firms in years 2015 and after, controlling for other district characteristics. Our empirical settings are intended to reduce the possibility of correlation between the instrument and unobservable district-specific factors.

An important justification for the exogeneity condition of the instrumental variable is the Tobacco Business Act, Article 16 (Designation of retailers). The law states that applicants must meet the designation criteria established by the Ministry of Strategy and Finance Ordinance, which requires stores to maintain a minimum 50–100 m distance between each business. Article 16 prohibits the unauthorized entry of convenience store businesses by prohibiting the issuance of additional operation permits. Concerns about reverse causality are alleviated because the issuance of open permits for convenience stores attempting to enter an area to capitalize on the surge in demand from increased single households is prohibited. Our empirical identification in the first-stage equation also aims to reduce the risk of instrument correlation on unobserved region-specific factors.

Table 2 presents the estimated first-stage results for Equation (4). The first column shows the basic specification, defined as Equation, using the uneven distribution of convenience store permits as an instrument (2). The second column displays the predicted number of one-person households using the shift-share style instrument, as defined by Equation (3). Local characteristics such as industrial structures, location-fixed effects, and year-fixed effects are all controlled for in both specifications. This alleviates concerns about possible confounders in our instrument. While both specifications show that the uneven distribution of operating permits correctly predicts the increase in single-person households, we use the latter specification in column (2) for our main estimation to take advantage of the

instrument's greater explanatory power. The estimated coefficient indicates that imputed change in single households accurately predicts the actual change in one-person households. For example, a 1-percentage-point increase in the predicted value raises one-person households by approximately 0.72 percentage points. The F-statistic value is 116.58, indicating that the instrument has enough explanatory power to avoid weak instrument bias.

[Table 2]

5. Results

5.1. Main Results

Table 3 shows the benchmark results for Equation (1), which estimates the impact of single-person households on employment and service sectors in the same region. The main outcome variable is the growth of employment, operating firms, and the city's GRDP. The predicted change in single households defined in Equation (3) is used as our instrument for the actual change in two-stage least-squares (2SLS) regressions. Each panel summarizes the effects on the local economy in terms of employment, number of firms, and GRDP. OLS and IV-2SLS results are reported in sequential rows for each panel. Column 1 represents the total effect for all industries, followed by columns that divide the effects based on standard industrial classification.[5]

[Table 3]

The positive and statistically significant 2SLS coefficients in Panels A and B suggest that increasing single households increases the number of jobs and firms. When household differentiation generates 10 new singletons in the area, local employment increases by about 14 people and attracts 2.5 new firms. Estimates in columns (2) to (6) show how the increasing number of single households stimulates local employment and firms in industries highly relevant to single households' lifestyles. Back-of-the-envelope calculations show that every ten increase in single-family income creates two new jobs and 0.38 new firms in the wholesale and retail industries. Similarly, ten more one-person households generate four new jobs and 0.08 new firms in the health and welfare service sectors.

[5] We summarize results for six industries potentially related to single-person households. Full table including results for all industry type is presented in Appendix Table 1.

In panel C, we observe the impact on the growth in the GRDP to further verify whether the increase in single-person households creates a demand for local services. We use real GRDP using the initial year's prices to measure the size of the region's economy as a proxy for real income in the region. Our hypothesis is supported by IV-2SLS coefficients that are both positive and significant. An additional singleton household raises the residing area's GRDP by approximately 106,770 USD (using the November 2022 currency rate). Disregarding the effect of industrial classifications, GRDP increased by approximately 2,946–16,415 USD for industries in the wholesale and retail business, accommodation and food business, and health and welfare business.

We propose that the primary mechanism causing the estimated effects on the local economy is a lack of family caregivers. One-person households have no other family member to help with meal preparation, cleaning, and grocery shopping while allocating time spent on work, leisure, and home production services. Thus, single households demand more of these services due to a lack of caregivers and time. As the result, there is an increase in employment and firms in industries that substitute home production, meal preparation, and family leisure. Loneliness from living alone would be another channel of effect. One potential cause of increased demand for arts, sports, and recreation businesses, attracting new jobs and firms, is a lack of social interactions. Finally, growth in the health and welfare industries in areas with a high concentration of single-person households is consistent with recent research. Rapid population aging is a major contributor to the growing number of elderly people living alone after the death of their spouses. As the number of elderly single-person households grows, demand in the health and welfare industry may be driving an increase in employment and firm entry.

In our estimation, the 2SLS estimates for employment and the GRDP are larger than the OLS estimates. While OLS estimates suggest that single households have a mediocre effect at marginal statistical significance levels, IV-2SLS estimates generally provide larger coefficients. This shows that our instruments successfully removed the effect of selection bias and unobservable factors captured in OLS estimates. Because of self-selection in residential areas and uncontrolled local infrastructure characteristics, the OLS estimates are likely to be underestimated. Smaller residences and lower housing rental prices, which attract the single-household population, may have harmed the local economy.

