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# Elastic attention, risk sharing, and international comovements☆

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ABSTRACT

In this paper we examine the effects of elastic information-processing capacity (or elastic attention) proposed in Sims (2010) on international consumption and income correlations in a tractable small open economy (SOE) model with exogenous income processes. We find that in the presence of capital mobility in financial markets, elastic attention due to a fixed information-processing cost lowers the international consumption correlations by generating heterogeneous consumption adjustments to income shocks across countries facing different macroeconomic uncertainty. In addition, we show that elastic attention can improve the model's predictions for the other key moments of the joint dynamics of consumption and income.



## 1. Introduction

Standard international real business cycle models have difficulty explaining some stylized facts in open economies. One of the major inconsistencies between the models' predictions and the empirical evidence concerns cross-county consumption and income correlations. Specifically, in a canonical open economy model under the complete market assumption, risk averse consumers will insure country-specific risk using international financial markets, which leads to highly, even fully correlated consumption regardless of output (or income) correlations.[1] However, the empirical evidence suggests that cross-country

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[1] See Chapter 6 in Obstfeld and Rogoff (1996) for a textbook treatment on this topic.

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consumption is far from perfectly correlated; in fact they are lower than output (or income) correlation in most cases.[2] Backus et al. (1992) call this inconsistency the "most striking discrepancy" between data and theory (Henceforth, the BKK puzzle).

In this paper, we propose a novel explanation for the BKK puzzle by incorporating elastic attention, which is optimally chosen by agents in response to fundamental shocks, into an otherwise standard small open economy (SOE) model. Specifically, we follow Sims (2010) and assume that individual consumers face fixed information-processing costs and thus have only limited and elastic information-processing capacity when making major economic decisions. Consequently, consumers cannot perfectly observe the state of the economy and learn the true state using noisy observations. Furthermore, they optimally choose information-processing capacity and make decisions based on perceived information.[3] Many empirical studies found that incomplete information about the state plays an important role in affecting individual agents' optimal decisions. For example, Coibion and Gorodnichenko (2012, 2015) find pervasive evidence consistent with Sims' rational inattention model using the U.S. surveys of professional forecasters, ordinary consumers and investors.[4] In particular, Coibion and Gorodnichenko (2015) find that information rigidities were falling from the late 1960s to the early 1980s as the volatility of macroeconomic variables was rising, while had been consistently increasing since the start of the Great Moderation (1983–1984). They then argue that one should be careful when treating information rigidities at the macro level as a structural parameter because these rigidities vary over time in response to changes in macroeconomic conditions.[5]

After incorporating this elastic attention idea, we first solve the model in closed-form solution and explicitly show that the elastic attention mechanism can endogenously generate heterogeneous and gradual consumption adjustments to income shocks across countries, and thus make the model better explain international consumption and income correlations as well as some other key stochastic properties of the joint dynamics of consumption and income in individual countries.

Our closed-form solution can help analytically inspect the key mechanism behind the results. We show there are three competing channels that interact and determine the consumption correlation in our benchmark model. The first channel is *the slow adjustment channel*. Specifically, if the home country and the rest of the world in our model economy have the same degree of slow adjustment, imperfect state observations generate a same pattern of gradual responses of consumption growth to income shocks, and the channel has no impact on the cross-country correlation because its impacts on consumption variance and cross-country consumption covariance are just cancelled out.[6] The second channel is *the common noise channel*. The common noise arising from imperfect observations is partially common within countries and is independent across countries. After aggregating over individual consumers, the common noise reduces consumption correlations across countries because it increases consumption volatility while having no effect on the covariance of consumption across countries. This channel can help distinguish our model from others such as the habit formation model and the model with incomplete information about income which cannot reduce the consumption correlation. The third channel is *the elastic attention channel*. Individual consumers facing fixed information-processing costs optimally choose their information-processing capacity (i.e., the degree of elastic attention) that affects the speed of consumption adjustment via interacting with the fundamental uncertainty. The gap between heterogeneous responses of consumption to income due to the elastic attention further reduces the cross-country consumption correlation.

It is worth noting that the elastic attention channel is different from that obtained in the rational inattention model with fixed capacity (e.g., Sims, 2003; Luo, 2008). Specifically, when the marginal cost of processing information is fixed while the optimal information-processing capacity can be adjusted in response to fundamental shocks, both the variance of noise and the speed of adjustment depend on the amount of fundamental uncertainty, which differs across countries by nature. This endogenous variation in the optimal information-processing capacity is the key underlying mechanism that generates *greater* heterogeneity and thus lowers cross-country consumption correlations. In addition, to separate the elastic attention channel and the common noise channel, we calibrate the key parameter on the common noise channel using three different national media concentration measures. By fixing the common noise parameter at the calibrated values, our quantitative results show that the model with elastic attention does a reasonably good job in matching the empirical counterparts of consumption correlations across countries.

To the best of our knowledge, most of the previous efforts to solve the BKK puzzle assume that consumers have infinite information-processing ability. In contrast, as shown in Sims (2003, 2006), the rational inattention hypothesis can provide a micro-foundation for modeling stickiness, randomness and delays observed in economic behavior.[7] This paper considers

[2] Table 1 of this paper reports the cross-country consumption and income correlations using the G-7 data.

[3] The assumption is also consistent with a psychology theory on elastic attention proposed in Kahneman (1973). It is worth noting that Sims (2003) first proposed the rational inattention hypothesis by assuming that economic agents only have limited and fixed capacity/attention, and did not study the elastic attention case.

[4] Hong et al. (2007) find supportive evidence for rational inattention in the financial markets. Specifically, they find that investors in the stock market react gradually to information contained in industry returns about their fundamentals and that information diffuses only gradually across markets.

[5] See Maćkowiak and Wiederholt (2015), Matejka and McKay (2015), Cheremukhin and Tutino (2016), and Luo and Young (2016) for applications of elastic attention in other macroeconomic settings.

[6] As will be discussed in Section 3.3, some other hypotheses such as habit formation can generate the same effect on the consumption correlation. Note that here we just use the basic formula for the correlation between two variables $X$ and $Y$: $\mathrm{cov}(X,Y)/(\mathrm{sd}(X)\,\mathrm{sd}(Y))$, where $\mathrm{cov}(X,Y)$ is the covariance between $X$ and $Y$, and $\mathrm{sd}(X)$ and $\mathrm{sd}(Y)$ are standard deviations of $X$ and $Y$, respectively.

[7] See Luo (2008) and Maćkowiak and Wiederholt (2009) for the applications of RI in the consumption and firm decisions within the linear-quadratic-Gaussian setting.