Local economic consequences of investment in children: Capitalization of child care services

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Abstract

Recent analyses of intergenerational mobility show that investments in children pay big dividends for them. The priority of resources in early childhood also affects the working of the local economy. Geographic variation in child care services motivates location of families and thereby affects housing markets and the local public economy. In this paper we analyze this local dimension of universal child care during a period of national reform to raise and equalize the child care quality and coverage across the country in Norway. We apply a rich dataset of housing transactions and characteristics for six years (2001-2006) and combine them with local government level data about quantity and quality of child care and various community controls. The analysis of capitalization faces serious methodological challenges of endogeneity and background factors affecting housing prices and local fiscal decisions. We investigate the relationship between child care and housing prices using a variety of fixed effects panel models and using political based instruments for child care services. The results show that housing prices respond to child care and are consistent with the recent literature on capitalization of schooling. The preferred panel model implies that one standard deviation increased coverage raises housing prices by 5 % and one standard deviation reduction in children per child care worker increases house prices by 6%. The estimates based on instruments indicate that OLS underestimates the degree of capitalization. We conclude that child care reform initiates adjustments at housing markets and confirms the role of geographic sorting as part of local fiscal allocations.

Key words

Capitalization, child care, housing prices, local government

JEL codes

H71, H75, R21, R23, R32

Recent research on intergenerational mobility shows the importance of investing in children – Chetty et al. (2011) presents convincing evidence and overview of results. The literature applies rich register data to study how schools contribute to educational and economic outcomes of the children. Jackson et al. (2015) summarize the conflicting evidence regarding school spending effects. Langørgen and Løkken (2017) and Løkken (2017) find that school spending in Norway raises future wages for some children when looking into the heterogeneity of effects. The new analyses add qualitative and quantitative aspects of schooling.

The attention has shifted somewhat from schools to child care – early interventions may have even stronger effects. Baker (2011) discusses the evidence comparing targeted interventions and universal child care. The literature has dealt with both child care subsidies and universal child care programs. Black et al. (2014) find a positive effect of child care subsidies on school performance. The analyses of universal child care have not reached common conclusions about the consequences for children's performance, but Havnes and Mogstad (2015) show positive long-term effects using data for Norway. The main identification challenge for the analysis of child care effects for intergenerational mobility is the geographical sorting of families. Residential mobility is part of the responses to changes in child care services. The mobility influences housing markets and allows for a valuation of the services in question. In this paper we study the local adjustment mechanisms to investment in children – the relationship between (expansion of) universal child services and housing prices in Norway during a period of child care reform.

The capitalization literature related to investment in children mainly covers the effects of schooling. Black (1999) innovated this literature by studying school quality effects on house prices by exploiting boundary discontinuities. Further analyses have investigated organization and quality of schools, such as the Figlio and Lucas (2004) analysis of school accountability systems. Recent studies of 'information shocks' about quality include Fiva and Kirkebøen (2011) and Imberman and Lovenheim (2016). Machin and Salvanes (2016) take benefit of a school admission reform changing the role of boundaries between school districts. We do not know of any studies of capitalization of child care services, but our approach is similar to the

many analyses of schools. Borge and Rattsø (2014) include child care services in an analysis concentrating on property tax capitalization.

Capitalization was introduced as a test of the underlying mechanisms of the Tiebout-model (Tiebout 1956) where competition and mobility between local governments lead to efficient resource allocation under specific assumptions. The hypothesis of property tax capitalization was first developed and tested by Oates (1969). Brueckner (1982) derived and tested an efficiency conditions related to the maximization of property value in the community. Later studies have questioned capitalization as a test of economic efficiency, as discussed by Hilber (2017).

The analysis of capitalization also offers information about government behavior. Wallis et al. (1994) develop the 'fiscal interest approach' further assuming that public officials prefer policies that relax their budget constraint. Fischel (2001a, 2001b) introduces the concept of 'homevoters', homeowners whose voting is guided by their concern for home values. To protect property values, homevoters will put great pressure on local governments to provide services efficiently. Dehring et al. (2008) presents empirical evidence in support of the homevoter hypothesis. Hilber and Mayer (2009) show that even voters not directly affected by the local public services care about them – 'why do households without children support local public schools?'. Ross and Yinger (1999) summarize the literature on sorting and voting.

