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Equity Aversion, Inequity Aversion and Economic Welfare: On the Macroeconomic Substantiation of Microeconomic Utility Functions

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Equity Aversion, Inequity Aversion and Economic Welfare

On the Macroeconomic Substantiation of Microeconomic Utility Functions

Friedrich L. Sell, Felix Stratmann

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Gleichheitsaversion, Ungleichheitsaversion und Wohlfahrt: Zur makroökonomischen Fundierung mikroökonomischer Nutzenfunktionen

von
Friedrich L. Sell und Felix Stratmann

Zusammenfassung:

In einem ersten Abschnitt modellieren wir zunächst die Dynamik einer Volkswirtschaft, stark vereinfacht, mithilfe trivialer Kreislaufzusammenhänge. Anschließend demonstrieren wir für Konsum (Nacheifern vs. Abstand halten) und Investition (Innovation vs. Imitation) die Tendenzen zu Konvergenz (Ungleichheitsaversion) und Divergenz (Gleichheitsaversion) in der Makroökonomie. Mit den Ergebnissen der makroökonomischen Analyse wenden wir uns der mikroökonomischen Modellebene zu und zeigen, wie sich die Eigenschaften, Zielfunktionen und Ergebnisse von ausgewählten Fairness-Modellen mit sozialen Präferenzen bei Integration von „Gleichheitsaversion“ in den theoretischen Rahmen ändern. Die gesammelten Resultate der makro- und mikroökonomischen Analyse ermöglichen uns dann eine Reihe interessanter wirtschaftspolitischer Schlussfolgerungen, beispielsweise für die Konjunkturpolitik oder die Vertragsgestaltung am Arbeitsmarkt.

Abstract:

In this paper, we first model the dynamics of an economy, making use of a simple, almost trivial circular flow analysis. Then, we demonstrate the effects of “keeping up with the Joneses” as well as of “keeping ahead of the Smiths” in private consumption and the role of innovation and imitation for private investment and economic growth. In either case, we detect both a tendency towards convergence (inequity aversion) and towards divergence (equity aversion) in the macro economy. On the background of the macroeconomic analysis we then turn to a microeconomic view and discuss how the characteristics, functions and findings of selected fairness models which include social preferences change when “equity aversion” is integrated into the theoretical framework. Thereafter, the collected results of both micro and macroeconomic analysis allow us to draw a series of conclusions concerning economic policy in different areas.

JEL-Klassifikation: E21, E22, D63, D01, D92

Key Words: economic welfare, inequity aversion, fairness concepts

Equity Aversion, Inequity Aversion and Economic Welfare: on the Macroeconomic Substantiation of Microeconomic Utility Functions

by
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1. Introduction

As macroeconomics has experienced a series of "revolutions", "paradigm shifts" or simply extensions / renewals – just to think of well-known headings such as "new classical macroeconomics", "new Keynesian macroeconomics" and many others – whose main methodical aim in the past few years has been to promote microeconomic substantiation of macroeconomic statements on correlations and interrelationships, the question now presents itself as to whether microeconomics, too, should reflect macroeconomic findings to a greater extent.

While the interaction between "keeping ahead" and "keeping up", i.e. between "innovation" and "imitation", has been known and nurtured by macroeconomic consumer research for a relatively long time – though for only a few years now by macroeconomic investment research / growth theory, at least in an explicit, formal manner – modern experimental and axiomatic game theory, which focuses on "fairness concepts" or "reciprocity concepts", has been dedicated almost exclusively to the subject of "inequity aversion", and basically is not even aware of the no less relevant phenomenon of "equity aversion". This is almost as if in breathing we forgot either to breathe in or to breathe out, or like only stretching our muscles or only flexing them. Can this make sense?

In this paper, we would like to help reduce this deficiency. In the next paragraph, we will first model the dynamics of a national economy – in a very simplified manner – by means of a trivial circular flow analysis. Subsequently, we will demonstrate the

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tendencies towards convergence and divergence for consumption and investment. This will cause us to contrast the concept of inequity aversion with that of equity aversion in the fourth paragraph. As a result, it will this time be a macroeconomic substantiation that will, as it were, be provided for an extended microeconomic utility concept. In the fifth paragraph, we will explore a few politico-economic recommendations, and paragraph number six will contain a final summary of our central results and an overview of the prospects of research still to be done.

2. The Dynamics of Consumption and Investment in an Overall Economic Context

2. 1 Introduction

An essential, almost trivial "explanation" of growth in a national economy is based on the equation that yields a closed national economy's GDP; after a few steps, one sees that – with a given quota of consumption and investment – growth is driven by the growth rate of consumption and of investments:

$$Y = C + I$$

$$\Delta Y = \Delta C + \Delta I \qquad \left| : Y \right.$$

$$\frac{\Delta Y}{Y} = \frac{\Delta C}{Y} + \frac{\Delta I}{Y}$$

$$\frac{\Delta Y}{Y} = \frac{\Delta C}{C} \cdot \frac{C}{Y} + \frac{\Delta I}{I} \cdot \frac{I}{Y}$$

If one now asks the logical question:

What drives $\frac{\Delta C}{C}$?

What drives $\frac{\Delta I}{I}$?,

one will easily arrive at the thought that consumption can be increased by a movement of keeping ahead and catching up, and investment by a movement of innovation and imitation, and this conclusion can be drawn without having to fall back on the interdependences popular in macroeconomics (consumption depends on income while at the same time determining income; investment depends on income changes while at

the same time determining income). That this is not a mere statement but can be underpinned by well-founded reasons will be shown in the following two paragraphs. What is true for the development of income can by analogy be demonstrated for income distribution, too; let us assume that a national economy's income flows into the two income groups I and II, for which wage earners and profit earners are frequently chosen as variables. If, also in this case, we express these parameters as growth rates, it becomes clear that – like above, and with given income quotas – growth is driven by the growth rate of the respective income categories.

$$
\begin{aligned}
&Y = Y_I + Y_{II} \\
&\Delta Y = \Delta Y_I + \Delta Y_{II} \qquad \big| : Y \\
&\frac{\Delta Y}{Y} = \frac{\Delta Y_I}{Y} + \frac{\Delta Y_{II}}{Y} \\
&\frac{\Delta Y}{Y} = \frac{\Delta Y_I}{Y_I} \cdot \frac{Y_I}{Y} + \frac{\Delta Y_{II}}{Y_{II}} \cdot \frac{Y_{II}}{Y}
\end{aligned}
$$

Now it is a well-known rule that the sum of the two income quotas must add up to one:

$$
\begin{aligned}
&1 = \frac{Y_I}{Y} + \frac{Y_{II}}{Y} \\
&\frac{Y_I}{Y} = \left(1 - \frac{Y_{II}}{Y}\right)
\end{aligned}
$$

This means that each income quota can be understood to be a residue of the respectively other income quota. If we make use of this trivial insight and insert it into the equation of the growth rate, we obtain:

$$
\begin{aligned}
\frac{\Delta Y}{Y} &= \frac{\Delta Y_I}{Y_I} - \frac{\Delta Y_I}{Y_I} \cdot \frac{Y_{II}}{Y} + \frac{\Delta Y_{II}}{Y_{II}} \cdot \frac{Y_{II}}{Y} \\
&= \frac{\Delta Y_I}{Y_I} + \frac{Y_{II}}{Y}\left(\frac{\Delta Y_{II}}{Y_{II}} - \frac{\Delta Y_I}{Y_I}\right)
\end{aligned}
$$

