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**Individual Differences in (Mis)perceptions of Economic  
Inequality: The Role of Ideology, Abstraction, News  
Consumption and Rationality**

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### Abstract

The aim of this study was to investigate how and why people misperceive the magnitude of economic differences. It was hypothesized that news consumption frequency, rationality and abstract-mindedness would predict accuracy in estimations of economic differences; and that economic ideology motivation would predict inaccuracy in estimations of economic differences. Moreover, it was hypothesized that greater levels of concrete-mindedness and economic conservatism would predict underestimation of economic differences, whereas greater levels of concrete-mindedness and economic liberalism would predict overestimation of economic differences. Data was collected by means of a questionnaire and consisted of responses from 223 participants. Perceptions of economic differences were measured by comparing participants' estimations with objective data. Results indicated that the hypotheses were supported to various degrees depending on the format of the estimation items. When estimation items were formulated in terms of absolute quantities results showed that (a) news consumption frequency predicted accuracy, (b) economic ideology motivation predicted inaccuracy, (c) economic conservatism predicted underestimation, and (d) economic liberalism predicted overestimation. When estimation items were formulated in terms of proportions results indicated that (a) cognitive reflection predicted accuracy, (b) abstract-mindedness and economic conservatism jointly predicted underestimation, and (c) concrete-mindedness and economic liberalism jointly predicted underestimation. The results suggest that items measuring perceptions of economic differences are more valid when expressed in terms of absolute quantities. The study contributes to construal level theory and system justification theory, as it reveals that the direction of misperceptions of economic differences depend on the interaction of abstract-mindedness and political-economic ideology.

*Keywords:* ideology, system justification, construal level theory, media, rationality, cognitive reflection, economic inequality

Individual Differences in (Mis)perceptions of Economic Inequality: The Role of Ideology,  
Abstraction, News Consumption and Rationality

Rising income and wealth disparity was rated the single most important trend in determining global developments over the next 10 years in World Economic Forum's latest Global Risk Report (2017). In addition, a recent poll survey revealed that most people are wrong in their estimations of the magnitude of various global issues, such as distribution of wealth in society (Ipsos MORI, 2016). Based on data from 40 countries, the study showed that people tend to overestimate how well wealth is distributed in their country. Notably, Swedish participants guessed that 20% of the population's wealth belongs to the poorer 70%, when in reality only 11% does. Several other studies have revealed similar results, showing that people tend to misperceive the magnitude of economic differences (e.g., Chambers, Swan and Heesecker, 2014; Headey, 1991; Kaplowitz, Broman & Fisher, 2006; Kaplowitz, Fisher & Broman, 2003; Norton & Ariely, 2011). Furthermore, a plethora of studies have shown that—for both disadvantaged and advantaged individuals—increased economic differences are associated with negative outcomes such as decreased health, happiness, trust and overall economic growth; and increased crime level and social dysfunction (e.g., Kawachi, Kennedy, Lochner & Prothrow-Stith, 1997; Napier & Jost, 2008; Oishi, Kesebir, & Diener, 2011; Pickett & Wilkinson, 2010; Wilkinson & Pickett, 2006; Uslaner & Brown, 2005).

The question as to why people tend to be inaccurate in their estimations of global issues such as economic inequality has not yet received any consistent answers within psychological research. Studies have shown varying results, partly since in some studies people have tended to underestimate the magnitude of economic differences (Headey, 1991; Kaplowitz et al., 2003, 2006; Norton & Ariely, 2011; Eriksson & Simpson, 2012), while in others they have

overestimated the magnitude of economic differences (Chambers et al., 2014). What is more, only a few studies have been conducted in order to investigate the underlying factors of misperceptions of economic differences. I will briefly describe those studies and their findings next.

### **Previous Research Explaining Misperceptions of Economic Differences**

At the outset, Headey's (1991) correlational study showed that Australians generally underestimate the magnitude of economic differences in society. Additionally, the study showed that peoples' perceptions of the magnitude of economic differences are in line with their perceptions of how large they think economic differences ought to be. This means that the greater economic differences in society people consider legitimate, the greater economic differences they perceive to exist. Thus, the finding that people underestimate the magnitude of economic differences indicates that people generally think there should be less economic differences in society than there actually are. For instance, Headey's (1991) study showed that working-class people underestimate the magnitude of economic differences to a greater extent than upper-class people do. Headey (1991) linked this result to the theory of cognitive dissonance reduction (Festinger, 1957), suggesting that working-class people underestimate economic inequality as way of decreasing their sense of social injustice by bringing their estimations closer to their ideal. Additionally, Headey (1991) also speculated that people underestimate economic differences due to the low salience of distributive issues in the media.

The general tendency to underestimate the magnitude of economic differences was also found in two sets of studies by Kaplowitz et al. (2003; 2006). Moreover, their studies revealed that Whites underestimate economic differences between Blacks and Whites to a greater extent than Blacks and that underestimations of economic differences were associated with lower levels

of the belief that discrimination against Blacks continues. Kaplowitz et al. (2003; 2006) advocated that increased knowledge about economic differences and the continuing discrimination of Blacks would decrease misperceptions of economic differences.

Another attempt to empirically test why people misperceive the magnitude of actual economic differences was made in a study by Norton and Ariely (2011), which attempted to identify the relationship between political orientation and misperceptions of economic differences in America. The results revealed that all participants—regardless of political orientation or level of income—tended to underestimate economic differences, while also desiring a more economically equal society. Norton and Ariely (2011) suggested that people underestimate economic differences to a great extent because of a shared desire among all political groups to live in a more egalitarian society than current America. However, Norton and Ariely's (2011) approach to measuring people's estimates of economic differences was evaluated by Eriksson and Simpson (2012) as leading to responses heavily influenced by anchoring bias (Epley & Gilovich, 2006). Eriksson & Simpson (2012) argued that because estimation items in Norton & Ariely's (2011) study were framed in terms of how much of total national income that was distributed to each quintile of the population, respondents either misunderstood the question or avoided the required calculation of perceived average incomes of each quintile into percent. In turn, this led to responses being more anchored towards an equal distribution, and thus to greater underestimations of economic differences. Eriksson and Simpson (2012) attempted to resolve the methodological issues in Norton & Ariely's (2011) study by using a measure that required less numeric skills. Their study showed that with this measure people underestimated economic differences to some degree, but not to the same extent as in Norton and Ariely's (2011) study.

Contrary to Headey's (1991), Kaplowitz et al.'s (2003; 2006), Norton and Ariely's (2011) and Eriksson and Simpson's (2012) studies, a study by Chambers et al. (2014) showed that

Americans generally overestimate economic differences, even when controlling for the influence of participants' income and education level. Their results indicated that this is because people tend to exaggerate the income of top earners, while underestimating the average income of the general population. Chambers et al. (2014) suggested that this in turn may be a result of "popular media's widespread reporting of high unemployment rates, the stagnant economy, and the genuine rise in wealth inequality" (p. 617). Furthermore, Chambers et al. (2014) found that liberals overestimate the magnitude of economic differences to a greater extent than conservatives do. They explained their result by referring to research showing that liberals tend to view the economic state of society more pessimistically than conservatives do (Duch, Palmer & Anderson, 2000; Schlenker, Chambers & Le, 2012), and therefore overestimate the magnitude of economic differences to a greater extent than conservatives.

In sum, previous research that has examined how people misperceive the magnitude of economic differences have shown both that people generally underestimate economic differences (Eriksson & Simpson, 2012; Headey, 1991; Kaplowitz et al., 2003, 2006; Norton & Ariely, 2011), and that people generally overestimate economic differences (Chambers et al., 2014). Speculations in previous studies as to why people misperceive the magnitude of economic differences have been that (a) people underestimate economic differences as a way of reducing feelings of social injustice and/or because of the low salience of distributive issues in the media (Headey, 1991), (b) underestimations are due to lack of knowledge about the continuing discrimination of those less privileged by the economic system (Kaplowitz et al., 2003; 2006), (c) underestimations of economic differences are due to a desire to live in a more economically just society (Norton & Ariely, 2011), (d) people overestimate economic differences because of the wide-spread reporting of economic inequality and unemployment rates in the media, and (e)

compared to conservatives, liberals overestimate economic differences to a greater extent because they have a more pessimistic view on economic conditions in society (Chambers et al., 2014).

### **The Current Study**

Despite the lack of empirically tested explanations as to why people misperceive the magnitude of economic differences, some suggestions have been put forth in previous research and some suggestions can be derived from psychological theories. The current study aims to empirically test some of these suggestions.

Firstly, a potential factor that has been suggested to influence perceptions of the magnitude of economic differences is the reporting of economic differences in the media. On the one hand, Headey (1991) speculated that his results that people tend to underestimate economic differences were due to the low salience of distributive issues in the media. On the other hand, Chambers et al. (2014) hypothesized that their results indicating that people overestimate economic differences could be explained by the high salience of distributive issues in the media. Furthermore, Kaplowitz et al. (2003; 2006) attributed their findings that people underestimate economic differences to lack of accurate knowledge about economic differences and discrimination of those disfavored by the economic system. A reconciliation of these suggestions is proposed in the present study by assuming that, in general, news in Swedish media accurately report levels of economic differences. Assuming this, it would be expected that those who consume news more frequently and use valid news sources would have more accurate perceptions of the magnitude of economic differences in various societies.