Our starting point is studies of local public finance. In the European countries child care typically is under the responsibility of local governments and with central government financing as general and specific grants in addition to the payments of parents. The standard approach is to study demand for various services taking into account the budget constraint of the local government. The Norwegian setting is described and analyzed by Borge, Brueckner and Rattsø (2014). The importance of fiscal competition has previously been shown by Carlsen et al. (2005) in an analysis of the relationship between firm mobility and infrastructure fees. Local governments with high firm mobility have lower fee level. Carlsen (2005) examines the effects of local fiscal variables and local economic conditions on migration plans of Norwegian households. His analysis confirms the importance of local services for migration plans and opens up for the possibility of capitalization effect of the services. Related to this paper and using the same housing data Carlsen et al. (2009) offer a first analysis of capitalization using information from household surveys. Interviews about

household satisfaction with local services are used to analyze the relationship between services satisfaction and housing prices. The contribution is a response to the literature struggling with input and output measures of services and shows that satisfaction is associated with housing prices.

Housing prices and fiscal conditions must be understood as simultaneously determined when the fiscal priorities of local governments take into account household location decisions. Local governments may choose service allocation in response to the migration pattern of households. Municipalities experiencing outmigration and declining house prices may mitigate these problems by improving services for highly mobile households. Standard OLS estimation will tend to underestimate the capitalization effects of services. We start out with panel analysis using various control variables and fixed effects to estimate the relationship between child care services and housing prices. Then we deal with the endogeneity problem by the use of instruments based on the background political structure affecting child care services. A substantial literature documents that characteristics of the local political system like party fragmentation, ideology, and female representation in the local council affect public service allocation. We argue that these characteristics can be used as instruments in our context since they are unlikely to have a direct effect on the housing market.

The overview of capitalization studies by Ross and Yinger (1999) is critical to the use of public spending per capita as a measure of public service quality. We must look for characteristics of the services important for the utility of the households. The present analysis makes use of detailed statistics available to describe quantity (coverage) and quality (children per employee, education level of employees) of universal child care. All three variables are readily observable for the local population and are important in the local political debate about child care. The child care services provided are the result of political budget processes including all local public services. Local governments are responsible for the organization and financing of local child care services, but there are both private and municipal kindergartens. We deal with the total service level including both private and public kondergartens. The analysis applies data for a period of national reform in the early 2000s expanding universal child care across all municipalities to achieve full coverage for all children. The national reform was basically financed by central government grants. Since there were large differences in the initial coverage of child care services, the municipalities had great variation in their expansion of the services.

The panel analysis confirms the role of the housing market in the local fiscal adjustment to child care services. Housing prices do respond to quantity and quality of child care. The preferred panel model implies that one standard deviation increased coverage raises housing prices by 5 % and one standard deviation reduction in children per child care worker increases house prices by 6%. The size of the effects is consistent with the literature estimating capitalization of schooling. These studies find that one standard deviation difference in test scores is associated with 2-5% higher property values (see overview of Black and Machin, 2011). The estimates based on instruments indicate that OLS underestimates the degree of capitalization. We conclude that child care reform initiates adjustments at housing markets and confirms the role of geographic sorting as part of local fiscal allocations.

The next section presents data and econometric specifications. After the discussion and interpretation of the results, we offer some concluding remarks.

Data and econometric formulation

The dataset covers Norwegian housing transactions during 2001-2006 and provides information about price, square meters, and type of house. After excluding extreme observations with respect to size and price per m^2, and transactions with missing values for some housing characteristics, we are left with a data set of around 307,000 observations.

