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## **Adam Smith and the Market Mind: extending the invisible hand**

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### **Abstract**

Adam Smith is often presented as the first neo-classical economist, or as the forerunner of behavioural economics. Smith's thinking, though, was broader than both these spheres. Through his writing, he teaches us to think about cognitive economics. Cognitive economics partners cognitive science and economics. The former brings insights into the (conscious) mind to the latter, especially extension of our own minds into Mr Market's mind. By recognising both the flaws and collective intelligence of that mind, employing a theory such as the Market Mind Hypothesis, we can gain a better understanding of markets, especially speculative episodes such as those characterised by meme stocks or crashes.

Key words: Adam Smith; Cognitive Science; Consciousness; Distributed Cognition; Economics; Extended Mind; Fallibility; Finance; Investment; Market Mind Hypothesis; Mind-Body Problem; Philosophy; Uncertainty.

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## 1. Introduction and background

Edinburgh, May 2022. An eclectic group of academics, investors, and policymakers gather in Panmure House to participate in a unique symposium. A magnificently restored monument, Panmure House is the last and only remaining residence of Adam Smith, the father of economics. Here he completed the final editions of his famous works and invited other luminaries of the Scottish Enlightenment for dinner discussions. With that as historic setting, the theme of the symposium is “The invisible hand extended by the market mind: addressing today’s economic challenges in the spirit of Adam Smith”.

Inspired by this event, this paper is about cognitive economics (Schotanus, 2022) which provides a different perspective on asset pricing from that currently offered by mainstream economics. Smith was namely not just the father of economics but arguably the first cognitive economist. Specifically, before Smith wrote his most famous book, *The Wealth of Nations* (WN, 1776), he laid out important moral conditions in his first masterpiece, *The Theory of Moral Sentiments* (TMS, 1759). In other words, Smith is the first cognitive economist because he combined early cognitive science (via TMS) with early economics (via WN). To wit, we will explain the symposium’s theme of how his famous invisible hand is extended by the market mind, manifesting collective intelligence, and how consciousness forms an ignored problem for mainstream economics (see also Knight, 1925b).

In his bestseller *Capital Ideas*, Bernstein states that “the market as a whole knows more than any individual investor can know” (1992, p. 136). That “the market” or “Mr Market”<sup>1</sup>—two monikers for the financial markets—can manifest collective intelligence is widely accepted. Hayek (e.g. 1945) and others explained how markets build, distribute, and

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<sup>1</sup> A term popularised by Benjamin Graham, among others mentor of investor Warren Buffett. Here it is meant more generally, used by investors as a metaphorical personification of financial markets (without any gender bias).

share society's knowledge. The wisdom of crowds is nowhere more powerfully reflected than in the market (e.g. Surowiecki, 2004; Shermers, 2008). By way of price discovery<sup>2</sup>, it allocates society's resources, which cannot be accomplished by any individual. Via the economic system, which combines the (physical) real economy and the (psychological) financial markets, we collectively attempt to benefit from and hedge against states of the world.

That doesn't mean that Mr Market is perfect. Far from it. Following earlier crashes and crises, The Global Financial Crisis (GFC) revealed flaws in the way markets can work, including misaligned agent incentives, such that actions benefiting the individual (and thus seeming rational), harmed the system as a whole. The GFC also reminded us of important interactions between markets and society. For example, a search for higher returns by fixed income buyers (also known as a 'reach for yield') manifested itself in aggressive mortgage lending and securitisation of those loans. Systemic credit risk rose beyond its sustainable limit, and a series of catalysts, culminating in the demise of Lehman Brothers, led to a sharp reversal in risk appetite, a collapse in asset prices and a near complete loss of trust in financial markets. Society (in the form of government, central banks and taxpayers) was forced to bail out the financial system to prevent "blind panic" (Monaghan, 2017).

The impact of the GFC did not end there. Large-scale central bank asset purchases followed for well over a decade, and these were stepped up and combined with fiscal stimuli when the Covid-19 pandemic struck. This latest round of support has culminated in a surge in global food and energy prices, dubbed a "cost of living crisis" (e.g. NYT, 2022). The subsequent need for central banks to raise policy rates to head off further inflation caused sharp falls in the price of bonds, equities and other assets, especially those of a more speculative type. The GFC and the "cost of living crisis" went hand in hand with central

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<sup>2</sup> In what follows we focus on prices. However, other 'big data' in markets are important as well in capturing (aspects of) market mentality, including e.g. flow, open interest, and volume.

banks' involvement in asset markets, changes in macro-prudential regulation and government stimulus programmes, underlining that markets have not been “free” in any true sense.<sup>3</sup> These crises are loud wake-up calls about our unhealthy economic mind-body which was vulnerable long before Covid-19 struck. It should worry economists and non-economists alike. They make painfully clear that the economic system affects almost everybody. Elsewhere we have called them existential reality checks (e.g. Schotanus, 2014; Schotanus, 2022). They are symptomatic of our wider predicament.

In fact, shortly after the nadir of the GFC, a lively debate emerged about its implications for economics, infamously captured in Queen Elizabeth's question during her 2008 visit to the London School of Economics: “Why did nobody see it coming?”. For example, Kay (2011) summarised two of his Financial Times columns in which he criticised mainstream economics, especially its failure as a theory due to its mechanical worldview (we consequently call it mechanical economics; see section 3). Pointedly, Guesnerie highlights an important reason for the debate: “Directions for a critical assessment of the rational expectations hypothesis have been explored, particularly in the last two decades, but *the urgency of deepening the reflection* should now become crystal clear” (2011; emphasis added). While the broader debate is kept alive by initiatives like CORE, INET, and Rethinking Economics, this particular topic seems to have retreated to the background. However, the key issues have not been sufficiently resolved. We are particularly disappointed by the lack of “depth” of “the reflection” despite the “urgency”.

Having spent most of our careers in investment management, we readily admit we are not pure academics, but, consistent with cognitive economics—prioritising impressions (e.g. “internal sentiments”, TMS, p. 387) instead of expressions (e.g. “external behaviour”, TMS,

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<sup>3</sup> The fact is that markets have always been manipulated throughout history. Criticising free markets is thus a straw man: they never existed in the first place. Arguably, manipulation is now occurring on an industrial scale.

p. 388)—we would submit that experiencing Mr Market up-close and personal by having ‘skin in the game’ as investors, we are qualified to share what the interiority of his mind is about. Moreover, regarding moral sentiments we view proper ESG investing—building a portfolio according to the spirit<sup>4</sup> of environmental, social, and governance criteria—as the market mind putting our collective conscience to work. After all, viewed as an intelligent collective entity Mr Market is not in the business of (self-) destruction, but survival (i.e. sustainability).

