Commitment, Risk, and Consumption: Do Birds of a Feather Have Bigger Nests?

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February 20, 2008

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[3]We thank Andrew Au, Misha Dworsky, Alex Janovsky, and Daniel Simundza for outstanding research assistance. We received helpful comments from Raphael Bostic, Raj Chetty, Christopher Carroll, Tom Davidoff, Ed Glaeser, Joe Gyourko, Caroline Hoxby, Brigitte Madrian, Andrew Postlewaite, Julio Rotemberg, Albert Saiz, Nick Souleles, Joel Waldfogel, Matt White, Justin Wolfers, seminar participants at Columbia Business School, Harvard University, UC Berkeley, UC Davis, University of Illinois, University of Washington, and Wharton, and two anonymous referees. Special thanks to Joel Waldfogel for suggesting the second half of the title. Shore gratefully acknowledges financial support from the National Institutes of Health - National Institute on Aging, Grant number P30 AG12836, and the Boettner Center for Pensions and Retirement Security at the University of Pennsylvania as well as the Zell/Lurie Real Estate Center at The Wharton School. Sinai received support from the Research Scholars Program at the Zell/Lurie Real Estate Center.

[4]JEL Classification: E21 (Consumption; Saving), R21 (Housing Demand), D8 (Information and Uncertainty).

Abstract

This paper presents a model and evidence that consumption commitments – goods like housing for which adjustment is costly – change the relationship between risk and consumption. Commitment provides a motive to reduce consumption in advance of possible future losses too small to warrant adjustment; this motive is absent for losses large enough to make adjustment worthwhile. This implies conditions for adjustment costs and loss magnitudes under which a mean-preserving increase in risk – one that makes small losses less likely but no loss or larger losses more likely – can actually increase housing consumption. Our empirical evidence exploits the interaction of these conditions with a novel source of variation in unemployment risk. Couples who share an occupation face increased risk as their unemployment shocks are more highly correlated. Consistent with our model, such couples spend more on housing, but only when adjustment costs are high and when potential losses are sufficiently large.

1 Introduction

Conventional economic wisdom suggests that households should respond to risk by saving more and consuming less. However, this precautionary saving intuition follows from the assumption that households can costlessly adjust their level and mix of consumption. (e.g., Leland, 1968; Sandmo, 1970; Drèze and Modigliani, 1972; Kimball, 1990) This simplification is often at odds with reality, as adjusting the consumption of many goods carries some transaction cost. For example, to reduce housing consumption, home owners must incur the costs of selling a house, buying a new one, and moving. Goods with this feature are often referred to as consumption commitments. The empirical literature on precautionary saving has examined the link between risk and saving, wealth, or consumption, but has paid remarkably little attention to adjustment costs.

We show that commitment introduces a motive for saving in advance of small losses that is not present for large losses; this can invert the usual negative precautionary saving relationship between risk and consumption. By way of intuition, when a household chooses the quantity of a consumption commitment such as housing, it recognizes that adjusting consumption (by moving) will be optimal only after a large loss. Following a small loss – when adjusting consumption is not warranted – the household has to reduce non-housing consumption substantially to maintain housing consumption. The marginal utilities of housing and non-housing consumption diverge. By reducing housing consumption *ex-ante,* a household that anticipates the possibility of such losses can mitigate the future divergence of housing and non-housing consumption. By contrast, following a loss large enough to make adjustment optimal, moving equates the marginal utilities of housing and non-housing consumption. Foreseeing this rebalancing, a household that anticipates the possibility of large prospective losses lacks this motive for reducing housing consumption *ex-ante*. As a result, an increase in risk that makes large losses more likely but small losses less likely can lead to greater housing consumption.

Using household-level microdata, we find that an increase in risk leads to more housing consumption when adjustment costs are relatively high but not when they are low. We bring two empirical innovations to bear on this question.

First, we exploit a novel source of variation to proxy for increasing risk. When couples share an occupation, the correlation of their unemployment events is higher. Couples with higher unemployment correlations face a higher probability that neither or both spouses will become unemployed but a lower probability that exactly one spouse will become unemployed. This approach follows much of the empirical precautionary saving literature in using occupation-based variation in unemployment risk as a proxy for income risk, but enables us to control separately for each spouse's occupation and identify the risk solely from the pairing of couples.

Second, we interact our measure of risk with proxies for adjustment costs. Identification comes from comparing the effect of our proxy for risk on housing consumption when adjustment costs are high versus when they are low. This controls for the possibility that same-occupation couples may differ from other couples in dimensions besides risk, and that these differences may affect housing consumption.[1] The model predicts that couples with higher unemployment correlations should consume more housing only when adjustment costs are large enough to deter moving. Therefore, we compare home owners (who have high moving costs) to renters (who do not). We find that same-occupation home owners spend at least 2.1 percent more on their houses than do different-occupation couples. This result obtains even after controlling for income, each spouse's occupation, and a host of other demographic characteristics separately for owners and renters. By contrast, same-occupation renters spend no more on rent than do different-occupation renters. This pattern cannot be explained by same-occupation couples' selection into home-ownership. The relationship

[1] Lusardi (1997) has raised the concern that the individual-level, occupation-based proxies for risk used in the precautionary saving literature (e.g., Carroll and Samwick, 1997) are prone to omitted variable bias. People in high-risk occupations differ from other individuals in dimensions other than risk that affect saving and consumption. We control for this possible individual-level omitted variable bias by controlling for the occupation of each spouse directly and then exploit variation in within-household diversification. This provides an alternative to the natural experiment approach used in Fuchs-Schundeln and Schundeln (2005) to overcome omitted variable problems.

between risk and housing consumption is also more positive when another measure of moving costs is high. When couples face effectively higher moving costs because they are unlikely to move for exogenous demographic reasons (age, education, presence of children), the difference between same- and different-occupation home owners' housing spending is greater.

The model also predicts that couples with higher unemployment correlations should consume more housing only when loss magnitudes are large enough to induce moving. We exploit cross-state variation in the non-linearity of the unemployment insurance (UI) schedule. When an unemployed household faces a lower UI replacement rate, the potential loss to permanent income is greater, raising the odds of moving. We compare households with more and less generous unemployment insurance. We find that same-occupation home owners spend more on housing relative to different-occupation home owners only when unemployment insurance is less generous.

The remainder of this paper is arranged as follows: Section 2 sets up a simple model of consumption commitments which predicts that a mean-preserving increase in risk can increase a household's committed consumption in some settings but not others; we describe the data in Section 3 and present results in Section 4; Section 5 concludes.

2 Model

In this section, we outline a stylized model of precautionary saving that incorporates consumption commitments. The model presented here contains standard features of precautionary saving and consumption commitment models. However, this is the first paper to focus on the non-linear implications for precautionary saving of a model with consumption adjustment costs. Chetty and Szeidl (2005) argue that commitment makes households more risk averse in the domain of small losses (too small to warrant adjusting committed consumption) than large ones (large enough to warrant adjusting committed consumption). This paper argues that this can be true for prudence as well as risk aversion. Commitment provides an incentive to reduce housing consumption (and therefore save) relatively more in anticipation of possible small losses than large ones. In a setting where adjustment is optimal only in response to large losses, an increase in risk that makes large losses more likely but small losses less likely (even one that is mean-preserving by construction) can increase committed consumption and reduce saving, thus inverting the standard precautionary saving result.

2.1 Setup

Following Chetty (2003), we present a model with two periods, $t = 1, 2$, and utility in each period a function, $u(h, f)$, of two goods, h (housing) and f (food).[2] The household's lifetime expected utility is an equally weighted average of the expected utility from the two periods:

$$U = u(h_1, f_1) + E[u(h_2, f_2)] \tag{1}$$

As in the precautionary saving literature, we treat household labor income risk as exogenous and endogenize consumption and saving. In the first period, the household receives an income Y_1 and decides how much of each good, h_1 and f_1, to consume. Remaining wealth, $Y_1 - h_1 - f_1$, is saved.[3] In the second period, the household receives an income $\tilde{Y}_2$, which is not known at time $t = 1$. At that time, the household must allocate its wealth, $Y_1 + \tilde{Y}_2 - h_1 - f_1$, between the two goods. If a household adjusts its consumption of good h, it pays a fixed transaction cost k.[4] It is this transaction cost which gives the h good

[2] Prices are normalized to 1 and there is no goods price risk. u is assumed to be symmetric, differentiable everywhere, strictly increasing and strictly concave. Relaxing the symmetry assumption does not affect the substance of the results. We require that $u_{hh} < u_{hf}$, so that increasing the quantity of housing consumed reduces the marginal utility of housing more than the marginal utility of food.

[3] A standard user cost model of home ownership transforms the asset price of the house into the flow cost of the consumption of housing services, h. (Hendershott and Slemrod, 1983; Poterba, 1984) The consensus of the literature is that the demand for housing is determined by the consumption motive rather than investment. (Henderson and Ioannides, 1983; Goetzmann, 1993; Brueckner, 1997; Flavin and Yamashita, 2002) Consequently, the dual nature of housing as an asset and consumption good does not preclude its use as an indicator of consumption. Showing the conditions under which households might save precautionarily in a housing asset is beyond the scope of this model. We will come back to this issue later to make sure a savings motive is not driving our empirical results.

Because we abstract from the investment problems examined in other work, we make the simplifying assumptions that there are no risky assets, the riskless interest rate is zero, and the household cannot save in the housing asset.

[4] Fixed transaction costs provide greater analytic tractability than the case of proportional transaction ($k \propto h_1$) costs with no effect on the qualitative predictions of the model.

its commitment feature. Therefore, a household's inter-temporal budget constraint can be written as:

$$
\begin{aligned}
Y_1 + \tilde{Y}_2 &= 2h_1 + f_1 + f_2 \text{ if } h_1 = h_2; \\
Y_1 + \tilde{Y}_2 &= h_1 + k + h_2 + f_1 + f_2 \text{ if } h_1 \neq h_2.
\end{aligned}
\tag{2}
$$

To determine the optimal consumption in the first period, we determine optimal consumption and indirect utility in the second period and then work backwards. In the second period, the household maximizes $u(h_2, f_2)$ subject to constraint (2), taking h_1 and f_1 as given. Therefore, optimal consumption is

$$
\begin{aligned}
h_2 = f_2 &= \frac{1}{2}\left(Y_1 + \tilde{Y}_2 - h_1 - f_1 - k\right) \text{ if } h_2 \neq h_1; \\
\text{and } h_2 = h_1;\ f_2 &= Y_1 + \tilde{Y}_2 - 2h_1 - f_1 \text{ if } h_2 = h_1
\end{aligned}
\tag{3}
$$

and second-period indirect utility, $v\left(Y_1 + \tilde{Y}_2 - h_1 - f_1, h_1\right)$, a function of second-period wealth and first-period housing, is the greater of

$$
\begin{aligned}
v\left(Y_1 + \tilde{Y}_2 - h_1 - f_1, h_1\right) &= u\left(h_1, Y_1 + \tilde{Y}_2 - 2h_1 - f_1\right) \text{ if } h_2 = h_1; \\
v\left(Y_1 + \tilde{Y}_2 - h_1 - f_1, h_1\right) &= u\begin{pmatrix} \frac{1}{2}\left(Y_1 + \tilde{Y}_2 - h_1 - f_1 - k\right), \\ \frac{1}{2}\left(Y_1 + \tilde{Y}_2 - h_1 - f_1 - k\right) \end{pmatrix} \text{ if } h_2 \neq h_1.
\end{aligned}
\tag{4}
$$

Adjusting housing consumption is optimal if and only if the indirect utility from moving is greater than the indirect utility from not moving:

$$
u\begin{pmatrix} \frac{1}{2}\left(Y_1 + \tilde{Y}_2 - h_1 - f_1 - k\right), \\ \frac{1}{2}\left(Y_1 + \tilde{Y}_2 - h_1 - f_1 - k\right) \end{pmatrix} \leq u\left(h_1, Y_1 + \tilde{Y}_2 - 2h_1 - f_1\right). \tag{5}
$$

The household will not adjust housing consumption, h, unless the shock to wealth is large enough that the benefit of rebalancing consumption exceeds the cost of moving. Once we have solved for the optimal consumption rule in the second period, we can solve for optimal consumption in the first period. The household's lifetime utility function (1) can be rewritten as:

$$
\begin{aligned}
U(h_1, f_1) = {} & u(h_1, f_1) \\
& + E\left[\max\begin{pmatrix} u\left(h_1, Y_1 + \tilde{Y}_2 - 2h_1 - f_1\right), \\ u\left(\frac{1}{2}\left(Y_1 + \tilde{Y}_2 - h_1 - f_1 - k\right), \frac{1}{2}\left(Y_1 + \tilde{Y}_2 - h_1 - f_1 - k\right)\right)\end{pmatrix}\right].
\end{aligned} \tag{6}
$$

In equation (6), $u(h_1, f_1)$ is the utility of first-period consumption. The expectation term is the expected utility of second-period consumption. Note that second-period utility is the maximum of the utility from not moving (the first term in the max operator) and the utility from moving (the second term).