The data of housing prices are documented in Appendix A. In the tables housing prices are grouped by municipal population size and part of the country. We also separate between three types of houses; detached houses, semi-detached or row-houses, and apartments. From 2001 to 2006 the average increase in nominal housing prices was 49-56 percent. By comparison the consumer price index increased by 8.3 percent during the same period, yielding a real housing price growth of 38-44 percent. House prices are clearly higher in urban areas (larger municipalities, the capital area) than in rural areas (small municipalities, east inland, and the northern part of the country). These differences widened during the period under study as the areas with the highest housing prices at the outset also experienced the highest growth in housing prices.

This study of capitalization effects of local public services focuses on child care services. Child care is assumed important for the migration of young families and therefore important for the housing market. In 2003 the national government initiated a child care reform. The background for the reform was concern regarding insufficient and geographical variation in coverage (the number of places in child care centers in relation to the number of children) and high user fees. A national limit on user fees was imposed, and it was binding for most municipalities. Lower user fees and expansion of coverage was financed by earmarked grants from the central government.

In the empirical analysis we use five indicators for quantity and quality of child care services. The first indicator of quantity is child care coverage for children aged 1-5 years of age. However, in most specifications we separate between "younger" and "older" children, i.e. 1-2 years of age and 3-5 years of age. The two quality indicators are the number of children in child care centers per man-year (inversely related to quality) and the share of the staff with professional child care education. Children per man-year is age adjusted and takes into account that younger children requires more staff.

Table 1 about here

Table 1 shows the development of the child care indicators during the period of study. It appears that coverage increased sharply, in particular for the younger children. On average child care coverage for children 1-2 years increased from 40 to 64 percent, while coverage for children 3-5 years increased from 83 to 94 percent. The variation in coverage across local governments (measured by the standard deviation) was also reduced, and more so for children 3-5 years of age. The number children per man-year dropped from 7.5 in 2001 to 6.9 in 2006, indicating a substantial increase in quality. The increase in the share of the staff with professional child care education was more modest.

We follow the standard approach and estimate a linear appproximation assuming that the interest rate is constant. The main shortcoming with this formulation is that the degree of capitalization will vary with housing value. The homogeneity of the housing standard in our data reduces this problem. For convenience we use a semi-log form and indexed for house h in local government i in year t:

$$\log(V_{hit}) = \beta_t + \beta_1 CC_{it} + \beta_2 OS_{it} + \beta_3 H_{hit} + \beta_4 A_{it} + u_{hit} \quad (1)$$

where V is the measured market price of house transactions, Q a vector describing child care services, OS represent other services, H is a vector of housing characteristics, A a vector of amenities and u an error term. The data for housing prices, housing characteristics and the indicators of child care services are described above. In the following we discuss other services and amenities.

The financing of Norwegian local governments is quite centralized, and the revenues are dominated by general purpose grants and regulated income and wealth taxes (where all local governments apply the maximum rates). Most services are subject to national mandating to have equalization of service levels across the country. We use local government revenues per capita as a control variable to represent quantity and quality of other local public services. The revenue measure comprises local taxes and general purpose grants and is adjusted for variation in spending needs across local governments.

Whereas the typical U.S. analysis uses data for a cross section of communities within a narrow geographical area that share a common labor market, a Norwegian analysis can rely on data for a larger geographical area comprising several labor markets. The variation is larger, but so is the heterogeneity. Extending the analysis to a larger geographical area and several labor markets makes the estimation of capitalization more challenging as the number of elements in the measurement of amenities will increase substantially. A large number of controls are included to capture local amenities. The municipal unemployment rate is included to represent local labor market conditions. The population size, the age composition of the population (the share of children and the share of elderly), and the settlement pattern capture community characteristics that may affect housing prices. The role of climate, shown to be important in US studies, is captured by a measure of the average winter temperature during 1971-2000.

Finally, we include fixed effects for centrality and labor market region. Centrality is based on a classification developed by Statistics Norway where the 435 local governments are divided into 7 groups depending on the travel distance to regional centers with specific functions.

Labor market regions are based on a classification made by Statisics Norway based on travel-to-work patterns. The country is divided into 46 labor market regions.