5.2. Effects on Types of Employment

We extend our investigation into the impact of single-parent households on employment. Table 4 summarizes the estimation results by employment type: self-employment, full-time workers, and part-time workers. While additional single households positively influence all job types, the results indicate a stronger effect in creating full-time jobs. When compared to self-employed and part-time workers, single households created five to ten times more full-time jobs. According to back-of-the-envelope calculations, ten more singletons in the region generate three full-time workers in health and welfare services and one additional full-time worker in the accommodations, food, wholesale, and retail service sectors. The effects were marginal for the arts, sports, recreation, transportation, and storage industries.

[Table 4]

5.3. Heterogeneous Effects by Age and Gender

Finally, we explore whether the impact of increasing single-person households varies by age and gender distribution of the households. We adopt the idea from recent literature that one-person households are a very diverse group in terms of consumption and social activities (Palmer, 20006; Yeung and Cheung, 2015; Klepek and Matusinska, 2016). We look for evidence on channels of effect by examining which demographic group within single households has the greatest impact on the local economy.

Table 5 confirms the age-related heterogeneous effect of single households. We divide the singletons into two groups: those aged 20 to 39 and those aged 65 and up. The results indicate that elderly single households attract more employment, more firms, and larger regional GDP, with the magnitude being approximately 1.5 times greater. The effects are consistent across various industries related to people living alone in their homes. The heterogeneous results are not surprising, because elderly singles face stronger needs to substitute home production services from nearby shops due to the absence of a caregiver. Alternatively, the weak purchasing power of young single-person households may have induced the heterogeneous behaviors, given that many of young adults living alone work in temporary low-wage occupations (Kim, 2014).

[Table 5]

Then, we examine at whether gender influences the impact on the local economy. Table 6's Panels A and B each summarize the estimation results for male and female singletons. There is not much of a difference based solely on gender. While female single households show slightly higher demand for local services and attract more jobs and firms, the difference is too marginal to suggest evidence for heterogeneity.

[Table 6]

However, an interesting result is obtained when gender and age are combined to look for heterogeneous effects. Appendix Table 2 is a cross table in which the columns represent changes in the local economy by gender and the rows represent the impact of single households on young and elderly singles. A significant difference is observed when young female singles are compared to male singletons aged 65 years and up. For young singles (ages 20–39), female single families induce more jobs, firms, and local demand. However, for elders (ages 65 and over), the effects are prevalent for male singletons. Therefore, our analysis by presenting the main driving forces of the effect on the local economy as young females and elderly males living alone.

5.4. Falsification Tests

We revisit the relevance condition for our instrument to confirm that single-person households primarily drove the estimated effects on local employment and businesses. One critical assumption for using our instrument is that the predetermined regional variations in convenience store operation allow for the attraction of single-person households while excluding other types of households. If multi-person households (private households consisting of two or more people) are enticed by convenience store businesses and migrate to the area in the same way that single-person households are, the positive effects on the local economy may be due to an overall increase in local population from migrating households rather than single-person households.

If our instrument is credible, no evidence of correlation between the instrument and the variation in multiperson households should be visible. Therefore, similar to Equation (4), we regress the growth of multiperson households between 2015 and 2019 on the instrument, to observe for correlation. According to the estimation results in Table 7, there is no significant evidence that convenience store permits attract households other than singletons.

The presence of small and insignificant coefficients, as well as a first-stage F-stat value of 1.689, alleviates concerns that households other than single-person households may have influenced the estimated results.

[Table 7]

6. Conclusion

The population growth has recently slowed; however, our research shows that the contrasting demographic trend of active household differentiation positively impacts the local economy. In particular, our study verifies the intercity relationship between the presence of single-person households and growth in local employment, the number of new firms, and the level of GRDP. We overcome endogeneity concerns by exploiting the uneven concentration of operating permits issued for convenience stores ten years prior to the observation period, resulting in a shift-share instrument that predicts the actual change in single households.

The results provide that local employment and the number of firms increased between 2015 and 2019 with the increase in the one-person household population. The effects were particularly strong and noticeable in industries that substituted home production, meal preparation, and family leisure. Evidence from rising GRDP suggests consumption spillovers in industries that provide alternatives to household chores. To summarize, changes in household structure caused by household differentiation and the loss of family caregivers boost employment and firms.

This paper particularly contributes to the existing literature on the role of household differentiation. As the most common type of household unit, single households are gaining significance as the primary economic subject. We explore the forces influencing local economic growth: single households' increasing demand in home production, meal preparation, and leisure industries. Contrary to the traditional belief, a stagnant population is not fatal to economic growth. We demonstrated that a decrease in population growth can be compensated for by increasing the number of households that differentiate into smaller units.

