Perception of Value of Money in Unfamiliar Currencies

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To Phillip, Julia and Sofia

DOCTORAL DISSERTATION IN PSYCHOLOGY

Abstract

Gamble, A. (2005*). Perception of Value of Money in Unfamiliar Currencies* Department of Psychology, Göteborg University, Sweden.

The real value of money as well as the perceived value of money is subject to changes. Inflation and deflation are examples of changes in real value. It has been shown that these changes do not always correspond to changes in subjective value. The money illusion implies that the subjective value of money is biased by the nominal representation in times of inflation or deflation. This thesis examines the related euro illusion referring to an influence of the nominal representation on the subjective value of money when a small-unit currency (high nominal value) is compared to a large-unit currency (low nominal value) or the reverse. In addition the thesis investigates whether accuracy-effort tradeoffs affect the size of the euro illusion. In Study I participants were in four experiments requested to evaluate prices of consumer products in their domestic currencies (Swedish crowns or pound sterling) or in euros, or to make evaluations of prices of low-price and high-price essential and non-essential consumer products in fictitious currencies with different exchange rates. Either a positive or a negative attitude was induced. In three experiments Study II tested the effects of mood on choices between two fictitious currencies for making payment or obtaining a salary as well as on choices between low-price and high-price consumer products with prices expressed in fictitious currencies. Mood was induced in one experiment and in two experiments natural mood was assessed. Three experiments in Study III investigated the role of income on the euro illusion. A reverse euro illusion was hypothesized because when the income is known, the prices of consumer products would be compared to the income, and thus they would be evaluated as less expensive in a currency with a large nominal value than in a currency with a small nominal value (called the compression effect). In Study IV three experiments systematically varied either the actual or subjective value for the same nominal value of money. The results of the conducted studies demonstrated the expected bias toward the nominal representation of prices (the euro illusion) when prices were expressed in fictitious currencies. This was done for both evaluations of prices of consumer goods, of choices of currency, and of choices between consumer products. Furthermore, both changes and no changes in the nominal representation affected price evaluations. In support of the role of accuracy-effort tradeoffs, the euro illusion was reduced by a more important task (evaluation of prices of high-price essential products), a negative attitude, and an induced activated negative mood, as well as a simple exchange rate.

Key words: Value of money, price evaluation, attitude, consumer choice

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Preface

The thesis consists of this summary and the following four studies referred to by their roman numerals:

I. Gamble, A., Gärling, T., Charlton, J., & Ranyard, R. (2002). Euro Illusion: Psychological insights into price evaluations with a unitary currency. *European Psychologist, 7*, 302-311.
II. Gamble, A., Västfjäll, D., Gärling, T., & Marell, A. (2005). Interaction effects of mood induction and nominal representation of price on consumer choice. *Journal of Retailing and Consumer Services, 12*, 397-406.
III. Gamble, A. (2005). Euro illusion or the reverse? Effects of currency and income on price evaluations. *Journal of Economic Psychology* (pending revision).
IV. Gärling, T., & Gamble, A. (2005). *Change in perceived value of money without change in nominal representation*. Manuscript.

This thesis would not have been written without the help from my advisor Professor Tommy Gärling. His support and enthusiasm through these years have made me realize that it is possible to achieve things that I thought were out of reach a long time ago. For this I am forever grateful.

Professor Rob Ranyard, University of Bolton, UK initiated this work as part of a collaborative project prompted by the introduction of the euro in several European countries. I am grateful to him for his valuable contributions and for being a co-author. I am also obliged to my other co-authors John Charlton, Agneta Marell, and Daniel Västfjäll.

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Finally, I would like to embrace my three children, Phillip, Julia, and Sofia for their endless patience with their mother, and also my sister Marie for all her encouragement.

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Göteborg September 2005

Amelie Gamble

Contents

Introduction

Money is an integral part of our daily lives. It is no exaggeration that barely a day passes without an economic transaction. Therefore, we believe that we know what money is worth. Yet, looking more closely, things are not always what they seem. The numbers printed on notes and coins do not necessarily correspond to the real value of money; the same real value may at times appear very high or very low, and thus the *subjective* value of money may change from one moment to the next.

Value of money may have three different meanings: the real value, the nominal value, and the subjective value. The real value refers to the amount that is paid in exchange for a good or service; the nominal value refers to the numbers printed on notes and coins; and the subjective value refers to the utility of a certain amount of money. The real value and the nominal value are believed to correspond and are hence referred to as the objective value of money. The subjective value is generally supposed to be a growing function of the objective value.

In daily transactions it is plausible to assume that the real value and the nominal value overlap, but that the real value differs from the nominal value for temporally distant outcomes. As a consequence, an individual must consider the time interval in order to make an accurate judgment of past or future monetary values. The salience of the nominal value, however, makes it difficult to perform such judgments. Even when time is not an issue, there are instances when the nominal value may have an undue influence on the judgment of the value of money, for example, when the real value is in different currencies. If the rate of conversion is unfamiliar or difficult to compute, the salience of the nominal representation may influence the evaluation of the money. The subjective value of money is thus affected. When the nominal representation is large, the money may be perceived as worth more than when it is small, independently of the real value.

The relation between the perceived or subjective value of money and the objective value of money is described by the value function for money. In this summary, I will begin with a brief reference to previous research on the value function. This is followed by a description of three types of violations of the invariance of the value function, namely changes of the origin, discontinuities, and changes of the scale unit. I will then more closely examine the last violation, reviewing previous research and proposed explanations. This violation is the focus of the empirical studies summarized thereafter.

Subjective Value of Money Related to Objective Value

Bernoulli (1738/1954) made a distinction between subjective and objective value of money. He assumed that the subjective value increases logarithmically with the objective value. This implies that multiplicative increases in the objective value correspond to additive increases in subjective value, that is, that the subjective value of each additional objective unit decreases. More recently, Galanter (1962, 1990) and Galanter and Pliner (1974) verified that the value function of money is concave (see Figure 1). However, they showed that it is a power function. This implies that constant ratios of the subjective value of money correspond to constant ratios of the objective values.

In Prospect Theory Kahneman and Tversky (1979) posited a concave value function, and Tversky and Kahneman (1992) showed that a power function is an acceptable approximation. As will be discussed further below, they also assumed different value functions above and below a reference point (origin). Above the reference point, the function relates subjective value to money that is added to a given amount (gains), below the reference point the function relates subjective value to money that is withdrawn from a given amount (losses). The value function is concave above but convex below the reference point reflecting that sensitivity decreases in both cases. In addition to the S-shaped value function, it is assumed that the function is steeper for losses than for gains. This implies that a withdrawal of a sum of money is valued more negatively if interpreted as a loss than if interpreted as a reduced gain, and, conversely, adding an amount of money is valued more positively if interpreted as a reduced loss than an increased gain.

Violations of Invariance of Subjective Value of Money

Research has thus demonstrated that the subjective value differs from the objective value of money. Still, it is assumed that the subjective value increases with the objective value. This increasing relation may however be distorted in several ways, hence violating an assumption of invariance. In line with this, for a given objective value of money, the subjective value may vary. Changes of reference point, loss of or a need for a particular sum of money, and the nominal representation of money are instances that may give rise to this variation in subjective value relative to the objective value of money.