The models are estimated by pooled OLS because of the short time series. It is well known that pooled regressions may underestimate the standard errors and thereby overestimate the t-values, see Wooldridge (2003). To avoid this problem we report t-values based on clustered standard errors taking into account that error terms from the same municipality are correlated. In the regressions we always include the full set of housing characteristics, month fixed effects to capture seasonal variation in housing prices and year to capture the growth of housing prices over time. Given that the statistical inference to some extent must be based on cross section variation, we investigate the robustness of the results using alternative formulations for the structural characteristics capturing labor and housing markets and the difference between urban and rural municipalities. As additional robustness checks we exclude small and large municipalities and estimate separate regressions for the three types of houses. Finally, endogeneity of child care services is investigated by instrument variables capturing female representation in the local council and other political variables unlikely to have direct effects on the local housing market.

Capitalization effects

The results of the main panel regressions for the dataset covering about 307,000 house transactions and most of the 435 municipalities during 2001-2006 are presented in Table 1. The first basic regressions in column A shows the 'raw' effect of child care coverage only taking into account housing characteristics and year and month fixed effects. We always include the full set of housing characteristics and include time dummies to take account of common shocks and seasonality. The housing characteristics come out with reasonable effects (Appendix B). Housing prices increase with size, but at a diminishing rate. Given that size is controlled for, semi-detached house and apartments have higher prices than detached houses.

The estimate of the 'raw' model in column A implies that an increase in share of child care coverage by 10 %-points is associated with 7.5% higher house prices on average, statistically significant at 1% level. As argued above, the expansion of child care coverage during this period is driven by national policy and financing. In the following we expand the model in

two dimensions – first to include more controls taking into account other factors influencing housing prices and narrowing down the comparisons, second to extend the description of child care services.

Column 2 of Table 1 shows the main battery of controls applied. Characteristics of municipalities observed over time include population size, age composition of the population, share of population in rural areas, unemployment rate, and winter temperature to account for other determinants of housing market performance. Unemployment and high share of rural population are associated with lower housing prices, while prices are higher in municipalities with large populations, typically cities. Population size and population density are strongly correlated in the data. A mild climate (high winter temperature) has a positive effect on housing prices.

Since all municipalities expanded child care during the period under study, the time series variation is similar in all municipalities. We do not find any interesting relationships to report in a municipal fixed effect model. We have experimented with alternative regional fixed effects at a more aggregate level and report results with labor market area fixed effects. The structure of labor market areas is constructed by Statistics Norway and consists of 46 regions based on travel-to-work patterns. Alternative specifications using the 20 counties and the 83 economic regions (also Statistics Norway) produce the same results. In addition we apply a classification defined by centrality where municipalities are distributed across 7 groups from low to high centrality. The centrality group fixed effects narrows down the comparison to municipalities with similar housing markets. Including this battery of controls the estimated capitalization coefficient is 0.673. A 10 %-point increase in child care coverage raises the housing price by about 6.7% on average.

Table 2 about here

The child-care coverage varies across age groups of the children, and the coverage is lower and with larger variation and higher increase among the young children 1-2 years of age. It is of interest to investigate whether the coverage of young children has been more important for the location decision of families. In column C the coverage is separated for the 1-2 years old and the 3-5 years old. Child care coverage is positively related to housing prices for both age

groups, and the estimate is highly significant for both groups. The effect of an increase in coverage by 10 %-points is 3.0% for the younger age group and 3.6% for the older age group.

Column D expands the model to include two quality measures of child care – the labor intensity measured by children per man-year and the share of staff with certified child-care education. The estimates in column D show that coverage and children per man-year come out as the main determinant of housing prices. Both quantity and quality matters. A one standard deviation reduction in children per man-year increases housing prices by 5%. By comparison, a one standard deviation in increase in coverage raises housing prices by 3-4 % for both age groups. The education level of staff does not come out with any significant effect on house prices.