*H<sub>1</sub>: Frequency of news consumption predicts accuracy in estimations of economic differences.*

Furthermore, misperceptions of the magnitude of economic differences have been suggested to be influenced by availability bias (Castillo, 2011; Evans, Kelley & Kolosi, 1992) and anchoring bias (Castillo, 2011; Eriksson & Simpson, 2012; Wegener, 1990). While availability bias implies basing one's judgment on the most recent or immediate information that comes to mind under uncertain conditions (Tversky & Kahneman, 1973), anchoring bias implies basing one's judgment on the most available information and adjusting it until it reaches a plausible estimate (Epley & Gilovich, 2006). An example of an availability bias in the case of estimating economic differences would be if one erroneously estimates the average income for a certain group by basing one's judgment on the most easily retrievable information about incomes for that group, such as the income of a friend who belongs to that group. An example of an anchoring bias would be if one erroneously estimates the average income for a group by basing one's judgment on the most easily retrievable information about incomes for that group, and then adjusting that value until it reaches a subjectively reasonable estimate.

Relatedly, being rational—as opposed to being intelligent—implies overcoming the influence of cognitive biases by being critical, basing one's beliefs on available evidence and assessing probability and base rates coherently (Baron, 2008; Stanovich & West, 2014). Whereas intelligence refers to cognitive abilities in processing information and using knowledge structures (Carroll, 1993), rationality is a more encompassing construct which also entails abilities in judgments and decision-making (Stanovich & West, 2014). More generally, rationality refers to adaptive responding, good judgment, and good decision making (Stanovich, West & Toplak, 2016). Thus, rationality may prevent the influence of cognitive biases when estimating the magnitude of economic differences and consequently lead to more accurate judgments.



*H<sub>2</sub>: Rationality predicts accuracy in estimations of economic differences.*

Another factor that has been investigated in relation to the degree of accuracy in estimations of economic differences is economic-political ideology. Whereas some studies have indicated that both liberals and conservatives underestimate the magnitude of economic inequality (Eriksson & Simpson, 2012; Headey, 1991; Norton & Ariely, 2011), others have shown that both liberals and conservatives overestimate the magnitude of economic inequality, but liberals do so to a greater extent (Chambers et al., 2014). In order to get a clearer view of how economic-political ideologies relate to misperceptions of economic differences, the present study aims to investigate whether the extent to which one is motivated by economic-political ideology predicts inaccuracy in estimations of economic differences. Studies on motivated reasoning have shown that people are motivated to seek information that are in line with their already held beliefs (Kunda, 1990), which implies that politically held beliefs influence perceptions of socio-political issues (Taber & Lodge, 2006; Wagner, Tarlov & Vivyan, 2012). The notion that those who hold stronger ideological beliefs have a more distorted world-view has received support from both heuristic research paradigms (Lupia, 1994; Kinsey & Popkin, 1993) and cultural cognitive theory (Gastil, Braman, Kahan & Slovic, 2011; Jost, Ledgerwood & Hardin, 2008; Reedy, Wells & Gastil, 2014; Wells, Reedy, Gastil & Lee, 2009). While the heuristic research paradigms take a micro-perspective by suggesting that distorted world-views are a result of biased information processing, research within cultural cognitive theory take a macro-perspective by assuming that misperceptions are a result of contextual influences such as culturally held belief systems (Reedy et al., 2014). Linking these findings to the perception of economic differences, it is hypothesized that stronger economic ideology motivation (i.e. strongly held economic ideology beliefs) predicts lower accuracy in estimations of economic differences.

*H<sub>3</sub>: Economic ideology motivation predicts inaccuracy in estimations of economic differences.*

In addition to the influences of frequency of news consumption, rationality and ideology motivation; I suggest that individual differences in tendency to think abstractly may be associated with the degree to which one misperceives the level of economic differences. Given that accurate perceptions of the magnitude of economic differences imply considering differences in wealth for a whole population, economic inequality is most likely construed as an abstract concept that is psychologically distant to the perceiver. A theory that provides a theoretical framework for the presence of individual differences in abstract thinking and perception of psychologically distant concepts is construal level theory (CLT; Liberman & Trope, 2008). CLT posits that perceptions of objects and events vary depending on their psychological distance to the perceiver.

Psychologically distant events are construed as abstract, superordinate and decontextualized representations; whereas psychologically close events are construed as concrete, subordinate and contextualized representations (Liberman, Sagristano & Trope, 2002). The relationship between abstraction and psychological distance has been shown to be bi-directional (Bar-Anan, Liberman & Trope, 2006), meaning that abstract objects and events are construed as psychologically distant and that psychologically distant objects and events are construed as abstract concepts.

Psychological distance can vary temporally (now vs. future/past), spatially (here vs. there) and socially (me vs. someone else), and can also vary in level of hypotheticality (Wakslak, Trope, Liberman & Alony, 2006). Thus, economic inequality could be considered an abstract concept that can vary in psychological distance on all dimensions (i.e. temporally, spatially, socially and hypothetically).

Relating to perceptions of psychologically distant concepts, studies have indicated that people who are in an abstract mindset (a) perceive information in contexts of broader patterns (Fujita & Roberts, 2010; Ledgerwood, Wakslak, & Wang, 2010), (b) more easily retrieve psychologically distant information (Liberman & Trope, 2008), and (c) make more accurate predictions and evaluations about psychologically distant events (Liberman & Trope, 2008; Nussbaum, Liberman & Trope, 2006; Peetz & Buehler, 2012; Wening, Keith & Abele, 2016). What is more, the existence of individual differences in abstract thinking has been indicated in various studies (e.g., Agerström & Björklund, 2013; Vallacher & Wegner, 1989), which means that people generally differ in whether they tend to think abstractly or concretely about objects and events. Based on these findings, it is hypothesized that individual differences in abstract-mindedness is related to higher accuracy in estimations of the magnitude of economic differences.

*H<sub>4</sub>: Abstract-mindedness predicts accuracy in estimations of the magnitude of economic differences, even when controlling for the influence of news consumption, rationality and economic ideology motivation.*

Considering the inconsistent results concerning the association between political-economic ideologies and the direction of estimations of economic differences (i.e. under- or overestimations), the present study also aims to investigate this relationship further. What empirical studies on this issue have shown so far is that (a) both liberals and conservatives underestimate the magnitude of economic inequality (Eriksson & Simpson, 2012; Headey, 1991; Norton & Ariely, 2011), and (b) both liberals and conservatives overestimate the magnitude of economic inequality, but liberals do so to a greater extent (Chambers et al., 2014). Clearly, no

conclusion about the association between political-economic ideologies and the direction of estimations of economic differences can be drawn from these results. However, suggestions for how political-economic ideologies are associated with accuracy in estimations of economic differences could be derived from various theories.

One such theory is system justification theory (SJT; Jost & Banaji, 1994). According to SJT people justify the systems in which they are a part as way of satisfying epistemic, existential and relational needs (Jost & Banaji, 1994). Epistemic needs refers to reducing uncertainty and instability, existential needs refers to reducing feelings of threat and relational needs refers to belonging in a group which shares one's beliefs (Jost et al., 2008). For instance, studies have shown that those who have lower needs for cognition, greater death anxiety and stronger desire to share reality are significantly more system justifying (Hennes, Nam, Stern & Jost, 2012). System justification as a form of motivational cognition has been affirmed by research indicating that system justification is motivated by (a) individual differences in self-deception and ideology (Jost, Glaser, Kruglanski & Sulloway, 2003), (b) situational cues such as system threat (Kay, Jost & Young, 2005), and (c) biased information processing (Haines & Jost, 2000; Ledgerwood, Mandisodza, Jost & Pohl, 2011). A sub theory of SJT that focuses only on the legitimization of economic norms is economic system justification (ESJ; Jost & Thomspson, 2000). In terms of misperceptions of economic differences, studies have shown that since justifying the economic system implies perceiving it as more equal, those higher on ESJ estimate economic differences to be smaller and more like their ideal (Rodriguez-Bailon et al., 2017; Willis, Rodríguez-Baílón, López-Rodríguez & García-Sánchez, 2015).

In terms of the relationship between political ideologies and perception of economic differences, studies have shown that conservatives view economic-societal conditions more positively and thus perceive economic differences to be smaller, whereas liberals view economic

conditions more pessimistically and thus perceive economic differences to be larger (Chambers, Swan, & Heesacker, 2014, 2015; Duch et al., 2000; Schlenker et al., 2012). Further support for this relationship between political ideology and estimation of economic differences can be found in research based on the multidimensional threat model (MET; Hirschberger, Ein-dor, Leidner & Saguy, 2016). In terms of economic inequality as a form of existential threat, the MET model classifies it as a *symbolic threat*. Symbolic threats makes salient group differences in morals, values, standards, beliefs and attitudes and are distinguished from *realistic threats*, which are related to the safety, health or well-being of one's in-group (Stephan & Stephan, 2000). Symbolic threats have been shown to be more emphasized by liberals (Kahn, Björklund & Hirschberger, 2017). Based on these findings, because liberals perceive economic inequality to be a greater existential threat than conservatives and therefore emphasize it to a greater extent, liberals may also estimate economic differences to be greater.