With that as context, the purpose of this paper is to build on Smith’s legacy and thinking. We start, in Section 2, with a short overview of the relevant literature. In Sections 3 and 4 we briefly highlight how a number of neoclassical<sup>5</sup> economists, respectively behavioural economists have attempted to simplify Smith’s findings, in support of their world view, while ignoring the broader cognitive economics perspective offered by Smith. Such narrow ‘defining’ of Smith’s work does him, and us, a disservice. In Section 5, we explain, regarding collective intelligence, how Smith’s legendary invisible hand is extended by the ‘market mind’, including via “moral sentiments”. After all, Smith mentioned the invisible hand in TMS (p. 215) before referring to it in WN.<sup>6</sup> Specifically, we will briefly introduce the Market Mind Hypothesis (MMH) which offers a psychophysical worldview with a mind-body perspective of the economic system, rather than that of a machine which is mainstream’s flawed view. In short, and translated in popular terms, Mr. Market is neither a voting nor a weighing machine, but a collective entity with a mind—warts and all. This is followed by suggestions for research (Section 6) and by listing some limitations and open questions (Section 7), before ending with a summary and conclusion (Section 8).

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<sup>4</sup> That is to say, the spirit of ESG transcends the letter, or some quant score, of ESG.

<sup>5</sup> While formally there are differences, neoclassical economics means to include new classical economics.

<sup>6</sup> Those claiming that only WN is relevant for economics (e.g. Milanovic, 2019) clearly miss the point (see also next section). Also, there is no difference in the meaning between both references: Smith views the invisible hand in general terms and operating in many different settings.

## 2. The Literature

It is generally acknowledged that, for a long time, Smith has been misunderstood. Economists have mostly (and wrongly) neglected TMS while selectively interpreting WN. Moreover, other researchers raised the so-called “Adam Smith problem”, suggesting that TMS and WN were incompatible. This is now largely seen as a straw man and the recent revival in interest (e.g. Collier, 2019; Collier & Kay, 2020; Norman, 2018), particularly in TMS, is fortunately leading to a proper appreciation of Smith’s idea(l)s. This is relevant in a wider context in light of the clash of worldviews we currently observe in our global society, whereby those idea(l)s are under threat.

Outside of traditional economics, scholars in a series of fields associated with cognitive science highlight the interaction of mind, body, and environment to understand better the nature of the world. We’ll offer a few examples shortly. First some background.

Cognitive science is the multidisciplinary field most closely associated with studying mind-matter interaction. Hofstadter (2007), for example, introduces the notion of the human brain as a ‘strange loop’—a mechanism where mind and body interact in a complex feedback loop. We’ll return to him in Section 7. Traditionally, philosophy of mind is focused on mind-matter interaction, including the related mind-body or consciousness problem. Increasingly, however, other cognitive disciplines are tackling this, making neuroscientists Koch and Tononi conclude that “the study of consciousness is becoming a science” (2015).

From philosophy of mind, Clark was one of the first to suggest that “the frontiers of . . . economics may turn out to border rather closely on those of . . . cognitive science . . . There is clearly much to learn. Perhaps we should learn it together” (1996, p. 288). He subsequently developed his Extended Mind Thesis which forms an important element of our view. It is nicely captured in the legendary question of his seminal 1998 paper, co-authored with David Chalmers: “Where does the mind stop and the rest of the world begin?” (Clark and Chalmers,

1998, p. 7), which we like to paraphrase as “Where does the investor’s mind stop and the rest of the market begin?”

From Sociology of Finance comes the concept of ‘performativity’. It examines how an idea, or model—once accepted or ‘proven’—can change common ‘practice’ in markets. MacKenzie (2003), for example, describes the gradual acceptance of theoretical option pricing models by traders in financial options exchanges; and then the sudden reappraisal of the details of those models after a market crash revealed a flaw in the models. Zaloom (2006), studying the open outcry ‘pit’ trading in Chicago’s commodities and futures exchanges, reveals a mind-body link between pricing and physicality, from her observations of how taller, more aggressive traders get trades done before others. The nature of how these exchanges operate has since changed, but her findings remain revealing.

At the interface of economics and (Freudian) psychoanalysis, Tuckett and Taffler (2012) describe how investors use stories or narratives by investors to give them the confidence (or ‘conviction’) to initiate and hold on to positions. Narratives in markets are not merely confined to investors seeking conviction. One of the most widely discussed topics in investing today is the use of social media for promoting narratives, disseminating (mis)information and co-ordinating traders (e.g. Barber et al., 2020). It is well understood that narratives can stimulate trading, which influences prices and can change business reality, and back again in a recursive pattern. Probably more important than narratives, however, is the innate origin and endogenous influence of price discovery which primarily involves numbers. Whereas Freud has not much to say about numbers, Jung has. His numerical archetypes—inspired by his friendship and collaboration with physicist Wolfgang Pauli—can be viewed as an early interpretation of the cognitive concept of “number sense” (Dehaene, 1997; for an investment perspective, see Schotanus, 2012). We mention this here also

because Smith expressed a view on numbers (see Section 3; we will return to prices in Section 7).<sup>7</sup>

From philosophy to Sociology of Finance to psychoanalysis, it is clear that researchers find complexity in markets that lies far beyond current mainstream models of asset pricing. The market's ability to seize and frame new ideas, to test hypotheses, to develop and promote narratives, and to engage in recursive loops is one of the striking similarities to the workings of the human mind.

Even within the financial economics literature, a series of recently published articles demonstrate the need to think beyond established theory and to consider the interaction between mind and market. For example, in 'The Benchmark Inclusion Subsidy' (Kashyap *et al.*, 2020) the authors "argue that a common practice of evaluating portfolio managers relative to a benchmark has real effects. Benchmarking generates additional, inelastic demand for assets inside the benchmark. This leads to a "benchmark inclusion subsidy": a firm inside the benchmark values an investment project more than the one outside. The authors quantify the size of the subsidy (which could be large) and identify empirical work supporting their model's predictions. Their finding "overturns the standard corporate finance result that an investment's value is independent of the entity considering it." Thus, an idea (that of 'market indices') leads to a process (comparing portfolio performance to a benchmark index) that affects asset prices, cost of capital and project selection, such that they diverge from the expectations of established finance theory.

In 'Flow-Driven ESG Returns', Van der Beck (2021) shows that "the performance of ESG investments is strongly driven by price-pressure arising from flows towards sustainable funds, causing high realized returns that do not reflect high expected returns." He finds that:

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<sup>7</sup> For a general overview of the connection between psychoanalysis and Adam Smith, see Özler and Gabrinetti (2017).