The following statement would not be a contradiction of our result: The bigger the growth rate of wages (first summand), and the more distinctly – for a given profit

quota – the growth rate of profits exceeds that of wages (parenthesized expression in the second summand), the faster the income of a national economy grows. This result is no more tautological than all other formulas for determining actual economic growth, but it offers the advantage of demonstrating according to our theory that both "catching up", expressed by the absolute growth rate of wage incomes, and "keeping ahead", expressed by the lead that profit income growth has over the growth of wage income, contribute to real income growth. This result will basically remain unchanged if we substitute the profit income quota; it is now true that both keeping ahead, expressed by the absolute growth rate of profit incomes, and catching up, expressed by the lead that wage income growth has over profit income growth, contribute to real income growth:

$$\frac{\Delta Y}{Y} = \frac{\Delta Y_{II}}{Y_{II}} + \frac{Y_I}{Y}\left(\frac{\Delta Y_I}{Y_I} - \frac{\Delta Y_{II}}{Y_{II}}\right)$$

It must be noted that the allocation of "activities" (wages catching up, profits keeping ahead) is not arbitrary but represents a stylized fact of economic research. The cycle follows the profits, while the wages follow the cycle.

2. 2 "Keeping up" and "Keeping ahead" as a Driving Force of Private Consumer Behavior (Duesenberry 1967, Johnson 1951/1952/1971 and Sell 1982)

As is well known, what is referred to as the "Easterlin paradox" – a doubling of absolute income will not at all cause satisfaction to double, too – can relatively easily be explained if one notes that most people are mainly interested in their own status as compared to that of other people – their relative status is more important to them than their absolute income position (Lewitt/Dubner 2006, p. 24). The role which comparing and being compared (in the following, cf. Sell, 1982) plays in determining individual consumption is described in unparalleled clarity by Duesenberry, who states that "the dissatisfaction with his consumption standard which an individual must undergo is a

function of the ratio of his expenditures to those of people with whom be associates" (Duesenberry 1967, p. 32).

If dissatisfaction – or its opposite, satisfaction – is expressed by the utility index U_i we obtain, according to Duesenberry, the following individual utility function of an arbitrary economic subject i:

$$U_i = U_i\left(C_i / \Sigma \alpha_j C_j\right)$$

In this equation, weight α_j indicates how strong consumer *i* assesses the influence of consumption expenditure by individual *j* to be on his own consumption expenditures. If this utility concept, which emphasizes the interdependence of acts of purchase, is applied to the evaluation of income redistribution measures, cases may occur where "a decrease in inequality might increase the average propensity to save" (ibidem, p. 44). Duesenberry's ideas were taken up by Harry G. Johnson (1951/1952/1971). The latter from the very beginning intended to investigate the exact character of the interdependence of acts of purchase with a view to income redistribution measures and possible multiplier effects on income. Johnson considers the parenthesized expression in the utility function to stand for relative consumption, with the weighting factors α_j assuming decisive importance (idem 1951, p. 295); let:

$$C_{i\ \text{relativ}} = \frac{C_i}{\Sigma \alpha_j C_j}$$

so that:

$$U_i = U_i\left(C_{i\ \text{relativ}}\right);\ U_i' > 0,\ U_i'' < 0$$

Using two simple numerical examples, Johnson explains two alternatives characteristic of the consumer behavior of a community divided into three classes or three individuals. In the first case of a 3-person community (A, B, C), it shall be known that in the initial condition, consumption is distributed as follows:

$$C_A = 50, \quad C_B = 100, \quad C_C = 150$$

Further, B shall allocate a weight of α_{BA}=¼ to the consumption of A, whereas he allocates a weight of α_{BC}=¾ to the consumption of C for the determination of his own relative consumption:

$$C_{B\ relativ} = \frac{100}{1/4\,50 + 3/4\,150} = 4/5$$

Now let us do a redistribution from C to A, whereby it is assumed that B's income is not impaired. It shall be known that this is done to an extent such that

$C_A = 75, \quad C_C = 125$

This means that:

$$C_{B\ relativ} = \frac{100}{1/4\,75 + 3/4\,125} = 8/9$$

Since 8/9 > 4/5, the satisfaction of B has increased, ceteris paribus, according to Johnson, which probably will cause him to restrict his own consumption to values below 100 (about 95), with his income unchanged. The quantity of α_{BC} (=3/4) is an expression of the "middle class person" B's effort to keep up with the consumption of the higher earner C, i.e. to *"emulate"* him. This is the behavior typically found in an *"emulative society"* (Johnson 1971, p. 166), which is also referred to as "*keeping up with the Joneses".* If the role model restricts his consumption, his lead obviously becomes smaller. This reduces my attempts at emulating him, thus curbing my own consumption. Accordingly, in such an "emulative society", there is the possibility that an income redistribution from rich to poor will not increase aggregate consumption of a given income, but reduce it (because 75+95+125<50+100+150). Note that the latter result, among other things, is fundamentally opposed to Kaldor's strongly disputed distribution theory.

In the opposite case, B orients himself more towards A, whose income is lower, i.e. B wants to always have a sufficiently large lead over A with respect to the quantity and quality of the consumer goods. Then, the values are e.g.: $\alpha_{BC} = 1/4$, $\alpha_{BA} = 3/4$.
Accordingly, before redistribution let:

$$C_{B\ relativ} = \frac{100}{3/4 \cdot 50 + 1/4 \cdot 150} = 4/3$$

However, after redistribution (see above) the following applies:

$$C_{B\ relativ} = \frac{100}{3/4 \cdot 75 + 1/4 \cdot 125} = 8/7$$

Because 4/3 > 8/7, B's feeling of utility will decrease as a result of redistribution, and his motivation to extend his own consumption will increase (to about 105). Johnson (1951, p. 296/97) refers to this type of behavior as *"superiority"* (in a later paper, he uses the somewhat misleading term "*competition*", cf. Johnson 1952, p. 141), and he also uses the expression *"keeping ahead of the Smiths"*. More generally speaking, this is a situation where everyone tries to maintain his lead over those who are below him in the income hierarchy. As a result, in such a "lead-oriented society", there is the possibility that an income redistribution from rich to poor will not reduce the aggregate consumption of a given income, but increase it (because 75+105+125>50+100+150). Note that in this case the tendency of Kaldor's results is confirmed.

However, the two above mentioned examples are not pure mental exercises but quite well symbolize the downturn in the economic cycle where wage agreements that lag behind lead to a reduction in profits and in the profit margin. In this case, the following applies: If an attitude of wanting to "keep ahead of the Smiths" (emulation) prevails over emulation ("keeping ahead of the Smiths"), the middle class ensures that consumer demand stabilizes (is further reduced) and thus mitigates (increases) the downturn.

In the following, we will extend the different cases distinguished by Johnson, thus also going beyond him. In doing so, we will apply our experiment so to speak inversely to the way it was applied before, which represents an existing upswing in the cycle. For the redistribution carried out now is from A to C, whereby it is assumed that B's income is not impaired. It shall be known that this will have the following consequence:

$C_A = 25, \quad C_C = 175$

Further, it shall initially apply that B allocates a weight of $\alpha_{BA}=¼$, to the consumption of A and a weight of $\alpha_{BC}=¾$ to the consumption of C for the determination of his own relative consumption.