Local government revenue per capita is included to represent other local public services and always with some positive effect on housing prices. Local government revenue is strongly regulated and consists mainly of general grants and regulated income tax sharing. The estimates when including local government revenue per capita as control variable are shown in panel E. Local government revenue has a positive and statistically significant effect on housing prices. Our interpretation is that this works as a control for other services expanded with higher local government revenue. Both child care coverage and children per man-year continue to have statistically significant effect on housing prices.

Our preferred model in panel F concentrates on children per man-year as quality variable and coverage for children 1-5 year as a common quantity variable since coverage for younger and older children seem to have similar effect. The quantitative effects are approximately 5% higher housing prices for one standard deviation higher coverage and 6 % for one standard deviation reduction in children per man-year. The size of the effect is comparable to those shown for school capitalization (see overview of empirical results by Black and Machin, 2011 and Davidoff and Leigh, 2008). The school studies find that one standard deviation difference in test scores is associated with 2-5 % higher property values. It should be noticed that school capitalization effects disappear when better and more complicated measures of quality are investigated, such as the analysis of value-added rankings of schools by Imberman and Lovenheim (2016). Our measure of quality, children per employee in kindergartens, is more readily observable and has had a lot of attention in the public debate.

The population size of the municipalities is important, since the working of the housing market differs between small municipalities in rural areas and larger municipalities in urban areas. Both the level and growth of housing prices are lower in rural areas. The many small municipalities also have few housing transactions. We investigate the possible importance of these factors by excluding municipalities below 5000, 10,000, and 20,000 inhabitants respectively, and also by excluding the three largest cities Oslo, Bergen, and Trondheim. As shown in Table 3, the size of the capitalization effects for both child care coverage and the quality measure children per full time worker are not much affected by the exclusion of small municipalities or the exclusion of the largest cities. The estimated coefficient for child-care coverage stays in the range 0.45-0.55 and for children per man-year in the range 0.030–0.045.

Table 3 about here

The dataset consists of different types of houses, and the capitalization may vary between housing types. The analysis covers detached houses, semi-detached houses, and apartments. Table 4 reports separate regressions for the three housing types to investigate the robustness. The sign of both coverage and children per man-year are consistent across housing types, but the pricing of semi-detached houses and apartments seem less responsive to child care indicators than detached houses. Children per man-year even become insignificant for apartments. One the other hand, it is interesting that the pricing of semi-detached houses and apartments are more responsive to local government revenue.

Table 4 about here

As discussed above, the underlying mechanism of capitalization is the mobility of households taking into account child care services when they decide location. Geographic variation of housing markets reflect shifting demands with shifting local public services. It follows that municipalities can set child care services with the intention to influence the migration pattern of households. The mechanism implies a possible endogeneity of child care services with respect to mobility and house prices. If child care services are prioritized to influence the mobility of households, we expect underestimation of the child care effect on housing prices using standard OLS. This will be the case when municipalities experiencing outmigration and declining house prices increase their child care coverage and quality to reduce outmigration. We investigate this simultaneity problem by the use of instruments for child care services.

Our strategy to handle the endogeneity of child care policy is based on the literature on political determinants of local public services. Svaleryd (2009) investigates whether the degree of female representation in Swedish local councils affects local public expenditure patterns. She finds that increased female representation increases spending on child care and education. Given this evidence we introduce the share of female representatives in the local council as instrument. The allocation of public services is typically studied in a demand framework, as applied by Borge, Brueckner and Rattsø (2014). Several studies of Scandinavian countries have shown that characteristics of the political structure add to the demand determinants of the local public services – notably party fragmentation (Kalseth and and Rattsø, 1997) and the socialist/ nonsocialist divide (Borge and Rattsø, 2007). We use a Herfindahl-index of (inverse) party fragmentation and the share of socialist representatives in the local council as instruments. The specification assumes that the political variables do not have a direct impact on the housing market.

