Housing and Fertility:
A macro-level, multi-country investigation, 1982-2016

Abstract

BACKGROUND

Low fertility (when women have fewer than 2 children on average) is a growing demographic reality affecting most economically developed countries and can have serious economic consequences such as labor market shortages. There is widespread agreement that country-level institutional differences are the main factors behind the fertility differences among low fertility countries.

OBJECTIVE

This paper examines the relationship between housing, arguably the least studied of the key social institutions, and fertility across 35 low-fertility countries.

METHODS

Using newly compiled indicators of multiple dimensions of the housing context we explore housing from the perspective of renters, home-buyers, and lenders and sellers. We use 10 indicators of the housing context and combine them into five different indexes: renter support index, homebuyer support index, lender/seller support index, a combined index of all three dimensions, home ownership regimes based on previous literature. We operationalize fertility in terms of both the quantum (period TFR) and tempo (period mean age at first birth).

RESULTS

Analyses paint a complicated picture showing variation by quantum and tempo of fertility, across geographic regions (Eastern vs non-Eastern European countries), and reveal a weakening relationship between the housing context and fertility at the country level over time.

CONTRIBUTION

This study contributes to our understanding of institutional or contextual effects on fertility by 1) analyzing the relationship between housing and fertility over a 34-year period; 2) adding a supply side dimension to the conceptualization of housing context; 3) examining the association with measures of both quantum and tempo of fertility.

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Since the mid-1900s, fertility levels worldwide have declined markedly reaching particularly low levels in most high-income countries. Consider the total fertility rate (TFR), a measure used to represent the average number of children a woman will have over her lifetime. In 2016 almost 100 countries had low fertility, defined as a TFR <2.1, and by 2025 UN projections predict this will increase to over half of the world's current countries (PRB 2014; World Bank Data 2018). Within this realm of low fertility there is considerable variability across countries. Australia and the US have recently had TFRs greater than 2.0 whereas Germany and South Korea had TFRs of 1.3 or lower, and various countries are in-between (PRB 2014).

Importantly, low fertility is problematic at the individual and population level. On the individual level, women report wanting more children than they are having (Edmonston et al. 2010; Régnier-Loilier and Vignoli 2011; Spéder and Kapitány 2014) but the factors that prevent women from realizing their desires are not well understood. On the population level, low fertility leads to aging, shrinking populations (unless dramatic immigration policies are put in place) with further consequences for welfare systems (particularly pay-as-you-go programs), health care systems, and the labor market (Bloom et al. 2010; Bongaarts 2004; Lee and Mason 2014; Lindh and Malmberg 2009; McDonald 2006).

Given the large variability across countries there is widespread agreement that country-level institutional differences are important factors behind the TFR differences (Harknett et al. 2014; Luci and Thevenon 2012; McDonald 2000; Rindfuss and Brauner-Otto 2008; Rindfuss and Choe 2015, 2016; Toulemon 2011). Multiple institutions have been identified as key factors influencing fertility including education, gender norms and equity, government family policies, the labor market, and housing. This study focuses on the latter—arguable, the institution which

has received the least amount of attention from demographers—and investigates the relationship between the institution of housing and fertility across 35 countries over 34 years. We consider two aspects of fertility: quantum (measured with the period TFR) and timing (measured with the period mean age at first birth). Further, we examine multiple dimensions of the housing context from the vantage points of both the seeker (renter or buyer) and owner (landlord or seller) to assess whether there are multiple dimensions of the housing context that are related to fertility and whether those relationships have changed over time. We use the terms housing context, housing, and the institution of housing interchangeably to refer to macro level characteristics that shape the housing options young people face.

Theoretical background

The relationship between housing and fertility has long been discussed in the fertility literature (Mulder 2013; Pinelli 1995) and has been recognized by policy makers (European Commission 2005). Despite this long history and the strong theoretical arguments pointing to the importance of the housing context we still do not have a solid empirical base showing the association between various aspects of the housing context and fertility. One article on country-level differences notes that "… there has been hardly any empirical research substantiating links between the characteristics of the housing market and fertility choices in developed societies" (Mulder and Billari 2010), and this sentiment is echoed regarding sub-national variation in housing and fertility (Kulu and Boyle 2009). Our paper is a step in filling in this gap in the literature and opens the door to future investigations.

For most young adults in industrialized countries with low fertility, the normative expectation is that they will leave their natal home sometime during the young adult years and before they start having their own children. Childbearing is then postponed until they have their

own dwelling unit – rented or purchased. Across these countries, the vast majority of people with children are not living with their parents, although there is variance across countries.[1]

Our main hypothesis then is that the easier it is for young adults to obtain their own dwelling unit, the younger the age at first birth, and by extension the higher the level of childbearing. The ability to obtain satisfactory housing is itself likely influenced by characteristics of the housing context. Previous research has found evidence that when housing markets are tight (i.e. costs are high or supply is low) it is harder for young people to obtain independent housing (Haurin et al. 1997; Hughes 2003; Lauster 2006), which then, postpones their transition to parenthood (Clark 2012). Further, individual level analysis provide evidence that couples who spend a larger proportion of their income on housing related costs have lower fertility (Flynn 2013).

Our expectations regarding the housing-fertility relationship over time are unclear. On the one hand, women's increasing employment and earnings could make it easier for them or couples to overcome housing market obstacles. On the other hand, if employed, the longer young men and women stay in the parental household, especially if they contribute little to household expenses, the longer they live with relatively high levels of disposable income. Additionally, preferences for one's own dwelling unit prior to parenthood have remained strong or increased over time. These factors may amplify obstacles presented by the housing market.

[1] UN data on household structure for selected countries reveals that the percent of multigenerational or complex households (defined as a single family nucleus and other persons) ranged from less than 2% in Norway to over 10% in Romania in 2011 (UNdata 2018). Furthermore, this has been decreasing in many countries, although to varying degrees. For example, in Russia and Ireland this rate decreased by over 25% from 2002 to 2010 (from 13.99% to 10.31% and 6.28% to 4.25%, respectively), whereas it only decreased by 5% in Hungary over a similar period (6.34% to 6% from 2001 to 2011) (UNdata 2018). Some countries have experienced increases in this type of household structure, but generally the prevalence is still low. For example, in Norway the percent of complex households increased by 19% from 2001 to 2011 but was still less than 2% of the total households (UNdata 2018). Childbearing in complex households is more common in Eastern and Southern European countries than Western European or Nordic countries.

To empirically examine the relationship between the housing context and fertility we must first identify the relevant dimensions of housing to consider. Below we discuss multiple factors within 3 dimensions of the housing context.

Renting.

Rental housing can be the first type of housing young people occupy upon leaving the parental home, in part because it is often more financially feasible than purchasing a home which typically requires a large lump sum down payment. When comparing the renting context across settings a key dimension is the prevalence of renting in the society. If rental housing is widely available and culturally acceptable we would expect that young people can move out earlier. Research on the housing context typically operationalizes the availability and acceptance of renting together in terms of the size of the rental market (Mulder and Billari 2010**)**. This then leads us to expect that when the rental market makes up a larger share of housing units it should be easier for young people to begin their own independent living.

Another factor that may influence renters' ability to obtain independent housing is government subsidies. In many countries governments spend considerable amounts supporting renters. This may be through large, well-established social housing programs in places like Austria, Denmark, and the Netherlands or via direct rent subsidies (Haffner and Oxley 1999; Sobotka 2016; Vestergaard 2002). Although not always targeted to young people, these subsidies make it easier for them, who typically have lower earnings, to afford their own housing unit.

Our hypothesis then is that people will have more children, and have them earlier, when renting is a more feasible option for them (i.e., rental units make up a larger share of the housing stock and government subsidies are greater).

Home buying.

Of course, renting is not the only way to obtain an independent living situation; individuals may also buy their housing unit. In fact, research at the individual level has demonstrated that homeownership is tightly connected to childbearing (e.g. Lauster and Fransson 2006; Mulder and Wagner 2001). While some research has found that childbearing is higher among homeowners than renters, others have argued that home ownership competes with childbearing because both are costly (Calvert 2010; Clark 2012; Lauster 2006, 2008; Mulder and Wagner 1998; Mulder 2013; Vignoli et al. 2013). However, owner-occupied homes are, on average, considered better for childbearing as they tend to be bigger, of better quality, in a better location, and the act of ownership may be another signal of life course transition (Hoekstra 2005; Mulder and Wagner 1998), making ownership positively related to fertility.

Ease of purchasing a home is itself influenced by many factors. First, is the actual price of housing units. When housing is relatively more expensive it is harder for young people to purchase their home, all else equal (Dettling and Kearney 2011; Ermisch 1999). But, housing prices themselves do not tell the full story as in many countries there are extensive banking and loan systems designed to help buyers purchase homes. Mortgages allow the cost of housing to be spread out over a substantial time-period dramatically reducing the need for large cash payments at the time of purchase. Since young people typically have less capital or savings to use for housing, this greatly increases their ability to purchase a home. The prevalence and use of formal mortgages varies substantially across countries. For example, *inter-vivo* intergenerational transfers are an important substitute for formal mortgages in the Southern European countries (Mulder and Billari 2010). Interest rates further effect the long-term price of this credit. If interest rates are high, those buying a dwelling unit will face higher monthly payments.

These dimensions of the housing context influence the cost of owning a home to the

individual or couple. This leads us to hypothesize, then, that, other things being equal, when prices are lower, mortgages are more widespread, and interest rates are lower it should be easier for young people to obtain their own dwelling unit, which would be related to higher and earlier childbearing.

Lending and selling.

Renters and homeowners are not the only parties involved in housing exchanges—property owners and bankers have their own set of concerns and constraints that may influence the ability of young people to obtain independent housing and start their own families. Obtaining a mortgage is itself influenced by the willingness of lenders to grant loans. One factor likely influencing the willingness of bankers to lend is their ability to obtain credit risk information. The better and more credit information available, the more willing bankers are to lend (Jappelli and Pagano 2002). Without this information lenders may be more likely to require a higher down payment, and/or perhaps require a parent to cosign a mortgage note. There is tremendous variability among countries both in terms of whether public or private credit bureaus exist and, if they do, what proportion of the population they cover. For example, the U.S. has had private credit bureaus since 1890 whereas France still has none (Jappelli and Pagano 2002). In France, securing a lease or buying a home typically involves submitting an extensive dossier that includes information on a guaranteed salary for an extended period of time (e.g. the period of the lease). Without that guarantee applicants may be declined or be required to have a year's rent in a French bank account. The larger the share of the population covered by credit bureaus, the more likely banks will lend to young adults, and hence higher fertility.

Because not all investments or rental contracts work out well conditions related to addressing issues such as mortgage foreclosures and evictions may also shape the housing

context (Mandič 2008; Mulder 2006; Stephens 2003). All else equal, bureaucratic processes that make foreclosures and evictions burdensome, in terms of time and/or money, make any rental or sale riskier. When lenders or property owners can operate within an efficient judicial system their lending and renting risks are further lowered, improving the ability of young people to obtain housing and start families. Again, these systems vary across countries. For example, Belgium, Germany, Italy and Spain have relatively inefficient systems in contrast to Finland, the Netherlands, and the U.S. (Chiuri and Jappelli 2003). We expect that less efficient systems are related to a greater reluctance of financial institutions to lend, more difficulty for young people to obtain housing, and hence lower and later fertility.

Combining dimensions: indexes and regimes

The discussion above focuses on the separate relationship between each dimension of the housing context and fertility. However, it is also important consider any clustering within or between domains because in both cases the dimensions may be substitutes or compliments for one another. For example, a large rental market may benefit renters by keeping rents low, but government subsidies may be able to achieve the same thing by making the real cost to the renter lower than that determined by a small market. These dimensions may also be additive such that home ownership is even more accessible to young people if mortgages are widespread and interest rates are low, than if only one of those conditions is true.

Similarly, the pro-natalist components of the rental and home purchasing dimensions are not necessarily in conflict with one another. A country may support renters through a large rental stock and rent subsidies, while also offering affordable mortgages to those who do want to purchase a home. And, that may or may not occur within a financial system with a high degree of information sharing. As such, we should simultaneously consider renting and purchasing

opportunities from the perspective of both the home seekers and providers.

There have been at least two notable attempts at classifying housing regimes as they may relate to fertility, both of which inform our study. Mulder and Billari (2010) use the percent of the housing stock owner occupied as a measure of rental availability and mortgage debt per capita to measure the ease of access to mortgages and identify four different homeownership regimes: the "Difficult" regime is where owner occupancy is high so there is a small rental market and homeownership is the norm but mortgage debt is not widespread meaning buyers must provide the bulk of the housing purchases price themselves or with the help of family networks; the "Easy" regime is where owner occupancy is high and mortgages are widespread so that it is relatively easy for young people to receive formal financial support from the banking sector to help them buy their own homes; the "Career" regime is where owner occupancy is low but mortgages are high implying that homeownership is not universal but it is formally supported when people do want to buy; the "Elite" regime is where owner occupancy is low and the mortgage debt ratio is low implying that homeownership is rare and typically only accessible to the wealthiest individuals. Using data from 1 year for Western European countries, they link these regimes explicitly to the TFR and find that, compared to that in the Career regime, the TFR was significantly higher in the Easy regime and lower in the Difficult regime. We consider their typology as a starting point for our longitudinal investigation.

Mandič (2008) takes a broader approach and characterizes home-leaving in general, incorporating fertility into the regime definitions, also focusing on the rental market and then adding in the physical space in terms of square footage. This study includes Eastern European countries and yields a different set of home-leaving regimes which cluster geographically: North-western, South-western, and North-eastern. Since this approach incorporates fertility into the

regimes we do not replicate it here.

Regional Differences

Most of the theory and research motivating the above discussion is grounded in Western European ideas of the housing market and family formation (Mandič 2008, 2010 are notable exceptions). However, Eastern European countries are also experiencing low fertility and should be incorporated.

Historically, Eastern European countries presented a complicated case regarding the relationship between housing and fertility due to the use of housing as a social benefit in planned economies (Mandič 2010). High quality rental units were highly desired and distributed to individuals and families by the party and official housing policies were often tied to having many children (Mandič 2010; Spéder 2016). For example, in Hungary, families with three or more children had priority for public housing and newly married couples were offered low interest loans (Spéder 2016). The transition to market economies meant a dramatic shift in the distribution of housing leading some countries to have "super home ownership" with rates over 80% by the mid-1990s.

Despite these historical differences to Western Europe, the housing contexts today are not dramatically different. Mandič (2010) concludes that many features of the role of housing in Eastern Europe are similar to those in Southern Europe and there is considerable variation within regions. A different study distributed Eastern European countries across home-leaving regimes integrating them with other European countries (Mandič 2008). The question of whether the relationship between housing context and fertility is similar in Eastern and non-Eastern Europe is an empirical one we investigate here.

Of course, no discussion of the clustering of European countries would be complete

without mention of welfare states (Esping-Anderson 1999). In fact, Mandič's (2008) home-leaving regimes are similar to the common welfare state distinctions with the addition of a North-eastern cluster regime for countries not incorporated into the existing framework. As with all country-level analyses the task of isolating "effects" of policies or social institutions from the broader country context or welfare package is difficult. To the extent that the housing context varies within a welfare state typology both across countries and over time, our study aims to provide evidence of a broad relationship between the housing context and fertility that may be further influenced by other components of the welfare state. Also, we rely on the changing associations over time between housing and fertility to further distinguish any housing "effect" from a general welfare state "effect" as countries rarely change their position within these typologies.

Data

We examine the relationship between the housing institution and fertility among 35 low-fertility countries:

- Non-Eastern Europe: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, UK, USA
- Eastern Europe: Bulgaria, Croatia, Czech Republic, Estonia, Georgia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, Slovenia, Ukraine

We compiled an annual time series from a range of sources for the period 1982-2016 yielding 622 country-years of data, although availability varies substantially across domains, countries, and years. We discuss this in more detail below.

Fertility indicators

We analyze both the quantum and tempo dimensions of fertility. To measure fertility quantum we use the period Total Fertility Rate (TFR) (hereafter simply referred to as the TFR; the sum of the age-specific fertility rates for a given year). We use the TFR in our analyses because our hypotheses are concerned with period effects—housing context in one period likely shapes the fertility decision-making process at that time. Data come from the Human Fertility Database (2018) with missing information filled in from Frejka and Sardon (2006) and Eurostat.