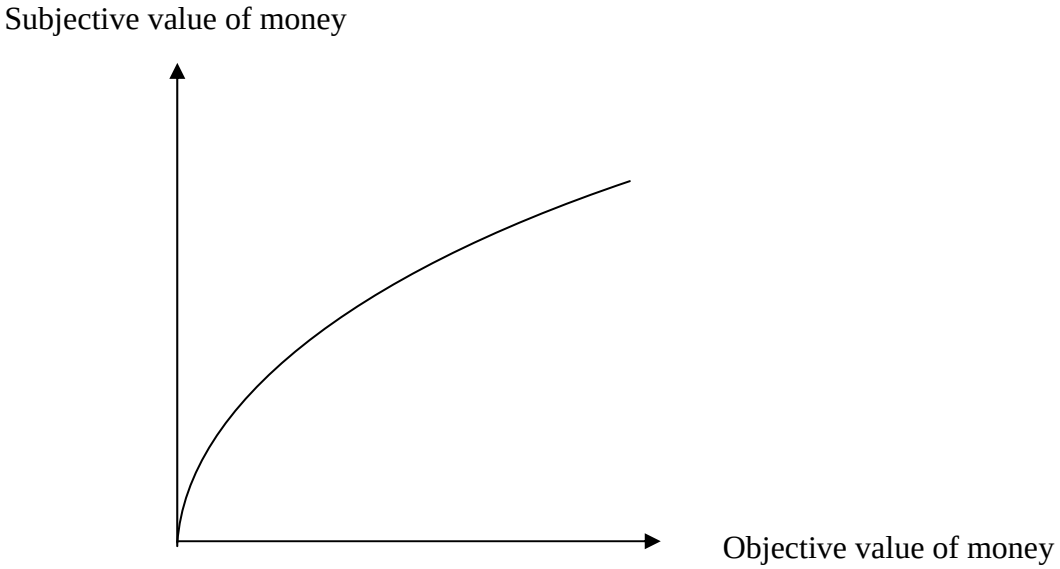

Figure 1. The value function of money

Changes of the Origin of the Value Function

In Bernoulli's (1738/1954) model of the value function of money, the origin is equivalent to the absence of money and the utility of money thus defined as states of wealth. Kahneman (2003) refers to this model as reference independent since it focuses on absolute values rather than on differences in value from a prior adaptation level or reference point. Contrasting Bernoulli's view, Prospect Theory (Kahneman & Tversky, 1979) posits that outcomes of choices are coded as gains or losses relative to a reference point. In general, the reference point is current assets. However, the reference point may be anything that is psychologically relevant to the decision maker. For instance, there are circumstances when the decision maker has the choice of more than one reference point (Kahneman, 1992), and hence, may alternate between coding the outcome of the decision as a gain or as a loss. Such a situation may occur for example in trading shares of stocks. Consider a stock dealer who buys stocks at time t_1 and sells them at time t_2 when the price is higher than the purchase price but lower than the price at which the stock dealer had hoped to sell the stock. If the dealer chooses the purchase price as the reference point, the selling price will be perceived as a gain. On the other hand, if the reference point is the price at which he or she had hoped to sell, the selling price will be perceived as a loss. Thus, depending on which reference point that is chosen, the subjective value will vary.

This example thus shows that the subjective value of money is not invariant but changes with changes of the reference point. In Prospect Theory (Kahneman & Tversky, 1979) a value function is proposed that takes into account this

violation of the invariance that is assumed to hold in the conceptualization of the value function proposed by Bernoulli (1738/1954) and others (Galanter, 1962, 1990; Galanter & Pliner, 1974)

Discontinuities of the Value Function

The invariance of the value function of money may also be violated when there is an increase in the subjective value of a certain amount of money (Kahneman & Tversky, 1979). There may be different reasons for such an increase. Thaler and Johnson (1990) described the break-even effect implying that something that recently has been lost is important to recoup. Thus, for this particular (lost) sum of money or more, the value becomes higher, hence causing a violation of invariance of the value function. As may be seen in Figure 2, the value function is discontinuous at the loss of a certain sum of money. Increases in the subjective value could also occur when a certain sum of money is needed to purchase a desired item. This sum of money may then be considered to be very attractive and, consequently, receives a higher subjective value.

Uncertainty about the size of an outcome is another reason assumed to cause distortion of the invariance of the value function. For instance, in times of inflation, the true price for a specific good or service may be difficult to estimate. Authorities providing information on inflation give the average price increases for a basket of goods and services and not for specific items. For this reason people may be indifferent to prices within ranges of prices.

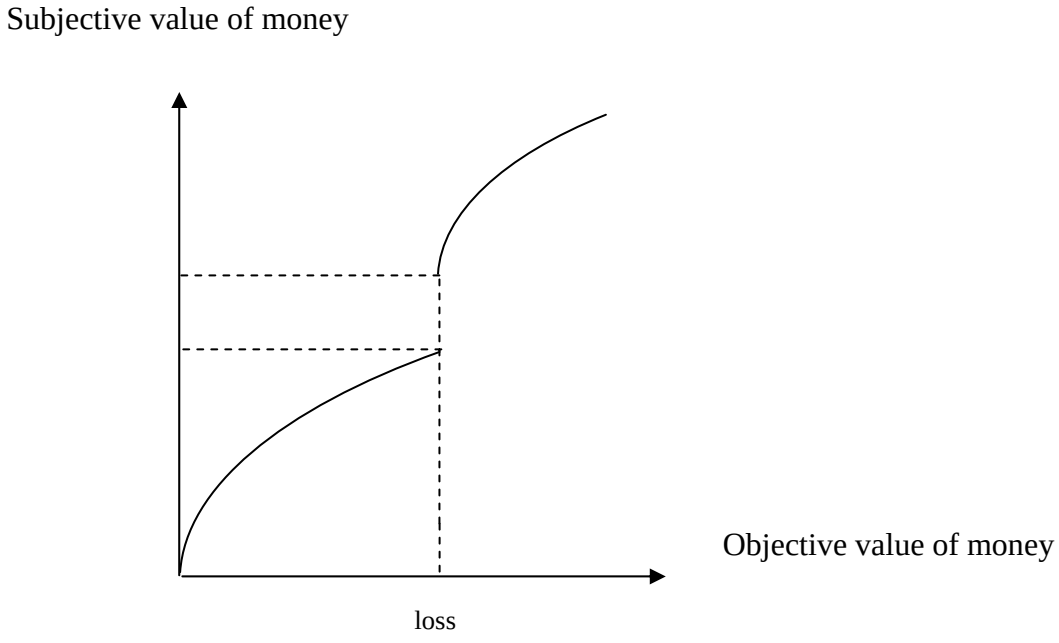

Figure 2. A value function with a discontinuity at the point of a prior loss.

Changes of the Scale Unit of the Value Function

In a series of experiments, Shafir, Diamond, and Tversky (1997) showed that participants making choices between different monetary outcomes did not always chose the alternative with the greatest gain. Instead, they chose the alternative with the largest nominal value disregarding the influence of inflation on the real value of the outcome. The nominal representation of money thus has an influence on participants' choices when the value of the alternatives vary across time due to inflation. The bias toward the nominal representation in this example has been termed the money illusion (Fisher, 1928; Patinkin, 1965). There may also be an influence on judgments and choices when the money is expressed in different currencies, for instance, when the price of a good or service is presented in two different currencies. The nominal representation will differ for the currencies when their respective money unit differs. Thus, the numbers will be larger in one currency and smaller in the other. As shown in Figure 3, the evaluation of the price may therefore also differ such that it may be perceived as more expensive when it is expressed in large as opposed to small numbers.

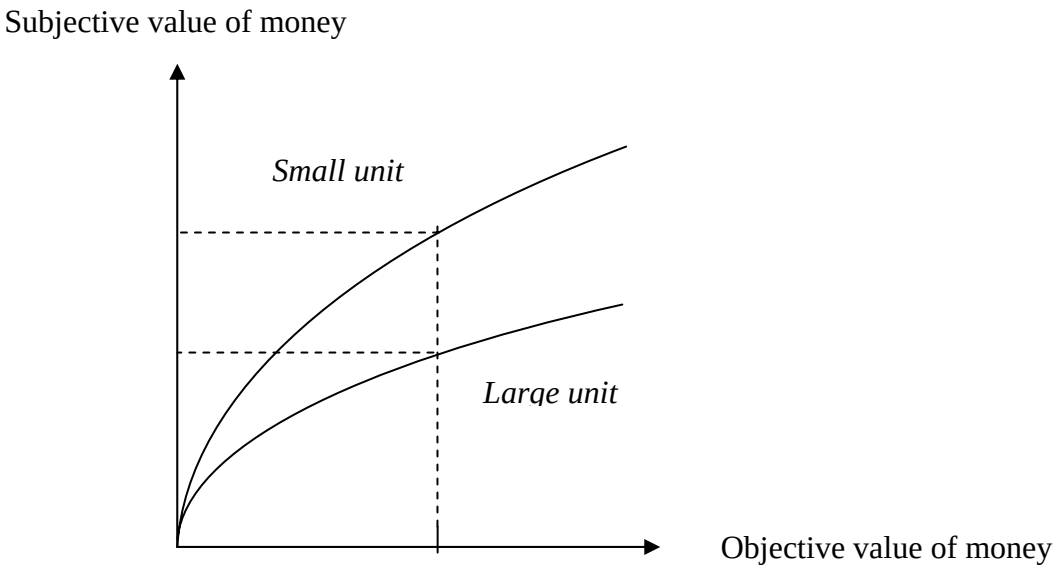

Figure 3. Value functions for a small and a large money unit, respectively.