ESJ and conservatism in regards to economic issues (i.e. pro-market economy and against redistribution of resources) are highly connected constructs (e.g., Jost & Thompson, 2000; Jost, Nosek & Gosling, 2008; Rodriguez-Bailon et al., 2017) and will therefore be combined into one measure of *political-economic ideology* in the present study, ranging from economic liberalism to economic conservatism. All in all, previous research suggests that compared to economically liberal people, economically conservative people perceive economic differences to be smaller. However, this association has not been investigated in terms of how accurately economic differences are perceived when compared with actual data. The present study aims to integrate the empirical findings that economic conservatism is associated with perceiving smaller economic differences and the previously stated hypothesis that abstract-mindedness is associated with greater accuracy in estimations of economic differences. Specifically, since the previously stated hypothesis implies that concrete-mindedness is associated with inaccuracy in estimations

of economic differences, it is hypothesized that concrete-mindedness and economic conservatism are associated with underestimation of economic differences, even when controlling for news consumption, rationality and economic ideology motivation.

*H<sub>5</sub>: Being concrete-minded and economically conservative predicts underestimation economic differences, even when controlling for the influence of news consumption, rationality and economic ideology motivation.*

Similarly, based on the previously stated hypotheses of this study and research showing that economically liberal people perceive economic differences to be greater than economically conservative people, it is hypothesized that concrete-mindedness and economical liberalism together predicts overestimation of the magnitude of economic differences.

*H<sub>6</sub>: Being concrete-minded and economically liberal predicts overestimation of economic differences, even when controlling for the influence of news consumption, rationality and economic ideology motivation.*

In summary, it is hypothesized that frequency of news consumption and rationality independently predict accuracy in estimations of economic differences, whereas economic ideology motivation predicts inaccuracy in estimations of economic differences. Further, it is hypothesized that abstract-mindedness is associated with accuracy in estimations of economic differences, even when controlling for news consumption, rationality and economic ideology motivation. It is also hypothesized that concrete-mindedness and economic conservatism jointly

predict underestimation of economic differences and that concrete-mindedness and economic liberalism jointly predict overestimation of economic differences.

By examining the relationship between these underlying psychological factors and misperceptions of economic differences, this study aims to contribute to the somewhat scant and inconsistent psychological research that has been conducted in this area so far. Firstly, the study may do so by investigating the influence of factors that have not been investigated in this area before. Secondly, by also examining the already empirically tested relationship between economic-political ideology and misperceptions of economic differences, the study may serve to unravel the inconsistent results in this area by examining the relationship from a novel point of view and by using various methodological approaches.

## Method

### Participants

A total of 226 individuals participated in the study. Two participants were omitted from the data analysis because they were under the age of 18 and one was omitted because their scores violated the assumption of multivariate normality by having a Mahalanobis distance value well below the recommended threshold of  $p > .001$ . The remaining sample consisted of 70% ( $n = 156$ ) women, 29% ( $n = 65$ ) men and 1% ( $n = 2$ ) who did not state their gender. The age of the participants varied from 18 to 69 years ( $M = 34$ ,  $SD = 12$ ) and 92% ( $n = 206$ ) of the participants were born in Sweden, while 8% ( $n = 17$ ) were born outside of Sweden. The participants' average monthly income was 20366 SEK (median = 15000,  $SD = 28668$ ). Eighteen percent ( $n = 40$ ) of the participants had a low economic standard (i.e., an income below 50% of the median income in Sweden), while 8% ( $n = 18$ ) of the participants had a high economic standard (i.e., an income above 200% of the median income in Sweden).

## Materials

Using a cross-sectional design approach, variables were measured by having participants indicate their responses in a questionnaire.

**Independent variables.** Variables used as predictors were frequency of news consumption, rationality, economic ideology motivation, economic-political ideology and abstract-mindedness. All predictors were measured with extant scales which were translated into Swedish prior to data collection. The quality of translations was checked for by having the Swedish items back translated by a second source. Phrasings in back-translated items that were semantically different from the original English items were rephrased for better fit. All continuous scales for the predictor variables were aggregated into indexes of responses prior to data analysis.

**News consumption.** Items measuring news consumption frequency were collected from the Swedish SOM institute's annual report of Swedish citizens' news consumption habits (Arkhedé & Ohlsson, 2015). The news consumption scale in the current study consisted of five items for which participants rated their news consumption frequency for various news sources such as evening papers, daily papers, national radio, national TV and national Radio- or TV service on the web. Frequency was rated on a scale for which 1 = *never*, 2 = *rarely*, 3 = *once per month*, 4 = *a few times per month*, 5 = *a few times per week* and 6 = *every day*. Because using one of the named news sources regularly does not necessarily imply that one regularly uses any of the other news sources regularly as well, the internal consistency of the scale was expected to be low. This fact was reflected in the very low Cronbach's alpha coefficient of .54. Thus, the low homogeneity of the news consumption items is considered tolerable in this study given that the items measure frequency of consuming news from various kinds of sources.



***Rationality.*** Two instruments aiming to measure different facets of rationality were included in the present study, namely the Cognitive Reflection Test (CRT; Frederick, 2005) and the Actively Open-minded Thinking Beliefs scale (AOT; Baron, Scott, Fincher & Emlen Metz, 2015). The CRT and the AOT are established measures of rationality and are included in Stanovich et al.'s (2016) Comprehensive Assessment of Rational Thinking.

The CRT measures the extent to which one relies on reflective (vs. intuitive) cognitive processing (Frederick, 2005). It consists of three open-ended questions, each asking for the correct answer to a mathematic problem that is presented in a way that facilitates responding based on intuition in lieu of reflective processing. One of the items is the “bat and ball” problem that goes “A bat and a ball cost \$1.10 in total. The bat costs \$1.00 more than the ball. How much does the ball cost?”. The most common incorrect response to this problem is ‘10 cents’, which indicates an inclination to process information intuitively. The correct response, ‘5 cents’, indicates a tendency to use more reflective cognitive processing. Participants’ level of cognitive reflection was operationalized as the number of correct responses on the three CRT items, ranging from 0 to 3. The internal consistency of the CRT has been quite high in previous studies (Cronbach’s alpha around .6), considering the shortness of the scale (Baron et al., 2015), and the alpha was .6 in the current study too.

The aspect of rationality that refers to actively open-minded thinking was measured using the AOT scale. The AOT measures the tendency to consider new evidence against favored beliefs, patience in problem-solving and the extent to which one believes actively open-minded thinking to be a desirable trait (Baron et al., 2015; Haran, Ritov & Mellers, 2013). Actively open-minded thinking has also been shown to be associated with lower susceptibility to cognitive biases (Macpherson & Stanovich, 2007; Sá, West, & Stanovich, 1999). The scale consists of eight items, which are rated on a Likert scale, ranging from 1 (*totally disagree*) to 7 (*totally*

*agree*). An example of an item from the AOT is “People should take into consideration evidence that goes against their beliefs”. The internal consistency of the AOT in the current study was somewhat low as Cronbach’s alpha = .64.

***Political-economic ideology.*** Political-economic ideology was measured using two scales; the Economic System Justification Scale (ESJ; Jost & Thompson, 2000) and a political-economic conservatism scale (Harnish, Bridges & Gump, 2017; Pratto, Sidanius, Stallworth, & Malle, 1994). The ESJ scale aims to measure the ideological tendency to legitimize economic differences in society and has been shown to correlate highly with political conservatism (Jost & Thompson., 2000). Whereas the original scale consists of seventeen items, a brief 7-item version of the scale by Jost et al. (2012) was administered in this study. The items were rated on a Likert scale ranging from 1 (*totally disagree*) to 7 (*totally agree*) and an example of an item on the ESJ scale is “Economic positions are legitimate reflections of people’s achievements”. The original 17-item scale had a Cronbach’s alpha coefficient of .73 (Jost & Thompson., 2000) and the same Cronbach’s alpha value was achieved for the 7-item scale in the current study.

Political-economic ideology was also measured with the political-economic conservatism scale by Pratto et al. (1994), which consists of three items assessing level of conservatism with regards to social, economic and foreign policy issues. The participants rated how liberal/conservative they considered themselves to be for each type of issue on a Likert scale ranging from 1 (*very liberal*) to 7 (*very conservative*). Inspired by Harnish et al. (2017), the item measuring liberalism/conservatism with regards to economic issues was the only item included in the measure of political-economic ideology in the present study.

ESJ correlated strongly with the economic conservatism item from Pratto et al.’s (1994) political-economic conservatism scale ( $r = .59, p < .001$ ). Putting them together into an 8-item

political-economic ideology scale gave a Cronbach's alpha coefficient of .77. The merged scale was therefore used in the data analysis as a measure of political-economic ideology.

***Economic ideology motivation.*** The extent to which participants were motivated by their political-economic ideology was operationalized as the strength of identification with either side of the political-economic ideology scale described in the previous section. Since the political-economic ideology scale was a Likert scale ranging from 1 (*very liberal*) to 7 (*very conservative*), economic ideology motivation was operationalized as the number of scores away from the middle score of the political-economic ideology scale. Thus, economic ideology motivation was measured by coding the middle score of the political-economic ideology scale as 0, and each score above or below the middle score as +1 (i.e., scores of 1 and 7 on the political-economic ideology scale were each coded as 3). Cronbach's alpha for the 8 items in the economic ideology motivation scale was .73.