Because our theory is also concerned with the timing of fertility, we also examine the tempo dimension of fertility with the period mean age at first birth. Data come from the Human Fertility Database (2018). Note, fewer country-years are available for these analyses than for those with the TFR.

Figure 1 shows the TFR (Panel a) and mean age at first birth (Panel b) for the country-years used in these analyses.

(Figure 1, about here)

Housing context indicators

Data on indicators of the housing context were compiled from a range of sources including the OECD, the World Bank, and published articles. A majority of data was obtained from the annual Hypostat reports published by the European Mortgage Federation (e.g., EMF 2008). Publically available data was merged, cleaned, and made available via XXXX. Additional information on data sources, availability, and merging processes are on the project website: (reference and website excluded for blind review). When only one data source was used we identify it below. Otherwise, please refer to the project website and supporting documents.

We examine several dimensions of the housing context using 10 distinct indicators that we combine into 4 composite indexes. The specific indicators were chosen based on their use in

the literature and on our theoretical framework. Although not always ideal, these measures are generally comparable data across countries over time and cover all three theoretically motivated domains. This paper lays the foundation for future data collections, harmonizations, and analyses.

We identified "high" or "low" categories by considering the distribution for all country-years of data that are available. To establish a cut-off point we used substantive reasons and/or the distribution of the measure, considering either the lowest quantile or the midpoint. We also considered the variation over time to avoid creating variables that proxy for period. Below we present some descriptive statistics for the sample of country-years used in the analyses. Only country-years with valid data for all measures used in an index were included in the analyses sample, although the analysis sample does vary across indexes.

Renter support. We include two measures to capture the housing context renters face: the size of the rental market and subsidies.

Owner occupancy. Owner occupancy, a measure of the size of the rental market, is measured as the percent of housing units that are owner occupied. We follow Mulder and Billari (2010) and code a country-year as having low owner occupancy if the rate was less than or equal to 75%. Sixty-three percent of country-years had low owner occupancy. Table 1 presents descriptive statistics across all country-years for this and all measures of housing used in the analyses.

(Table 1, about here)

Government spending on housing. We capture government subsidies or spending on housing using the percent of GDP spent on "rent subsidies and other cash benefits to the individual to help with housing costs (Adema, Fron and Ladaique 2011)." Notably this does not

include other forms of subsidies such as support to the elderly or disabled, emergency benefits, mortgage relief, or implicit subsidies.[2] High spending, more than 0.1% of GDP, occurred for 62% of country-years.

Renter support index. To create an index of how supportive a housing context is of renters we sum the dichotomous indicators for these two dimensions. This index ranges from 0 to 2 with a mean across all country years of 1.25. Twenty-two percent of country-years scored a 0 and 46% scored a 2.

Home buying. We have four measures that capture the access and affordability of home ownership.

Housing prices. The most obvious measure of housing costs is the price of housing itself. Prices, standardized national prices relative to 2000 prices, come from annual Hypostat reports published by the European Mortgage Federation. The specific type of housing included in this measure (e.g., urban only, all, or second hand dwellings only) does vary across countries but is more consistently defined within countries over time. We consider low prices to be those that were 105% of the 2000 value for that country; this accounts for 40% of housing prices.

Mortgage debt per capita. Mortgage debt per capita is a measure of how widespread mortgages are in a country—a larger value implies that mortgages are more widespread or more available. The measure is calculated as the total outstanding residential loans per capita and comes from annual Hypostat reports published by the European Mortgage Federation. We follow Mulder and Billari (2010) and consider a per capita mortgage debt of greater than or equal to 10,000 Euros to be high availability: 42% of country-years had high mortgage availability.

Mortgage debt ratio. Mortgage debt ratio is similar to the mortgage debt per capita in that

[2] A measure of governments subsidizes on housing for young adults specifically was not available.

it can be an indicator of how widespread mortgages are. The measure is calculated as the total outstanding residential loans as a percent of the country's GDP and comes from annual Hypostat reports published by the European Mortgage Federation. We consider a mortgage debt ratio greater than or equal to 90 as high (83% of country-years). Note, the two measures of mortgage availability are highly correlated (Pearsons correlation coefficient =0.87, $p<0.001$).

Interest rates. We also include lending interest rates as they effectively make mortgages more or less affordable. Data are from the World Bank World Development Indicators and are defined as "the bank rate that usually meets the short- and medium- term financing needs of the private sector." Lending interest rates less than or equal to 5% were considered low and accounted for 22% of country-years.

Homebuyer support index. We create an index of factors that support buying a home summing the four dichotomous indicators. Only 3 country-years had all 4 buyer supports so we top code the measure at 3. The index ranges from 0 to 3 with a mean of 1.86 across all country-years. We also tested alternative combinations of these measures and discuss them below.

Lending/selling. We have 4 measures that capture home purchasing and renting from the perspective of the property owners and mortgage lenders.

Credit bureaus. We have two measures of the extent of credit bureaus in a country—the percent of the adult population covered by private credit bureaus and the percent covered by public bureaus. Data for both come from the World Bank. We consider high coverage by a private or public bureau to be greater than 45% or 12% of the adult population, respectively. Forty-four percent of country-years had high coverage by a private credit bureau and 22% by a public credit bureau.

Judicial efficiency. Judicial efficiency refers to the strength of legal rights in a country

and comes from the World Bank Doing Business Project. “Strength of legal rights index measures the degree to which collateral and bankruptcy laws protect the rights of borrowers and lenders and thus facilitate lending. The index ranges from 0 to 12 (although only from 2 to 11 in our data), with higher scores indicating that these laws are better designed to expand access to credit” (World Bank, Doing Business Project 2018). We consider a score greater than 5 to denote high efficiency accounting for 69% of country-years.

Bureaucratic efficiency. Our last indicator concerns the general state of bureaucracy in a country as measured by the procedures involved in starting a business. We use this as a measure of the overall climate facing lenders and sellers. Data again come from the Word Bank Doing Business Project. The index ranges from 2 to 15 in our data with a higher value denoting a more bureaucratic process. We consider a score between 0 and 6 to be less bureaucratic environment accounting for 48% of the country-years.

Lender/seller support index. We sum the dichotomous variables for these indicators into an index of support for lenders and sellers, where greater support is expected to be passed down to young people in the form of lower costs of housing. Only 3 country-years had all 4 buyer supports so we top code the measure at 3. The index ranges from 0 to 3 with a mean across country-years of 1.82.

Composite measures of the housing context: Finally, we created composite measures that attempt to capture multiple dimensions of the housing context simultaneously.

Combined index. First, we create an index that is the sum of our three previous indexes—renter, home-buyer, and lender/seller support. This index ranges from 1 to 8 with a mean value of 4.69. Note, however, that because of variation in data availability we only have 97 country-years available (Belgium, Bulgaria, Czechia, Estonia, Finland, France, Hungary, Iceland, Ireland,

Italy, Malta, Netherlands, Norway, Slovakia, Sweden, and the UK; 2006-2015).

Homeownership regimes. This measure replicates Mulder and Billari's (2010) homeownership regimes. These 4 regimes—Career (41% of country-years), Elite (12%), Easy (11%), and Difficult (35%)—are based on the dichotomous indicators for low owner occupancy and high mortgage debt per capita.

Control variable.

We also include a measure of the general economic situation with a variable for GDP per capita obtained from the World Bank (logged value, constant 2010 US dollars). Of course, there are many other macro-level factors which may be shaping both the housing context and fertility. We use this one measure in part because obtaining comparable data across countries over time is difficult and we wanted to use as many country-years of data as possible in our analyses. We note that our models are simple and serve as a starting point for comparative research on housing over time.

Methods

We employ multiple, but relatively simple, steps to identify the overall association between the housing context and fertility and any change over time in that association. For our first step, our repeated cross-sectional analysis, we estimated the relationship between each indicator of housing context and fertility using a separate OLS regression for each year and indicator with country as the unit of analysis. We plot these effect estimates on separate charts for each indicator to show how these associations change or do not change over time.

However, because much of this relationship may be due to country level characteristics that we cannot include in those models we then estimate pooled models with country-level fixed effects and a continuous control for year. Again, we do this separately for each housing indicator.

We refer to this second step as our pooled, fixed-effects analysis. We did explore models using dummy variables for each year and they reveal that a linear control for year is appropriate. Third, we add interaction terms between the measure of housing context and year to our pooled, fixed-effect models to assess whether the relationship varies over time.

All our models also include our control measure of GDP per capita.

Because Eastern European countries have historically had a very different housing context and are not always included in the existing literature we also estimated all of these relationships separately for Eastern and non-Eastern European countries.

In all analyses we use a two-year lag so that an indicator of housing context is related to fertility that occurs two years later (e.g. renter support in 1994 correlated with the period TFR in 1996). We do not use this lag to establish causality, but using data from the same year is problematic since the conceptions, and therefore any active decision making and behavior, for the births in that year would have occurred before the housing indicator. Our empirical aim is establishing the overall, macro-level association between this understudied dimension of context (housing) and fertility. When we discuss "effects" we are referring to effect estimates in our regression models, not to causal relationships.

In order to use as much of the available data as possible, the analysis sample depends on the specific indicator and analytic step.

Results

Total Fertility Rate

Renter support. We begin by considering the rental context as measured by the size of the rental market and government subsidies on rents. Figure 2, Panel a shows the results from the repeated cross-sectional analysis. We see here that countries with better conditions for renters

had higher fertility. The effect estimate has decreased over time, which is consistent with a weakening relationship, but it is unlikely these are statistically different estimates.

Table 2 then presents the results from the pooled models with Model 2 adding in the interaction term between housing context and year. Once we control for fixed, country-level characteristics and GDP, we do not see evidence of a relationship between the rental context and the period TFR. This is also clearly seen in Figure 3, Panel a where we graph predicted TFR by renter support for each year using Model 2.

Home-buyer support index. Turning to buying a home, in Figure 2, Panel b, we see that as expected countries with higher values of the index (e.g. less expensive housing, more and lower cost mortgages) had higher fertility. However, we see a different story when we control for country-specific characteristics in the pooled models. Table 2, Model 4 shows a large positive regression coefficient for the home-buyer support index and a negative coefficient for the interaction with year. We can see this interaction by looking at the predicted TFRs in Figure 3, Panel b. Here we see that early in the study period (1996 to the early 2000s) the TFR was higher in countries where it was easier to buy a home, but that relationship flipped in more recent years. However, none of these differences are statistically significant. Note, we also explored measures that do not include housing prices and only include the measures of mortgage debt per capita and interest rates. The results are substantively the same, although in the measure that excludes housing prices the differences seen in Figure 3, panel b are statistically significant in the earliest years.

(Figure 2, about here)

(Table 2, about here)

(Figure 3, about here)

Lender/seller support index. Next, we use our measure that captures housing from the perspective of landlords, home sellers, and bankers. Figure 2, Panel c shows the repeated cross-sections where we again see evidence of a positive relationship with TFR. Countries where it is less risky and easier for lenders, landlords, and home sellers had higher fertility. Models 5 and 6 in Table 2 reveal that once we have accounted for country effects this positive relationship still holds. Figure 3, Panel c shows the linear predictions and we see that countries with greater supports for lenders and sellers (e.g. more information is available on potential lenders or renters, and a more efficient bureaucracy that may facilitate mortgage foreclosures or evictions) had higher TFRs than those with a less supportive environment. This effect has been weakening over time.

Combined index. Next we turn to the measure which combines renter, home-buyer, and lender/seller support into one index. As expected, we continue to see a positive relationship between housing and TFR in the cross sectional analysis (Figure 2, Panel d). However, once we control for country-specific characteristics there are no significant differences in fertility by levels on the combined index (Table 2, Models 7 and 8; Figure 3, Panel e). We also estimated models where we included the three separate indexes as different variables and only the lender/seller support index was statistically significant.

Homeownership regimes. Career, elite, easy, difficult. Finally, we consider the composite measure of homeownership regimes identified by Mulder and Billari (2010).

Figure 2, Panel e shows the results from the repeated cross-sectional analyses with the Elite regime as the comparison group. We see that, in most years, countries in the Career and Easy regimes had significantly lower fertility than those in the Elite regime. Fertility in the Elite and Difficult regimes was not statistically different. Other analyses reveal that the Career regime

also had significantly higher fertility than the Difficult and Elite regimes and that the Career and Easy regimes were never different from each other. We note that the findings regarding Career vs Difficult regime are similar to what Mulder and Billari themselves found when they looked at data for 2004, but they did not find a significant relationship between the Elite and Career regimes.

In Table 3 we show results from the pooled models that include country-level fixed effects and a control for GDP. Models 1 and 2 use the Easy and Difficult regimes as the reference category respectively. Models 3 and 4 add in the interaction term with year. This table shows clear significant differences in fertility by homeownership regime when interacted with year. Figure 3, Panel e shows the predicted TFR based on Model 3 for all four regimes. Again we see that the Elite and Difficult regimes are quite similar to one another. Being in the Easy regime was associated with the highest TFR in the mid- to late-1990s, but by 2002 it was not statistically different from the Difficult regime. By the end of the data analysis period (2016) being in the Elite regime was associated with significantly higher TFR. The TFR for countries in the Career regime was never statistically different from those in the Easy or Difficult regimes (the direction of the relationships was consistent with other analyses) but is significantly lower than the Elite regimes by 2012.

(Table 3, about here)

Eastern vs non-Eastern European Countries

Next we look separately at the relationship between the housing context and fertility for Eastern and non-Eastern European countries. We are not able to conduct this regional analysis for the homeownership regimes identified by Mulder and Billari (2010) because virtually all Eastern European country-years are in either the Elite or Difficult regime. We focus our

discussion on the results from the pooled, fixed-effects models shown in Table 4.

(Table 4, about here)

Renters support. Table 4, Models 1 and 2 show that while renting context was not related to fertility for all countries, it was significantly related to fertility for non-Eastern European countries, but in the opposite direction as expected. This is also seen in the predicted TFRs shown in Figure 4, panel a. Among non-Eastern European countries, those with more support for renters had lower fertility in the 1980s and 1990s. By 2007 the relationship had flipped to be in line with our expectations so that those with more support for renters had higher fertility, although those differences are not statistically significant. For Eastern European countries more support for renters has always been associated a higher TFR, but these differences were never statistically significant.

Home-buyer support index. The relationship between the home-buyer support index and TFR is no longer statistically significant when we look separately at Eastern and non-Eastern European countries (Table 4, Models 3 and 4; Figure 4, Panel b).

(Figure 4, about here)

(Table 4, about here)

Lender/seller support index. Models 5 and 6 show the relationship between the lender/seller support index and TFR, with the predicted TFRs shown in Figure 4, Panel c. For both Eastern and non-Eastern European countries lender/seller support was positively related to fertility such that country-years with more supportive environments had higher TFRs. However, this relationship has weakened over time such that there was no statistically significant difference in fertility for non-Eastern European countries by 2015 and 2016 for Eastern European countries.

Combined index. Looking at the combined housing index we also see a significant difference in TFR by housing support (Table 4, Models 7 and 8; Figure 4, Panel d). Up until 2012 non-Eastern European countries with higher housing support had higher fertility. On the other hand, starting in 2012 we see that Eastern European countries with more housing supports have higher TFRs.

In summary, overall we see a changing relationship between the housing context and fertility, as measured by the period TFR, and one that differs for Eastern and non-Eastern European countries. For Eastern European countries, we find strong evidence of a correlation between the combined indicator of housing support and fertility likely driven by the support for lenders and sellers. On the other hand, for non-Eastern European countries there is some evidence that renter supports may become significantly related to the fertility in the future (assuming current trends continue), but generally there appears to be a weakening relationship between housing support and TFR.

Mean age at first birth

We now turn to the mean age at first birth as our indicator of fertility. Looking at the cross-sectional results we see that the lender/seller support index has the expected relationship—countries with a higher lender/seller support index had earlier (i.e. lower) mean age at first birth (Figure 5, Panel c). However, the other measures were not significantly related to first birth timing. For the Mulder and Billari (2010) homeownership regimes countries in the Elite regime had higher fertility than those in the other three regimes in the last few years of analysis (Figure 5, panel e).