Table 5 about here

We start out with the combined instrumentation of the quantity (coverage) and quality (children per worker man-year) of child care. The first stage regressions are reported in the left panel of Table 5. Both child care coverage and children per man-year increase with the share of female representatives in the local council. Gender representation matters for local priorities. The quality variable children per man-year also is significantly affected by characteristics of the local party system. Less party fragmentation is associated with higher child care coverage, while a higher share of socialists has the opposite effect. The hypothesis of weak instruments cannot be rejected using the Sanderson-Windmeijer multivariate F-test.

The right panel of Table 5 reports the second stage regression for the determinants of the two main measures of child care services. The qualitative results are the same as with OLS, but as expected the quantitative effects increases with 2SLS. The higher (absolute value) point estimates indicate that standard OLS underestimates the capitalization effect. According to the Hansen J statistic the hypothesis of valid instruments cannot be rejected, but the two child care variables are only marginally significant.

Table 6 about here

Since the combined instrumentation of two child care variables is demanding, we continue by concentrating on child coverage in Table 6. We report results with and without the quality variable (children per man-year) as a control, but the results are almost identical in the two cases. In the first stage estimation in the first column of Table 6 child care coverage is well predicted, in particular by the share of females in the local council, and the hypothesis of weak instruments is clearly rejected. The second stage estimate is positive and highly significant. Again, the estimate is much larger than in the OLS model (Table 2). Handling the endogenous child care policy in the analysis of housing prices is challenging, but the results confirm the importance of child care for housing prices when we build the background political characteristics into the model.

Concluding remarks

In this paper we analyze the local dimension of universal child care during a period of national reform to raise and equalize the child care quality and coverage across the country in Norway. We apply a rich dataset of housing transactions and characteristics for six years (2001-2006) and combine them with local government level data about quantity and quality of child care and various community controls. We conclude that child care reform is capitalized into housing markets and confirm the role of geographic sorting as part of local fiscal allocations. Continued work in this project will look at better ways of exploiting the national reform.

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Table 1
The indicators of child care services, 2001-2006

Year	Coverage 1-5 years	Coverage 1-2 years	Coverage 3-5 years	Children per man-year	Education
2001	0.665 (0.114)	0.400 (0.158)	0.834 (0.109)	7.5 (1.42)	0.297 (0.073)
2002	0.692 (0.112)	0.428 (0.161)	0.859 (0.103)	7.4 (1.28)	0.300 (0.076)
2003	0.721 (0.105)	0.455 (0.157)	0.879 (0.095)	7.4 (1.18)	0.312 (0.070)
2004	0.752 (0.095)	0.497 (0.152)	0.905 (0.082)	7.2 (1.09)	0.314 (0.073)
2005	0.781 (0.088)	0.550 (0.150)	0.925 (0.076)	7.1 (1.14)	0.319 (0.081)
2006	0.823 (0.075)	0.636 (0.131)	0.941 (0.061)	6.9 (0.96)	0.310 (0.079)

Note: Means with standard errors in parentheses. Coverage and education are measured on a 0-1 scale. Children per man-year is age-adjusted taking into account that younger children are more resource demanding.

Table 2
Pooled regression results, 2001-2006

	A	B	C	D	E	F
Child care indicators						
Child care coverage 1-5 year	0.750	0.673				0.498
	(2.95)	(7.00)				(5.78)
Child care coverage, 1-2 year			0.302	0.256	0.206	
			(3.31)	(3.16)	(2.58)	
Child care coverage, 3-5 year			0.360	0.416	0.290	
			(2.55)	(3.15)	(2.36)	
Children per man-year				-0.0429	-0.0348	-0.0351
				(-3.90)	(-3.31)	(-3.19)
Share of staff with child care				-0.0793	-0.018	
education				(-0.48)	(-0.12)	
Other local public services						
Local government revenue					0.454	0.458
per capita (log)					(4.22)	(4.29)
Community characteristics						
Population size (log)		0.134	0.131	0.128	0.110	0.112
		(12.35)	(12.11)	(11.87)	(10.61)	(10.83)
Share of children		4.70	4.79	4.39	4.10	4.06
		(2.48)	(2.50)	(2.52)	(2.63)	(2.64)
Share of elderly		-2.75	-2.70	-2.59	-2.74	-2.76
		(-3.13)	(-3.04)	(-3.25)	(-3.97)	(-4.06)
Share of population living		-0.291	-0.293	-0.257	-0.307	-0.302
in rural areas		(-4.92)	(-4.99)	(-4.23)	(-5.29)	(-5.59)
Unemployment rate		-6.47	-6.61	-6.60	-5.81	-5.72
		(-4.10)	(-4.19)	(-4.88)	(-5.36)	(-5.25)
Winter temperature		0.011	0.011	0.014	0.012	0.012
		(2.25)	(2.26)	(2.70)	(2.57)	(2.54)
Housing characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Month fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Centrality fixed effects	No	Yes	Yes	Yes	Yes	Yes
Labor market fixed effects	No	Yes	Yes	Yes	Yes	Yes
Number of municipalities	412	411	411	410	410	410
Number of obs	307,714	307,710	307,710	302,304	302,304	302,310
R^2	0.398	0.686	0.686	0.688	0.689	0.689

