Relative Consumption Benchmarks

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Consumption benchmarks, of both the internal and external types, have recently moved beyond the realm of asset pricing models and been applied in other macroeconomic settings.[1] Ljungqvist and Uhlig (2000) study the role of consumption externalities in setting the optimal labor tax rate. Uribe (2002) shows that internal habit persistence in consumption goes a long way towards explaining observed dynamics of terms-of-trade and consumption following exchange-rate-based stabilization programs. Fuhrer (2000), also using a model featuring internal habit persistence, shows that habits have implications for the transmission mechanism of monetary policy. These are but a very few of the papers in recent years that have successfully used consumption benchmarks to explain various macroeconomic phenomena. While each of these authors shows that consumption benchmarks are useful in solving some puzzle, they all introduce benchmarks into the representative agent's utility function in a specific way, either in an additive form (for example, Ljungvist and Uhlig (2000) and Uribe (2002)) or in a multiplicative form (for example, Fuhrer (2000)).

Dupor and Liu (2003) make an interesting but as-yet little-exploited contribution to the evolving discussion on consumption externalities in macroeconomics by identifying two distinct aspects of such externalities. By disentangling the concepts of jealousy/admiration and keeping-up-with-the-Joneses/running-away-from-the-Joneses (KUJ/RAJ), they provide researchers interested in the effects of consumption externalities general tools to use.

Before proceeding, I offer a more general intuitive interpretation of the concepts KUJ and RAJ than in Dupor and Liu (2003). Simply put, KUJ is a desire to be similar to others, while RAJ is a desire to be different from others. The phrase "keeping *up*" suggests that individuals are always struggling to *increase* their consumption to match that of some reference group. However, "keeping *down* with the Joneses" seems a perfectly well-defined notion as well. Frank (1999) anecdotally discusses how he once refrained from purchasing a showy car only because his neighbors owned

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[1] Abel (1990) and Gali (1994) are two of the seminal early examples of applications to asset pricing.

more pedestrian vehicles – seemingly an instance of keeping *down* with the Joneses. In any case, Dupor and Liu show very elegantly that these two competing desires are independent of whether an individual is jealous or admiring of others.

However, by positing the individual's objects of choice to be consumption and leisure and appealing to intuition to suggest that externalities are unimportant in leisure, Dupor and Liu (2003) are perhaps not quite as general as they could be. I aim here to extend their analysis slightly to allow for externalities of different intensities on two different goods. Two common examples of two-good models, in which neither of the goods is leisure, are international models featuring tradables and nontradables and monetary models featuring cash goods and credit goods. In Chugh (2002), I show that allowing externalities of different intensities on cash goods and credit goods in an otherwise standard cash-in-advance economy delivers implications for optimal monetary policy and the welfare costs of inflation different from the usual ones. While it is true that Frank (1999) argues that externalities seem to be unimportant in leisure, his more general point is that context affects different goods differently,[2] and it is this idea that motivates me in Chugh (2002) and here.

Consider a representative agent with period utility function

$$u(c_1, x_1, c_2, x_2), \tag{1}$$

where c_1 and c_2 are the agent's consumption of two different goods, x_1 and x_2 are per capita consumption of the two goods, and utility is strictly increasing and strictly concave in c_1 and c_2. I consider the environment to be an endowment environment, with the endowment, denoted e, costlessly transformed into either of the consumption goods.

Following Dupor and Liu (2003), define jealousy (admiration) in good 1 to be $u_2 < 0 (> 0)$, and jealousy (admiration) in good 2 to be $u_4 < 0 (> 0)$. Let

$$z(c_1, x_1, c_2, x_2) \equiv \frac{u_1(c_1, x_1, c_2, x_2)}{u_3(c_1, x_1, c_2, x_2)} \tag{2}$$

be the individual's marginal rate of substitution between the two goods. Preferences display KUJ (RAJ) in good 1 if $dz/dx_1 > 0 (< 0)$, and preferences display KUJ (RAJ) in good 2 if $dz/dx_2 < 0 (> 0)$. Notice that the specification of Dupor and Liu (2003) is recovered by setting $u_4 = 0$, $dz/dx_2 = 0$, and interpreting good 2 to be leisure.

The individual's problem is to maximize (1) subject to the constraint $c_1 + c_2 = e$, with x_1 and x_2 taken as given. The first-order condition in a symmetric equilibrium is

$$u_1(c_1, c_1, c_2, c_2) = u_3(c_1, c_1, c_2, c_2). \tag{3}$$

Because the endowment is freely transformed into either good, the individual chooses consumption of the two goods so that the marginal rate of substitution is one.