(Figure 5, about here)

Turning to the pooled, fixed-effects models we see that across all measures (including the

combined index) more supportive housing contexts are associated with later childbearing early in the study period, but earlier childbearing in more recent years (Table 5 and Figure 6). These relationships switch around 2006 for all measures of housing support.

(Table 5, about here)

(Figure 6, about here)

For the Mulder and Billari (2010) home ownership regimes (Table 6, Figure 6 Panel e) we see that early in the study period Career homeownership was associated with earlier childbearing than in the Easy or Difficult regimes. By the end of the period (starting in about 2013) countries in the Difficult regime had later childbearing than those in the Career regime, but there were no other significant differences across groups.

(Table 6, about here)

Eastern European vs non-Eastern European countries

Regression results for the separate Eastern and non-Eastern European samples are shown in Table 7 with predicted values in Figure 7. The regression results imply that the results are driven by the non-Eastern European countries. In recent years, since about 2010, more support for renters and home-buyers was associated with significantly earlier childbearing for non-Eastern European countries. The differences in mean age at childbearing by support for lenders and sellers were not statistically significant, but do follow the same pattern. There is no difference in the mean age at first birth for Eastern European countries for any measures of housing context.

(Table 7, about here)

(Figure 7, about here)

Summarizing these results, across all domains of housing we see a changing relationship

such that early in the observation period greater support was associated with later transition to parenthood, but that in more recent years the relationship has reversed to be as predicted by our theoretical framework. In particular, we see that there is an increasing effect of the housing context on the timing of first births for non-Eastern European countries. Countries with higher scores for renter and home-buyer support have had younger mean ages at first birth since about 2011.

Conclusion

Housing as a social institution is a theoretically important but understudied component of the relationship between social context and fertility in low fertility settings. The existing literature regularly calls for additional research on the macro-level relationship between housing and fertility. This paper is in response to those requests. We build on a well thought out conceptualization of housing (Mulder and Billari 2010) that incorporates factors related to both renting and home ownership and expand it in four important ways. First, we include a third dimension, lender and seller supports. Second, we add additional countries, notably Central and Eastern European countries that constitute a large proportion of low fertility countries today. Third, we examine these relationships over time to provide information on the changing relationship between housing and fertility at the macro level. Fourth, we examine the relationship between housing and both the quantum (TFR) and timing (mean age at first birth) of fertility.

Our results support the theoretical frameworks that point to housing as a potentially import factor, particularly as it relates to the timing of childbearing. However, these relationships have not been constant over time nor are they the same across regions. For example, although we initially found evidence that more support for lenders and sellers was related to higher fertility, once we look at Eastern and non-Eastern European countries separately we see that a

convergence across these groups makes the predicted TFRs statistically indistinguishable from one another in recent years.

Our results point to changing ideas and behaviors connecting home ownership and childbearing. This may be because owning a home was considered a necessary precondition for having children, but that social norm has changed or weakened over time meaning young people may be more willing to start and grow their families while living in rental units. It may be that having an independent space rather than owning a home has become the important aspect of housing. This change in norms would be in line with our findings that early in the observation period fertility was higher in countries with low support for renters and with more support for lenders and sellers. It may also be that secular changes in the housing market and recent housing crises have simply made homeownership prohibitively expensive to young people and when faced with the choice they elect to have children in conditions that are different from their ideals.

For Eastern European countries, we see that support for lenders and sellers, the new dimension of the housing context we introduce, and the combined measure of housing context are associated with significantly higher predicted TFRs. We find no significant relationship between housing and the timing of the first birth, but this may be largely because childbearing is already relatively early throughout much of this region. The more holistic measure of housing context may be more appropriate for the Eastern European context given the complex and changing relationship between housing and government policy.

This paper focuses on between country rather than within-country differences and there may be components of the housing context relevant to individuals that vary within countries (Kulu, Boyle, and Andersson 2009). We make this choice for several reasons. First, there are numerous dimensions of the housing context that are constant within a country but vary across

countries and have a profound influence on the ability of young adults to obtain their own dwelling unit. Second, focusing on country-level differences reduces the contaminating effects of migration. Consider the price of housing. Within any country there are substantial differences across local housing markets and we expect that these within-country differences are important with respect to fertility. But migration to places within a country where the housing situation is more favorable to young adults makes it exceedingly difficult to examine within-country housing effects on fertility. Migration to obtain a dwelling unit might also be a motivation for cross-country migration, but it is likely a magnitude smaller than within country migration. Finally, the housing crisis in the U.S. provides an additional motivation for examining country-level associations. While the degree to which housing prices changed during the most recent housing crisis in the U.S. varied across local housing markets, it was certainly a country-wide phenomenon.

Of course, this research is not without its limitations. Most obviously, it is a simple analysis at the macro level with only one control measure and the measures may not always be perfectly comparable across country-years. As such, this study may raise more questions than it answers. Why have these associations changed over time? Are they due to changes in norms and expectations and changes in other institutions such as education and the labor market? Do these dimensions of the housing context matter independently of other institutional factors or in combination with them? Perhaps the true impact of housing depends on economic job security. This may explain our counter-intuitive findings of a negative relationship between the housing context and fertility early in the study period. And, of course, what do these macro-level conditions mean to individuals and how is their behavior shaped by them?

We are not able to investigate mechanisms or even the direction of the causal effect. We

do use a 2-year lag between our measures of the housing context and fertility to lessen the potential for reverse causality, but we cannot come close to establishing a causal relationship. Future research, likely including extensive data collection and harmonization, is necessary to shed light on these pieces of the relationship.

The dimensions of the housing context and the measures we use here are not exhaustive nor are they always the ideal operationalization. We use these measures because they allow us to include the most number of country-years. Other measures, for instance the loan-to-value ratio, are key components of the housing context (a low interest rate may not be so attractive if you are still required to put a large percentage of the housing price as a down payment (Chiuri and Jappelli 2003)). Unfortunately, our data sources for the loan-to-value and other measures had minimal country-year overlap with the other measures used in the home-buyer support index. Similarly, the actual length of mortgage foreclosure and time to eviction may be better measures than our global measure of judicial efficiency, which could simply be reflecting something about court and legal systems that do not influence housing at all. Other important factors we were not able to incorporate into our analyses include housing costs relative to income, the cost of rental units, the size of housing units, and the conditions of housing (Di and Liu 2006; Flynn 2013; Simon and Tamura 2009). There are undoubtable many other dimensions of housing that are relevant for fertility decisions. The goal of this research is open a door into empirical investigations of this topic.

Finally, although this study expands our understanding of the housing-fertility relationship by including Central and Eastern European countries, we were not able to include any Asian countries in our analyses. Low and delayed fertility is also a major concern in many Asian countries as are general housing concerns (Fukuda 2009). Although independent living of

young people was historically less common in Asian than in Western Europe, young couples are living away from their parents in increasing proportions and housing has been identified as a potential important barrier to family formation (Fukuda 2009; Lee and Choi 2015). About one-third of young people in Japan are living alone and 70-80% of young couples are living in households without their parents (Fukuda 2009). Additionally, the structure of the housing market is extremely burdensome to young people requiring a large down payment even for rentals that can equal 6 months of rent (Fukuda 2009; Lee and Choi 2015). Understanding how the housing-fertility relationship operates in low-fertility Asian countries and how that relationship is or is not different from what we see elsewhere is crucial.

Despite these limitations, the analyses presented here provide an important base for understanding the relationship between the institution of housing and fertility. Which dimension of housing matters for fertility depends on the country region, likely reflecting long histories of different housing and banking systems, and on the specific measure of fertility. Additional research, particularly that which can shed light on young peoples' housing expectations and requirements as related to family formation and growth, can build off these findings.

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Figure 1. Fertility over time, 1962-2016

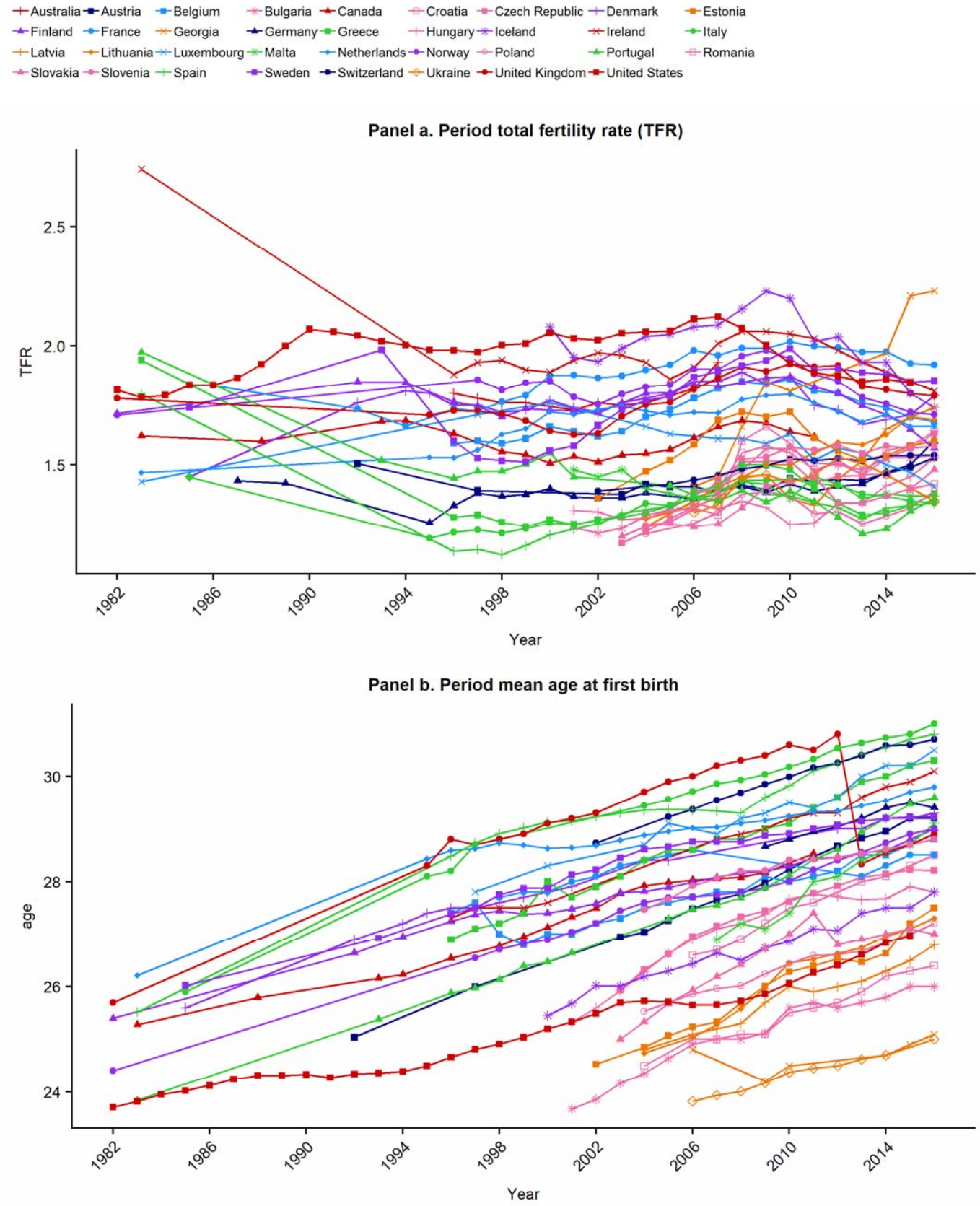
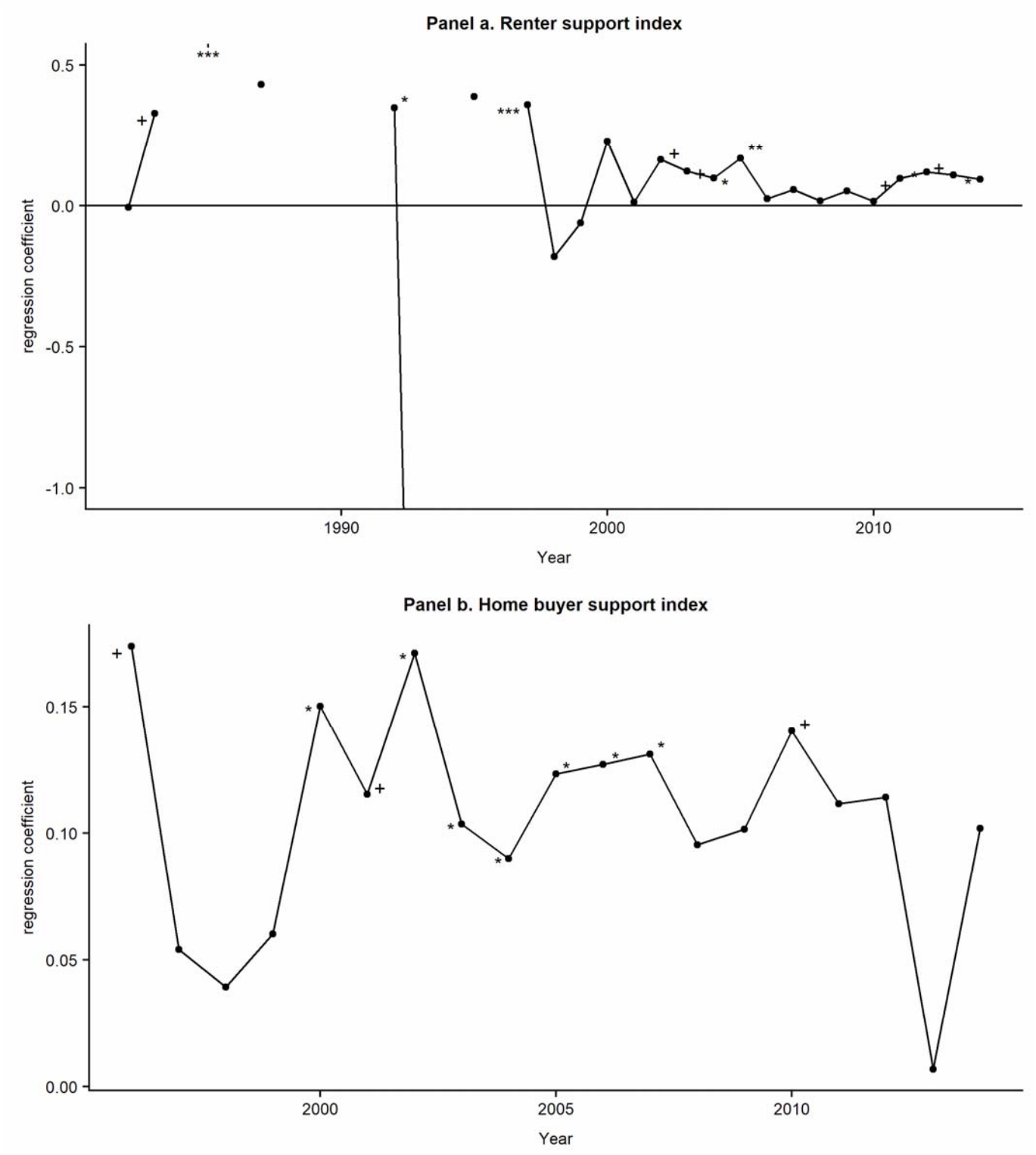
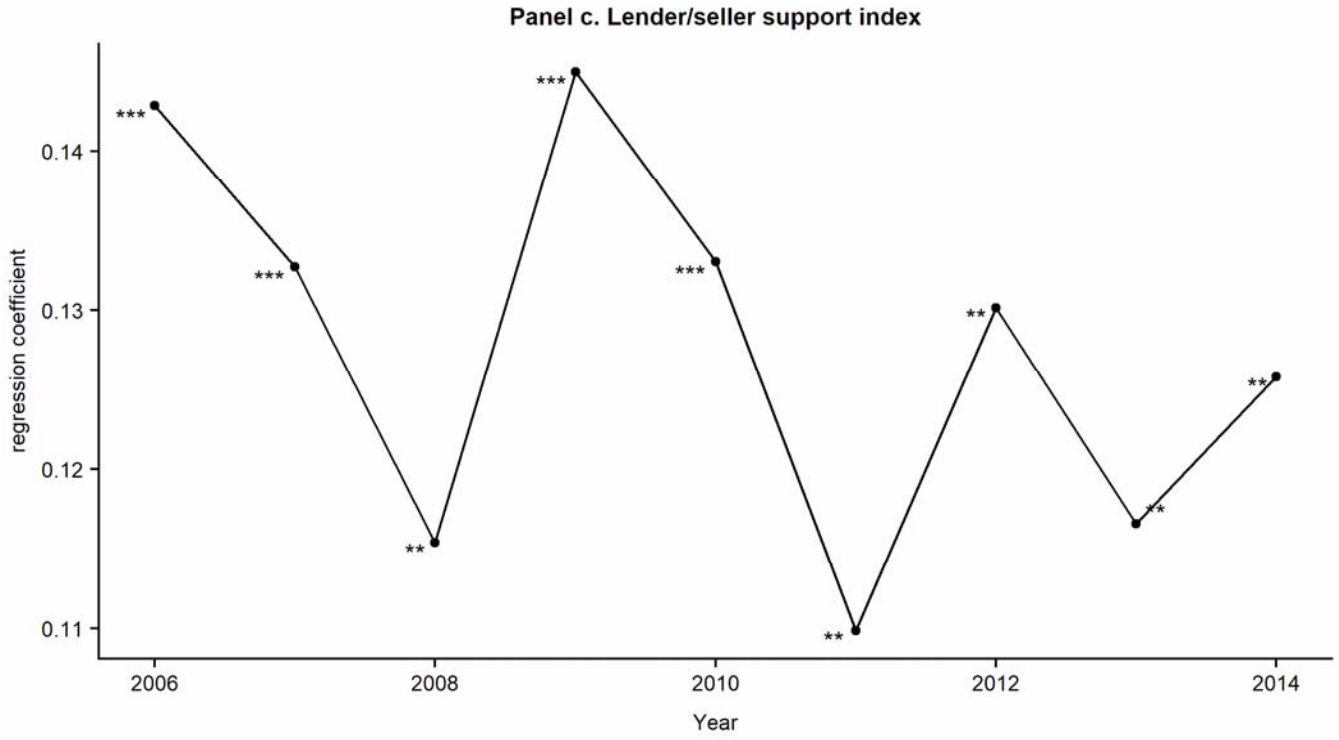
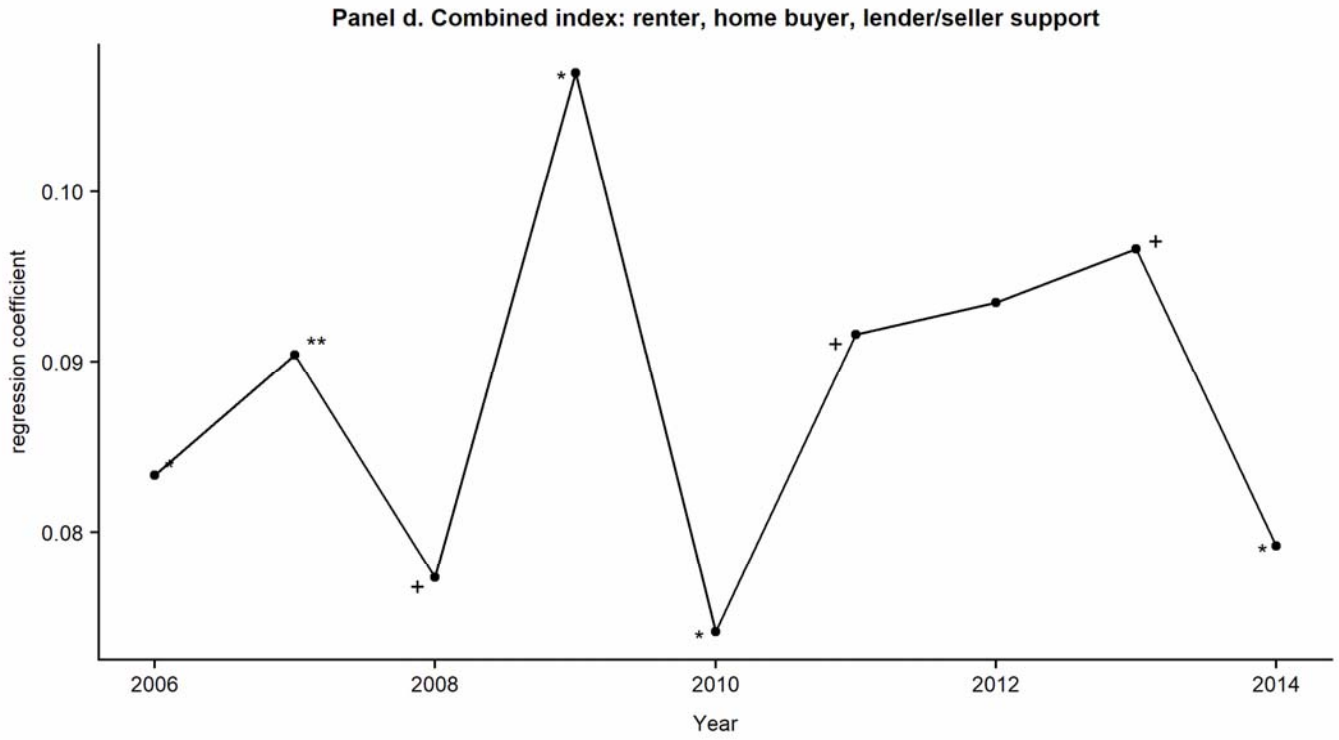