“empirically, withdrawing 1 dollar from the market portfolio and investing it in the representative ESG fund increases the aggregate value of high ESG-taste stocks by 2-2.5 dollars” and argues that “while the low aggregate elasticity of substitution is worrying for the overall stability and efficiency of equity markets, it supports the effectiveness of impact investing. Flows towards green funds, that invest in cross-sectionally inelastic stocks, substantially reduce the cost of capital of the firms in the fund’s portfolio.” Once again, an idea (in this case, ‘ESG investing’) leads to developments in investment processes that cause asset prices to diverge from those expected by established theory.

Mainstream asset pricing theory can only *explain* such divergences as ‘temporary anomalies’, or perhaps ‘exogenous shocks’. This need not be incorrect, but for those seeking to *understand* how assets are priced in practice, it is unhelpful. Moreover, mainstream thinking also portrays divergencies as ‘frictions’ or ‘distortions’, perpetuating the benchmark of perfectly competitive and fully-informed markets. In contrast, by considering where mind and market interact in comprehensible ways (such as with index inclusion or flows to ESG funds), we gain a better understanding of asset pricing in practice. Furthermore, this approach allows us to see the interaction between asset prices, a firm’s cost of capital and subsequent project selection in the physical world. This is a far ‘richer’ way of thinking, and—as Van der Beck suggests when referring to green impact investing—could reveal the precise mechanisms by which asset markets help mitigate climate change, one of the ‘big issues’ of our time.

Whereas other heterodox asset pricing theories, such as the Adaptive Markets Hypothesis (Lo, 2004) can accommodate the index inclusion and ESG flows phenomena above, the MMH provides an understanding of the (cognitive) *drivers* of the phenomenon animated by consciousness.

Next, we briefly target two papers which exemplify how Smith is often misinterpreted and, in a way, sometimes hijacked to support a self-serving agenda.

### **3. Smith, the Neoclassical View**

While there have been many (neo)classical comments on Smith (for an overview, see, e.g., West, 1978), the general consensus is that most embraced the best-known principles underlying WN. However, that embrace often squeezed out the more nuanced view of Smith.

The first featured article, by George Stigler (1976), emphasises the (neoclassical) conviction that Smith was all about competition and selfishness, while disregarding what he emphasised—particularly in TMS—as counterbalance: the importance of cooperation, empathy (or “sympathy” as he called it) and justice.

Stigler claims, for example, that Smith’s success was due to “one overwhelmingly important triumph: he put into the center of economics the systematic analysis of the behavior of individuals pursuing their self-interest under conditions of competition. This theory was the crown jewel of *The Wealth of Nations* and it became, and remains to this day, the foundation of the theory of the allocation of resources” (1976, p. 3). In contrast, Smith stated that “to restrain our selfish, and to indulge our benevolent affections, constitutes the perfection of human nature; and can alone produce among mankind that harmony of sentiments and passions in which consists their whole grace and propriety” (TMS, p. 31).

Our issue with Stigler’s perspective is that he extracts selectively from Smith to reinforce an economic paradigm that Smith would regard as unbalanced and lacking in a richness that he appreciated and described in his works. It concerns two items: competition vs cooperation and academic thought versus public thought.

On the first point, Smith’s balanced view includes the importance of cooperation and early on in WN he states: “In civilised society man is at all times in need of the cooperation

and assistance of great multitudes” (WN, I, ii, p.22). This nuanced interpretation was later echoed by Alexis de Tocqueville when he spoke of “self-interest properly understood”. We like to add our complexity, i.e. synergetic, argument to it, particularly relevant in a market-setting, via coordination dynamics:

synergy refers to the combined effects that arise from interdependence among parts and processes in a given context that are not possible or achievable from those entities acting alone. A strong case can and has been made for functional synergies as the drivers for the evolution of cooperation in complex systems. (Kelso, 2022, p.2)

In more popular terms, in all games there is dependency and a need to cooperate by playing according to some mutually agreed rules. You can’t compete if you don’t have a competitor, who is your “friendly enemy, the necessary adversary” in the words of Zen Master Alan Watts (“The Taoist Way”, undated). Markets involve both competition and cooperation, between which there is often a fine line, e.g. former competitors merge.

On the second item, Stigler judged Smith’s success in terms of his “impact...on other scholars, not his impact on public thinking or policy.” Stigler thus tries to separate Smith’s scientific contributions as an economist from contemporary applications of those contributions to public policy. In contrast, Friedman (1977), for example, treats Smith’s contributions to economic science as inseparable from his contributions to politics. As others have also commented, Smith’s invisible hand was not just a metaphor for the price mechanism. It also was a political statement about limited government and the superiority of entrepreneurship and private enterprise (later [and less politically] expanded upon by Schumpeter, and Drucker, for example).

Finally, Stigler arguably reflects ‘physics envy’ when he describes self-interest as “Newtonian in its universality” (1976, p. 22). What follows from this perspective is mechanical economics. Smith, however, seemed to embrace a more nuanced view of the pricing system than that of a purely mathematical device: “Number, considered in general . . .

is one of the most abstract and metaphysical ideas, which the mind of man is capable of forming” (TMS, p. 418). On that note, Smith regularly makes (implicit) dualist distinctions between the mental and the material domain. It is something most of us do, which Hayek called “practical dualism” (1952, p. 191). For example, Smith distinguishes between “passions . . . from the body” (TMS, p. 35) and “passions . . . from the imagination” (Ibid, p. 39). Stigler himself makes several comments which reveal dualist tendencies, e.g. “Investments in what we now call human capital do not become incorporated in a *tangible* saleable commodity. . . [but lead to] . . . new *knowledge*” (Stigler, 1976, p. 10; emphasis added). And “the *psychological* cost of performing an hour of [physical] labour is more stable, in its significance to a person, than the *psychological* pleasure from the [physical] consumption of some bundle of good” (Ibid, p. 13; emphasis added). This is interesting because dualism is inconsistent with mainstream’s worldview—following the physical sciences—of “mechanistic monism” (Knight, 1925b, p. 251). We have discussed these and related issues previously (e.g. Schotanus, 2022) and will not do so here.

In summary, Stigler simplifies Smith’s findings and proceeds to frame it in support of his world view, while ignoring the broader cognitive economics perspective offered by Smith.