Note: The dependent variable is the log of the housing price. T-values based on clustered standard errors (at the municipal level) in parentheses.

Table 3
Pooled regression results, investigating population size, 2001-2006

	All	Above 5000	Above 10,000	Above 20,000	Excluding 3 largest cities
Child care coverage, 1-5 year	0.498	0.454	0.473	0.460	0.572
	(5.78)	(4.75)	(4.14)	(2.60)	(6.54)
Children per man-year	-0.0351	-0.0393	-0.0420	-0.0329	-0.0406
	(-3.19)	(-3.14)	(-2.58)	(-1.49)	(-3.69)
Local government revenue per capita	0.458	0.635	0.649	0.669	0.448
	(4.29)	(3.89)	(3.24)	(3.02)	(4.69)
Community characteristics	Yes	Yes	Yes	Yes	Yes
Housing characteristics	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes
Month fixed effects	Yes	Yes	Yes	Yes	Yes
Centrality fixed effects	Yes	Yes	Yes	Yes	Yes
Labor market fixed effects	Yes	Yes	Yes	Yes	Yes
Number of municipalities	410	190	101	45	407
Number of obs	302,304	293,763	276,308	239,772	183,472
R^2	0.689	0.690	0.696	0.705	0.687

Note: The dependent variable is the log of the housing price. T-values based on clustered standard errors (at the municipal level) in parentheses. Community characteristics include population size, age composition, settlement pattern, rate of unemployment, and winter temperature.

Table 4
Pooled regression results, different types of houses, 2001-2006

	All	Detached	Semi-detached	Apartment
Child care coverage, 1-5 year	0.498	0.667	0.438	0.331
	(5.78)	(7.20)	(4.05)	(2.67)
Children per man-year	-0.0351	-0.0363	-0.0272	-0.0204
	(-3.19)	(-3.38)	(-1.79)	(-1.42)
Local government revenue per capita	0.458	0.560	0.650	0.711
	(4.29)	(5.11)	(5.29)	(4.04)
Community characteristics	Yes	Yes	Yes	Yes
Housing characteristics	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes
Month fixed effects	Yes	Yes	Yes	Yes
Centrality fixed effects	Yes	Yes	Yes	Yes
Labor market fixed effects	Yes	Yes	Yes	Yes
Number of municipalities	410	409	289	294
Number of obs	302,304	97,104	38,765	166,441
R^2	0.689	0.740	0.751	0.639

Note: The dependent variable is the log of the housing price. T-values based on clustered standard errors (at the municipal level) in parentheses. Community characteristics include population size, age composition, settlement pattern, rate of unemployment, and winter temperature.