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Table 1: Summary Statistics

Variables	Obs	△2016 Mean	△2016 SD	△2017 Mean	△2017 SD	△2018 Mean	△2018 SD	△2019 Mean	△2019 SD
Panel A: Gross Regional Domestic Product (change per log population)									
Total	229	16651	38908	17841	68148	17320	70505	13876	39739
Wholesale & Retail	229	943.63	3468.7	1115.6	4322.8	940.21	5238.1	1600.1	6997.5
Accommodation & Food	229	571.11	1894.7	−73.45	1300.7	555.53	1241.4	538.06	1623.2
Health & Welfare	229	1595.9	1928.9	1455.8	2208.5	1841.8	2433.8	2558.9	3257.6
Arts, Sports & Recreation	229	433.32	1455.0	−365.5	1412.6	288.85	1548.8	225.21	1377.6
Panel B: Number of Firms (change per log population)									
Total	229	20.810	33.630	23.211	33.424	4.300	29.928	40.533	41.156
Wholesale & Retail	229	3.977	11.047	3.432	8.489	−3.089	10.298	9.302	10.739
Accommodation & Food	229	9.546	10.707	4.416	9.068	0.491	7.233	11.350	11.966
Health & Welfare	229	1.662	2.018	2.591	2.548	0.383	1.526	1.050	1.643
Arts, Sports & Recreation	229	1.666	2.178	1.042	1.894	0.988	1.548	1.438	1.807
Panel C: Number of Jobs (change per log population)									
Total	229	152.34	273.06	127.28	292.34	158.67	308.32	192.35	254.83
Wholesale & Retail	229	19.114	54.379	14.567	52.056	15.741	60.915	30.895	59.804
Accommodation & Food	229	28.162	52.609	14.667	36.079	28.065	43.562	30.726	59.804
Health & Welfare	229	35.972	45.317	57.772	58.762	40.884	47.680	44.722	46.976
Arts, Sports & Recreation	229	9.472	14.267	5.468	12.479	7.511	12.285	5.733	12.755
Panel D: Single-Household Distribution (change per log population)									
Total	229	68.305	224.90	75.745	94.363	78.483	246.98	101.09	138.82
Ages 20–39	229	13.420	89.786	17.393	49.185	27.857	91.766	47.277	79.674
Ages 65 or more	229	24.844	55.134	26.531	22.625	25.339	62.753	30.224	30.423
Live in poor environment	229	14.128	81.648	12.188	21.897	13.951	93.209	14.796	26.101
Panel E: Demographic Characteristics									
Elderly (%)	229	25.618	9.094	26.737	9.217	27.908	9.375	29.277	9.627
Female (%)	229	49.903	1.312	49.916	1.306	49.931	1.308	49.925	1.333
Worker (%)	229	35.806	26.127	36.381	25.334	37.568	25.584	39.003	25.285
Population Density	229	3914.6	6187.6	3886.7	6134.4	3854.2	6070.9	3829.9	6029.7
Average age	229	43.764	4.617	44.312	4.656	44.889	4.689	45.516	4.754

Table 2: First-Stage Regressions

	(1) Basic IV	(2) Bartik shift-share IV
Predicted Value	50.233***	0.716***
	(5.611)	(0.066)
1st-stage *F*	80.14	116.58
Year FE	Yes	Yes
Living zone FE	Yes	Yes
Observations	916	916
R-squared	0.213	0.221

Note: The dependent variable is the yearly change in single households. The explanatory variable is the number of new operation permits issued in the convenience store business in 2006. Column 1 denotes the results obtained by using the distribution of convenience store operating permits as an instrument, as defined by Equation (2). Column 2 employs the instrument defined in the Equation (3). The observational units are districts (n = 229). LZ FE denotes regional fixed effects for 58 living zones built by the Statistics Development Institute of the National Statistical Office based on residents' actual living areas, similar to commuting zones in the United States (Autor and Dorn, 2013). Standard errors in parentheses are heteroskedasticity robust and clustered by district (n = 229) level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 3: Effects of Single Households on the Local Economy