Figure 2. Housing context indicators and period TFR. Regression coefficients from repeated cross-sectional analysis controlling for logged GDP per capita. Two year lag between housing and fertility variables.




Panel c. Lender/seller support index
regression coefficient
0.14
0.13
0.12
0.11
2006
2008
2010
2012
2014
Year


Panel d. Combined index: renter, home buyer, lender/seller support
regression coefficient
0.10
0.09
0.08
2006
2008
2010
2012
2014
Year

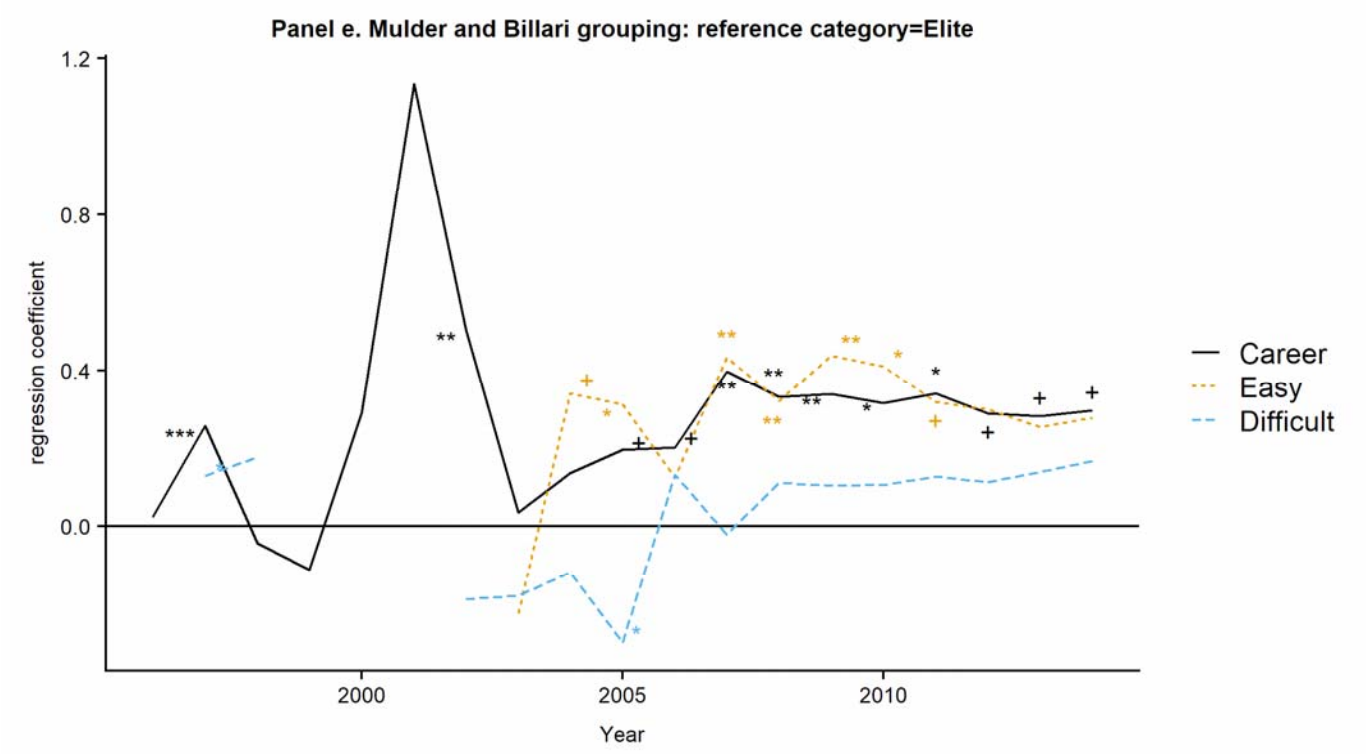
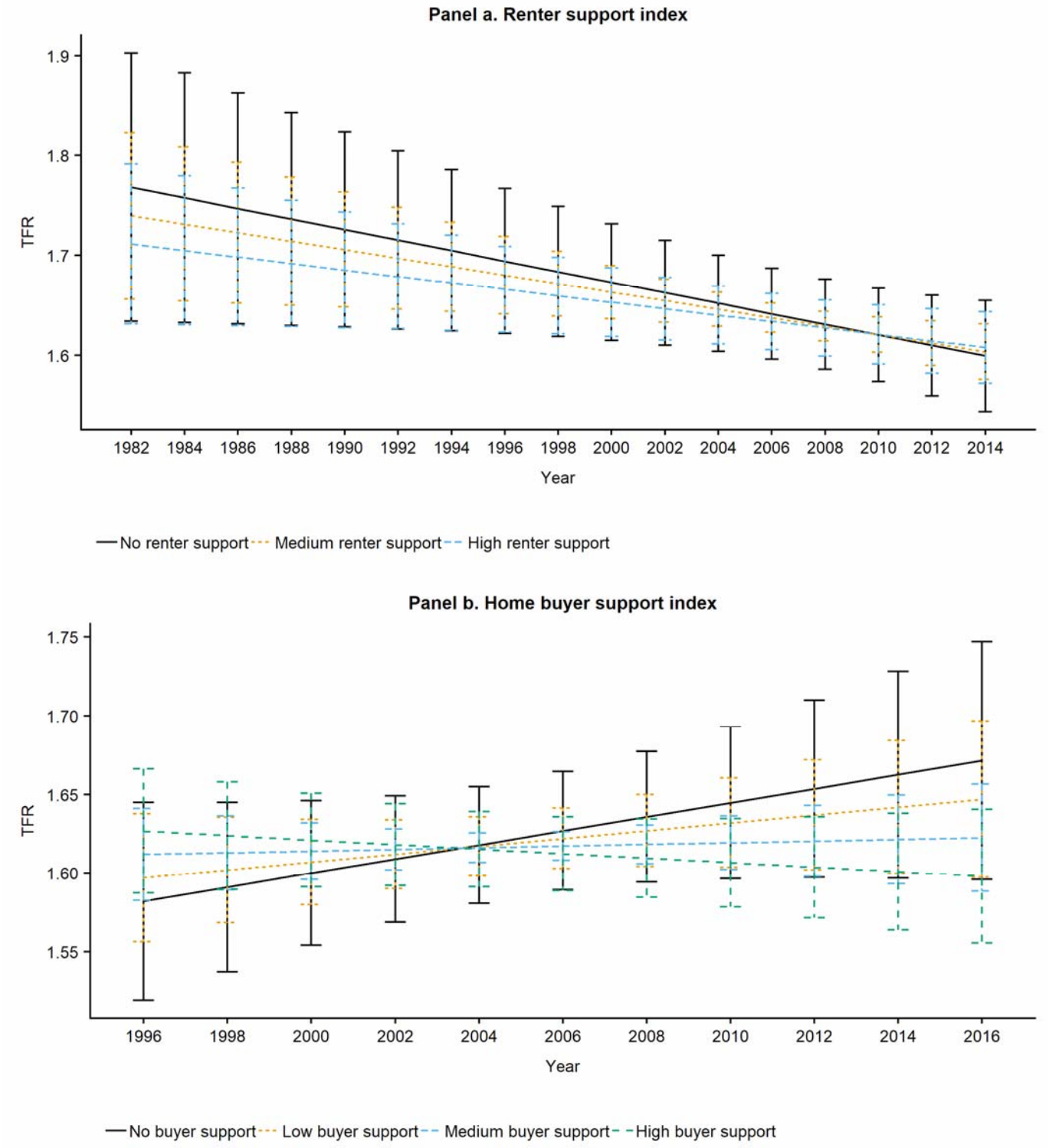
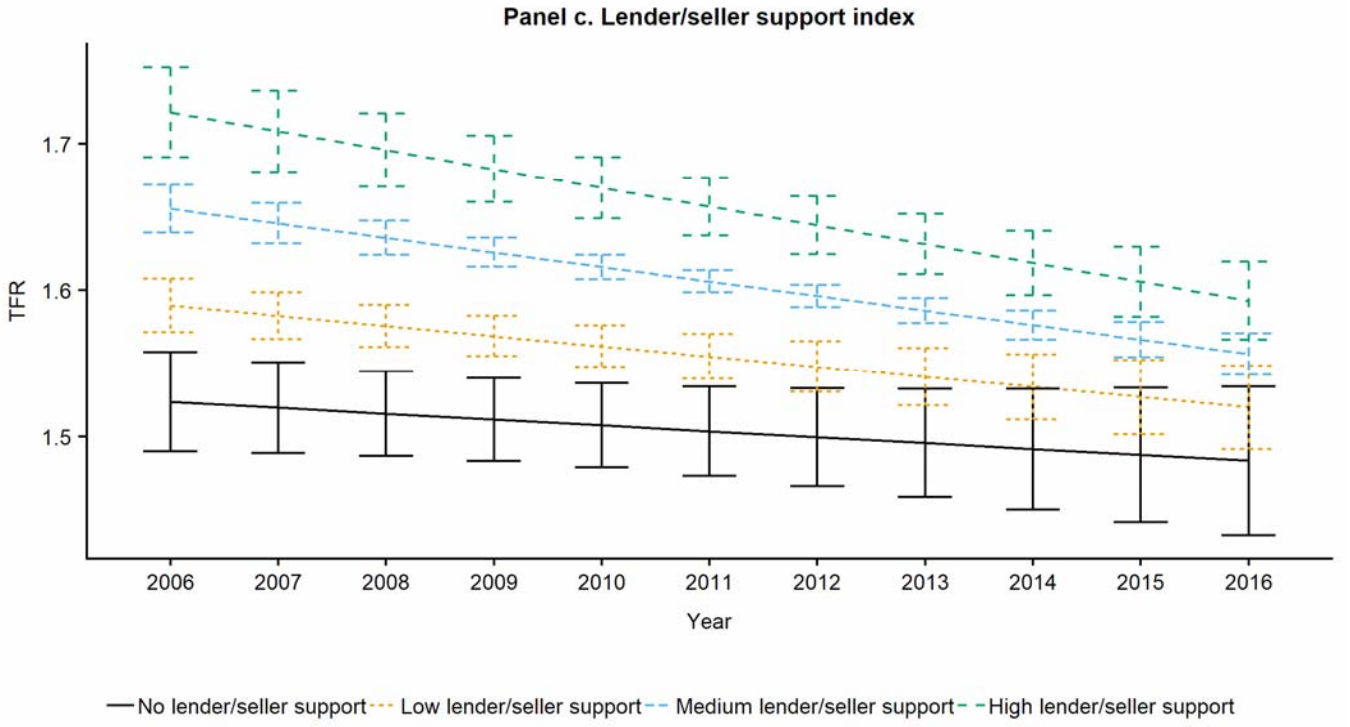
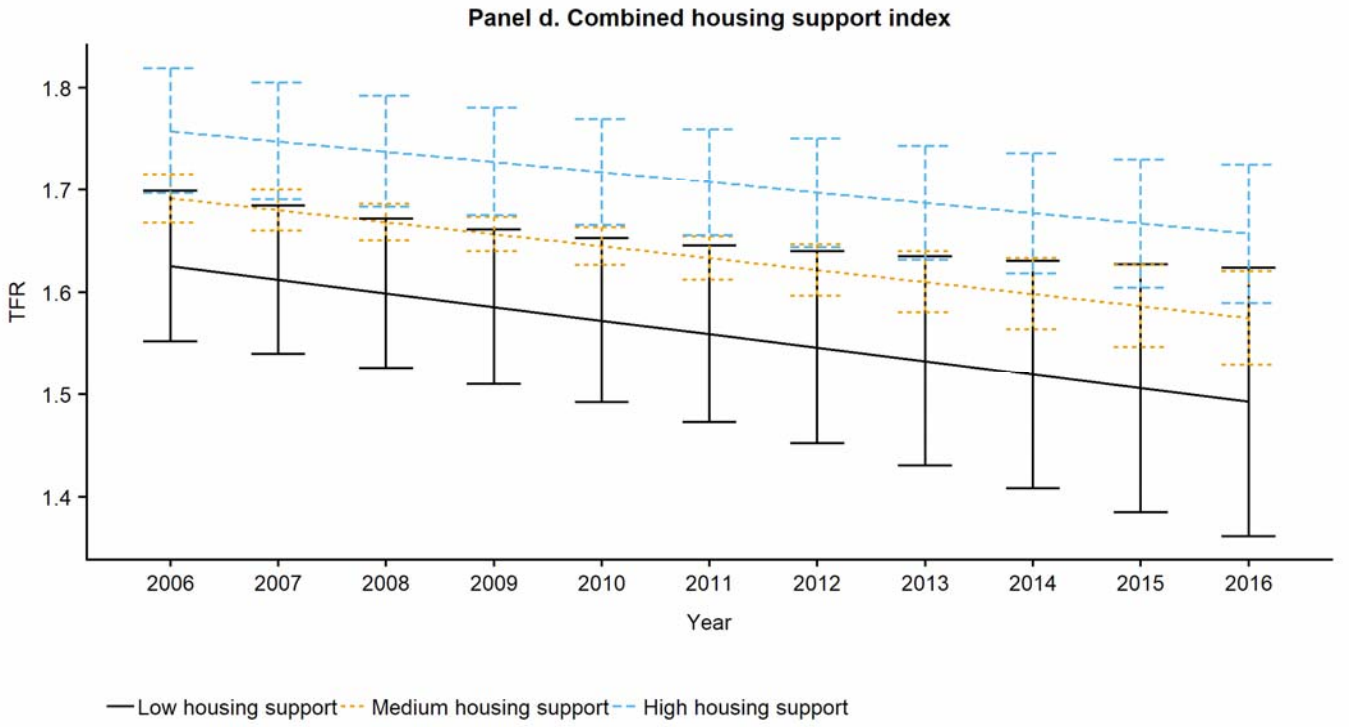