#### **4. Smith, the Behavioural View**

The second featured article, by Ashraf et al. (2005), emphasises the behavioural conviction that Smith's “impartial spectator” equates to “System 2” of dual-system or dual-process thinking, the most prominent theory in behavioural economics (see, e.g., Kahneman, 2012). For example, the authors argue that:

Adam Smith’s psychological perspective in *The Theory of Moral Sentiments* is remarkably similar to “dual-process” frameworks advanced by psychologists . . . , neuroscientists . . . and more recently by behavioral economists . . . , based on

behavioral data and detailed observations of brain functioning. It also anticipates a wide range of insights regarding phenomena such as loss aversion . . . , willpower and fairness . . . that have been the focus of modern behavioral economics. (Ashraf et al., p. 132)

But this type of suggestion also simplifies Smith's work and ignores his wider perspective (see also Dow, 2010, p. 254; for an updated general perspective, especially on the impartial spectator [who we'll discuss below], see Shin, 2015).

At this point we would like to briefly say something about consciousness. It is sufficient for our purposes if we accept consciousness as real and as a capability that distinguishes us from other animals and machines. In short, humans are sentient beings: they are exceptional in being able to appreciate 'what it is like' to undergo experiences, especially in a qualitative or phenomenal sense. Examples from daily life include feeling the hurt of pain, seeing the red of a tomato, and hearing the mellow sound of a piano. Translated in an economic setting, examples include feeling the hurt of a losing trade, seeing the red of falling prices on screen, and hearing the bullishness in the voice of a client. For our purposes it is perhaps helpful to think about consciousness as an additional "system" or overlay to dual-process thinking. Specifically, whereas our unconscious forms "System 1" (S1, for "fast thinking") and our deliberation forms "System 2" (S2, for "slow thinking"), we might think of our consciousness as forming a derivative "System 3" (S3) to experience such thinking (its phenomenality) and feedback upon it (see also, e.g., Evans, 2018). There are a number of arguments to advocate an overlay "System 3". One comes from complexity theory—think of the contribution by Kurt Gödel—which teaches us that any system (in this case our S1/S2) cannot be understood from within itself. A related argument is more intuitive: how can we compare and judge S1/S2, including any outcomes from their fast, respectively slow thinking if we not first become aware of their distinctiveness. In other words, being emotional ("S1") feels completely different from being rational ("S2") and this offers complementary information over and above these sub-states.

In TMS, Smith himself actually suggests that there is a kind of S3 in the form of “immediate feelings” or “sensations”. He specifically states that “moral sense” or “(dis)approbation” can only indirectly be judged via reason while, importantly, they originate from direct experiences: “it cannot be reason [i.e. S2] which originally distinguishes those different *qualities*, but immediate sense and feeling [i.e. S3]” (p. 377; emphasis added). In other words, morality’s qualities of ‘right’ versus ‘wrong’ is a matter of S3. On that note, our dispute particularly involves the fact that the impartial spectator is all about “fellow feeling” and “sympathy”, i.e. empathy. So, the impartial spectator—applying Theory of Mind (ToM)—recognises particular (and very diverse) mentalities rather than ‘reasons’ them away in standard logic. We will return to this shortly. Another experiential example is imagination, which plays an important role, especially in relation to “sympathy”. To wit, in dualist terms, it emphasises the mental origination of sympathy which often is not equal to the real (physical) situation of the person we feel it for (e.g. p. 16). As indicated above, we can view S3 more generally as reflecting on/being conscious of (outcomes of) S1 and S2. Arguably, we can only distinguish between dual processes by experiencing what it is like, for example, to be emotional (S1) compared to what it is like to be rational (S2). In fact, Ashraf et al. even acknowledge that for one of the most important behavioural biases Smith “displayed an acute awareness of loss-aversion as an *experiential* phenomenon” (2005, p. 132). In short, S3 could thus be called a ‘phenomenal’ or ‘feeling’ system.

And yet, Ashraf et al. equate Smith’s “impartial spectator” with S2: “The Theory of Moral Sentiments is packed with insights . . . using the dual-process framework of [respectively] the passions [S1] and the impartial spectator [S2]” (2005, p. 132; text in brackets added for clarity). This despite the fact that Smith talks in cognitive (i.e. impression) terms about the need for the impartial spectator to “enter into” a sentiment, underlining that it is about its ‘interiority’ (i.e. as experienced). For example, reason may then be needed to

correct any “excess” or “deficit” to the level where the impartial spectator can “enter into” the respective sentiment. Also, at the collective level he is talking (via sympathy) about intersubjectivity.

Smith observed and understood people as human beings, rather than *homo economicus*. He appreciated the role of self-interest, which has been taken up by neoclassical economists in the form of ‘rational man’. He also observed departures by individuals from economically optimal or rational behaviour, and these observations have been taken up by behavioural economists, who have designed research questions, experiments and empirical studies to describe better the behaviour of individuals. But Smith went further still: he described an economy as a complex, adaptive system (even though complexity theory was not available then).<sup>8</sup> He knew that, when observed, an economy revealed a form of collective intelligence, an endogenous ability to adapt and reshape itself in a way that appeared beyond the ken of any individual, or any mechanical thought process. His insight was so profound, that it is unsurprising that other fields took from Smith. In biology, for example, Gould acknowledged that natural selection “is, in essence, Adam Smith’s economics transferred to nature . . . Reproductive success becomes analogues to profit” (2002, p. 122; see also McCloskey, 1983, p. 487).

Both the neoclassical economists and the behavioural economists fail to take Smith in his entirety, instead leaving us with a diminished, partial understanding of his story. By ignoring, for example, his views on empathy, morality, and aesthetics, they claim, and then interpret, Smith’s ideas selectively for their own agendas. Such reductions do no justice to his writings which are complex, nuanced, and wide ranging.

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<sup>8</sup> See, e.g., Balland et al. (2022).

## 5. Smith, the Cognitive Economist

Cognitive economics (e.g. Chater, 2015; Johnson, 2019; Mulgan, 2017) is an emerging heterodox theory that complements but also challenges mainstream economics. It partners cognitive science with economics, each offering explanations to the other. Cognitive science teaches economics about mentality (present in markets; e.g. herd mentality), whereas economics teaches cognitive science about market forces (present in minds; e.g. your unconscious S1 competing with your deliberate S2). As we have explained elsewhere (Schotanus, 2022), combining these culminates in a reflexive two-way premise: market-as-mind, respectively mind-as-market. Its shared Market Mind principle is intelligent (and sometimes conscious) self-organisation—especially resource allocation—via (ideally spontaneous) market dynamics, like competition~cooperation<sup>9</sup>, consumption~production, demand~supply, risk~reward, discovery, exchange, valuation, etc. This principle is not fail-safe: sometimes there are imbalances, excesses, and other unhealthy conditions, both in minds and markets.

Regarding the mind-as-market, for example, in TMS (p. 63) Smith describes “that great purpose of human life which we call betterment of our condition” as (the amount of) “sympathy” for your mental state paid via (the amount of) “attention of the world”. This can freely be interpreted as probably the earliest version of mind-as-market, especially its shared aspects: sentiments being valued via intersubjective awareness.