***Abstract-mindedness.*** Individual differences in tendency to think abstractly or concretely were measured with the Behavior Identification Form (BIF; Vallacher & Wegner, 1989). The BIF consists of 25 items that measure the level of action identification for various actions. For each item, the respondent is asked to indicate whether an action (e.g. "writing a list") is best described as a high level identification (e.g., "getting organized") or as a low level identification (e.g., "writing things down"). Abstract-mindedness is operationalized as *high-level identifications of actions*, whereas concrete thinking is operationalized as *low-level identification of actions* (Smith & Trope, 2006). Participants' level of abstract-mindedness was defined as the total number of high-level identifications chosen of the 25 items. In the item for which the action to be identified was "paying rent", the original option "writing a check" was changed into "transferring money" because this was considered a more up-to-date description of the action. The BIF showed high reliability within the sample as Cronbach's alpha = .83.

**Dependent variables.** Three dependent variables were used to test the hypotheses: namely, (a) the degree of absolute deviance in estimation of economic differences (b) the degree of underestimation of economic differences, and (c) the degree of overestimation of economic differences. Each dependent variable was based on a special computation of one deviance variable, which was measured by using items constructed specifically for the present study.

**The deviance variable.** The deviance score that was used to compute each dependent variable was calculated by subtracting participants' estimations of the magnitude of economic differences with the objective magnitude of economic differences. The type of questions about economic differences included in the questionnaire was thus reliant on what kind of objective data that could be found on the matter. The objective data that estimation scores were compared to in order to create the deviance score were retrieved from SCB's (2017a; 2017b) and OECD's (2017b) databases on economic differences.

The deviance score was based on items asking participants to estimate (a) the average income of various income groups (e.g., the richest 10 % and the poorest 10 %), (b) the share of total national income distributed to each quintile of the population, (c) the proportion of people with high economic standard in the population, and (d) the proportion of people with low economic standard in the population. Because I intended to measure deviance in estimations of economic differences in general, deviance scores were obtained not only for psychologically close populations (i.e., in Sweden in recent years), but also temporally distant (i.e., in Sweden 20 years ago) and spatially distant populations (i.e., in Germany and the US). The instrument measuring deviance in estimation of economic differences consisted of 22 items and since deviance scores were indicated on different scales, all the deviance scores were transformed into Z scores before they were computed into each of the dependent variables. As way of increasing validity, deviance scores were obtained using various response formats, which can be divided

into multiple-choice items and free-response items. Multiple-choice items were responded to in terms of relative quantities (i.e., proportions) and with visual aid, whereas free-response items were responded to in terms of absolute quantities (i.e. average income) and without visual aid. A compilation of all items that were used to measure deviance in estimations of economic differences, categorized by response format, can be seen in Table 1.

Table 1.

*Each item measuring deviance in estimation of economic differences, categorized by question type (columns) and psychological distance dimension (rows).*

	Multiple-choice	Free-Response
Psychologically close	Population quintiles' shares of total national income in Sweden in 2015	Ratio between the income of the richest 20% and the poorest 20% of the population
	Proportion of high income earners in Sweden in 2015	Ratio between the income of the richest 10% and the poorest 10% of the population
	Proportion of low income earners in Sweden in 2013	Palma ratio
		Ratio between the income of women and men
		Ratio between the income of immigrants and people born in Sweden
Temporally distant	Population quintiles' shares of total national income in Sweden 1995	Ratio between the income of the richest 20% and the poorest 20% of the population
	Proportion of high income earners in Sweden 1995	Ratio between the income of the richest 10% and the poorest 10% of the population
	Proportion of low income earners in Sweden 1995	Palma ratio
Spatially distant 1	Proportion of low income earners in Germany 2013	Ratio between the income of the richest 20% and the poorest 20 % in Germany
		Ratio between the income of the richest 10% and the poorest 10 % in Germany
		Palma ratio
Spatially distant 2	Proportion of low income earners in the US in 2013	Ratio between the income of the richest 20% and the poorest 20% in the US
		Ratio between the income of the richest 10% and the poorest 10% in the US
		Palma ratio

*Multiple-choice items.* Eight of the items measuring deviance were presented as multiple-choice questions. Responses were selected by participants among several alternatives, one of which represented the correct response and the other alternatives being distractors which represented different degrees of under- or overestimation of economic differences. The method used for constructing the multiple-choice distractors was inspired by Ali, Carr and Ruit's study (2016), in which the distractors were based on participants' most frequent incorrect responses to the same items presented as free-response questions in a pilot study. Furthermore, multiple-choice items were constructed in accordance with extant guidelines based on reviews, empirical assessment and application of the properties of validity (Haladyna, Downing & Rodriguez, 2002; Moreno, Martínez & Muñiz, 2015). This implied adapting the content and style of stems and distractors to be in line with validated presentation formats for multiple-choice items.

The number of distractors in multiple-choice items ranged from 4-6 and it was possible to either underestimate or overestimate the magnitude of economic differences in each multiple-choice item. Correct responses were coded as 0 and for each overestimating response the score was coded as +1 (i.e., overestimating a little was coded as 1, overestimating more was coded as 2, etc.). For each underestimating response the score was coded as -1 (i.e., underestimating a little was coded as -1, underestimating more was coded as -2, etc.). The coded response constituted the deviance score for each item.

*Free-response items.* Fourteen items measuring deviance in estimation of economic differences were presented as free-response items. For these items, participants were asked to estimate the average income of various income groups (e.g., the richest 10% and the poorest 10%). These estimations were then calculated into ratios representing the economic differences between income groups. For instance, the ratio representing the estimated economic difference between the richest 10% and the poorest 10% would be calculated by dividing the estimated

average income of the richest 10% by the estimated average income of the poorest 10%.

Deviance scores for five different ratios indicating level of economic differences could be computed using responses to these items; namely, the ratio between the income of the richest 20% and the poorest 20%, the ratio between the income of the richest 10% and the poorest 10%, the ratio between the share of national income of the richest 10% and the poorest 40% (also known as *Palma ratio*; Palma, 2011), the ratio between the income of men and women, and the ratio between the income of immigrants and people born in Sweden.

The deviance score for each item was computed by subtracting the natural logarithm of the estimated income ratio with the natural logarithm of the actual income ratio. Hence, a deviance score of 0 implied a correct estimation of economic differences, whereas a deviance score of  $>0$  implied an overestimation of economic differences and a deviance score of  $<0$  implied an underestimation of economic differences. The natural logarithms of the ratios were used instead of raw ratio estimation scores because it has been found to be an appropriate method to use when measuring economic differences (Becker, 1975; Jasso, 1980; Jasso & Wegener, 1997; Kelley & Evans, 1993; Verwiebe & Wegener, 2000; Willis et al., 2015). The reason for this is that it takes into account that the differences in income among rich people have a lower weight than differences among poor people. Further, income ratios were used as a measurement of estimation of economic differences instead of absolute income estimations because it shifts focus from currency units to the relative income hierarchy (Castillo, 2011; Kelley & Zagorski, 2004).

*Validity of the deviance variable.* Because responses to items measuring the deviance in estimations of economic differences were to be indicated by the participants in terms of numbers, consideration had to be taken to ensure that the items were easy to understand and independent of the participants' level of numeracy. To this end, each item was constructed by utilizing at least



one of two strategies, namely, (a) to use visual displays as a way of communicating numerical relations inherent in the items (i.e. multiple-choice items in the present study), and (b) to construct item responses in terms of absolute quantities instead of relative quantities and probabilities (i.e. free-response questions in the present study). The latter method has been recommended to use in order to increase validity in numeracy measures, because most people find it easier to think in absolute rather than relative terms (e.g., Bodemer, Meder & Gigerenzer, 2014; Eriksson & Simpson, 2012; Gigerenzer, Gaissmaier, Kurz-Milcke & Woloshin, 2007; Lautenbach, Christensen, Sparks & Green, 2013; Liberali, Reyna, Furlan, Stein & Pardo, 2012). However, because objective data on economic differences is often presented as proportions of income, some items required responses expressed as relative quantities. For those items, care was taken to make it as easy as possible for participants to understand the meaning of the items by using pie charts as visual aid and using multiple-choice as response format. Research has shown that pie charts facilitate understanding of numerical concepts (e.g. Garcia-Retamero & Cokely, 2013; Garcia-Retamero & Galesic, 2010; Hawley et al., 2008; Lautenbach et al., 2013; Smit et al., 2016) and that presenting items as multiple-choice increases the number of correct responses relative to when presenting them as free-response items (Ali et al., 2016; Norman, 1988; Norman et al., 1987; Schuwirth & Donkers, 1996; Ward, 1982).

*Absolute deviance in estimation of economic differences.* The degree to which participants' estimations of economic differences deviated from measures of actual economic differences constituted their absolute deviance score. For each of the 22 items, the absolute deviance score was the same as the positive value of the deviance score. This means that for those who overestimated economic differences, their absolute deviance score was the same as their deviance scores, whereas for those who underestimated economic differences (i.e. having a negative deviance score), their deviance score made into a positive value was used as a measure

of absolute deviance. The internal consistency of the absolute deviance scores was quite high as Cronbach's alpha = .87.

*Underestimation of economic differences.* The degree to which participants underestimated the magnitude of economic differences was measured by inverting their negative deviance score. Those who were correct in their estimations or overestimated economic differences (i.e. having a deviance score  $\geq 0$ ) had an underestimation score of 0. The internal consistency for all 22 underestimation scores was high as Cronbach's alpha = .84.

*Overestimation of economic differences.* Participants' degree of overestimation of economic differences was measured by using their positive deviance scores. Those who were correct in their estimations or underestimated economic differences (i.e. having a deviance score  $\leq 0$ ) had an overestimation score of 0. The Cronbach's alpha coefficient for all 22 overestimation scores was .89.