Panel e. Mulder and Billari grouping: reference category=Elite
regression coefficient
1.2
0.8
0.4
0.0
2000
2005
2010
Year
Career
Easy
Difficult

Figure 3. Linear predictions, period Total Fertility Rate (TFR) by housing context indicators over time.




Panel c. Lender/seller support index
TFR
1.7
1.6
1.5
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
Year
No lender/seller support
Low lender/seller support
Medium lender/seller support
High lender/seller support


Panel d. Combined housing support index
TFR
1.8
1.7
1.6
1.5
1.4
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
Year
Low housing support
Medium housing support
High housing support

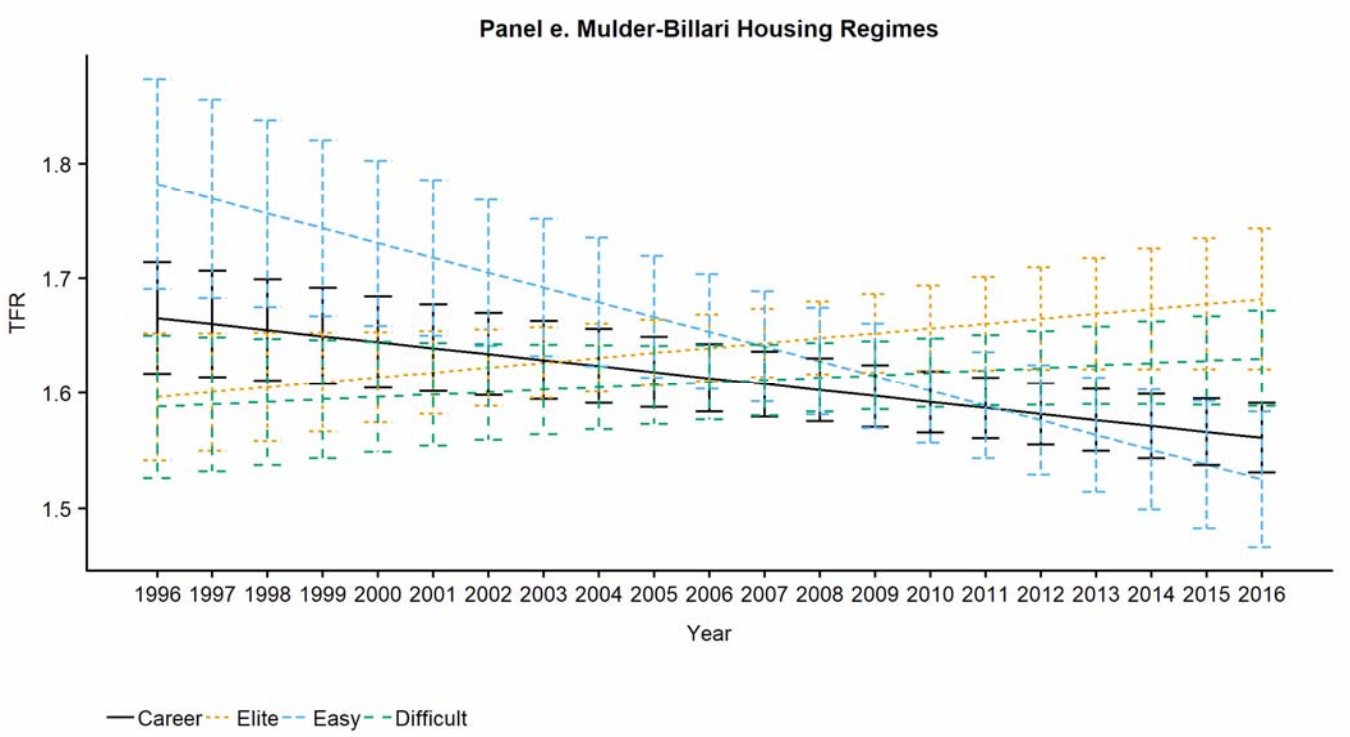
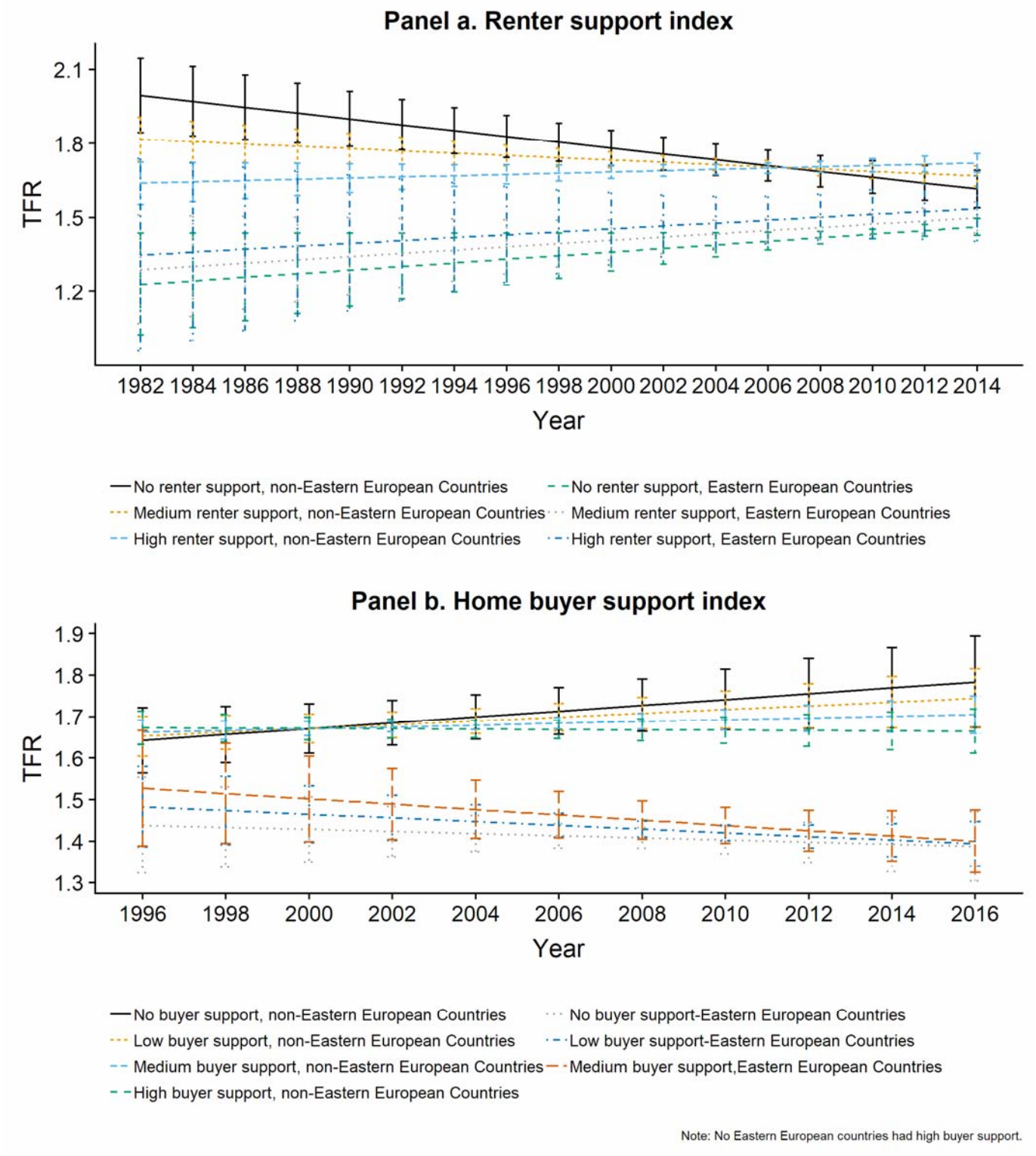
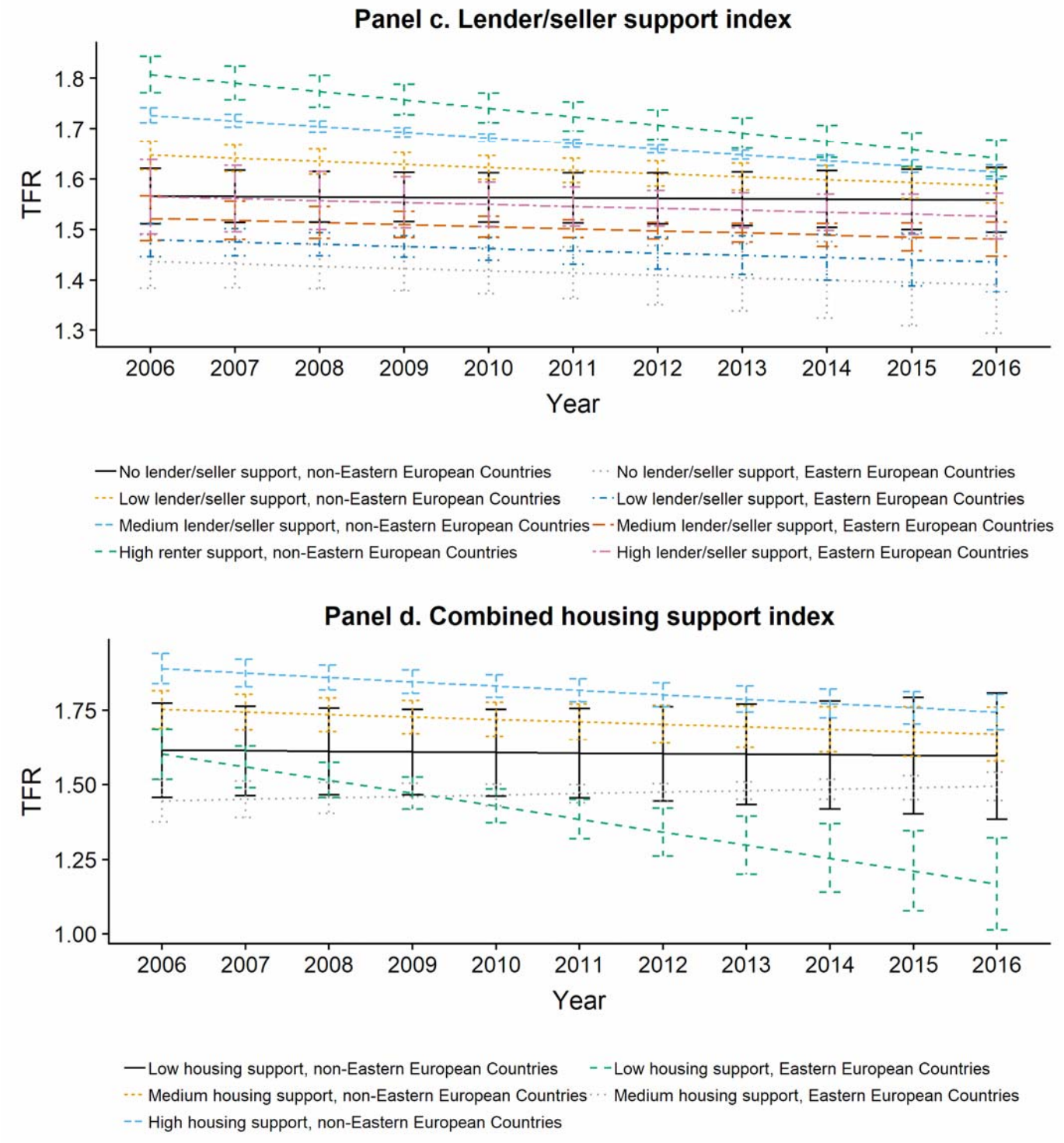

Panel e. Mulder-Billari Housing Regimes
TFR
1.8
1.7
1.6
1.5
1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Year
Career
Elite
Easy
Difficult

Figure 4. Linear predictions, period Total Fertility Rate (TFR) by housing context indicators over time by region (Eastern European vs non-Eastern European).