The MMH (e.g. Schotanus, 2014; Schotanus, 2016) informs our interpretation of cognitive economics which justifies viewing Smith as the first cognitive economist. It primarily focuses on the other aspect, i.e. market-as-mind. Technically, the MMH states that the market—embodying interacting humans and their technologies—not only distributes and

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<sup>9</sup> We borrow the tilde or squiggle symbol of coordination dynamics to emphasise the complementarity of these forces.



shares their knowledge but also intersubjectively extends their conscious minds, thereby manifesting collective consciousness. Prices and their patterns are the informational signatures of this, with market mood—varying from despair to exuberance—as its phenomenal experience in real time. In more popular terms, the MMH formalises what investors have always casually referred to as ‘the market’s mind’ (e.g. Neill, 1931, p. 222; Soros, 1987, subtitle). In cognitive terms, they implicitly apply Theory of Mind (ToM) and other concepts to understand Mr Market, for example.

Connecting the market’s mind with its invisible hand, Tooby and Cosmides argue that “Natural selection’s invisible hand created the structure of the human mind and *the interaction of these minds is what generates the invisible hand of economics*” (1994, p. 328; emphasis added).

More generally, there are profound connections, including similarities, between markets and minds. They reach far beyond, for example, the rationality of the Rational Expectations Hypothesis (REH; see, for example, Muth, 1961) or the biases and heuristics that behavioural economics has highlighted (e.g. Kahneman, 2012). It is not that these hypotheses or observations are *incorrect*, but instead they are incomplete, inconsistent, and/or of limited assistance in understanding how markets actually work. On rationality, for example, you cannot have it both ways: argue (as per the EMH) that information is instantly interpreted and integrated in (adjusted) expectations, but then argue (as per behavioural economics) that such interpretation—via S2—takes time and involves “slow thinking”. Arguably, the ‘limit’ of S2 thinking is perfect, instantaneous expectations/price setting. In practice, S2 thinking is slower than instantaneous, and some thinkers will make errors, whereby—as per the MMH—such errors will not always be independent in a mentally-connected, intersubjective world with shared knowledge and narratives.

To wit, the MMH emphasises consciousness which embeds human mentality in general and knowledge in particular. Knight, for example, states that “*Communication between consciousnesses* is the fundamental fact of knowledge and the nearest we can ever get to an “ultimate” in human experience” (1925a, p. 381; emphasis in original). This “ultimate” experience is empathy (as per Smith) or more broadly intersubjectivity, as described by Yuval Harari: “The intersubjective is something that exists within the communication network [e.g. the market] *linking the subjective consciousness of many individuals*” (2014, p. 117; emphasis added).

In raising the crucial issue of mind-matter interaction (including mental causation) and arguing against a mechanical view of markets, we can draw on Popper, from his paper on the mind-body problem:

There is no reason (except a mistaken physical determinism) why *mental* states and *physical* states should not interact . . . If we act through being influenced by the grasp of an *abstract relationship*, we *initiate physical causal chains which have no sufficient physical causal antecedents*. We are then ‘first movers’, or creators of a physical ‘causal chain’. (1953, para. 6.3-6.4; emphasis added).

We emphasise “abstract relationship” here because price is such a relationship: a number that establishes an exchange between a buyer and a seller. Specifically, a price states the ratio in units between what is paid and what is received in return. While it suggests agreement on costs, in investing it also implicitly reflects disagreement on that famous (future) ‘value’ (in the eye of the beholder). Moreover, a price is usually paid in a fiat currency which, essentially, is a mental construct itself which relies on trust but is intrinsically worthless. Financial derivatives, like futures and options, add another layer of abstraction to this. In sum, a price can “influence” the “act” of exchange involving some physical good(s), thereby initiating “physical causal chains”. We will return to the role of prices as numbers in Section 7.

To conclude, the recent revival in interest in Smith's ideas is welcome. In the process it seems his insights are increasingly well understood by many. It is just that orthodox financial economics has yet to incorporate cognitive concepts like empathy and intersubjectivity properly into its worldview. We suspect Smith would be disappointed to see that, instead, some economic scholars selectively took (or continue to take) components of his thinking in support of a narrower world view.

## **6. Research and applications**

As per our research manifesto (see Appendix), properly dealing with economic and investment issues depends on correctly identifying the central underlying problem. That is the motto of our research programme which aims, via projects and practical applications, to put empirical meat to the theoretical bones of the MMH. It locates economics' central or "hard" problem in the complex mind-matter interaction at both the individual and collective level. A nested sub-problem is what we refer to as the market's mind-body problem, although for our purposes here we will equate the two. Elsewhere (e.g. Schotanus, 2022) we discuss this in more detail, so we only provide a summary here.

To wit, the MMH allows us to critically assess mechanical economics from a cognitive angle, particularly the consequences of treating (collective) mind-bodies as machines. In explaining his concept of reflexivity, Soros argues that "treating drug addicts as criminals creates criminal behaviour. It misconstrues the problem and interferes with the proper treatment of addicts" (2010, p. 10). Interpreted metaphorically, similarly treating a fallible Mr. Market as an automaton "creates" mechanical behaviour, "misconstrues" the hard problem, and "interferes" with "proper" price discovery as the culmination of society's wider chain of discovery. Moral hazard is but one of the consequences.

The term “hard problem”, aka mind-body problem, originates in cognitive science (e.g. Chalmers, 1995). Akerlof and Shiller’s “mental causation”<sup>10</sup>, Soros’s reflexivity, and earlier observations by Hayek (1952, p. 28), Mises (1957, p. 65), and Soddy (1921, pp. 5-6) all point to the elephant in economics’ room: its version of the hard problem. This concerns the perceived dualism at the heart of the economic system in general and the role of agents’ consciousness in particular. To hit it home, here is Knight once more:

The power of mechanistic logic over common-sense is great! But it does not extend to making the plain man deny that he and his fellows are conscious beings moved by conscious interests. Once more, one who denies the significance of consciousness is simply putting the abstract criteria of a logical system ahead of the fundamental principles [of psychophysical interaction] which form the only foundation for that system itself. (1925b, p. 253)

The original mind-body problem has bedevilled philosophers, scientists, and other researchers for centuries. Mind-bodies are peculiar in that regard. For example, they are subject to psychophysical laws: you jumped up because you experienced fear.<sup>11</sup> Machines, on the other hand, are subject to mechanical laws: the clock chimed (simply) because its long arm hit twelve. But the mind-body problem reaches into the general dichotomy between the mental world and the physical world more deeply.