### **Procedure and ethics**

Prior to data collection, three pilot studies were carried out. The first pilot study was conducted in order to outline the most frequent incorrect responses to free-response estimation items measuring the dependent variables, which were to be used as distractors in multiple-choice items in the main study. The second pilot study was conducted in order to check that the difficulty level of estimation items was reasonable and the third pilot study aimed to check the time requirement for filling out the questionnaire.

Participants were recruited via online forums and on various campus sites of Lund University and Malmö University in Sweden. Those recruited via online forums filled out a web based questionnaire and those recruited at campus sites filled out a paper-and-pencil questionnaire. The contents of the web based and paper-and-pencil questionnaires were identical.

The study was conducted in accordance with the rules and regulations concerning ethical conduct within psychological research (APA Manual, 2010). Prior to their participation in the study, all respondents gave their consent and were informed on the procedure and the overall aim of the study. All participants were guaranteed anonymity, confidentiality and the possibility to withdraw at any time.

## **Results**

The aim of the present study was to examine how and why people misperceive the magnitude of economic differences in various populations. To test the hypotheses, three regression analyses were conducted; one for each dependent variable. Moreover, exploratory analyses were carried out in order to attend to methodological issues of the study.

### **Preliminary analyses**

Prior to any hypothesis testing, preliminary analyses were conducted in order to ensure that there were no violations of the assumptions of normality, linearity, multicollinearity and homoscedasticity. The analyses indicated one violation of these assumptions. Specifically, an examination of multivariate outliers revealed a Mahalanobis Distance score well below the recommended threshold of  $p > .001$ . This outlier was omitted from the subsequent analyses.

### **News consumption**

A two-step hierarchical multiple regression analysis was carried out including all the independent variables predicting absolute deviance. Frequency of news consumption, rationality measures and economic ideology motivation were entered in the first step; whereas abstract-mindedness was entered in the second step, as to control for the other predictors. The results of

the regression analysis can be seen in Table 2. Frequency of news consumption predicted lower absolute deviance in estimations of economic differences to a statistically significant level,  $p = .001$ . This result is in line with the hypothesis that those who consume news more frequently are more accurate in their estimations of economic differences.

Table 2.  
*Results of hierarchical multiple regression analysis predicting absolute deviance in estimations of economic differences.*

Predictor	$t$	$\beta$	$\Delta F$	$df$	$\Delta R^2$
Step 1			6.45	4, 218	0.11**
News consumption	-3.50	-0.23**			
Cognitive reflection	0.51	0.03			
AOT	-1.27	-0.09			
Economic ideology motivation	3.92	0.27**			
Step 2			0.17	1, 217	0.00
Abstract-mindedness	-0.36	-0.02			

*Abbreviations.* AOT = actively open-minded thinking  
\*\* $p < .01$

### **Rationality**

As can be seen in Table 2, the results indicated that neither cognitive reflection,  $p = .61$ , nor actively open-minded thinking,  $p = .21$ , significantly predicted absolute deviance in estimations of economic differences. Thus, no support was found for the hypothesis that rationality predicts accuracy in estimations of economic differences.

### **Economic ideology motivation**

As is demonstrated in Table 2, economic ideology motivation significantly predicted absolute deviance in estimations of economic differences,  $p < .001$ . This result is in line with the hypothesis that economic ideology motivation predicts inaccuracy in estimations of economic differences.

**Abstract-mindedness**

The results of the analysis testing whether individual differences in abstract-mindedness predict lower levels of absolute deviance in estimation of economic differences, even when controlling for the influence of news consumption, rationality and economic ideology motivation, can be seen in Table 2. The hypothesis that abstract-mindedness predicts accuracy in estimations of economic differences was not supported,  $p = .72$ .

**Concrete-mindedness and economic conservatism**

The hypothesis that concrete-mindedness and economic conservatism are associated with underestimation of economic differences, even when controlling for the influence of news consumption, rationality and economic ideology motivation, was tested by conducting a three-step hierarchical multiple regression analysis. The control variables constituting of news consumption, rationality measures and economic ideology motivation were entered in the first step. To see if concrete-mindedness and economic conservatism respectively predicted underestimation, these variables were entered in the second step. Because the hypothesis assumes that there is an interaction effect between concrete-mindedness and economic conservatism, an interaction variable was computed which represented the value of the concrete-mindedness score (i.e. reversed abstract-mindedness score) multiplied with the political-economic ideology score. This interaction variable was entered in the third step of the regression. The dependent variable was the degree of underestimation of the magnitude of economic differences and the results of the regression analysis can be seen in Table 3. The results indicated that there was no interaction effect of concrete-mindedness and economic conservatism on underestimation of economic differences, when controlling for news consumption, rationality and economic ideology motivation,  $p = .85$ . Thus, the hypothesis that concrete-mindedness and economical conservatism

is associated with underestimation of economic differences is not supported in the present study. However, the results indicated a main effect of economic conservatism, such that economic conservatism predicts underestimation of economic differences, even when controlling for news consumption, rationality and economic ideology motivation,  $p = .03$ .

Table 3.

*Results of hierarchical multiple regression analysis predicting underestimation of economic differences.*

Predictor	<i>t</i>	$\beta$	$\Delta F$	<i>df</i>	$\Delta R^2$
Step 1 Control variables			0.85	3, 219	0.011
News consumption	-0.72	-0.05			
Cognitive reflection	-1.20	-0.09			
AOT	-0.27	-0.02			
Step 2 Main effects			2.54	2, 217	0.023 <sup>†</sup>
Concrete-mindedness	0.71	0.05			
Economic conservatism	2.20	0.16*			
Step 3 Interaction effect			0.04	1, 216	0.000
CM x EC	-0.20	-0.04			

*Abbreviations.* AOT = actively open-minded thinking; CM = concrete-mindedness; EC = economic conservatism

<sup>†</sup> $p < 0.10$

\* $p < .05$

### Concrete-mindedness and economic liberalism

A three-step hierarchical multiple regression analysis was conducted to test the hypothesis that concrete-mindedness and economic liberalism jointly predicts overestimation of economic differences, even when controlling for the influence of news consumption, rationality and economic ideology motivation. The control variables measuring news consumption, rationality and economic ideology motivation were entered in the first step, whereas concrete-mindedness and economic liberalism (i.e., reversed political-economic ideology score) were entered in the second step. An interaction variable representing concrete-mindedness scores multiplied with economic liberalism scores was created for this regression analysis and entered in the third step.

The dependent variable was degree of overestimation of the magnitude of economic differences. As can be seen in table 3, the results indicated no significant interaction effect of concrete-mindedness and economic liberalism on overestimation of economic differences,  $p = .64$ . Thus the hypothesis that concrete-mindedness and economic liberalism predicts overestimation of economic differences, even when controlling for news consumption, rationality and economic ideology motivation was not supported. However, a main effect of economic liberalism was found, which indicated that economic liberalism is associated with overestimation of economic differences, even when controlling for news consumption, rationality and economic ideology motivation,  $p = .001$ .

Table 4.

*Results of hierarchical multiple regression analysis predicting overestimation of economic differences.*

Predictor	<i>t</i>	$\beta$	$\Delta F$	<i>df</i>	$\Delta R^2$
Step 1 Control variables			2.59	3, 219	0.034 <sup>†</sup>
News consumption	-2.76	-0.19**			
Cognitive reflection	1.16	0.01			
AOT	-0.02	-0.00			
Step 2 Main effects			5.26	2, 217	0.045**
Concrete-mindedness	0.02	0.00			
Economic liberalism	3.23	0.22**			
Step 3 Interaction effect			0.22	1, 216	0.001
CM x EL	-0.47	-0.14			

*Abbreviations.* AOT = actively open-minded thinking; CM = concrete-mindedness; EL = economic liberalism

<sup>†</sup> $p < 0.10$

\*\* $p < .01$

### Methodological issues

**Systematically missing values.** Since a total of 27 participants did not respond to at least one of the items measuring the dependent variables, analyses were conducted in order to examine whether these missing values had a distorting effect on the previously described results. Firstly,

independent samples t-tests were conducted to see if participants who did not respond to items measuring the dependent variables differentiated from the rest of the sample in their levels of news consumption frequency, rationality, economic ideology motivation, abstract-mindedness and economic conservatism. A dummy variable for whether the participant had any missing responses for the dependent variables was used in the analyses. Results indicated that there was a statistically significant association between economic conservatism and whether participants had missing responses,  $t(221) = -2.15, p = .03$ . Specifically, those who did not respond to estimation items scored significantly higher on economic conservatism ( $M = 3.19, SD = 1.2, N = 27$ ) than those who responded to all estimation items ( $M = 2.72, SD = 1.05, N = 196$ ).

Secondly, in order to rule out that missing values had an impact on the major findings of the present study, each hypothesis was tested while also controlling for the influence of systematically missing values. This was done by conducting every hypothesis test again, but with the dummy variable for whether the participant had any missing responses for the estimation items in the first step of the regression. However, each hypothesis test reached the same level of statistical significance regardless of whether missing responses were controlled for, indicating that the missing responses had no systematic effect on the main findings of the present study.

**Response formats.** The estimation items that were avoided by some participants were those that were presented as free-response items, and thus responded to in terms of absolute quantities, without visual aid and responded to by a more economically liberal sample. In order to see if there were any systematic differences between responses using the two different response formats, I tested each hypothesis separately for dependent variables based on multiple-choice and free-response items, while also using the dummy variable for missing responses as a control variable. This resulted in six additional regression analyses (i.e., three analyses for each response format). Results indicated that when conducting hypothesis tests separately for dependent



variables based on multiple-choice questions, free-response questions or both types of response formats, there were some differences in terms of which variables reached statistical significance.