Effects of Nominal Representation of Money: Empirical Findings

A bias toward the nominal representation of a currency has been called the *euro illusion* (Burgoyne, Routh, & Ellis, 1999; Gamble, Gärling, Charlton, & Ranyard, 2002) referring to the situation citizens in Europe encounter when their national currency is being converted to the euro. It implies that the change of scale unit of the value function of money entailed by the currency change has an impact on the subjective value causing a violation of its invariance. Not only the perception of prices but also choices of, for instance, consumer goods and services may be biased toward the nominal representation.

The money illusion and the euro illusion are basically the same phenomenon in that the nominal representation in both cases influences the subjective value of money; in the former case the subjective value of money does not change when the real value changes because the nominal representation stays the same, in the latter case the subjective value changes because the nominal representation changes though the real value stays the same.

The transition to the euro in the many countries in the European Union (EU) has inspired a recent upsurge of research into the effect of the nominal representation of money in different currencies on price evaluations (Gamble et al., 2002; Gamble, Gärling, Västfjäll, & Marell, 2005), on price estimates and the attractiveness of salaries (Jonas, Greitemeyer, Frey, & Schultz-Hardt, 2002), and on spending behavior (Cannon & Cipriani, 2003; Raghubir & Srivastava, 2002; Soman, Wertenbroch, & Chattopadhyay, 2002). In a similar vein Svedsäter, Gamble, and Gärling (2005) found that buying and selling stock shares are affected by the nominal value of the shares.

Thus, it has been found that the nominal value biases the subjective value of money in diverse contexts. For instance, in Germany Jonas et al. (2002) performed an experiment in which they asked participants to price various consumer products from a department store catalogue. The results showed that when estimating the product prices in the unfamiliar currency, euro, compared to the familiar currency, German mark (DM), the estimates were higher in euros (low nominal value) than in DM (high nominal value). It was inferred that a currency with a lower nominal value than the familiar currency was perceived to be worth less and, therefore, prices of the consumer products had to be increased to be compatible to the nominal value of those in the familiar currency.

Raghubir and Srivastava (2002) demonstrated that participants systematically underspend in currencies with higher nominal values and systematically overspend in currencies with lower nominal values relative to their familiar currency. In a series of experiments participants were requested to purchase silk ties and scarves in different countries with currencies corresponding to a multiple (high nominal value) or a fraction (low nominal value) of their familiar currency. Controlling for threats to internal validity, such

as differences in perception of product quality as well as preferences due to country-of-origin, the results showed that, when the foreign currency was a multiple of the home currency (i.e., a higher nominal value), participants willingness to pay (WTP) for the consumer products decreased the larger the nominal value in relation to the home currency. For instance, WTP was lower in Romanian leu (1US$ = ROL 24,500) than in Norwegian krone (1US$= NOK 9.5). Conversely, when the foreign, unfamiliar currency was a fraction of the home currency (i.e., a lower nominal value) WTP increased. Thus, the authors concluded that the nominal value or face value of the unfamiliar currency influences participants' willingness to pay for the consumer products.

Similar effects on WTP were demonstrated in experiments in which participants were asked to pay for various products in fictitious currencies with different nominal values (Soman et al., 2002). In addition, Soman et al. tested the possibility of a reversal of the effect of the nominal value arguing that not only prices of consumer products but also salaries are considered in making economic decisions. In several experiments participants were informed about a budget constraint and, subsequently, asked about their willingness to purchase consumer products or lottery bets. The assets and the product prices were expressed either both in the same currency or in different currencies. One of the experimental tasks requested participants to allocate money to diverse budgets such as shopping, recreational activities, and eating out. In a within-groups design, in the first session participants were asked to budget money in their home currency, in the following session taking place two weeks later, they were asked to do the same in fictitious currencies, expressed either in a low nominal or high nominal value. As predicted, participants in the low nominal value condition allocated less money than did participants in the high nominal value condition relative to their home currency. The results were interpreted to indicate that the perceived purchasing power, that is, the nominal difference between the disposable income and the allocated money, was less in the low nominal value than in a high nominal value condition. However, the pattern was reversed when budgets and prices of the consumer products were not expressed in the same but in different fictitious currency units.

The nominal value has also been found to affect the attractiveness of a salary. In an experiment conducted in Germany by Jonas et al. (2002), the participants were asked to state how many minutes they were willing to spend traveling to work when the salary was paid either in euros or DM (the real amount being the same in both conditions). As predicted, the time participants were willing to travel was significantly longer in the DM than in the euro condition.

In real life consumers report having difficulties adapting to the euro (Aalto-Setälä & Riajas, 2003; Cannon & Cipriani, 2003, Kirchler & Meier- Pesti, 2002; Marques & Dehaene, 2004, Meier-Pesti & Kirchler, 2001; Ranyard, Routh, Saldanha, & Burgoyne, 2005). Commonly, it has been found that consumers

continue to convert from the euro to their old currency several months after the transition has taken place. Thus, it has been proposed that the difficulties consumers experience in estimating prices of consumer products depends in part on the conversion strategies they use. For instance, the nominal value is believed to have a stronger influence the more difficult the conversion strategy (Raghubir & Srivastava, 2002). Recent research has therefore investigated the use of conversion strategies (Dehaene & Marques, 2002; Lemaire & Lecacheur, 2001; Lemaire, Lecacheur, & Ferréol Barbey, 2001). A practical aim of this research is to develop methods for teaching effective conversion strategies to consumers. However, in field studies the influence of the nominal representation is difficult to disentangle from the many other factors influencing the problems consumers face. Different segments of the population may experience more difficulties than others (Aalto-Setälä & Raijas, 2003;Vissol, Layani, & Ramón, 1999; Ranyard, Burgoyne, Saldanha, & Roth, 2005; Burgoyne, Routh, & Ellis, 1999), and there are differences between countries in the adaptation to the euro (Marques & Dehaene, 2004). The experiments conducted in order to investigate the influence of the nominal value have therefore been done in laboratory settings in which many of these variables are controlled for. In contrast, Cannon and Cipriani (2003) made a controlled experiment to examine the role of the nominal value in a natural setting. In a number of churches in Italy and Ireland, church giving was investigated before and after the transition to the euro with the purpose of finding out whether the nominal representation of money had an impact on how much money people gave. Specifically, it was hypothesized that church giving would decrease with the nominal value of the income. In Italy there was an increase in giving that was significantly higher after the introduction of the euro. However, there was also an increase, albeit smaller, in Ireland. Thus, the effect of the nominal value was in the opposite direction for the two countries since the Italian lire had a higher nominal value than the euro and the Irish punt had a lower nominal value than the euro. Given these results, the mechanisms behind the effect of the nominal value are open to debate. The next section discusses mechanisms proposed in the literature to account for the effects of the nominal value on the subjective value of money in the context of different currencies.

Effects of Nominal Representation of Money: Proposed Explanations

Two different mechanisms have been proposed to account for the effects of the nominal representation of money on the subjective value of money, the anchoring-and-adjustment heuristic (Kahneman & Tversky, 1994) and the difference assessment (Soman et al., 2002) based on the numerosity heuristic (Pelham, Sumarta, & Myaskovsky, 1994). The former is based on the assumption that people are influenced by a number that has been presented prior

to making an estimate; the latter deal with the perception of numbers. Other related suggestions have also been made (Marques, 1999). Furthermore, it has been proposed that accuracy-effort tradeoffs play a role (Gamble et al., 2002; Raghubir & Srivastava, 2002).