[2]See in particular his page 165.

In contrast, a social planner does not take x_1 and x_2 as given. The social planner sets $c_1 = x_1$ and $c_2 = x_2$ directly in the utility function before maximizing with respect to the resource constraint, so the first-order condition for the planner is

$$u_1(c_1, c_1, c_2, c_2) + u_2(c_1, c_1, c_2, c_2) = u_3(c_1, c_1, c_2, c_2) + u_4(c_1, c_1, c_2, c_2). \tag{4}$$

Comparing the two first-order conditions, it is clear that if jealousy (admiration) on each of the two goods is equal at the symmetric Pareto optimal allocation, then the decentralized economy achieves the Pareto optimum. This result is similar to the result shown in Chugh (2002) that if externalities are of equal intensity on both the cash good and the credit good, then consideration of optimal monetary policy and welfare costs of inflation proceeds as in a standard cash-in-advance economy. That is, equal-intensity jealousies "cancel out" in some sense. But this is a knife-edge case. Consider instead the case where good 2 features either mild jealousy or mild admiration (the magnitude of u_4 is small but nonzero) and good 1 features strong jealousy (u_2 is negative and large).[3] Then it is clear, using the same argument as in Dupor and Liu (2003), that the symmetric equilibrium allocation features overconsumption of good 1 relative to the Pareto optimum, and hence, because of the fixed endowment, underconsumption of good 2. Thus, different intensities of jealousy on different goods lead to an inefficient consumption mix.

I now consider how KUJ/RAJ interacts with jealousy. Similar to the result in Dupor and Liu (2003), KUJ in this model has the potential to amplify the distortion only if the jealousies on the two goods are of different intensities. That is, if the jealousies "cancel out" in the sense described above, then KUJ cannot affect the equilibrium allocation. Without loss of generality, consider the case already described that strong jealousy exists on good 1 and either mild jealousy or mild admiration exists on good 2, so that the equilibrium allocation features overconsumption of good 1. If KUJ exists on both of the two goods, then the perceived rise in per capita consumption of good 1 steepens the private indifference curve at the asymmetric equilibrium, and the corresponding *fall* in perceived per capita consumption of good 2 (because $x_1 + x_2 = e$, where e is the fixed endowment) also causes the indifference curve to steepen (recall that KUJ in good 2 means $dz/dx_2 < 0$). The result is that overconsumption of good 1 is amplified by the presence of KUJ on both goods. However, if good 1 exhibits KUJ but good 2 exhibits RAJ, there are offsetting effects on the private indifference curve at the asymmetric equilibrium. The private indifference curve may steepen or flatten depending on which effect is stronger. Whether consumption of good 1 rises even further due to this "relative Joneses" effect cannot be determined. KUJ on good 1 and RAJ on good 2 may balance each other exactly so that there is no amplification effect at all. Indeed, the overconsumption of good 1 could be mitigated by the relative Joneses effect or even eliminated altogether.

[3]The reason why neither u_2 nor u_4 can be zero is discussed below.

Figures 1 and 2, which are analogous to Figure 2 in Dupor and Liu (2003), present some of the above arguments using a simple functional form. Suppose the utility function is

$$u(c_1, x_1, c_2, x_2) = \frac{[c_1 - \alpha_1 x_1]^{1-\gamma_1}}{1-\gamma_1} + \frac{[c_2 - \alpha_2 x_2]^{1-\gamma_2}}{1-\gamma_2}, \tag{5}$$

with $\gamma_i > 0$ and $\alpha_i < 1$, $i = 1, 2$. Given our definitions, $\alpha_i > 0$ ($\alpha_i < 0$) implies jealousy (admiration) on good i, irrespective of the precise values of γ_1 and γ_2. An attractive property of this utility specification is that, given $e = 2$, which we will assume, the decentralized symmetric allocation is invariant to utility parameters and is pinned down only by the slope of the resource frontier.[4]

Using this example utility function, in the left panel of Figure 1, the social planner's indifference curve I_0 is tangent to the resource constraint at point A.[5] With jealousy on good 1 and mild jealousy or mild admiration on good 2, the private indifference curve is steeper than I_0 at the planner's allocation. Holding constant the values of x_1 and x_2 at their socially-optimal levels, the individual is induced to choose point B, where indifference curve I_1 is tangent to the resource constraint. Thus, the relative jealousy causes overconsumption of good 1 in *partial* equilibrium because point B represents an asymmetric allocation.