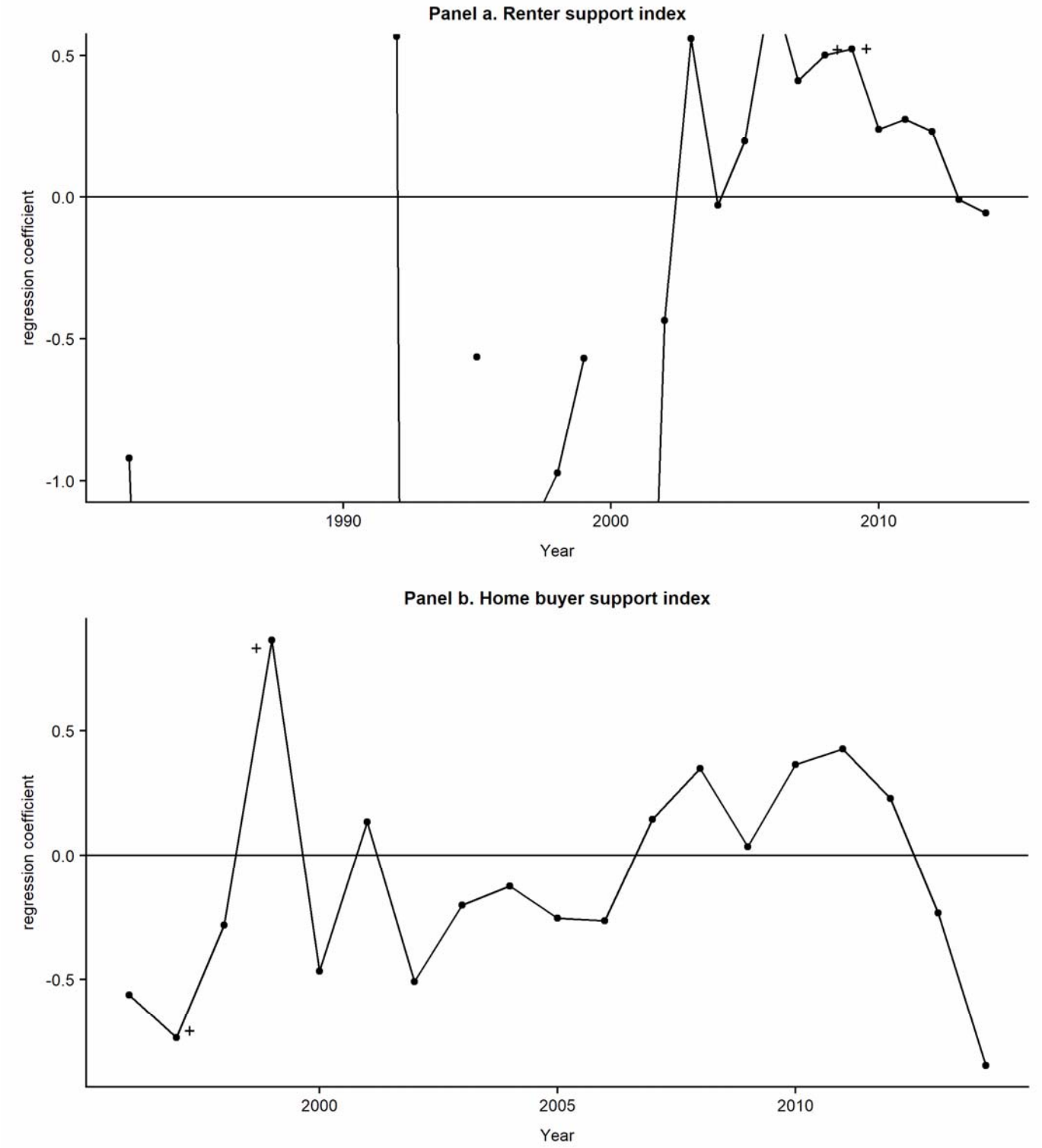


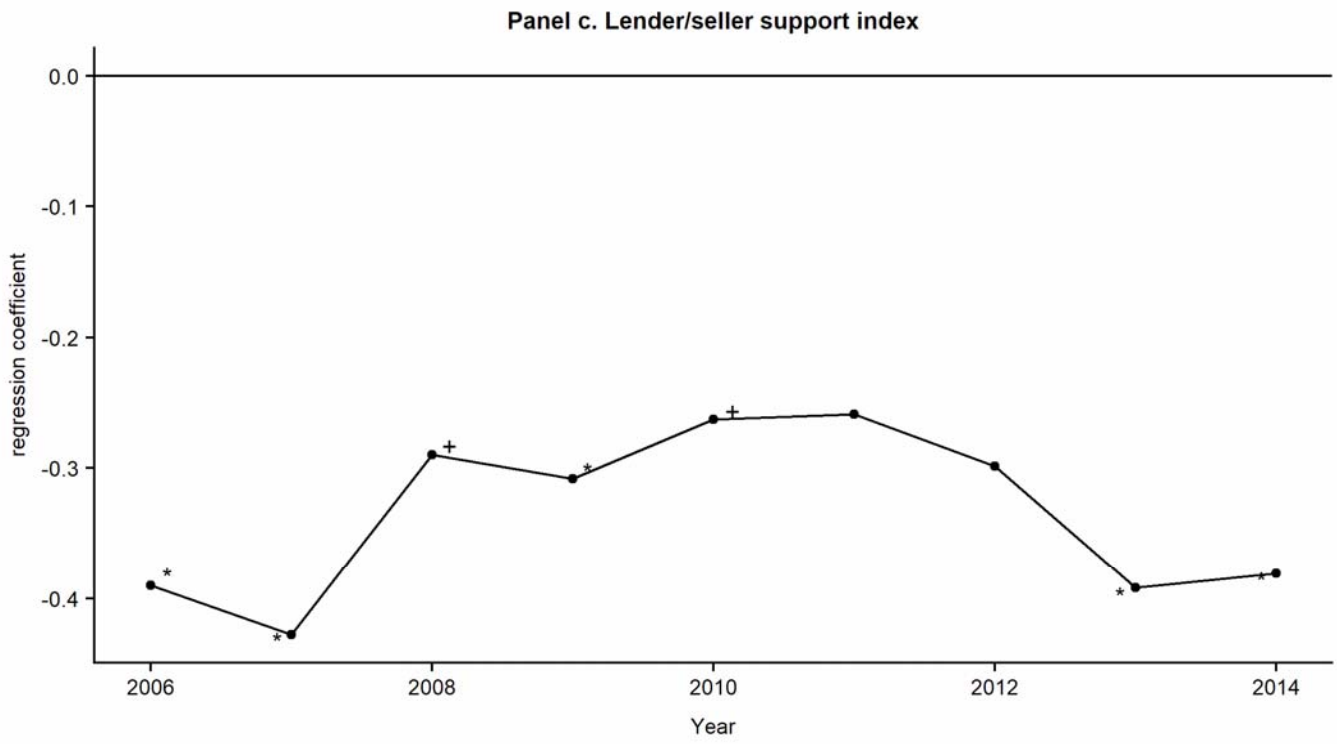
Note: No Eastern European countries had high buyer support.

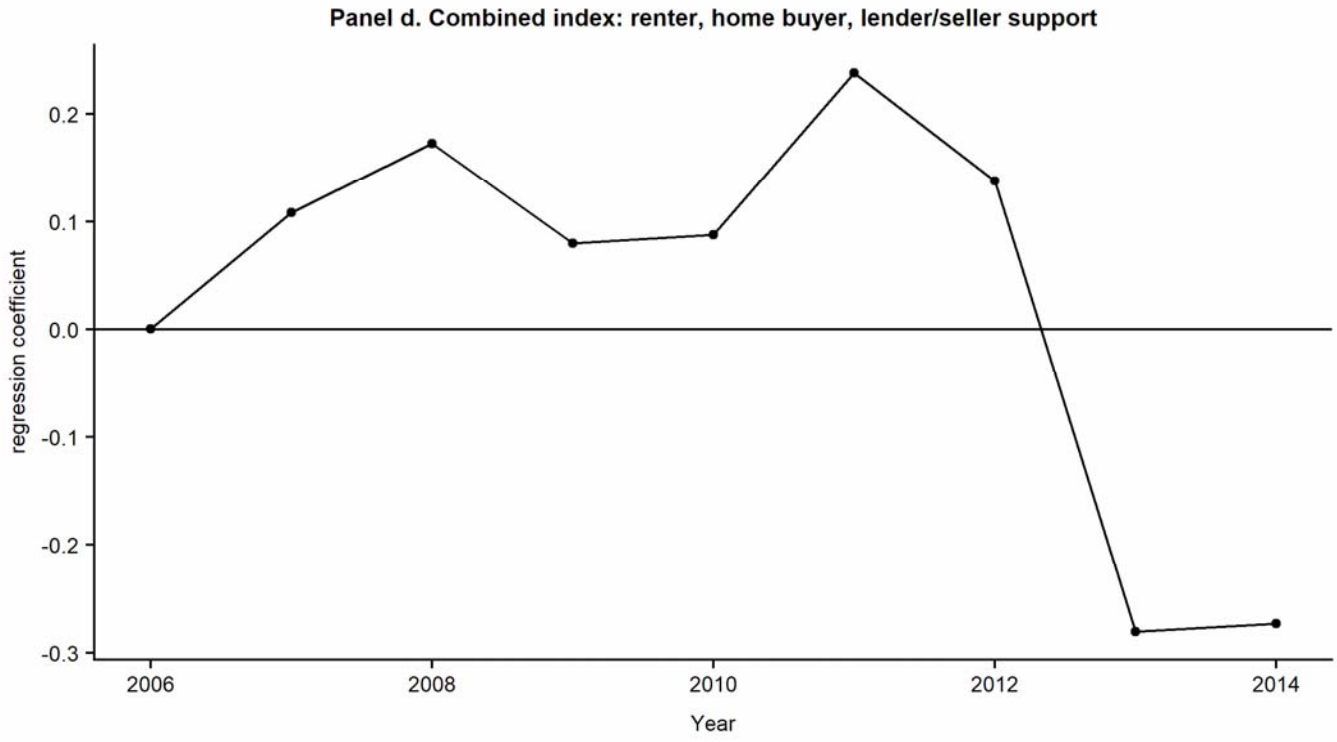


Note: only 1 Eastern European country-year had a value greater than 4 (the medium value shown here).

Figure 5. Housing context indicators and mean age at first birth. Regression coefficients from repeated cross-sectional analysis controlling for logged GDP per capita. Two year lag between housing and fertility variables.




Panel c. Lender/seller support index
0.0
-0.1
-0.2
-0.3
-0.4
regression coefficient
2006
2008
2010
2012
2014
Year


Panel d. Combined index: renter, home buyer, lender/seller support
0.2
0.1
0.0
-0.1
-0.2
-0.3
regression coefficient
2006
2008
2010
2012
2014
Year

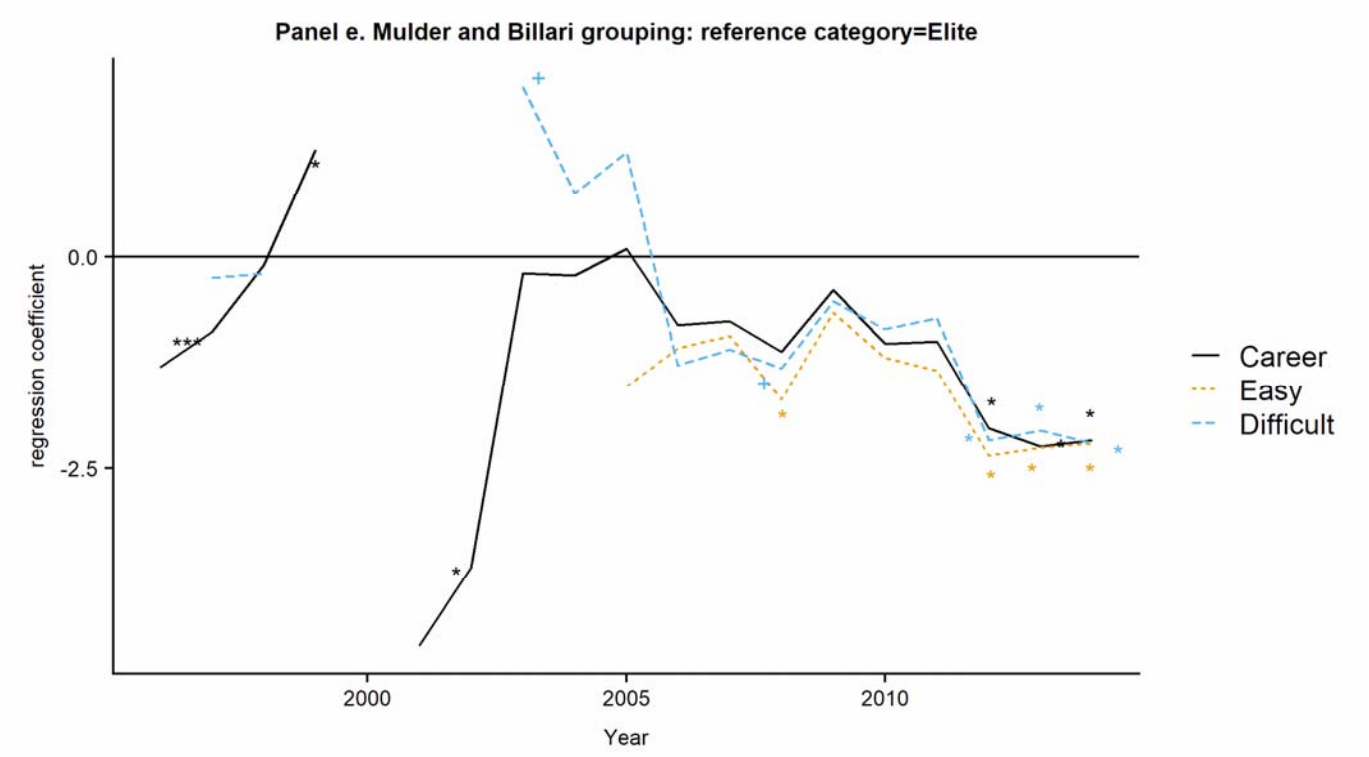
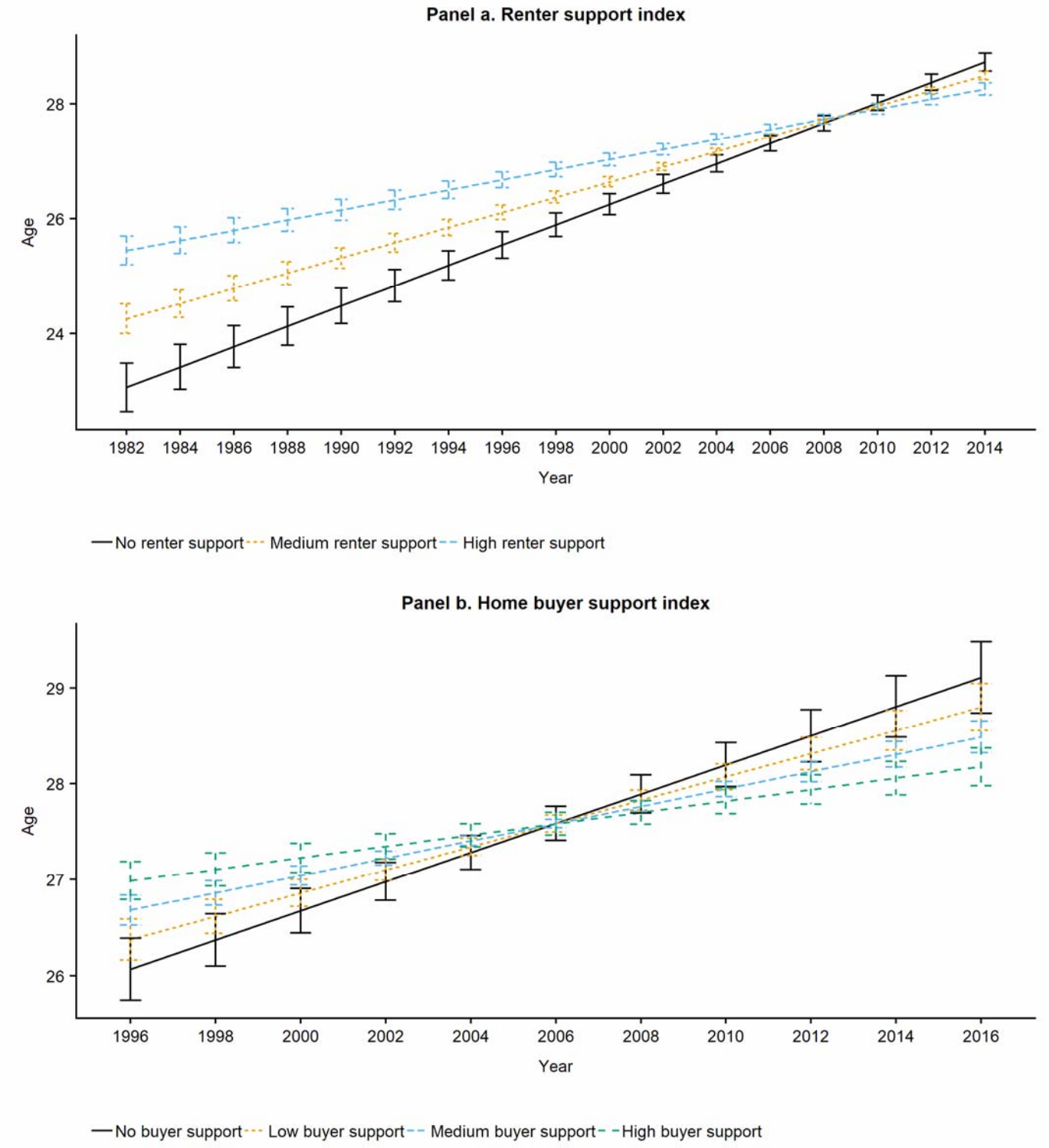
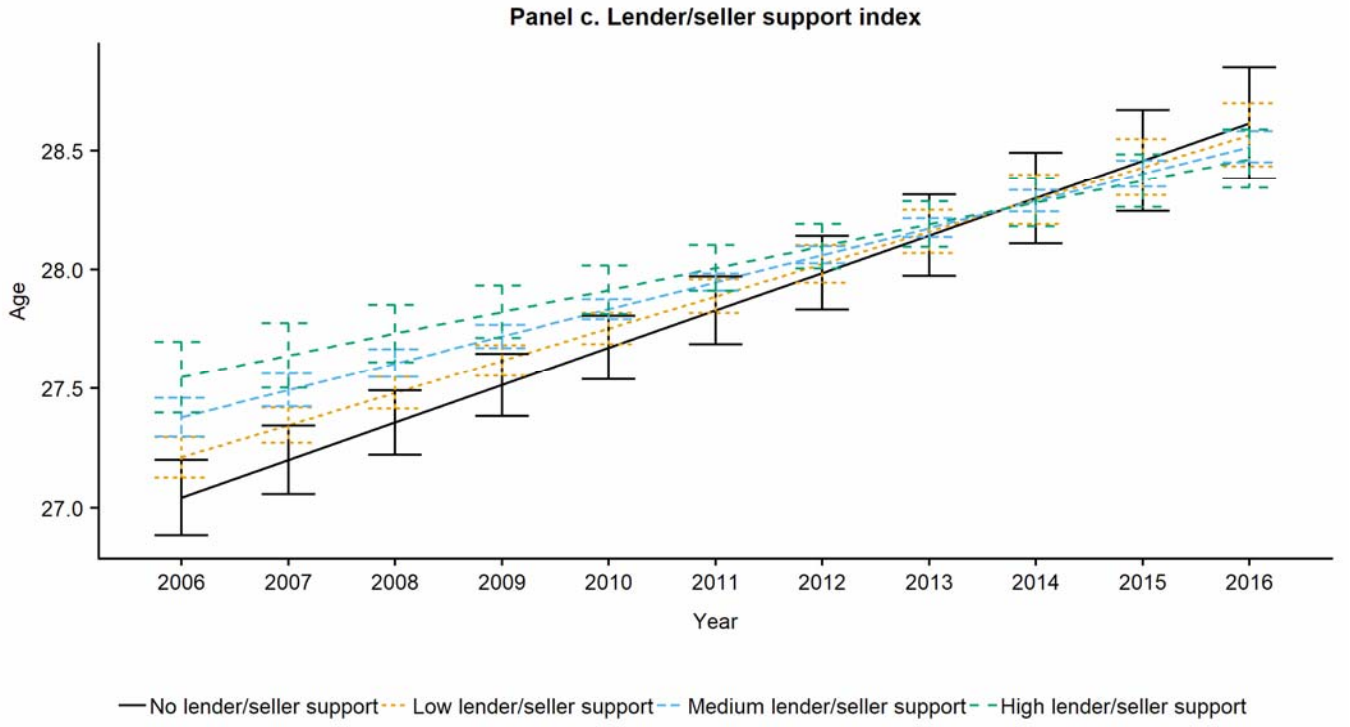
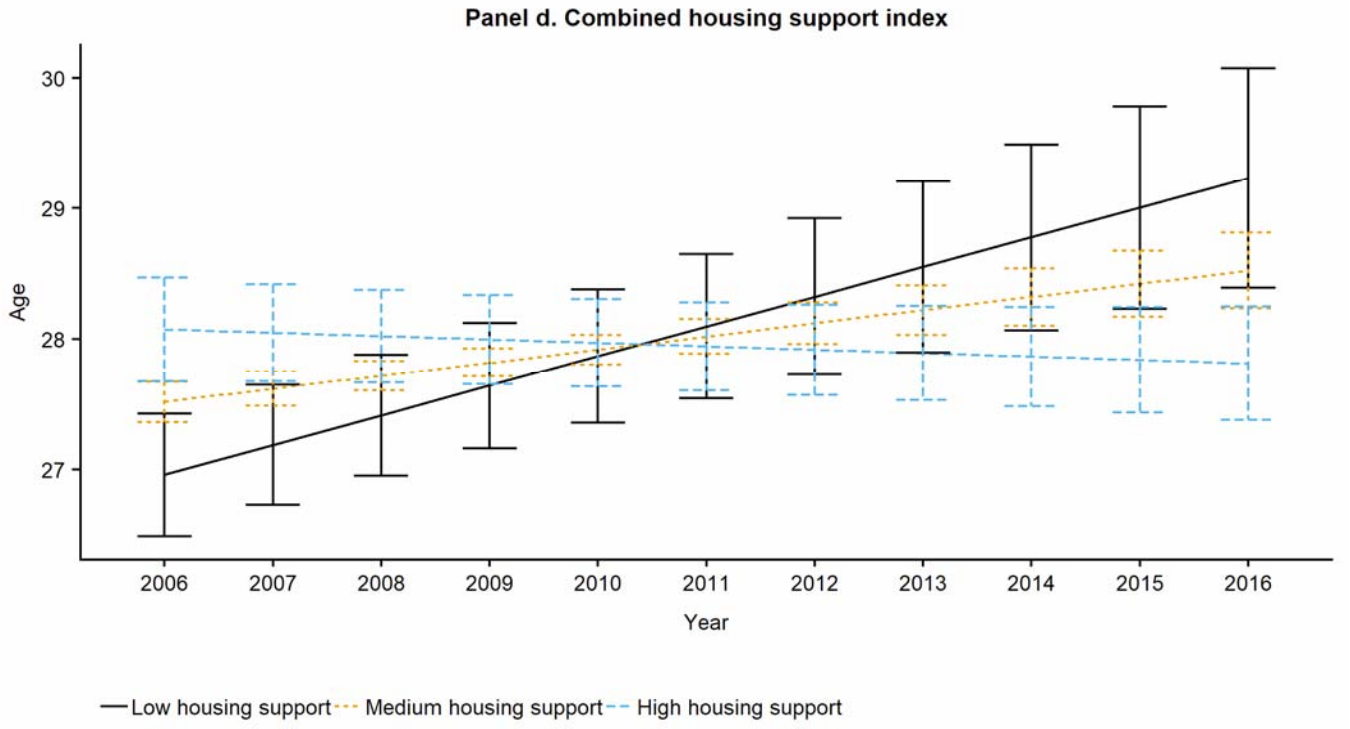