Anchoring and Adjustment

Tversky and Kahneman (1974) provided an early description of anchoring-and-adjustment in judgments under uncertainty. It is a cognitive heuristic in which estimates are influenced by a starting point, or anchor, in such a way that the estimates are adjusted toward the anchor. The anchoring effect was originally demonstrated in a series of experiments where participants were asked to give their estimates of various quantities, for instance, the percentage of countries in Africa that are members of the United Nations. Before giving their estimates participants were asked to state whether the number of countries was higher or lower than an ostensibly arbitrary number obtained by the experimenter from spinning a wheel of fortune. Different groups were given different anchors (i.e., the arbitrary number from the wheel of fortune). The results showed that high anchors yielded significantly higher estimates than did low anchors. Typically, the adjustment is insufficient as demonstrated in an experiment in which participants were asked to intuitively multiply a series of numbers, presented either in an ascending or descending order. The participants' estimated products were significantly lower for the former than for the latter series.

Anchoring effects are difficult to avoid and have been found exceptionally robust as demonstrated in a variety of situations (e.g., Chapman & Johnson, 2002). Building on this previous research, Raghubir and Srivastava (2002) proposed that the anchoring-and-adjustment heuristic describes how the process of arriving at a certain price estimate in an unfamiliar currency is accomplished. For instance, when estimating prices of consumer products in a foreign currency, the nominal value of reference prices in the familiar currency may serve as an anchor (Jonas et al., 2002; Raghubir & Srivastava, 2002; Mussweiler & Englich, 2003). Raghubir and Srivastava (2002) posit how the anchor (i.e., the nominal value in the unfamiliar currency) influences the evaluation of product prices in a foreign currency such that an inadequate adjustment of the exchange rate yields a reference price in the familiar currency that is subsequently adjusted toward the anchor value. The assimilation of the reference price to the anchor price will lead to a price estimate biased toward the nominal value. The degree of bias may depend on the accuracy of the conversion process. In line with this, it has been found that uncertainty with regard to price estimates in a foreign currency enhances the anchoring bias (Mussweiler & Englich, 2003). Recent research on anchoring effects has demonstrated that more effortful thought moderates the effect of anchoring when anchors are self-generated, but not if the experimenter provides them as in standard anchoring experiments

(Epley & Gilovich, 2005). It is believed that different psychological processes are activated. The results in this thesis show that the influence of the anchor will be moderated by different factors.

Numerosity Heuristic and Difference Assessments

Young children may mistakenly believe that the change received after having paid for a product is worth more than the initial note that was used as payment. The reason is that the number of units of money (i.e., the number of coins) is larger after the transaction than before. Pelham, Sumatra, and Myaskovsky (1994) refer to this as the numerosity heuristic. They describe a number of previous research findings from animal studies as well as in social psychology showing that both animals and people confuse numerosity (the number of units) with quantity (e.g., the total area or weight). For instance, in a study of operant conditioning in chickens, a kernel of corn divided into four pieces was found to be a more effective reinforcer than a whole kernel (Wolfe & Kaplan, 1941; cited in Pelham et al., 1994). Similar results have been demonstrated in studies on rats; for instance, it has been found that rats preferred four smaller food pellets as opposed to one larger food pellet (Capaldi, Miller, & Alptekin, 1989). In studies on people, high self-esteem seems to be enhanced if a single belief (e.g., I am creative, analytical, and verbal) about oneself is divided into several distinct statements (e.g., I am creative; I am analytical; I am verbal) (Showers, 1992), and attitudes may change more readily if persuasive arguments to do so are divided into several arguments (Petty & Cacioppo, 1984).

Thus, not only animals but also people may falsely infer quantity from numerosity in diverse contexts. According to Pelham et al. (1994), there are three potential reasons for the numerosity heuristic; one is that the numerosity heuristic is an adequate response since in natural environments very often many means more (e.g., many trees make a bigger forest). The second reason originates from the extension of research on the psychophysics of diminishing sensitivity as exemplified by Prospect Theory (Kahneman & Tversky, 1979). With the concave shape of the value function for gains as a starting point, Thaler (1985) proposed that people prefer segregation of gains as opposed to joint outcomes because two separate gains have a greater expected utility than the sum. The third reason stems from research on cognitive development. It has been suggested that young children possess a preverbal counting system, which is active in various judgment tasks. It is believed that this counting system is particularly susceptible to numerosity (e.g., Gallistel & Gelman, 1991).

In recent research on the effects of numerosity, Pelham et al. (1994) found that participants relied on numerosity cues for inferring quantity in a number of cognitive tasks including estimating the area of a circle that had been divided into several triangle-shaped pieces, estimating a sum from either few-elements or many-elements cues, in probability assessments, and to obtain more favorable

impressions of a stranger from a list of traits that was separated into many overlapping traits rather than grouped together.

Soman et al. (2002) similarly proposed that when evaluating prices of consumer products in unfamiliar currencies people are influenced by the numerosity of the currency. In line with economic theory, they suggest that people in order to evaluate a product price compare the price to a salient standard of reference, for instance the price of a similar consumer product or their income. They may do so by evaluating the ratio between the reference and the product price, or as Soman et al. argued, by evaluating the difference between the reference and the product price, a process they label difference assessments. Clearly, if the ratio were calculated, the price of the consumer product would not be evaluated differently whether in one currency or the other (the real value is assumed to remain constant across currencies), but if the difference is calculated, for instance, between the income and the product price, the numerosity of the currency might have an effect on the evaluation of the product price such that the difference in a low nominal value will be perceived as smaller (less numerous) than in a high nominal value and hence the product price will be evaluated as more expensive in the former than in the latter currency.

The Symbolic Distance Effect and the Compression Effect

When the same objective value of money is represented by different nominal values in different currencies, several other effects of numbers may affect how the value of money is judged. One is the symbolic distance effect implying that the latency of comparative judgments is inversely related to the difference between the numbers´ nominal values (Dehaene, 1992). For example, it takes longer time for people to decide that 6 is larger than 5 than that 9 is larger than 2. Marques (1999) noted the relevance of this effect for understanding how people manage the euro transition. A consequence is that price comparisons may be slower in the euro if the numbers are smaller in euro (i.e., has a lower nominal value) than in the former domestic currency. In addition, it may be assumed that if the numbers refer to the prices of goods and services, after the conversion the smaller numerical difference between the numbers is perceived as a smaller monetary difference between the product prices that implies that the subjective value of the difference is less. As Marques (1999) noted, consumers have to learn that even a small difference in price might mean a large increase (or decrease) in spending. It should be noted that this is identical to difference assessments (Soman et al., 2002), that is, that due to the numerosity heuristic, a given price difference converted to another currency with a lower nominal value is judged to be smaller or vice versa. Gamble (2005) refers to this as the compression effect.

Another effect relevant to the subjective value of money is also recognized by Marques (1999). As several studies have shown, numerical differences

appear subjectively smaller the larger the numbers involved (e.g., Dehaene, 1992). This is the assumption that a concave function relates the subjective value of money to the objective value of money (see Figures 1 and 3). It is implied that the same objective price difference will be subjectively smaller for higher prices than for lower prices. In contrast, the compression effect or difference assessment implies that a smaller difference between numbers denoting prices is perceived to be smaller than a larger difference. As already noted, this explains why conversion to a currency with a lower nominal value may make differences between prices appear smaller. If both effects are present, even though it would still be the case that converting to lower nominal values would lead to a subjectively smaller difference than converting to higher nominal values, the difference due to nominal value would be less for higher prices than for lower prices.