The second panel of Figure 1 shows how in the decentralized *symmetric* equilibrium, the overconsumption of good 1 is unambiguously amplified by the presence of KUJ on both goods. The private indifference curve steepens even further at point B, which induces the representative agent to consume at point C, where indifference curve I_2 is tangent to the resource constraint. Point C features higher c_1 than does point B.

Alternatively, for the same intensities of jealousy/admiration (i.e., holding fixed the values of α_1 and α_2 in our example), the overconsumption of good 1 could also be dampened, as illustrated in Figure 2.[6] With only a slight change in the curvature of utility over good 1, the left panel of Figure 2 again plots as point A the socially-optimal allocation, which lies on indifference curve I_0. As before, the relative jealousy causes overconsumption of good 1 in *partial* equilibrium because point B represents an asymmetric allocation. Now, however, holding constant the KUJ effect on good 1, if RAJ on good 2 is sufficiently strong, the overconsumption of good 1 can be *dampened*, so that the decentralized symmetric allocation, point C, lies between point A and point B.[7]

The difference between the two example parameterizations behind Figures 1 and 2 is very slight,

[4]For $e = 2$, the decentralized symmetric allocation is simply $c_1 = c_2 = e/2 = 1$ for any $(\gamma_1, \gamma_2, \alpha_1, \alpha_2)$.

[5]The specific parameter values we use in plotting Figure 1 are $e = 2$, $\alpha_1 = 0.5$, $\alpha_2 = 0.05$, $\gamma_1 = 1.5$, and $\gamma_2 = 0.5$. The solution point A is $(c_1 = 0.673, c_2 = 1.326)$, the solution point B is $(c_1 = 0.954, c_2 = 1.046)$, and the solution point C is $(c_1 = 1, c_2 = 1)$.

[6]Compared to Figure 1, we now set $\gamma_1 = 0.5$, keeping other parameters unchanged.

[7]The solutions in Figure 2 are: point A is $(c_1 = 0.551, c_2 = 1.449)$, the solution point B is $(c_1 = 1.157, c_2 = 0.843)$, and the solution point C is $(c_1 = 1, c_2 = 1)$.

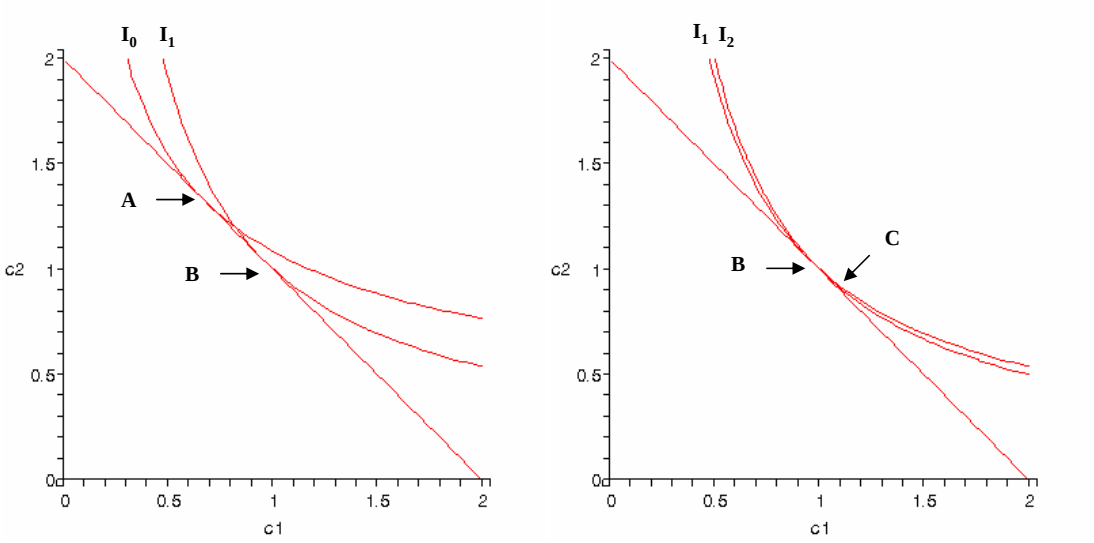

Figure 1: **Overconsumption can be amplified by the "relative Joneses" effect.** Left panel shows that relative jealousy on good 1 causes overconsumption of good 1 — point A is the symmetric Pareto-optimal allocation, point B is the asymmetric decentralized allocation. Right panel shows that if KUJ exists on both goods, or if KUJ on good 1 dominates RAJ on good 2, then overconsumption of good 1 is amplified — point B is the asymmetric decentralized allocation, point C is the symmetric decentralized allocation.