Why is it a problem? Mind engages with matter as part of our survival in general, and to coordinate our behaviour in particular. However, there seems to be a gap in our understanding of their interaction. In other words, we do not exactly know the psychophysical laws. This especially concerns the nature of consciousness which, as we mentioned, is particularly manifested via phenomenality—peculiar feelings and sensations that affect (e.g. Panksepp, 1998) and complement any behaviour and thinking. Although not

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<sup>10</sup> “[W]e will never really understand important economic events unless we confront the fact that *their causes are largely mental* in nature” (2009, p. 1; emphasis added).

<sup>11</sup> For the purists: yes, it could be the other way around, but that is not important here. In any case, this type of detail and related issues will not be discussed in this paper.

infallible, we consequently experience a world that is frequently very distinct from the scientific clinical descriptions of it. This (inter)subjectivity adds a qualitative impression to any quantitative analysis of its state. While real it is also ineffable.

In general terms, dealing with the mind-body problem—let alone solving it—is about bridging this gap whereby the challenge is twofold:

1. In terms of theory: how to explain mind-matter interaction. This is appropriately called the “explanatory gap” (e.g. Levine, 1983) and is the traditional focus of cognitive science. In particular, *expressive* limitations (i.e. not able to express or capture mental qualities in quantitative vocabulary) lead to *explanatory* limitations (i.e. not able to explain mental qualities in quantitative terms).<sup>12</sup> For example, statistics quantify economic events after they have occurred (as static snapshots), not their real-time experience (which has duration; e.g. experiencing price moves).
2. In terms of practice: how to improve mind-matter interaction. Individual efforts, for example, include yoga, tai chi, and other contemplative practices. On a larger scale, such practical attempts are especially relevant for instances where multiple mind-bodies deal together with states of the world, often tackling problems that cannot be solved by an individual. This makes it the focus of cognitive economics. Recognising this is one of the distinguishing features of the MMH. Over time, in industry and science, humans created methods and tools (e.g. the telescope) to transform objects (e.g. planets) and materials in order to better ‘handle’ them mentally. More generally, economics is “a technique for controlling nature and bending natural forces and *materials* to the *will* of man” (Knight, 1925a, p. 373; emphasis added). A modern development is digitalisation/virtualisation to dematerialise physical objects (e.g. into digital assets held in decentralised ledgers).<sup>13</sup> The market and its price system have been crucial in these collective bridging efforts.

For the economic system the mind-body problem extends to the collective level, meaning that it involves the composite economic mind-body which consists of the interacting conscious mind-bodies of economic agents and their technologies, divided between the real and financial economies. So, when Alan Greenspan, in his famous 1996 “irrational exuberance” speech, talks about “the complexity of the interactions of asset markets and the economy”<sup>14</sup> it ultimately concerns the dualism of the psychological of the former and the

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<sup>12</sup> This is also what Hayek meant when describing practical dualism.

<sup>13</sup> Metaphysically, think Wheeler’s “It from Bit”. As an aside, it is likely that more bespoke and active investment management will be required in this domain, including thorough research.

<sup>14</sup> See also Claessens and Kose (2017).

physical of the latter. This macro level interaction confronts us—particularly those experiencing it as participating (dualist) agents—with the overarching problem. Keynes implicitly refers to it via (Descartes’) “animal spirits” which manifest as “waves of optimism and pessimism”. In basic terms it is captured in the following question: what is market mood and how do we account for it?

Perhaps the most important application of MMH, e.g. by adapting Hayek’s “practical dualism”, is that it enables a better understanding of market phenomena that are unexplained by mechanical economics. Reflexivity—the claim that (mental) perception and (physical) action recursively interact—is one such phenomenon. A simple example of reflexivity is where a share price rises to levels that require extraordinary assumptions to equilibrate to likely discounted future cash flows, and where share issuance soon follows. The firm is thus able to raise capital at a far lower cost of capital than its competitors and gains a long-term competitive advantage, leading to a better chance of corporate survival and/or superior growth. (In)famous examples from 2021 include the so-called ‘meme stocks’, including GameStop Corp., Bed Bath & Beyond, and AMC Entertainment Holdings Inc., where there were extraordinary share price increases in the absence of fundamental corporate news.<sup>15</sup>

The price patterns seen were consistent with those found in co-ordinated short-squeezes and/or speculative mania; and capital raises soon followed, providing new ‘low-cost’ capital to both firms. The ‘meme’ influenced the market price, which prompted share issuance and thus ‘shaped’ the future economic reality (which in turn would influence the share price, and so on recursively).

Reflexivity clearly has much to say about the interaction between asset markets and the economy, and yet this concept is not to be found in orthodox economic theory. Soros

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<sup>15</sup> Another situation where something “mental” (in this case, the promise of future acquisitions) has a tangible effect in the market (which may not materialise for “real”) is via so-called blank-cheque special purpose acquisition (or “Spac”) vehicles. For example, these shell companies accounted for a third of US IPO filings in the first half of 2020, but their bubble has deflated since. We will not discuss them here.

argues that the market cannot correctly discount (i.e. predict) the future because it is shaping it. Specifically, “financial markets [i.e. prices] can affect the so-called fundamentals which they are supposed to reflect” (Soros, 1994). Andrew Smithers, for example, agrees:

*Asset prices have an important impact on the real economy, and one which has often been denied, partly because they have no place in the neoclassical model and partly because asset prices cannot become overvalued according to EMH. But, once their importance is accepted, it explains why economic forecasts are not just fallible but must be so.* (2011, p. 3; emphasis added)

The Bank for International Settlements (sometimes referred to as ‘the central bankers’ central bank’) has its own interpretation of this phenomenon:

*Asset prices can be analysed to provide information to policymakers about market expectations as such, eg for future interest rates, exchange rates, etc. In particular, central banks can use short-term interest rates and derivative financial instruments to infer market expectations about the monetary policy outlook.* (Hördahl and Packer, 2007, p.15; emphasis added)

The previous section has highlighted some evidence suggestive of asset price misalignments and bubble-like behaviour. An important reason why policymakers should be concerned about such misalignments is obviously that they are associated with severe risks to the *real* economy. In trying to gauge such risks, it is important to understand how changes in asset wealth impact consumption (Hördahl and Packer, 2007, p.14; emphasis added).

Thus, prominent traders, economists and central bankers each acknowledge and consider the recursive interaction between asset prices and the real economy. The BIS even regards this as obvious. However, this does not equate to appreciating the complexity, let alone understanding, such interaction (especially as psychophysical in nature).

