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# How beneficial was the Great Moderation after all?

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ABSTRACT

This paper computes the welfare effect of the Great Moderation, using a representative-agent consumption-based asset pricing model. The Great Moderation is modeled according to the data properties of consumption and dividend growth rates, which display a reduction of their innovation-volatility and increased persistence: the latter is a characteristic that has been largely unaddressed in the literature. The theoretical model (a long-run risk model) is calibrated to match average asset pricing variables, as well as consumption and dividend dynamics before and during the Great Moderation. The model captures the relevant features of the Great Moderation (decreased variance, increased persistence, asset prices). It predicts only a modest welfare gain from Great Moderation (0.38 percent in consumption equivalent), due mainly to the utility cost of a late uncertainty resolution.



## 1. Introduction

The Great Moderation has received an enormous amount of attention in the literature, much of it devoted to assessing a range of possible causal factors.[1] Relatively little research, however, has addressed whether the Great Moderation was important in terms of improving households' welfare. After all, how beneficial was the Great Moderation? In this paper I calculate the welfare gain caused by the Great Moderation, and conclude that it is more than likely modest, equal to 0.38 percent in consumption equivalent terms. The main insight that explains the absence of a large Great Moderation gain follows from the increased persistence of consumption since the early eighties, as well as the roughly unchanged asset price moments throughout the post-war period.

Accurately computing the welfare gain from the Great Moderation requires two important factors. First, as argued by Obstfeld (1994) and Otrok (2001b), if preferences are not time-separable, economic agents care not only about the magnitude of fluctuations in consumption but also about the persistence and other temporal characteristics of those fluctuations. Hence, computed welfare gains depend crucially on the assumed laws of motion of consumption before and during the Great Moderation. Therefore, the first feature of my analysis carefully accounts for how both consumption variance and persistence have changed during the Great Moderation period. Second, because macroeconomic fluctuations are a source of risk for households, models intended to assess the gain from this risk reduction ought to have empirically

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[1] Kim and Nelson (1999), McConnell and Perez-Quiros (2000), and Blanchard and Simon (2001) are among the pioneers of the literature on the Great Moderation. A survey of this literature can be found in Stock and Watson (2003).

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reasonable asset pricing implications, as discussed by Tallarini (2000). In fact, these observed prices are our best measures of how actual agents value risk. Therefore, a second feature of my analysis closely scrutinizes the asset pricing implications of the models used for computing welfare.

The vast literature on the Great Moderation focuses mainly on the significant reduction in the variance of either the growth rates of macroeconomic variables or of their business cycle components. However, in the empirical part of the paper I argue that the Great Moderation is also characterized by an increased persistence of both consumption and dividends.[2] Whereas the decline of the volatility of consumption and dividend innovation shocks has a stabilizing effect, the increased estimated persistence shifts the resolution of uncertainty from the short run to the long run. This finding is important because, depending on the preferences used to measure agents' welfare, later resolution of uncertainty (driven by the increased persistence) might actually reduce the welfare gain of the Great Moderation. In addition, I investigate whether the Great Moderation has also influenced some of the key moments of financial variables, such as the mean and variance of the risk-free rate, of the equity premium, and of the Sharpe ratio. The main result is that asset price moments are roughly stable throughout the post-war period. To summarize, I identify three important stylized facts about the effects of the Great Moderation: first, the unconditional variance of consumption and dividend growth has largely declined; second, their autocorrelation structure displays an increased persistence; third, asset pricing moments seem to have remained fairly stable.

With these considerations in mind, I propose an asset pricing model that is able to replicate the three effects of the Great Moderation described above. I consider a long-run risk model as in Bansal and Yaron (2004). The choice of this model is motivated by several factors. First, it is one of the few consumption-based asset pricing models in the literature that can replicate both first and second moments of asset pricing. The ability of the long-run risk model to match the asset pricing moments derives from the assumption of non-separable utility function (as in Epstein and Zin, 1989) and the presence of a small and largely persistent component in the consumption and dividend processes, i.e. the long-run risk. Second, this model includes the dynamics of both consumption and dividends. Third, it is suitable for welfare calculations, as showed by Croce (2013). I consider two main departures from Bansal and Yaron (2004)'s original model. First, I abstract from stochastic time-varying probability of the exogenous processes, and, second, I characterize the exogenous dynamics of consumption and dividend growth with a richer autoregressive process (a third order autoregressive polynomial), which perfectly captures the shift in the variance and autocorrelation of consumption and dividend growth before and during the Great Moderation, as estimated in the data.

Given the tight relationship between the statistical properties of consumption and dividend processes, asset prices, and welfare, one of the contributions of this paper is to discipline the model to be able to match the variance of consumption and dividend growth, their autocorrelation, and a set of asset price moments for both the pre-Great Moderation sample (1950Q1–1983Q4) and the Great Moderation sample (1984Q1–2007Q4). Specifically, since the ultimate goal of the paper is to assess the welfare change due to the Great Moderation, it is necessary to assume that the preferences of economic agents did not change in the two subsamples. Otherwise, it would not be possible to assess the welfare implications of a change in the statistical structure of the exogenous processes (such as a reduction in their variance, or an increase in their persistence) since welfare differentials would be driven by shifts in taste. I calibrate the parameters characterizing the joint stochastic process of consumption growth, dividend growth, and long-run risk component to match the following target moments in each of the two subsamples: the first three autocorrelation coefficients and standard deviation of consumption and dividend growth, and the average and standard deviation of the equity premium. The proposed calibration successfully replicates the target moments in the two subsamples. Then, the theoretical framework allows computation of the welfare gain of the Great Moderation: I conclude that the welfare gain is rather modest and equal to 0.38 in consumption equivalent terms. Alvarez and Jermann (2004) propose a method to compute the marginal cost of consumption fluctuations as a function of only observable time series. Applying the same procedure as in Alvarez and Jermann (2004) in the pre-Great Moderation period and in the Great Moderation period, I find that the model-free welfare gain of the moderation is equal to 0.11 percent, which is similar to the benchmark result derived above. Given its nature, however, the model-free welfare calculation is not able to disentangle the role of the different effects on welfare that were characteristic of the Great Moderation.

The theoretical model, in fact, is useful for isolating and understanding the welfare contributions of the different features that characterize the Great Moderation. The Great Moderation period relates to the pre-Great Moderation period in three dimensions. The Great Moderation, in fact, experiences a reduction in the unconditional variance of consumption and dividend growth (*variance effect*), a shift of the autocorrelation structure of consumption and dividend growth (*autocorrelation effect*), and a roughly constant set of asset pricing moments (*asset price effect*). Another contribution of the paper is to examine in isolation the role of each of these forces on asset prices and welfare, by running two alternative scenarios. In the first scenario, I assume that an economist is interested only in matching the observed decline in the unconditional variance of consumption and dividend growth in the Great Moderation period. Hence, in this scenario, I isolate the role of the *variance effect*. In this case the predicted average equity premium largely decreases: intuitively, since the economy is less exposed to *iid* risk, the return of risky assets is similar to the return of the risk-free asset. The welfare gain of moving from the pre-Great Moderation period to this counterfactual scenario, described only by a decline in the

[2] Pancrazi (2013) and Pancrazi and Vukotic (2013) find similar results for consumption, investment, and output, and for the Solow residuals, respectively.