Before redistribution, the following applies (see above): $C_{B\ relativ}=\frac{4}{5}$

Afterwards, the following applies:

$$C_{B\ relativ} = \frac{100}{\frac{1}{4}25 + \frac{3}{4}175} = 100/137,5$$

Since 100/137.5 < 4/5, the satisfaction of B has decreased, ceteris paribus, according to Johnson, which probably will cause him to extend his own consumption to values above 100 (about 105), with his income unchanged. Accordingly, during times of upswing, aggregate demand is even increased in an emulative society as a result of the middle class's consumption.

In the opposite case, B orients himself more towards A, whose income is lower; in this case, by analogy to above example, the values shall e.g. be: $\alpha_{BC} = 1/4$, $\alpha_{BA} = 3/4$. Accordingly, before redistribution, the following applies (see above):

$$C_{B\ relativ} = 4/3 = 1,33$$

However, after redistribution, the following applies:

$$C_{B\ relativ} = \frac{100}{\frac{3}{4}25 + \frac{1}{4}175} = 100/62,5 = 1,6$$

Because 1.6 > 1.33, B's feeling of utility will, however, now increase as a result of redistribution, and he will be more likely to reduce his own consumption (to about 95). In a society characterized by the desire to "keep ahead of the Smiths", aggregate demand will more likely be curbed by the consumption of the middle class in periods of upswing.

If the cases investigated by Johnson himself as well as the cases added and evaluated by us are analyzed, the overall result is a system of effects that is certainly of interest to economic research – an overview is given below. This provides an impressive proof of the macroeconomic relevance which *equity aversion* has for economic research, as it dampens the effects of both downturns and upswings, thus smoothening the cycle.

Table 1: Consumer Behavior and the Economic Cycle

Consumer behavior / Phase	"Emulation" prevails	Attitude of "keeping ahead of the Smiths" prevails
Upswing	Upswing is intensified	Consumption is dampened
Downturn	Downturn is intensified	Consumption is stabilized

Source: own design

3. "Imitation" and "Innovation" as Driving Forces of Private Investment Behavior (Blümle 1989, Barro / Sala-i-Martin 1997 and 2004)

3. 1 The Hunter / Prey Model

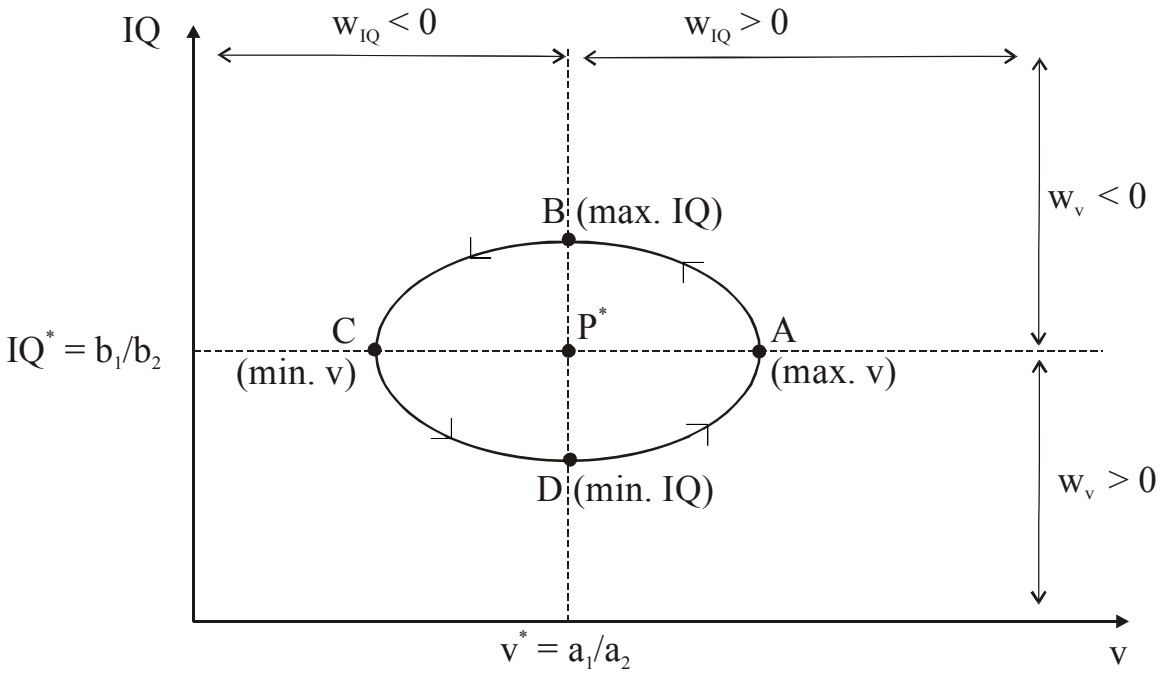
Blümle's paper of the year 1989 – by analogy with findings from the theory of evolution which hold that population numbers of hunters and prey are always anticyclical – in line with the assumptions by Joseph Schumpeter described the competitive process *within a closed national economy* as an interaction between innovators (advancing prey) and pursuing imitators (pursuing hunters). Both groups of market players make investments, but the imitators are given the role of ensuring that the (new) technological knowledge created by the innovators is being diffused. In this context, it is of particular merit that Blümle modeled the relationship between the disparity of income distribution and the competitive process: Innovators see to it that their own production methods are more cost-effective, thus causing a profit disparity among vendors (curve by Barone). This attracts imitators onto the market whose investments cause the new knowledge to be diffused while also triggering an erosion of the profit disparity that existed before. However, with the disappearance of "difference profits", real investment decreases, too, and financial investment becomes more attractive. This means that there is a positive relationship between the growth rate of the investment quota (dependent variable) on the one hand and the profit dispersion (independent variable) on the other hand. At the same time, there is a

negative relationship between the growth rate of profit dispersion (dependent variable) and the investment quota (independent variable).

Analogies with consumer behavior are obvious: Imitators try to emulate innovators; by their behavior, they cause the monopoly profits of the pioneering entrepreneurs to melt, and their income difference decreases. The latter will not take long to respond: Through new innovations, they again escape the imitators, creating a distance between themselves and their hunters once more.

Figure 1 demonstrates the following: On the axes, the overall economic investment quota (IR) and the variance of the profit per unit v (profit dispersion) are marked off; there is a central position where the stationary equilibrium is located (at P*). Profit dispersion assumes the value $v^* = a_1/a_2$ there: The smaller the inclination to financial investments a_1 and the higher the arbitrage intensity on the commodity markets a_2, the faster profit differences are reduced. At the equilibrium, the investment quota is determined by $IQ^* = b_1/b_2$: The bigger autonomous technological progress b_1 and the smaller the profit erosion speed by imitations b_2, the longer it will take for innovation leads to be reduced by investment.

Figure 1: Equilibrium and Dynamics in the Hunter / Prey Model



Source: Blümle 1989

At point A, profit dispersion is at its maximum, and accordingly, the incentive for risky innovations is high: IR increases. Now, initial imitators appear, IR continues to rise, but profit dispersion v decreases – until the maximum IR is reached at point B. The decreasing profit dispersion v and the slowing down of the diffusion process cause IR to drop until a minimum dispersion of profits is reached at point C; still existing profit differences are no longer being reduced. If difference profits increase again due to the occurrence of autonomous technological progress, profit dispersion v will, as a result, increase again. The system moves in the direction of point D where a minimum is reached in the real investment quota. From there, the investment quota will increase again as a result of high pioneer profits and increases in profit dispersion.