	(1) All industries	(2) Wholesale & retail	(3) Accommodation & food	(4) Health & welfare	(5) Arts, sports & recreation	(6) Transportation & storage
Panel A: Employment						
OLS	0.038**	0.006*	0.009*	0.002**	0.001*	0.001*
	(0.017)	(0.003)	(0.005)	(0.001)	(0.001)	(0.0005)
IV-2SLS	1.481***	0.233***	0.227***	0.432***	0.060***	0.010
	(0.212)	(0.062)	(0.031)	(0.039)	(0.008)	(0.027)
Mean of dep var	157.7	20.07	25.41	44.84	7.046	3.367
Panel B: Number of Firms						
OLS	0.293**	0.032*	0.038**	0.051**	0.004	0.025*
	(0.131)	(0.017)	(0.015)	(0.021)	(0.004)	(0.013)
IV-2SLS	0.248***	0.038***	0.076***	0.008***	0.014***	0.006***
	(0.024)	(0.008)	(0.007)	(0.001)	(0.002)	(0.001)
Mean of dep var	22.21	3.406	6.451	1.422	1.283	0.524
Panel C: Gross Regional Domestic Product						
OLS	35.160	1.178	0.614*	2.607**	0.412	1.334*
	(27.577)	(1.384)	(0.327)	(1.183)	(0.395)	(0.720)
IV-2SLS	152.20***	14.905**	4.182***	23.377***	1.810	−0.172
	(56.940)	(6.354)	(0.943)	(1.626)	(1.593)	(1.813)
Mean of dep var	16423	1150	397.8	1863	145.5	460.9
Observations	916	916	916	916	916	916

Note: The explanatory variable is the change in single-person households Equation (3) defines the instrument for the number of operating permits issued to convenience stores. The units of observation are districts (n = 229). Standard errors in parentheses are heteroskedasticity robust and clustered by district level.
*** p < 0.01, ** p < 0.05, * p < 0.1.

Table 4: Effects of Single Households on Types of Employment

	(1) All industries	(2) Wholesale & retail	(3) Accommodation & food	(4) Health & welfare	(5) Arts, sports, & recreation	(6) Transportation & storage
Panel A: Self-Employed Workers						
OLS	0.019*	0.002	0.008*	0.001	0.001*	0.0004*
	(0.010)	(0.002)	(0.004)	(0.001)	(0.001)	(0.0002)
IV-2SLS	0.146***	0.014***	0.069***	0.0004	0.010***	0.003***
	(0.014)	(0.004)	(0.006)	(0.002)	(0.001)	(0.0005)
Mean of dep var	10.58	0.438	5.597	0.274	0.909	0.221
Panel B: Full-Time Workers						
OLS	0.243**	0.025**	0.023***	0.045**	0.002	0.025*
	(0.106)	(0.011)	(0.007)	(0.019)	(0.002)	(0.014)
IV-2SLS	1.013***	0.115**	0.103***	0.380***	0.031***	0.014
	(0.213)	(0.041)	(0.018)	(0.041)	(0.007)	(0.017)
Mean of dep var	100.4	13.14	11.13	33.64	3.365	−0.890
Panel C: Part-Time Workers						
OLS	0.017	0.001	0.003	0.002	0.001	0.004
	(0.025)	(0.005)	(0.004)	(0.006)	(0.001)	(0.003)
IV-2SLS	0.242**	0.050**	0.018	0.053	0.016**	0.004
	(0.081)	(0.017)	(0.024)	(0.037)	(0.007)	(0.008)
Mean of dep var	35.23	4.342	5.419	7.872	1.819	1.426
Observations	916	916	916	916	916	916

Note: The explanatory variable is the change in single-person households Equation (3) defines the instrument for the number of operating permits issued to convenience stores. The units of observation are districts (n = 229). Standard errors in parentheses are heteroskedasticity robust and clustered by district level.
*** p < 0.01, ** p < 0.05, * p < 0.1.

Table 5: Effects of Single Households on the Local Economy (By Age)