Accuracy-Effort Tradeoffs

It has been demonstrated that decision making is both flexible and adaptive (Payne, 1982). Decision makers engage to varying degrees in information processing contingent on requirements of accuracy of decision outcomes as well as required mental effort. Contingent decision making was formalized in the theory proposed by Payne, Bettman, and Johnson (1993; see also, Bettman, Luce, &, Payne 1998). Briefly, the basic assumptions are that decision makers have acquired various decision strategies from previous experience and training, and that a choice between these strategies is made in the form of a metadecision of how to decide. Different strategies not only require different degrees of mental effort, they also vary in accuracy for different decision problems. Consequently, in deciding how to decide, the decision maker has to consider and make a tradeoff between the degree of mental effort to invest and the desired accuracy of the outcome of the decision. This choice may either be a conscious choice or depend on a previously learnt relation between certain features of a decision and the accuracy and effort of a strategy.

Kahneman (2003; see also Kahneman & Fredricks, 2001) offered a similar analysis making a distinction between fast and highly accessible intuition and slow and deliberate reasoning. Kahneman assumes that intuitive judgments come easily and spontaneously to mind generated from impressions of the attributes of a stimulus. These highly accessible judgments may be biased; however, they can be overridden by a more thorough analysis, thus changing or possibly correcting the bias. Cognitive mechanisms and the characteristics of the evoking stimuli determine the degree of accessibility.

Gamble et al. (2002) and Raghubir and Srivastava (2002) have noted that the effect of the nominal representation on price evaluations and choices may depend on how accurate the available information is processed. An issue that has been raised is what factors affect this accuracy-effort tradeoff.

Figure 4 illustrates how the assumed accuracy-effort tradeoff affects and is affected by different factors. It is assumed that an individual intends to purchase a good or service. Its nominal price is accessible but cannot be evaluated unless it is converted to a familiar currency. If the conversion is from euro to the domestic currency, research has identified several conversion strategies (Dehaene & Marques, 2002; Lemaire & Lecacheur, 2001; Lemaire, Lecacheur, & Ferréol Barbey, 2001) that are retrieved from memory or external sources (e.g., information about exchange rate). It may be assumed that the more accurate these are, the more effort is required. Cognitive skill and motivation jointly determine the tradeoff the individual makes. If an accurate evaluation of the price of a consumer product is important to achieve, more effort is invested. However, lack of cognitive skill (e.g., knowledge of available conversion strategies) may still result in an inaccurate evaluation. A purchase decision is based on the outcome of the price evaluation.

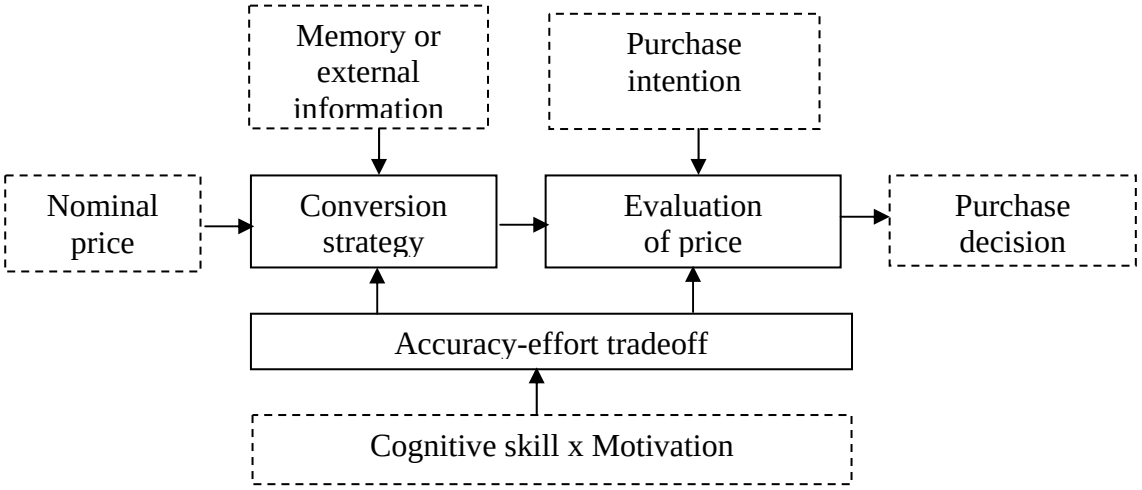

Figure 4. The hypothesized role of accuracy-effort tradeoff in evaluations of prices of consumer products in an unfamiliar currency.

Summary of Empirical Studies

Overview

The primary aim of the empirical studies was to investigate the effects of the nominal representation of money on price evaluations and purchase decisions. A second aim was to demonstrate the role of accuracy-effort tradeoffs for how strong these effects are. Accuracy requirements were varied in several ways including properties of the consumer products and services (price and

necessity), an induced positive vs. negative attitude, and induced and natural mood.

Study I

The aim of Study I was to examine whether in line with the euro illusion and the compression effect, the nominal value of money affects evaluations of product prices. Four experiments were conducted. In Experiments 1 and 2 price evaluations of consumer products were compared for two currencies, the participants' domestic currency and the Euro, either in Sweden or in Great Britain. In the two following experiments fictitious currencies were compared.

In Experiment 1 a sample of Swedish households were asked in telephone interviews to evaluate prices and price increases for a set of consumer goods and services. In two groups of interviewees, the product prices and the price increases were specified either in Swedish crowns or in euros. The conversion rate to Swedish crowns was given to participants in the euro group. For three out of the four goods and services, the results showed that the product prices were evaluated as more expensive and the price increases were perceived as larger when specified in Swedish crowns than in euros. These results were in line with both the hypothesized euro illusion and the compression effect.

In order to further investigate these effects, Experiment 2 was conducted in Great Britain with undergraduates as participants. In contrast to Swedish crowns, British pound sterling has a lower nominal value than the euro; hence the price evaluations were expected to be reversed to those of the Swedish sample. However, the results were not in line with this expectation since the evaluations were in the same direction as those made by the Swedish sample. It was suggested that some factor other than the nominal value played a role, such as familiarity with the domestic currency or a tendency to believe that domestic prices are more expensive for the selected goods and services than they are in the European Monetary Union (EMU) countries.

In order to control for familiarity, in Experiment 3 unfamiliar fictitious currencies were constructed where currency units ranged from very small to very large. For the very small-unit currency, we anticipated a reversed effect, the "Lira effect," so called because of the similarity to the Italian lira, which has a very large nominal value. As will be discussed later, we suspected that there would be difficulties in converting prices of consumer products to Swedish crowns from a currency with such a large nominal value.

We also chose six consumer products that were considered low-priced and six that were high-priced, each categorized into three essential and three nonessential items. Because of the hypothesized accuracy-effort tradeoff (Payne et al., 1993), it was assumed that the price evaluations of high-price essential items would be less affected by the nominal representation than low-price non-essential items. High-price essential items were assumed to have greater importance to participants, and the effort invested in converting the currency in

order to evaluate the prices of them would thus be greater, defying the impact of the euro illusion for these items.

Undergraduates randomly assigned to four groups were asked to imagine that they had been offered a job in a pleasant European country. Before accepting the offer, they were told to assess the cost of living by examining prices for a selection of goods and services. Their task was to rate the product prices compared to Swedish prices for the selected items. In the four groups of participants the product prices were given in four different fictitious currencies. They were informed about the exchange rate to Swedish crowns. Consistent with the euro illusion, the results showed that prices were rated as more expensive in a small-unit than in a large-unit currency and that this effect was larger for low-price non-essential than for high-price essential items, thus suggesting that less thorough processing accounts for the euro illusion. Also, in line with the hypothesized Lira effect, the results were reversed for the smallest currency unit.

In Experiment 4 we investigated whether a positive or negative attitude would contribute to the explanation of the results of Experiment 3. Drawing on research in judgment and decision making (Isen, 2000; Schwarz, 2000) showing that a positive mood leads to less thorough processing than a negative mood, we argued that these results may generalize to attitudes (Eagly & Chaiken, 1993) so that a positive attitude would lead to less thorough processing than a negative attitude. Consequently, a positive attitude would enhance the euro illusion whereas a negative attitude would reduce the euro illusion. In order to test this conjecture we used the same scenario as in Experiment 3 with the difference that the European country was described as unpleasant. This description was assumed to induce a negative attitude. Another two groups of undergraduates participated in the experiment. As expected, the euro illusion disappeared for all goods and services except for low-price non-essential items. Taken together, the results of Experiments 3 and 4 indicate that the euro illusion exists and that its size is influenced by the degree of thorough processing.