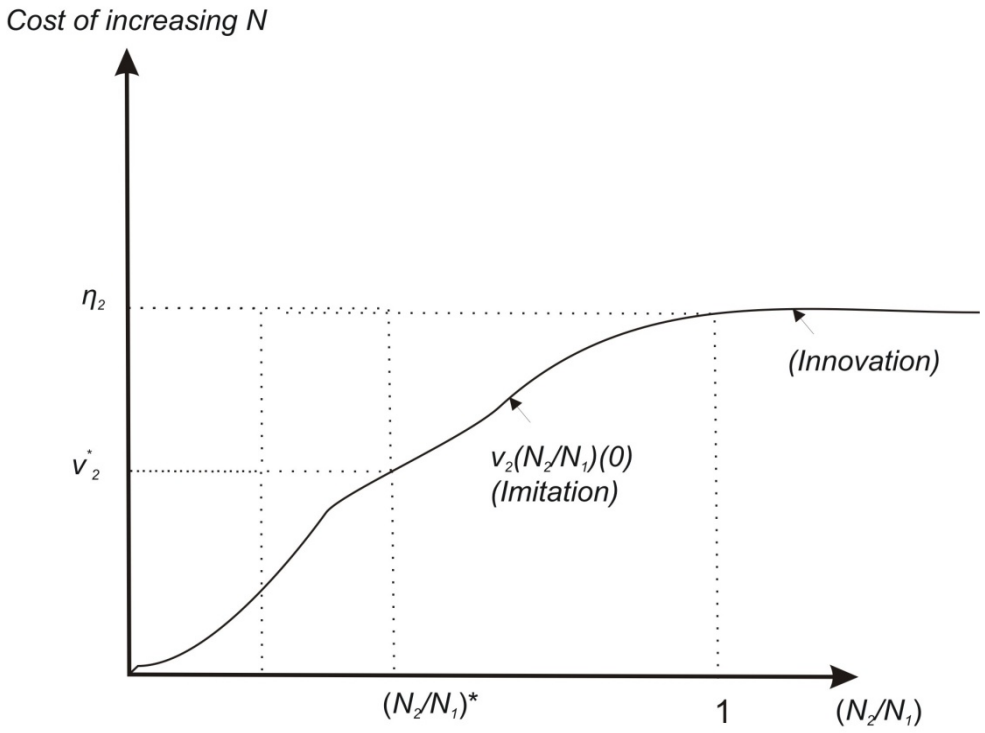
3. 2 The Catch-Up Model

Without directly referring to Blümle, Barro and Sala-i-Martin basically developed further and applied his ideas to the situation of *open national economies* in the world economy whose per capita incomes are on different levels. Their approach states that in the end, threshold countries are able to catch up with industrialized nations because

the imitation and implementation of new developments (originating elsewhere) typically is cheaper than innovations (2004, p. 349). A new aspect is that also the imitator, i.e. the person who, through product piracy, is the only one in his own country to possess the new intermediate product developed in the industrialized country, also becomes a monopolist (i.e. for the relevant novel intermediate product) within the borders of his home country. The imitator will as a rule always (only) be able to copy a certain subset N_2 of the overall stock of innovations N_1. In this context, it shall apply that the copying costs are an increasing function of the ratio between N_2 and N_1:

$$v_2(t) = v_2(N_2 / N_1); v_2' > 0$$

Figure 2: Costs of Innovation and Imitation in the Growth Process



Source: Barro and Sala-i-Martin (2004), Economic Growth, Massachusetts Institute of Technology, page 354

These imitation costs will be below the innovation costs η_2 as long as the ratio is $(N_2/N_1) < 1$ (at least normally, for in exceptional cases, it may even be cheaper to finance innovations oneself instead of initiating complex imitations).

A sensible interpretation of the model by Barro and Sala-i-Martin implies that the industrialized countries will again and again succeed in expanding innovations N_1 such that the growth rate of N_1 never falls below that of N_2, and that for the representative

threshold country, a balanced and constant relationship of $0 < (N_2 / N_1)^* < 1$ develops, with associated costs v_2^*. In the process, both the innovator in the industrialized country and the imitator in the threshold country achieve temporary monopoly positions as described in the hunter / prey model by Blümle, ensuring that a distance is maintained to (internal) pursuers. However, the threshold country will not be able to completely catch up with the industrialized nations and to reach their output per worker *through imitation alone*. This in any case applies as long as the overall productivity index A remains behind that of the country groups mentioned (Barro / Sala-i-Martin 2004, p. 358). However, this index may be raised in the threshold country by improving economic and political institutions (ibidem, p. 372).

3. 3 Conclusion

The – not totally unimportant – question remains whether the characteristics described are to be allocated to different individuals or may also be found within the very same person. For the consumer, there seems to be a positive answer to this question: If he does not happen to be at the top or bottom of the income pyramid, he will always want to both catch up with and keep ahead of other consumers. It is basically the same for the entrepreneur: Firstly, an imitator (inventor) can quickly turn into an inventor (imitator). As Barro and Sala-i-Martin demonstrated, I can temporarily be a monopolist even as an imitator, which will give me a motivation to keep competitors at a distance. It might be added that even among innovators, there will be a desire to keep up, considering the fact that even for innovations, a ladder of productivity increases exists!

4. The Introduction of Equity Aversion into Known Fairness Models

4. 1 Introduction

In order to integrate the concept of equity aversion (EA) into the theoretical framework of already existing models, we will in this paragraph deal with the works of Fehr and Schmidt (1999), Bolton and Ockenfels (2000) and Rabin (1993). All of these models aim to explain the actual results of experiments contradicting the assumption that individuals are purely self-interested. The respective reasons given are certain

ideas of fairness and / or social preferences which, however, have different forms and vary as to their influence on the models' target functions. In addition to disagreeing on the form of social preferences, these models also contain several indications of and possible arguments for the existence of equity aversion, i.e. for supplementing the social preferences by this factor, as planned in this essay.

4.2 Indications of the Existence of EA in the Works of Fehr / Schmidt (1999), Bolton / Ockenfels (2000) and Rabin (1993), and a Possible Proof

Both Fehr and Schmidt (1999), as well as Bolton and Ockenfels (2000), in principle acknowledge the existence of individuals who acquire utility gains from positive income differences with respect to other individuals, and they do not see this as a fundamental contradiction to their theories (e.g. Bolton / Ockenfels 2000, p. 172 or Fehr / Schmidt 1999, p. 824). Unfortunately, however, they subsequently either fail to examine this possibility any further or deny the possible influence of such individuals on the models' results as a matter of principle. Nevertheless, e.g. in the model by Bolton and Ockenfels, an important condition of a model with equity aversion is already fulfilled without any further comment, since the individually optimum relative income proportion always is clearly above the equal distribution. Furthermore, the concept of EA provides possible explanations for several striking factors observed in experiments, e.g. that with increasing payoffs and / or incomes, the importance of social preferences decreases, as was generally found in the above mentioned works. Frey (1997) sums up this general observation in a very clear and general statement, stating: "The more costly it gets, the lower the weight of moral concerns." (Frey 1997, p. 57). Instead of pointing out that once a certain level of wealth has been achieved, pure self-interest prevails over social preferences (or other moral considerations), one could also argument that equity aversion increases with income. In other words: Inequity aversion is the prevailing social preference with small income levels; in this case, income inequalities are mainly to one's own detriment. There is hardly any possibility of distinctly getting ahead of others. As the income increases, so does the desire to distance oneself from those further down, i.e. to achieve inequalities to one's own advantage. Inequity aversion (IA) is pushed into the background by EA, the