	(1) All industries	(2) Wholesale & retail	(3) Accommodation & food	(4) Health & welfare	(5) Arts, sports & recreation	(6) Transportation & storage
Panel A: Young Single Households (ages 20–39)						
A1. Employment						
OLS	0.733**	0.070*	0.077***	0.086***	0.0001	0.065**
	(0.284)	(0.037)	(0.025)	(0.028)	(0.007)	(0.032)
IV-2SLS	3.647***	0.573***	0.560***	1.062***	0.147***	0.026
	(0.630)	(0.170)	(0.092)	(0.164)	(0.027)	(0.069)
Mean of dep var	157.7	20.07	25.41	44.84	7.046	3.367
A2. Number of Firms						
OLS	0.087***	0.012**	0.019**	0.004***	0.002*	0.002**
	(0.031)	(0.006)	(0.008)	(0.002)	(0.001)	(0.001)
IV-2SLS	0.612***	0.097***	0.186***	0.020***	0.035***	0.015***
	(0.087)	(0.023)	(0.023)	(0.004)	(0.005)	(0.003)
Mean of dep var	22.210	3.406	6.451	1.422	1.283	0.524
A3. Gross Regional Domestic Product						
OLS	112.710	3.392	1.735***	5.115**	0.978	3.957**
	(73.332)	(3.678)	(0.614)	(2.188)	(0.986)	(1.872)
IV-2SLS	376.48***	36.852**	10.340***	57.797***	4.475	−0.426
	(138.155)	(16.624)	(2.667)	(7.744)	(4.145)	(4.479)
Mean of dep var	16423	1150	397.8	1863	145.5	460.9
Panel B: Elderly Single Households (ages 65+)						
B1. Employment						
OLS	0.572**	0.064	0.093**	0.145**	0.009	0.049**
	(0.275)	(0.047)	(0.041)	(0.066)	(0.012)	(0.023)
IV-2SLS	5.506***	0.865***	0.846***	1.607***	0.222***	0.039
	(0.838)	(0.230)	(0.127)	(0.114)	(0.025)	(0.103)
Mean of dep var	157.7	20.07	25.41	44.84	7.046	3.367
B2. Number of Firms						
OLS	0.087*	0.013	0.021	0.005**	0.004*	0.002
	(0.046)	(0.011)	(0.013)	(0.002)	(0.002)	(0.001)
IV-2SLS	0.923***	0.146***	0.281***	0.031***	0.053***	0.022***
	(0.102)	(0.031)	(0.031)	(0.006)	(0.006)	(0.003)
Mean of dep var	22.210	3.406	6.451	1.422	1.283	0.524
B3. Gross Regional Domestic Product						
OLS	29.753	1.024	1.190	7.138*	1.337	2.048
	(40.674)	(4.698)	(0.940)	(3.855)	(1.336)	(1.878)
IV-2SLS	564.00***	55.208**	15.490***	86.585***	6.703	−0.639
	(224.437)	(23.346)	(3.549)	(5.637)	(5.685)	(6.716)
Mean of dep var	16423	1150	397.8	1863	145.5	460.9
Observations	916	916	916	916	916	916

Note: The explanatory variable is the change in single-person households Equation (3) defines the instrument for the number of operating permits issued to convenience stores. The units of observation are districts (n = 229). Standard errors in parentheses are heteroskedasticity robust and clustered by district level.
*** p < 0.01, ** p < 0.05, * p < 0.1.

Table 6: Effects of Single Households on the Local Economy (By Gender)

	(1) All industries	(2) Wholesale & retail	(3) Accommodation & food	(4) Health & welfare	(5) Arts, sports & recreation	(6) Transportation & storage
Panel A: Male Single Households						
A1. Employment						
OLS	0.463**	0.041*	0.055***	0.066**	0.0001	0.050*
	(0.216)	(0.025)	(0.021)	(0.027)	(0.005)	(0.029)
IV-2SLS	2.855***	0.453***	0.456***	0.840***	0.106***	0.014
	(0.432)	(0.131)	(0.082)	(0.085)	(0.017)	(0.052)
Mean of dep var	157.7	20.07	25.41	44.84	7.046	3.367
A2. Number of Firms						
OLS	0.053**	0.007	0.011*	0.003**	0.002	0.001*
	(0.025)	(0.005)	(0.006)	(0.001)	(0.001)	(0.001)
IV-2SLS	0.475***	0.073***	0.136***	0.016***	0.026***	0.011***
	(0.055)	(0.017)	(0.015)	(0.003)	(0.003)	(0.002)
Mean of dep var	22.210	3.406	6.451	1.422	1.283	0.524
A3. Gross Regional Domestic Product						
OLS	63.039	1.092	0.986*	3.467**	0.436	2.501**
	(51.641)	(2.532)	(0.520)	(1.693)	(0.835)	(1.145)
IV-2SLS	288.93***	28.635**	7.977***	44.952***	2.783	0.094
	(108.538)	(11.538)	(2.242)	(3.471)	(2.862)	(3.564)
Mean of dep var	16423	1150	397.8	1863	145.5	460.9
Panel B: Female Single Households						
B1. Employment						
OLS	0.460**	0.051	0.057**	0.075**	0.002	0.040*
	(0.214)	(0.034)	(0.025)	(0.034)	(0.006)	(0.021)
IV-2SLS	2.966***	0.461***	0.438***	0.859***	0.129***	0.028
	(0.410)	(0.114)	(0.047)	(0.069)	(0.015)	(0.058)
Mean of dep var	157.7	20.07	25.41	44.84	7.046	3.367
B2. Number of Firms						
OLS	0.060**	0.009	0.014	0.003**	0.002*	0.001*
	(0.030)	(0.007)	(0.008)	(0.001)	(0.001)	(0.001)
IV-2SLS	0.501***	0.082***	0.161***	0.017***	0.030***	0.012***
	(0.044)	(0.015)	(0.012)	(0.003)	(0.003)	(0.002)
Mean of dep var	22.210	3.406	6.451	1.422	1.283	0.524
B3. Gross Regional Domestic Product						
OLS	40.301	1.881	1.013	4.121**	1.049	1.897
	(37.569)	(2.845)	(0.685)	(2.016)	(0.764)	(1.291)
IV-2SLS	309.91***	29.978**	8.470***	46.967***	4.357	−0.787
	(116.650)	(13.493)	(1.649)	(3.158)	(3.422)	(3.650)
Mean of dep var	16423	1150	397.8	1863	145.5	460.9
Observations	916	916	916	916	916	916

Note: The explanatory variable is the change in single-person households Equation (3) defines the instrument for the number of operating permits issued to convenience stores. The units of observation are districts (n = 229). Standard errors in parentheses are heteroskedasticity robust and clustered by district level.
*** p < 0.01, ** p < 0.05, * p < 0.1.