To better understand the optimal first-period consumption $\{h_1^*, f_1^*\}$ we must add structure by making assumptions about the distribution of $\tilde{Y}_2$. We assume that the household has two wage earners, a husband and wife, and that uncertainty comes from the possibility that one or both may receive a negative wage shock, which we refer to as becoming unemployed. Income for either husband or wife is Y_2 if employed and $Y_2 - L$ if unemployed. The husband's probability of unemployment is p while the wife's is q. There is a correlation $\rho \in [-1, 1]$ between the employment status of the husband and wife. Therefore, the distribution of household income in the second period, $\tilde{Y}_2$, can be written as:

$$
\begin{aligned}
\text{Both spouses employed}: & \ \tilde{Y}_2 = 2Y_2 \text{ with probability } 1 - p - q + \phi \\
\text{Exactly one spouse unemployed}: & \ \tilde{Y}_2 = 2Y_2 - L \text{ with probability } p + q - 2\phi \\
\text{Both spouses unemployed}: & \ \tilde{Y}_2 = 2Y_2 - 2L \text{ with probability } \phi, \text{ where} \\
& \phi \equiv pq + \rho\sqrt{pq(1-p)(1-q)}.
\end{aligned} \tag{7}
$$

Increasing the correlation of the couple's unemployment events ρ (or equivalently ϕ while holding p and q fixed) is equivalent to adding a mean-preserving spread in the distribution of household labor income, increasing the probability of the best and worst outcomes (neither or both unemployed) while decreasing the probability of the medium outcome (exactly one unemployed). However, expected household income, $E\left[\tilde{Y}_2\right] = 2Y_2 - (p+q)\,L$, is independent of ρ or ϕ.

In this setting, there are 3 possible states (none, one, or both unemployed) with two possible adjustment actions for each (move or don't move) so there are $2^3 = 8$ possible patterns of adjustment (e.g., move if and only if one or both spouses become unemployed).

2.2 Optimal Consumption

In general, it is not possible to solve for the optimal h_1 and f_1 analytically. Instead, we consider the special case in which unemployment probabilities p and q become arbitrarily small. We also include numerical results with more realistic unemployment probabilities (10 percent) and proportional adjustment costs for the empirically plausible case of separable log utility. These numerical results are similar to the analytic results. In the appendix, we present analytic results for quadratic utility without assuming that unemployment probabilities go to zero. Again, results are similar. In all cases, we make the empirically realistic assumption that unemployment rates (p and q) are low in the sense that dual employment is the most common state. This implies that the distribution of income is negatively skewed ($E\left[\left(\tilde{Y}_2 - E\left[\tilde{Y}_2\right]\right)^3\right] < 0$) so that the only relevant housing adjustments are those that reduce housing consumption.[5]

Lemma 1 *Assume utility $u(h,f)$ satisfies $u(x,y) = u(y,x)$, $u_h, u_f > 0$, $u_{hh}, u_{ff} < 0$, and $u_{hh}, u_{ff} < u_{hf}$ and finite u_{hhh}, u_{fff} for all $h, f \in \left[\frac{1}{4}(Y_1 + 2Y_2) - 2L, \frac{1}{4}(Y_1 + 2Y_2)\right]$. Also assume Y_1, Y_2, and L are strictly positive. In the limit as p and q go to zero, any value of $k \in [0, \infty]$ lies in one of four non-empty, contiguous ranges in which adjustment is a) always*

[5] If we considered lottery risk (where the income distribution is positively skewed) instead of income risk (where it is negatively skewed), one possible increase in risk would increase the probability of winning a lottery large enough to induce moving to a larger house while decreasing the probability of winning a lottery too small to induce a move. The model would then predict even greater reductions in housing consumption than would be predicted by a model of precautionary saving without consumption commitments. In that case, individuals would adjust consumption in good states but not bad ones.

optimal, b) optimal if and only if at least one becomes unemployed, c) if and only if both spouses become unemployed, and d) never optimal, where these ranges are listed in ascending order of k;

(a) When k is such that adjustment is always optimal, then $\lim_{p,q\to 0} \frac{dh_1^*}{d\phi} \gtreqless 0$ if and only if $u_{hhh} \lesseqgtr 0$. As $p, q \to 0$, this pattern of adjustment is only optimal for $k = 0$;

(b) When k is such that adjustment is optimal if and only if at least one spouse becomes unemployed, then $\lim_{p,q\to 0} \frac{dh_1^*}{d\phi} = 0$;

(c) When k is such that adjustment is optimal if and only if both spouses become unemployed, then $\lim_{p,q\to 0} \frac{dh_1^*}{d\phi} > 0$;

(d) When k is such that adjustment is never optimal, then $\lim_{p,q\to 0} \frac{dh_1^*}{d\phi} \gtreqless 0$ if and only if $u_{hhh} \lesseqgtr 0$.

Proof. *See Appendix A.1 for proof and for closed-form expressions for $\lim_{p,q\to 0} \frac{dh_1^*}{d\phi}$, $\lim_{p,q\to 0} \frac{df_1^*}{d\phi}$, and ranges of k.* ■

2.2.1 Cases (a) and (d): Adjustment is always optimal or never optimal

When adjustment costs are very low (case a) or very high (case d), the adjustment decision will be the same in all states. Increasing risk (here, ϕ, the covariance of couples' unemployment spells) increases or decreases consumption depending on the third derivative of the utility function. When utility is quadratic ($u_{hhh} = 0$), increasing risk has no impact on consumption. These results are identical to those commonly found in the precautionary saving literature.

In the empirically relevant case of prudence ($u_{hhh} > 0$) considered in standard precautionary saving models, increasing risk reduces consumption. Marginal utility goes up more than twice as much when both husband and wife become unemployed than when only one becomes unemployed. Therefore, increasing risk (increasing ϕ) increases expected marginal utility and reduces the optimal level of consumption.

This is illustrated by Figure 1, which presents numerical results for the case of log utility, 10 percent expected unemployment rates, and no moving costs.[6] (The results are qualitatively the same when moving costs are so high that adjustment is never optimal.) The figure shows the marginal lifetime utility of first-period housing consumption, $dU\left(h_1, f_1^*\left(h_1\right)\right)/dh_1$ (y-axis), as a function of initial housing consumption, h_1 (x-axis) in different unemployment states. These lines represent the first-order condition for first-period housing in various states if the second-period realization were known. In other words, holding wealth fixed, how does a marginal increase in first-period housing consumption impact lifetime utility if both spouses (or one or none) are employed in the second period? If both the husband and wife are unemployed, represented by the "△" plot, then the marginal utility of first-period housing consumption is strongly negative; the family could have increased lifetime utility had it bought a smaller house initially. By contrast, if both spouses are employed, the "□" plot, then the marginal utility of first-period housing is positive; the family could have increased lifetime utility had it bought a bigger house initially. The "o" plot, representing the marginal utility when exactly one spouse becomes unemployed, is in between.

Plot "+" in this figure is merely an average of the "△", "o", and "□" plots, weighted by the respective probabilities of these three outcomes. Since the first-order condition for h_1 is

$$E\left[dU\left(h_1, f_1^*\left(h_1\right)\right)/dh_1\right] = 0, \tag{8}$$

the optimal level of consumption is simply the point where the expected marginal utility plot, "+", crosses the y-axis. A mean-preserving spread increases the weight on the neither employed and both employed states ("△" and "□" plots) by reducing the weight on the one employed state ("o" plot). Because $u_{hhh} > 0$, the "△" plot (neither employed) is substantially lower than the "o" plot (one employed) and the "□" plot (both employed). Therefore, a mean preserving spread will move the expected marginal utility (the "+" plot) down and therefore reduce the optimal level of initial housing consumption. This is a

[6] These plots assume that the level of food consumption in the first period is chosen optimally given first-period housing but that the second-period employment realization is not known in the first period. We use the following parameters: $Y_1 = 2$, $Y_2 = 1$, $L = 0.5$, $p = q = 0.1$, $\rho = 0.2, k = 0$.

graphical representation of precautionary saving.

2.2.2 Case (c): Adjustment is optimal only in the worst state

When adjustment costs k are high enough to deter moving in the face of small losses (one spouse unemployed) *and* low enough to make moving optimal in the face of large losses (both spouses unemployed), a precautionary dis-saving motive is introduced. Increasing risk now leads to more housing consumption, inverting the standard precautionary saving result.

This can be seen graphically in Figure 2, which is identical to Figure 1 except for a 10 percent proportional cost of adjusting housing consumption. Relative to the size of the loss, this adjustment cost is low enough to make moving optimal if both spouses become unemployed but high enough to deter moving when only one spouse becomes unemployed. The noteworthy feature of this figure is the extremely low marginal utility of first-period housing consumption when exactly one spouse becomes unemployed, the "o" line.

When exactly one spouse becomes unemployed, the household is stuck in a house that is more expensive than it would prefer. There is an imbalance between the high level (and low marginal utility) of housing consumption and the low level (and high marginal utility) of food consumption. Reducing first-period housing consumption by \$1 increases lifetime utility in this event because it allows the household to increase second-period food consumption – which has a high marginal utility – by \$2. The marginal utility of first-period housing, the "o" line, is highly negative for households with exactly one unemployed spouse. These households have to reduce food consumption dramatically in the second period because it is too costly to adjust housing consumption. They would have been much better off had initial housing consumption been lower. This provides a strong motive to reduce housing consumption in advance of possible single-unemployment.

When neither spouse becomes unemployed, the household chooses not to move. Reducing first-period housing consumption to increase food consumption in the second period (which has a low marginal utility) would decrease lifetime utility. When both spouses become unemployed, the household chooses to pay a moving cost to rebalance housing and food consumption; because consumption is low the marginal utility of wealth (which will be spent on food and housing equally) will be higher, but not much higher than the marginal utility in the one-unemployed state. Had initial housing consumption been \$1 lower, both housing and food consumption would be \$0.50 higher in this state.[7] The \$1 reduction in initial housing consumption would increase utility but not as much as it would in the single-unemployment state.

A mean-preserving increasing risk (increasing ϕ) increases the weight on the neither employed and both employed states ("△" and "□" plots) by reducing the weight on the one employed state ("o" plot). Since the "o" plot (one employed) is substantially higher than the average of the "△" plot (both unemployed) and the "□" plot (both employed), a mean-preserving increase in risk will move the expected marginal utility (the "+" plot) up and therefore increase the optimal level of initial housing consumption.

This setup implies a substantial positive relationship between income correlation and housing consumption. In the numerical example given in Figure 2 (with log utility and 10 percent moving costs), increasing the correlation of unemployment from no correlation to perfect correlation increases optimal spending on housing by 2.9 percent (and decreases optimal non-housing consumption by 1.0 percent). The saving rate falls from 3.8 percent to 2.9 percent when the correlation of income increases. This effect is similar in size to – but of the opposite sign from – what would be predicted by a standard model of precautionary saving without moving costs. Without moving costs, the same increase in income correlation leads to a 1.2 percent reduction in both housing and non-housing consumption and an increase in the saving rate from 3.3 percent to 4.4 percent.