Table 5 presents a comparison of standardized coefficients and t-values between the results which differed from the previously conducted hypothesis tests in terms of whether they reached statistical significance. Next, I will describe how each hypothesis test differed when conducting analyses separately for multiple-choice and free-response questions.

Table 5.

*Results of hypothesis tests conducted separately for dependent variables based on multiple choice items, free-response items, and both multiple-choice and free-response items.*

	MC		FR		MC and FR	
	<i>t</i>	$\beta$	<i>t</i>	$\beta$	<i>t</i>	$\beta$
DV: Absolute deviance						
News consumption	-0.97	-0.06	-3.63	-0.24**	-3.50	-0.23**
Cognitive reflection	-2.03	-0.14*	1.33	0.09	0.51	0.03
Economy ideology	1.71	0.12 <sup>†</sup>	3.94	0.27**	3.92	0.27**
DV: Underestimation						
EC	-0.74	-0.05	3.24	0.23**	2.20	0.16*
CM x EC	-3.72	-0.83**	1.45	0.32	-0.20	-0.04
DV: Overestimation						
EL	0.43	0.03	3.76	0.26**	3.23	0.22**
CM x EL	-1.77	-0.51 <sup>†</sup>	0.28	0.08	-0.47	-0.14

*Abbreviations.* MC = multiple choice items, FR = free-response items, DV = dependent variable; CM = concrete-mindedness; EC = economical conservatism; EL = economic liberalism

*Note.* Only results which differed from the hypothesis tests in terms of statistical significance are included in this table.

<sup>†</sup> $p < 0.10$

\* $p < .05$

\*\* $p < .01$

**News consumption.** The hypothesis that frequency of news consumption predicts accuracy in estimations of economic differences was supported when using both multiple-choice and free-response items. However, this relationship was not significant when the dependent variable was based on only multiple response items, as can be seen in Table 5. This means that news consumption frequency is only significantly associated with accuracy in estimations of

economic differences when items measuring deviance in estimation are presented as free-response questions and thus, responded to in terms of absolute quantities and without visual aid.

***Rationality.*** When the dependent variable included both multiple-choice and free-response items, the hypothesis that rationality (i.e., cognitive reflection and actively open-minded thinking) predicts accuracy in estimation of economic differences was not supported. As can be seen in Table 5, cognitive reflection significantly predicted lower absolute deviance in estimation when using multiple-choice items. Therefore, the hypothesis was supported only when items were presented as multiple-choice items, and thus responded to in terms of relative quantities and with visual aid.

***Economic ideology motivation.*** The hypothesis that economic ideology motivation predicts inaccuracy in economic differences reached the same level of statistical significance, regardless of response format.

***Abstract-mindedness.*** The separate hypothesis analyses for testing the hypothesis that abstract-mindedness associated with accuracy in estimation of economic differences, even when controlling for news consumption, rationality and economic ideology motivation, reached the same level of statistical significance regardless of response format.

***Concrete-mindedness and economic conservatism.*** The hypothesis that concrete-mindedness and economic conservatism jointly predicts underestimation of economic differences, even when controlling for news consumption, rationality and economic ideology motivation, was not supported when conducting hypothesis tests with a dependent variable based on both multiple-choice and free-response items. However, as demonstrated in Table 5, a significant interaction effect between concrete-mindedness and economic conservatism emerged when conducting analyses with only multiple-choice items as measurement of the dependent variable. The results indicated that when the measurement of the dependent variable was based

on only multiple-choice items, underestimation of economic differences was predicted by (a) abstract-mindedness and economic conservatism, and (b) concrete-mindedness and economic liberalism. The results also indicated a difference in statistical significance of the association between economic conservatism and underestimation of economic differences, which was significant when using measurement based on both response formats. The analyses conducted separately for multiple-choice and free-response items showed that economic conservatism only predicted underestimation of economic differences when the dependent variable was based on items presented as free-response items, and thus responded to in terms of absolute quantities.

*Concrete-mindedness and economic liberalism.* The hypothesis that concrete-mindedness and economic liberalism is associated with overestimation of economic differences, even when controlling for news consumption, rationality and economic ideology motivation, was not supported when conducting the analysis with a dependent variable based on both multiple-choice and free-response items. When conducting the hypothesis test separately for multiple-choice and free-response items, the results indicated that there was a near significant interaction effect between concrete-mindedness and economic liberalism on degree of overestimation, such that concrete-mindedness and economic conservatism predicted degree of overestimation of economic differences. Furthermore, the results indicated that the association between economic liberalism and underestimation—which was significant when using both response formats—was significant only when conducting the analysis based on items presented as free-response questions, and thus responded to in terms of relative quantities.

### **Discussion**

The hypotheses of the present study were supported to various extents depending on the methodological approach of measuring the dependent variables. Firstly, when the dependent

variable was based on items measuring respondents' estimations of economic differences by use of free-response items, support was found for the hypotheses that frequency of news consumption predicts accuracy and that economic ideology motivation predicts inaccuracy. Furthermore, when the dependent variable included only free-response items it was also found that economic conservatism significantly predicted underestimation, whereas economic liberalism significantly predicted overestimation. However, these results were not hypothesized. Secondly, when the dependent variable included only multiple-choice-items cognitive reflection significantly predicted accuracy in estimations, which partly supports the hypothesis that rationality predicts accuracy in estimations of economic differences. Furthermore, when using only multiple-choice-items to measure the dependent variable, a significant interaction effect was found which indicated that underestimation of economic differences was predicted by (a) abstract-mindedness and economic conservatism, and (b) concrete-mindedness and economic liberalism. Results and implications for each hypothesis will be discussed below.

### **Absolute deviance**

**News consumption frequency.** The finding that news consumption frequency was associated with accuracy in estimations of economic differences was in line with the first hypothesis. This finding supports the notion that news in various media formats generally provide accurate facts about the economic state of society and therefore contributes to more accurate estimations of economic differences among those who frequently consume news. Moreover, this result is in line with the proposition put forth by Kaplowitz et al. (2003; 2006) that being better informed about economic differences leads to greater accuracy in estimations of economic differences. By contrast, Headey (1991) and Chambers et al. (2014) attributed their findings of misperceptions of economic differences to the influence of distorted facts about the state of the

economy and economic distribution issues spread by the media. However, insofar as the results of this study indicate that peoples' perceptions of economic differences are affected by the reporting of such issues in the media, the results of the present study are in line with Headey's (1991) and Chambers et al.'s (2014) conjectures.

The hypothesis that frequency of news consumption predicts accuracy in estimations of economic differences received different levels of statistical support depending on which of the two methodological approaches that were used to measure the dependent variable. The methodological approach for which the hypothesis received no support was signified by that items were (a) presented as multiple-choice items, (b) responded to in terms of relative quantities, and (c) presented with visual aid. While research has indicated that judgments about numerical concepts are more accurate when questions are presented as multiple-choice items (Ali et al., 2016; Norman, 1988; Norman et al., 1987; Schuwirth & Donkers, 1996; Ward, 1982) and with visual aid (Garcia-Retamero & Cokely, 2013; Garcia-Retamero & Galesic, 2010; Hawley et al., 2008; Lautenbach et al., 2013; Smit et al., 2016), research has also revealed that cognitive biases are more influential on judgments regarding numerical concepts when items are presented in terms of relative quantities (e.g., Bodemer et al., 2014; Eriksson & Simpson, 2012; Gigerenzer et al., 2007; Lautenbach et al., 2013; Liberali et al., 2012). Notably, some of the relative quantity-measures in this study were similar to those used in Norton & Ariely's (2011) study, with the difference that in this study those relative quantity-items were presented as multiple-choice questions instead of free-response questions. Norton & Ariely's (2011) measures of estimations of economic differences were evaluated by Eriksson and Simpson (2012) as leading to responses influenced by anchoring bias (Epley & Gilovich, 2006). Eriksson and Simpson (2012) argued that because economic differences presented in terms of relative quantities are not directly observable

to the perceiver, estimations require calculations of aggregates of incomes, instead of relying on knowledge about absolute income shares of difference income groups.

Thus, the results of this study showing that news consumption frequency did not have a significant effect on estimations when they were expressed in terms of relative quantities point to the possibility that responses expressed as relative quantities may have been influenced more by anchoring bias than actual knowledge, in spite of the attempts to facilitate comprehension of questions about relative quantities by presenting them as multiple-choice items and with visual aid. These results give further support to Eriksson and Simpson's (2012) arguments that capturing true perceptions of economic differences is better done by framing estimation items about economic differences in terms of absolute quantities. Taking this stance, the methodological differences in response formats will hereon be emphasized by referring to multiple-choice items as relative quantity-items and free-response items as absolute quantity-items.

Overall, this result contributes with knowledge concerning what role news consumption plays in predicting accuracy in estimations of economic differences, because it shows that news consumption frequency is associated with greater accuracy when estimations are compared to actual data of economic differences.