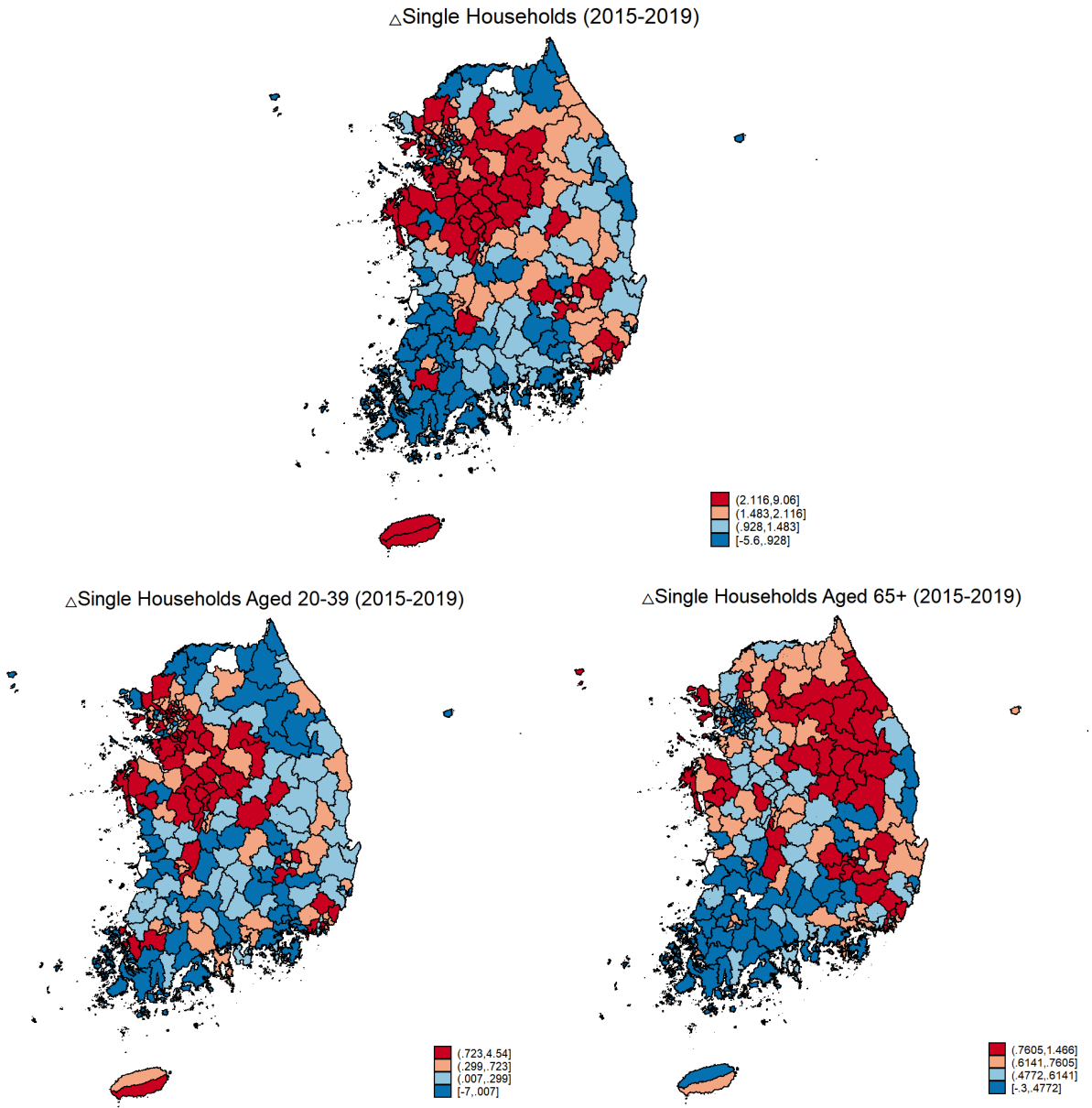
Table 7: Falsification Test

(First-Stage Regressions on Multi-Person Households)

	(1) Basic IV	(2) Bartik shift-share IV
Predicted Value	15.14 (11.04)	0.172 (0.133)
1st-stage *F*	1.882	1.689
Year FE	Yes	Yes
Living zone FE	Yes	Yes
Observations	916	916
R-squared	0.280	0.279