Lemma 1 proves that increasing risk (formally, increasing ρ or ϕ holding p and q fixed) will lead to increased housing and decreased food consumption. The net effect on aggregate consumption (housing plus food) depends on curvature of the utility function (u_{hhh}), though it is strongly positive even for quadratic utility (Lemma 2, $u_{hhh} = 0$) and log utility (Figure

[7] The increase is actually \$0.50 plus half the nominal reduction in moving costs. In this numerical example, moving costs are proportional to initial housing consumption.

2, $u_{hhh} > 0$).. Unlike a setting without adjustment, it is no longer sufficient (though still necessary) that $u_{hhh} > 0$ for increasing risk to lead to increased saving. Note increasing risk makes the household more likely to rent here, in the sense that the compensating differential needed for the household to accept the adjustment cost k (as opposed facing no adjustment cost) is increasing with ϕ.

2.2.3 Case (b): Adjustment is optimal in all but the best state

In this case, increasing ϕ has no effect on housing consumption. Instead, the household responds to increased risk by adjusting food consumption. Depending on the curvature of the utility function, $df_1^*/d\phi$ could be of either sign. However, there exists a $k > 0$ such that $df_1^*/d\phi < 0$ for any utility function with $u_{hhh} > 0$. Absent wealth effects that come from the impact of paying an adjustment cost on marginal utility, increasing risk leads to reduced food consumption and increased saving.

3 Data and variable construction

To estimate our model, we use two microdata sets. For data on changes in employment status, occupation, and the probability of moving, we use the April 1996 panel of the Survey of Income and Program Participation (SIPP), which follows a panel of households for 48 months between April 1996 and March 2000. When we examine the effect of sharing an occupation on housing consumption and home ownership, we use a pooled cross-section of households from the 1980, 1990, and 2000 Integrated Public Use Microdata Series (IPUMS) of the U.S. Census. These data are a 1 percent random sample of responses to the U.S. Decennial Census and contain self-reported house values, incomes, and occupations, as well as employment status, a limited moving history, and a number of demographic variables and geographic identifiers.[8]

The SIPP initially contains 3,897,211 person $\times$ month observations, and the three waves

[8] Since house value and income are recorded as ranges, we assign the midpoint of the range or 1.5 times the top code. All dollar values are converted to real (2000) using the CPI.

of the IPUMS together initially contain 2,778,194 household-level observations. We impose several restrictions on our samples which, taken together, reduce the number of usable observations to 270,136 household $\times$ month observations for the SIPP and 302,342 household observations for the IPUMS. These restrictions are detailed in Appendix Table A. In both the SIPP and IPUMS, we limit our attention to married couples in which both spouses are currently employed. In the IPUMS, we also impose the restrictions that both spouses work full-time and live in Metropolitan Statistical Areas (MSAs).[9] We restrict our attention to MSAs so we can control for local housing costs.

We make extensive use of occupation data in both data sets. The IPUMS reports one occupation variable with 227 categories that is consistently defined over all three waves, based on occupation definitions from 1950. As detailed in Table 1.A, the average rate of same-occupation couples across all occupations in the sample is 9.6 percent. In the SIPP data summarized in Table 1.B, the prevalence of same-occupation couples is somewhat lower, at 3.2 percent, since occupation definitions in the SIPP are more granular, with 463 three-digit codes. Table 2 lists the 20 occupations in the IPUMS with the highest fraction of same-occupation couples. The fraction of same-occupation couples varies widely by occupation – it ranges from 15 percent for physicians to zero for many occupations. The third column of this table shows the distribution of occupations among same-occupation couples. Note that these couples are drawn from a large number of common occupations such as managers (27 percent of same-occupation couples), teachers (16 percent), and clerical workers (9 percent). High socioeconomic status professions such as physicians, lawyers, and professors are found in less than 5 percent of these couples.

Consistent with the framework developed in Section 2, our proxy for income risk will be unemployment. In the SIPP, we define a person as employed when they have a job all month or have a job part of the month but spend no time as laid off or searching for a job; we

[9] In the IPUMS, we discard households containing part-time or unemployed spouses because it is difficult to accurately measure their occupation or potential earnings capacity. In particular, one spouse might keep their labor supply in reserve as a buffer in case the other spouse becomes unemployed (Cullen and Gruber (2000)).

define them as unemployed when they spend all month unemployed or have a job only part of the month and spend some of the month as laid off or searching for a job. In the IPUMS, we define a person as unemployed when their stated usual hours of work in that year are zero. While we will restrict our sample to dual-employed couples, we will want to control for the probability of unemployment. We impute that probability for a husband (wife) as the average rate of unemployment for husbands (wives) in the same occupation and year, excluding the husband's (wife's) own observation, imposing the sample restrictions described in Appendix Table A (except for the full-time worker restriction).[10] Table 1 shows that the annual unemployment rate for home-owning husbands (p) in the IPUMS averages 6.5 percent and the unemployment rate for wives (q) averages 13.5 percent. The higher unemployment rates in the SIPP, 8.6 and 25.1 percent, respectively, are consistent with the more stringent definition of employment in these data.

4 Empirical Evidence

In this section, we test the empirical implications of the theory developed in Section 2. Do couples with more highly correlated unemployment events spend more on housing? The model predicts that this will be the case when adjustment costs are high enough to deter moving in all but the worst states. Otherwise, the standard precautionary saving result will obtain: increasing the correlation of couples' unemployment events will reduce housing consumption.

We implement this empirically by regressing log housing spending, $\ln(H_{i,t})$ on our indicator of increased risk (1_ρ), proxies for low moving costs or small potential losses from unemployment ($X_{i,t}$), and the interaction of the two ($1_{\rho,i,t} \times X_{i,t}$), for household i in year t in the IPUMS data:

[10] Since people who are unemployed may state that they have no occupation – even when they have worked and plan to work in a given occupation – this procedure likely underestimates the true unemployment rate by occupation.

$$\ln\left(H_{i,t}\right) = \alpha 1_{\rho,i,t} + \beta\left(1_{\rho,i,t} \times X_{i,t}\right) + \gamma_X X_{i,t} + \gamma_Z Z_{i,t} + \delta_{m,t} + \gamma_{XZ}\left(X_{i,t} \times \left(Z_{i,t} + \delta_{m,t}\right)\right) + \gamma_\Omega \Omega_{i,t} + \varepsilon_{i,t} \tag{9}$$

We also include controls for other demographic information ($Z_{i,t}$) and MSA×year ($\delta_{m,t}$) interacted with $X_{i,t}$ and also the occupation of the husband and wife ($\Omega_{i,t}$).

Standard tests of precautionary saving omit $X_{i,t}$ to measure $\alpha + \beta \times \bar{X}_{i,t}$, the relationship between risk and housing consumption (or more commonly, wealth or saving) for the average $\bar{X}_{i,t}$ in the sample.[11] A model of precautionary saving without adjustment predicts $\alpha + \beta \times X_{i,t} < 0$; increased risk leads to reduced housing consumption for any $X_{i,t}$. By contrast, our model predicts that $\alpha + \beta \times X_{i,t} < 0$ for high values of $X_{i,t}$ (e.g., when moving costs are low) but $\alpha + \beta \times X_{i,t} > 0$ for low values of $X_{i,t}$. Equation (9) identifies α and β – and therefore $\alpha + \beta \times X_{i,t}$, providing a test of predictions from our model and from standard precautionary saving models – so long as high- and low-risk couples do not differ in their unobserved taste for housing ($E\left[\varepsilon_{i,t} \times 1_{\rho,i,t}\right] = 0$). We argue that this assumption is not only valid, but also much more likely to be valid than the analogous assumption required for most precautionary saving tests.[12]

Since our model predicts that $\alpha + \beta \times X_{i,t} < 0$ for high values of $X_{i,t}$ (e.g., when moving costs are low) but $\alpha + \beta \times X_{i,t} > 0$ for low values of $X_{i,t}$, it also predicts that $\beta < 0$. For estimates of β to be unbiased, we need only assume that any *difference* in the unobserved taste for housing between low- and high-risk households is uncorrelated with $X_{i,t}$, moving

[11] These tests (including Skinner, 1988; Dynan, 1993; Carroll and Samwick, 1997) regress individual-level occupation-based proxies for income risk ($1_{occ,i,t}$ in contrast to our use of the household-level same-occupation proxy for risk, $1_{\rho,i,t}$) on various measures of household wealth (in contrast to our use of housing consumption). Other papers take a similar approach in the housing context. Those empirical studies find a negative relationship between income risk and home ownership (Diaz-Serrano, 2005; Haurin, 1991; Robst, Deitz, and McGoldrick, 1999). Prior evidence on housing spending is ambiguous. Haurin and Gill (1987) find that military husbands' incomes positively affect their housing spending but their wives' incomes (which they argue are more uncertain) do not. Haurin (1991) examines the effect of income risk on house spending, and fails to find a statistically significant effect.

[12] These papers assume that individual-level occupation-based proxies for risk ($1_{occ,i,t}$) are uncorrelated with unobservable tastes ($E\left[\varepsilon_{i,t} \times 1_{occ,i,t}\right] = 0$), an assumption that has been criticized. (Browning and Lusardi, 1996; Lusardi, 1997)

costs or the magnitude of the losses: $E\left[\varepsilon_{i,t} \times 1_{\rho,i,t} \times X_{i,t}\right] = 0$. We can identify β correctly even if the unobserved taste for housing differs between high- and low-risk couples ($E\left[\varepsilon_{i,t} \times 1_{\rho,i,t}\right] \neq 0$), or between couples with high and low $X_{i,t}$ ($E\left[\varepsilon_{i,t} \times X_{i,t}\right] \neq 0$). This weaker identifying assumption provides a second test of predictions from our model.

To proxy for risk, 1_{ρ}, we use whether a couple shares the same occupation. Same-occupation couples, as we show in the next subsection, have a lower probability of just one spouse becoming unemployed and higher probability of neither or both spouses becoming unemployed. We include separate dummies to control for the direct effects of the husband's and wife's occupations, $\Omega_{i,t}$, to exploit variation in within-household diversification. Once we remove the effect of either spouse's occupation on housing consumption, does *sharing* an occupation further increase that consumption? In other words, do a dual-teacher couple and a dual-realtor couple together spend more on owned housing than two mixed teacher/realtor couples? Unlike precautionary saving papers that use individual-level occupation-based proxies for risk ($1_{occ,i,t}$), same-occupation dummies allow us to identify α even when risky occupations are correlated with unobserved taste for consumption. In other words, our couple-level assumption that $E\left[\varepsilon_{i,t} \times 1_{\rho,i,t}\right] = 0$ – which we need to identify α – may hold after controlling for individual occupation, even when its individual-level analog $E\left[\varepsilon_{i,t} \times 1_{occ,i,t}\right] = 0$ – needed to identify α in other papers – does not.

We use two different proxies for low adjustment costs, $X_{i,t}$,which will range from zero (the highest adjustment costs, where moving is optimal only in the worst state) to one (the lowest adjustment costs, where moving is optimal given smaller shocks). First, we compare home owners ($X_{i,t} = 0$) to renters ($X_{i,t} = 1$), since home ownership involves greater costs of moving. Second, we use an estimate of the expected length of stay in the house, based on demographics ($X_{i,t} =$ expected probability of moving). A household that anticipates more frequent moving has a lower effective cost of a forced move. For a household that is likely to move anyway, the cost of a forced move is a minor shift in the timing of the move. If a household was unlikely to move in the absence of joint unemployment, the effective moving cost is the full moving cost.

As a proxy for the magnitude of the income loss due to unemployment, X_{it}, we use the relative generosity of unemployment insurance ($X_{i,t} = 1$ if UI generosity is in the bottom decile, 0 otherwise). Access to more generous UI, whether due to differences in the UI rules across states and over time or nonlinearity in the reimbursement schedule, makes it more likely that even dual-unemployed couples will not choose to move.