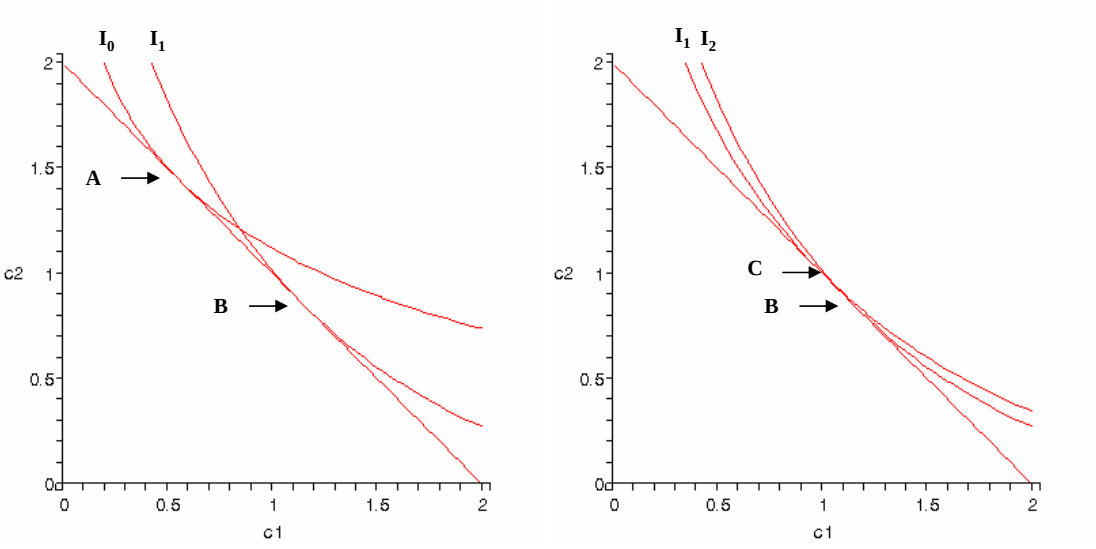

Figure 2: **Overconsumption can be dampened by the relative Joneses effect.** Left panel shows that relative jealousy on good 1 causes overconsumption of good 1 — point A is the symmetric Pareto-optimal allocation, point B is the asymmetric decentralized allocation. Right panel shows that if KUJ exists on good 1 but sufficiently-strong RAJ exists on good 2, then overconsumption of good 1 is dampened — point B is the asymmetric decentralized allocation, point C is the symmetric decentralized allocation.

reflecting just a modest change in the degree of risk aversion for good 1. This suggests that the effects we are discussing may not be simply mathematical curiosities, but instead may be present in quite standard calibrations of quantitative models. In turn, this suggests that quantitative models that employ consumption externalities may be taking stands on the issues we point out without even being aware of doing so because the relative Joneses effect can switch sign quite easily.

Developing a parametric example in which RAJ on good 2 is so strong that it completely eliminates, or even reverses, the overconsumption of good 1 induced by the relative jealousy is more challenging. The example utility function we present above cannot achieve these effects. However, it seems that *some* utility function would exhibit such a property, as our intuitive discussions above suggest. Such a utility form may, for example, involve (perhaps complicated) Giffen effects between the goods.

The assumption here of an endowment economy has allowed sharp consideration of a phenomenon potentially important for the discussion of consumption externalities: if per capita consumption of some good increases, then per capita consumption of some other good must decrease.[8] That is, $x_1 + x_2 = e$. In the context of a consumption-leisure tradeoff, in the absence of any changes in productivity, increased per capita consumption must be accompanied by decreased per capita leisure, and vice versa. So the assumption of an endowment economy does not drive the results described here. The analysis of the other configurations of relative jealousies and relative Joneses effects proceeds analogously. The broad lesson that emerges is that it is ultimately relative jealousies and relative Joneses effects that matter in models of consumption externalities. In any particular application, intuition or empirical evidence will have to guide the directions of these two independent effects.

[8] In the short-run, at least.

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