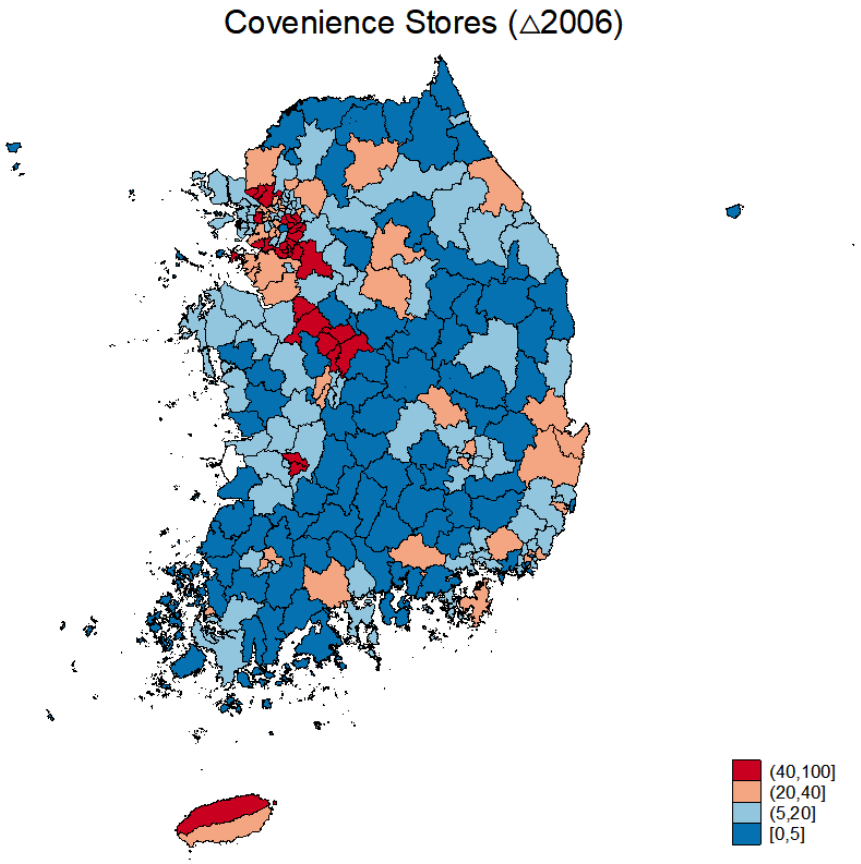
Note: The dependent variable is the yearly change in multi-person households. The number of new operation permits issued in the convenience store business in 2006. Column 1 denotes the results obtained by using the distribution of convenience store operating permits as an instrument, as defined by Equation (2). Column 2 employs the instrument defined in Equation (3). The units of observation are districts (n = 229). Standard errors in parentheses are heteroskedasticity robust and clustered by district (n = 229) level.
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Figure 1: Distribution of Single Households



Note: The graph depicts the proportional change in single-person households between 2015 and 2019. The figures are derived from the Population Census, Statistics Korea. The STATA package "spmap" is used to visualize the uneven growth of one-person households in South Korea's 229 administrative districts (Sigungu).

Figure 2: Distribution of Instrumental Variables



Note: The number of convenience stores is calculated from the Business License Data from Korea Local Information Research & Development Institute. The "spmap" package in STATA is applied to visualize the uneven distribution of our instrument in South Korea's 229 administrative districts (Sigungu).

Appendix Table 1: Effects of Single Households on the Local Economy (All Industrial Classifications)