Panel e. Mulder and Billari grouping: reference category=Elite
regression coefficient
0.0
-2.5
2000
2005
2010
Year
Career
Easy
Difficult

Figure 6. Linear predictions, period mean age at first birth by housing context indicators over time.




Panel c. Lender/seller support index
Age
28.5
28.0
27.5
27.0
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
Year
No lender/seller support
Low lender/seller support
Medium lender/seller support
High lender/seller support


Panel d. Combined housing support index
Age
30
29
28
27
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
Year
Low housing support
Medium housing support
High housing support

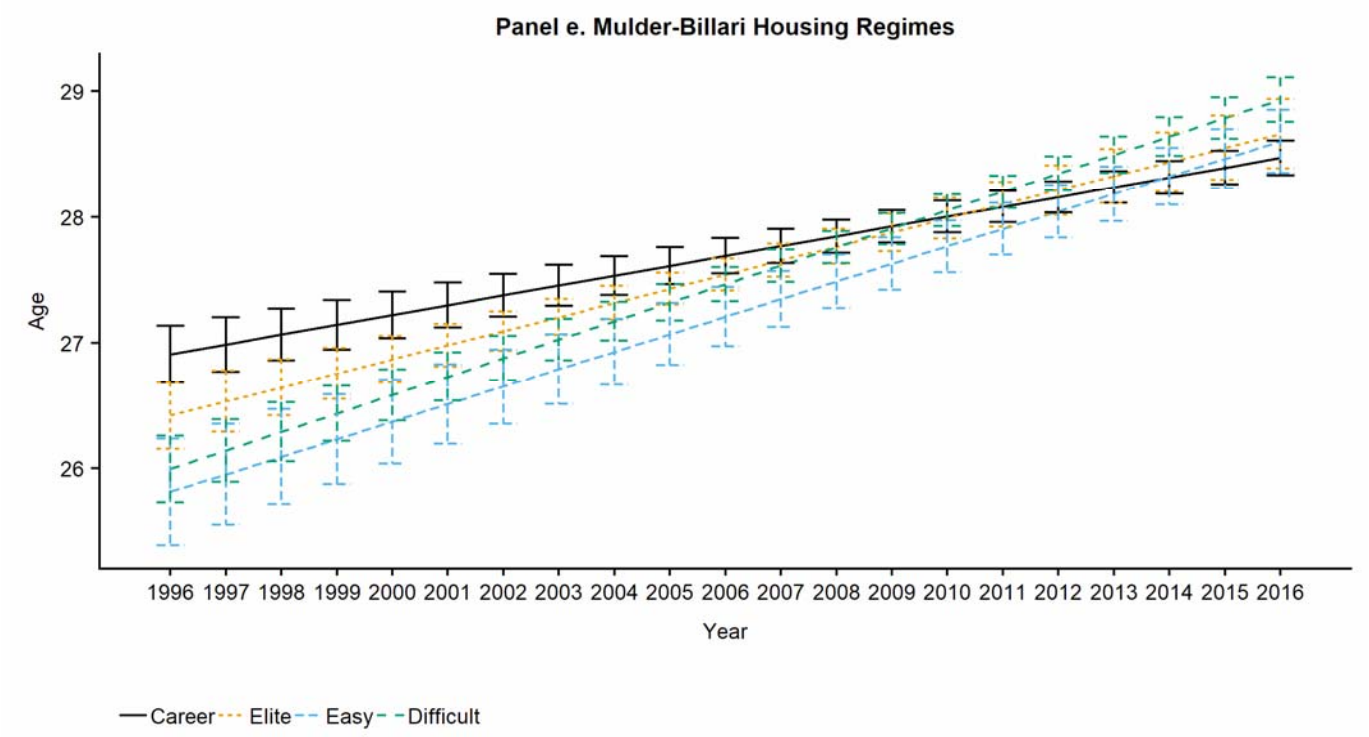
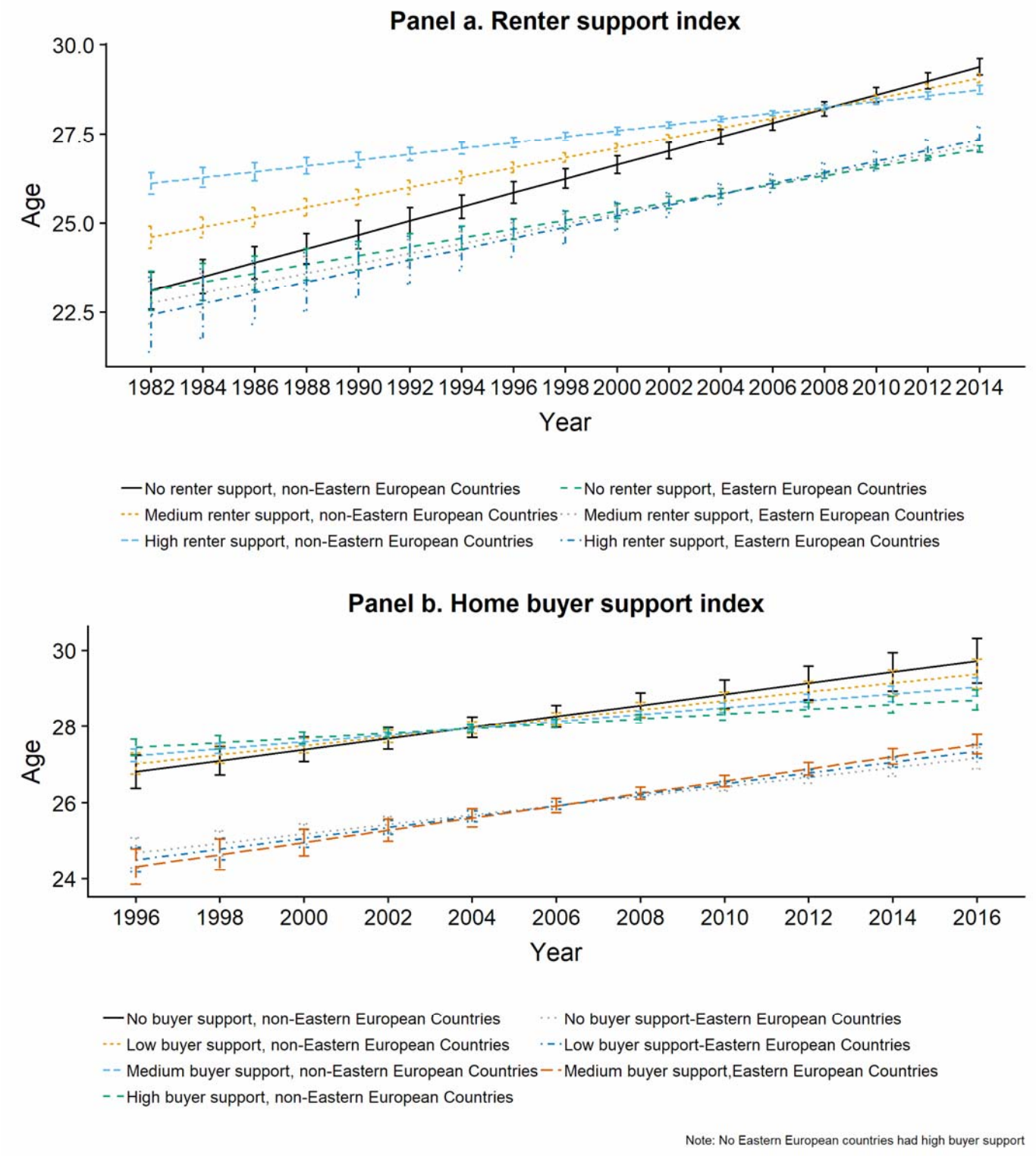
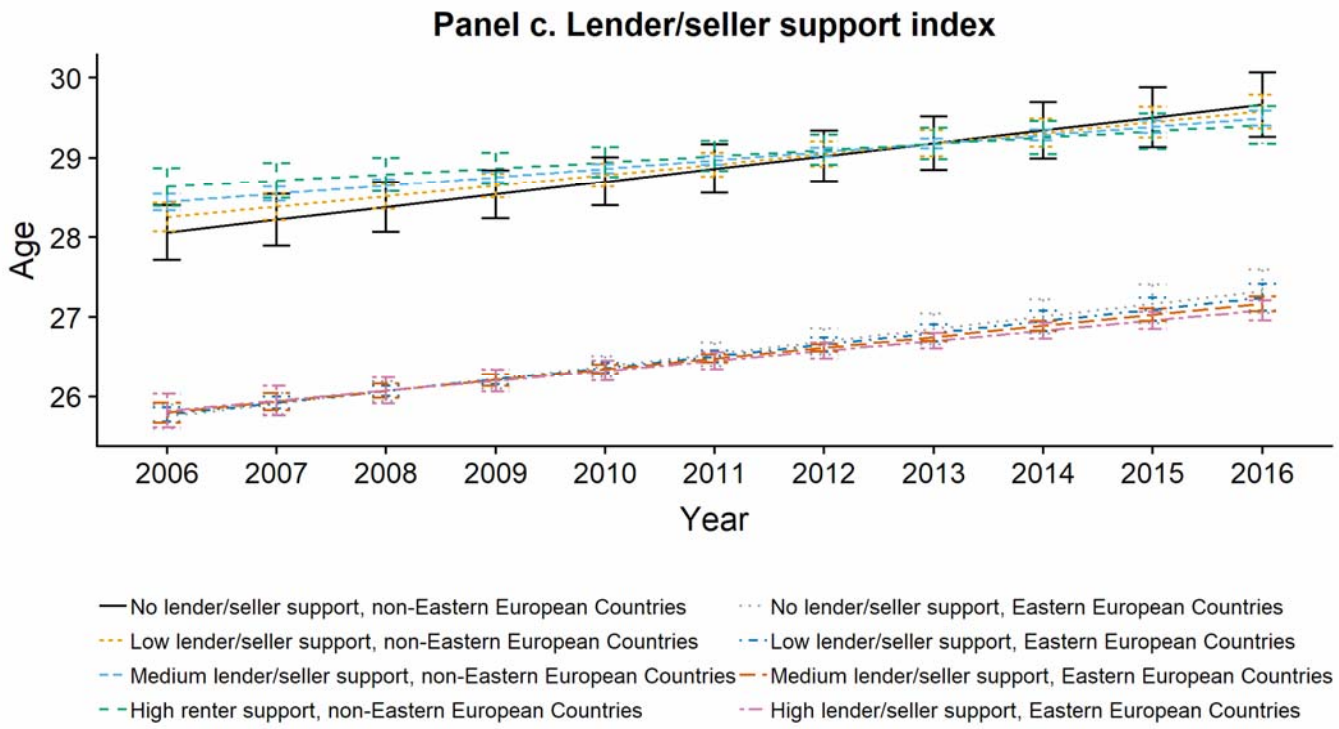
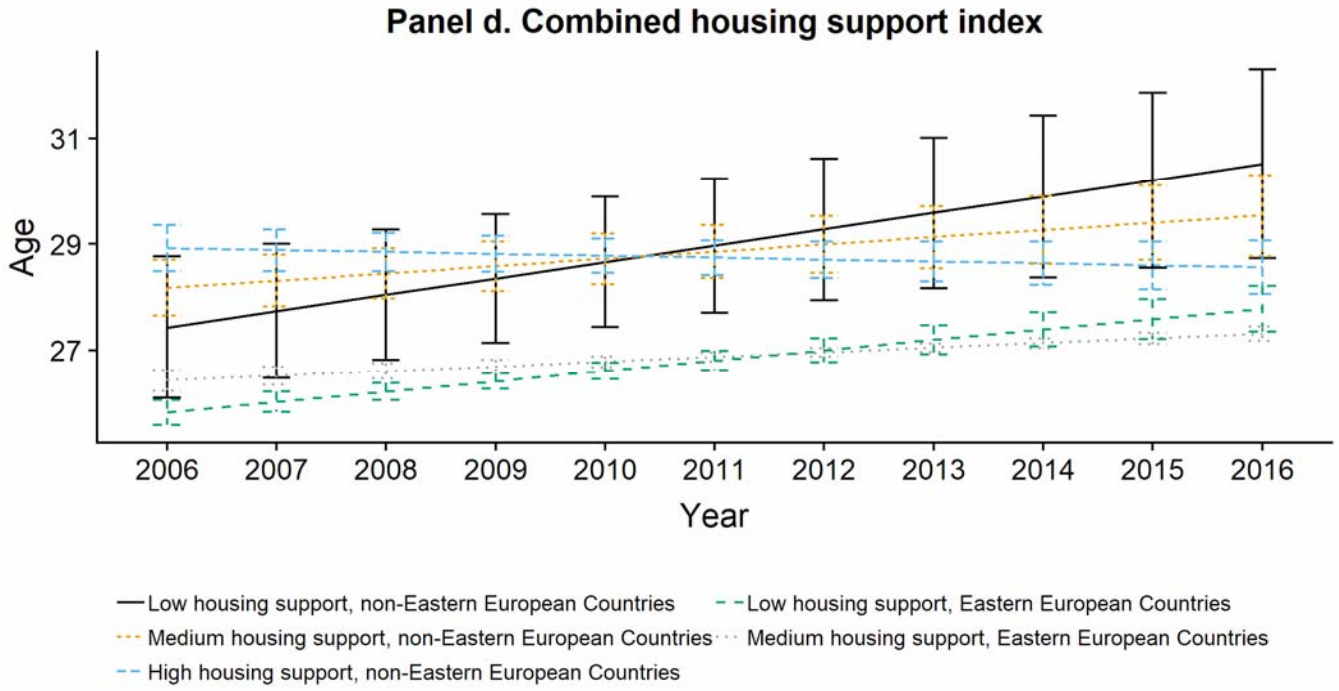