interest in avoiding inequality decreases. Additionally, not all results from experiments can be fully explained by the social preferences defined in the above mentioned works, e.g. the extreme distribution of the endowment forecast by Fehr und Schmidt (1999) in the dictator game (DG), with a modification of the game lacking. Accordingly, models not considering equity aversion might well be inadequate. However, EA would then also have to be provable by experiments. That the experiments looked at have so far failed to provide any indications pointing in this direction may be due to their design and the existing experimental conditions. The experimental environment may determine which types of social preferences develop to what degree, and whether they play a role at all. The latter is sufficiently demonstrated in the works relating to games dealing with market power; on the possible endogeneity problems, e.g. Rabin (1993) claims: "(...) one could consider the question of which types of economic structures are likely to generate which type of emotions" (Rabin 1993, p. 1295). These circumstances are made even clearer by Frey (1997, p. 120), who, in describing the framing effect, emphasizes: "The way a decision problem is formulated and the way the information is presented, have a marked effect on individual decisions." According to Frey's view, who fundamentally criticizes the exclusive focus on the price effect in the economic standard theory, this means that EA (and by analogy, IA) is an intrinsic motivation for individual behavior which, accordingly, is not only oriented towards the direct monetary (external) incentives. Looking back on the possible endogeneity problem of experimental game theory, it must be stated that it is of central importance to try to find suitable experimental framework conditions in order to identify EA and to successfully prove it. In this context, however, it must be ensured that this proof is not itself endogenously based on the experimental design, since "depending on what definitions and concepts are used, and under what general circumstances the relationship is tested, it is possible to produce almost any result" (Frey 1997, p. 15)! In a first step, this paper is to demonstrate, through modifications of the original models by Fehr and Schmidt and by Bolton and Ockenfels, how EA could be integrated into existing model structures. Rabin's model will be exempted due to its comparably limited applicability and other restrictions (see below).

4.2.1 Fehr and Schmidt (1999): A Theory of Fairness, Competition, and Cooperation

In this model, income differences with respect to the other members of the reference group for a given own income always lead to utility losses. In this case, the negative effect of advantageous inequality (represented by the third term of (1)) is smaller than that of inequality to one's own detriment (represented by the second term). As a result of this kind of IA, the individual utility function for the 2-person case – which will be chosen also in the following because it is easier to describe and compare – will assume the following form:

(1) $U_i(x) = x_i - \alpha_i \max\{x_j - x_i, 0\} - \beta_i \max\{x_i - x_j, 0\}$ with $0 \leq \beta_i < 1$ and $\beta_i \leq \alpha_i$; $\alpha_i > 0$; $i \neq j$

Another possibility of integrating EA into the model by Fehr and Schmidt in addition to IA, which already takes effect, would be to change the sign of parameter β. Although the authors already see the existence of such individuals, this would result in individual i maximizing his utility at $x_j = 0$, with a given own income (figure 3.1). Thus, there would be an interest in the maximum advantageous inequality possible. However, if a function with EA (as an additional effect to IA) is to represent that the individuals are only interested *in a certain degree* of advantageous inequality (if maximizing $U_i(x)$, and with and without a given x_i), the purely linear type of equation which Fehr and Schmidt chose for reasons of simplification must be given up, and with respect to advantageous inequality, a combined effect of IA and EA must be produced limiting the utility gains from growing positive income inequality. A respective modification could have the following form, which also is graphically depicted in figure 3.2:

(2) $U_i(x) = x_i - \alpha_i [\max\{x_j - x_i, 0\}]^2 + \max\{x_i - x_j, 0\} - \beta_i [\max\{x_i - x_j, 0\}]^2$

Parameter α_i now shows the size of the negative effect of disadvantageous inequality, which grows out of proportion. The term preceded by parameter β_i together with the second term represents the opposing effects of IA and EA with respect to

advantageous inequality: Due to the effects of EA, utility increases with growing advantageous inequality for a given x_i until this benefit is overcompensated by the IA effect which, also in this case, has a disproportionate influence. Therefore, there now additionally exists a limit value for each individual with social preferences from which increasing income leads to utility losses due to the fact that advantageous inequality grows too much. Unlike in the original model, individuals with social preferences for whom $dU_i(x)/dx_i>0$ globally applies now no longer exist. The function with EA and its parameters must now fulfill the following important assumptions and have the following characteristics (in addition to a few less important requirements which are therefore not mentioned here):

The following still applies: α_i and $\beta_i \geq 0$, as well as $\alpha_i \geq \beta_i$. Inequality to one's own advantage always results in higher utility values than inequality to one's own detriment, even if the numerical value is identical, and assuming that $x_i = x_j$. Functions $U_i(x)$ and $U_i(x_j|x_i)$ have their clear maximum if $x_i > x_j$. As already mentioned, an increase in one's own income leads to utility losses from a certain limit value. Increasing EA is expressed by a decreasing value for β_i, smaller values of β_i imply decreasing EA, and an increasing aversion to disadvantageous inequality is expressed by an increasing value for α_i. When concretizing a function in the above-mentioned form, a sufficiently small domain should be selected for α_i in order to avoid that $U_i(x)=0$ applies already in the case of small disadvantageous inequality, which would mean that the effects of IA on the utility values would be overrated. The possible range of values for β_i, i.e. the permissible expressions of EA, must be selected such that $U_i(x_j|x_i)$ is maximized in the range $x_i > x_j$ and for $x_j > 0$. Due to the IA (with its increasing effect), which, in addition to EA, is relevant in the range $x_i > x_j$, $U_i(x_j=0|x_i) < U_i(x_j=x_i|x_i)$ shall also apply: For a given own income, it is better from the point of view of i if j has the same income than if j has no income at all.