Other interactions are less obvious, but still widely discussed. Consider the process undertaken in setting the interest rate by the U.S. Federal Reserve. At its simplest, central bankers could adopt a formulaic approach (such as a ‘Taylor Rule’). They might also consider how interest rate policy affects asset prices. For example, an unexpected rise in interest rates might create an ‘inverse wealth effect’, inducing a recession which leads to

greater unemployment. Fed policy likely also influences inflation *expectations*: “The importance of expectations in creating inflation is the subject of controversy, but this certainly gives the Fed a strong incentive not to desist. It looks as though inflationary psychology is getting out of hand, so it behooves the central bank to counter that” (Auteurs, 2022a).

In practice, market participants (mentally) anticipate the Fed’s situation and can (physically) act by trading in such a way that they move bond yields and equity prices enough to forestall and impact the Fed’s actions. This phenomenon is reflexive in nature and is the narrative described by leading global financial journalists (see, for example, John Auteurs, 2022b). Mechanical economics has little to say about this market dynamic (indeed, cannot explain the phenomenon). Behavioural economics does a little better, observing the behaviour of certain market actors. AMH goes further still, but, of all the approaches, MMH provides the most complete description and explanation of the phenomenon. Nevertheless, as Soros and Smithers argued above, it remains impossible to make reliably accurate, explicit forecasts for inflation, interest rates, asset prices or economic output.

Other potential areas of research include the examination of instability that is not due to exogenous factors, such that we develop models in which changes in mood (not new information) can lead to substantially different outcomes (metaphorically, think of the tale of The Emperor’s New Clothes). Path dependency, which is not included in EMH, is another area of interest. Studies into price momentum challenge the EMH and could be fertile ground for the MMH to offer a better understanding of the momentum effect by including mood (see next section). Path dependency could also relate to the frequency of (and intervals between) bubbles and crashes, as well as to market behaviour that is associated with the types of actor present in markets at any given time, with prices influenced by the collective memory or learning of participants.



Is it possible for us to maintain different theories of asset pricing, or must one eventually prevail? In an exploration of how potentially conflicting theories about financial markets can co-exist, Phoa *et al.* (2007) explore radically different hypotheses of how asset markets work. They too discuss reflexivity, its position amongst financial theories, and its application to understanding trading in one of the world's largest asset markets: US mortgage bonds. The authors "make the case for an eclectic hermeneutics of financial markets, based on structuralist and post-structuralist methods", much as we argue for the inclusion of MMH to assist in understanding and interpreting financial market phenomena that are ill-explained by orthodox theory.

## **7. Limitations and open questions**

Cognitive economics aims to shift the paradigm for understanding how markets work, but, like all theories, would be strengthened by the rigour of hypothesis testing. Appendix 1 contains a research manifesto, which could lead to the development of testable hypotheses. Still, some readers will criticise the MMH for its lack of falsifiability. In our defence we invoke the words of Hayek (who was a friend of Popper):

while it is certainly desirable to make our theories as falsifiable as possible, we must also push forward into fields where, as we advance, the degree of falsifiability necessarily decreases. This is the price we have to pay . . . (1967, p. 29).

In turn, the EMH suffers a joint-hypothesis problem and thus can never be rejected properly. Experiments in behavioural economics reveal biases in individuals and groups, but struggle to scale these insights to the level of 'the market as a whole'. Thus, with inherent problems in rejecting or scaling existing hypotheses and observations, we must be open-minded in how we think about markets.

A further limitation of MMH is that, although it explains how markets work, it does not, *per se and currently*, make predictions for asset returns, or guide market participants on

how to invest. At first sight, the Capital Asset Pricing Model (CAPM), by contrast, makes an attempt at the former and does a better job at the latter. Specifically, proponents of CAPM and EMH may sensibly wish to own ‘the market portfolio’. In practice, the market portfolio of all assets is ill-defined (e.g. does it include collectibles or Russian government bonds?) and it is not ‘feasible’ in practice (e.g. a property cannot be owned by all investors when it is owned wholly by an individual). Instead, investors use proxies such as equity index funds. Once this happens, however, predators spring up to front run the re-balancing of index funds, or to exploit their predictability and need to trade. This predation is simple to understand, and profitable. For example, Chen et al. (2006) estimate that up to \$2.1 billion per annum is lost from funds that track the S&P 500 and Russell 2000 indices, due to predatory trading (including the short-selling of stocks ahead of demotion from an index) by those who anticipate the predictable actions of full replication index funds. Index predation is consistent with AMH and explained by MMH. Armed only with current economic orthodoxy, students of markets lack the tools to understand the market or the mind in all its richness: phenomena such as index predation, meme stocks or reflexivity can be described as ‘shocks’ or ‘anomalies’, but this is to use a stunted vocabulary for describing frequent, large-scale phenomena that diverge from the model.

But there is more to this, and here we arrive at the limitations of what we can say about prices. In his important critique of the CAPM—challenging in particular its assumptions of unlimited borrowing and unlimited short-selling—Markowitz concludes

that it is time to move on . . . [I]n the face of the empirical problems with the implications of the model, we should be cognizant of the consequences of varying its convenient but unrealistic assumptions. In particular, we should be cognizant of what more realistic assumptions concerning investment constraints imply about how we should invest, value assets, and adjust for risk. (2005, p.29)

At no time did this become clearer than a few years later during the GFC. As we state in the Appendix, the existential nature of Lehman’s collapse (and to a lesser degree those of other

systemic crises) was a key lesson. Mr Market is not an automaton and treating him as such (based on mainstream's mechanical worldview) has unintended consequences, especially regarding its endogenous dynamics within the economic system. This particularly applies to prices. So, moving on then, to what extent is the MMH (also) a theory of prices? What does it have to say about them, beyond what we already mentioned?

Price discovery and mood mutually influence. They are the market's own reflexivity (Mr. Market's self-reflexivity, if you will). Nevertheless, consistent with physicalism the EMH considers this as epiphenomenal and not relevant. However, it raises certain questions that mechanical economics consequently leaves unanswered, for example regarding the momentum/mood feedback:

why do states of *optimism* lead to different choices than states of *pessimism*? Why when the market is *crashing* everyone rushes to *sell*, and when it is *growing*, everyone rushes to *buy*? (Bechara and Damasio, 2005, p. 362; emphasis added)

This returns us to our earlier interpretation of Popper's comment on being influenced by abstractions—i.e. prices as numbers. Their movement affects, to the point of impacting the (physical) fundamentals of the real economy. It is economics' version of the general “claim that something abstract—something non-physical, such as the knowledge in [e.g. prices] . . . —is affecting something physical” (Deutsch, 2011, p. 114).