Study II

In Study I we obtained support for the hypothesis that the importance of the task, that is the significance and the price of a good or service, influenced how thoroughly participants performed the conversion of the prices, thus being more or less susceptible to the euro illusion. A positive attitude furthermore seemed to increase the euro illusion, whereas a negative attitude decreased it.

In Study II we extended these findings by investigating the effects of mood on the euro illusion. Mood has been found to vary both in valence and activation (Russell, 1980). Induced positive mood causes less thorough processing than negative or neutral mood (Isen, 2000; Schwarz, 2002), and low activation likewise causes less thorough processing than high activation (Hockey, Maule, Clough, & Bdzola. 2000; Lewinsohn & Mano, 1993). We thus hypothesized that

a positive and low activation mood would cause less thorough processing and therefore a stronger euro illusion, whereas a negative and low activation mood would cause a weaker euro illusion. Instead of price evaluations, in Study II we examined choices of different currencies (Experiments 1 and 2) and choices of consumer products varying in prices expressed in different nominal values (Experiment 3).

In Experiment 1 undergraduates assigned to different groups were requested to make choices between currencies with different nominal values, one large-unit currency (small numbers) and one small-unit currency (large numbers), either to pay for a consumer product or to receive their salary. In line with the euro illusion, we hypothesized that the participants were more willing to pay for the consumer product in the currency with the small nominal value and to receive their salary in the currency with the large nominal value. Furthermore, we assumed that this bias would be modified by mood.

The participants were asked to imagine that they worked in a country in the European Union that had two currencies (dual pricing), so that they could use any of the two currencies. The conversion rate to Swedish crowns was given for both currencies. Participants were thus assured that there was no difference in real value between currencies. In order to induce mood differences, participants were instructed to recall and write down an emotional episode (Gerrhard-Hesse, Spies, & Hesse, 1994). In four different groups the emotional episode should refer to being sad and miserable (negative valence-low activation), anxious and jittery (negative valence-high activation), calm and relaxed (positive valence-low activation), or happy and elated (positive valence-high activation). The emotion-describing adjectives were selected from Västfjäll, Friman, Gärling, and Kleiner (2002). To enhance the mood manipulation, participants were also requested to answer a set of appraisal questions (Smith & Ellsworth, 1985). Before and after the instructions, activation and valence were measured by self-ratings. This manipulation check verified that the mood induction was successful.

Consistent with the hypothesis, the results indicated that the currency with small nominal value was preferred when paying for the consumer product whereas the currency with the large nominal value was preferred when receiving the salary. There was also an expected effect of mood so that the difference in percentages of choice of currency was largest for low activation and positive valence, less for high activation and positive mood, even less for low activation and negative mood, and did not differ for high activation and negative mood.

In Experiment 2 we examined whether natural mood would have the same effect as induced mood. The procedure was identical to Experiment 1 except that there was no mood induction. As in Experiment 1, mood was rated on two scales measuring activation and valence before the choices of currency. The results for additional groups of undergraduates replicated the same pattern for choice of currency, thus suggesting that the nominal representation influences

choices of currency. However, the analysis of mood did not demonstrate that natural mood had the same effect, as did induced mood**.** Another similar attempt to investigate the effect of natural mood was made in Experiment 3, yielding the same negative results as Experiment 2.

The experimental task in Experiment 3 was to make choices between cheaper and more expensive consumer products. Three consumer products with and without additional features were presented to the participants. They were asked to imagine that these consumer products were items that they would like to buy for their new home in a EU country. In pilot studies prior to the main experiment, we determined how much more participants were willing to pay in Swedish crowns for the additional features. Participants in the main experiment were requested to choose the consumer products with or without the additional features, for example, a telephone equipped with a number display (expensive version) and the same telephone without this additional feature (less expensive version). In two different groups of undergraduates, the prices were given in two fictitious currencies, a small-unit currency in one group and a large-unit currency in the other group. The results were consistent with the hypothesis in showing that the choices were biased toward the nominal representation. Thus, the more costly consumer products with additional features were chosen when the prices were expressed in the currency with the small nominal value, the less costly consumer products without additional features when the prices were expressed in the currency with the large nominal value.

Study III

The importance of the price evaluation task, a negative attitude towards the country, and an induced negative mood were demonstrated in Studies 1 and 2 to be moderating factors reducing the influence of the nominal value. In Study III the aim was to examine whether the euro illusion would reverse if prices of consumer products in an unfamiliar currency were compared to disposable income expressed in the same currency. It was hypothesized that due to the compression effect (Marques, 1999) or difference assessment (Soman et al., 2002), product prices would be evaluated as more expensive in a currency with a small nominal value and less expensive in a currency with a large nominal value. The logic behind this hypothesis is that the currency unit determines the subjective value of the difference between the numbers such that in a large currency unit (low nominal value) the difference is perceived as subjectively smaller than in a small currency unit (high nominal value). Thus, the price of a consumer product would be evaluated as more expensive in the former currency because there would be “less money left” than the corresponding difference between the price and the disposable income in the latter currency. Three experiments investigated the effect of income on price evaluations. In Experiment 1 participants were either informed about their income or not. In Experiment 2, for participants who were informed about their income, a budget

constraint was introduced in order to make the income more salient. Experiment 3 informed participants about their income and requested them to judge whether they could afford to pay for the consumer products.

In Experiment 1 undergraduates were randomly assigned to four groups. They were presented with a booklet similar to that of Experiment 3 in Study I, except that there were only two fictitious currencies (low and high nominal value, respectively) and in two of the groups participants were informed about their salary in the fictitious currencies. There were eight (four low-priced and four high-priced) consumer products to be evaluated. In line with the euro illusion the results showed that for the groups with no information about salary, all but two consumer products (one low-priced and one high-priced item) were evaluated as less expensive in the low nominal value condition than in the high nominal value condition. However, even though the euro illusion was weaker overall in the salary than in the no-salary conditions, the role of income on the price evaluations was limited in that only two high-priced items were evaluated as more expensive in the low nominal value condition. Participants may thus have compared the prices to the salary for the high-priced products but not for the low-priced products.

In order to make disposable income more salient and hence promote the comparison to the income, in Experiment 2 another two groups of undergraduates were informed about the income as before with an additional budget constraint for low-priced consumer products. Research on mental accounting has demonstrated that people label money and “deposit” them in different mental accounts appropriate to the particular label (Thaler, 1999). Once empty the account is likely to cease. Thus, we conjectured that the prices of all products would be compared to the budget and reverse the euro illusion for all product prices. The results were however similar to those of Experiment 1, that is, the hypothesized reversal of the euro illusion was obtained for the same two high-priced products whereas the euro illusion still persisted for the low-priced products.

Prices of goods and services entailing a greater expense might have been compared to the salary since there was a reversal of the euro illusion for some high-priced items, but the results of Experiments 1 and 2 did not clearly demonstrate that participants compared prices of the consumer products to their salary. In Experiment 3 we explicitly asked the participants whether they could afford to pay for the set of consumer products given their salary. Undergraduates randomly assigned to two groups were again presented with a similar scenario as before. Instead of evaluating the product prices, they were requested to rate to what extent they could afford to pay for the set of consumer products. The results showed an increase with price indicating that the participants understood the instructions. However, a crossover interaction between currency and price revealed that the euro illusion did not disappear for low-priced products.