**Rationality.** Results of the separate hypothesis tests for the two response formats indicated a significant association between cognitive reflection and accuracy in estimations of economic differences when estimation items were responded to in terms of relative quantities. This result partly supports the second hypothesis that rationality predicts accuracy in estimations of economic differences. This extends previous research on the association between rationality and accuracy in judgments (Baron, 2008; Stanovich & West, 2014; Stanovich et al., 2016) by showing that the association holds specifically when estimating economic differences. However,

the fact that the association between rationality and accuracy was significant only when estimation items were responded to in terms of relative quantities and when cognitive reflection was the measure of rationality necessitates further elaboration.

Because cognitive reflection has been shown to reduce the impact of cognitive biases when making judgments (Frederick, 2005; Toplak, West & Stanovich, 2011) the results provide further support to the notion that responses to the relative quantity-items may have been more influenced by cognitive biases. Inferring from this notion that responses to absolute quantity-items thus reflect participants real perceptions of economic differences to a greater extent, the results suggests that accuracy in estimations of economic differences are not predicted by level of rationality, unless estimations are expressed in a manner that requires calculation and cognitive reflection.

The question remains as to why only the cognitive reflection measure, and not the actively open-minded thinking measure, of rationality had a significant effect on accuracy for relative quantity- items. One explanation may be that cognitive reflection reduces the impact of cognitive biases to a greater extent than other forms of rationality. This notion has received support in a previous study by Toplak et al. (2011), in which it is also suggested that the CRT is a more valid instrument to use than measurements such as the AOT. Toplak et al. (2011) argue that because the CRT measures actual performance of judgments, it is more likely to reflect respondents true level of rationality than measures which are based on self-reports, such as the AOT. Moreover, the low internal consistency of the items measuring actively open-minded thinking in the present study may have resulted in an underestimation of the association between actively open-minded thinking and accuracy in estimations. Relatedly, some of the participants in this study expressed confusion about the meaning of items in the AOT. Though it is unclear whether the confusion was related to the phrasing or the semantics of the items, potential solutions to this problem in

future studies may be to either use better translations of items or to use a more valid measure of rationality. However, considering that the AOT has been validated in previous studies (Baron, 1993; Baron et al., 2015; Haran et al., 2013) and found to decrease susceptibility to cognitive biases (Macpherson & Stanovich, 2007; Sá et al., 1999), the former solution is probably the most passable.

**Economic ideology motivation.** As hypothesized, economic ideology motivation was found to predict inaccuracy in estimations of economic differences. However, the hypothesis was not supported when using only estimation items responded to in terms of relative quantities. Linking this to the notion that items responded to in terms of absolute quantities allow for estimations that better reflect participants real perceptions, the results imply that economic ideology motivation has an impact on people's real perceptions of economic differences. While the result is in line with previous research showing that those who more strongly identifies with—and therefore are motivated by—their ideological beliefs have a more distorted world-view (Gastil et al., 2011; Jost et al., 2008; Lupia, 1994; Kinsey & Popkin, 1993; Reedy et al., 2014; Wells et al., 2009), it also extends on these studies by indicating that the relationship holds for estimations of economic differences in particular.

**Abstract-mindedness.** The hypothesis that abstract-mindedness predicts accuracy in estimations of economic differences was not supported. Thus, the association between abstract-mindedness and emphasis on psychologically distant information (Fujita & Roberts, 2010; Ledgerwood, Wakslak, & Wang, 2010; Liberman & Trope, 2008) and accuracy in judgments of psychologically distant events (Liberman & Trope, 2008; Nussbaum et al., 2006; Peetz & Buehler, 2012; Wening et al., 2016) could not be extended to estimations of economic differences in this study.



A potential explanation to the non-significant results could be found in research indicating that abstract-mindedness is associated with greater reliance on values (Agerström & Björklund, 2009a, 2009b) and ideological beliefs (Ledgerwood, Trope, and Chaiken, 2010) when making judgments. By relying more on values and ideological beliefs, abstract-minded peoples' estimations of economic differences may have been distorted by myside biases in this study. Myside bias is the tendency to not consider other arguments than those in line with one's own held beliefs when making judgments (Baron, 1991; Stanovich, West & Toplak, 2013). It is a component of irrational thinking, and specifically, negatively linked with actively open-minded thinking (Baron, 1991, 1993). Unfortunately, the measure of actively open-minded thinking did not reach an acceptable level of reliability in the current study, and the relationship between abstract-mindedness, actively open-minded thinking and estimations of economic differences could therefore not be investigated further.

The proposed relationship between abstract-mindedness, myside bias and estimations of economic differences would be in line with previous suggestions that perceptions of economic differences are influenced by cognitive biases (Castillo, 2011; Eriksson & Simpson, 2012; Evans et al., 1992; Wegener, 1990). Furthermore, it would be in line with the results of this study which revealed an association between abstract-mindedness, economic conservatism and underestimation of economic differences, since it suggests that those who are abstract-minded and economically conservative make estimations more in line with already held beliefs (i.e., the belief of low inequality in society).

### **Underestimation of economic differences**

**Economic conservatism.** Although not hypothesized, the results indicated an association between economic conservatism and underestimation of economic differences when estimation

items were responded to in terms of absolute quantities. This is in line with research indicating that compared to economically liberal people, economically conservative people perceive economic differences to be smaller (Chambers et al., 2014, 2015; Duch et al., 2000; Rodriguez-Bailon et al., 2017; Schlenker et al., 2012; Willis et al., 2015). Furthermore, the results provide support for the assumptions of SJT that economically conservative people are more motivated to justify the economic system by perceiving it as being more equal (Jost & Thompson, 2000). This is the first study to show that these associations hold when estimations are compared with actual data on economic differences.

**Abstract-mindedness and economic conservatism.** It was hypothesized that underestimation of economic differences would be predicted by concrete-mindedness and economic conservatism. This hypothesis was based on the assumption that concrete-mindedness would be related to inaccuracy in estimations, as well as on research indicating that economic conservatism is associated with lower estimations of economic differences (Chambers et al., 2014, 2015; Duch et al., 2000; Rodriguez-Bailon et al., 2017; Schlenker et al., 2012; Willis et al., 2015) and greater justification of the economic system (Jost & Thompson, 2000). Given the results that abstract-mindedness was not associated with accuracy in estimations in this study, it was no surprise that there was also no interaction effect between concrete-mindedness and economic conservatism on underestimation of economic differences.

However, contrary to the hypothesis, the results revealed an interaction effect of abstract-mindedness and economic conservatism on underestimation of economic differences, but only when estimation items were responded to in terms of relative quantities. While keeping in mind Eriksson and Simpson's (2012) conclusions that estimations are more likely to be anchored on an equal distribution when presenting items as relative quantities, this result could be interpreted as an indication of that people who are abstract-minded and economically conservative are more

susceptible to anchoring bias. Thus, the results could be explained by adding the possibility that abstract-minded participants may have been more susceptible to myside bias and that economic conservatism was found to be associated with underestimation of economic differences.

Not only does this finding extend on CLT by delineating under which conditions abstract-mindedness is related to underestimation of economic differences; it also extends on SJT by indicating that people who are abstract-minded and economically conservative are more likely to justify the economic system when presumably being more susceptible to anchoring bias.

**Concrete-mindedness and economic liberalism.** Unexpectedly, it was also found that concrete-mindedness and economic liberalism was associated with underestimation of economic differences when estimation items were responded to in terms of relative quantities. Based on studies indicating that concrete-mindedness is related to optimism bias when judging the outcome of hypothetical events (Armor & Sackett, 2006; Peetz & Buehler, 2012; Yan & Unger, 2014) and the notion that cognitive biases may have been more influential when items were expressed in terms of relative quantities (Bodemer et al., 2014; Eriksson & Simpson, 2012; Gigerenzer et al., 2007; Lautenbach et al., 2013; Liberali et al., 2012), concrete-minded participants were possibly more susceptible to optimism bias when responding to relative quantity-items. In combination with the finding that economically liberal people perceive the economic system as a greater threat (Kahn et al., 2017) and that the perception of system threat increases system justification (Kay et al., 2005), a potential explanation to the finding may be that economically liberal and concrete-minded respondents underestimated economic differences to a greater extent because they were more susceptible to optimism bias and perceptions of system threat. This explanation would also be in line with Headey's (1991) speculation that those who perceive economic inequality as a greater threat underestimate economic differences as way of reducing feelings of social injustice. Thus, these results extend on previous studies and theories by revealing the conditions under

which concrete-mindedness and economic liberalism is associated with underestimation of economic differences.

### **Overestimation of economic differences**

**Economic liberalism.** The hypothesis that being concrete-minded and economically liberal predict overestimation of economic differences was not supported, most likely due to a failure to provide support for the hypothesis that concrete-mindedness predicts absolute deviance in estimations of economic differences. However, a significant association was found between economic liberalism and overestimation of economic differences when estimation items were responded to in terms of absolute quantities. This finding replicates previous studies indicating that compared to economically conservative people, economically liberal people perceive economic differences to be greater (Chambers et al., 2014, 2015; Duch et al., 2000; Rodriguez-Bailon et al., 2017; Schlenker et al., 2012; Willis et al., 2015), as well as studies on SJT showing that economically liberal people are generally less inclined to justify the economic system (Jost & Thompson, 2000). This study extends on SJT and previous studies by showing that estimations of economic differences of those who are more economically liberal are larger than actual economic differences.

### **Limitations and directions for future research**

The main limitations of the present study were that (a) some responses to estimation items were systematically missing, (b) the use of different response formats gave incoherent results, (c) framing estimation items in terms of numerical quantities may have induced undue bias among participants who have lower numeric skills and (d) lack of reliability in the measurement of actively open-minded thinking.