In the vector of controls, Z, we include the imputed probability of each of the husband and wife becoming unemployed since that affects expected income. We include the product of these probabilities to control for the probability that both spouses would be jointly unemployed if their risks were independent. The Z vector also includes the squared unemployment rates for the husband and wife in case the relationship between the risk of unemployment and housing demand is nonlinear. We control for family income, the share of the income earned by the husband, and dummies for the number of people in the household, the number of children, the educations of the husband and the wife, and the age brackets for the husband and wife. We include dummy variables for year. In our preferred specifications we include dummies for the MSA of residence (m) interacted with year, $\delta_{m,t}$. In case the effect of these demographics on housing demand varies spuriously with moving costs, we interact each of these controls with $X_{i,t}$.

4.1 Sharing an Occupation, Unemployment Correlation, and the Probability of Moving

Before estimating equation (9), we present empirical evidence that a) sharing an occupation increases the correlation of couples' unemployment events, so that $1_{\rho,i,t}$ is a good proxy for ϕ in the model; and b) dual unemployment dramatically increases the odds of moving that a household moves relative to single unemployment or dual employment. These results indicate that our proxies for risk and moving costs line up with Case (c) of the model, in which moving is optimal if and only if both spouses become unemployed and increased risk leads to higher housing consumption.

First, using the data from the SIPP, we estimate the within-household unemployment correlation, controlling for the observable characteristics, $Z_{i,t}, \delta_t$, and $\Omega_{i,t}$, for same- and different-occupation couples. The procedure is described in Appendix (B). We find that same-occupation couples face an increase in risk stemming from more highly correlated unemployment. Over the course of a year, they are more likely to be either both employed or both unemployed, and are less likely to have just one spouse unemployed – even controlling for each spouse's occupation. The estimates are reported in Table 3. In the first column, different-occupation households have low unemployment correlations of 5.0 percent (with a bootstrapped standard error of 0.3 percent), reflecting their within-household diversification. Same-occupation households, by contrast, have a 23.2 percent correlation in their unemployment risks, yielding a difference between same- and different-occupation couples of 18.1 percent (2.4 percent standard error).[13] Same-occupation couples' spread in risk can be seen in columns 2 through 4. Same-occupation couples have higher rates of both spouses becoming unemployed (2.2 percent vs. 1.4 percent) and both spouses remaining employed (86.2 percent vs. 81.3 percent), and lower rates of just one spouse becoming unemployed (11.7 percent vs. 17.3 percent). The differences between each of these are statistically significant. The overall rate of becoming unemployed is somewhat lower for same-occupation husbands and wives: 2.2 percentage points lower for husbands (column 5) and 1.9 percentage points lower for wives (column 6).

Second, dual-unemployment appears to proxy for a "large shock" because it dramatically increases the likelihood of moving relative to single-unemployment or dual-employment. For the sample of couples in which both spouses are employed in the current month, we estimate a probit to predict moving over the following 12 months. As covariates, we include dummy variables for whether none, one or two spouses are unemployed in the next month and also

[13] We obtain similar results if we restrict the sample to homeowners. In that case, the difference in correlation between same- and different-occupation couples is 0.134 (0.025). We also obtain similar results if we use the SIPP's layoff variable rather than our measure of unemployment or "same industry" rather than "same occupation."

$Z_{i,t}, \delta_t$, $\Omega_{i,t}$, and a dummy variable for home ownership.

Table 4 reports the marginal effect on the probability of moving of going from zero to one unemployed and from one to two unemployed. In the first column, just one spouse becoming unemployed raises the probability of moving over the next 12 months by 2.7 percentage points. If both spouses become unemployed, the likelihood of a move rises by an additional 6.3 percentage points over single-unemployment couples. Since the average annual moving rate is just 5 percent for dual-employed home owners, dual unemployment yields an enormous jump in the likelihood of moving.[14]

4.2 The Relationship Between Income Risk and House Value

We examine the two predictions of our model: first, $\alpha+\beta\times X_{i,t}>0$ for low $X_{i,t}$ (high moving costs) but not otherwise; and second, $\beta<0$. To test the first prediction, we must assume that same-occupation couples do not differ from other couples in their unobserved taste for housing, after including a host of controls ($E\left[\varepsilon_{i,t}\times 1_{\rho,i,t}\right]=0$). To test the second, weaker prediction, we must assume only that any difference between same- and different-occupation couples in their unobserved taste for housing is uncorrelated with $X_{i,t}$ ($E\left[\varepsilon_{i,t}\times 1_{\rho,i,t}\times X_{i,t}\right]=0$).

First, does greater risk increase housing consumption when moving costs are high enough to deter moving in all but the worst states? We begin by restricting our attention to households with high moving costs, home owners. We predict $\alpha>0$; same-occupation home owners consume more housing than otherwise identical different-occupation home owners. These results are reported in Table 5, where we find that same-occupation home-owning couples spend more on housing on average than do different-occupation home-owning cou-

[14]Since we do not observe unemployment severity, the realization of moves after an unemployment shock is only a rough indicator of the probability of crossing an S-s bound. Since some unemployment events in the data have a larger effect on permanent income than others, they do not correspond perfectly to the unemployment states in the model. In particular, a substantial fraction of unemployment shocks are temporary. As such, the estimates in Tables 3 and 4 will not map perfectly to model parameters. Even if all households who suffer dual-unemployment (as defined in our model) move, it is not surprising that many household listed as dual-unemployed (but whose unemployment is very transitory) in the data do not move.

ples. Column 1 of Table 5 reports the results when the only additional covariates are the unemployment rate controls, log of family income, and the income share of the husband. Husbands and wives with the same occupation spend 4.3 percent more on housing ($\hat{\alpha} = 0.043$, with a 0.4 percent standard error) than couples with different occupations.[15] This positive relationship between "same occupation" and housing consumption, $\hat{\alpha} > 0$, is consistent with our model but not consistent with a standard precautionary saving model without adjustment costs.

By including additional covariates in this regression, we can rule out many alternative reasons unrelated to risk why same-occupation couples may have a greater preference for housing. In column 2, we control for MSA of residence in each year and a host of household demographic characteristics. We find that same-occupation couples buy houses that are on average 2.7 percent more expensive when compared to different-occupation couples in the same MSA and same year. In column 3, to control for the possibility that same-occupation couples are more prevalent in occupations that have a strong unobservable preference for housing, we add dummy variables for each spouse's occupation. The new coefficient on "same occupation" implies that, after controlling for covariates, same-occupation couples spend 2.1 percent (0.4 percent standard error) more on their houses than do different-occupation couples. Since same-occupation couples have an 18 percentage point higher correlation in unemployment risk (from Table 3), simple extrapolation gives an elasticity of house spending with respect to the unemployment correlation of 0.12 (0.021/0.18).[16]

[15] While we generally treat the other estimated coefficients as nuisance parameters, some persistent results bear highlighting. Consistent with empirical precautionary saving papers that exploit occupation-level variation in unemployment risk (e.g., Carroll and Samwick, 1997, 1998), husbands in occupations with high risks of unemployment spend less on housing (the coefficient on the husband's imputed unemployment rate < 0). We also find that households that face greater occupation-based unemployment risk spend less on housing (the coefficient on the husband's unemployment rate $\times$wife's rate < 0). But our key finding is that these results are attenuated or even reversed when the correlation of couples' unemployment increases (the coefficient on same occupation > 0).

[16] These results do not seem sensitive to our particular empirical choices. We obtain essentially the same results when we: use "same industry" rather than "same occupation" as our proxy for couples' unemployment correlation; control for other dimensions of similarity, such as age (in ranges) and education; or split the sample by decade, running separate regressions for 1980, 1990, and 2000. However, we find a significantly larger effect of a higher correlation in unemployment risk on housing spending for same-occupation homeowners when the husband is under age 45, where neither of the spouses have had any post-secondary

Second, does greater risk increase housing consumption more when moving costs are higher ($\beta < 0$)? In Table 6, we compare high- and low-moving cost households by adding an interaction of the same-occupation dummy variable with a proxy for moving costs. In columns 1 and 2, we pool renters and home owners together. The proxy for low moving costs is whether a household rents, with $X_{i,t} = 1$ for renters and $X_{i,t} = 0$ for home owners. Column 1 includes the full set of $Z_{i,t}$ covariates and the $\delta_{k,t}$ MSA $\times$ year dummies, all interacted with $X_{i,t}$, the dummy for renter status. Column 2 adds occupation dummies. The dependent variable is log housing spending, defined as log annual rent for renters and log annualized house price for owners. We annualize the house price to standardize renters' and owners' housing costs, and calculate it by multiplying the house price by the sample average rent to house price ratio. Errors in this transformation will be absorbed by the renter dummy.

The first row of Table 6 shows that same-occupation home owners spend about 2.7 percent more on housing than do different-occupation home owners ($\hat{\alpha} = 0.027$, with a standard error of 0.5 percent). The second row of Table 6 reports that the difference in housing spending between same- and different-occupation renters is 4.6 percentage points *less* than the difference for owners ($\hat{\beta} = -0.046$ with a standard error of 1.0 percent), yielding a negative relationship on net between risk and housing spending for renters. This difference between owners' and renters' response to risk is the pattern predicted by a model with consumption commitments and rejects a standard precautionary saving model. When we include controls for the occupations of the husband and wife in column 2, the results are similar.

Columns 3 and 4 of Table 6 present the results from estimating equation (9) on a sample of home owners and using the imputed probability of moving as the proxy for low moving costs, $X_{i,t}$. We impute the likelihood of moving as the rate of recent moving by similar families. In the IPUMS, we construct the average rate of having moved in the previous

schooling, or when the household income is below the sample median.

year by husband's age × husband's education × presence of children cells. We define the bins using 10-year age brackets, nine education categories, and an indicator for whether the family has any children, and take the average for all of the households in that bin excluding the household in question. The covariates $Z_{i,t}$ control separately for each of the household attributes we use to impute the probability of moving (age, education, and presence of kids), so $X_{i,t}$ can be identified separately from $Z_{i,t}$ by the fact that the age profiles of moving vary with education and offspring.

The first row of column 3 corresponds to home owners with a zero imputed probability of moving – that is, they are highly unlikely to move. Such households face the highest moving costs, and same-occupation households in that category spend 4.6 percent (with a standard error of 0.7 percent) more on housing than do otherwise identical different-occupation households. For a household that was planning to move anyway ($X_{i,t} \approx 1$), the effective cost of a forced move is very low; these couples should display the standard negative relationship between risk and consumption. This is what we find. As the likelihood of moving rises, reflecting a more-mobile household, the differential between same- and different-occupation households is reduced (row 2). At a probability of moving of about 0.35 – a three-year expected stay (1/0.35) – the estimated difference between same- and different-occupation households disappears.[17] And then, as the probability of moving increases more, same-occupation households are estimated to consume *less* housing than otherwise-equivalent different-occupation households. These highly-mobile households have low moving costs and thus behave like precautionary savers when faced with an increase in risk. In column 4, adding occupation dummies as controls does little except reduce the magnitude of the estimated coefficients on the "same occupation" variables by one-third.

Columns 5 and 6 of Table 6 present results of regressions identical to columns 3 and 4 for the subsample of renters. Given the lower moving costs faced by renters, there is no reason to believe that the probability of moving for demographic reasons would have any additional

[17] When $X = 0.35$, $-0.133 \times X = -0.046$, exactly offsetting the estimated coefficient on same occupation.

effect on the relationship between "same-occupation" and housing consumption. Consistent with this prediction, we find that the estimated coefficient on the "same occupation" term is insignificantly different from zero, so that the relationship between "same occupation" and housing consumption for renters is independent of their exogenous move probability.