Study IV

Study IV aimed at demonstrating that the evaluation of prices of goods and services may change despite that the nominal values are the same. In Experiment 1 undergraduates evaluated prices of ten consumer products presented in a fictitious currency. The scenario was the same as before: Participants were requested to imagine that they had been offered a job in a country in the EU but before accepting the job offer they wanted to find out about the cost of living in the country. The product prices were chosen so as to reflect the normal prices in Swedish crowns. However, instead of presenting the product prices in different nominal values, the nominal values (in a fictitious currency) were the same in the two groups. In the different groups participants were given different exchange rates that were multiples of Swedish crowns, one above (high-value condition) and one below (low-value condition) the normal product prices in Swedish crowns. In line with research on price evaluations (e.g., Lowengart, 2002), it was assumed that prices of consumer products would be perceived as cheaper or more expensive, the larger the difference to a reference price retrieved from memory. The results showed that the product prices were evaluated as more expensive in the high-value condition than in the low-value condition. Thus, the actual value of money had an effect on price evaluations that the nominal value did not seem to counteract.

In Experiment 2 another sample of undergraduates performed the same price evaluation task. All received the same product prices in Swedish crowns. Half of them were informed about the (fictitious) inflation rate in the foreign country during the last year, the other half received no such information. It was assumed that information about inflation rate would depreciate the subjective value of money. By comparing the product prices to a reference price that was lower than the target price in the inflation condition, the prices were expected to be evaluated as more expensive in the inflation condition than in the no-inflation condition. The results confirmed this for all the products.

A conceptual replication was conducted in Experiment 3. Two groups of participants were first asked to imagine that they had bought something that they considered worth or not worth the money. Consistent with Bonini, Biel, Gärling, and Karlsson (2002), this procedure was assumed to lead to an increase or depreciation of the subjective value of money. Ostensibly unrelated to the previous task, participants then again performed the same price evaluation task with prices in Swedish crowns. The results showed that, in the high-value (worth the money) condition, prices were evaluated as less expensive than in the low-value (not worth the money) condition for almost all the products.

Taken together the results of Experiments 1-3 indicate that both actual and subjective value of money might change for the same nominal representation. This held true whether the nominal representation was a fictitious currency or a real familiar currency.

Conclusions and Discussion

The aim of this thesis was to investigate the hypothesis that the nominal representation of money influences evaluations of prices as well as choices of consumer products. The influence of the nominal representation of money on its subjective value, referred to as the money illusion, has been established in other contexts (Shafir et al., 1997). We hypothesized that a similar bias, called the euro illusion, occurs when consumers use a new currency. As noted above, this term was coined by the fact that the experiments were carried out in connection with the introduction of the euro in several countries in Europe. However, it should be understood that the bias toward the nominal representation might occur anytime consumers need to consider prices of goods and services in a foreign currency that has a larger or smaller unit than their domestic currency.

The results of the experiments in Studies I-III supported the euro illusion except for Experiment 2 in Study I. This experiment was carried out in Great Britain. It was hypothesized that product prices would be evaluated to be higher in euros than in pounds sterling because of the higher nominal value. Instead, the evaluations were similar to the evaluations made by the Swedish sample in Experiment 1 in Study I, that is, lower in euros.

In the experiment by Jonas et al. (2002) German participants estimated typical prices of consumer products in euros and in German mark (DM). Consistent with the results of Experiment 1 in Study I, it was found that the DM was worth more than the euro. Like the Swedish crown, the DM has a higher nominal value than the euro. However, also similar to the results of Experiment 2 in Study I, the German participants estimated the pound sterling to be worth more than the euro. Again, this result is not consistent with the hypothesis that the nominal representation affects the perceived value of a currency. According to an alternative explanation proposed by Jonas et al. (2002), when participants were asked to estimate prices of consumer products in foreign currencies, no reference price was activated as when they estimated product prices in their own familiar currency. A reference price was assumed to be formed on the basis of previous experiences of shopping that normally takes place in the home country. Thus, as substantiated by the results of another experiment (Jonas et al., 2002, Study 5), the reference prices established in the national country appears not to be applicable in a “shopping in a foreign country” frame as compared to a “shopping at home” frame. As a consequence, when asked to estimate prices of the same products in a foreign currency, participants assumed that these prices were different. A similar explanation is suggested in Study I. When evaluating given product prices either in pound sterling or euro, participants might have compared prices in the UK with prices in the EMU countries. If participants believed that the latter product prices are lower, then the direction of the effect is also explained. This explanation may furthermore account for the results of Experiment 1 in Study I, although the results of this experiment indicated a bias

toward the nominal representation. In effect, presumably no valid test was performed of the effect of the nominal representation. However, the use of fictitious currencies in the following experiments should have provided valid tests.

It was conjectured that the influence of the nominal representation on the perceived value of money is reduced or eliminated when more effort is invested to convert from one currency to another. An alternative hypothesis is that it is not possible to affect this influence of the nominal representation. However, the results of the studies in this thesis clearly show that the euro illusion is influenced by both cognitive skill and motivational factors. Several findings in the present thesis substantiate that the euro illusion is influenced by accuracy-effort tradeoffs (Bettman et al., 1998; Payne et al., 1993). This conclusion also corresponds to Kahneman's (2003) claim that a thorough analysis may correct biased judgments made intuitively from impressions of highly accessible task attributes. For instance, in Experiments 3 and 4 in Study I, when the task was important (i.e., for high-price essential goods or services) the required calculations were assumed to be thorough. As expected, this led to a smaller influence of the nominal representation or a weaker euro illusion. Conversely, calculations were assumed to be less thorough when the task was less important. This led, as expected, to a larger influence of the nominal representation or a stronger euro illusion. A positive attitude may increase and a negative attitude may decrease the willingness to make effortful calculations in order to reach an accurate outcome. The results of Experiments 3 and 4 in Study I showed, in line with these suggestions, that the euro illusion was stronger for an induced positive attitude compared to an induced negative attitude. In a similar vein, the results of Experiment 1 in Study II showed a stronger influence of the nominal representation on choices of currency for paying for a product or receiving a salary when participants were in a deactivated positive mood than when they were in an activated negative mood. Thus, as hypothesized, induced mood had a similar effect on an accuracy-effort tradeoff, as did an induced attitude. Consistent results were reported by Raghubir and Srivastava (2002).

One may conceptualize the evaluation of prices of goods and services in an unfamiliar currency as a two-stage process where one first tries to convert from the unfamiliar currency to the familiar currency by using a conversion strategy previously learnt, thereafter making the evaluation by checking if the product price, when expressed in the familiar currency, is too low, too high, or fair. However, if the outcome is not very important or attitude or mood is positive (and deactivated in case of mood), this calculation strategy may (consciously or unconsciously) be judged too demanding. The person may then resort to making intuitive judgments. According to Kahneman (2003), salient information may then exert an undue influence. When evaluating the product price in the unfamiliar currency, the nominal value, being salient, may bias the evaluation. In comparison to the price for the particular product in the familiar currency,

functioning as a reference, the price in the unfamiliar currency may appear lower or higher. “Shopping in a foreign country” frame may work in the same way but instead of being influenced by the nominal value, a person may be influenced by other factors such as some previous opinion about the prices of consumer products in that particular foreign country. With fictitious currencies, there is no such frame, and the nominal value will thus play a larger role. In a similar vein, it has been found that price trends are influenced by expectation of rising prices of consumer products in euros, in comparison to German mark (DM) (Traut-Mattausch, Schulz-Hardt, Greitemeyer, & Frey, 2004; Greitemeyer, Schultz-Hardt, Traut-Mattausch, & Frey, 2005). In spite of evidence to the contrary, participants estimated that product prices in the lower nominal value, the euro had risen more than the equivalent prices in DM. In fact, when prices had remained stable the participants still evaluated them as significantly higher in the low nominal value than in the high nominal value and when they had fallen they were judged to be stable.

Several studies in numerical cognition witness to the larger difficulty people have in processing large than small numbers (Dehaene, 1992). A related phenomenon is that cognitive simplification strategies may be applied, so that a small currency unit is changed to a large unit (e.g., 100,000 changed to 100K). As a result, the nominal representation changes. We proposed this as an explanation in Experiment 3 in Study I of the “Lira effect” (also called the “monopoly money phenomenon,” see Raghubir & Srivastava, 2002), the observation of a reverse euro illusion for the currency with the smallest unit (resulting in very large numbers). Changing from large numbers to small numbers may also reflect an accuracy-effort tradeoff.