Firstly, the prevalence of systematically missing values for the estimation items implied that some participants were more inclined than others to report their estimations of economic differences. An analysis testing this prediction revealed that those who systematically avoided some estimation items scored higher on economic conservatism. A potential reason for this may be that because economically conservative respondents may not generally perceive the implications of economic differences to be as important compared to the rest of the sample (Kahn et al., 2017; Rodriguez-Bailon et al., 2017; Willis et al., 2015), they simply cared less about filling in all the items concerning this matter. Moreover, the items which were avoided were those that were formulated in terms of absolute quantities and presented as free-response questions without visual aid. Thus, although research have indicated that absolute quantity-items better assess respondents estimations (Bodemer et al., 2014; Eriksson & Simpson, 2012; Gigerenzer et al., 2007; Lautenbach et al., 2013; Liberali et al., 2012;), a probable explanation to the avoidance of those items may be that the lack of alternatives and visual aid required more effort and thus were more difficult to fill out. This may in turn have led respondents less inclined to put effort into their participation to skip those items. A way to circumvent this kind of caveat in future research may be to use incentives for participants in order to motivate them to put more effort into their participation (Armor & Sackett, 2006). Another suggestion is to use a shorter and more comprehensible measurement format; perhaps by investigating fewer variables at a time, using multiple-choice items and/or using items with visual aid.

Secondly, concerning the inclusion of both relative- and absolute quantity-items, it was intended to increase the validity of the measurement of estimations of economic differences by using as many items as possible that aimed to measure the same construct. In addition, given that the construction of estimation items were dependent on extant data on economic differences, which are most often described in terms of relative quantities, it was considered necessary to

include such estimation items. However, the results showing different levels of statistical significance for hypotheses depending on response format indicated a lack of validity for the measure including both response formats. This is clearly a limitation of the study, if intending to use only the invalid measurement based on both response formats. However, the invalidity of the unitized measure coincidentally enabled a comparison of results emanating from the two response formats. This comparison in turn led to new empirical findings regarding how estimations of economic differences differ depending on assessment method. Although I encourage future studies to use different methodologies in order to map out under which conditions associations between psychological factors and estimations of economic differences exist and when they do not, I suggest that such initiatives are theoretically based from the start as to avoid unexpected outcomes such as in the present study.

Thirdly, framing economic differences as numerical quantities in this study was necessary in order to enable the comparison between respondents' estimates and actual data. However, a potential confounding factor that this study failed to include was level of numeracy. Numeracy is the ability to apply and reason with numerical concepts (Brooks & Pui, 2010) and is thus likely to predict accuracy in estimation of economic differences when these are framed as numerical quantities. It is therefore suggested that future studies intending to investigate the associations between psychological factors and estimations of economic differences framed as numerical quantities control for the influence of numeracy. It is also encouraged for future studies to investigate perceptions of economic differences among those lower in numeracy. A suggested approach for doing so would be to use methods devoid of numerical concepts, such as rank-order measures or qualitative methods.

Lastly, a limitation of this study was the failure to achieve an acceptable level of reliability in the measurement of actively open-minded thinking. Future studies attempting to

investigate the association between actively open-minded thinking and estimations of economic differences are thus encouraged to use a more valid translation of the AOT than the one used in the current study. Thus, in response to the limitations of the present study, future research should (a) use incentives and/or more comprehensive estimation measures to prevent loss of responses, (b) take into account the potential differences in results before using different methodological approaches, (c) control for level of numeracy, and (d) use a more reliable measure of actively open-minded thinking.

Further, future studies aiming to investigate the association between abstract-mindedness, political-economic ideology and misperceptions of the magnitude of economic differences may want to test the potential mediating effects of myside bias and optimism bias. Specifically, future studies could investigate whether myside bias—which is speculated to mediate the effect of abstract-mindedness and economic conservatism on underestimation of economic differences—would be activated if the criterion variable involved estimations of the severity of an issue that is typically emphasized by conservatives (e.g., declined economic growth). The results of the present study suggest there would be no such mediation effect for abstract-mindedness and economic conservatism, but for abstract-mindedness and economic liberalism. Similarly, future studies could investigate the potentially mediating effect of optimism bias by testing whether concrete-mindedness and economic conservatism would predict underestimation of societal issues perceived as a greater threat among conservatives, which the results of this study suggests it would.

Future studies within SJT may investigate further the influence of abstract-mindedness and response format on economic system justification. The potential explanations for the association between abstract-mindedness and system justification could be tested by investigating under which conditions abstract-mindedness influences conservatives' and liberals' level of

system justification. For instance, the results of this study suggest that the aggregated effects of abstract-mindedness and economical conservatism would result in greater economic system justification, compared to the independent effects of each, when making judgment under uncertain conditions. Similarly, it would be expected that the aggregated effects of concrete-mindedness and economical liberalism would result in greater economic system justification, compared to the independent effects of each, when making judgment under uncertain conditions.

What is more, seeing as economic perceptions vary depending on country and culture (Cohen, 2004) and that the present study was based in Sweden, future studies are encouraged to replicate the findings of the current study in other countries and cultures.

## **Conclusion**

This study generated new knowledge regarding how and why people misperceive the magnitude of economic differences in society. Specifically, it was found that news consumption frequency and lower economic ideology motivation predicted accuracy in estimation of economic differences. Although not hypothesized, it was also found that economic conservatism is associated with underestimation of economic differences, whereas economic liberalism is associated with overestimation of economic differences. These findings are in line with previous studies indicating that compared to economically liberal people, economically conservative people generally perceive economic differences to be smaller (Chambers et al., 2014, 2015; Duch et al., 2000; Rodriguez-Bailon et al., 2017; Schlenker et al., 2012; Willis et al., 2015) and are more inclined to justify the economic system (Jost & Thompson, 2000). However, this is the first study to show that this relationship also holds when comparing estimations of economic differences with actual data of economic differences.



The results also supported the notion put forth in previous research that measuring estimations of numerical values in terms of relative quantities increases the risk of responses being influenced by cognitive biases; both in general (Bodemer et al., 2014; Gigerenzer et al., 2007; Lautenbach et al., 2013; Liberali et al., 2012) and when measuring estimations of economic differences in particular (Eriksson & Simpson, 2012). Assuming that relative quantity-items increased the impact of cognitive biases in estimations, the present study indicates that abstract-minded conservatives and concrete-minded liberals underestimate economic differences when under the influence of cognitive biases. The result indicating that those who are abstract-minded and economically conservative underestimate economic differences was not in line with what was hypothesized in the present study, but could be explained by previous studies showing that abstract-mindedness is associated with greater reliance on values (Agerström & Björklund, 2009a, 2009b) and ideology beliefs (Ledgerwood, Trope, and Chaiken, 2010) when making judgments, and that economic conservatism is associated with lower estimations of economic differences (Chambers et al., 2014, 2015; Duch et al., 2000; Rodriguez-Bailon et al., 2017; Schlenker et al., 2012; Willis et al., 2015) and greater justification of the economic system (Jost & Thompson, 2000).

The unexpected finding that concrete-mindedness and economic liberalism predicts underestimation of economic differences could be explained by previous findings indicating that concrete-minded are more susceptible to optimism bias (Armor & Sackett, 2006; Peetz & Buehler, 2012; Yan & Unger, 2014) and that economic liberals perceive economic inequality as a greater threat (Kahn et al., 2017). Thus, in line with SJT it would be expected that those who are concrete-minded and economically liberal would underestimate economic differences as a way to reduce the perception of system threat (Kay et al., 2005).

Overall, these findings offer an explanation to the inconsistent results in previous research showing both that people underestimate (Headey, 1991; Kaplowitz et al., 2003, 2006; Norton & Ariely, 2011; Eriksson & Simpson, 2012) and overestimate (Chambers et al., 2014) economic differences, by suggesting that the direction of misperceptions of economic differences depends on level of abstract-mindedness, political-economic ideology and response format. The findings of this study also contribute to CLT and SJT by revealing under which conditions abstract-mindedness and political-economic ideologies—both independently and jointly—are related to misperceptions of economic differences, and thus economic system justification.

While in line with previous studies, the findings of this study also offer a new understanding of how and why people underestimate the magnitude of economic differences. Specifically, this is the first study to show that accuracy in estimations of economic differences is predicted by news consumption frequency and that inaccuracy in estimations of economic differences is predicted by economic ideology motivation. This is also the first study to show that the direction of misperceptions of economic differences depend on level of abstract-mindedness, political-economic ideology and response format. What is more, the present study suggests that reported estimations of economic differences are most valid when asked about in terms of absolute quantities.

Evidently, people are detached from the reality of economic inequality to various degrees depending on a number of psychological factors. This detachment may lead to misguided political support, as well as misjudgments and biased decision-making regarding economic issues. What is more, misperceptions of economic differences may lead to undue stereotyping of people belonging to different economic strata than one's own (Kaplowitz et al., 2003; 2006). Generating more knowledge about how and why people misperceive the magnitude of economic differences is therefore of great value, especially seeing as perceptions of economic inequality is

closely interlocked with voting behavior (e.g., Lewis-Beck & Stegmaier, 2013; Jacoby, 2010; Wilkin, Haller & Norpoth, 1997) and thus political-economic policy-making. Hopefully, this study may offer a new empirical ground on which to base more robust testing of related theories in this area of research in the future.

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