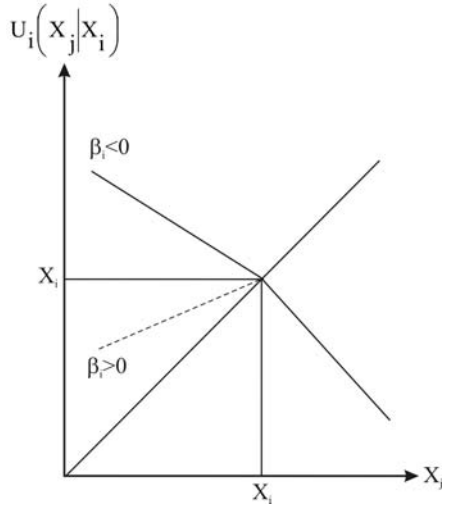


Figure 3.1

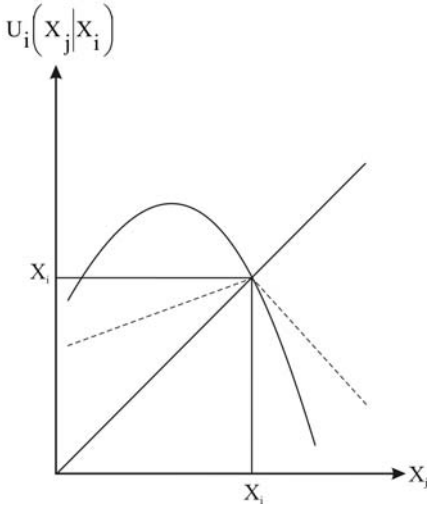


Figure 3.2

A possible deficiency of the selected function is the fact that the condition is fulfilled that disadvantageous inequality does not lead to negative utility values too quickly. However, negative function values in the case of already relatively weak disadvantageous inequality are not necessarily problematic, considering e.g. the relatively high rejection limits for offers in the ultimatum game (UG) quoted by Fehr und Schmidt (1999), p. 844, table III. Depending on the values selected for α_i, also the original model results in $U_i(x)<0$, even if negative inequality is relatively small. Another striking factor in the modified function is the fact that increasing values of the payoffs imply smaller ranges of values for α_i and β_i in order to ensure that the function will still provide acceptable results. This means that there is a negative endogenous relationship between the possible parameter size and the size of one's own payoffs ($d\alpha_i/dx_i<0$ and $d\beta_i/dx_i<0$): The larger they are, the stronger EA will be and the smaller the aversion to disadvantageous inequality. The latter characteristic by inversion corresponds to the insight that a decreasing income to be distributed leads to increasing rejection limits in the UG (cf. Rabin 1993, p. 1284). One could try to solve this possible endogeneity problem of the function by weighting the effects of the social preferences with the size of the payoffs; on the other hand, this necessity to adapt the parameters suggests another possible interpretation that was already mentioned before: Smaller income levels thus necessarily imply that there is little interest in keeping a distance between oneself and poorer income classes, i.e. that EA is low. Rather,

individuals in this situation are interested in strong equality within the reference group (high IA), but most of all in non-existing disadvantageous inequality. The more one's own income grows, the more EA increases, i.e. the more interested one becomes in keeping a positive distance and the more the interest in equality within the reference group will decrease on the whole. Also, utility losses due to "even richer" individuals decrease; it is more interesting to keep ahead of the less well-off.

Nevertheless, also the interest to keep ahead of those further below has its limits. As has been seen, excessive positive inequality in the case of the present modified social preferences from a certain limit will first lead to utility losses and as a final consequence also to negative values of the utility function. Depending on the intensity of parameter β_i (i.e. the size of EA), however, this final limit may well lie within a range of extreme positive inequality. The possibility of negative utility values from one's own positive income is dismissed by Fehr and Schmidt as an unrealistic assumption (cf. p. 824), whereas Bolton and Ockenfels do consider this an option – within the given possible range of values (this aspect will be explained in more detail when describing the model in the following paragraph). Therefore, this characteristic of the modified function does not necessarily pose a problem: For one thing, there are in fact already models with social preferences which allow for this possibility (at least implicitly via the possible range of values of their preference parameters). For another thing, this characteristic is the stringent consequence of the assumption that due to the parallel existence of IA and EA within the preference order, fairness considerations must continue to play a role also in the case of advantageous income disparities. If this did not apply, we would have to deal with extremely "spiteful" individuals who, with a given own income, would be interested in making their counterparts acquire a position of maximum inferiority, thus pursuing a particularly extreme type of self-interest.

4.2.2 Bolton and Ockenfels (2000): A Theory of Equity, Reciprocity, and Competition (ERC)

The theory of Bolton and Ockenfels and its results are mostly very similar to those of Fehr and Schmidt; differences exist e.g. with respect to the selection of the social reference point. Instead of interpersonally comparing their own payoff within the reference group with that of the other members, individuals in this case compare what is referred to as their *relative payoff standing* ($=\sigma_i$) with the relative share a person would receive in the case of equal distribution. Each deviation from this leads to a loss which increases with the size of inequality, although (unlike in the theory by Fehr and Schmidt) no differentiation is made between inequality types. From a certain limit value, increasing payoffs result in decreasing values for the target function (= motivation function). The reason for this is the trade-off between the positive effect of increasing individual payoffs on the target function and the negative effect connected with an increase of payoff that the *relative payoff standing* moves away from the social reference point. This trade-off is represented by the comparative effect (Bolton / Ockenfels 2000, p. 171), the second term of the function given below. The function given by the authors for the 2-person case has the following form:

(3) $\nu_i(c\sigma_i,\sigma_i) = a_i c\sigma_i - b_i/2\,(\sigma_i - ½)^2$ $[a_i \geq 0,\ b_i > 0,\ \sigma_i = \sigma_i(y_i,n,c) = y_i/c\ (c > 0)$ with $c = \Sigma y_i]$

The relationship between a_i (= size of the interest in income and / or size of self-interest) and b_i (= size of the comparative effect) describes individual social preferences and thus determines the function's limit values. Exactly like in the model by Fehr and Schmidt, the assumption applies here, too, that only part of the individuals have social preferences. This means that both models assume that there is also a certain proportion of individuals in the overall population who are interested in their own payoff and / or income exclusively. Due to the model structure selected, the value σ_i ($= r_i$), which maximizes the motivation function given in (3), is always within the range of advantageous inequality, even without EA, because the First Order Condition (FOC) for the maximization of $\nu_i(c\sigma_i,\sigma_i)$ generally results in $r_i = ½ + a_i c/b_i$. Another

important limit of σ_i is the value s_i from which on the motivation function will assume positive values. For individuals with social preferences other than the conceivable extreme values, the following always applies in the 2-person case looked at: $s_i < ½ < r_i$. In their work, the authors introduce an example with the values $a_i/b_i = ¼$ which leads to limit values exactly within this interval for s_i and r_i. However, as already mentioned in the last paragraph, the given range of values for the possible manifestations of parameters a_i and b_i unlike the model by Fehr and Schmidt does allow for the possibility of big positive income inequalities leading to negative values of the target function. Accordingly, e.g. in the mentioned example, in the case of $\sigma_i = 1$, the largest possible advantageous inequality, already parameter values of $a_i/b_i < ⅛$ would lead to $\nu_i(c\sigma_i,\sigma_i) < 0$ in the original model. The integration of EA into the motivation function presented in (3) could e.g. be represented by the following functional equation for the 2-person case which in many respects resembles the modified model by Fehr and Schmidt:

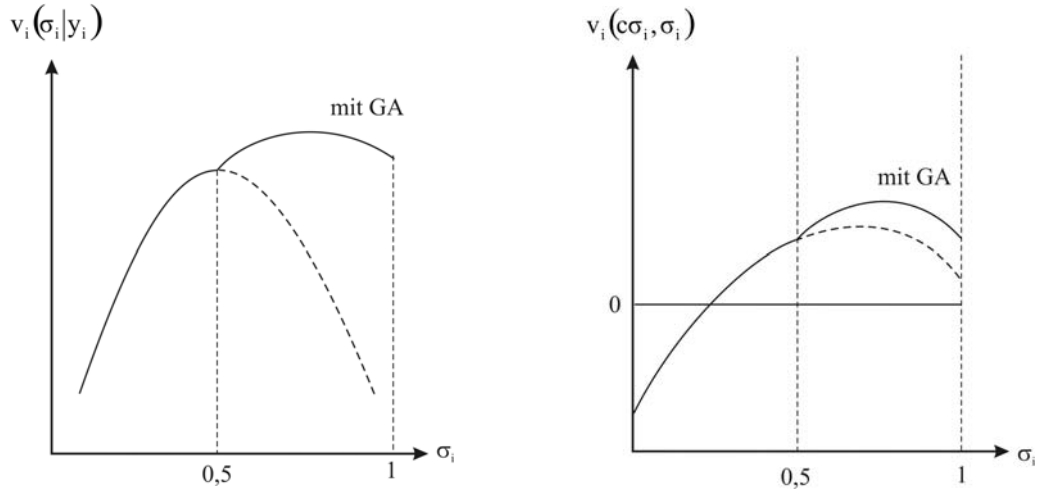
$$(4) \qquad \nu_i(c\sigma_i,\sigma_i) = a_i c\sigma_i - b_i/2\,(\sigma_i - ½)^2 + c_i \max\{\sigma_i - ½, 0\} \quad \text{with } 0 < c_i < ½\, b_i - a_i c$$