Finally, columns 7 and 8 present results comparing how the response to risk varies with unemployment insurance (UI) generosity for the subsample of home owners.[18] A higher UI replacement rate reduces the effective size of shocks to permanent income since it affords the unemployed the ability to set a higher reservation wage in their job search. (Feldstein and Poterba, 1984) A theory incorporating consumption commitments predicts that there would be a positive relationship between "same occupation" and housing spending only when the household could experience a loss large enough to induce moving. As the UI replacement rate increases, the odds of such a sizeable loss falls, and the difference in housing spending between same- and different-occupation couples should decrease (become less positive). By contrast, a model of precautionary saving without commitment would predict that same-occupation couples would spend less on housing than different-occupation couples and that gap should decrease (become more positive) as UI becomes more generous and replaces the precautionary function of the household's own savings. (This precautionary saving mechanism is described in Engen and Gruber (2001).)

[18] There are several sources of variation in the generosity of UI, which we define as the replacement rate of the couple's wages. While state UI programs typically compensate the unemployed for up to 50 percent of lost wages up to a cap, the level of the cap and the replacement rate schedule vary across states, over time, and according to the number of dependent children. In addition, the generosity of UI is a nonlinear function of income: the replacement rate remains constant until income reaches the cap, at which point it declines with income. Once income exceeds the cap, the absolute benefit amount remains level at 50 percent of the cap amount but is declining as a percentage of income.

This nonlinearity in the replacement rate implies that the share of income earned by each spouse influences the couple's total replacement rate in the event that both spouses lose their jobs. For example, if both spouses earn exactly the cap amount and both become unemployed, they collectively will receive 50 percent of their former wages. But if one spouse earns twice the cap amount and the other earns almost nothing – total family income is the same but its allocation across spouses is not – the family can at best replace 25 percent of their former income.

To implement this proxy, we calculate UI replacement rates for each spouse using the unemployment insurance calculator developed by Cullen and Gruber (2000) and extended by Chetty. We are grateful to Raj Chetty for letting us use his UI calculator and benefit data. Since the calculator contains information about UI since 1984, we restrict our sample to 1990 and 2000. We then calculate the household's replacement rate as the average replacement rate for each spouse, weighted by their respective income shares.

To test this theory we interact an indicator variable for the couple being above the 10th percentile of the UI replacement rate (so $X_{i,t} = 1$ for those with relatively more generous unemployment insurance (low L) and $X_{i,t} = 0$ for those with less generous unemployment insurance (high L)) with the same-occupation indicator.[19] We also control for the UI replacement rate dummy interacted with the demographic covariates, MSA $\times$ year, and state $\times$ year. The standard errors are corrected for correlation by state $\times$ year $\times$ X.

The results are reported in column 7. Same-occupation households that face low UI replacement rates spend 7.3 percent (1.8 percent standard error) more on housing relative to different-occupation households. This difference is attenuated when UI becomes more generous. A same-occupation household facing the higher replacement rate spends just 1.8 percent (7.3 − 5.5) more on their house than an otherwise identical different-occupation household. In column 8, we add separate occupation dummies for the husband and wife. While the signs on the "same occupation" coefficient remain the same, they are smaller in magnitude than in column 7 and no longer are statistically significant.

4.3 Self-selection

Because high moving-cost households increase housing consumption when income risk rises while low moving-cost households do not, we can reject both the standard precautionary saving model and the possibility that our results can be explained by an unobserved taste for housing amongst high-risk households. Suppose same-occupation couples had a higher mean unobserved taste for housing than different-occupation couples, so their preference distribution were shifted to the right. That form of heterogeneity would cause same-occupation

[19] The 10th percentile household average replacement rate is about 15 percent. The replacement rate increases rapidly above that point to a maximum of 0.5: the mean replacement rate in the bottom decile is 0.076 and in the top 90 percent it is 0.352. In columns 7 and 8 we weight the unemployment risk variables by the husband's and wife's income shares. (The husband's unemployment rate is multiplied by s and the wife's by $(1 - s)$. The same occupation indicator is multiplied by $s\,(1 - s)$.) We also control for s and $s\,(1 - s)$ separately. This weighting is necessary to separately identify the UI replacement rate effect, which is a function of the program rules and the within-household distribution of income, from the distribution of income alone. In Table 6, we report the coefficients on the same occupation variables evaluated at the average $s\,(1 - s)$, which is 0.243.

home owners to spend more on their homes. But it would also suggest, counterfactually, that same-occupation renters would spend more on rent.

We can also reject other alternative explanations for the results presented in Subsection 4.2. Suppose instead that same-occupation couples merely had a preference for spending a lot on home ownership but not on rental housing. Such households would have higher spending on owner-occupied housing but not rental housing. But they should also be more likely to own their houses, which is rejected by the data. In Table 7, we regress an indicator variable for being a home owner on the "same occupation" dummy variable (1_ρ) and also interact it with our estimated probability of moving. Same-occupation couples are less likely than different-occupation couples to be home owners, a result that is strongest for couples who are unlikely to move.

If same-occupation couples had the same mean but higher variance in their unobserved taste for housing than different-occupation couples, it could explain more of the empirical regularities we find. Since same-occupation households would have thicker tails in the distribution of their preference for housing – they would either love housing or hate it – same-occupation households who loved housing would own and also spend more than the more neutral different-occupation households. Those same-occupation households who disliked housing would rent and not spend much on rent relative to different-occupation households. In addition, depending on the clearing price of owned housing, it is possible that more different-occupation than same-occupation households prefer owning. In that case, same-occupation households would have a lower rate of home ownership. If this explanation were true, there is a straightforward and testable prediction. The residuals for the same-occupation, home-owning couples in the housing demand regression should be more right-skewed than those for the different-occupation couples. Similarly, the residuals for the same-occupation renting couples in the rent regression should be more left-skewed. In our data, there is no distinguishable difference in skewness in residuals between same- and different-occupation couples, so variation in the second moment of unobserved taste for housing cannot explain our results.

Furthermore, it seems unlikely that any difference between same- and different-occupation couples in the taste for housing is present only for households with a low exogenous probability of moving or less generous unemployment insurance. UI generosity is determined by state interacted with the within-household wage distribution. In our regressions, we control for state and the wage distribution separately, identifying the UI effect using the interaction of the two sources of variation. Similarly, the probability of moving is determined by age $\times$ education $\times$ presence of children. Again, we control for each of these covariates separately. It would be highly unlikely for house-loving households to be concentrated within one of these subgroups. Furthermore, there is no reason why any such effect would be limited to home owners and not renters, which would be needed to reconcile Columns 3 and 4 of Table 6 with Columns 5 and 6.

5 Conclusion

This paper shows adjustment costs can invert the usual negative relationship between risk and consumption. The result is driven by the strong desire to reduce committed consumption in advance of possible shocks too small to warrant adjustment relative to shocks large enough to make adjustment worthwhile. An increase in risk that makes small losses less likely but large losses more likely will then lead to increased committed consumption.

We illustrated this idea in the context of a dual-career household that faces unemployment risk and consumes housing. This result requires adjustment costs to be high enough to deter moving in all but the worst states. Therefore, it should not apply when moving costs are low, as they are for renters or those who expect to move soon. We exploit this feature of the model in our empirical tests, which compare the effect of increased risk in settings where moving costs are high to ones where they are low. This comparison provides a test of the model that differentiates it from leading alternative hypotheses.

When we proxy for a mean-preserving increase in risk by whether a married couple shares the same occupation, which is a proxy for a higher correlation in unemployment risk, we find the predicted pattern pervasive in the data. Controlling for each spouse's characteristics, including their individual occupations and probabilities of unemployment, we find that same-occupation households spend relatively more on housing. As expected, this result is confined to home owners, and is strongest for those owners who face effectively higher moving costs due to a lower exogenous probability of moving. Finally, same-occupation couples spend relatively more on housing consumption compared to different-occupation couples when unemployment insurance is less generous.

In this paper, we focus on the role of adjustment dynamics in affecting the relationship between risk and the level of consumption. The precautionary saving literature is concerned with the impact of prudence on the level of saving or consumption, but not on adjustment dynamics. We show that such adjustment can have a large effect on the relationship between risk and consumption, both in theory and in data.[20] Of course, our finding that commitments affect the relationship between risk and consumption does not deny the importance of prudence in generating precautionary saving. It merely follows from a difference in the precautionary motive in the domains of large and small losses.

Our findings may also explain why precautionary saving results are quite sensitive to the sample in which they are measured. (Hurst, Kennickel, Lusardi, and Torralba, 2005) Some papers find little evidence that those with more risk save more and spend less. These include Dynan (1993) and Guiso, Jappelli, and Terlizzese (1992) who use household consumption variability and expectations of household risk, respectively, as measures for risk. Other papers find strong evidence of this relationship, including Carroll and Samwick (1997, 1998) and Fuchs-Schundeln and Schundeln (2005) who exploit individual-level, occupation-based

[20] This result is at the nexus of precautionary saving, S-s adjustment, and consumption commitments literatures. The consumption commitments literature examines the impact of adjustment dynamics on risk-aversion and not on prudence and the level of consumption. (Chetty and Szeidl, 2007; Browning and Crossley, 2004; Postlewaite, Samuelson, and Silverman, 2006) The empirical literature on durable goods and S-s bands considers the impact of shocks on adjustment dynamics but not on the target level of consumption. (Attanasio, 2000; Eberly, 1994; Bertola, Guiso, and Pistaferri, 2005). Following Grossman and Laroque (1990), portfolio choice has also been studied at length (Fratantoni, 1998, 2001; Flavin, 2001; Flavin and Yamashita, 2002; Chetty and Szeidl, 2005).

variation in income risk. Our results help to reconcile these varied findings. We show that results in the domain of individual-level risks to single unemployment may be different from household-level risks to dual unemployment. In the range of individual-level losses, our findings mirror the standard precautionary saving results: couples in occupations with higher unemployment probabilities consume less housing. Expanding the range of losses to include household-level dual-unemployment – holding total unemployment risk fixed – this is reversed.

A Appendix A: Proofs

Plugging the distribution of unemployment shocks from equation (7) into the objective function from equation (6) yields the following objective function:

$$\begin{aligned}
U(h_1, f_1) = {} & u(h_1, f_1) \\
& + (1-p-q+\phi)\max\begin{pmatrix} u(h_1, Y_1+2Y_2-2h_1-f_1), \\ u\left(\frac{1}{2}(Y_1+2Y_2-h_1-f_1-k), \frac{1}{2}(Y_1+2Y_2-h_1-f_1-k)\right)\end{pmatrix} \\
& + (p+q-2\phi)\max\begin{pmatrix} u(h_1, Y_1+2Y_2-2h_1-f_1-L), \\ u\left(\frac{1}{2}(Y_1+2Y_2-h_1-f_1-k-L), \frac{1}{2}(Y_1+2Y_2-h_1-f_1-k-L)\right)\end{pmatrix} \\
& + \phi\max\begin{pmatrix} u(h_1, Y_1+2Y_2-2h_1-f_1-2L), \\ u\left(\frac{1}{2}(Y_1+2Y_2-h_1-f_1-k-2L), \frac{1}{2}(Y_1+2Y_2-h_1-f_1-k-2L)\right)\end{pmatrix}
\end{aligned} \tag{10}$$

The first maximum refers to second-period utility in the dual-employment state, the second to the single-employment state, and the third to the dual-unemployment state. In Case (a) (always move), the second argument in each maximum is assumed to be greater; in Case (b) (move only under single- or dual-unemployment), the first argument is assumed to be greater only in the first maximum; in Case (c) (move only under dual-unemployment), the second argument is assumed to be greater only in the third maximum; in Case (d) (never move), the first argument is assumed to be greater in each maxima.