When self-report ratings were used in Experiments 2 and 3 in Study II to assess current mood, no effects of mood were observed. Despite this the euro illusion prevailed. As reviewed by Rusting (1998), natural mood differences may however not be related to information possessing. Thus, people who naturally are in a deactivated negative mood may not process information differently from those in a naturally activated positive mood.

It is generally argued that people evaluate economic transactions with regard to a relevant reference point (e.g., Soman et al., 2002). In Study I we assumed that the reference point was the price of a consumer product in the familiar currency retrieved from memory that was compared to the posted price in the unfamiliar currency. However, a possible caveat of Studies I-II is that in real life both product prices and the money people have to spend are expressed in the same currency. If it is assumed that the evaluation of the price for a particular consumer product depends on how much money is left of the income after the purchase, that is the income is used as a reference point, then the influence of the nominal representation may be different. A large-unit currency may make this difference appear smaller than a small-unit currency, thus possibly leading to evaluations of the product price as more expensive, which is

a reverse effect compared to those observed in the previous experiments in this thesis. This reasoning is consistent with the compression effect (Marques, 1999) and difference assessment (Soman et al., 2002). The effect of income was investigated in Study III. The result showed that, when participants were informed about the income and given a budget constraint, the hypothesized compression effect was demonstrated for two high-priced consumer products. The other products were evaluated as more expensive in the low nominal value than in the high nominal value currency. This is the euro illusion. It was proposed that the prices of the low-priced products were regarded as insignificant and as such were not compared to the budget but rather compared to a reference price retrieved from memory. Alternatively, they were compared to the budget but a mere glance may have been sufficient to judge that the prices were very low and thus not affecting the budget. Hence, the perceived difference between the budget and the prices of the low-priced products did not seem to have an impact on the price evaluations. One important implication of these results is that the euro illusion prevails even though knowledge of an income in the same currency is accessible. At the same time, it should be noted that the effect might be reversed for high-price consumer products.

The results of Study III also have bearing on the proposed explanations of the effect of the nominal representation. Soman et al. (2002) argue that the effect of the nominal representation depends on difference assessments biased by the numerosity heuristic (Pelham et al., 1994). Thus, it is implied that the more numerous a currency (the higher nominal value) and the larger the difference between the price of a consumer product and a budget or income, the less expensive the price is perceived. However, as noted above, all product prices may not be deducted from the budget even when a budget is available. In this case the anchoring-and-adjustment heuristic explanation (Raghubir & Srivastava, 2002) may account for the results. The results from Study I as well as those obtained by Raghubir and Srivastava (2002) may speak to this point. Since there was no budget or income, it does not seem possible to explain the result with the difference assessment. In the experiments conducted by Soman et al. (2002) participants were asked to budget money. They were informed about an income in fictitious currencies to be allocated to budgets for various consumer products with posted prices in the same fictitious currencies as the income. This seemed to have invited difference assessments. Yet, in Studies I and III both the anchoring-and-adjustment heuristic and the numerosity heuristic may explain the results. Pelham et al. (1994) suggested that the numerosity heuristic is less cognitively demanding than the anchoring-and-adjustment heuristic. For example, in one experiment the participants were given either few–element or many-element series in an addition problem, in one condition with a cognitive load and in another condition without a cognitive load. The results showed that participants relied more on the numerosity than the anchoring-and-adjustment heuristic in solving the problem when under cognitive

load (i.e., the adjustment of the obtained sum should have yielded a larger sum for the few-element problem than the many-element problem because in order to match the sum of the many-elements, the numbers were larger in the few-element condition; cf. Tversky & Kahneman, 1974). It is impossible to conclude from the results of Studies I and III whether one heuristic is more cognitively taxing than the other. Both may anyhow be responsible for biasing the outcome of the evaluations. As Cannon and Cipriani (2003) pointed out, different heuristics may be applicable when people try to adjust to a complex reality.

However, the difference between the price of a consumer product and a reference price may play a role for price evaluations (Lowengart, 2002). Still, the anchoring-and-adjustment heuristic with a known conversion rate could explain the difference assessment. If the prices of consumer products were deducted from the disposable income or budget, a difference would be obtained. This difference, serving as a salient anchor, may subsequently be converted to the familiar currency yielding a reference number (i.e., the difference) in the familiar currency. This "reference difference" is insufficiently adjusted toward the anchor, thus biasing the outcome of the evaluation. Analogous to the price evaluations, a difference in a low nominal value would thus be regarded as worth less or the reverse.

The results of Study IV present a challenge to the general conclusion of this thesis. Despite that the nominal representation of the prices of consumer products was the same, participants evaluated the product prices differently depending on changes in actual value (exchange rate) as well as subjective value of the money. The effect of the exchange rate demonstrated in Experiment 1 is consistent with the assumption that accuracy-effort tradeoffs affect the degree to which the nominal representation influences price evaluations (Gamble et al., 2002; Raghubir & Srivastava, 2002). Thus, simple converting rules, such as in Experiment 1, will as the results indicated make price evaluations more accurate (Dehaene & Marques, 2002; Lemaire & Lecacheur, 2001; Lemaire, Lecacheur, & Ferréol Barbey, 2001).

In the remaining two experiments in Study IV, it may be argued that the nominal value played a role. In Experiment 2 the product prices were evaluated as more expensive given knowledge of inflation. The effect of inflation on the economy (only leading to nominally higher prices) is obviously not taken into account. This is the money illusion (Shafir et al., 1997) in disguise. In Experiment 3 the price evaluations are made after participants recall having bought something they did or did not think worth the money. Thus, the subjective value of the money either increased or decreased. After a decrease the prices of the goods and services were evaluated as more expensive than after an increase. In this case the inflation is "subjective," and similarly as for objective inflation, the influence of the nominal value accounts for the results.

Although the present results are difficult to interpret otherwise, it has not been shown directly that the nominal representation affects the perceived value

of money, only indirectly from studying price evaluations and choices of consumer products. Further research is therefore needed using other methods for measuring value of money (Galanter, 1962, 1990; Galanter & Pliner, 1974; Hershey, Kunreuther, & Schoemaker, 1982).

The present studies have not directly assessed the conversion strategies that participants use, only providing an exchange rate. Thus, still another line of additional research would be to either vary conversion strategies systematically or assessing those used (Lemaire et al., 2001). Previous results show that even elaborate conversion strategies lead to systematic errors. Thus, that participants used a particular conversion strategy leading to errors may in principle explain the present results. However, it is unlikely that the errors then would vary systematically with different factors in the way they were shown to do in the present experiments.

In this thesis I have tried to demonstrate that the value of money as a standard for how to evaluate consumer goods and services as well as incomes is all but a stable measurement. The real value of money changes over time. This is a topic for economics (see, e.g., Lewis & Mizen, 2000) and out of scoop for this thesis. Yet, the main interest of this thesis is the subjective value of money as it varies as a function of the nominal value of the currency. Thus, it has been demonstrated that people may experience difficulties how to appraise the value of unfamiliar currencies, but also as shown in Study IV in their domestic currency. In real life the fluctuating subjective value of money may lead to economic mistakes. However, money as a unit of account is still preferable to a barter economy. For instance, a mortgage to be paid over several years may still be evaluated even though money changes over time. Consider the alternative of barter economy; the combination of, for instance, cars, clothes and wheat to pay off a loan would cause an absurd confusion regarding the exchange rate for each of these goods in the future. Thus, even though money is a poor unit of account it still serves its purpose.

However, inflation will probably still be a source of difficulty causing the perception of the value of money to be biased by the money illusion. Another source of difficulty may be that certain product prices will change more rapidly than others such as now is the case with for instance ever changing petrol prices and different bargains and sales. All this taken together might lead to confusion about how to evaluate money apart from those caused by inflation or deflation. The transaction to the euro may be one step in making life easier for consumers. A unitary currency may facilitate the comparison of prices across borders. Hence, a drop in prices is expected in those countries where they now are higher (Mussweiler & Strack, 2004). Even though, causing difficulties in the beginning, the euro will eliminate at least one problem of the subjective value of money for the consumers within the EMU; namely that of the conversion from one currency to another.

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