The third term, which has newly been added to the model, with its parameter c_i demonstrates the individual size of EA, which grows with an increasing c_i and only in the range $\sigma_i > ½$ acts on the motivation function in the opposite direction with respect to the comparative effect. The comparative effect, which disproportionately grows with increasing inequality, overcompensates the effect of EA once σ_i has reached a certain value. The function and its parameters have the characteristics described and / or must fulfill the following assumptions:

Growing EA ($dc_i > 0$) generally leads to $dr_i > 0$. The reason for this is a change in the FOC, which means that in the case of existing EA, the following applies for r_i: $r_i = ½ + a_i c/b_i + c_i/b_i > ½ + a_i c/b_i$ (= value of the original model without EA). Although compared with the model without EA, it will always apply that $dr_i > 0$, the definition of the possible range of values of c_i will only allow values with $r_i < 1$. The extreme case of an individual with social preferences but without an aversion to the maximum possible advantageous inequality is thus excluded also in this case. In the range of

$\sigma_i < ½$, where EA does not play a role, the model with EA corresponds to the original model; in particular, there must be no changes to the s_i lying within this range. It would apply that $ds_i > 0$ e.g. if the integration of EA into the model also led to an intensification of the comparative effect in the range of $\sigma_i < ½$, i.e. to a higher aversion to disadvantageous inequality. In addition, by analogy with the original model, $\nu_i(\sigma_i=0) < 0$ must continue to apply, the sign of $\nu_i(\sigma_i=1)$ still depending on the size of the comparative effect, expressed by b_i.

In order to correctly represent the interest in higher relative payoff standing generated by EA, the characteristics of function $\nu_i(\sigma_i|y_i)$ must change, too. The latter in the original model is strictly concave and reaches its maximum at the social reference point $\sigma_i = ½$: With a given own income, individual i is interested in a share of the overall income the size of equal distribution. There is only an interest in a maximum value of y_i in the case of a given σ_i (an increase of y_i with a fixed σ_i necessarily implies a respective increase in the income of j so that there are no changes in the size of the relative payoff standing). This characteristic remains unchanged by the integration of EA into the model, although as compared with the original model, in the function $\nu_i(\sigma_i|y_i)$, the optimum for σ_i^* shifts into the range where $\sigma_i > ½$, i.e. into the range with advantageous inequality (figure 4.1): With a given personal payoff, i is now interested in having a relative payoff standing above the value of equal distribution. This means that the integration of EA will not only result in the general $dr_i > 0$, as has been described, but also create an individual interest in a positive absolute income equality in the case of a given personal income ($\sigma_i > ½$ implies for each given y_i a $y_j < \bar{y}_i$). Due to the still existing comparative effect in this range, which counteracts EA, the existence of EA also at this point does not lead to an effort to achieve maximum advantageous inequality, i.e. a desired extreme value of $\sigma_i = 1$ with a given own income. This is ensured, like already in the motivation function, by the range of values of c_i given in (4). The strict concavity of $\nu_i(\sigma_i|y_i)$ therefore is maintained. Graphically, EA in the model leads to an increase of the gradients of the functions $\nu_i(\sigma_i|y_i)$ and $\nu_i(c\sigma_i,\sigma_i)$ in the range $\sigma_i > 1/n$, as outlined in figures 4.1 and 4.2 for n=2:



A drawback of the chosen form of functional equation is the fact that the value which c_i can assume as parameter of EA is determined by the two other parameters a_i and b_i. Therefore, interpersonal comparisons of the size of EA are made very difficult. It would be imaginable to distinguish the size of EA on the basis of the percentage achieved with respect to the maximum possible manifestation. Just like in the extended version of the model by Fehr and Schmidt, it is not necessary to vary the social reference point when integrating EA. As regards its form and effect, the comparative effect remains unchanged in the function, only in the range $\sigma_i > ½$, there is an additional influence caused by the effect of EA.

4.2.3 Rabin (1993): Incorporating Fairness into Game Theory and Economics

The applicability of Rabin's model is comparatively limited: E.g., only 2-person games of the normal type, with complete information, can be analyzed. The actions (the strategy played) by the opponent are now evaluated as "fair" or "unfair" not only based on the result (the individual payoff) but also on the basis of the underlying intention. This evaluation triggers a reciprocal response: Individuals respond positively to behavior felt to be fair (high own payoff). However, if the other player wants to harm me, his payoff is reduced through the strategy I will choose to play myself. Both reciprocal reactions may result in the individual payoff not being maximized since these direct losses may be overcompensated by the utility gain from the reciprocal response (= acting according to social preferences). A conceivable way of integrating EA into this model's framework would be to reduce the reciprocal response to "fair behavior" in order to make the desired advantageous inequality possible. The interest

in an increase in the opponent's payoff would decrease. The response to unfair behavior (= reduction of the opponent's payoff in order to prevent disadvantageous inequality) would not have to change. The result would be an asymmetry in the response to "fair" and "unfair" behavior. The reference payoff, referred to as *equitable payoff* (Rabin 1993, p. 1286), which finally serves to determine how the behavior of the other player is evaluated, would have to increase, too, with existing EA (due to the basic interest in keeping a positive distance to the other player).

5. Politico-economic Conclusions

5.1 Introduction

In the following, the results of the preceding macroeconomic and microeconomic analysis make it possible to draw a series of politico-economic conclusions resulting from the existence of EA and its effects. In particular, this concerns the relationships between the social preference types prevailing in society and changes in aggregate economic consumption, recommendations for the power of patent rights and general competition policy and the effects the existence of EA has on the job market, as well as aspects of social welfare that need to be observed.

5.2 Equity Aversion, Consumption and Built-in Flexibility

A distribution policy leveling out differences is of little help with a view to consumption stimulation: For one thing, because it makes it more difficult to introduce new consumer goods / consumption patterns and it restricts options of keeping ahead, and for another thing because this may reduce the incentive to "keep up with the Joneses". If this emulation is the dominating social preference, i.e. if society is emulative, a redistribution from "rich" to "poor" leads – as has been seen – to a negative change in aggregate consumption (on a microeconomic level, the dominance of emulation means that social preferences with EA and IA exist, but that IA is more marked): The consumption level of the upper income class (= C_C in Johnson's model), who are the object of emulation, drops. The emulation pressure felt by the medium income class decreases, and the latter reduce their consumption, too. In lead-oriented societies, however, efforts at "keeping ahead of the Smiths" prevail; in this case, this

type of redistribution accordingly causes the consumption of the most important reference group (= lower income levels) to rise with respect to the medium income category. The latter therefore feel an increasing pressure to keep ahead, which also increases consumption. The overall result thus is a positive consumption effect. Changes in consumption vary with the individual social classes: Those directly affected by the redistribution will alter their consumption in the direction of the redistribution (consumption by the upper income levels drops, while that of the lower levels rises); the change in consumption by the middle class is ex ante not clear, as seen above. Therefore, the overall effect on aggregate economic consumption demand in the case of redistribution of a given income also depends on what share which social class has in this process. Therefore, before conducting a redistribution campaign that levels inequalities, political decision-makers should evaluate whether society is emulative or lead-oriented, and which meaning the individual income groups presented have for the overall effect. Only then can the effects on aggregate economic consumption be forecast correctly. Since in a lead-oriented society, a reduction of fluctuations in aggregate economic consumption and thus a risk reduction will take place, the social planner of a risk-averse society will consider the prevalence of "keeping ahead of the Smiths" desirable. The influences of EA observed on aggregate consumption effects make another aspect clear: a new and / or changed built-in flexibility in the cycle! As has been seen, the attitude of wanting to keep ahead, which is found in the middle income class, results in a smoothening of economic fluctuations as far as consumption is concerned. Since these people are the "key players" of society, they render a complementary service to the built-in flexibility of the social security systems which mainly concern the middle to low income classes. Thus, an emulative society is generally harder hit by economic fluctuations, the built-in flexibility tends to be weakened if emulation prevails, whereas a lead-oriented society with its prevailing efforts to keep ahead responds to the cycle with a strengthened built-in flexibility.