Panel e. Mulder-Billari Housing Regimes
Age
29
28
27
26
1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Year
Career
Elite
Easy
Difficult

Figure 7. Linear predictions, period mean age at first birth by housing context indicators over time by region (Eastern European vs non-Eastern European).







Note: only 1 Eastern European country-year had a value greater than 4 (the medium value shown here).

Table 1. Descriptive statistics for measures of housing context.

	N	MIN	MAX	MEAN	STD
Renter support index.	435	0	2	1.25	0.78
% owner occupied		34.6	98	72.22	12.48
Low % owner occupied (<=75%)		0	1	0.63	0.48
% of GDP on housing		0	1.7	0.33	0.34
High government spending on housing (>0.1%)		0	1	0.62	0.49
Home buying index	295	0	3	1.86	0.97
Housing prices relative to 2000 prices		0.34	4.27	1.36	0.64
Low housing prices (<1.05)		0	1	0.40	0.49
Mortgage debt per capita (1,000s euros)		0	58.33	12.90	13.61
High mortgage debt per capita (>=10,000Euros)		0	1	0.42	0.49
Mortgage debt ratio		0.4	101.2	37.01	25.43
High mortgage debt ratio (>=90)		0	1	0.83	0.38
Interest rates		0.5	27.44	7.45	3.75
Low interest rates (<=5%)		0	1	0.22	0.42
Lender/seller support index	348	0	3	1.82	0.87
% of population covered by private credit bureaus		0	100	44.62	39.96
Private credit bureaus: high coverage (45%)		0	1	0.44	0.50
% of population covered by public credit bureaus		0	100	10.93	22.23
Public credit bureaus: high coverage (12%)		0	1	0.22	0.41
Judicial efficiency: strength of legal rights index		2	11	6.56	2.08
High strength in legal rights (>5)		0	1	0.69	0.46
Bureaucratic efficiency		2	15	6.16	2.72
Less bureaucratic (<=6)		0	1	0.48	0.50
Composite indexes					
Combined index	97	1	8	4.69	1.86
Homeownership regimes (Mulder and Billari 2010)	385	1	4	2.40	1.33
Career		0	1	0.41	0.49
Elite		0	1	0.12	0.33
Easy		0	1	0.11	0.32
Difficult		0	1	0.35	0.48

Table 2. Housing context indicators and period TFR. Results from pooled models with country-level fixed effects.

	Renter support index		Home buyer support index		Lender/seller support index		Combined index	
	1	2	3	4	5	6	7	8
Housing indicator	-0.00	-2.05	-0.00	3.94 +	0.05 ***	5.98 *	0.02 *	-1.04
	(-0.10)	(-0.82)	(-0.25)	(1.75)	(6.72)	(2.01)	(2.19)	(-0.36)
Year	-0.00 *	-0.01 *	-0.00	0.00	-0.01 ***	-0.00	-0.01 ***	-0.01 +
	(-2.42)	(-2.08)	(-0.02)	(1.50)	(-7.16)	(-1.29)	(-4.22)	(-1.81)
GDP per capita (log of 10,000 constant 2010 US$)	0.25 ***	0.26 ***	0.45 ***	0.42 ***	0.74 ***	0.74 ***	0.67 ***	0.68 ***
	(3.61)	(3.66)	(7.49)	(6.77)	(13.47)	(13.53)	(5.25)	(5.14)
Interaction term: housing indicator * year		0.00		-0.00 +		-0.00 *		0.00
		(0.82)		(-1.75)		(-1.99)		(0.37)
Constant	6.23 **	9.55 *	-2.96	-11.67 *	13.26 ***	2.08	17.04 **	22.25
	(2.62)	(2.02)	(-1.14)	(-2.08)	(5.11)	(0.34)	(3.28)	(1.49)
Number of country-years	435	435	295	295	348	348	97	97
Number of countries	33	33	24	24	35	35	16	16

+ p < 0.10; * p< 0.05; **p< 0.01; *** p< 0.001

Table 3. Homeownership regimes and period TFR. Results from pooled models with country-level fixed effects.

	1	2	3	4
Career	-0.02	-0.01	19.02 ***	14.74 **
	(-1.07)	(-0.44)	(3.38)	(3.25)
Elite		0.01		-4.28
		(0.48)		(-0.69)
Easy	-0.00	0.01	34.34 ***	30.06 ***
	(-0.01)	(0.36)	(4.44)	(4.16)
Difficult	-0.01		4.28	
	(-0.48)		(0.69)	
Year	-0.00 **	-0.00 **	0.00	0.00
	(-3.19)	(-3.19)	(1.64)	(0.99)
GDP per capita (log of 10,000 constant 2010 US$)	0.65 ***	0.65 ***	0.57 ***	0.57 ***
	(11.48)	(11.48)	(9.74)	(9.74)
Interaction: Career * year			-0.01 ***	-0.01 **
			(-3.39)	(-3.26)
Interaction: Easy * year				0.00
				(0.70)
Interaction: Elite * year			-0.02 ***	-0.01 ***
			(-4.44)	(-4.16)
Interaction: Difficult * year			-0.00	
			(-0.70)	
Constant	2.57	2.56	-12.78 *	-8.50 *
	(1.23)	(1.23)	(-2.50)	(-2.15)
Number of country-years	385	385	385	385
Number of countries	31	31	31	31

+ p < 0.10; * p< 0.05; **p< 0.01; *** p< 0.001

Table 4. Housing context indicators and period TFR, by region (Eastern European vs non-Eastern-European countries). Results from pooled models with country-level fixed effects.

	Renter support index		Home buyer support index		Lender/seller support		Combined index	
	Eastern-European Countries	non-Eastern-European Countries	Eastern-European Countries	non-Eastern-European Countries	Eastern-European Countries	non-Eastern-European Countries	Eastern-European Countries	non-Eastern-European Countries
	1	2	3	4	5	6	7	8
Housing indicator	1.45	-14.47 ***	3.84	4.97	-0.44	10.68 **	-32.29 ***	4.25
	(0.17)	(-4.74)	(0.59)	(1.58)	(-0.08)	(3.20)	(-3.67)	(0.95)
Year	0.01 +	-0.01 ***	-0.00	0.01 +	-0.00	-0.00	-0.06 ***	0.00
	(1.94)	(-4.10)	(-0.52)	(1.79)	(-0.77)	(-0.22)	(-3.99)	(0.01)
GDP per capita (log of 10,000 constant 2010 US$)	0.44 ***	-0.01	0.61 ***	0.35 ***	0.66 ***	0.83 ***	0.80 ***	1.20 ***
	(4.84)	(-0.07)	(6.27)	(4.16)	(7.22)	(7.94)	(5.21)	(4.10)
Interaction term: housing indicator * year	-0.00	0.01 ***	-0.00	-0.00	0.00	-0.01 **	0.02 ***	-0.00
	(-0.17)	(4.74)	(-0.58)	(-1.58)	(0.09)	(-3.18)	(3.67)	(-0.94)
Constant	-17.34 *	25.55 ***	0.81	-16.07 *	4.48	-5.80	113.41 ***	-11.53
	(-2.51)	(4.68)	(0.09)	(-2.10)	(0.38)	(-0.82)	(3.88)	(-0.41)
Number of country-years	107	328	66	229	139	209	39	58
Number of countries	11	22	6	18	13	22	5	11

+ p < 0.10; * p< 0.05; **p< 0.01; *** p< 0.001

Table 5. Housing context indicators and period mean age at first birth. Results from pooled models with country-level fixed effects.

	Renter support index		Home buyer support index		Lender/seller support index		Combined index	
	1	2	3	4	5	6	7	8
Housing indicator	-0.03	89.46 ***	0.03	62.01 ***	0.08 *	43.92 **	0.12	84.92 ***
	(-0.52)	(11.82)	(0.56)	(5.68)	(2.12)	(3.18)	(1.58)	(4.61)
Year	0.10 ***	0.18 ***	0.08 ***	0.15 ***	0.12 ***	0.16 ***	0.06 **	0.27 ***
	(19.50)	(23.00)	(9.58)	(9.97)	(17.87)	(10.98)	(3.02)	(5.50)
GDP per capita (log	0.99 ***	0.72 **	1.58 ***	0.97 **	-0.10	-0.09	1.04	0.00
10,000 constant 2010	(3.81)	(3.26)	(5.00)	(3.05)	(-0.37)	(-0.36)	(1.12)	(0.00)
Interaction term: housing		-0.04 ***		-0.03 ***		-0.02 **		-0.04 ***
indicator * year		(-11.82)		(-5.68)		(-3.17)		(-4.61)
Constant	-189.23 ***	-335.11 ***	-142.70 ***	-287.41 ***	-205.86 ***	-287.48 ***	-99.57 *	-514.15 ***
	(-22.52)	(-23.51)	(-10.45)	(-10.07)	(-16.27)	(-10.06)	(-2.64)	(-5.35)
Number of country-years	391	391	263	263	328	328	96	96
Number of countries	32	32	23	23	34	34	16	16

+ p < 0.10; * p< 0.05; **p< 0.01; *** p< 0.001

Table 6. Homeownership regimes and period mean age at first birth. Results from pooled models with country-level fixed effects.

	1	2	3	4
Career	0.02	-0.02	68.43 **	138.41 ***
	(0.17)	(-0.15)	(2.62)	(7.01)
Elite		-0.04		69.98 *
		(-0.35)		(2.51)
Easy	-0.06	-0.10	-55.24	14.74
	(-0.41)	(-0.73)	(-1.58)	(0.47)
Difficult	0.04		-69.98 *	
	(0.35)		(-2.51)	
Year	0.10 ***	0.10 ***	0.11 ***	0.15 ***
	(18.85)	(18.85)	(9.23)	(16.18)
GDP per capita (10,000 constant 2010 US$)	0.81 **	0.81 **	0.39	0.39
	(3.23)	(3.23)	(1.56)	(1.56)
Interaction: Career * year			-0.03 **	-0.07 ***
			(-2.61)	(-7.01)
Interaction: Easy * year				-0.03 *
				(-2.51)
Interaction: Elite * year			0.03	-0.01
			(1.57)	(-0.48)
Interaction: Difficult * year			0.03 *	
			(2.51)	
Constant	-188.72 ***	-188.68 ***	-201.37 ***	-271.35 ***
	(-19.42)	(-19.41)	(-8.42)	(-16.15)
Number of country-years	360	360	360	360
Number of countries	31	31	31	31

+ p < 0.10; * p< 0.05; **p< 0.01; *** p< 0.001

Table 7. Housing context indicators and period mean age at first birth, by region (Eastern European vs non-Eastern-European countries). Results from pooled models with country-level fixed effects.

	Renter support index		Home buyer support index		Lender/seller support index		Combined index	
	Eastern-European Countries	non-Eastern-European Countries	Eastern-European Countries	non-Eastern-European Countries	Eastern-European Countries	non-Eastern-European Countries	Eastern-European Countries	non-Eastern-European Countries
	1	2	3	4	5	6	7	8
Housing indicator	-29.44	114.24 ***	-36.62	55.48 **	20.77	55.66 *	71.97 **	115.24 **
	(-1.29)	(11.26)	(-1.64)	(3.33)	(1.38)	(2.60)	(2.94)	(3.04)
Year	0.12 ***	0.20 ***	0.12 ***	0.15 ***	0.16 ***	0.16 ***	0.23 ***	0.37 **
	(12.27)	(20.62)	(7.39)	(6.67)	(9.52)	(7.35)	(5.60)	(3.23)
GDP per capita (log of 10,000 constant 2010 US$)	1.26 ***	0.88 **	1.13 **	0.60	0.06	-1.10	-0.01	1.52
	(5.11)	(2.77)	(3.39)	(1.33)	(0.22)	(-1.60)	(-0.02)	(0.61)
Interaction term: housing indicator * year	0.01	-0.06 ***	0.02	-0.03 **	-0.01	-0.03 *	-0.04 **	-0.06 **
	(1.29)	(-11.26)	(1.65)	(-3.33)	(-1.38)	(-2.60)	(-2.94)	(-3.04)
Constant	-234.91 ***	-375.06 ***	-233.29 ***	-270.64 ***	-290.61 ***	-282.77 ***	-439.26 ***	-722.76 **
	(-12.58)	(-20.91)	(-7.43)	(-6.40)	(-8.92)	(-6.26)	(-5.42)	(-3.06)
Number of country-years	107	284	66	197	137	191	39	57
Number of countries	11	21	6	17	13	21	5	11

+ p < 0.10; * p< 0.05; **p< 0.01; *** p< 0.001