A.1 Proof of Lemma 1: $p, q \to 0$

A.1.1 Optimal Consumption

Relabel $U(h_1, f_1)$ as $U(h_1, f_1, p, q, \phi, k)$. The existence of u_{hh}, u_{ff}, u_{hhh}, and u_{fff} over the relevant ranges of h and f ensures that u_h, u_f, u_{ff}, and u_{hh} are continuous over this range. We ignore the values Y, L, and k that form knife-edge cases in which the two arguments in the second or third maximum are exactly equal (where the conditions for this are present below). These cases occur with probability zero if model parameters are chosen at random within an arbitrarily small window. This implies that $\partial U(h_1, f_1)/\partial f_1$, $\partial U(h_1, f_1)/\partial h_1$, $\partial U^2(h_1, f_1)/\partial f_1 \partial \phi$, and $\partial U^2(h_1, f_1)/\partial f_1 \partial \phi$ are continuous in the neighborhood around $h_1, f_1 = \frac{1}{4}(Y_1 + 2Y_2); p = q = \phi = 0$. Consider the solution to the system of four equations (which are straightforward to calculate in terms of equation (10)):

$$\begin{aligned}
\partial U(h_1, f_1)/\partial f_1 &= 0 \\
\partial U(h_1, f_1)/\partial h_1 &= 0 \\
\partial U^2(h_1, f_1)/\partial f_1 \partial \phi &= 0 \\
\partial U^2(h_1, f_1)/\partial f_1 \partial \phi &= 0
\end{aligned}$$

in four unknowns $\{f_1^*, h_1^*, \partial h_1^*/\partial \phi, \partial f_1^*/\partial \phi\}$. When $p = q = \phi = 0$, $h_1^*, f_1^* = \frac{1}{4}(Y_1 + 2Y_2)$ will be part of one such solution (as they solve the first-order conditions described for an interior optimum described in the first two equations); it is trivial to show that this is the global optimum in the maximization problem. The implicit function theorem ensures that there exists a ball for p, q, and ϕ around $p = q = \phi = 0$ such that all solution $\{f_1^*, h_1^*, \partial h_1^*/\partial \phi, \partial f_1^*/\partial \phi\}$ for these values of p, q, and ϕ are arbitrarily close to the solutions when $p = q = \phi = 0$. Therefore, $\lim_{p,q \to 0} \{h_1^*, f_1^*, h_1^*/\partial\phi, \partial f_1^*/\partial\phi\}$ can be found by evaluating this system of equations at $p = q = \phi = 0$. $\lim_{p,q \to 0} h_1^*, f_1^* = \frac{1}{4}(Y_1 + 2Y_2)$. The solutions for $h_1^*/\partial\phi$ and $\partial f_1^*/\partial\phi$ in each of the optimal adjustment cases is shown below. The ranges of k that rationalize these patterns of optimal adjustment are given below.

Case (a) Always move:

$$\frac{dh_1^*}{d\phi} = \frac{df_1^*}{d\phi} = \frac{\begin{bmatrix} u_h\left(\frac{1}{4}(Y_1+2Y_2) - \frac{1}{2}k, \frac{1}{4}(Y_1+2Y_2) - \frac{1}{2}k\right) \\ -2u_h\left(\frac{1}{4}(Y_1+2Y_2) - \frac{1}{2}k - \frac{1}{2}L, \frac{1}{4}(Y_1+2Y_2) - \frac{1}{2}k - \frac{1}{2}L\right) \\ +u_h\left(\frac{1}{4}(Y_1+2Y_2) - \frac{1}{2}k - L, \frac{1}{4}(Y_1+2Y_2) - \frac{1}{2}k - L\right) \end{bmatrix}}{u_{hh}\left(\frac{1}{4}(Y_1+2Y_2)\right) + u_{hh}\left(\frac{1}{4}(Y_1+2Y_2) - \frac{1}{2}k\right) + u_{hf}\left(\frac{1}{4}(Y_1+2Y_2) - \frac{1}{2}k\right)}$$

Note that the denominator is negative since by assumption $u_{hh} < 0$ and $u_{hh} < u_{hf}$. The numerator will be positive if $u_{hhh} > 0$ everywhere, negative if $u_{hhh} < 0$ and zero if $u_{hhh} < 0$. Therefore, $dh_1^*/d\phi < 0$ if $u_{hhh} > 0$ everywhere, $dh_1^*/d\phi > 0$ if $u_{hhh} < 0$ everywhere, and $dh_1^*/d\phi = 0$ if $u_{hhh} = 0$ everywhere.

Case (b) Move in all but best state:

$$\frac{dh_1^*}{d\phi} = 0;$$

$$\frac{df_1^*}{d\phi} = \frac{1}{2}\frac{\begin{bmatrix} u_h\left(\frac{1}{4}(Y_1+2Y_2), \frac{1}{4}(Y_1+2Y_2)\right) \\ -2u_h\left(\frac{1}{4}(Y_1+2Y_2) - \frac{1}{2}L - \frac{1}{2}k, \frac{1}{4}(Y_1+2Y_2) - \frac{1}{2}L - \frac{1}{2}k\right) \\ +u_h\left(\frac{1}{4}(Y_1+2Y_2) - L - \frac{1}{2}k, \frac{1}{4}(Y_1+2Y_2) - L - \frac{1}{2}k\right) \end{bmatrix}}{u_{hh}\left(\frac{1}{4}(Y_1+2Y_2), \frac{1}{4}(Y_1+2Y_2)\right)}$$

Housing consumption does not change in response to increased risk, ϕ. Food consumption does. Again, the denominator of $df_1^*/d\phi$ is negative. By the same continuity argument using the implicit function theorem as above, as $k \to 0$, the numerator converges to the numerator in Case (a). Therefore, there exists a $k > 0$ such that $df_1^*/d\phi < 0$ for any utility function with $u_{hhh} > 0$ everywhere, since the numerator converges to a value that must be positive if $u_{hhh} > 0$. For larger values of k, depending on the curvature of the utility function, $df_1^*/d\phi$ could be of either sign. $df_1^*/d\phi = \frac{1}{4}k$ for $u_{hhh} = 0$ (quadratic utility), though again this converges to zero as k does. Note that $df_1^*/d\phi$ in the quadratic case merely represents a wealth effect, as $\frac{1}{4}dE\left[f_1^* + h_1^* + \tilde{h}_2 + \tilde{f}_2\right]/d\phi = \frac{1}{4}k$.

Case (c) Move only in worst state:

$$\frac{dh_1^*}{d\phi} = \frac{1}{2}\frac{u_h\left(\frac{1}{4}(Y_1+2Y_2), \frac{1}{4}(Y_1+2Y_2) - L\right) - u_f\left(\frac{1}{4}(Y_1+2Y_2), \frac{1}{4}(Y_1+2Y_2) - L\right)}{u_{hh}\left(\frac{1}{4}(Y_1+2Y_2), \frac{1}{4}(Y_1+2Y_2)\right) - u_{hf}\left(\frac{1}{4}(Y_1+2Y_2), \frac{1}{4}(Y_1+2Y_2)\right)}$$

Again, the denominator is negative. The numerator is positive because marginal utility is falling in consumption and $\frac{1}{4}(Y_1 + 2Y_2) - L < \frac{1}{4}(Y_1 + 2Y_2)$. Therefore $dh_1^*/d\phi > 0$. The general closed-form expression for $df_1^*/d\phi$ is complex and uninformative, but under separability when $u_{hf} = 0$, when utility is of the form $u(h,f) = g(h) + g(f)$ then it reduces to:

$$\frac{df_1^*}{d\phi} = \frac{1}{2}\frac{g'\left(\frac{1}{4}(Y_1+2Y_2) - L - \frac{1}{2}k\right) - g'\left(\frac{1}{4}(Y_1+2Y_2) - L\right)}{g''\left(\frac{1}{4}(Y_1+2Y_2)\right)}$$

As a result, $d(f_1^* + h_1^*)/d\phi$ can be expressed under separability as:

$$\frac{dh_1^* + df_1^*}{d\phi} = \frac{1}{2}\frac{g'\left(\frac{1}{4}(Y_1+2Y_2) - L - \frac{1}{2}k\right) - 2g'\left(\frac{1}{4}(Y_1+2Y_2) - L\right) + g'\left(\frac{1}{4}(Y_1+2Y_2)\right)}{g''\left(\frac{1}{4}(Y_1+2Y_2)\right)}$$

While the sign of this expression will depend on the concavity of g, note that it is positive when $g''' = 0$ because $L > \frac{1}{2}k$. We know that $L > \frac{1}{2}k$ because if not then adjustment would reduce both housing and food consumption in the dual-unemployment state.

Case (d) Never move:

$$\frac{dh_1^*}{d\phi} = -\frac{1}{4}\frac{\left[\begin{array}{c} u_h\left(\frac{1}{4}(Y_1+2Y_2), \frac{1}{4}(Y_1+2Y_2) - 2L\right) - 2u_h\left(\frac{1}{4}(Y_1+2Y_2), \frac{1}{4}(Y_1+2Y_2) - L\right) \\ +2u_f\left(\frac{1}{4}(Y_1+2Y_2), \frac{1}{4}(Y_1+2Y_2) - L\right) - u_f\left(\frac{1}{4}(Y_1+2Y_2), \frac{1}{4}(Y_1+2Y_2) - 2L\right) \end{array}\right]}{4u_{ff}\left(\frac{1}{4}(Y_1+2Y_2), \frac{1}{4}(Y_1+2Y_2)\right) - u_{hf}\left(\frac{1}{4}(Y_1+2Y_2), \frac{1}{4}(Y_1+2Y_2)\right)}$$

Note that the denominator is negative. The numerator is negative when third derivatives are positive. To put this formally, when utility is separable and of the form $u(h,f) = g(h) + f(h)$ then

$$\frac{dh_1^*}{d\phi} = \frac{df_1^*}{d\phi} = \frac{1}{4}\frac{g'\left(\frac{1}{4}(Y_1+2Y_2)\right) - 2g'\left(\frac{1}{4}(Y_1+2Y_2) - L\right) + g'\left(\frac{1}{4}(Y_1+2Y_2) - 2L\right)}{g''\left(\frac{1}{4}(Y_1+2Y_2)\right)}$$

which is positive if and only if $g''' > 0$. As in Case (c) the general closed-form expression for $df_1/d\phi$ is complex and uninformative without separability.

A.1.2 Ranges of k

Define $\nu(x) \equiv u(x,x)$. Note that since utility is strictly increasing it is straightforward to define $\nu^{-1}(u) = x$ such that $\nu(x) = u$. In the limit as $p, q \to 0$, the following ranges for k characterize the optimal pattern of moving as a function of k given Y and L.

Case (a) Always move:

$$k = 0$$

Case (b) Move in all but best state:

$$0 < k \leq \frac{1}{2}(Y_1+2Y_2) - L - 2\nu^{-1}\left(u\left(\frac{1}{4}(Y_1+2Y_2), \frac{1}{4}(Y_1+2Y_2) - L\right)\right)$$

Case (c) Move only in worst state:

$$k > \frac{1}{2}(Y_1 + 2Y_2) - L - 2\nu^{-1}\left(u\left(\frac{1}{4}(Y_1 + 2Y_2), \frac{1}{4}(Y_1 + 2Y_2) - L\right)\right)$$
$$k \leq \frac{1}{2}(Y_1 + 2Y_2) - 2L - 2\nu^{-1}\left(u\left(\frac{1}{4}(Y_1 + 2Y_2), \frac{1}{4}(Y_1 + 2Y_2) - 2L\right)\right)$$

Case (d) Never move:

$$k > \frac{1}{2}(Y_1 + 2Y_2) - 2L - 2\nu^{-1}\left(u\left(\frac{1}{4}(Y_1 + 2Y_2), \frac{1}{4}(Y_1 + 2Y_2) - 2L\right)\right)$$

The three cut-off points are obtained by setting the inequality in equation 5 to equality for $\tilde{Y} = 2Y_2, 2Y_2 - L, 2Y_2 - 2L$, respectively, and setting $h_1^* = f_1^* = \frac{1}{4}(Y_1 + 2Y_2)$.

