



Unemployment insurance in a sticky-price model with worker moral hazard

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ABSTRACT

This paper studies the role of unemployment insurance in a sticky-price model that features an efficiency-wage view of the labor market based on unobservable effort. The risk-sharing mechanism central to the model permits, but does not force, agents to be fully insured. Structural parameters are estimated using a maximum-likelihood procedure on US data. Formal hypothesis tests reveal that the data favor a model in which agents only partially insure each other against employment risk. The results also show that limited risk sharing helps the model capture many salient properties of the business cycle that a restricted version with full insurance fails to explain.

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1. Introduction

Unemployment is a ubiquitous feature of modern economies. Yet in a dynamic general equilibrium setting, unemployment does not emerge unless certain frictions, such as efficiency wages (e.g., Danthine and Donaldson, 1990; Gomme, 1999) or search externalities (e.g., Merz, 1995; Andolfatto, 1996), are built into the labor market. A frequent assumption underlying these models is that workers perfectly insure each other against variations in labor income resulting from job loss. The rationale is that insurance contracts make the intertemporal decisions independent of one's employment status, thereby circumventing complications that arise from heterogeneous work histories. Restoring homogeneity to the model, the argument goes, allows the researcher to focus on the role of labor market imperfections in accounting for unemployment and other important aspects of the data.

Notwithstanding the desire to highlight the labor market, the assumption of complete risk sharing has two potential drawbacks that have received little attention in the macroeconomic literature. First, there is no compelling evidence that points to full insurance as an empirically realistic premise. To the contrary, many studies using micro-level data show that unemployment spells cause a non-trivial decline in one's consumption spending (e.g., Dynarski and Sheffrin, 1987; Cochrane, 1991; Dynarski and Gruber, 1997; Gruber, 1997; Stephens, 2001, 2004). At the very least it would be useful to have a business cycle model that is more consistent with our understanding of the risk-sharing behavior of consumers. Second, the assumption of full insurance is appropriate provided its effect on the conclusions of the model are small. It is

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difficult to determine whether full insurance meets this standard in the absence of a model that embodies alternative insurance possibilities.

In light of these issues this paper estimates an equilibrium model of unemployment that incorporates a menu of different risk-sharing options, and by doing so, departs from the widespread practice of considering only the case of full insurance. More specifically, this paper asks whether the assumption of full insurance is sufficient to explain most of the key properties of the US business cycle, or whether limiting the insurance opportunities substantially improves the fit of the model. To that end, I construct a dynamic sticky-price model that gives prominence to a frictional labor market along the lines of [Alexopoulos \(2004\)](#). The central idea is that workers face a temptation to shirk that arises from firms' inability to monitor effort. Consequently, employers design a payment mechanism that discourages shirking. The outcome corresponds to an efficiency wage that exceeds the market-clearing level and makes unemployment an equilibrium feature of the economy.

Unemployment insurance enters the model by means of an income-pooling device that permits, but does not force, agents to fully insure each other against employment risk. Workers contribute a portion of their earnings into a fund that is redistributed equally to the unemployed. Individual contributions are governed by an exogenous function that defines the scope of insurance coverage. The specification used in the model can accommodate any one of a continuum of different arrangements, including both partial and full insurance cases.¹

The paper proceeds by estimating the parameters of the model using a maximum-likelihood procedure with quarterly US data on per capita consumption, investment, the real wage, inflation, and the nominal interest rate. Two versions of the model are estimated that differ in their treatment of risk sharing. One leaves the insurance parameter unconstrained, allowing the data to ascertain the extent of risk sharing among agents. The second restricts this parameter prior to estimation to guarantee full insurance in equilibrium. Likelihood ratio tests provide the basis for a formal comparison of fit between the restricted, full insurance version and the unrestricted alternative that allows for partial insurance. Econometric results indicate that the data prefer a model in which agents are only partially insured. Point estimates of the insurance parameter imply that individual consumption is about 38 percent less for unemployed members. A likelihood ratio test of the null hypothesis of full insurance is easily rejected at standard significance levels.

Although useful for comparing model fit, likelihood ratio tests are not very informative about precisely which features of the data are better explained by the inclusion of partial insurance. Imposing the full insurance restriction causes all of the parameters to deviate from their unconstrained estimates, so any discernable shift in empirical performance is the result of changes in all of the parameter values, not just in the degree of risk sharing. The log-likelihood criterion alone is, therefore, not sufficient to identify the specific contribution of the partial insurance mechanism. To evaluate the role of insurance coverage independently from other features of the model, I conduct various simulations of the unconstrained model with partial insurance and compare the findings to those from an identical version with full insurance imposed after estimation. First, impulse response functions show that partial insurance, by altering the pattern of real wage dynamics, enables key structural shocks to have a bigger and more persistent effect on measures of real economic activity. Second, evidence from a broad survey of moments confirms that limited risk sharing helps match the low relative volatility of the real wage and the small correlation between wages and output observed in the data. It also boosts the degree of wage persistence, as reflected in the correlations between current and lagged real wages. Third, variance decompositions reveal that the unrestricted model with partial insurance is more consistent with the belief that monetary shocks have a modest impact on the business cycle, while investment-specific technology shocks play a dominant role in driving economic fluctuations.

1.1. Related literature

There are a few recent papers showing that the performance of business cycle models can be improved in certain areas by restricting the insurance opportunities available to agents. Using a GMM procedure, [Alexopoulos \(2004\)](#) estimates a flexible-price model with unobservable effort driven by technology and fiscal shocks. Two distinct insurance arrangements are examined by imposing alternative calibrations on the wage-pooling equation. The first is the case of full insurance, and the second is a partial insurance plan whereby consumption declines by about 22 percent when unemployed. The results indicate that partial insurance helps amplify and propagate the responses to both shocks while improving the volatility and co-movement of real wages and employment. In a related paper [Alexopoulos \(2007\)](#) shows that partial insurance also generates a more sluggish price response to monetary shocks from the perspective of a limited participation model.

Aside from the inclusion of sticky prices, this paper extends [Alexopoulos'](#) research by conducting statistical inference on the insurance component of the model. [Alexopoulos](#) bases her comparison of insurance schemes on an assortment of key second moments, leaving open the question of whether partial insurance actually improves the fit of the model. I impose greater econometric discipline by estimating the degree of risk sharing in an environment that nests full insurance as a special case. The maximum-likelihood strategy employed here enables the researcher to formally test the null hypothesis of complete risk sharing against the alternative of partial insurance.

[Givens \(2008\)](#) develops a monetary business cycle model that combines sticky prices with unobservable labor effort. Similar to the present study, his model features an insurance mechanism that allows for varying degrees of risk sharing.

¹ I avoid computational problems related to consumption heterogeneity by using a family construct that makes all decisions regarding asset accumulation (e.g., [Alexopoulos, 2004](#); [Danthine and Kurmann, 2004](#)).

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