A further important result of our analysis is the identification of the existence of a positive endogenous relationship between the size of the GDP of a country and the

effects of inequality-reducing redistribution measures on aggregate economic consumption. However, the existence of the effect described in the following depends on the condition that a change in aggregate economic consumption is mainly determined by the consumption effect of the middle income classes (C_B in the examples by Johnson). This predominance by the middle class may be assumed to apply mostly to "developed" – or, better, "wealthy" – countries (e.g. those of the OECD). Therefore, they are the only ones this relationship may be applied to. As already described in our work, IA is the prevailing social preference in small incomes, whereas EA prevails in higher incomes. If this is applied to the overall economic picture, it means that for a low per capita income, i.e. for low GDP levels, IA is the prevailing social preference in the individuals of the society looked at. In the case of rising per capita incomes, i.e. a growing GDP, EA is gaining ever more importance. This shift in social preferences for different GDP values will lead to different kinds of behavior of the middle income class in the case of redistribution. For the sake of clarity, only two possible manifestations of the GDP levels are compared here: GDP_{low} and GDP_{high}. In the case of GDP_{low}, IA prevails, the middle class with its decisive effect on aggregate consumption therefore place their focus on "emulation": They orient themselves towards the higher incomes, whose consumption decreases as a result of redistribution. In this case, redistribution leads to a negative effect on aggregate consumption, as already explained. In the case of a high per capita income (= GDP_{high}), the middle class's EA is the prevailing factor. This is expressed by the fact that they want to keep ahead of the lower income classes whose consumption increases due to redistribution. As is known, redistribution from rich to poor will in this case lead to an increase in aggregate consumption. Thus, with an increasing GDP, a positive consumption effect in the national economy becomes increasingly likely in the case of redistribution from rich to poor. In other words: Owing to the existence of EA and, as has been described, its changed effect on the behavior in the case of rising per capita incomes, there is a positive endogenous relationship between the size of the GDP and the direction of the overall effect on consumption if there is a redistribution from rich to poor.

5.3 EA, Patent Protection and General Competition Policy

In this paragraph we will shortly explain the importance of the analysis results on EA for patent protection: Protecting intellectual property by patent law continues to be the right thing to do. However, licenses and patent fees must not make imitation unnecessarily expensive, since this finally promotes piracy and undermines the actual purpose of patent protection. But even more importantly, one fails to notice that imitation in fact may also hold benefits for the person whose product is imitated: In the end, this imitation will cause the innovator to again implement new innovations (due to his interest in keeping ahead as soon as he has lost the monopoly position held with his original invention, a process accelerated by imitation) – see the catch-up model in paragraph 3.2. Imitation thus also has indirect, delayed and positive effects for the enterprises / societies it concerns. This indirect positive effect for the imitated must be set off against the cost of imitation (= decreasing incentive for innovations because the profits gained from them cannot be skimmed off by the innovator exclusively) when determining the strength of optimum patent protection. Accordingly, too rigid patent protection from this point of view is certainly not ideal. The same result may also be applied in answering the following general question:

Which type of competition policy is suitable? The most efficient method is probably to keep markets open, i.e. to push back protectionism. Only in this way will “best practice” diffuse quickly and efficiently, and the additional incentives for new innovations created by increasing competition will reduce the cost of the opening of the markets for market players who dominated these markets until then.

5.4 EA and Labor Market

The existence of EA also has an influence on the efficient design of employment and / or compensation contracts. Compared with other social preference orders (IA, altruistic motives etc.), it in turn increases the interest in a high income of one’s own in order to be able to keep a positive distance from the other individuals (“keeping ahead of the Smiths”). If more effort – which, however, must really be observable in the given situation – leads to higher wages (success-oriented payment or efficiency wages), individuals with EA will choose a higher effort level than individuals without

EA in order to obtain those higher wages. As a result, the marginal disutility of labor and / or the cost of additional effort is / are reduced for the equality-averse employee by the additional positive utility effect of higher wage earnings triggered by the social preferences with EA. Individuals with a high degree of EA will therefore frequently be found in jobs offering performance-oriented compensation and the resulting possibility of positive income inequality. This must be taken into account in designing wage contracts of different occupational groups. It not only shows a clear connection to the theory of efficiency wages (see above) but also to the insider / outsider theory of the labor market: EA is also an additional argument why insiders strive to secure their wage level and their wage lead with respect to entrants and outsiders.

5.5 EA and Satisfaction / Welfare

According to Frey (1997), the *intrinsic motivation* of individuals is reduced if external (which also include monetary) interventions lead to their crowding out. This may e.g. result in decreasing faith in the existing political system (as a special form of *intrinsic motivation* and / or *civic virtue*). Therefore, if this fact is applied to social preference orders containing IA and EA, not only strong inequality (microeconomically speaking: big individual utility losses due to a strong negative effect by IA) but also too much equality leads to decreasing faith and / or a high degree of political dissatisfaction. Accordingly, egalitarianism imposed by the state, e.g. via the tax system, in addition to the known negative effects from distortion increasingly runs counter to social preferences the higher its degree, thus leading to growing welfare losses and therefore also to growing discontent. This situation has different consequences: For one thing, it provides an additional possible aspect when looking at the collapse of the socialist and communist states with their extremely egalitarian political systems, an aspect which clearly illustrates the sociopolitical relevance of EA. For another thing, this underpins the necessity of adapting welfare functions according to A. Sen, which basically take social preferences into account but have neglected EA so far.

6. Conclusion and Prospects

After a macroeconomic substantiation of equality aversion in the first three paragraphs, the fourth paragraph places the focus on the level of microeconomic models. Findings obtained so far are used to concretely integrate the concept of EA into already existing utility concepts by Fehr and Schmidt as well as by Bolton and Ockenfels, finally making a few comments on the fairness model by Rabin. The model extensions we developed demonstrate the changes caused by the existence of EA both in the functions and in the model results described in literature so far. In this context, it is also explained which indications of the existence of EA are already found in the original models and which aspects would have to be observed if trying to prove EA in an experimental set-up. Such an experimental proof of equality-averse individual preferences would certainly be an important next step as part of research in the field of EA. In addition, emphasis should also be placed on further concretizing the implications for economic policy presented in this work and on identifying additional conclusions. It would also be important to be able to clearly state under which conditions and circumstances changes occur in the importance of EA for social preferences. In this paper, we have already made initial statements on the relationship between the size of EA and the individual income level of the groups of individuals looked at.

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