A.2 Proof of Lemma 2: Quadratic Utility

Lemma 2 *Assume utility is quadratic, so that* $u(h, f) = h - \frac{1}{2}\alpha h^2 + f - \frac{1}{2}\alpha f^2, \alpha > 0$*:*

(a) When k *is such that adjustment is always optimal, then* $\frac{dh_1^*}{d\phi} = 0$*;*

(b) When k *is such that adjustment is optimal if and only if at least one spouse becomes unemployed, then* $\frac{dh_1^*}{d\phi} > 0$*, but approaches zero as* $p, q \to 0$*;*

(c) When k *is such that adjustment is optimal if and only if both spouses become unemployed, then* $\frac{dh_1^*}{d\phi} > 0$*;*

(d) When k *is such that adjustment is never optimal, then* $\frac{dh_1^*}{d\phi} = 0$*.*

Proof. *See Appendix A.2 for proof and closed-form expressions for* h_1^* *and* f_1^**.* ■

Calculating $\partial U(h_1, f_1)/\partial h_1 = 0$ and $\partial U(h_1, f_1)/\partial f_1 = 0$, two equations in two unknowns (h_1, f_1), and solving this pair of equations in each case yields:

Case (a) Always move:

$f_1^* = h_1^* = (Y_1 + 2Y_2 - (p+q)L - k)/4$, so that

$df_1^*/d\phi = h_1/d\phi = 0$;

Case (b) Move in all but best state:

$h_1^* = \left(Y_1 + 2Y_2 - \left((p+q)L - (p+q-\phi)^2 k\right)/(4 - 3p - 3q + 3\phi)\right)$;

$f_1^* = (Y_1 + 2Y_2 - (p+q)L - (p+q-\phi)k)/4$; so that

$dh_1^*/d\phi = (3(p+q)L + (p+q-\phi)(8 - 3p - 3q + 3\phi)k)/(4 - 3p - 3q + 3\phi)^2 > 0$;

$df_1^*/d\phi = k/4 > 0$

Case (c) Move only in worst state:

$h_1^* = (Y_1 + 2Y_2 - (p+q)L - k\phi)/4 + (\phi(2 - p - q)L + (1-\phi)k)/(4 - 3\phi)$;

$f_1^* = (Y_1 + 2Y_2 - (p+q)L - k\phi)/4$, so that

$dh_1^*/d\phi = \left(4\left(2-p-q\right)L + \left(-8\phi+3\phi^2\right)k/4\right)/\left(4-3\phi\right)^2; df_1/d\phi = -k/4 < 0$

$2L > k$ is sufficient (but not necessary) for $dh_1/d\phi > 0$. $2L > k$ can be shown most simply by noting that the decision in the dual unemployment state to move necessarily means having a lower level of housing consumption relative to not moving. So as not to be dominated, moving must allow for a higher level of food consumption than not moving

$$\frac{1}{2}\left(Y_1 + 2Y_2 - 2L - k - f_1 - h_1\right) > Y_1 + 2Y_2 - 2L - f_1 - 2h_1. \qquad (11)$$

If $k > 2L$, then equation 11 implies that $f_1 + 3h_1 > Y_1 + 2Y_2$, which is inconsistent with the optimal values f_1^* and h_1^*. Therefore, $2L > k$ so that $dh_1^*/d\phi > 0$.

Case (d) Never move:

$h_1^* = f_1^* = \left(Y_1 + 2Y_2 - \left(p+q\right)L\right)/4$, so that

$dh_1^*/d\phi = f_1^*/d\phi = 0$

B Appendix B

We use the following procedure to calculate the difference in correlation:

1. Using probit, estimate $I_{UE,i,t} = \lambda 1_{\rho,i,t} + \varsigma_Z Z_{i,t} + \varsigma_\delta \delta_t + \varsigma_\Omega \Omega_{i,t} + \nu_{i,t}$ separately for husbands and wives, where $I_{UE,i,t}$ is an indicator variable for whether a currently-employed husband (wife) becomes unemployed at some point over the subsequent six months.

2. Estimate $\nu_{i,t}$, and predict $I_{UE,i,t}|1_{\rho,i,t} = 0$, and $I_{UE,i,t}|1_{\rho,i,t} = 1$ for each spouse (H, W).

3. Regress $\nu_{H,i,t} \times \nu_{W,i,t} = \tau 1_{\rho,i,t} + \upsilon_Z Z_{i,t} + \upsilon_\delta \delta_t + \upsilon_\Omega \Omega_{i,t} + \varpi_{i,t}$ using OLS.

4. Predict $\nu_{H,i,t} \times \nu_{W,i,t}|1_{\rho,i,t} = 0$, and $\nu_{H,i,t} \times \nu_{W,i,t}|1_{\rho,i,t} = 1$.

5. Compute

$$\frac{\overline{\nu_{H,i,t} \times \nu_{W,i,t}|1_{\rho,i,t} = 1}}{\sqrt{\overline{I_{UE}|1_{H,\rho,i,t} = 1}\left(1 - \overline{I_{UE}|1_{H,\rho,i,t} = 1}\right)\overline{I_{UE}|1_{W,\rho,i,t} = 1}\left(1 - \overline{I_{UE}|1_{W,\rho,i,t} = 1}\right)}}$$
$$- \frac{\overline{\nu_{H,i,t} \times \nu_{W,i,t}|1_{\rho,i,t} = 0}}{\sqrt{\overline{I_{UE}|1_{H,\rho,i,t} = 0}\left(1 - \overline{I_{UE}|1_{H,\rho,i,t} = 0}\right)\overline{I_{UE}|1_{W,\rho,i,t} = 0}\left(1 - \overline{I_{UE}|1_{W,\rho,i,t} = 0}\right)}}$$

6. Estimate the standard errors by bootstrapping (1)-(5) using sampling with replacement and 200 replications.

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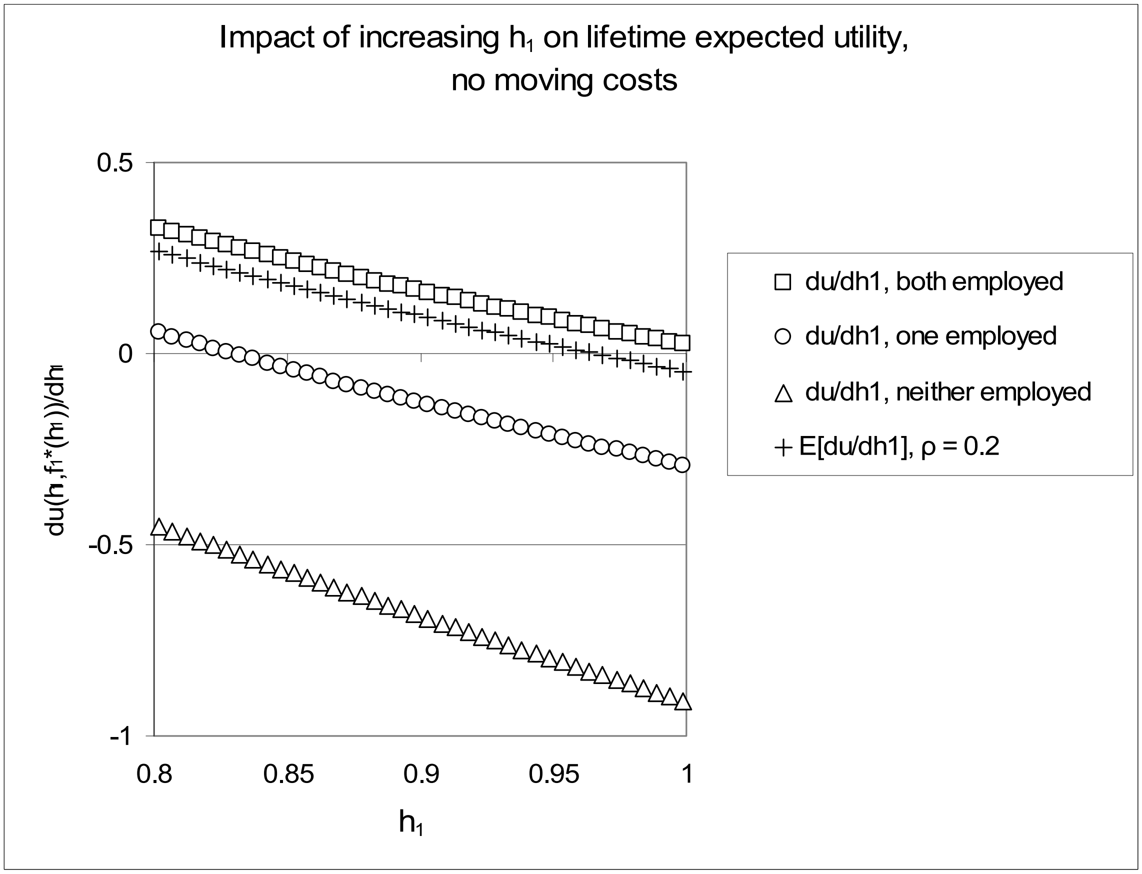
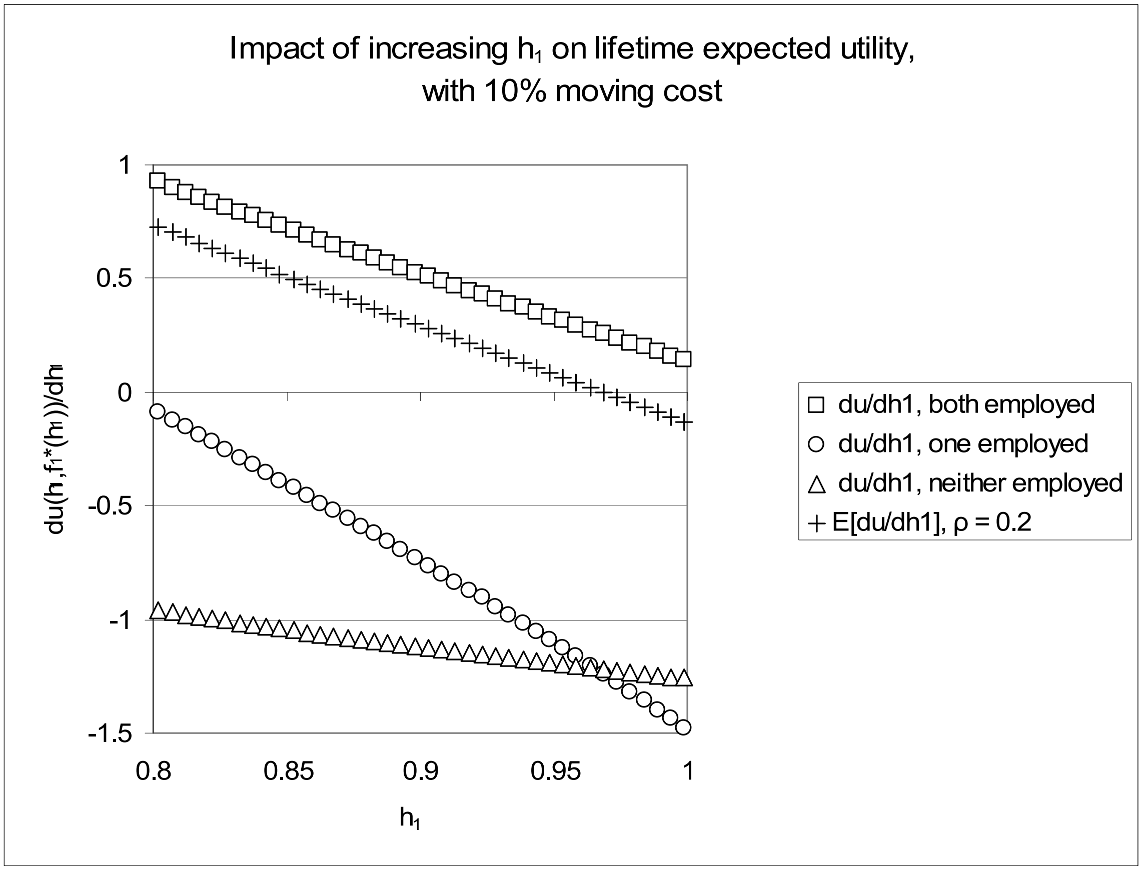
Figure 1:



Notes: This figure plots the marginal lifetime utility of first-period housing consumption against first-period housing consumption. There are no moving costs, so k=0. First-period income, $Y_1=2$; second period income for a given spouse is either $Y_2=1$ with probability 1-p=1-q=0.9 or Y_2-L=0.5 with probability p=q=0.1. As a result, total household second-period income is 2, 1.5, or 1. The correlation of the household's unemployment shocks is $\rho=0.2$. Lifetime utility is given as the sum of log food and log housing consumption in periods 1 and 2.