Looking for the origin of such influence, often there is nothing but the number itself. We can clarify this by borrowing the “domino” thought experiment from Hofstadter (2007), in which a large network of dominos operates like a computer, depending on whether its input is a prime number or not. In his example, Hofstadter uses 641 (we refer the reader to his book for more details). The relevance for prices is that Hofstadter makes the following observation about the influence of specific characteristics of numbers. We are then:

not talking about anything physical at all. Not only has the focus moved upwards to collective properties of the chainium, but those properties somehow transcend

the physical and have to do with pure abstractions, such as primality . . . 641's primality is the best explanation, perhaps even the *only* explanation, for why certain dominos *did* fall and certain other ones *did not* fall. In a word, 641 is the prime mover. (2007, p. 38-39)

Deutsch explores this further by linking it to the mind-body problem (2011, p. 117).

The point for our purposes is that prices have similar intrinsic properties which affect events. While we do not know these, we like to label them anyway, often as narratives or even confabulations. So, while the comparison only goes so far, investors' "expensive" or "cheap" is like Hofstadter's "primality". And the S&P's Devil's Low of "666" in 2009 is like Hofstadter's "641".

In sum, prices—as abstractions—are not just an irreducible part of the psychophysical economic system. They also are the "prime movers" in an endogenous sense, i.e. the tail that is wagging the dog.

## **8. Summary and conclusion**

In this paper, we briefly analysed two economics papers to show how Adam Smith's work has been simplified and selectively used by some scholars to defend their own, narrower worldviews. We argue that Smith's thinking was broader than neo-classical or behavioural economics. It inspires our interpretation of cognitive economics.

Our wider aim is to contribute to the ongoing debate on revising economics' paradigm, away from its damaging mechanical worldview. The MMH offers an alternative psychophysical worldview which recognises the collective intelligence of Mr Market's mind (extending his invisible hand), while also acknowledging its flaws. It improves our understanding of markets, especially speculative episodes such as meme stocks or crashes (e.g. 1987, 2000-2002, 2008, 2020). "Something is wrong with the economics profession if events like those of 2008 do not change its thinking" (Summers, 2018). Smith teaches us to

think about cognitive economics and we have an opportunity to build on his early instincts and insight, for the betterment of economics and society.

There are many reasons why honouring and building on the wider thinking of Adam Smith is so appropriate and needed. The world is experiencing challenging times. Many of the freedoms, rights, and other benefits we enjoy as market-based democracies are under threat, especially from authoritarian regimes. These benefits—and the crucial “moral sentiments” they are based on—were a direct result of the Scottish Enlightenment, of which Smith is one of the luminaries and Panmure House stands as its monumental symbol, literally.

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## *Appendix: Research Manifesto*

### **Introduction**

This appendix briefly introduces our research programme in cognitive economics (CognEcon).

### **Research motto**

Properly dealing with economic and investment issues depends on correctly identifying the central underlying problem. That is our motto. We are particularly inspired by Arthur Schopenhauer's advice: "The task is not so much to see what no one has yet seen, but to think what nobody has yet thought, about that which everybody sees." CognEcon locates economics' central problem (see "Research problem") in the complex mind-matter interaction at both the individual and collective level. In short, like our own substrate, transmission in the economic system is psychophysical in nature. Following earlier comments—for example by Hayek (1952), Knight (1925), Mises (1957), and Soddy (1922)—Akerlof and Shiller (2009) hinted at this (i.e. "mental causality", p. 1) more recently, as did Soros ("reflexivity", 1987) and Sornette ("consciousness", 2003). But they didn't dig deep enough, whereas CognEcon takes us all the way down into the psychophysical rabbit hole to explore how minds and markets are related. This ultimately leads to the Market Mind principle: intelligent (sometimes conscious) self-organisation via market dynamics. This supports a reflexive two-way premise: mind-as-market and market-as-mind.

### **Research hypothesis**

While CognEcon will cover other related topics, it will be spearheaded by the Market Mind Hypothesis (MMH). The MMH primarily focuses on the second leg of the above principle. Specifically, it turns the idea of "the market's mind", casually expressed by numerous investors through time, into a thesis. Formally, the MMH states that the market, by embodying interacting investors and their technologies, not only distributes and shares their knowledge but also intersubjectively extends their conscious minds, manifesting collective consciousness. In ontological terms: compared to mainstream's mechanical worldview which offers a machine perspective of the economic system, the MMH offers a psychophysical worldview with a mind-body perspective. Translated in popular terms, Mr Market is not a voting or weighing machine, but a collective entity with a mind—warts and all. Consequently, mistreating him as an automaton is part of the (growing) problem.

### **Research problem**

The MMH identifies the central problem as economics' version of cognitive science's notorious mind-body or "hard" problem: understanding mind-matter interaction, i.e.

acknowledging consciousness, in markets. Specifically, it concerns the (perceived) dualism at the heart of the economic system in general—i.e. the ‘physical’ real economy versus the ‘psychological’ financial market—and the role of agents’ consciousness in particular. Among others, it involves epistemology, metaphysics, and ontology. It also is the source of radical uncertainty.

### **Research need**

The MMH highlights that mainstream economics—fixated by its version of physicalism, motivated by physics envy—denies/ignores this problem, making it the elephant in its room. Worse, with extended consciousness as its blind spot this leads to flawed thinking, in turn resulting in damaging mechanistic policies and practices. The LTCM, Lehman, and “Repo” crises hit this home via dangerous tail-wagging-the-dog dynamics but their existential lesson has not been learned. As long as we do not address this—as part of a larger revision of economics paradigm—society will suffer.

### **Research backing**

The MMH is backed and informed by various (4E) cognitive theories, in particular Clark’s theory on the extended (distributed) mind. MMH’s Market Mind principle underlies both minds and markets. Specifically, in terms of extended cognition it translates/turns around—what became known as—Clark and Chalmers’ parity principle into the following: market dynamics (e.g. consumption~production, competition~cooperation, demand~supply, risk~reward, discovery, exchange, valuation, etc.) are the processes that are universal and shared between minds and markets, i.e. they take place in both. As its metaphysical stance MMH adopts and adapts Hayek’s “practical dualism” (earlier already suggested by Knight [and by others, e.g. Wolfgang Pauli, elsewhere]). Finally, it subscribes to Chalmers’ “dual realisation” of information which, in our case, is applied to prices.

### **Research data**

The MMH worldview means that economic data will be investigated from a psychophysical, rather than mechanical perspective. To wit, prices and their patterns are the market mind’s informational signatures, while market mood—varying between depression (despair) and mania (exuberance)—is its phenomenal experience (via sentience) in real time.

### **Research projects**

CognEcon will host projects to investigate the economic system from a cognitive science perspective. These projects will, in particular, provide the empirical flesh to the theoretical bones of the MMH. It will also publish articles, papers, and reports, as well as organise events (e.g. lectures, seminars, and symposia). Finally, new methods and tools need to be developed. Some examples of (planned) research projects are available on request.