	(1) Agriculture, Forestry, Fishing	(2) Mining and quarrying	(3) Manufacture	(4) Electricity, gas, and steam supply	(5) Construction	(6) Wholesale and retail trade	(7) Transport and storage	(8) Accommodation and food service	(9) Info and comm	(10) Finance and insurance	(11) Real estate activity	(12) Scientific and technical	(13) Education	(14) Health and social work	(15) Arts, sports & recreation
Panel A: Employment															
OLS	0.000	-0.000	0.004*	0.000	0.003***	0.006*	0.001*	0.009*	0.001*	0.000	0.001	0.003**	0.003**	0.002**	0.001*
	(0.000)	(0.000)	(0.002)	(0.000)	(0.001)	(0.003)	(0.000)	(0.005)	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
IV-2SLS	0.001	0.001	-0.077	0.005	0.130***	0.233***	0.010	0.227***	0.071	-0.024	0.026	0.325***	0.051***	0.432***	0.060***
	(0.002)	(0.001)	(0.107)	(0.005)	(0.043)	(0.062)	(0.028)	(0.031)	(0.062)	(0.029)	(0.020)	(0.072)	(0.018)	(0.039)	(0.008)
Mean dep var	0.122	-0.00836	2.067	0.0423	1.831	3.406	0.524	6.451	0.164	0.0563	0.601	0.852	1.414	1.422	1.283
Panel B: Gross Regional Domestic Product															
OLS	-0.261	-0.203**	24.199	-0.169	-7.227***	1.178	1.334*	0.614*	3.483	0.019	1.975	4.782*	0.840*	2.607**	0.412
	(0.282)	(0.092)	(21.59)	(0.597)	(2.195)	(1.384)	(0.720)	(0.327)	(2.177)	(1.167)	(1.379)	(2.711)	(0.441)	(1.183)	(0.395)
IV-2SLS	-1.211	-0.392	59.185	-0.3384	-5.045	14.905**	-0.172	4.182***	12.401	-0.471	4.221	31.12***	0.674	23.377***	1.810
	(1.328)	(0.343)	(52.66)	(3.721)	(6.205)	(6.354)	(1.813)	(0.943)	(7.623)	(6.297)	(3.417)	(6.807)	(1.511)	(1.626)	(1.593)
Mean dep var	31.83	-26.35	4040	381.9	678.5	1150	460.9	397.8	1123	1200	1100	1388	473.6	1863	145.5
Panel C: Number of Firms															
OLS	-0.000	-0.000	0.028	0.002*	0.016	0.032*	0.025*	0.038**	0.02**	-0.000	0.007	0.046	0.020***	0.051**	0.004
	(0.000)	(0.000)	(0.030)	(0.001)	(0.014)	(0.017)	(0.013)	(0.015)	(0.010)	(0.004)	(0.006)	(0.029)	(0.006)	(0.021)	(0.004)
IV-2SLS	0.001***	-0.0001	0.02**	0.0001	0.018***	0.039***	0.006***	0.076***	0.004	0.001	0.01**	0.016***	0.017***	0.008***	0.014***
	(0.0002)	(0.0001)	(0.005)	(0.0001)	(0.002)	(0.008)	(0.001)	(0.007)	(0.002)	(0.001)	(0.004)	(0.004)	(0.003)	(0.001)	(0.002)
Mean dep var	0.447	-0.0847	9.308	0.217	17.57	20.07	3.367	25.41	3.744	-2.539	0.524	11.62	6.742	44.84	7.046
Obs	916	916	916	916	916	916	916	916	916	916	916	916	916	916	916

Note: The explanatory variable is the change in single-person households Equation (3) defines the instrument for the number of operating permits issued to convenience stores. The units of observation are districts (n = 229). Standard errors in parentheses are heteroskedasticity robust and clustered by district level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Appendix Table 2: Heterogenous Effects of Single Households: Interaction of Age and Gender

	(1)	(2)	(3)	(4)	(5)	(6)
		MALE			FEMALE	
	△Regional GDP	△Firms	△Workers	△Regional GDP	△Firms	△Workers
Panel A: All Business						
Young Singles (20-39)	623.204***	6.130***	1.020***	915.041***	8.731***	1.475***
	(229.390)	(1.088)	(0.155)	(344.550)	(1.498)	(0.197)
Elderly Singles (65+)	1,570.942**	15.601***	2.597***	876.458**	8.411***	1.421***
	(632.082)	(2.441)	(0.339)	(343.508)	(1.270)	(0.145)
Panel B: Wholesale and Retail Business						
Young Singles (20-39)	61.763**	0.973***	0.156***	88.512**	1.358***	0.241***
	(26.526)	(0.308)	(0.040)	(41.351)	(0.370)	(0.052)
Elderly Singles (65+)	155.690**	2.477***	0.398***	84.780**	1.308***	0.232***
	(61.369)	(0.701)	(0.095)	(38.667)	(0.332)	(0.045)
Panel C: Accommodation and Food Business						
Young Singles (20-39)	17.205***	0.978***	0.293***	25.008***	1.288***	0.473***
	(5.317)	(0.201)	(0.042)	(5.660)	(0.183)	(0.055)
Elderly Singles (65+)	43.370***	2.490***	0.744***	23.954***	1.241***	0.456***
	(12.413)	(0.493)	(0.107)	(4.816)	(0.151)	(0.042)
Panel D: Health and Welfare Business						
Young Singles (20-39)	96.958***	1.802***	0.033***	138.676***	2.528***	0.050***
	(13.022)	(0.285)	(0.006)	(18.885)	(0.380)	(0.009)
Elderly Singles (65+)	244.407***	4.587***	0.085***	132.828***	2.436***	0.048***
	(18.170)	(0.369)	(0.018)	(8.879)	(0.177)	(0.009)
Observations	916	916	916	916	916	916

Note: The explanatory variable is the change in single-person households Equation (3) defines the instrument for the number of operating permits issued to convenience stores. The units of observation are districts (n = 229). Standard errors in parentheses are heteroskedasticity robust and clustered by district level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.