Figure 2:



Notes: This figure plots the marginal lifetime utility of first-period housing consumption against first-period housing consumption, h_1. The cost of adjusting housing consumption is 10% of h_1. First-period income, Y_1=2; second period income for a given spouse is either Y_2=1 with probability 1-p=1-q=0.9 or Y_2-L=0.5 with probability p=q=0.1. The correlation of the household's unemployment shocks is ρ=0.2. As a result, total household second-period income is 2, 1.5, or 1. Lifetime utility is given as the sum of log food and log housing consumption in periods 1 and 2. Given these parameters, it is optimal to adjust housing consumption in the second period only if both spouses become unemployed within the range of values for h_1 shown.

Table 1.A: IPUMS Summary statistics

	Owners Only		Renters Only	
Variable	Mean	Std. Dev.	Mean	Std. Dev.
Husband and wife report same occupation (1950 definitions)	0.096	0.294	0.096	0.295
Husband and wife report same industry (1950 definitions)	0.141	0.348	0.127	0.333
House value; monthly rent	175,893	129,027	666	332
Family income	91,252	59,064	61,777	39,942
Husband's imputed unemployment rate (p)	0.065	0.022	0.071	0.025
Wife's imputed unemployment rate (q)	0.135	0.038	0.147	0.041
Husband's share of income	0.621	0.170	0.598	0.181
Imputed probability of moving	0.148	0.083	0.196	0.093
Sample average probability of moving	0.112	0.315	0.338	0.473
Number of observations	231,598		48,464	

Notes: Data are from the 1980, 1990, and 2000 IPUMS. Sample construction is detailed in Appendix Table A. Dollar amounts are in real (2000) dollars. The number of observations for the "same industry" row is 240,680 for owners, and 59,987 for renters. The sample size differs because a larger fraction of the IPUMS sample reports their industry than do their occupation.

Table 1.B: SIPP Summary statistics

Variable	Mean	Std. Dev.
Husband and wife report same occupation	0.032	0.155
Husband and wife report same industry	0.094	0.292
Family income	69,570	54,164
Husband's unemployment rate	0.086	0.280
Wife's unemployment rate	0.251	0.434

Notes: Data are from the April 1996 panel of the Survey of Income and Program Participation, which covers 48 months between April 1996 and March 2000. Sample construction is detailed in Appendix Table A.

Table 2: Top 20 Occupations by Percent of Couples Who Share the Same Occupation

	Occupation, 1950 basis	(1) Same Occ. Share of the Occ.	(2) Occ. Share of Sample	(3) Percent of Same Occ. with Occ.
1	Physicians and Surgeons	15.05%	0.51%	1.62
2	Teachers	11.91%	5.24%	13.33
3	Operative and Kindred Workers	11.87%	6.55%	15.77
4	Managers, Officials, and Proprietors	11.27%	11.49%	27.52
5	Lawyers and Judges	10.17%	0.81%	1.80
6	Professors (subject matter unspecified)	7.62%	0.58%	0.94
7	Managers & Superintendents, building	7.60%	0.37%	0.56
8	Professional, technical & kindred workers	7.28%	3.15%	5.01
9	Real estate agents and brokers	6.82%	0.83%	1.17
10	Members of the armed services	5.90%	0.64%	0.79
11	Salesmen and sales clerks	5.52%	4.25%	4.94
12	Clerical and kindred workers	4.97%	8.68%	9.12
13	Janitors and sextons	4.81%	1.46%	1.42
14	Editors and reporters	4.47%	0.39%	0.38
15	Cooks, except private household	4.28%	0.97%	0.88
16	Policemen and detectives	3.72%	0.78%	0.57
17	Mail carriers	3.60%	0.34%	0.23
18	Insurance agents and brokers	3.31%	1.10%	0.77
19	Stock and bond salesmen	3.30%	0.28%	0.17
20	Service workers, except private household	3.00%	0.56%	0.36

Notes: Only occupations comprising at least 0.25 percent of the sample are shown in this table. Column (1) presents the ratio of the number of same occupation couples in an occupation to the number of couples where either (or both) spouse has that occupation. Column (2) is the ratio of the number of couples where either (or both) spouse has that occupation to the total number of couples. Column (3) is the fraction of same occupation couples with this occupation. Data are from the 1980-2000 IPUMS.

Table 3: Probability of one or both spouses becoming unemployed at some point during a 12-month window conditional on both initially employed, by whether the couple shares an occupation

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Unemployment correlation	Probability no spouses unemployed during subsequent 12 months	Probability at most one spouse unemployed during subsequent 12 months	Probability both spouses unemployed at some point during subsequent 12 months	Probability husband becomes unemployed during subsequent 12 months	Probability wife becomes unemployed during subsequent 12 months	# of observations
Different Occupation	0.050 (0.003)	0.813 (0.001)	0.173 (0.001)	0.014 (0.0003)	0.075 (0.001)	0.126 (0.001)	172,348
Same Occupation	0.232 (0.024)	0.862 (0.005)	0.117 (0.004)	0.022 (0.002)	0.053 (0.003)	0.107 (0.005)	5,481
Difference	0.181 (0.024)	0.049 (0.005)	-0.057 (0.005)	0.008 (0.002)	-0.022 (0.003)	-0.019 (0.005)	

Notes: The unit of observation is a couple × month. The sample consists of married couples who both report being employed in any given month. Same occupation couples have the same three-digit occupation codes. The columns are computed using the formula in equation EEE and the estimated unemployment correlations and probabilities from footnote FFF. All estimates condition on household income, the husband's share of the income, the number of people in the household, the number of children, age, education, and occupation of the husband and the wife, and year. Data are from the April 1996 panel of the Survey of Income and Program Participation. Standard errors (in parentheses) are bootstrapped using sampling with replacement and 200 replications.

Table 4: Marginal probability of moving over the next 12 months, by unemployment status

	(1)	(2)
LHS variable	Moves in the next 12 months	
Difference between one newly unemployed and none unemployed	0.027 [7.18]	0.025 [6.73]
Difference between two newly unemployed and one newly unemployed	0.063 [2.35]	0.062 [2.07]
Occupation dummies?	No	Yes
Adjusted R^2	0.1399	0.1861
Number of Observations	201,413	183,430

Notes: z-statistics are in square brackets. The unit of observation is a couple × month. The sample consists of married couples who both report being employed in the current month. The columns report the estimated marginal effects of the number of spouses jointly unemployed on the probability of moving, estimated using a probit. The probability of moving measures whether there will be at least one change of address during subsequent 12 months. All estimates control for: home ownership status, household income, the husband's share of the income, the number of people in the household, the number of children, age, education, and year. Data are from the April 1996 panel of the Survey of Income and Program Participation.

Table 5: The effect of higher correlation in unemployment risk on log house value, for homeowners

LHS variable: log(house value)	(1)	(2)	(3)
Same Occupation [1_ρ]	**0.043** **(0.004)**	**0.027** **(0.003)**	**0.021** **(0.004)**
Husband's unemployment rate [p]	-6.026 (0.271)	-2.290 (0.227)	1.516 (0.375)
Husband's unemployment rate^2 [p^2]	23.872 (1.580)	6.804 (1.304)	-8.089 (2.086)
Wife's unemployment rate [q]	-0.098 (0.205)	0.455 (0.172)	0.213 (0.293)
Wife's unemployment rate^2 [q^2]	-1.234 (0.707)	-1.922 (0.586)	0.460 (1.027)
Husband's unemployment rate × Wife's rate [$p \times q$]	-11.313 (1.496)	-6.554 (1.239)	-2.644 (1.282)
Z controls?	No	Yes	Yes
MSA × year dummies?	No	Yes	Yes
Occupation dummies?	No	No	Yes
Adjusted R^2	0.2976	0.3180	0.3370

Notes: N=231,598. Left-hand-side variable is log(house value). See Appendix Table A for the sample construction. The **Z** vector of demographic controls in columns (2) – (4) include the log family income, husband's percentage share of the couples's income, a vector of dummy variables for the number of persons in the household, number of children, educational attainment of the husband and wife, and age of the husband and wife. Data are from the 1980-2000 IPUMS.

Table 6: How the effect of risk varies with moving costs and the magnitude of potential income losses

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
LHS variable:	Log(Housing spending)		Log(House price)		Log(Rent)		Log(House price)	
Sample:	Everyone		Owners		Renters		Owners	
X variable:	X=1 if renter, 0 if owner		X=P(moving)		X=P(moving)		X=1 if in top 90 percent of UI replacement rate, 0 otherwise	
Same occupation	0.027 (0.005)	0.022 (0.005)	0.046 (0.007)	0.033 (0.007)	-0.057 (0.036)	-0.038 (0.035)	0.073 (0.018)	0.027 (0.017)
Same occupation × **X**	-0.046 (0.010)	-0.039 (0.010)	-0.133 (0.041)	-0.079 (0.041)	0.157 (0.165)	0.175 (0.160)	-0.055 (0.019)	-0.016 (0.018)
Z × **X** controls?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
MSA×year×**X** controls?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Occupation dummies?	No	Yes	No	Yes	No	Yes	No	Yes
Adjusted R^2	0.0863	0.0982	0.5353	0.5498	0.1477	0.2127	0.5575	0.5694
Number of Observations	290,062	290,062	231,598	231,598	58,464	58,464	156,285	156,285

Notes: Housing spending is defined as log annual rent for renters and log(house price × sample average(rent)/sample average(house price)) for owners. The **Z** vector of demographic controls include the log family income, husband's percentage share of the couples's income, a vector of dummy variables for the number of persons in the household, number of children, educational attainment of the husband and wife, and age of the husband and wife. The regressions in columns 7 and 8 also include state × year × **X** controls and report robust standard errors, corrected for correlation by state × year × being in the top 90 percent of UI replacement rate. Data are from the 1980 through 2000 IPUMS except for columns 7 and 8, which use the 1990 and 2000 IPUMS.

Table 7: The effect of same occupation on the demand for homeownership, and the impact of effective moving costs

	(1)	(2)
LHS variable:	Own = 1	
Sample:	Everyone	
X variable:	P(moving)	
Same occupation	-0.018 (0.005)	-0.017 (0.005)
Same occupation × **X**	0.019 (0.027)	0.019 (0.026)
Z × **X** controls?	Yes	Yes
MSA × year × **X** controls?	Yes	Yes
Occupation dummies?	No	Yes
Adjusted R^2	0.1942	0.2024
Number of Observations	290,062	290,062

Notes: Linear probability model where the left-hand-side variable takes the value of 1 if the household owns its own home. See Appendix Table A for the sample construction. The **Z** vector of demographic controls include the log family income, husband's percentage share of the couples's income, a vector of dummy variables for the number of persons in the household, number of children, educational attainment of the husband and wife, and age of the husband and wife. Data are from the 1980-2000 IPUMS.

Appendix Table A: Sample Construction

Restriction	Number lost	Total remaining
Data source: IPUMS		
Original sample		2,778,194
Live in an MSA	1,016,455	1,761,767
Married	779,536	982,231
Husband and wife both age 25 or over	63,992	918,239
Listed occupations	20,499	897,740
Husband and wife both work full-time	572,470	325,270
8 or fewer people in household	1,513	323,757
Not a farm household	2,318	321,439
Family income above zero and not missing	113	321,326
Both husband and wife have income ≥ 0	1,160	320,166
Occupation not rare (contains > 200 persons/year)	17,806	302,360
Cell size for imputing probability of moving ≥ 30	185	302,175
House value or rent non-missing and > 0	12,113	290,062
Data source: SIPP		
Original sample (person × month)		3,897,211
Married couple households × month	3,117,752	779,459
Drop extended families	160,775	618,684
Reported occupation	127,711	490,973
Can follow employment status for six months	90,404	400,569
Employed in current month	130,433	270,136

Sources: 1980, 1990, and 2000 IPUMS; April 1996 panel of the SIPP