Table 5
IV with both child care indicators endogenous, 2001-2006

	First stage		Second stage
	Child care coverage, 1-5 year	Children per man-year	Housing price
Share of females in the local council	0.283	-1.054	
	(5.04)	(-2.13)	
Share of socialists in the local council	-0.165	0.039	
	(-3.46)	(0.07)	
Herfindahl-index	0.136	1.375	
	(1.61)	(1.87)	
Child care coverage, 1-5 year			0.918
			(1.69)
Children per man-year			-0.185
			(-1.62)
Community characteristics	Yes	Yes	Yes
Housing characteristics	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes
Month fixed effects	Yes	Yes	Yes
Centrality fixed effects	Yes	Yes	Yes
Labor market fixed effects	Yes	Yes	Yes
Number of municipalities	410	410	410
Number of obs	301,499	301,499	301,499
SW multivariate F-test of weak instruments	3.57	3.04	
(p-value)	(0.029)	(0.049)	
Hansen J statistic			0.061
(p-value)			(0.805)

Note: T-values based on clustered standard errors (at the municipal level) in parentheses. Community characteristics include population size, age composition, settlement pattern, rate of unemployment, winter temperature, and dummies for centrality and part of country. The Hansen J statistic is a test of overidentifying restrictions.

Table 6
IV with child care coverage as endogenous, 2001-2006

	Quality left out		Quality as control	
	First stage	Second stage	First stage	Second stage
	Child care coverage, 1-5 year	Housing price	Child care coverage, 1-5 year	Housing price
Share of females in the local council	0.278		0.283	
	(5.41)		(5.59)	
Share of socialists in the local council	-0.157		-0.165	
	(-3.36)		(-3.46)	
Herfindahl-index	0.125		0.135	
	(1.47)		(1.59)	
Child care coverage, 1-5 year		1.523		1.306
		(3.81)		(3.63)
Community characteristics	Yes	Yes	Yes	Yes
Housing characteristics	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes
Month fixed effects	Yes	Yes	Yes	Yes
Centrality fixed effects	Yes	Yes	Yes	Yes
Labor market fixed effects	Yes	Yes	Yes	Yes
Number of municipalities	411	411	411	411
Number of obs	306,899	306,899	306,899	306,899
SW F-test of weak instruments	12.38		13.33	
(p-value)	(0.000)		(0.000)	
Hansen J-statistic (p-value)		2.295		2.413
		(0.318)		(0.299)

Note: T-values based on clustered standard errors (at the municipal level) in parentheses. Community characteristics include population size, age composition, settlement pattern, rate of unemployment, winter temperature, and dummies for centrality and part of country. The Hansen J statistic is a test of overidentifying restrictions.

Appendix A. Housing prices by municipal population size and part of country

Table A1a
Housing prices (in NOK 1000) 2001 and 2006, grouped by municipal population size

Population	Detached		Semi-det./Row		Apartments	
	2001	2006	2001	2006	2001	2006
Below 5,000	940	1206	837	1152	1101	1145
5,000 – 10,000	1139	1590	992	1379	1075	1261
10,000 – 20,000	1323	1868	1131	1571	1006	1316
20,000 – 50,000	1408	2154	1276	1788	1120	1385
50,000 and above	1954	3286	1613	2539	1224	1913
All houses	1450	2262	1399	2117	1180	1763

Table A1b
Housing prices (in NOK 1000) 2001 and 2006, grouped by part of the country

	Detached		Semi-det./Row		Apartments	
Part of the country	2001	2006	2001	2006	2001	2006
The capital area	1858	2983	1675	2587	1273	1972
East inland	1067	1479	998	1412	1006	1238
East coast	1371	1904	1167	1454	1127	1185
South	1425	2167	1241	1866	1078	1631
West	1500	2167	1298	2081	1115	1697
Middle	1210	1928	1321	2070	1106	1587
North	1118	1960	900	1767	1092	1605
All houses	1450	2262	1399	2117	1180	1763

Appendix B. Estimated effects of housing characteristics

Table B1
The effects of housing characteristics

	Model A Table 2
Size (m^2)	0.0110
	(6.75)
Size squared	-0.0000141
	(-22.64)
Semi-detached or row house	0.202
	(4.40)
Apartment	0.404
	(4.58)

Note: The dependent variable is the log of the housing price. T-values based on clustered standard errors (at the municipal level) in parentheses.